FLIGHT DECK III

A Pictorial Essay of a Day in the Life of an Airdale

WITH FIRST-PERSON COMMENTS BY EDWARD ATKINS

Since I am and was, literally, the only one involved in the creation of all aspects of this book, other than the fine work done by Kathleen Dyson designing its text-pages, I alone am responsible for any and all errors and gaffs such as misapplying words ("Brevity is the sole of wit" instead of "Brevity is the soul of wit"; a "grate injustice" instead of a "great injustice", etc.). Depending as I do on a magnifying glass makes difficult my picking up these foolish phonic errors. Also, it's an oxymoron to say a proofreading author: the book would never be completed. That being said, I hope and trust that this necessarily one-man volume will nevertheless be of beneficial effect to one and all. Now let's see how it goes.

ISBN 9780971013438

Edward Atkins
Ship-n-Planes Publishing Company
13705 Lakewood Court
Rockville, MD 20850

Printed in the United States of America

CONTENTS

Prologue iv

Preface v

1. Introduction 1

2. Images 4

3. Biographies 812

4. U.S. Constitution 818

5. Epilogue 829

Index 832

PROLOGUE

It's an axiom that with increased learning there's a commensurate increase in (earned) self-esteem. There then follows the axiom that what with earned self-esteem there is less (need to) bullying (where the contemptible scourge of bullying is the last refuge of the coward. [Not all cowards are bullies but all bullies are cowards. Who has ever heard of someone who has earned self-esteem being anti-social?] Yes, those who have respect for others are those who have the self-respect derived from knowing the joy of learning.

How then to engender and encourage this joy of learning? This joy of meeting and overcoming a legitimate challenge? It's been my firm conviction that lacking a genuine, abiding interest in a subject there will be little real, useful learning and all else will be but moot. The paraphernalia of education will be essentially for naught and good money will be thrown after bad money.

Therefore, how stimulate this genuine interest? This thirst for knowledge?One way would be to instill in the thought-processes the importance of a given subject. In my personal case I was "consumed" with the beauty and utter utility and usefulness of electronic equipment. For others it will be something else that catches and stimulates one's imagination. The "trick" here is to spread this exhilaration into many different paths (don't be a "Johnny one-note"). With the above in mind I have assembled mini-discussions of many and diverse subjects with a view of striking a spark in the consciousness of the reader that will blossom into full-blown academics and a thirst for knowledge. [Athletes don't get a pass here. As a matter of fact, their work-ethic gives them a leg-up in this endeavor.] It would be a veritable victory if a teacher could inspire a fascination in students in the subject at hand. To me that is the sine qua non, or a reasonable facsimile of, what a teacher should provide. Perhaps each class of instruction should begin with a brief but hard-hitting resume of the attributes of a given subject thus giving the student the "justification" for expending one's efforts on the road to knowledge. It would be, it should be, a brief but hard-hitting "pep-talk". Hopefully the following "resumes" will be the impetus for this (joyful) journey and the initial push to a satisfying and useful life (in engineering, overcoming inertia and friction represent a real barrier but once in motion much less energy is required to maintain that motion. I believe the same applies to learning). With this, let's roll up our sleeves and begin (after pointing out that this book, as well as Volumes 1 and 2, is dedicated to those brave men of the U.S. Navy who faced up to the furies of the enemy; why then cannot you show some bravery yourself in facing up to the challenges of acquiring academic knowledge that will benefit not only you but also society?).

PREFACE

In the large scheme of things, these three volumes of the "Flight Deck" trilogy concern a very small part of this country's military heritage. The point to be made is that it is the sum total of events that make up our common national heritage. And it is this heritage that should not be left to the fragility of an uninterested memory. To allow our common heritage to languish and then disappear in the the dustbin of unattended history is to do harm to that which binds us together as a great nation. Thus it shall be that this three-volume trilogy will do its minuscule bit to prevent part of our mutual heritage to all but perish from our mutual consciousness. This I believe would a sad situation for a proud country. Hopefully these three volumes will add to our mutual and beneficial edification. And further, we should cherish that which was good while trying to understand that which was demonstrably bad. (Here we have an intellectual exercise to differentiate the good from the bad as well as mediate what went on in between.) Finally, let's diligently try to conserve that "good" that preceded us. These find their expressions in such traditional examples such as George Washington's guiding hand and declining the authoritarian's mantel, Thomas Jefferson's eloquent call for freedom in the Declaration of Independence, James Madison's grand design of the U.S. Constitution, Thomas Paine's inspiring "give me liberty or give me death", Alexander Hamilton's promotion of capital creation and the means of production (where Jefferson was a proponent of agrarianism), or Benjamin Franklin's espousal of common sense found in his Almanac. These are but some highlights examples of the start of the heritage of our nation that has become the fulfillment of many of the best of ideals. We are patriots all who contribute to the continuing success of this grand country "from sea to shining sea". (In my own personal ancestry I'm proud of having as my great grandfather Paul Moody who, history has it, was the first person in this country to develop and integrate a factory with the machines of production to produce cotton fabrics. He was, by all accounts, the instigator of the industrial revolution in this country. (Little wonder that I am captivated by the operation of a factory floor full of automatic machine tools. Paul Moody has been enshrined in Lowell, Massachusetts, the site of his endeavors. Further along, my grandfather Edward Atkins was one of the first in the field of the nascent automobile industry by forming an electric car business. Next, my father Paul Moody Atkins was a Phi Beta Kappa from Yale and earned a PhD in economics from the University of Chicago while my mother, born in France (Charmonix and Paris), earned a Masters Degree from the University of Syracuse. Moving along, did I "drop the ball"? I sadly bow my head in the affirmation, especially since my father told meat age twelve that I should do twice as much as anyone else. Why, he didn't say.) We owe a great deal of debt to people of stature that form a n important part of our heritage.

Our heritage, let us honor, cherish and conserve t that which is good as so deemed over time and let us learn from that which is not. Surely it is the heredity of this country of which we can be proud that binds us together "as one nation, under God, indivisible with liberty and justice for all". Our heredity should help us define that which is good and beneficial while also giving us a a useful guide and vision of the future. While we cannot expunge the past, we can certainly learn from it. (To paraphrase, those who forget the past are doomed to relive it.) A learned society is the bedrock of the solid society. It must be asked, "How can a democracy long last bereft of a citizenry that is knowledgeable?" Such a democracy fraught with ineptitude will certainly not flourish as is our want for our heirs. Would that everyone were proud of our nation's heritage. This respect for our heritage encourages us to strive for the best (where the striving and learning is an affirmation of life writ large.) To reiterate, since no democracy will long survive bereft of that solid foundation of an informed citizenry, and since informed choice depends on valid knowledge, I will attempt to "salt" this volume with the concept that to learn is to prosper and enjoy, and in sone cases to be overjoyed. This might be a shock to those who believe that the only real enjoyment is to be found primarily in the realm of the physical senses. However, the nonpareil of a satisfactorily functional society is the in the world of our mental attributes. Heritage and learning, learning and heritage, two of the pillars that made this country great. Though very, very small, this trilogy addresses part of our heritage in pictures that represent a very restricted segment of that heritage.

INTRODUCTION

The order of presentation of the pictures of this third volume is semi-random so as to presumably generate a sense of continuing curiosity as to what follows and a feeling of alertness not found so much as when the material is ordered into chapters as was done in volumes one and two (which was necessary to establish the discrete functions occurring on an active flight deck). This curiosity will hopefully enhance one's interest, the bedrock of the will to learn, the raison d'etre of these volumes. I've been told that these three volumes cover a subject that is new to 99out of 100 readers. If "newness" is a synonym for "interest" then "newness" will be a powerful stimulus in the generating the desire to learn. If I were to paraphrase the purpose of this trilogy, it would be "To Learn". To learn is to live; not to learn is to . . . . .

The pictures of these three volumes are basically of three types: photographic, soft-edged, and "painted". To my way of thinking, all are attractive in their own right and deserve equal time for perusal and also cogitation. While the text is useful for understanding the contents of a picture, it is to the readers' benefit to "place themselves in the picture" , immersing themselves both emotionally and intellectually in the action or inaction. In this way one will gain a fuller appreciation of that moment in time seen in the picture. For instance, its not just an aircraft ready to launch, but it's also the deafening roar of the full-powered engine as its propeller lashes the air into a frenzy of overpowering wind-blasts as the aircraft vibrates "straining at its leash". Mix all those elements together at one time and we have an intellectual picture of what's happening. Now add the varying range of emotions involved in this moment in time and we have a clearer but limited understanding of what the picture should tell us. The question arises: we see, but do we comprehend? Perhaps, yet only partially at best. They say that a picture is worth a thousand words.. Are even a thousand sufficient necessarily? (Parenthetically, with 1170 pictures in these three volumes we have 1,170,000 words with which to contend, plus another 450,000 words of text. Let's be frank though, it's not the number of words brought to the table but the attitude that the reader brings. Furthermore, this approach to looking at pictures should apply to any worthwhile pictures.) Sometimes the details of a picture are of most interest, but usually it's the entire presentation bereft of the details that is the most satisfying and edifying. One reason for this is that each picture can represents a story within a story within a story. Thus should we savor a picture rather than just regard a picture, especially if they portray a dynamic situation. Yet, who cares about the pictures in these volumes? Those who respect our country's most crucial, and critical, history, that's who. Is that you and you and you?

Well, let's consider why anyone should care about these pictures in these three volumes. First, following this section will be a recounting of the wartime exploits of one of our carriers, the U.S.S. Lexington (chosen partly because it was the site of many of the pictures in these volumes, as taken by the photographer Captain Steichen and his crew).* The Lexington was named after one of the first military encounters in behave of the creation of this country during Revolutionary times. Still, this begs the question as to why these volumes would attract anyone beyond their obvious historic content. For one thing, they are new to most everyone which makes them of immediate interest which interest in turn kindles the desires to LEARN. I'm not going to proselytize the merits of knowing the history of WWII. This should be self-evident e to all but the self-absorbed. However, I will say that it's thought to be important to convey to as many people as possible the huge ongoing effort involving several million combatants over the expansive Pacific Ocean. And whose events changed the world irreversibly. These pictures, and the text, might throw a new light, a new perspective, on this part of our nation's history. Being new it will presumably be interesting which interest will stimulate learning, the Rosetta Stone of living. (Not the least of reasons for the impetus to learn is that a knowledgeable society is a requirement for the upgrade that the tenuousness of a democracy always needs. It is this lack of appreciation, and the attendant lack of interest, in the world around us that is disturbing. How can we take for granted the wealth of interesting things that surround us daily? In a way this lack of interest is a travesty on life itself. This statement should be a wake-up call for those who take everything for granted. Why fritter away your time in trivial pursuits? And your intelligent enough to know what they are. If these books can do one thing, it is hoped that they will elicit and arouse a true sense of interest in the world around them leading to a real desire to learn. If this comes to pass, it will certainly be a happy outcome.

---

* The U.S.S. Lexington (CV-16) was one of thirteen Essex-class carriers to participate actively in WWII. Its record of action will be very briefly enumerated here to provide a sense of its contribution to the arduous task of rolling back the tide of enemy encroachment on a freedom-loving world in the Pacific arena. The Lexington arrived at Pearl Harbor on August 8, 1943 The dates of enemy action at various locations now follow: September 18, 1943 (Tarawa), October 5-6, 1943 (Wake Island), November 19, 1943 (Tarawa-Makin), December 4, 1943 (Kwajalein). On December 4, the Lexington was struck by a Japanese air-launched torpedo. It returned to Pearl Harbor for temporary repairs followed by permanent repairs at Bremerton, WA. It returned to action on March 18, 1944 (Mille-Wotje), then March 30, 1944 (Palau), April 1, 1944 (Woleai), April 21-25, 1944 (Hollandia),April 28-30, 1944 (Truk, the Japanese Pearl Harbor), May 1, 1944 (Pomape), June 11-30, 1944 in an ongoing large engagement at Saipan-Tinian), June 19-29, 1844 (Japanese Fleet was trying to deny these islands from the U.S. because the B-29 bombers could reach Japan from there), June 25, 1944 (Guam, adjacent to Saipan-Tinian), June 26, 1944 (Pagan), July 2-5, 1944 (Guam again), July 14, 1944 to November 8, 1944 (Central/Western Pacific)July 18-24, 1944 (Guam), July 26-27, 1944 (Palau), August 5, 1944 (Bonin Islands), September 6-7, 1944 (Palau), September 9, 1944 (Mindanao/Philippines), September 12, 1944 (Cebu-Lette/Philippines), September 12-18 (Palau), September 22-23, 1944 (Luzon/Philippines), October 10, 1944 (Nansei Shoto), October 13-14, 1944 (Formosa (Taiwan)), October 24-25, 1944 (Japanese Fleet) November 5-8, 1944

(Manila/Philippines). On November 4, 1944 the Lexington sustained a hit on the island superstructure by a Kamikaze suicide plane and soon after retired to Ulithi Atoll for repairs. December 11, 1944-January 6, 1045 (Western Pacific). December 14-17, 1944 (Luzon/Philippines), January 3-5, 1845 (Formosa (Taiwan)), January 6-7, 1945 (Luzon-Manila/Philippines), January 9, 1945 (Formosa), January 12, 1945 (Indo-China (Vietnam)),January 15, 1945 (Pescapore Islands), January 16, 1945 (Hong Kong), January 21, 1945 (Formosa), January 23, 1945 (NanseiShoto) February 10, 1845-March 4, 1945 (Western Pacific)February 16-17, 1945 (Tokyo), February 19, 1945 (Iwo Jima), February 21-22, 1945 (Iwo Jima), February 25, 1945 (Tokyo), March 1, 1945 (Nansei Shoto). On March 2, 1945 Lexington returned to Ulithi on its way to the Bremerton Naval Shipyard for routine overhaul. June June 13, 1945 ({eyte/Philippines & Wake Island), June 26, 1945 (San Pedro Bay/Philippines), July 19, 1945 (Tokyo), July 15, 1945 (Kamaishi/Japan & Hokkaido/Japan), July 16, 1945 (Tokyo), July 18, 1945 (Yokosuka/Japan), July 24, 1945 (Kobe/Japan & Kure Naval Base/Japan), July 28, 1945 (Kure Naval Base& Nagoya/Japan), August 9, 1945 (Honshu/Japan), August 13, 1945 (Tokyo), August 14, 1945 (Hyakurigahara/Japan), August 15, 1945 (Japan surrenders — at long last!)

The other carriers had similar "resumes" reflecting that long and arduous period in our nation's history. This was history spelled with a capital "H". The U.S.S. Lexington (CV-16) now is a museum ship (Corpus Christi, TX) as are the U.S.S. Intrepid (CV-10) in New York City, the U.S.S. Yorktown (CV-11) in Charleston, SC and the U.S.S. Hornet (CV-12) located in the San Francisco Bay area. The Lexington was kept in service the longest and so is the most modern of the four carriers. However, all of them had received major renovations after the war to such an extent that I would not feel "at home" on any of them. First, the flight deck was modified such that aircraft could be launched and landed at the same time by means of an angled deck at 12 degrees (the Antietam was the first U.S. ship to receive this modification). Then the deckedge elevator was moved to accommodate this change. Next, all the guns of all calibers were removed because of their ineffectiveness in the age of guided missiles. This change radically changed the island superstructure configuration, The interior of the pilothouse was widened and the radar/communication arrays in the superstructure were all but eliminated (also because of technological advances and tactical capabilities of the computer-driven AEGIS system. All interior spaces were upgraded to such an extent that I wouldn't recognize anything. The living spaces were"plush" comparatively speaking since fewer personnel were on board. Yes, the Lexington is a different ship from the WWII Essex-class carriers and their memory will only be satisfactorily retained through pictures such as provided in these three volumes. This is why I spent time and effort at the National Archives to gather part of our for all posterity.(the people at the Archives were all very helpful and courteous, for sure). One intense year of my life was spent on the "Flight Deck" and I wanted to retain those memories. While no one else could care about these images as I do, if they care even a little, that will be well and history will be serves.

INTO THE WIND, FULL SPEED AHEAD

As the carrier swings into the wind at flank speed to launch/land aircraft we have an over view which serves as a metaphor for the vastness that represented the magnitude of the U.S. Navy's ongoing enterprise against a tenacious foe that placed our country in unprecedented jeopardy during the first year of our participation in WWII. Though not entirely unexpected, the shock of the violence that initiated the entrance of the United States into WWII caused a summoning of our national purpose. (To have a purpose soundly held is to have an advantage greatly beneficial.) From up here on high that mighty ship below looks to be but a play-toy. However, reality has over 3,000 personnel crewing that miniature ship that packs up to 100 aircraft on board. Though docile and quiet in this view, when flight operations commence, "all hell breaks loose" (in the vernacular). It's not a place for the faint of heart. And sometimes the initials "F.D." do not stand for Fire Department, but rather, Flight Deck when things go amiss. Truth to tell though, this was not all that frequent yet, "Will it be THIS time, this landing?"

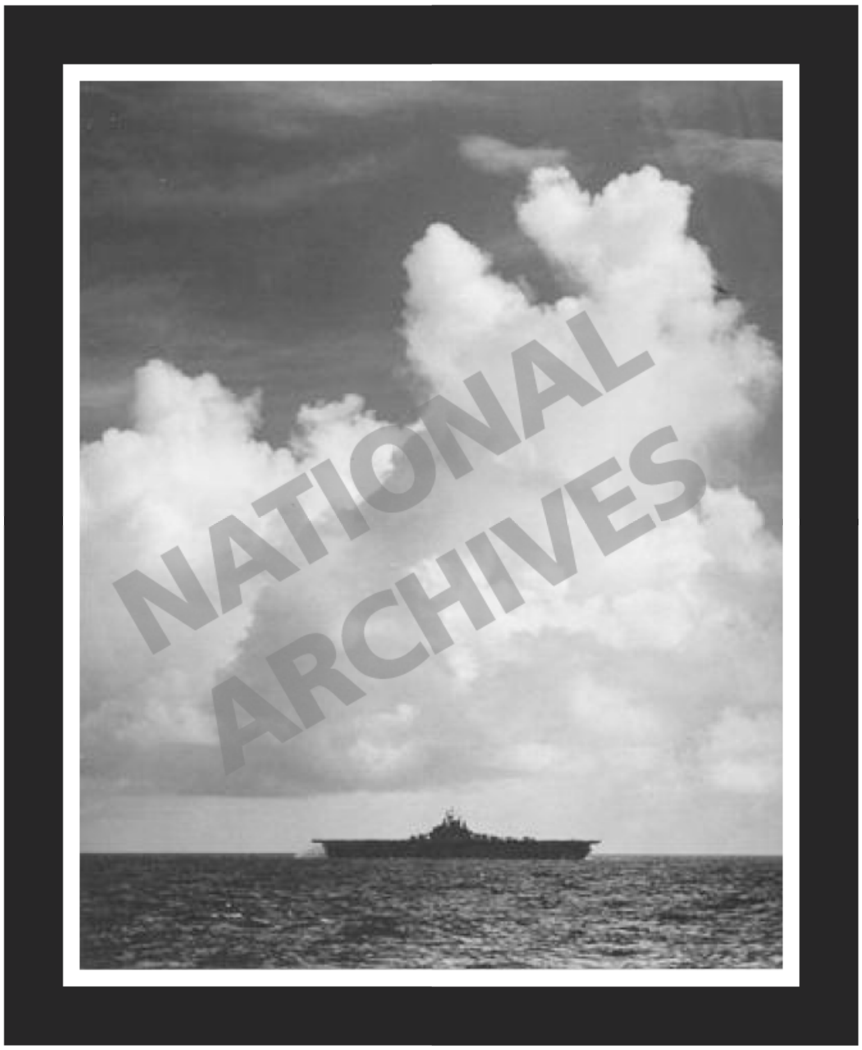
As said in the Introduction, this third volume will discuss, among other things, those items that surround us daily but which are also merely taken for granted daily even though they are what support us with a life-style of ease. I consider this attitude to be a rank lack of regard and appreciation for the efforts of many, many others who are responsible for the welfare of you and me (please, there will be no political, or theological, statements made in these volumes; there are certainly many books that address these two subjects and I tip my hat to those who willingly take on such contentious subjects; in doing so they tread where few can do so in a reasonable, rational and balanced manner, I would just say parenthetically that too many of them have a sharply defined agenda which I consider makes what follows moot). In the presentations to follow, I will address the general audience and not the experts. If the experts find faults in my presentations, I apologize. If the semi-informed do, then good for them. This will allow the more astute of you to make the mental corrections and in so doing it will engender alertness on your part, where alertness is a by-word for INTEREST. This interest will in turn energize you to turn the page to seek new challenges, the life-blood of learning. Thus the reader will not be reading about the "mundane" electric power system, say, but rather the reader will be "an explorer discovering the new and the exciting "an El Dorado" if you will. If I were to offer a young person some advice it would to treasure the ability and opportunity to learn things both new and old: new things to increase your repertoire and old things to augment that which you already think you know. We are after all what we think and not what we look like. This applies to me and thee and them and those over there and there. Finally, though said before, as it should, there will be no democracy without a well-informed citizenry, and that includes you and you.


NATIONAL ARCHIVES

THE MIGHTY ESSEX

As we approach the mighty Essex-class carrier from on high we are well aware that it is but a bauble as compared to the magnificent display of nature as provided by God-Almighty. I confess that I am often enthralled by the display of a sky filled with different kinds of cloud configurations as they are painted across the vast sky. But yes, Mother Nature can be a cruel tyrant on the sea as she churns the waters into a cauldron of wet fury. And yet She most often provides us with a panorama of sheer beauty overhead if we but look upward to enjoy this marvelous gift. My personal preference can be seen in these volumetric, billowing cumulus clouds such as these. This is a true glory. On board ship one had only to look up to dispel the, to disperse the dread of the noise, the, the conflict, the near-death that seemed to follow you wherever you went during a long launch or landing operation among those "unfriendly" and animated aircraft here on deck. But life goes on down there on the flight deck of this might Essex-class carrier., a magnificent and ingenious construct. (Throughout this book there will be unaccounted for shifts of tense from present to past to present. This is bad form but it suits my manner of presentation. For this I apologize.) Of course the ship is not a "bauble". It is instead an immensely complicated construct that contains many discrete systems such as the propulsion system, the electrical system, the radar system, the fire-control system (aims the anti-aircraft guns), the communication system, among others as well as all the requirements for a small sea-going city of over 3,000 personnel not to mention all the equipment to service and maintain a small combat air force of 100 aircraft.

Let's consider the communication as it applies to us. (This book will deal with the basics "to bring everyone up to speed" concerning the world around us.) When speaking, we generate compressions and rarefactions of the air-molecules. These in turn impinge on a thin flexible disk which, when "deformed" by the air-molecules, cause an electric current of fixed amplitude and high frequency (the carrier-wave) to vary in amplitude at the low-frequency of the sound-wave (voice-wave). This is called amplitude modulation. (Frequency-modulation uses a constant frequency carrier with the audio imposed on it to vary the frequency as represented by both amplitude and frequency. This eliminates the static caused by high-amplitude noise spikes.) At the receiver the audio low-frequency is stripped from the carrier (demodulated) and sent to a device similar to the microphone that generated the audio at the transmitter. This receiver is the earphone that you to hear the transmitted message where a flexible disk moves the air-molecules in consonance with your original vocalization.



A GATHERING OF THE EAGLES

It's been several hours over the wide Pacific and now it's time to come home. The pilots are weary of confronting the unknown, making the hazardous landings not uniformly without incident. The personnel on the flight deck below know this and feel the corresponding anxiety which shows in the body-language and grim facial expressions. The roar of the taxiing aircraft contribute to the mix of emotions. The "old" grizzled hands of landings past take this in stride, but what of the "still wet behind the ears" teenaged Airdales? Never mind, there's work to be done. Also there's something to be desired regarding this picture: while the aircraft over the bow of the ship is satisfactory, where is the aircraft that should be in the landing pattern "above" the stern of the ship heading to the left? It's assume that there's also another aircraft out of sight to the left, in a turn, about 20 seconds behind the landing aircraft. Whereas these pilots land with one hand on the control-stick and the other on the throttle, for some time now they land "hands off" by means of computer software and automatic controls.

"Everyone" knows that computer software is a program of sequential instructions that control the operation of a computer. Do they also know that each instructions consists of ones and zeros in a specific order? And that these instructions reside in a special memory unit from which an instruction, in its turn, is connected to a decoding unit by a counter. Thus instruction #1 is routed to the decoder which decodes the ones and zeros, thereby generating an electrical signal that, say, closes another path between a specific location in another special memory to the arithmetic unit. Instruction #2 might perform the same operation on the contents of another memory location. Instruction #3 might then be decoded to tell the arithmetic unit to add the two numbers in the arithmetic unit. This simple set of three instructions is performed in a millionth of a second and thus the computer responds to your mouse-click "instantaneously". Computer programs are written in user-friendly language which in turn is converted to assembly language which the computer, in a translation program, converts to a sequential set of instructions each of which consist of a uniquely sequenced set of ones and zeros. These instructions ordinarily contain both address and control data. Thus, "move (control) the data at location xyz (address) to the arithmetic register". Next, the counter increments to retrieve the following instruction and so it goes for perhaps a set of only 5 instructions or thousands of instructions. Furthermore, there can be programs within programs within programs within ... Simple concepts, fantastic results depending on the creativity of the programmer.

HOOK DOWN, FLAPS DOWN

While the hooks are down, the flaps remain retracted. When landing, the flaps will be distended from the trailing edge of the wing to provide added lift at the slower landing speed of 70 mph. But even here the velocity of these SB2C Helldivers seems to be fairly slow or the camera/film fairly fast to account for the "stationary" propellers. If one looks closely it can be seen that simultaneously one aircraft has just touched down on the flight deck, one aircraft just to the right of the superstructure is taxiing forward, and one aircraft is being parked up forward. Right now there are two green-shirts unhooking the just landed aircraft and "assuredly" there are a pair of Airdales running to this aircraft with wheelchocks in hand, a pair of Airdales accompanying the taxiing aircraft, one to each wheel, and a pair of Airdales at each wheel of the parking aircraft. However it should be said that what is missing are the aircraft playing follow-the-leader in the race-track pattern around the carrier at 100 feet as they queue up to come aboard the carrier. To me this is a glaring omission from an otherwise "neat" picture.

Elements of a picture can be missing as above but every element of a computer must be present and properly connected or else it's worthless as a tool to do useful work. Very briefly, a computer system consists of the input units (keyboard, mouse, etc.), output units (monitor, printer, etc.), central processing unit (CPU), main random access memory (RAM), and auxiliary read only memory (ROM). The CPU in turn consists of the local memory, the counter, the decoder, the arithmetic unit and the control unit. These basic units will comprise a functional computer system with the CPU being a one inch square chip consisting of conservatively a million transistors. These transistors are merely electronic switches that are either on or off (one or zero). Since a character (A, B, C, ...1, 2, 3 etc.) is made up of 8 bits on or off. The instruction to add the number in one location (address 5227) to the number in another location (address 6321) would total 8 x 9 = 72 bits, where the instruction is given by ADD 5227 6321. A transistor switch functions by applying an electrical signal to a terminal on the transistor. If the signal is positive (a one) the transistor is turned on and if the the electrical signal is negative (zero) the transistor is turned off. The fabricators of these computer chips have done a fabulous job in miniaturizing these chips so that millions of transistors can be put on a single chip. Since the distances between elements in the chip are so small and since electricity travels at the speed of light, operations can be accomplished in millionths of a second and even faster as technology evolves. Thousands of instructions are done in a wink.


T46
T
46

“PRETTY AS A PICTURE”

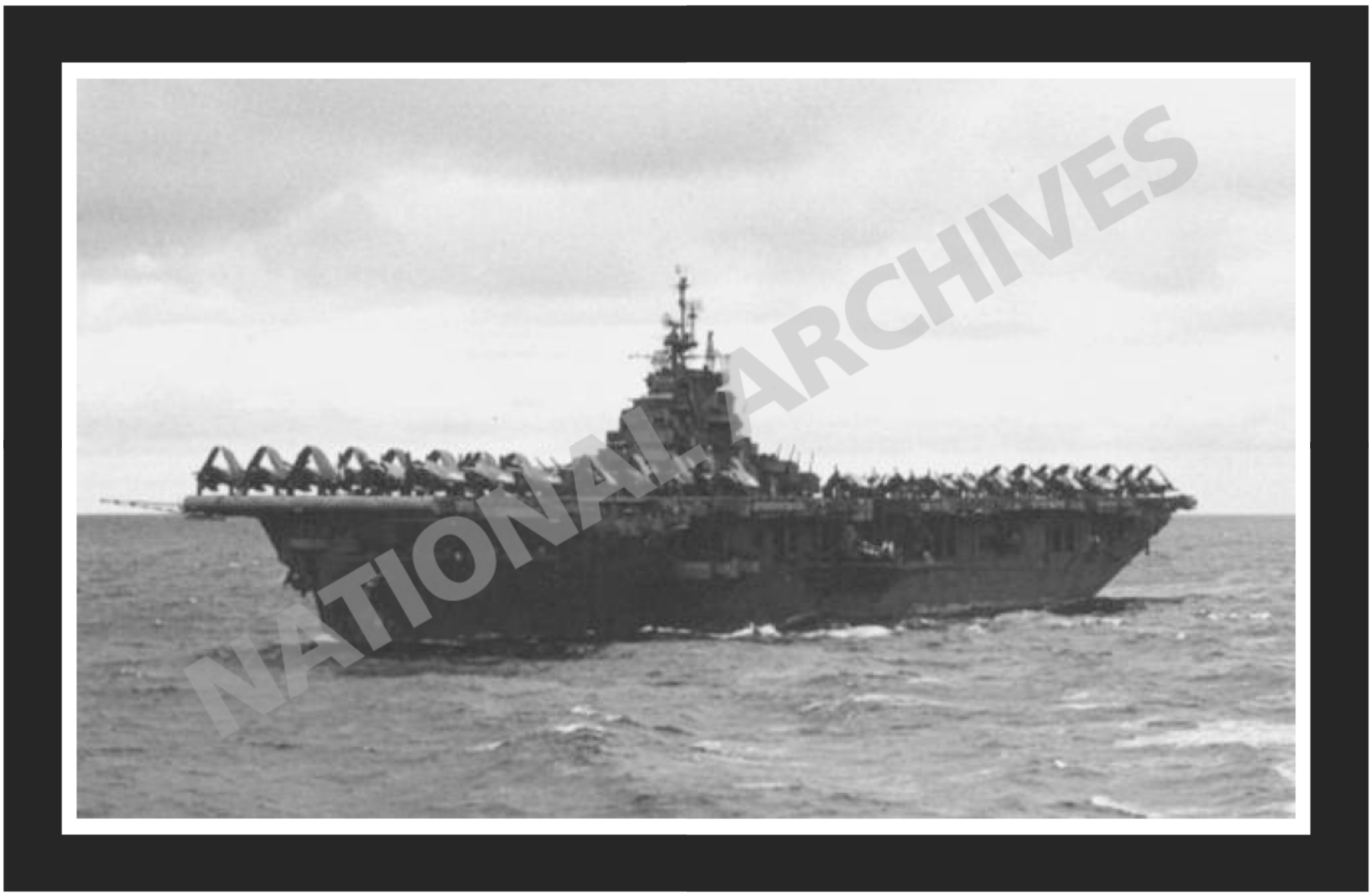
How can anyone say such a thing about a massive “dreadnaught”, the mighty Iowa-class battleship of yore? Easily so as depicted here in this picture. Essentially (and it’s the essentials that must precede all else) the beauty, if you will, is to be found in the stark and stately lines of the silhouette with the contrast of a backdrop of soft-edge, light-value clouds that makes for the impact of this dreaded conveyor of those fearful canons. To emphasize this impact notice that there are no distractions elsewhere except for that cruiser far in the distance to the right. Parenthetically, that cruiser is well within the range of the Iowa’s 16-inch guns but to the chagrin of the black-shoe Navy, their day is well past because the aircraft of the carriers (brown-shoe Navy) can carry bombs much bigger than are the projectiles of the 16-inch guns. The present-day Navy still has a full complement of carriers but in the future perhaps they too will be supplanted by missiles fired from afar. The answer of course is to cause the world to so well adjust itself that warfare will be of historical note only. (But again, no politics.)

How is this silhouette displayed on the computer’s monitor? Not surprisingly, very much as is a TV picture but with a static picture instead of a dynamic one. First, the monitor screen (Cathode Ray Tube CRT) consists of phosphor dots called pixels (picture elements). Usually there are 768 lines of 1024 dots across. These dots emit light in an amount as determined by the energy in the electron beam as it is generated by an electron-gun. This electron-gun sweeps the stream of electrons over each dot left to right, top to bottom 60 times a second to refresh the emission of light from each dot (called persistence). There are two pairs of coils around the neck of the CRT and an electric circuit to energize these coils to cause the electron beam to sweep the screen from top to bottom (60 times a second). The CRT has been evacuated of air to lessen the resistance to the electron-beam. We are all set now to apply a voltage to the electron-gun in consonance with the picture, a larger voltage for white values and less voltage for dark values. Since I scanned the picture to form a binary bit-map file, this file must first be converted to an analog format; that is, the ones and zeros of the file must be converted to a continuous voltage that represents the ones and zeros of the bit-map. The device that does this is called a digital-to-analog converter (DAC). Basically, the values of black to white are, say, o to 256. The number one is 000001, the number five is 000101, etc. The DAC is a decoder that converts a pixel of the ship, say 0000010 and a pixel of the sky, say 001000. All the pixels are stored in a special memory register, translated to a continuous analog value and then sent to the electron-gun. One final requirement: this action must be closely synchronized with the sweep-circuit.

"THE PAINTING"

Yes, though this is a photograph from the National Archives I consider it a painting because its lack of detail is consistent with a painting's prime purpose of presenting the essence of the subject-matter, first and foremost. This it does with a composite view, without detail, of the flight deck in its packed mode (to me very reminiscent of the Antietam's normal load). The prime message here is the packing-factor as seen most clearly by observing the four F4U Corsairs and two F6F Hellcats lined up at the very front of the flight deck. During launch operations such an arrangement is the Airdale's worst nightmare: how to proceed to a wheelchock when there is precious little space between the aircraft? But go they must do. Being a "painting" this picture is more evocative than descriptive to me. It in turn requires more contemplation, and this is good for building upon one's character, that defining stamp of oneself which one should guard scrupulously.

For those who think this picture to be too drab and dull, let's consider what causes a CRT monitor to present images in color. Building on what was said on the previous page, each pixel of the black-and-white monitor's screen is divided into three separate red, green and blue phosphor dots. Various values out of the red, green and blue electron-guns determine the brightness shown by a dot when struck by the electron-beam from that electron-gun. Millions of different colors are available from the pixel as determined by how much each red, green and blue dot was stimulated by the electron-gun. Now, there's a mask situated between the monitor's screen with its pixels and the electron-guns. This mask is placed very close to the screen. This mask, opaque to electrons, has a set of three very small holes directly opposite each of the three dots of each of the pixels. Each of the three holes is so precisely placed and the output of each of the three electron-guns are so accurate that the stream of electrons from the red gun only go through the hole opposite the red dot. The same applies to the green and blue electron-guns and their respective mask-holes. Thus, as the electron-beam is swept from left to right and top to bottom only the red dots are stimulated by the red electron-gun. The same applies to the green and blue colors. Of course the image to be projected must be decomposed into its red, green and blue components by the computer before these components are applied to the monitor. These three color-components are stored in a special memory register before being sent to the monitor. The above simplified description obscures a very difficult job of actually fabricating this marvelous device that we daily take so much for granted. Please, be appreciative. You owe it.


NATIONAL ARCHIVES

HOME AGAIN

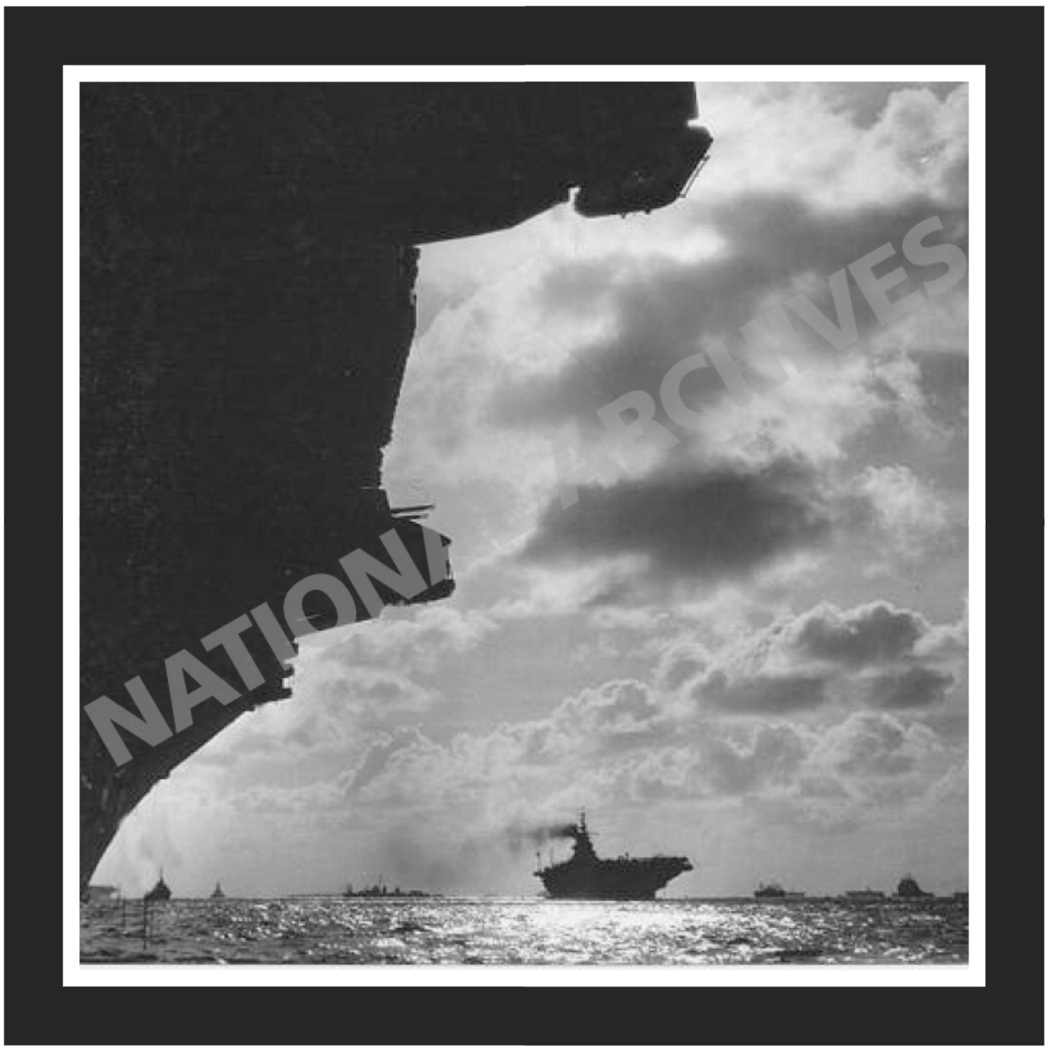
It's apparent that while "our" ship has just launched its aircraft "their" ship is bringing its aircraft home. This is done so as to keep constant pressure on the enemy forces. The lone spectator is sitting on the deckedge elevator as indicated by the safety netting . This looks like something I'd do but didn't because our accompanying carrier (either the Bon Homme Richard CV-31 or the Boxer CV-21) was always about 10 miles away and parallel to us. Why the large separation I don't know unless it was to make a less concentrated target to the enemy. Notice the activity on the hanger deck: as aircraft taxi forward and some of them are immediately taken down below to allow more space topside. One can only wonder what the spectator is thinking right now: "what a perfect landing" or "how soon to the next launch?' or "how best to reach that wheelchock" or "what is my girl thinking and doing right now?" or "will I ever see home again?" In any event I can vouch for that persistent yearning for home and at long last normalcy.

Then again, perhaps our loner is wondering about something more prosaic such as how radio transmissions can go from here to there. That is, how does an antenna work? Very briefly as are all of these small snippets, a radio-wave is generated when an alternating current is applied to a wire that is terminated unattached to anything else. Although there are many types of antennas, we will talk of only this straight wire strung between two insulted posts. The transmitter sends the alternating current to the antenna at a radio frequency of 550 kc to 1600 kc for broadcast purposes. As the current travels along the wire (antenna) an electromagnetic wave is generated around the wire (there is also an induction field of magnetic energy that remains close to the wire and is the means inducing a current in another wire, i.e., a motor-generator). However, the wire's electromagnetic field is radiated from it if the frequency is high enough. This is so because the direction of the current in the wire reverses before the field can collapse back to the wire. Thus at radio frequencies the electromagnetic energy continues outward (it is radiated). While receiving antenna can have non-critical sizes, the transmitting antennas of all types must be precisely calibrated to the frequency of the transmitting current. As the frequency goes up the wavelength goes down and the antenna correspondingly decreases in size (length). If these precise physical dimensions are not adjusted properly, transmitted energy is diminished. Antenna design is a large and very technical subject with many different types extant. Imagine, the air about us is awash with electromagnetic signals unseen by us.

THE SILHOUETTE

For those familiar with Volumes 1 and/or 2 my partiality for silhouettes is clear: the essentials of a picture are best captured by showing only the basics devoid of distracting details other than the outline. Here is seen the large overhang of the port side of the carrier as it frames the lines of one of those powerful Essex-class ships no matter how diminutively presented. (Diminishing people though is close to unforgivable.) The port side of carriers has a pronounced overhang to off-set the bulk of the superstructure. I increased the contrast of sky and ship for its dramatic impact though I don't ordinarily espouse drama in my own life (except in a quiet way). I suppose that year on the Antietam's flight deck was enough drama to last a life-time. For my part, it's the simple things that cheer me on even though I also thrive on learning "how things work". So, t o each his own. All is serene here in this safe harbor, but what of lurking submarines? At least if you're sunk here in a harbor there are other ships nearby to retrieve you from the water which is unlikely if you're sunk out to sea.

A computer transistor, an On-Off switch, is so small that a million of them will fit on a one-inch square chip of silicon (infused with other metals to form semiconductors—neither conductors nor insulators). This silicon/metal combination is applied as a vapor onto a mask/stencil to fabricate the entire chip at one time. Interconnections between transistors are done at the same time. There are two kinds; bipolar and field-effect. The former operates by controlling a "large" current by applying a small current to the junction of 2 sections that are respectively charged positively and negatively. The controlling current, when turned on, opens the path for the main current. The field effect transistor works essentially the same except that it is fabricated to open the Gate to the main current, from Source to Drain, by applying a voltage to the Gate. The transistor is used in all parts of a computer and obtains its versatility by virtue of the fact that it is a variable resistor able to control electric currents and voltages. Transistors are not only used in computers as switches but also as amplifiers, logic gates, decoders storage registers, control circuits, arithmetic circuits and even in the high voltage and high current power supplies of a computer. Sizes become smaller and smaller and speed becomes faster and faster. Radio circuits also come under its sway in the firm of analog amplifiers (though digital is replacing most analog circuitry). Without the transistor we wouldn't have the computer as we now know it. It's a small package but a giant in effect as witness all the many devices we carry on our person without the slightest pause. The chips are indispensable.



REVERSE VIEW

Now it's the battleship Iowa looking at the carrier, the same carrier with the four F4U Corsairs and two F6F Hellcats across the front edge of the flight deck. The battleships of the Iowa-class bristled with twenty 5-inch anti-aircraft guns, six of which can be seen in this view (recall that the Essex-class carriers carried twelve 5-inch guns for air protection). So it was that the black-shoe Navy defended the brown-shoe Navy (in addition to providing close-in bombardment support by shelling the shore-line as the marines embarked on their invasion of the many enemy-held islands in the Western Pacific). That was how it went out there: brothers-in-arms, one-for all, all for one. How much of that do we see in this dat and age? Perhaps much, perhaps little. If you look closely you'll see a group of sailors to the right in foul-weather gear which gives an indication of the conditions. Now magnify this by a factor of at least two and you'll understand a little bit better the way it was on the flight deck during flight operations. Miserable, and that's putting it somewhat mildly. But as people often say, "that's not as bad as such-and such (so what are you complaining about?). Touche'.

Have you ever wondered how it is that such a smooth printout is possible from your desktop printer? Since the pictures in these three books were produced by means of laser printing, several following pages will be devoted to explaining this remarkable technology. To begin, the "bitmap" must first be discussed. When I scanned the photographs at the National Archives I included the entire dimensions of the picture. For example, let's consider a picture 10 inches wide and 6 inches high I scanned the picture at 150 dpt (dots per inch) where a dot is a picture element (pixel). Since there are 50,625.dots in each square inch and since there are 60 square inches in the scanned photograph, there are 1.35 million dots (pixels) in this picture. Now the computer stores this picture-file as 1.35 million bytes where each byte is a computer character of 8 bits (a bit is a one or a zero, on or off). This byte in turn is required to represent a dot's (pixel;s) characteristics such as brightness and color. In turn, a byte can represent two to the eight different conditions (2x2x2x2x2x2x2x2=256 different conditions such as perhaps 50 unique brightness levels and 206 unique colors). These 1.35 million bytes are placed in a file and identified as "Picture #12, say. We are now set to process this file in the printer to obtain an excellent printout. But first it's necessary to send this file to a register in the the printer's own microprocessor. When this is done by the main computer's software we will then start the process of printing the image as seen in this book. To be continued.

A GATHERING OF GIANTS

Looking across the deckedge elevator we see two other Essex-class carriers. A gathering of giants as they seek safe waters after the rigors of the hazardous flight operations. It is now that a sailor is able to gain respite and if so inclined, reprise the ache oft love found, love lost. Back then the song that was the classic love ballad and best reflected these sentiments was Hoagy Carmichael's "Stardust". It is such a beautiful conjunction of words and music that I feel constrained to give voice to the words,: "[And now the purple dusk of twilight time, steals across the meadows of my mind, high up in the sky the little stars climb, always reminding me that we are apart. You wander down the lane and far away, leaving me a song that will not die, love is now the stardust of yesterday, the music of the years gone by.] Sometimes I wonder why I spend the lonely night, dreaming of a song, the melody haunts my reverie and I am once again with you , when our love was new , and each kiss an inspiration. Ah but that was long ago and now my consolation is in the stardust of a song, beside a garden wall when stars are bright, you are in my arms, the nightingale tells his fairytale of paradise where roses grew, thought I dream in vain, in my heart it always will remain, my stardust melody, the memory of love's refrain". Though this was probably the best ballad and an all-time classic, there were many other stand-outs of that genre, To someone who grew up with that music (even though our parents looked down their noses at the popular songs of the day) what passes for (popular) music today is, well, of rights hardly music. What ever happened to musicality? To melody? To meaningful, well crafted lyrics (if you can even understand what's been said)? (I'm afield here of the purpose of this book but for the record, "Stardust" is THE Gold Standard of a love song—at least in "my book")

A laser printer has five fundamental requirements: (1) interface its processor with the system's processor, (2) interpret the data arriving from the system's data register (the bitmap of the image), (3) control the paper movement through the printer, (4) sensitize the paper so it will cause the toner to adhere to the paper, (5) cause the toner to fuse to the paper. The system computer transmits the image bitmap to the printer's storage register (recalling that this bitmap specifies how much toner is deposited at each dot—a toner is a very fine-grained graphite powder). The printer's processor then VERY rapidly turns on and off a laser beam of light onto a rotating mirror. This mirror reflects the beam of light horizontally onto a cylinder, from left to right. Thus there are varying intensities of laser light across the surface of the cylinder (drum).


NATIONAL ARCHIVES

MEMORIAL DAY

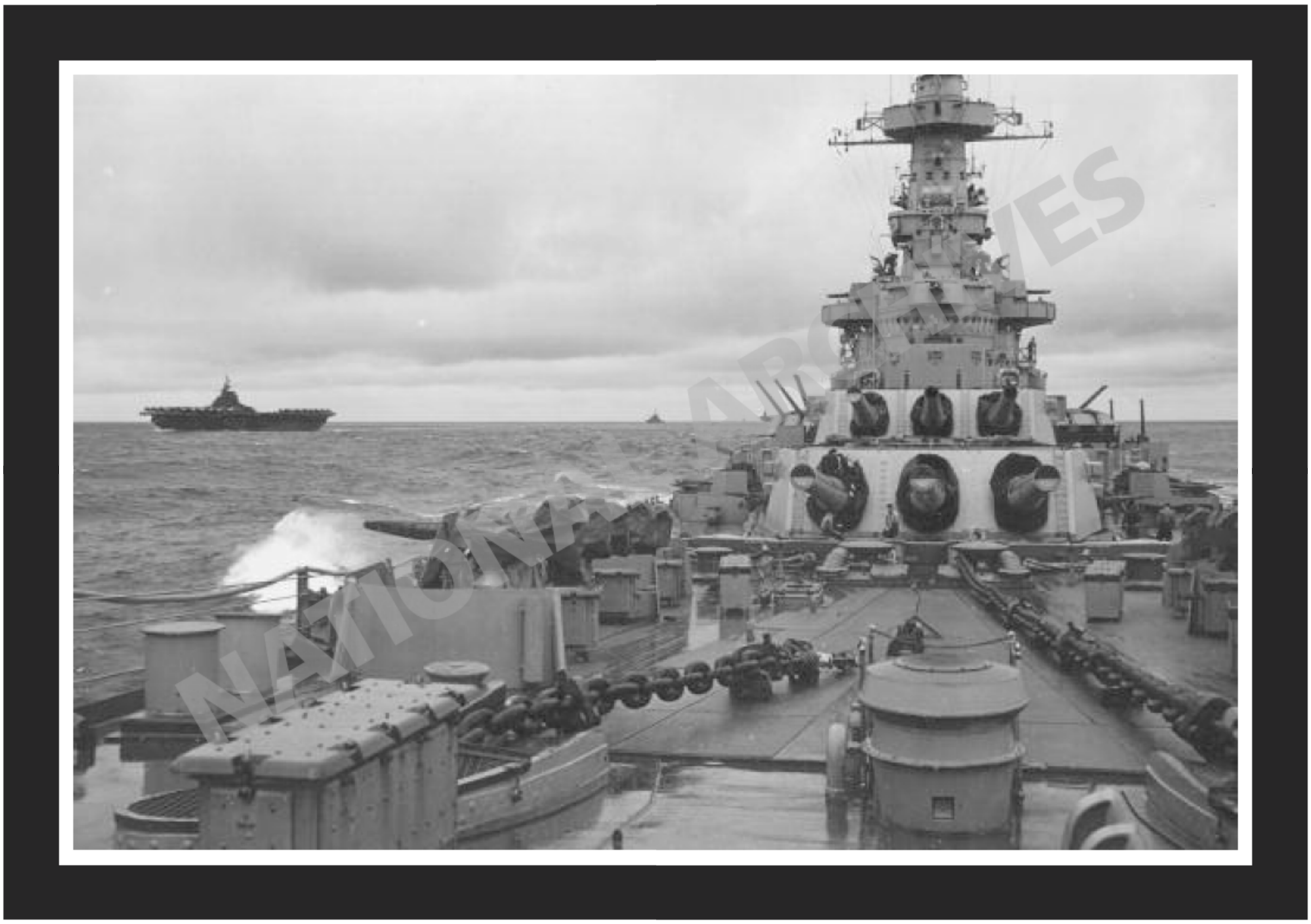
Memorial Day 2005, flags aflutter, patriot speeches well made, and Fleet Week in New York City. Shades of Memorial Day 1936 when I was but ten years old and my mother and I were invited aboard a battleship anchored with similar ships on the Hudson River all of which were bedecked with colorful signal flags. To say that I was awe would be putting it mildly. While not comparable to the U.S.S. Iowa, the ships were just as gray, the teakwood decks just as clean, and the 16-inch guns just as big. When I was a boy of ten I had an "officer's" peaked white hat with black visor. With my ten inch wooden model of a gray-painted destroyer I would play captain of that ship. corresponding with the "realistic" comic-strip titled "Don Winslow of the Navy". He always did everything well and properly in spite of all the many trials and tribulations. After I left the domain of my hero Buck Rogers I turned to a more mature model as represented by Don Winslow. Little did I know then that the future outcome would place me in the Navy in a much different role, that of an Airdale who hardly existed at that time. By the same token, if I was a few years older or younger, three books would never have been written. And in fact, these pictures would very likely never "seen the light of day" because I know of no such pictures having been published. And who but an Essex-class Airdale, a dying breed, would do so?

Returning to the printer, the printer pulls the paper over an electrically charged wire that generates a static positive electric charge on the paper. Where each point of the laser-beam strikes the cylinder (drum) it causes a negatively charged film of zinc oxide on the surface of the drum to change its charge so that the dots have the same electrical charge as the sheet of paper, from negative to positive. Each positive charge makes a dot which will print black on the paper. The part of the cylinder that remains untouched by the laser beam retain their negative charge. These areas remain white on the paper. As the drum turns so too is the paper fed to the drum. In this process the paper comes in contact with a bin that contains black powdered graphite called "toner". This toner is charged negatively, opposite that on the drum as created by the laser beam. Since opposite charges attract, the negative toner is attracted to the drum where it has been charged positively by the laser beam (these are the dots as specified by the image-file in the printer's storage register). Now there is a pattern of toner-dots on the drum corresponding to that file and where the laser laid down a charge. To be continued.

THE BIG GUNS

The big guns of the Iowa-class battleships can be "appreciated" by comparing them to the sailor sitting under the lower middle i6-inch barrel. Though each of the guns (cannons) train in unison they each are elevated individually. Again, they can easily reach that battleship seen on the horizon. However consider that just one degree of motion of the platform (ship) in either pitch or roll will make a hit unlikely even when all the elements of the fire-control problem (calculations) are accurate: elevation, train, wind speed and direction, pitch and roll an heave, humidity, etc. (Back then the computers were mechanical gears and cams, etc.) The Navy fights its battles not only fully exposed but also on an unstable platform due to wave action. All these considerations are magnified many times when dealing with the 5-inch AA problem. That includes fast moving 3-dimensional motion of the target. One further thing with which a Navy man must contend: even if he survives an attack unscathed but his ship is sunk, the chances are that he'll nevertheless have a watery grave. An infantry-man's lot can be a difficult one but at least he's on terra firma with means of concealment usually available. However, this is not sensible rivalry; both can be at great risk but enough of this wandering recitation.

Printer continuation: As the drum continues to turn, it presses against the sheet of paper as it is being advanced. Even though the electrical charge on the drum created by the laser beam striking the drum is the same as that on the paper, the paper's charge is the stronger and so it pulls the negatively charged toner onto the paper. Now the rotation of the drum places its surface against the a thin wire called the "corona wire" . An electric current through this wire caused a positive corona around this wire. This charge causes the drum to take on its original negative charge so that the drum can be used for another print operation. Another set of rollers pulls the paper to a section of the printer called the "fusing system". In this section pressure and heat bind the toner permanently to the paper by melting and pressing a wax that is part of the toner. This then outlines the processes that the laser printer uses to produce excellent fine-grained pictures as well as text. The process completes in about fifteen seconds to produce the picture seen here. About two thirds of that time is used by the processor to do all its calculations before actually running the paper though the printing cycle described above. It's very easy to take this remarkable process for granted as we do for so many other things in our busy (?) lives. Use your time sensibly and don't waste it on senseless video games so many of which are rude, crude, pernicious and destructive.



A BUCOLIC SEASCAPE

In one picture of welcome repose can be seen both the offensive potential of a lethal bomb and the defensive capability of those upward-pointing 5-inch anti-aircraft guns. What we don't see, what doesn't engage our attention and interest, is that clearly treacherous domain of densely packed, cheek-by-jowl aircraft that soon will warm up their engines in preparation for another of the two daily flight operations. Let's be candid about this: the Airdale in truth feared to tread that domain lest he find himself dead in that "terrain". The question could be raised: which was worse, the mental stress and strain, the mortal trepidation or the actuality of spinning propellers, seen and unseen, the hurricane force winds, and that incessant, overbearing roar of insistent engines at full power? The answer is, mon ami, both. In a word, everything. While the commotion on deck made by machines was overwhelming, the demeanor the men (youth) was absolutely sober and low-key, There was not a shred of, shouting, and arm-waving, dramatic gesturing or bravado. No, rather it was the quiet tenseness of he who was walking "into the valley of the shadow of death", no more, no less, and assuredly, no mindless, raucous clatter.

Since I had to scan each one of the approximately 1500 photographs, an exposition of the flatbed scanner is in order. The scanner's remarkable ability lies in its capability to translate an unlimited range of analog voltages (levels of gray scale) into digital values. To begin, a light source illuminates the picture placed face down on a plate of glass above the scanning mechanism. White spaces reflect more light than do varying shades of gray (or color) A motor moves the scanning head beneath the glass window on which the photograph lies. As the head moves it receives light reflected from each 1/90,000th square inch of the photograph. The reflected light is sent through a set of mirrors that are moved by motors, thus keeping it directed through a lens. This lens focuses the light onto light-sensitive diodes (uni-direction electrical device) that convert the amount of light into an electric current (more light, more current). An analog-to-digital converter stores the analog as digital dots (pixels), 300 pixels per inch horizontally. These voltages represent shades of gray. For color pictures, the scan-head makes three passer per horizontal line with the light from each pass going through a red, green or blue filter before it strikes the image. After the required number of horizontal lines, the bitmap is sent to its storage register. The theory here is straightforward, the implementation is not. When one considers the smallness of each pixel.


NATIONAL ARCHIVES

WHAT'S HAPPENING?

Since I'm unable to explain why those hawsers (large ropes) are strung between the two ships, I'll have to let the readers unravel this puzzle. When tired of this, they can appreciate the richness of the tones, black to white, as the carrier frames the destroyer. In the process, don't overlook the interesting filigree of ropes dangling beneath the life-raft hanging below the overreaching flight deck. There are many such life-rafts under the flight deck but these are not nearly enough to accommodate the 3000+ personnel on an Essex-class carrier during wartime. This leaves the question of those who could not swim should the ship sink (here "swimming is defined as slowly tread watering. This is an ability that is trivial but essential "for future reference". Pardon the term "trivial"; having been on a swim-team, that was the word that first came to mind. As is often the case, what is difficult for one is simple for another. The primary difference between two such people is their mental attitude about a specific thing, including swimming AND working on an active flight deck. Since yesterday was Memorial Day many grave sites were visited by the family and friends. A sailor who dies on the flight deck has no such permanent resting place He is buried at sea to rest forever in "Davy Jones' Locker". No yearly flowers for him nor for those "lost at sea". But truly, is a specific spot required to keep one forever in one's mind and memory? I should hope not. We're better than that.

Given the above, what's the likelihood of being hit by a bomb(s)? or being sunk? The science of probability is not useful here because the sample is too small (number of fleet carriers is too small ——- remember the sign "Get the carriers!"). However, the science of probability is a valid, albeit esoteric, subject. In fact the eminent mathematician Pierre LaPlace called it a science that started as a game (cards and dice) and evolved into "the most important object of human knowledge" (even though he was born in1749). Probability and statistics are two sides of the same coin. The former knows the contributing factors but does not know the end result while statistics knows the end result but does not know the contributing factors that produced that result. Rolling the dice is an example of probability and knowing that there are x number of cars A and y number of cars B and z number of cars C is an example of statistics. Since statistics relies on the collection, classification and analysis of data a computer with its graphics is an indispensable tool for both statistics and probability. LaPlace would swoon over its availability (we can only admire the more the efforts and results of the mathematicians and scientists of yore).

WATER-POWER

At times the sea will treat a ship as its plaything, dashing it here, then heaving it there. Such is its power that ship and man can only hold tight and take its blows till the Almighty has had its way. Such power as is displayed here is a sight to behold as a weary Airdale has a little time of respite to watch a magnificent show. Even while the sea seems relatively subdued there is a huge source of energy to be found as the strength of the ship is matched against the inertia of the sea. Man can only survive the elements, he can never really master them. Here we observe (look with interest) on a supply ship as it is buffeted by the wash of the overgearing carrier. These ships always came to us; we never went to them. The small city that a carrier is requires replenishment periodically: food and munitions, spare parts and fuel, gasoline and oil, and so on. Yes, this was a needed diversion that was a bone that came none too soon. It was a time to revel in the fresh smell of salt spray as the wind whipped it round and about. The admixture of whites and aquamarine and light blue and dark blue were a sight to relish. A brief but welcome interlude, for sure.

Water-power. While the term is most often associated with falling water here it can be more closely identified with energy. Matter can be seen and touched but energy can only be detected by its effects on matter. The ocean being matter indicates the presence of energy by its waves here caused by both wind and reflection from the carrier. We find energy in heat and friction (motion of molecules), in chemicals, in electromagnetism and light, in electricity and nuclear particles. Energy can be defined as the capacity to do work which turns out to be a force applied over a distance. In turn, force is the result of matter whose velocity (speed and/or direction) is changed. The original energy may be either potential (a stone on a ledge) or kinetic (a moving car). All that remains here is the nature of "power". It is defined as the amount of work done in a unit of time. Naturally "energy" finds meaning in describing those who are energetic in mind and body. At the same time, "power" has both a good and bad connotation such as a benevolent or despotic dictator. Back in the days of yore these two concepts had purchase because societies needed cohesiveness to survive. Now however this is almost completely moot. Now the term "the powerful" has a pejorative, even sinister, ring to a great many people who are subjugated. It has been well said, "Let freedom ring" where the end does not justify the means and where they who rule do not take the "holier than thou" attitude. This is a stretch from the topic of energy, work, force, and power but it is a useful stretch. Again, we tale things, important things, for granted at our peril.

REPLENISHMENT TIME

With the tanker along side on a relatively calm day the carrier takes on fuel and/or high-octane aviation gasoline. With the modest speed of the two ships you pray that a lurking submarine does mot have you in its sights. What a staggering prize it would be: a fleet carrier and a tanker in one gigantic conflagration! Note the three 40-mm quad gun sponsons on the side of the ship of which the forward one had a hatch (door) that led directly into the Airdales' berthing compartment. This was where I would on occasion have my Sunday supper sandwich all to myself as I enjoyed the color-display of the water breaking from the bow of the ship. It was calm. It was peaceful. It was what I needed. The three masts on the outboard flight deck held the aerial for the low-frequency radio. The masts were lowered to a horizontal position during launch operations. The massive superstructure was counterbalanced by the overhang flight deck on the port side while the starboard side can be seen to have no such overhang (we're looking forward here).

A mathematician would have fun explaining why that hose takes on the configuration it's displaying. Geometry is just one of the fascinating segment of mathematics. Actually the curve of the hose can be a polynomial equation such as x=ay^4+by^3+cy^2+dy+e. With the correct values for the variable y and the correct values for the constants a,b,c,d,and e we can plot the curve on the x-y diagram. Thus, some of the most important equations to obtain the curve of the hose. (The actual process is too involved to discuss here,) Such an operation ties in closely with analytic geometry which is an algebraic method of generating geometric figures comprised primarily, at least in the first instance, with straight lines and some standard curves such as circles and parabolas, etc. The study of calculus requires an understanding of this subject. A primary use of algebra is to be found in the solution of a problem that can be expressed in words; this includes all the sciences and engineering disciplines as well as businesses and other professions. For example, "let x be a number such that twice this number is six more than the number; what is the number?" Algebra allows us to write an equation that represents this word-problem: 2x=x+6. and x==6. Simple indeed, but it is the method used to generate all kinds of important and useful relationships. Algebraic formulations are mathematic's shorthand for solving many important things, not the least of which is Einstein's historic equation E=mc^2 (energy equals mass times the square of the speed of light, a monumental concept from a very "simple" formula. Indeed, some of the "simplest" are the most important

THE U.S.S. WASP (CV-18)

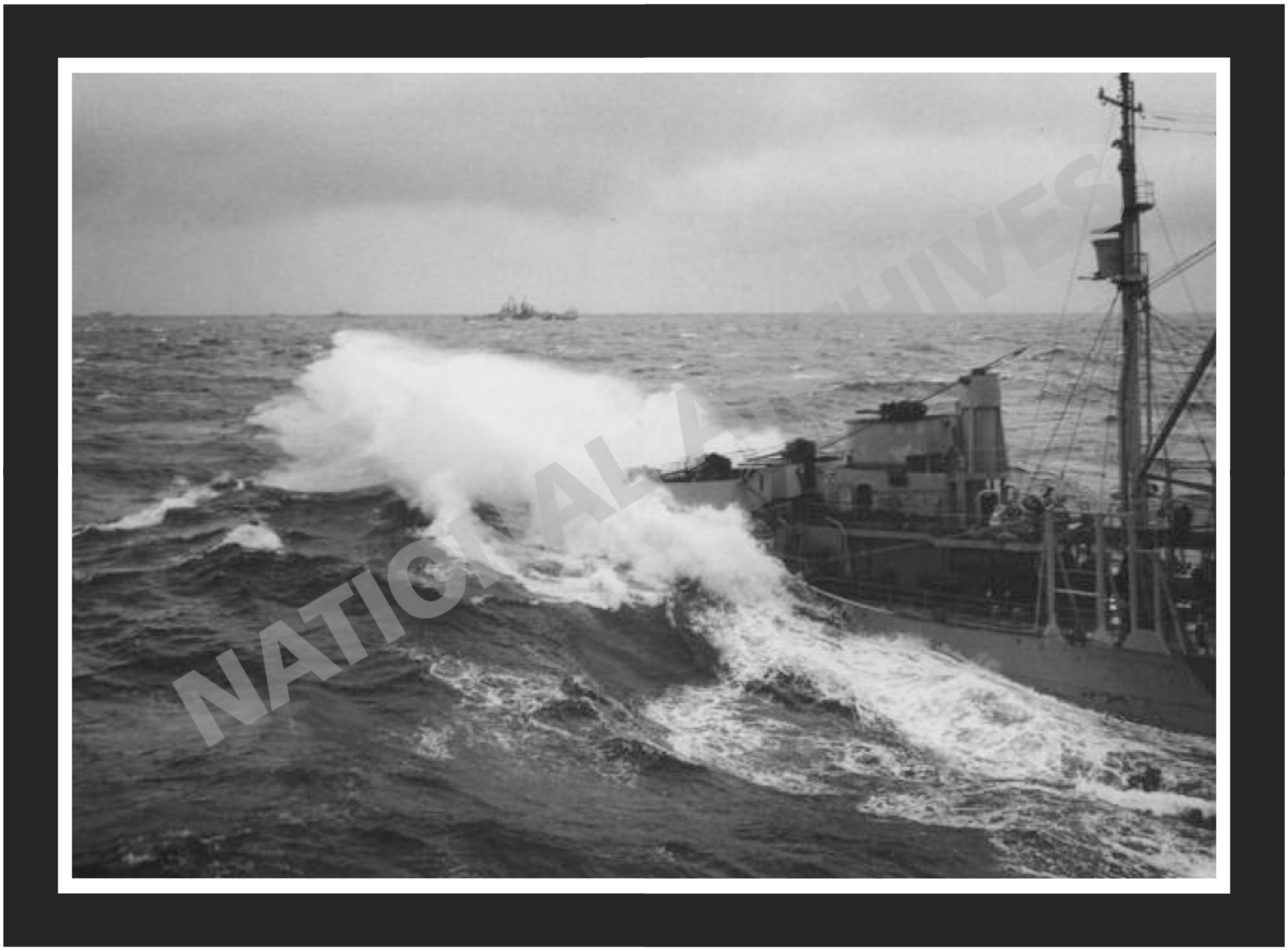
Rest assured the Wasp does not sting. What it does do is destroy enemy ships. Right now it's charging ahead at or near its flank speed of 33 knots (about 36 mph) to generate enough wind-speed over the bow of the ship to enable the safe landing of the aircraft. It has already landed 30 F6F Hellcats and one F4U Corsair. What puzzles this old Airdale is why there is no Corsair next to the superstructure taxiing forward while another Corsair is going below on the deckedge elevator while a third Corsair is just about to touch down on the deck at about 50 yards from the back edge of the 300 yard long flight deck? In any event, the Wasp's speed will keep it free from marauding enemy submarines in the area. Since the fleet carriers had no sonar Underwater detection devices) they had to depend on speed or the protection of the escorting destroyers which not only had sonar but also the ordnance necessary to destroy (hence "destroyer") enemy subs. It should be said that the newer Essex-class carriers had armor-plating below the water-line to protect against torpedoes. I've not researched the records to determine the efficacy of this shield but suffice it to say that no Essex-class carrier was sunk (but what did a lowly seaman know about these things?).

So just how is it that such a large ship can propel itself so fast? It does so by means of 150,000-hp applied to four shafts attached to four propellers six feet in diameter. This power was generated by assembling the propulsion units in two independent units. Each unit had two boiler-rooms with a boiler in each compartment. There was also an engine room with two sets of turbines. The boilers supplied steam at a pressure of 565 pounds per square inch at a temperature of 850 degrees Fahrenheit. The steam was directed to the turbines, those fan-like devices with many narrow, long blades closely spaced so as to catch the impinging steam before letting it pass through the blades. The high temperature gave the steam high energy by virtue of the fact that energy is a direct function (ramification) of the motion of the steam molecules. The turbines' shafts were geared down by a double- reduction gearbox. I can remember well that when the ship was moving at flank speed the ship seemed "alive" because it would vibrate perceptibly. When fully loaded the ship was 36,000 tons (unloaded 27,000 tons). On one occasion I was at the helm during gunnery practice during trials (when I was in the Navigation Division until April 1945). The command was given, "Right full rudder" and I spun the helm three times quickly. Going at full speed at the time, the ship heeled over far enough to make one question the sanity of the O.O.D (Officer of the Deck). It went well and I let out a silent sigh of relief. We did this two more times. The only other time this happened was at the end of the war when the Antietam made a fairly tight circle maneuver.

SAME SHIP, DIFFERENT MOMENT

What happens when an irresistible force meets an immovable object? Is the ship the irresistible force or the immovable object? Does it matter? What does matter is that as the ship shudders under the impact the sailors are wondering about, the sailors are praying for water-tight integrity. At first sight it appears that the massive sea is about to swallow the valiant ship in its entirety. At this moment, can you place yourself there on the bridge watching as your ship, your sanctuary, slides into oblivion? Is this retribution for things said and left unsaid? For things done and left undone? No, this can not be an allegory when it is but a conjunction of ship and wave conjured to to jar you into the realization that there are large forces out there with which to contend. Simply said, put on your foul-weather gear and hold tight, both figuratively and actually because Mother Nature is not yet through testing you. In the meantime enjoy the texture and muted gradations of gray of wave and sea and sky while the soft-edged depiction of the ship etched on this backdrop completes an image worth preserving. (I still do not stop marveling at the professionally artistic capabilities of the Navy photographers who chronicled the exploits of the Navy during WWII. If not for them the bite of the hostilities in the Pacific Theater would in large measure pass into the dustbin of obscurity. I believe that we are in their debt.)

We've talked about the speed of the ship, the force of the waves, the underwater ordnance of depth charges. These are all manifestations of the study called physics. In this regard let's enumerate some of the most basic laws of physics which form the bedrock of so much that we take for granted. These laws are simple in concept but profound in effect: WEIGHT is mass times acceleration due to gravity; FORCE is mass times acceleration of the mass; TURNING FORCE is the force times distance of the applied force and directed perpendicularly to the line between the force and turning point; SPEED is the distance divided by the time to travel that distance; CONSTANT ACCELERATION is change in speed divided by time for that change; PRESSURE is force divided by area on which force acts; GRAVITY is a constant times product of two masses divided by distance between the two masses; FRICTION is force between two surfaces times a coefficient; WORK is force times distance; CENTRIPETAL FORCE is mass times velocity squared divided by radius of orbit; LIQUID PRESSURE is liquid density times acceleration due to gravity times depth; ELECTRIC CURRENT is voltage divided by resistance; ELECTRIC POWER is voltage times current; GAS LAWS: volume inversely proportional to pressure—both volume and pressure proportional to temperature.



THE CROWN OF MAN'S MAKING

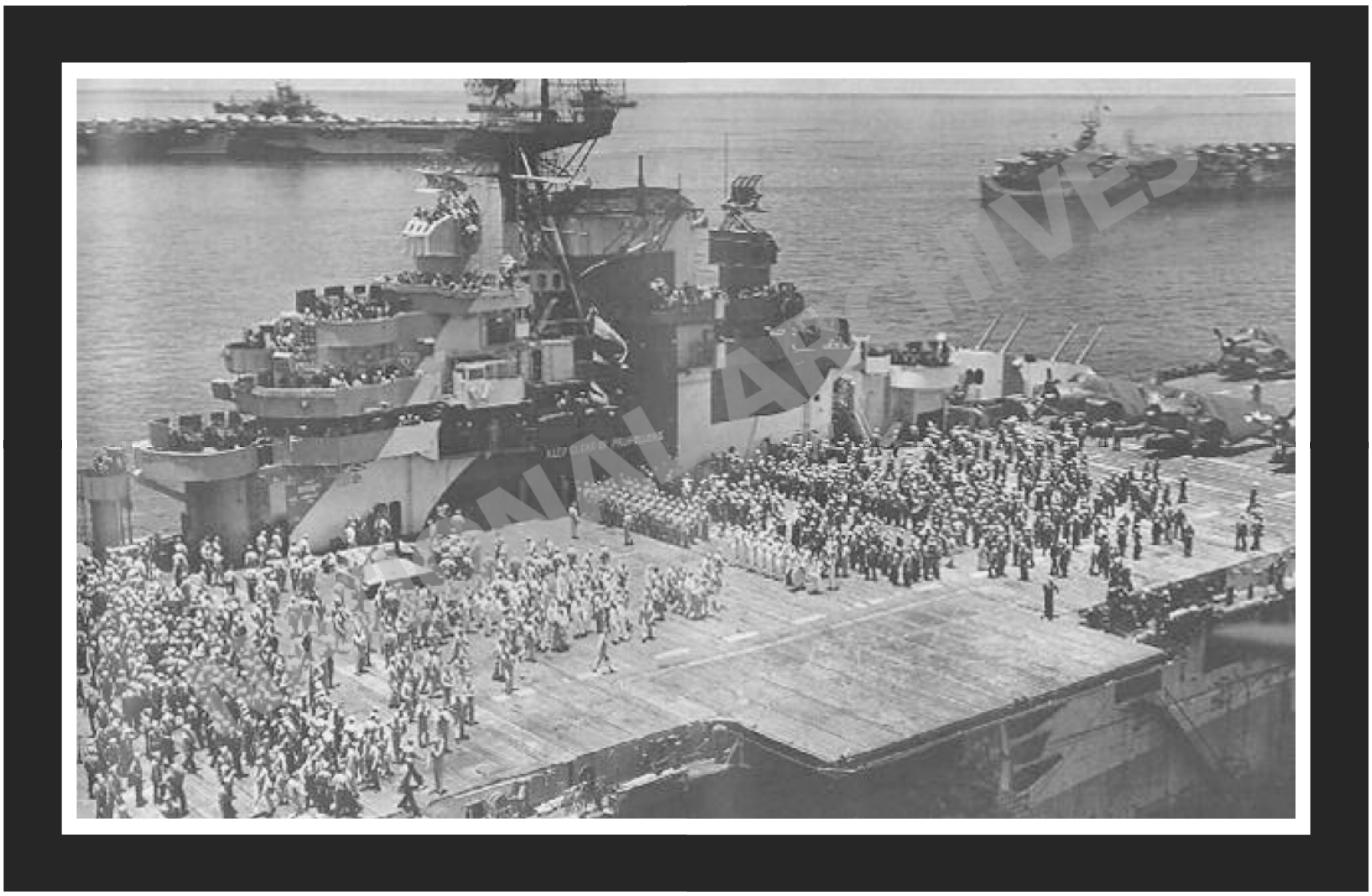
I find this picture to be very pleasing in an oblique way: the mighty, the marvelous, the magnificent Essex-class aircraft carrier of WWII , that epitome of precision forms a backstop to a shipyard full of apparent clutter and disarray that gives vent to the attributes of this paragon of man's making. All of this in spite of the fact that I am not partial to pictures that one would call "busy". Here "business" can be considered of the essence even to the point of obscuring the beauty behind. Is it not ironic that from the "confusion" of the shipyard comes the orderliness of the ship? This is the kernel of this picture, making it worth the words above. Shipyards have a way of looking disorganized and unkempt and having seen only Navy shipyards I don't know whether civilian ones are better or worse. Since most large naval activities are "shipshape" I would think they were the most kempt (or at least as kempt as a shipyard can be). There's something incongruous about a neat, sleek naval ship in an actively working shipyard. Where the Antietam was built (Philadelphia Naval Shipyard) things were tidy although we didn't arrive at the shipyard until the ship was fundamentally completed. One of my vivid memories of naval ship yards (Philadelphia and Pearl Harbor) was the pungent smell of burned oil of the ships stationed there. Now many of the ships are fueled by nuclear power (which says that if a ship can be energized thus in a safe manner, why can't cities? But hold on, this takes us to the forbidden area of politics).

A nuclear reactor power plant generates electricity by using heat to turn a turbine (a fan-like device with many long narrow vanes) that turns an electric generator (a wire coil spinning within a set of two coils of wire). This description is comparable to a coal, gas or oil fired power plant. The source of heat to turn the turbine is quite different though. The fuel to run a nuclear power plant is an isotope of the heavy radioactive metal uranium, namely U/235. There are other fuels available and all of them have the characteristic of being fissionable (able to be split in two when struck by a slow neutron thus generating heat and another slow neutron. If enough of this isotope is assembled there is reached a "critical mass"; the reaction is self-sustaining because the number of neutrons produced by fission is greater than those lost by radioactivity. At the same time there must be a so-called moderator (carbon rods inserted and withdrawn from the critical mass) that absorbs neutrons so that the reaction doesn't "run away".We in this country have stopped building nuclear reactors because of the perceived safety factor of runaway reactions and disposal of spent fuel.Yet France generates 80% of its power from this source.

JOB DESCRIPTIONS

What we see here are some of the 3000+ personnel of a WWII Essex-class carrier. However, when out to sea my world on the flight deck was populated by only a fraction of this number: In round numbers there were 7 aircraft directors (yellow-shirts), 35 Airdales (blue-shirts), 100 plane-captains (brown-shirts), 7 catapult/arresting-gear personnel (green-shirts), 20 armament people (red-shirts)and 20 fuel operatives (red-shirts). Added to this mix were the usual spectators (seamen on the catwalks and officers up in the superstructure). This was my world almost every day for a year. The Antietam never had those words "Keep Clear Of Propellers" emblazoned on the side of the superstructure as here (as if this admonition was necessary!). The Antietam also never was painted with a camouflage, of which there were at least six varieties. This picture gives a good view of the most worked elevator of the three because as a large number of aircraft were landed on the flight deck they were immediately taken down below to the hanger deck to make room for the following aircraft. The forward elevator was quickly overrun with aircraft and the aft elevator was of course too close to the landing area (many a crash occurred in this area). After all the aircraft were aboard all three elevators were used to move the aircraft from below to topside in preparation for the next launch operation. It was these elevators that made possible the large number of aircraft that a carrier could usefully handle. One hundred aircraft is substantially more than the present-day carriers: though they are larger in flight deck space their aircraft are also larger than WWII aircraft. I suppose that is called progress and who's against progress?

All the people in this picture have a specific job, but at this time of graduation what of the job-seekers? What now? Presumably one has made at least a rudimentary choice of job based on one's INTERESTS. If a job is not at least partially interesting (to you) then there is little chance that it will be enjoyable. One of the joys of life is to be "lucky" enough to have a job one likes. (I did not choose to be an Airdale and it was not what one would consider enjoyable. But then, you are "as happy as you choose to be".) Ideally, one will have a solid sense of purpose built upon one's interests derived from one's LEARNING. One could even say that one should "imprint" oneself with that purpose without giving up one's options: explore new and different venues. Be aware of what claims your interest without being afraid to nurture this. In short, obtain and retain an open and inquisitive and active mind. Without it one is merely coasting along. A vigorous body is fine but a vigor mind is even better (by far).



“OLD GLORY”

“Old Glory” flew from a pole at the after pilothouse, every day. At this location were two lookout chairs that I would frequent in the evenings when all was quiet. I would think back to home and what might have been with “my girl”. As I gazed out to sea in my solitude to contemplate and lament my fate back home, youth and distance were not generous to me. And yet I was able to gain that succor, that relief, that quiet eventide brought to me after a debilitating “day at the office”. Above and to the right of the flag is the 5-inch gun director used to acquire and track an enemy aircraft. Directly below the flags is a row of six 20-mm guns To their right is the starboard signal bridge consisting of a blinker light and a set of colorful signal flags, each flag having a particular meaning. The only one I knew was the flag “Fox”. It was a white flag with a red diamond whose points touched each side of the flag. It was flown alone whenever flight quarters was called. Right below the 20-mm guns is a long row of three foot high “baskets” outboard of the catwalk and on the same level as the flight deck. These “baskets” contain corks tied together in a netting, They are available for personnel when the ship sinks. Certainly there are far too few of them to accommodate 3000+ officers and sailors. (Who will live, who will die?)

I’m no longer going to use the artifice of the topic in the first paragraph determining that of the second. In the ensuing pages there will be no correspondence between the two paragraphs. The seamlessness was nice but now is too restrictive.

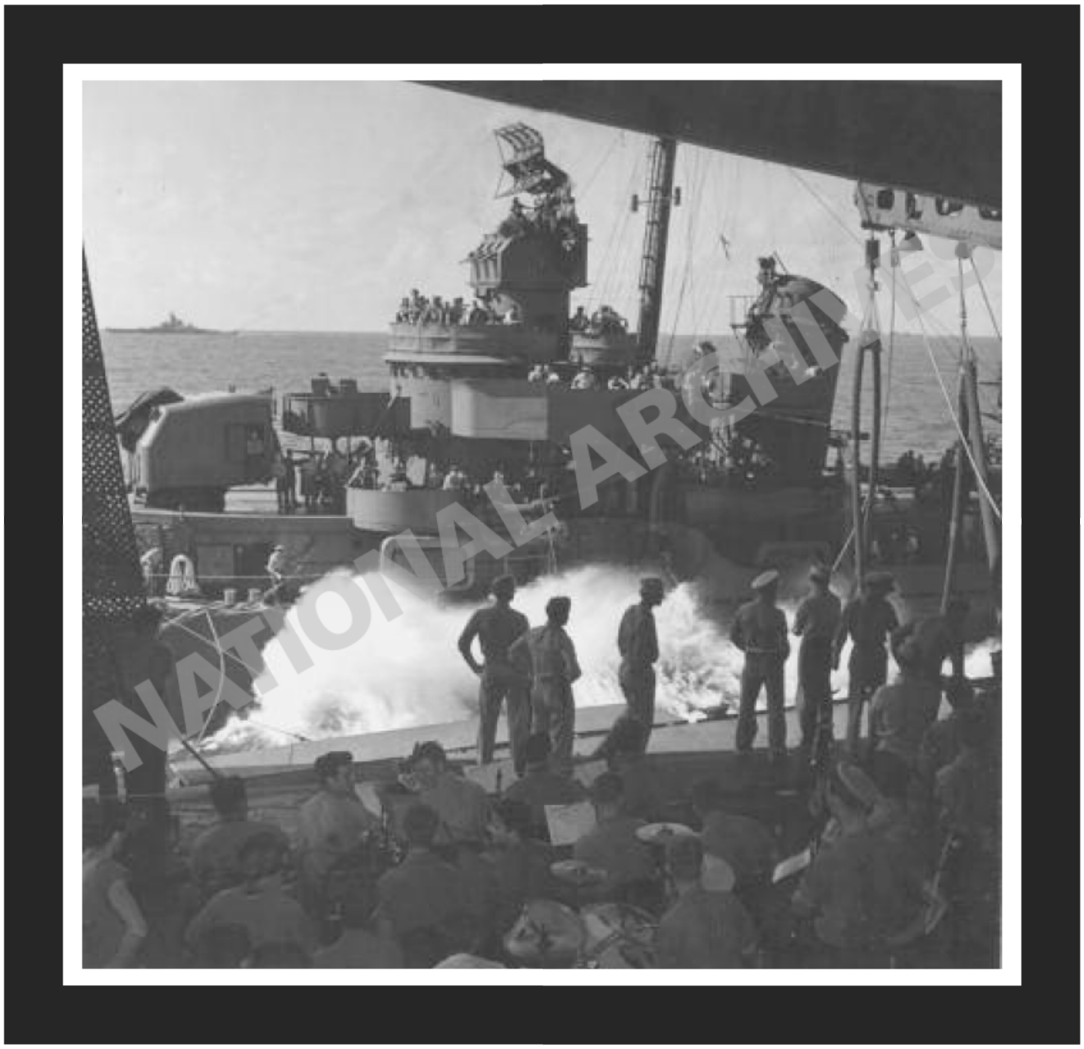
How does an internal combustion e engine (gasoline engine) work? Most car engines have six steel-hardened cylinders, each about 10 inches high and 6 inches in diameter (purists must be patient here). Each cylinder has a piston that slides (with the help of oil) within the cylinder. Each cylinder also has two 1-inch diameter valves at the other end of the cylinder. These valves are raised and lowered one-half inch by a cam on a camshaft (a steel shaft with a cam, or irregularly shaped disk, for each of the valves on all of the cylinders. The linear motion of the piston in the cylinder is converted to rotary motion by a rod that is connected to the piston by a pin that allows swiveling motion of the rod to the right or left and at the other end it is connected to a crank on a crankshaft by a sleeve that allows the crank to move within the sleeve. (A crank, six of them, is an integral part of the crankshaft about four inches long but displaced, in parallel, from the crankshaft also by about four inches.) To be continued.


NATIONAL ARCHIVES

"AND THE BAND PLAYED ON"

About all I can say here is that there was never a band on the Antietam. And probably not on that battleship in the distance. It was a"big deal" ti the sailors on the destroyer to sidle up to a carrier. And why not? A destroyers lot was not a easy one. A destroyer also needed to quench its thirst to stay up with the fast fleet carriers.over extended time. The oil also served as useful ballast.

Now that the basic structure is in place, how does it work? This engine makes use of the four-cycle method, the predominate one requiring two revolutions of the crankshaft (which is connected to the drive-shaft which in turn drives the wheel-axle through a T-gearbox; first though the drive-shaft is geared down by a transmission-box that converts the high speed of the crankshaft to the lower speed, higher rotational torque of the drive-shaft). To begin, the piston starts at the top of the cylinder with both valves closed. As the piston now moves downward the intake valve opens allowing a spray of gas-air mixture to enter the cylinder. Both valves are now closed due to the proper arrangement and position of the cam-shaft. The crankshaft then pushes the piston upward compressing (heating) the gas-air mixture (second cycle). At this time both valves are closed. The third cycle is initiated by a spark plug firing in this cylinder instantly causing an explosion to force the piston downward and imparting a large force on the its crank. That is, the crankshaft is turned violently. The fourth cycle then occurs as the camshaft turns causing the cam to lift the exhaust valve to vacate the spent gas-air mixture. The first two cycles cause one revolution of the crankshaft and the second two cycles the second revolution of the crankshaft. The afore mentioned four cycles are then repeated. The engine require cooling water around the cylinders to dissipate heat (water pump and radiator that exposes the heated water to cool air), oil lubrication in the cylinders (oil pump), electric starter motor connected to the crankshaft, electric generator to charge the battery which energized the starter motor, and an electrical system to fire the spark plugs. The spark plugs have to be fired at precise times and in the old days this was accomplished by a linkage to the cam-shaft. That everything works in unison is a marvel but what is not so marvelous is the amount of effort to reach things which might need repair. The technology that is the gasoline engine is remarkable however it would seem that the electric car, when the battery has been sufficiently developed and photovoltaic technology reaches adequate efficiency



A VARIATION IN GRAY

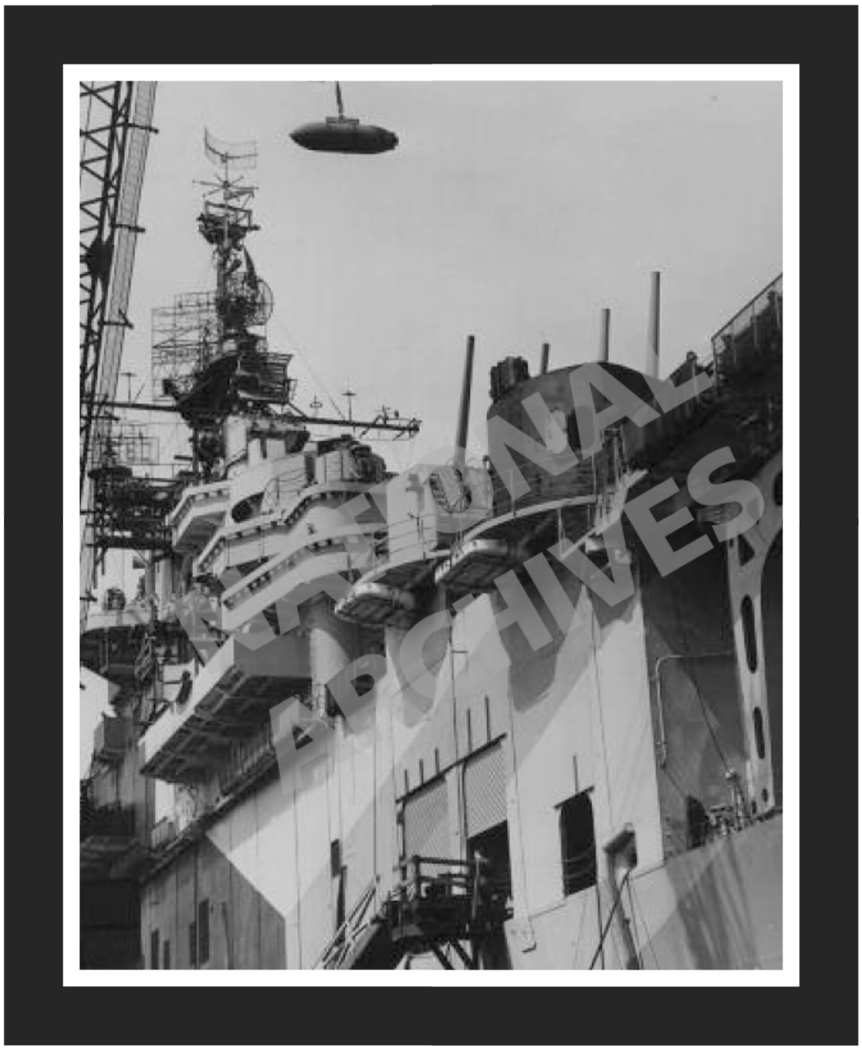
The smooth light grays of above the flight deck are nicely enhanced by the strong dark grays below the flight deck. There is even an interesting silhouette of the tail-section of an SB2C Helldiver on the hanger deck as it's being serviced by the mechanics now that we're in port. (Could it be Pearl Harbor? Or Tokyo? Hong Kong? Or Manila? Maybe it's Tsingtao, China? Possibly Guam or Saipan? These were the only ports-of-call reached by the Antietam when I was aboard.) Right now either the port or starboard watch is on liberty until midnight. Tomorrow it will be the other watch that is given their liberty and then it's out to sea again. This is a busy time for the mechanics as they service the aircraft now that they're quiet while the Airdales recoup themselves both physically and mentally from the rigors of seemingly incessant wind, noise and danger. (Yes, danger. Though not willing to admit to this, it was nonetheless "there".) // Clearly seem here are those baskets, outboard of the catwalk, containing the cork-supported rope-netting. Essentially, wherever there were no 20-mm guns there was this netting. It was both reassuring and disturbing at times such as these when there was no flight deck activity to occupy you. That "inverted L" just below the flight deck is a crane used to bring supplies aboard, hold fuel lines and anything else that needed to come aboard including those big, BIG Avengers right above the crane.

Integrated Circuit (IC). What are they? When I was growing up there was the vacuum-tube which was used to amplify electric signals or turn electric currents on and off. Today a handful of integrated circuits the size of a fingernail exist, each containing hundreds of thousands of transistors where each transistor performs the same function as the 4-inch high vacuum-tube! The IC could be any of a number of complete electric circuits that function as decoders or counters or program storage or if a little larger, a complete digital processor that controls a desktop computer. The basic elements of an IC are the resistor (impedes electric current), a capacitor (stores electrons), a diode (allows only one-way electric current) or a transistor (amplifies an electric current or turns it on or off). The IC resides on a thin slice of semiconductor (neither a conductor nor a resistor). The afore mentioned components are physically formed in this semiconductor substrate as layers of n– and p-type semiconductor: "n" adds a limited amount of free electrons and "p" offers a place for wandering electrons (captures them). Controlling the passage of electrons through the transistor allows the on/off capability of transistors, the basis of digital computers. The layers are formed in the silicon substrate by a photographic process. To be continued.

LARGE BOMB, LARGER SHIP

An interesting view this, this view that greets visitors to a world far removed from anything yet experienced. But come aboard and feel the sense of purpose that this ship engenders. One could say that THE purpose of this ship was to cause havoc, or if you will, Hell Fire on earth with ugly looking bombs seen here dangling overhead. It's a large ship, this thing of beauty that has been designated the odious but necessary task of dealing death and destruction. // When returning from liberty after dark the ship seemed to loom even higher over your head than it did during the daylight as you looked up 50 feet to the flight deck and then beyond that the superstructure towering another 50 feet higher. For a neophyte such as myself at that time this made an emotional impact that has not left me. Silly to mention it now but very impressive then, especially after dark. And to think that I was actually a useful part of this entire enterprise was rather heady for a lowly sailor just out of school. Yes, I was at the bottom of the totem pole on board ship, yes I was doing simpleminded things for the enterprise but there I was actually doing them. I must admit I was quietly proud of my contribution. It's an axiom, I believe, that if you are proud of what you do, you do that well. The "Pride of the Marines" is not for nothing. So be proud of yourself.

Integrated Circuits continued. The following description of the fabrication of an IC will be rudimentary at best. But presumably it will give a satisfactory idea of what's involved. A schematic diagram of a circuit (decoder, counter, memory, etc.) is converted to a drawing of the circuit in the form of channels and lines that represent the components of the circuit and their interconnections. Some channels are of positive p-type silicon and some of negative n-type silicon. Included are lines that connect the components together as do wires in the original circuit. This drawing now is photographed and from which are obtained masks of only the p-type material or n-type material plus the connector-lines mask. These photographs are reduced in size by orders of magnitude. They are then placed on the silicon dioxide, neutral substrate and a gaseous p-type or n-type silicon is laid down by deposition. Any unwanted material is etched away by light or chemicals (?). What is left after these several processes are channels of positive and negative silicon plus resistors and capacitors that form thousands and thousands of switches (transistors) and diodes that enable digital and logic circuits to perform the arithmetic and logic functions required of decoders and controllers and counters and memories and on and on. Each transistor measures 1/1000 of a millimeter on an edge. For one brought up on vacuum tubes this is nothing less than miraculous. I believe it shows intelligence to be impressed with things that are deserving of admiration.



A SPOILED DAY

This is probably not what this pilot had in mind when he left the ship earlier in the dat. It's quite possible that he took a wave-off too late and as a consequence (yes, things have consequences) he splashed his aircraft into the sea when making too abrupt a turn at too slow a speed. (Stall speed). Well at least he didn't come crashing down onto the flight deck creating a blazing inferno his aircraft and jeopardizing all those in the area. In this scenario, he fell about 30 feet essentially straight down. This is going to have bad results what with the remaining volatile high-octane aviation gasoline in the tank. It was not necessarily his fault given the "fact" that the landing signal officer (LSO) gave him the wave-off too late or that the arresting-gear personnel (green-shirts) were too slow unhooking the previous aircraft. Those aircraft with wings folded upward can be seen not to be F4U Corsairs: their wings inboard are not in the "gull" configuration. Four aircraft are probably Korean War Douglas AD-2 Sky raiders. They were listed as being powered at 2,700-hp, a pretty healthy package.

Accountability: what is it? Is there a more important or appropriate word? If so then what? Trustworthiness? Responsibility? Respect? What if it were possible to combine all four words into one? Would that not be the Golden Word? Such a word belongs to the ages. But who among us can claim it as our own? Would that all of us would pay attention to the essence of such words by not diluting their basic meaning by temporizing them. Fight the good fight of one for all and all for one (a la Three Musketeers) . The French Revolution, following ours, generated a decent motto that we should give favor to: "Liberty, Fraternity, Equality" (of opportunity, not outcome). The four words are strong words to be housed in the pantheon of commitment to a leavened wisdom. In the Navy jargon they were more succinct: "straighten up or ship out". Or the WWII song titled "Straighten Up And Fly Right". Accountability: can you be proud of your "account"? In other words, have you grown up? As one corollary to this, "Those with honor do not rationalize (the method) to justify the desired result. To end on a more positive, upbeat note give thought to the following"

> "God give me the SERENITY to
> Accept the things I can not change,
> The COURAGE to change the things I can,
> And the WISDOM to know the difference."


NATIONAL ARCHIVES

HOMEWARD BOUND

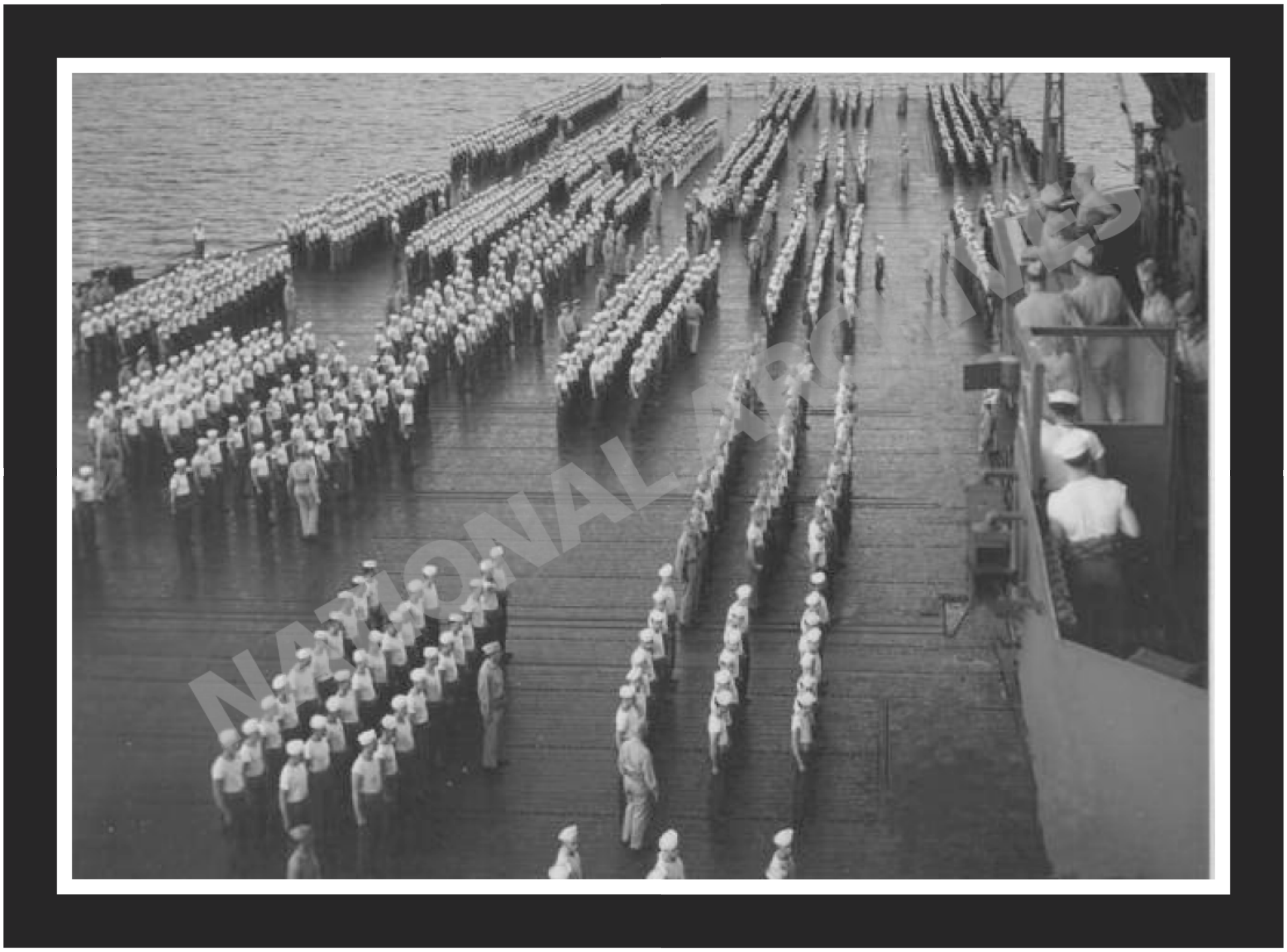
The time was May 1946 when on the flight deck I was told that I was going home the next day! At long last I was finally actually going home to never again have to contend with those "angry aircraft that meant me nothing but harm". Finally, finally nine months after the war was over (and three months after my "contract of the duration and six months") I was actually homeward bound. Yes, I was happy to be going home, and yes, I was glad to be departing the "sound and fury" of that tempestuous and treacherous flight deck but most of all I realized that at long last I would finally be with "my girl" again. At least I was hoping beyond hope that she was "my girl", the one person in the whole world who made life a thing of joy. She was the one who gave me that exquisite feeling of being with my indispensable soul-mate without whom all else was but flotsam and jetsam. She was, in a phrase, my very life. With all this was the acutely disturbing fact that she was regularly seeing a Navy officer candidate, in his spiffy uniform, not far from her college Wellesley. I met him once at Wellesley on a double-date, he of a spiffy uniform, me of a little sailor-suit. Well at least I "knew" what the situation was. A big help, that! Young people, and I was young, have the tendency to think crucial things are dire. (If things can go wrong they will go wrong. Or some such "law".) Though "my girl" dutifully wrote to me by the month, the letters were "dutiful" although she said I was only feeling "puppy love". I was afraid that correcting her would cause her to push away from me. And so I continued with my depressing dejection while never giving up on better things to come. Yes, true love, young love, is foolish that way. And so it came to pass that the Navy showed excellent efficiency in the form of a letter that reached me on a transport in the middle of the Pacific Ocean. While I should not have been surprised, her letter stunned me: she said that she was engaged to that officer candidate. Devastation does not begin to describe my feelings. The world turned upside down, the sky came crashing down, the stars were where the sea should be. She made herself distant thereafter and while I can not fault her, I could commiserate with myself and make myself unworthy of attention. It was a lose-lose situation and one that was hard to shake. Adding insult to injury, all they played on the jukebox on that slow boat to the states was the song "If I Loved You", the song that restated the fact that "you were not loved". Over and over and over it went, and to this day I can not hear it but that I find myself on that transport heading for what I thought was unending desolation. I was wrong. I survived and though I did not prosper I believe I did gain strength I did not know I had. , "Welcome home sailor".


NATIONAL ARCHIVES

INSPECTION

This picture was not taken aboard the Antietam, at least not when I was aboard. The reason I say that is that everyone's dungarees (blue-jeans to a civilian) are uniformly dark, as if new. Also we never had inspections except when in port and liberty was in the offing (which mean that half the crew was in their "whites' or dress blues). Those of us in our work uniforms as here had all varieties of shades to our dungarees, from semi-dark to well-weathered (faded). Mine soon became not only faded (with the help of the sun) but also I had tears at the knees due to always kneeling when in among the aircraft (it was easier to withstand the wind that way). [Others had their medals and colorful ribbons but I had my ragged dungarees as my remembrance of service gone by.] Furthermore, whenever we were at sea we had no time for things such as inspections as here. We were definitely a working ship, "9 to 5". Now that I think back on it it's a wonder that I wasn't reprimanded for being "out of uniform" (having those tears). However, being a working ship these things probably were overlooked to a certain extent: "if he's doing his job let him go". Actually, since we were in amongst the aircraft out of view so often we therefore weren't seen that much. Besides, the petty officers and officers had their hands full running a full-time operation. (There I go rationalizing but I agree, sometimes it's necessary.) However, the Antietam was definitely shipshape in all respects to my observation. That I know.

Networks (not the personal kind that can lead to substandard results): "Everyone" uses the Internet but how many understand even the rudiments of its operation? To begin at the beginning each character is represented by an 8-bit code where each bit is either a one or a zero, the domain of everything that is digital. Although the path from the telephone exchange to your house is analog (continuously varying at an "infinite set of values between A and B) the rest of the path is digital. The conversion between the two types of data is accomplished by an A-to-D converter, Actually though, the early telephone lines transmitted analog audio signals while the terminal computers dealt with ones and zeros. The solution was to convert the digital ones and zeros to on-off analog tone-values (a one was one volt, a two was two volts, etc. The device that made this conversion was a modem (historically the Bell 103 as designed by Bell Labs). Now the telephone system could be connected to the digital world. Individual computer users connect to the Internet through a so-called Server. These servers are network operating systems whose software directs the computers request to the desired destination. To be continued.



LIBERTY CALL

The ranks have been mustered, the inspection has been made and liberty-call has sounded. Could it be that that first sailor is an Airdale leaping to the ground before bounding into that truck to the right? An Airdale really appreciated liberty-calls. Having been one, I know this well. To my reckoning from April t 1945 to May 1946 we put into Pearl Harbor twice, Tokyo once, Yokosuko (Tokyo Bay) once, Tsingtao (China) once, Manila once, Hong Kong twice. Eight twelve hour passes during thirteen months is not excessive. Notice that the catwalk on the right drops down by about two feet. This was to make room for the access-opening just under the propeller of the left aircraft (TBM Avenger). This opening leads to the Gallery Deck just beneath the flight deck and 30 feet above the hanger deck. Here are located activities associated with the flight operations such as the pilots' readt0rooms, aviation supplies, squadron workshops and supplies, etc. as well as gun fire-control shop, radio rooms, admiral and captain's facilities, and many other things such as arresting gear controls.

The Internet makes use of packet-switch technology in which packets consisting of 48 bytes (8 bits/byte) of data, voice or video along with 5 bytes of control data are transmitted asynchronously over one of many possible paths that are interconnected by many switches. Along each path. This data is generated at the rate of 1.5 megabits/sec (million) to 1.2 gigabites/sec (billion). ("In my day" these numbers were unimaginable). Each switch along the way determines the next most expeditious route for that packet at that particular time. When all the individual packets of a given message arrive at their destination the final switch in the path from A to B must reassemble the packets into their proper order. Actually, the packets are more properly said to be assembled in cells of 48 bytes. These cells are made up of groups with specific functions: Synchronization preamble, destination address, source address, packet length, data field, and error control. Thus the packet-switch functions are: check valid packet, check destination address, monitor traffic on paths, check trouble reports, determine best route, reassemble packets, retransmit on request, and initiate error recovery. These functions are accomplished by a microprocessor running software programs. To be sure, these programs are complex but so is the hardware that is implements by the software. Here again to the uninitiated what gas been described seems like wizardry, and but it is not Instead it's the coming together of many, many intelligent people who have a vision of extraordinary possibilities and then bringing them forth. Who can help but admire these people? I challenge anyone to do so. Again, the Internet is used by "everyone" willy-nilly without giving it a second thought. Do so now. You owe it.


NATIONAL ARCHIVES

SO PROUDLY WE HAIL

Today is Flag Day, June 14, the day that we should stand up and robustly sing "Stars and Stripes Forever" . The flag which we so proudly hail, let it forever be a symbol of all that is good and noble. They stand at attention, these who have been chosen to defend and protect this land which we call home where is honored not just freedom but it is also that place where fairness of purpose remains an abiding , an everlasting beacon. Carry on, carry on you men of destiny where virtue shall prevail. // Even the aircraft stand at attention here on the broad reaches of a well-worn flight deck. It has seen many a brave pilot leave its confines to fly who knows where to confront who knows what. "Where do you find such men" to leave the "sanctuary" of the ship to seek out the unknown wherein lies the enemy? And who among you could follow in their footsteps, these volunteers of the air? It's a vast ocean out there with no place to set down if things go awry. I will vouch for the fact that there was no pilot going to an aircraft with jaunt or a jocular manner. Their faces reflected that SERIOUS business was afoot, war-movies notwithstanding: no "top-guns" here with "automatic-everything".

Chemistry: a chemist is concerned with the study of materials, their composition and how this changes under what conditions. This places the chemist at the very foundation of matter, both inorganically and organically. The chemists' domain is that of the 92+ elements that make up all matter. The element oxygen plus the element hydrogen combine to form the compound (molecule) water. Each element is made up of a nucleus containing positively charged protons and neutral neutrons enveloped by a cloud of swirling negatively charged electrons. These electrons are to be found in various diameter shells with each shell containing a unique number of electrons for that element. (The force that keeps the electrons and the protons separated is an interesting one that is the domain of nuclear and particle physicists.) The atomic number of an element is the number of protons in its nucleus while an isotope of an element is determined by the varying number of neutrons that reside within the nucleus. The electrons swirling in the outer shell are responsible for the chemical reactions (bonding with other elements) with which we are familiar. The atomic mass is determined by the number of protons and neutrons in the nucleus while the number of electrons in the outer shell vary from element to element, being either 2, 8,18, or 32. All elements combine in simple whole-number ratios such as 2:1, 5:4, etc. A proton is 1836 times the mass of the electron while the atom itself is mostly unoccupied space. Finally the mass of the atom could also be called its atomic weight. To be continued. To form the basis of other "chemical" discussions to come.


NATIONAL ARCHIVES

TRANSFERRED OFF

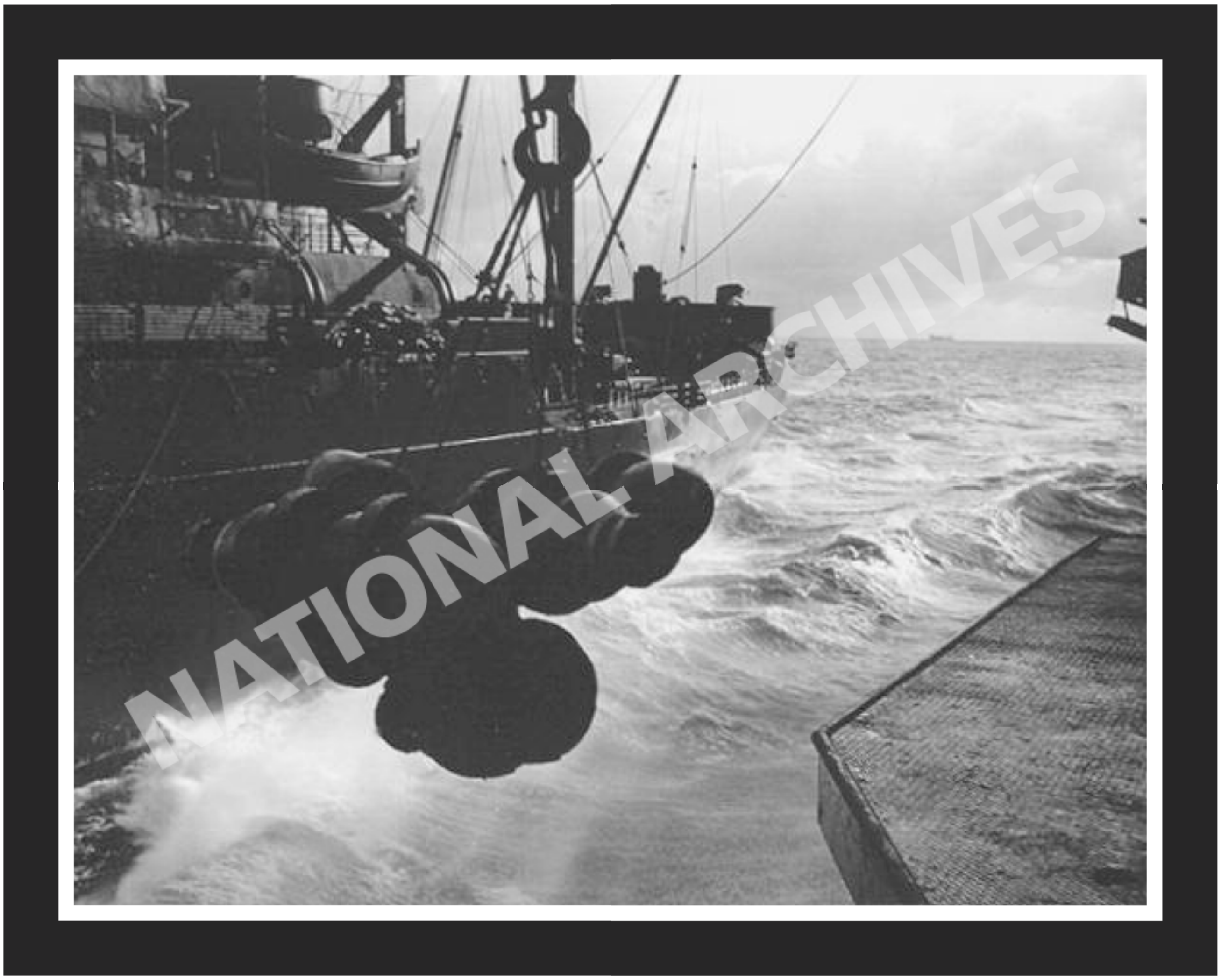
Personnel depart the Antietam for another duty-station while back aft the crane loads yet more sinews of battle as the wheels of war grind on, and on. At the same time sailors in whites are leaving the lowered deckedge elevator to go on liberty. Who's the luckier? All their worldly goods are in those sea-bags wrapped with a mattress/blanket. A sailor has his dress blues, his whites, shoes, work-shirt, dungarees, socks, "scivvies", a couple of white T-shirts and anything else he can fit into that bag. I was dumb enough to pack a 78–rpm record called "Dream" by Tommy Dorsey, Frank Sinatra and the Pied Pipers (to retain that memory I had before I left home even though I couldn't play it on board. The transfer seen here might be part of a normal rotation of duties but quite unlike my transfer from the Navigation Division to the Airdales. It happened in an instant, or at least as fast as it takes to say, "Atkins, you're transferred to the V1F Division (Airdales) effective immediately". The Ensign who delivered this curt little bit of news then quickly turned heel and left. No explanation, no soft touch. Just like that, from the most prestigious division to the least in three seconds flat. But , "Yours is not to reason why, yours is but to do and ..... " (die?). Well, that's an exaggeration certainly but it fairly well expressed the feeling at the time. Besides, "C'est la guerre" my friend, c'est la guerre.

Chemistry continued: each proton and neutron are of the same mass (also considered weight) while within each electron-shell there are up to four types of orbits called s-, p- , d- and f-orbitals. There is one s-orbital in each shell, the most firmly held. This is followed by the p-orbitals (always three), the d-orbitals (five) and the f-orbitals (seven). The shapes of these orbitals are spherical, two spheres touching. Solid figure eight and crossed solid figure eights respectively. The p-, d-, and f-orbitals are directional in space. The outer electrons of the shells are more energetic than the inner ones. This detail was necessary in order to more clearly describe the Periodic Table, the Rosetta Stone of chemistry.: the elements are arranged according to their atomic number and their orbitals. Elements at the beginning of each horizontal row (period) have one electron in the outer shell. All elements in each vertical column (group) nave similar chemical properties because they all have the same number of outer electrons. Moving down the table the length of the periods increases in steps because as the atoms become larger there are more types of orbitals become available. Thus the Periodic Table emphasizes the similarities and gradation of properties within each group. To be continued with the fundamentals.

BOMBS AWAY

With the supply ship on one side, approaching us, and the carrier on the other side, the bombs dangle as they reach for the apron extending from the hanger deck. Right about now is test-time with the bombs at the level of the apron when they should be several yards above it to assure a safe and soft landing. Transferring a load such as this is always problematical when it is understood that the large bulk of the carrier continually "throws" wave after wave toward the supply ship. This in turn of course causes the smaller ship to roll more than usual and with each roll toward the carrier the load dips. This does not generate confidence. Therefore the tug on the load must be carefully timed so that it lands on the apron "lightly and politely". At 2,000 pounds each this load of 12,000 (?) pounds requires more than politeness; it requires a strong and firm control with as few stops and starts as possible to prevent a dangerous swaying back and forth. A swaying 12,000 pound load sometimes has "a mind of its own". But the war must go on so the challenges do not stop. It's a war-weary world out there so let's be done with it.

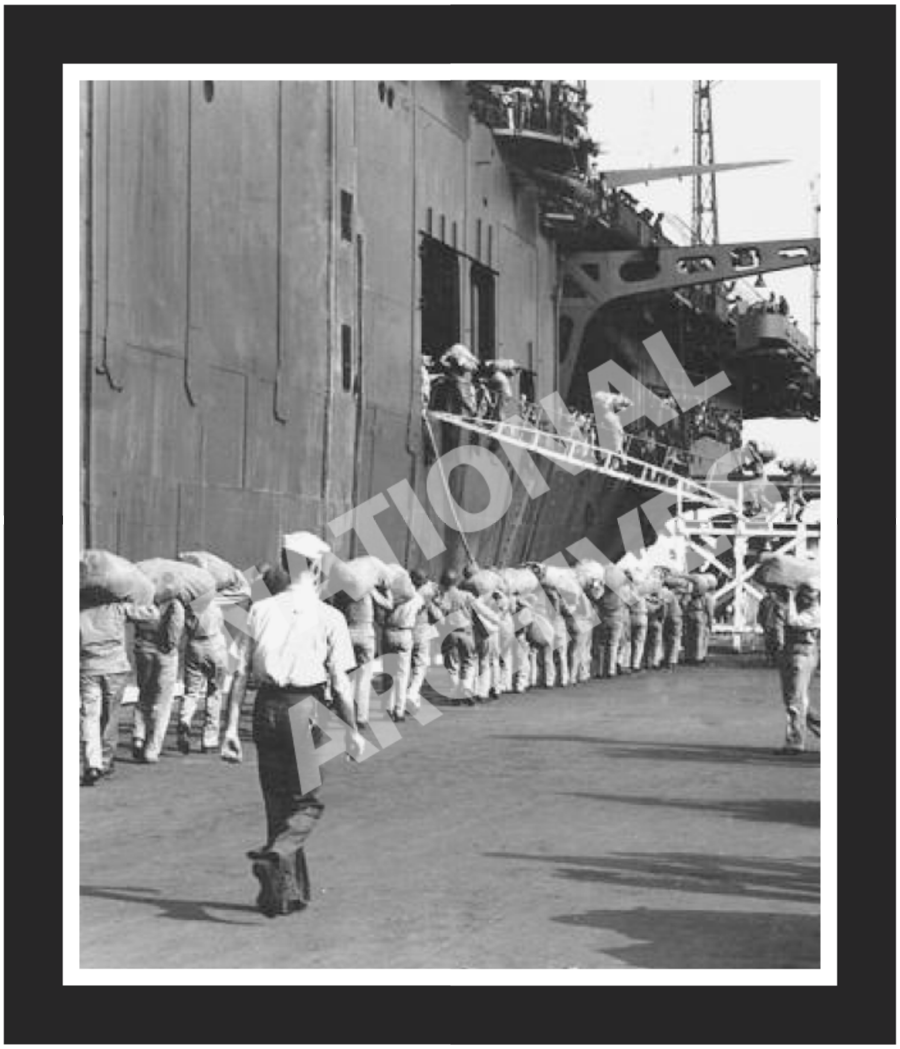
Chemistry continued: An aggregate of like atoms is a molecule and an aggregate of unlike atoms is a compound. Most of the elements (atoms) are metals which easily give up electrons (from their outer shell) allowing for electrical conductivity. These electrons are excess to the filled outer shell. Some metals have one, two, three and more excess electrons but only the elements in Group 18 to the far right of the Periodic Table have completed outer shells. They are called the Noble Gases and are of neutral charge. All other atoms are either negatively charged with excess electrons in the outer shell (cations) or with a deficit of electrons leaving their outer shell positively charged (anions). Most nonmetals are gases at room temperature. Most metals in nature are compounds in the form of ore. Metals easily combine with oxygen to form iron oxide, or rust. Oxygen is easily removed from iron oxide but sodium oxide requires a powerful electric current to produce sodium. The sodium in the sea-water however is easily extracted though the power of the sun evaporating the water. These operations are in the domain of the subset of chemistry called physical chemistry. Chemists use a form of equations to make more clear a chemical reaction. For instance iron oxide (ore) plus carbon form iron plus carbon dioxide: 2FeO + C –> 2Fe + CO(2). Matter has three states: solid, liquid and gaseous. These states reflect the condition of the electrons within the matter. The electrons in a solid move relatively slowly, in a liquid faster and in a gas even faster, Water is of course the prime example when it takes the form of solid ice, liquid water and gaseous steam.


NATIONAL ARCHIVES

WELCOME ABOARD MARINES

These are sea-going marines on board to man some of the 20-mm guns and specifically to protect the captain with his own personal "body guard". This of course was to continue an age-old tradition for the most part and probably the only part. While there were master-at-arms (Navy) on board to provide police presence, I never saw an occasion in which they were needed. Presumably the marines, who had firearms, were the backup to the master-at-arms (who didn't have sidearms to my knowledge. It was a large crew of 3,000, a small city really, but without any altercation, ever, of which I was aware. The marines' bedrolls must be on board because they are not carrying them nor are they carrying their rifles which they do have on board. Also notice that they carry their helmets on their heads rather than pack them away. Personally I like the style and slant of that sailor's cap. That's being properly "dressed". Meantime the crane is extended outward for some job and the aerial towers are in the upright position to better receive radio traffic that is constantly on the air. One might ask why the flight deck is so high up. I would say it's because the waves might wash over the aircraft unless they were high up. The more valid explanation is that an adequate hanger deck plus the gallery deck requires the height to be high.

Chemistry cont.: just how do different type elements (atoms) combine (bond) with each other? The two most important methods are "ionic" and "covalent". Except for the noble gases (which are inert) all atoms have either too many or not enough electrons in their outermost shell. In ionic bonding for instance the extra electron of a metal is taken up by a nonmetal, all of which are shy electrons in the outer shell. The metal sodium has one excess electron in its outer shell which it "gives" to a chlorine atom which is missing an electron in its outer shell. [Sodium (11) –>2+8+1, one extra electron in next outer shell and chlorine (17) –> 2+ 8+7, one electron shy of 8, a full shell.] The covalent bond between two different type atoms provides for the two atoms to share an electron each one possesses. Thus chlorine atoms, with one electron shy in their outer shells, will both share an electron so that both atoms have two electrons in common with each other. Valence electrons are those that are involved in bonding two dissimilar atoms as in ionic bonding or similar atoms as in covalent bonding. The driving force in the bonding process is the desire of the ionic atoms (all except the noble gases) to complete their incomplete outer shells. This condition is a stable one to which nature strives. The description so given is of course very basic but it does form a useful starting point for further presentations at a later time. Chemistry is a fascinating subject.


NATIONAL ARCHIVES

THE WAR MUST GO ON

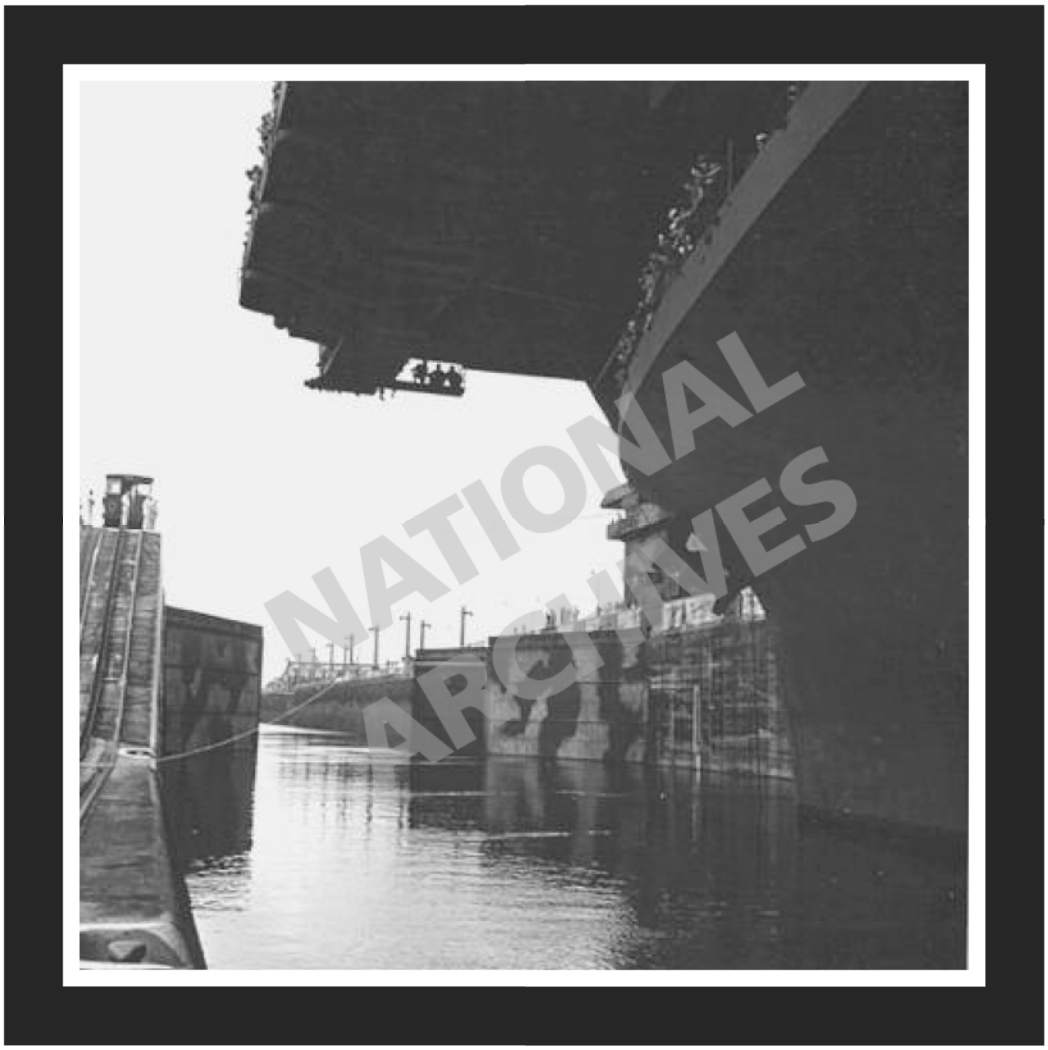
With the mighty Iowa-class battleship on one side and the imposing Essex-class carrier on the other side, this resupply ship is in good company. BUT it's also a part of a fabulous target for some insidious lurking enemy submarine. This is due to the fact that these ships, by virtue of the exercise in progress, are proceeding at a very modest pace slow enough for a submarine to intercept this quarry. Presumably there is a protective shield of surrounding destroyers but the hell of it is the uncertainty of it all. When? Where? How? (At least you know why, so they can't call it paranoia.) Not a pretty picture, this recipe for underlying anxiety. Nevertheless, we observers can sit back and enjoy the beauty of such monuments of human ingenuity and creativity as those marvelous ships with such functionality. To some (to many?) the above thoughts are just so much babble but to those others of us who appreciate the creation of complicated but useful objects, we manifestly understand. I can not say too much that most all of us take much too much for granted. It's almost as if there's a complete disconnect between those who create our ever present infrastructure and those who only use it without the slightest thought, even only now and then. Let's "get with it".

Manufacturing Technology: my own abiding interest most of my working life has been manufacturing technology generally and automatic controls specifically. An aspect of this technology is the important field of process control that produces primarily chemically derived products.This is the domain of the chemical engineer while manufacturing technology is the domain of the mechanical engineer, with the automatic control of the machines of production being under the aegis of the electrical engineer (my area of interest). This field of endeavor concerns the three prime specifications that are required of a machine's control functions: speed of response of the machine to a commanded position, the stability of the machine once it reaches its commanded destination and the accuracy of reaching that commanded position. These three requirements might turn out to be mutually exclusive at the first implementation. It is then that the control engineer (electrical engineer) has to make incremental adjustments to bring all three specifications as nearly correct as possible by designing a circuit, usually in software, to reduce the out of specification values to as low an amount as possible. Fortunately he now has the benefit of ingenious computer software to simplify this problem. However, he must still have a solid background in certain areas of mathematics and some experience, some trial-and-error and even some intuition.

PANAMA CANAL

We look upward and see the flight deck. We look forward and see the Panama Canal. We transit the Canal and receive a time to relish. Ah sweet tranquility. All is calm, all is peaceful. (It remains a puzzlement to me to realize that most everyone measures the "fun" that they're having by how much noise is being made. The more the cacophony, the more the "fun". Let's hear it for the quiet ones!). Since the Antietam was built in the Philadelphia Naval Shipyard and since the fleet carriers fought only in the Pacific Theater, we too had to make passage through the Canal. We were able to just squeak through but the present day carriers would not be able to do so. They were only about 100 feet longer than the Essexes but are twice as massive (but carry only about 2/3 the number of aircraft as did the Essex-class carriers of WWII. That's because the present dat aircraft are much larger than the F6F Hellcats and F4U Corsairs of our day. Only the TBM Avengers approached the size of the modern aircraft. However, a single aircraft of today can cause more devastation than a group of WWII aircraft what with the more lethal "smart" bombs that use radar to acquire and track its target. Speaking of advances, if a ship can be powered by nuclear energy why can't our factories do the same? (This should be considered a rhetorical question since politics is not considered in these pages.)

Control Systems: As mentioned, control systems are an integral part of manufacturing systems. The basic concept behind the controller is as old as James Watt's steam engine where the outward centripetal force on a set of rotating iron balls the size of baseballs would activate some gears that in turn would decrease the driving signal to the engine thus slowing it down. In modern day control systems the difference between the desired input and a signal fed back from the output would be an error signal that was then used to correct the output. That is, the desired input X is compared to the actual output Y and the difference, error E, is applied to the driving motor to restore the output to its desired position (the driver is an electric motor which turns CW for a positive error and CCW for a negative error). A comparison circuit generates the error signal, an amplifier amplifies the error signal and a tachometer generates an output signal as a function of speed (presuming a speed controller). The accuracy, the speed of response and the stability of the system are all adjusted by modifying the error signal in some unique way which requires a mathematical evaluation, Without explaining it, these modifications to the error signal involve the application of additional gain, the application of integration to the error signal and the differentiation of the error signal. These modifications are done by a filter combination of gain, integration, and differentiation.


NATIONAL ARCHIVES

GHOST SHIP

Where is everybody? Why isn't the deck teaming with people? What a bizarre picture! The Antietam was awash with colored shirts and a island superstructure crowded with onlookers. The only people to be seen here are that one sailor next to the signal light (upper right) and that Airdale on the tractor (lower right). What's really weird is that there's no one in Pri Fly just above and slightly back of the engine cowling. The Air Officer and three of his staff should be there "running the show". Part of the explanation is that this is the last Essex-class carrier built (the U.S. Philippine Sea named for the biggest naval battle ever, fought in 1945). Her duty was during the Korean War, 1950-1952 which had no naval battles. Nevertheless, where are the people? I don't know but I thought the deck-level view was interesting. This F4U Corsair is obviously taking off since its tail-hook is in the retracted position but I don't recall such an extended take-off run: the aircraft take-off point was right under the Pri Fly . Here we observe that the tail-section is already elevated in preparation for lift-off. We have a good view of the flaps on the trailing edge of the wings being in the down position to provide additional lift at the slower speeds of launch and landing requiring the air over the top of the wing to move faster than on the bottom thus generating lift.

Automatic Controls: automatic controls, what do they do? One very important application is to operate the articulated mechanical arms that place integrated circuit chips into electronic circuit boards as are found in your computer system, TV, and other such devices, These arms are much faster and more accurate than a human arm. The mechanical arm grasps an electronic chip, lifts it upward, swings horizontally and then moves it downward to place the chip into needle- size holes. It does this in two seconds maximum (speed of response) with no errors (accuracy) time after time again (stability). The machine with the articulated arm can be programmed to do any number of similar jobs. Instead of a grasp attachment at the end of its arm, there could be a cutting tool that shapes steel or cuts unique parts from metal, etc. The computer software program can be taught to make decisions based on the results of its actions. There is a machine which is programmed to etch a very complex design, such as handwriting, in a block of steel. Different people are thrilled by different things. I'm not embarrassed to say that I'm thrill whenever I watch a automatic machine-tool in operation. I appreciate the ingenuity of such a machine. It's better than a robot: these automatic machine-tools create useful things that make our lives better. That's good.


NP
S
NAVY
NATIONAL ARCHIVES

HELLDIVER ON ITS WAY

How can a machine of war contribute to such a pretty picture? Its silhouette makes it look flat especially against those magnificent cumulus clouds that define three-dimensions. Actually the clouds speak to the huge amount of energy stored in those bulbous reservoirs of water. (I darkened the aircraft to "flatten" it at the same time darkening the clouds to give them more "volume". Thus the emphasis is on the clouds and not the aircraft.) The pilots called the Helldiver "the beast" because of its bulk but mostly because it had problems early on. I can't comment on the latter but as to the former, it has strong lines, not ugly ones. At this time it's making a dive (probably for practice because the bomb-bay doors are not open (yet?)). Perhaps this is a shallow dive but it's my understanding that this is how they did it. No doubt there are those who believe it should go "straight" down. Since they start at a high altitude this would not seem a sensible way to do it, but I defer to the experts on this. It would seem to stand to reason that going straight down from a high altitude would cause "blackouts" since the pilots of this era did not have pressurized suits. Before joining the Navy I applied for the V-5 program that trained you to be a Navy pilot. They said I had high blood pressure and so I did not qualify. However, if I had qualified I'm sure I would have "washed out" because I become very light-headed with motion such as this. But that's how it goes.

Control Systems: As was said previously, control systems are based on the idea of feeding back a part of the output so as to compare that with the input which represents the desired output. Any discrepancy is the error signal which is used to bring the output back into conformance with the desired output. This concept happens all the time such as when you are driving the car. It happened when I was at the helm of the Antietam during my short time in the Navigation Division: the Officer of the Deck (OOD gave a command to head at 20 degrees. We were heading at 60 degrees so I spun the helm ("steering wheel") about 1 ½ revolutions and watched as the compass started to approach the 20 degree desired output. If the compass needle swung past the 20 degrees (it didn't because I started correction before reaching 25 degrees) I would use the difference between that reading and 20 degrees as the error signal. Thus the error signal would then be used by me, the controller, to turn the wheel in the opposite direction. I might have overshot the 20 degrees again slightly in the other direction but again reducing the error even smaller. This process described is called "hunting" (not good). The speed of response might be alright but the accuracy was bad and the stability marginal. (DON'T drive your car this way!)


NATIONAL ARCHIVES

"SMOOTH SAILING"

How placid it all seems as it floats there so smoothly through calm skies. Not having been a pilot I can only surmise that in fact this flight is characterized quite differently: the cockpit is badly constraining what with hours of solitary travel. The engine not feet away is properly giving forth with endlessly loud noise. The entire frame of the laboring aircraft is vibrating incessantly and the fumes emitted by the engine is close to nauseating. Not an attractive situation surely, but what do I know, never having been a pilot? Now if one were to ask about what an Airdale thought (and no one has) then I could paint a proper picture, I would tell them true. It seems that most people, and most people are not pilots, will say that piloting an aircraft such as this one is "glamorous". However, have they thought it through and factored in the foregoing? Probably not, which is typical of most subjects (sad to say). Add to the above the fact that those pilots had the mental fatigue of flying for hours over vast stretches of the endless Pacific Ocean to say nothing of the anxiety of not knowing what lay ahead when in enemy territory. If glamorous means heroic, fine, but heroes also die in inhospitable circumstances. Part of the mystic here is that all of the pilots were volunteers (extra pay notwithstanding). We are in their debt.

Control Systems: engineering concerns itself with understanding and controlling matter and forces of nature. The control system engineer in turn is interested in understanding and controlling a portion of this universe which is called a system. There are two aspects of this effort, namely understanding the system and then controlling it. Once the system is understood the means of control are derived with the aid of a mathematical model of the system. This involves industrial manufacturing, chemical processes, and aeronautical, mechanical, and electrical disciplines. The end result is the control of the system response. In order to understand and control a complex dynamic system one must analyze the interrelationships between the system variables as defined by the math model. Furthermore, since control systems imply dynamics, a firm grasp of the calculus is necessary (differentiation and integration and differential equations). Even though there are computer programs available to do much of the calculations, the math models must be understood. The basic physical laws (voltage equals current times resistance, etc., etc.) are used to derive these differential equations. In sum, (1) define the system and components, (2) formulate the equations and assumptions, (3) describe the differential equations of the model, (4) solve the equations for the desired output variables, (5) analyze again to satisfaction and repeat the process.

WHAT NOW MAESTRO?

We're in the Ready Room, we pilots. We're digesting the latest data concerning our next target, an airfield. Apparently we're all set to go what with our parachutes on, helmet and goggles at the ready and a Bowie Knife strapped to our side. These pilots are what some called "the point of the spear". One wonders what they are thinking right mow just before climbing into the cockpit for launch. Is it going to be a spirited run against an overactive defense bristling with AA guns and swarming hostile aircraft? Or is it just another rerun of a now moribund target still smoldering from a previous strike? As in most other activities, including the flight deck, there are those who relish the fray and those who do not. Some of these pilots probably can't wait to mix it up with the enemy. It's a "game" to them (but who knows why) while to others it's a matter of overcoming a genuine reluctance to engage (here we have a fine example of the "analog" to be discussed next). These latter are in a real way more dedicated to their job than are those who relish the confrontation. To the latter it's a necessary ordeal that must be overcome. On the flight deck I would probably place myself more than half way to the latter category. The former provides the needed verve while the latter gives the enterprise a necessary stability.

While the digital computer uses the classical logic of ones and zeros (switch on, switch off) a different type of calculator makes use of what is called "fuzzy logic". This is a new technology that appeared in the 1970's. Instead of seeing the world in black or white its world is all the shades of gray . The digital world would say it's either red or not red. The "fuzzy" world would say it's a given shade of red, one of many. This is how we humans know the world. The digital computer has it easy: it's either this or that and that's what makes it so powerful. We "analog" humans though respond to gradations which is illustrated by a human operator controlling a crane that lifts cargo containers by cables from a ship and runs it perpendicularly from the ship to a waiting truck- or rail-bed. When the crane-head moves horizontally away from the ship the load sways away from and toward the ship if the crane-head moves abruptly (which it must because time is of the essence). The fuzzy logic controller controlling the crane-head compensates for this sway by emulating what a human operator would do (which is to anticipate the motion of the load by controlling the crane-head acceleration and deceleration.). This replication of a human operator's actions is very easily programmed in a fuzzy logic controller while the reason a digital computer controller is inadequate is the nonlinear nature of the system. Analog wins here hands down.


ALL PILOTS
OF THE TWO
TO DETERMINE
POINT OF AIM
290 KTS — 2500' ALT.
DIRECTOR SIGHT
TARGET PUT
OR 45°
DIVE
SPOT
ORD.

NOT A MISSIONARY'S MISSION

What needs to be done will be done because war is Hell and theoretical discussions will never change that. And so there will be Hell to pay at this Corsair's destination,. The 5.25-inch rockets under the wings will travel line-of-sight zooming in to awaken the recipients followed by the parabolic curve of gravity delivering the bomb to send them to oblivion. Not pretty this even if necessary. That other item under the fuselage is a detachable auxiliary fuel-tank. It is not jettisoned as was done by the Army Air Force during WWII. On a ship supplies are scarce. (The Army Air Force was changed to a separate Air Force along with the Army and Navy (sorry, but the marines are still a part of the Navy). The marines did though fly off the carriers in Corsairs to provide support for the marines on the ground. The Corsair's long nose gives the impression that it has an extra large engine. Not so. Without going into details, its engine is the standard radial engine as are all Navy aircraft (easier maintenance) but it was so designed that some of the Corsairs had up to 2,800-hp engines sufficient to drive the large 13-foot diameter propeller. (All Army single-engine aircraft except the Thunderbolt were in-line water-cooled engines. These of course presented less air-resistance but at this point I fade and leave further comments to the experts.

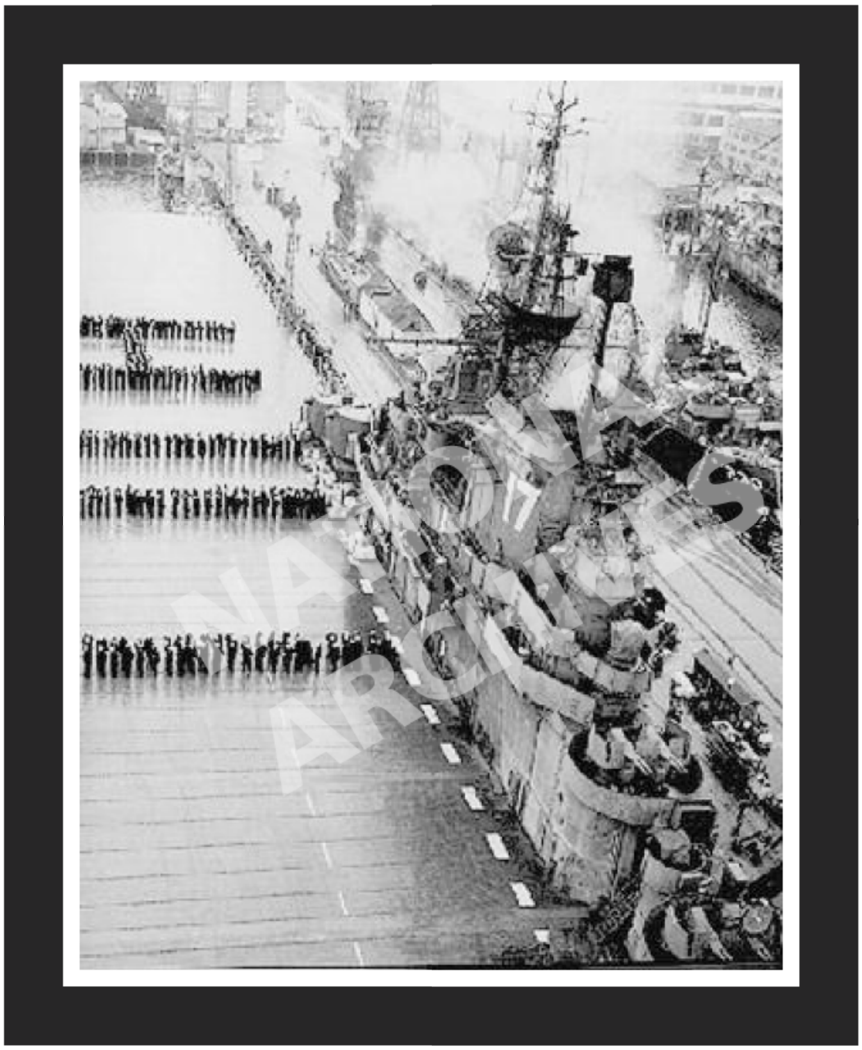
Fuzzy Logic: the task at hand is to design a machine (controller) that replicates the human operator of the container- crane keeping in mind that the container varies in weight from container to container. Also keep in mind that it is foolhardy to make a decision or come to a conclusion without the hard solid facts of the situation. Just so it is foolish to operate a crane if you don't know the conditions of the crane and load. Thus the operator might make the following rules-of-thumb: (1) start the crane with medium power, (2) if you're started and far away from the desired position (right over the truck-bed) adjust the motor-power so that the container lags somewhat behind the crane-head, (3) if you are closer to the desired position reduce the speed so that the container precedes the crane-head by a small amount, (4) when the container is very close to the desired position power up the motor, (5) when the container is over the desired position and the sway is zero stop the motor. In order to automate the control of the container-crane it is necessary to have sensors to provide the controller with the requisite input values. In this application the distance of the load from its desired position is required as well as the angle with the vertical of the sway of the cable holding the container. These will be called "Distance" and "Angle".These values will describe the current condition of the container. To be continued.


B
NAVY

ISLAND RISING

There it stands, the distinctive feature of an Essex-class carrier, the island superstructure bristling with guns and fire control radars and search radars and communications antennas as well as the "brains" of the ship. Strange to say, it was this configuration that was my "totem/talisman" for the discouragement, the depression, the loneliness (of an unrequited love) endured in the dat-in, day-out noisy and hostile world of those "angry aircraft". That a "totem/talisman" was necessary could be found in the fact that one of the Airdales,, a constantly dejected, dispirited and distracted fellow, paid for that with his life. Soon after another Airdale pointedly told me that that Airdale had "family problems" back home. Sometimes, in some instances, a "totem/talisman" is needed. Mine was that majestic island. Now though the museum ships in New York City, in Charleston, in Corpus Christi, in Hunters Point, they all have had their islands shorn of their distinction. They are no longer the ships that I once "knew and loved". They are a mere shadow of their former selves and they no longer inspire as did the WWII generation. Time and circumstances change and so did the Essexes. But fortunately there are these pictures to retain those ships of yore, those magnificent Essex-class carriers of which I am proud to have been a part.

Fuzzy Logic continued: the previous five rules must now be converted into IF-THEN rules. (1) IF Distance = far AND Angle=zero THEN Power= positive medium. (2a) IF Distance =far AND Angle=negative small THEN Power=positive big. (2b) IF Distance =far AND Angle= negative big THEN Power=positive medium. (3) IF Distance=medium AND Angle=negative small THEN Power=negative medium. (4) IF Distance= close AND Angle=positive small THEN Power=positive medium. (5) IF Distance =zero AND Angle=zero THEN Power=zero. IF-THEN rules always represent a reaction to a given situation (If this situation then this action). In this container problem each situation is identified by two conditions: Distance and Angle as derived by sensors. The conjunction "AND" assures that the values of both variables Distance and Angle are considered. The question remains, "How are the actual values of the variables Distance and Angle "fuzzified?" That is, how does a fuzzy controller use precise values? And once fuzzified, how does the controller infer the proper value of power to use to bring the container (load) to the proper spot both accurately and quickly (speed of response)? Once the variable values are fuzzified the controller uses fuzzy inference to do the job but once done, how does it defuzzify the result? This will be discussed on the next page. The concepts are not hard but they do require thought.



INSPECTION TIME

The requisite inspection before liberty-call was usually not much of an inspection beyond being neat, clean and with a haircut (no shaggy dogs here). It was perfunctory at best, the continuation of tradition of which the Services are properly wont. Tradition in the Navy was part and parcel of basic discipline without which the military Services would be a Service in name only. Why do they call the Services "Services"? It doesn't take much thought to understand why. Tradition means conserving from the past that which is good and beneficial to all of society, the best of what preceded, the tried and the true. As we go from generation to generation things change, sometimes for the better but also sometimes for the worse. It is here that tradition should be revisited for its wisdom that survived the test of time. To blithely proceed without paying heed to those before them could well lead to unnecessarily taking the wrong direction at the proverbial fork in the road. As has been said, in paraphrase, "those who forget the past are doomed to relive it. Admittedly, this could be all to the good but also all to the bad. Build on what has been found to be good. Conserve this accumulated wisdom even while maintaining an open mind as conditions change and new approaches are called for evaluation. A closed mind is no mind at all especially when looking either forward or backward. (How we arrived here from an inspection is mot clear. Oh yes: conservatism in the name of progress is devoutly to be desired, and traditions are its handmaid.

Fuzzy Logic continued: we will consider a specific situation, namely that the target position is 12 yards from its starting point. How is this represented? First, assign linguistic values to the variables: Distance (far, medium, close, zero and too far); Angle (positive big, positive small, zero, negative small and negative big); Power (positive big, positive small zero, negative small and negative big). Now assign the maximum Distance as 30 feet, the maximum Angle as 80 degrees and the maximum Power as +/- 30 kW. Next we construct a graph for each variable Distance, Angle and Power with th x-axis being 30 feet, +/- 90 degrees and +/- 30 kW respectively. With this we can identify the numeric value of 12 feet in linguistic terms: far, to the degree of 0.2 and medium to the degree 0.9. The rest are zero. Next, zero degrees to the degree 0.2 , positive small to the degree 0.8, the rest being zero. (It sounds complicated but with a simple z-y graph, it is simple. With the input variables converted to linguistic variables, the fuzzy inference process can identify the rules that apply to the current situation of 12 feet and can compute the values of the output linguistic variable. This will be continued on the next page.


NATIONAL ARCHIVES

MAIL-CALL

The "mail-call" sound over the PA system is sweet indeed. Three thousand pairs of ears perk up at its call. And why not? Once a month does not provide much solace. Yet what does one expect? This is wartime and the enemy doesn't care about your tender wishes (do you care about theirs?). In any case the letters I received were never "personal" in that special way. "My girl" did not have the sentiments toward me that I had toward her. "That's the way it goes" was the overriding expression in those days whenever things didn't go your way, Because her feelings toward me were only perfunctory I was limited in what I could say to her while she certainly wouldn't be interested in what I did. That would only cause more distance between us, But who cares about this. Of more interest is is how they move the load from here to there.. Or why they do it this way and not that way. Or why so many people are involved. Or what division are these people from. Or how mail went from here to my bunk. Or when is it too rough to make this transfer. Or how was the lead-line passed from which ship to which ship. Or is that all just mail. Or how long does the operation take. Or is there danger from lurking submarines. Or how fast are the ships moving Or what else comes to mind? The point to be made here is that one should have an inquisitive and active mind, always nurturing it. As has been said, "A mind is a terrible thing to waste". Gas yours so been?

Fuzzy logic continued: each linguistic variable (far, medium, close, etc.) is represented on an x-y graph as a triangle having the same y-value but having a different base value. Thus "medium" ranges from10 to 25on the x-axis and "close" ranges from 0 to 10 on the x-axis. Therefore the triangles in all cases intersect the triangle on both sides of it. We are now ready to consider fuzzy inference. There are several ways of inferring the correct power to apply based on the amount of intersection of the two membership functions (each triangle on the x-y graph). A numeric value (say 12 feet and 5 degrees) is included within two linguistic membership functions (say 0.2 of the "far" and o.8 of the " medium". Similarly for the other variable. According to the rules set down earlier, these values (0.2 of far and 0.8 of medium along with 0.3 of 5 degrees and 0.7 of 10 degrees, say) convert to 0.1 of small negative power and 0.6 of zero power. A ratio or a proportionality or some other method is then used to obtain the numeric value of, say, negative 2 kw. The foregoing admittedly sounds complex but in fact, when using x-y graphs, is intuitively straightforward. A handful of IF-THEN rules are the "only" programming needed where only VERY complex equations are required for standard control systems design.

TOPSIDE SENTINELS

It was obviously important that the ship knew what was out there at all times, even beyond the vision of mere mortals. Radar provided this early warning and was thus invaluable. There's no need to identify everything in this picture except for the large items. To the left middle can be seen the parabolic radar dish (reflector) of the Mk 12 Radar antenna which sits directly atop the big "box", the Mk 37 fire-control director for the dual 5-inch guns below it to the left. This fire-control system was used exclusively on carriers, battleships, cruisers and destroyers. It could handle all air-targets except the enemy's Buka bomb that was propelled by its own engine. Part of the Mk12 assembly is the small IFF (Identification Friend or Foe) antenna. Also part of the Mk37 system is a 15-inch optical rangefinder. Connected to the parabolic reflector is the Mk22 Radar antenna. To the right and up is the SP Radar, an 8-foot dish with a range of 80 miles. To its right is the SK Radar configured as a 17x17 foot antenna. This radar could detect targets at a distance of 100 miles also having an IFF antenna attached to it. However, during the latter part of 1944 it was replaced by the 17-foot circular SK-2 Radar because it produced no wasteful side-lobes (of radiated energy. The Antietam had this radar at the outset and as the other carriers had, many smaller high-frequency radio antennas that seemed to "sprout " everywhere. It not only carried aircraft, it carried electronics of all shapes and sizes. With the war, technology was on the ascent, never to look back.

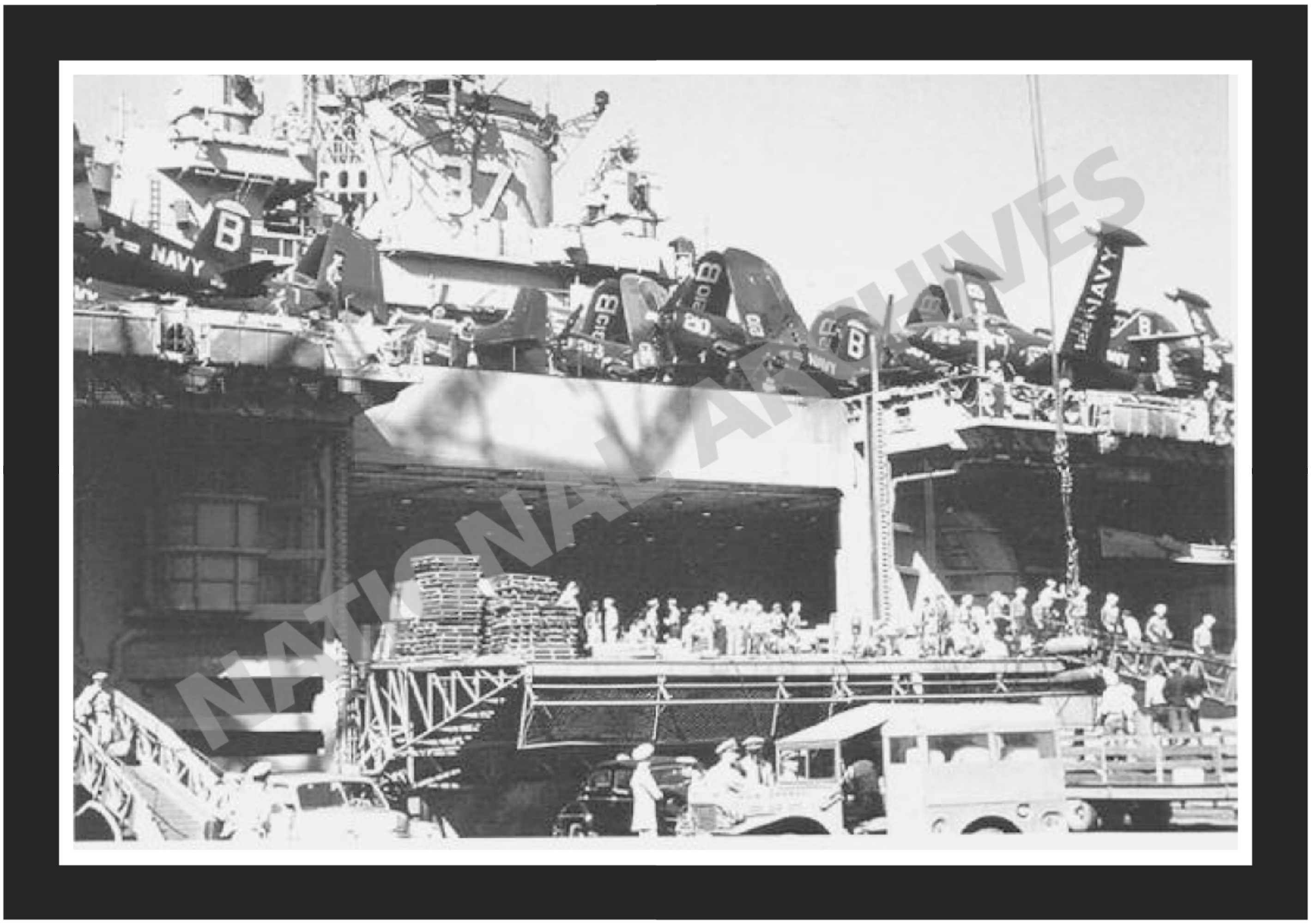
Neural Networks: artificial neural networks (ANN) are computer software programs that imply a biological neural network in that for a given input stimulus there is a corresponding output response. In effect, the ANN is a pattern recognition program that uses a computer to do the "heavy lifting" (mathematical calculations). It's been ten years since I was last involved with ANTs and their applications while in the Navy Department. Things no doubt have changed and since my reading acuity has been limited and since automatic controls has been my interest I have not stayed current with the technology. I can say that the most similar version of ANN to biological neural networks has been a computer program that in effect replicates the biological stimulus-response link. It was developed at the National Institutes of Health (NIH) in Bethesda, MD close to my home. However, the most comprehensive system by many, many orders of magnitude is the Holographic Neural Network, (Hnet) also based on the biological stimulus-response link. It could accept hundreds of thousands of stimuli and generate just as many responses in almost real time (instantaneously). What a truly remarkable software program!


NATIONAL ARCHIVES

U.S.S. PRINCETON (CV-37)

Commissioned in June 1949, it carries the Douglas AD Skyraider and the Grumman F9F Panther jet. The first thing to note here is the depth of the gallery deck immediately below the flight deck and as seen above the lowered deckedge elevator. By comparing the size of the people on the hanger deck one can judge the headroom on the gallery deck. Also note that even though it's daytime the hanger deck lights are turned on to facilitate the movement of supplies there from the pallets now stacked on the left side of the deckedge elevator. Since the elevator is used as a loading dock they have lowered the netting on the outside of the elevator (the netting was to prevent Airdales from falling off the elevator when positioning aircraft there. There's an access bridge on either side of the elevator, the one on the left for the "liberty hounds" and the one on the right for the "working stiffs". When on terra firma and looking up at the ship, it's an impressive panorama to be sure, probably more impressive than when actually in among the aircraft because you get the "big picture". Strange how one can feel nostalgic looking at these pictures of a place that once held more than a little anxiety much of the time and outright fear some of the time. Now though all is benign, all is calm all is "comfortable.

Neural Networks: ANNs find many applications that solve diverse problems that can't be solved otherwise. Both fuzzy logic and ANNs have been programmed with relative ease to imitate your balancing a broom on your fingertip. To my knowledge this has not been done using standard control techniques because the differential equations of the model's dynamics of the problem are not easily forthcoming. Also the computations would be prohibitive in terms of the necessary real-time solutions (I believe). The area of applications that I set for myself is based on the concept of lookup tables which in effect are decision tables based on a set of IF-THEN statements. These are not the same as the fuzzy logic statements where the values of the variables are "fuzzy" (far, near, etc.). ANNs use precise (numeric) values. In addition, the fuzzy logic example of the previous page used only two variables, Distance and Angle, to solve an actual problem to good effect. On the other hand, ANNS can make use of dozens of variables very easily while the Holographic Neural Network (Hnet) can solve problems using tens of thousands of variables in an "instantaneous" fashion. Such large problems have no practical value (unless someone from the chemical industry or refinery plant tells us differently; they're concerned with number of variables, not speed of response). The next few pages will discuss some applications of the Hnet software (which can be trained to recognize in seconds hundreds of thousands of faces).


NAVY
B

CLEAR SKY, CALM SEA

Clear sky, calm sea, clear deck and smooth sailing as the flags flap in the breeze made by the ship's progress. Here now we have the perfect time to relieve our frazzled nerves before the next reprise of flight quarters sounds shortly. At least that was the way it was on the Antietam as we trained squadron after squadron for duty on the other carriers. There was no respite between assaults on enemy targets as was the case for other carriers that were given R and R (Rest and Rehabilitation) between raids on the enemy.. "Sure, that's true but then you didn't have those enemy air attacks on your ship as we did whenever we ventured into hostile territory". This is an argument I never heard but I'm making it for the reader. My only rejoinder to this might be that who knew when our roles would be reversed, such as tomorrow? Those things never concerned me because I took each day one at a time: Whew! Another day accomplished unscathed. And that was about it, no more, no less. But hey, flight quarters is going to sound in a little while so stop the prattle and enjoy the view while you still can because this afternoon we'll be launching 90 aircraft just as we did this morning. Sun rise, sunset, sunrise, sunset and so it goes without change or letup.

Neural Networks continued: over ten years ago I put together a concept and applications of this concept. I'll provide two summaries of this concept and then illustrate its use on the following pages. First summary: (1) A neural network table lookup methodology is a solution looking for a problem to solve. (2) The problem must be in the form such that a decision, a diagnosis, a control action is a function of a set of conditions (3) The solution to these many conditions each of many values is to teach (train) a neural network a set of these input-output pairings (input conditions/output decision). (4) Thus the effort consists of finding those problems that have a unique output for a unique set of interrelated, multiple inputs. So, it's find the appropriate problem, find the parameters which apply to the problem, generate the lookup table, train the neural network, and finally test the system. To be sure, the third step is the creative one and the one that requires knowledgeable understanding of the problem. That is, an expert(s) must be able to know the answers to the content of the lookup table. The expert must know that if A and B and C and D then X. This statement comprises one horizontal line of the table. In practice there will be tens, hundreds, thousands of these horizontal lines. The vertical columns of the table represent the variables (conditions) of the problem, each of which can have a thousand values. Applications will clarify this,


NATIONAL ARCHIVES

OUR FLAG ON HIGH

I don't recall our flag ever having bee flown from on high as here. Invariably our flag was flown from a mast attached above Bat Two (Battle Station Two, the after pilot house in case the forward one was put out of commission due to enemy action). Long may she fly in honor. Ordinarily I am not partial to a picture having too much detail. This picture is picture-perfect. Even the circular 7-foot diameter search radar can be seen with clarity as it's etched against the sky. Only the newer Essexes carried this type radar instead of the 17-foot square antenna that generated wasteful side-lobes of radiant energy. With guns "at rest" and an unpopulated deck it seems strange indeed. Even that F6F Hellcat is alone with a partial companion that perfectly reflects my situation on the Antietam: all alone but never without a crowd on deck and never that person that could be called "a buddy". So it was throughout my thirteen months in the Navy. It was in no way a hardship even though to have had it otherwise would have served as support to a limited extent. However I have no complaints whatsoever in this regard. It was part of the territory as I had devised. (To be a little more blunt, it was partly because I couldn't abide the typical military banter of guys away from girls. Crudity was not my cup of tea.)

Neural Networks continued: to review, (1) Areas of interest are decision-making, diagnosis/troubleshooting, and control actions. (2) Develop applications in these areas by using the concept of a syndrome: a pattern of symptoms (an indication of something derived from sensors which together characterize a specific, a particular condition. (3) Based on specific conditions, an expert(s) defines (predetermines) a specific decision, diagnosis, or control action. (4) Now train the neural network to learn these input-output relationships . (5) Next download this decision table into the computer. // One of the beauties of a neural ne lookup table is the "instantaneous" interpolation of retrieving the output when using the software package HNet. These things will become clearer as we describe some applications. // Ten years ago I found a short treatise by two medical doctors in the library of the National Military School of Medicine at the Naval Medical Center in Bethesda, MD. In their presentation they provided exactly the type of data for which I was searching. Their data and their idea was generated before the advent of neural networks though. Therefore all I did was to apply the above concept to their thesis, namely that medical disorders could be identified by determining the values of the constituent parts of the blood as determined by devices that "read" a blood sample. To be continued.

WHAT'S NEXT?

Now that the Airdales have positioned this Hellcat they're off to the next job which is placing aircraft in preparation for a launch. Note that someone, most probably the brown-shirt plane-captain, is in the cockpit to apply the brakes should they be needed while the aircraft is being pushed by the Airdales. With this calm sea that isn't necessary but plane-captains are solicitous of "their" aircraft. Pilots don't do this because they're in the cockpit only when the engine is being fired up. Beyond that shining sea is a carrier to the left and a battleship to the right. What comes to mind is that we're looking at a giant game- board with toy ships which are moved according to some esoteric strategy/tactics. Actually, the small ships and when they're there the diminutive clouds on the horizon give one the sensation of the vastness of the scene. Observe that the Airdales are not talking one to the other. There's no small-talk or prattle going on here. Or groups of people. This picture illustrates well the business-like demeanor that accompanies all activity on the flight deck during "business hours". The atmosphere of "camaraderie" is missing because there's serious work to be done and more serious situations in the offing with which to contend. This is a sober job, one not conducive to chit-chat or idle banter and there are NO standup comedians here, for sure.

Neural networks cont.: what follows is a verbatim recording of a report that I made over ten years ago: "The doctors proposed that a person's disorder (a medical term) can be indicated by the levels of the constituent parts of the patents blood. What they did was to take blood-sample readings of each of a large number of people all of whom had disorder X. This generated a "profile" (what has been called a "signature" elsewhere) of the disorder X. Thus the profile of disorder X is (using nonsense numbers) that the amount of Total Protein is 27, the amount of Albumen is 6, the amount of Calcium ion is 42, etc. They were thus identifying a disorder by taking the average of each of the 12 constituent parts of the blood- sample of many, many people with that disorder Then they did the same procedure for each of many different disorders, thus obtaining a set of profiles, (This standard method of medicine of using syndromes is maintained here in that it is a set of conditions that determines what the disorder is. But in this case –as is critical to the methodology of this report – the set of parameters (constituents) are fixed, i.e., every disorder is a function of the same set of parameters. With this background, a system will be briefly described that could theoretically be operated by a technician (to be verified by a doctor), There is an instrument that will evaluate the components (constituents) of a blood-sample consisting of 70+ (to be continued)


31

PARTIALLY STACKED DECK

This is what I'd call a very modestly packed flight deck. The only conclusion I can surmise is that half the aircraft are on a mission and that this contingent of aircraft will be launched before the others return. There's a sprinkling of each type of aircraft here (F6F, F4U, TBM and SB2G) as they warm up their engines for a launch. The Hellcats and the Corsairs are armed with 5.25-inch rockets under their wings instead of bombs implying close air support for the troops on the ground. I detect Airdales manning only the up front aircraft—so where are the others? Well they're not there because for some reason the wheelchocks have already been pulled which was not the operating procedure, ever, on the Antietam.

Continuation of previous page: constituents, in the exemplars of disorders (Remember, an exemplar here is a set of values of a set of constituents of a blood-sample for each of many disorders). This set of exemplars would be learned by the neural network, as usual. Now, the technician would draw the blood-sample and place it the instrument that detects the amount of each of the constituents of the blood-sample. This data could be automatically read into the neural network which in turn would "instantaneously" indicate which of the disorders is most closely matched by this sample. This concept is admittedly theoretical since it is not known whether the medical community buys off on the idea of relating am exemplar to a given diagnosis. There seem to be so many exceptions and unknowns in the medical world that all of the above could well be problematical at best. Also, perhaps the range of values of the constituents for a given disorder may be too large in the real world. And yet, the concept of developing a set of exemplars that represent various disorders would seem to be made to order for an area where the very nature of medical diagnosis is based on the idea, and yes, the necessity of thinking in terms of syndromes. For it's the idea of "syndrome" upon which this report based. A "syndrome" and an "exemplar" are different names for the same thing: a set values of a set of parameters representing a decision/diagnosis/action." Ten years ago there were devices that could read a sample of blood and generate the values of as many as 70+ constituents in a matter of a couple of minutes at most. How many constituents would be required is a medical opinion, certainly not mine and the medical viability of this concept was not ascertained by my inquires back then. Having received no ratification I discontinued further efforts. In any event, I owe a more explanatory description of the workings of a neural network lookup table. That will come next, followed by other applications.


136
132

BIG BIRDS AT REST

I have previously said that I was a loner. I'm not proud if having been one and I wouldn't wish it on anyone. It would have been much better (it's always better) to be a part of a support group especially on the flight deck.

Neural networks: It's time to describe the lookup table that is the centerpiece of this type of application. The letters A to K represent the variables, such as G = the constituent calcium ion, H = the constituent albumen, etc. Each variable can take on a range of values.

A	B	C	D	E	F	G	H	I	J	K	
											1
											2
											3
											.
											n

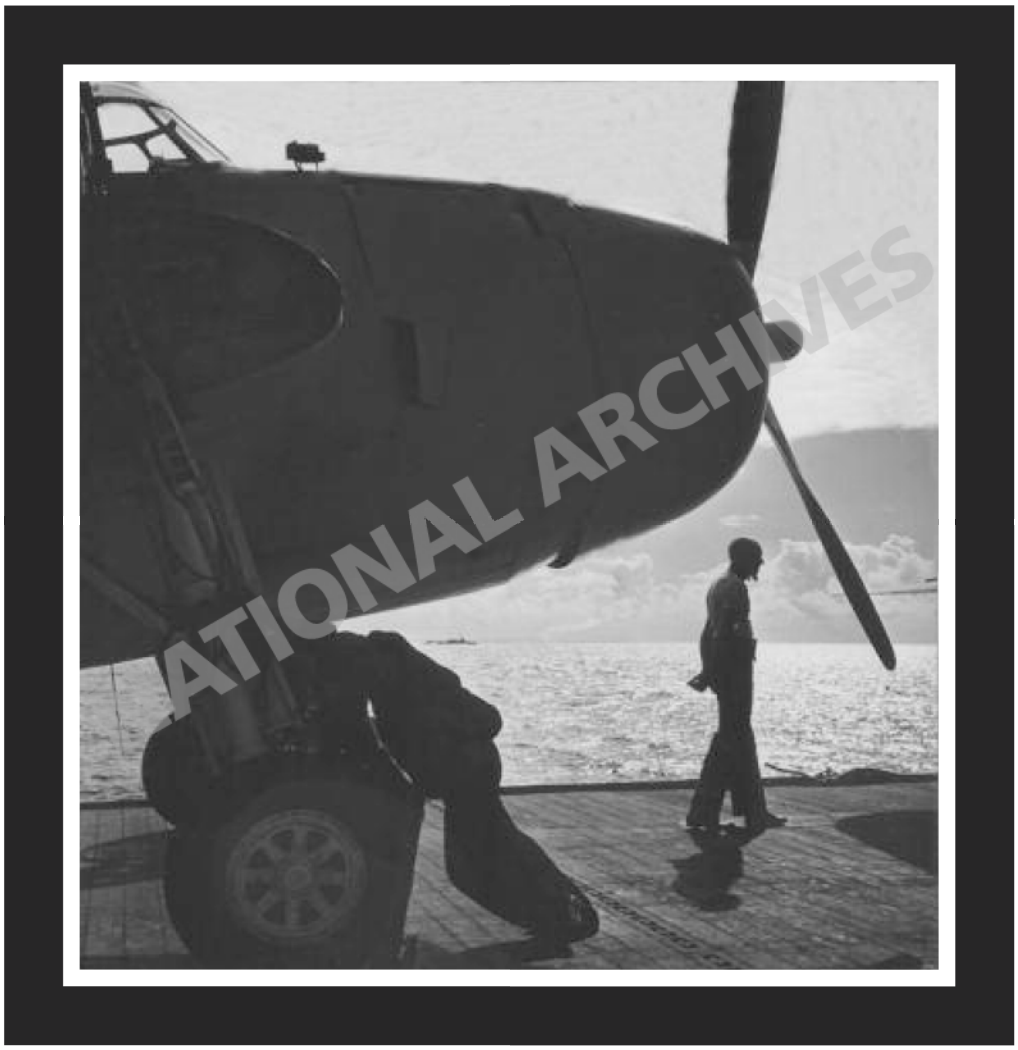
Each row is an exemplar (or vector) of a specific disorder (or decision or control action). The numbers 1,2,3,...n are the output of the decision table. Thus we have "n" specific, unique outputs. As was mentioned earlier the number "n" can be tens of thousands (if one were so inclined to deal with problems of such vast magnitude). Thus a device takes readings of a large number of those with disorder X, takes the average of these readings and places these averages into the table. Thus the variable B might equal 61, the variable C equal 18, the variable D equal 7, etc for disorder X The same process is done for all of the rows "n". Next this process again uses the measuring device to read the values of another group with disorder Y and so on for all the disorders "n". We now have a lookup table of exemplars for each of the disorders. (The exemplars are mathematically called "vectors".) The next step is to load the computer (neural network) with the decision table. To run the program an operator applies a vector to the decision table where the vector is a set of readings A to K of someone who is to be diagnosed for an unknown disorder (his blood-sample was analyzed by the measuring device). This data could be typed into the computer or applied directly from the measuring device. With the application of the patient's blood-sample vector, the computer (neural network) "instantaneously" compares it with every exemplar in the decision table to find the closest match. In effect the NN (neural network) decision table is a large set of patterns that can be likened to a graph on an x-y plot. Trying to find two graphs that match is difficult especially if there are 100 or 1000 variables in the table. To the program HNet this is a "piece of cake". To find a perfect match is "impossible" but the HNet interpolates within the table to find the best match. If the best match is with row 21 then diagnosis #21 is the "solution" to be ratified by the doctor after the nurse ran the test. Even you or I could run the test.


7
16
NATIONAL ARCHIVES

WHAT??

What's happening here? Why is the one Airdale "putting his shoulder to the wheel" trying to budge the 10,000 pound Avenger while the other Airdale is blithely walking away? Maybe the one is satisfied with the placement and the other is not. No. It's the yellow-shirt who decides where the aircraft are placed, while this is just a case of the Airdale on the left not having "gotten the word". That sort of thing hurts one on one's journey through life: to be "left out of the loop" (ignored) , especially when it's been done deliberate. But that's neither here nor there as we consider this picture. The more serious metaphor is the one in which apparently the one is walking away from the job at hand while the other is "giving his all" (I feel somewhat awkward placing quotes around each and every colloquialism but I also feel obliged to maintain distinctions). That is, one could consider this a tableau of life as it really is: some "put their shoulders to the wheel" and some walk away "to let the other guy do it". We're now back to that linchpin of a successful society: responsibility and accountability. As someone has said, "get out of the wagon and help push it". It couldn't be said better. For those who think that what's good for them is good, they'll have difficulty comprehending this. Self-serving has its place because it energizes a group, but it surely seems to exist in excess for some who only consider their goals and nothing else.

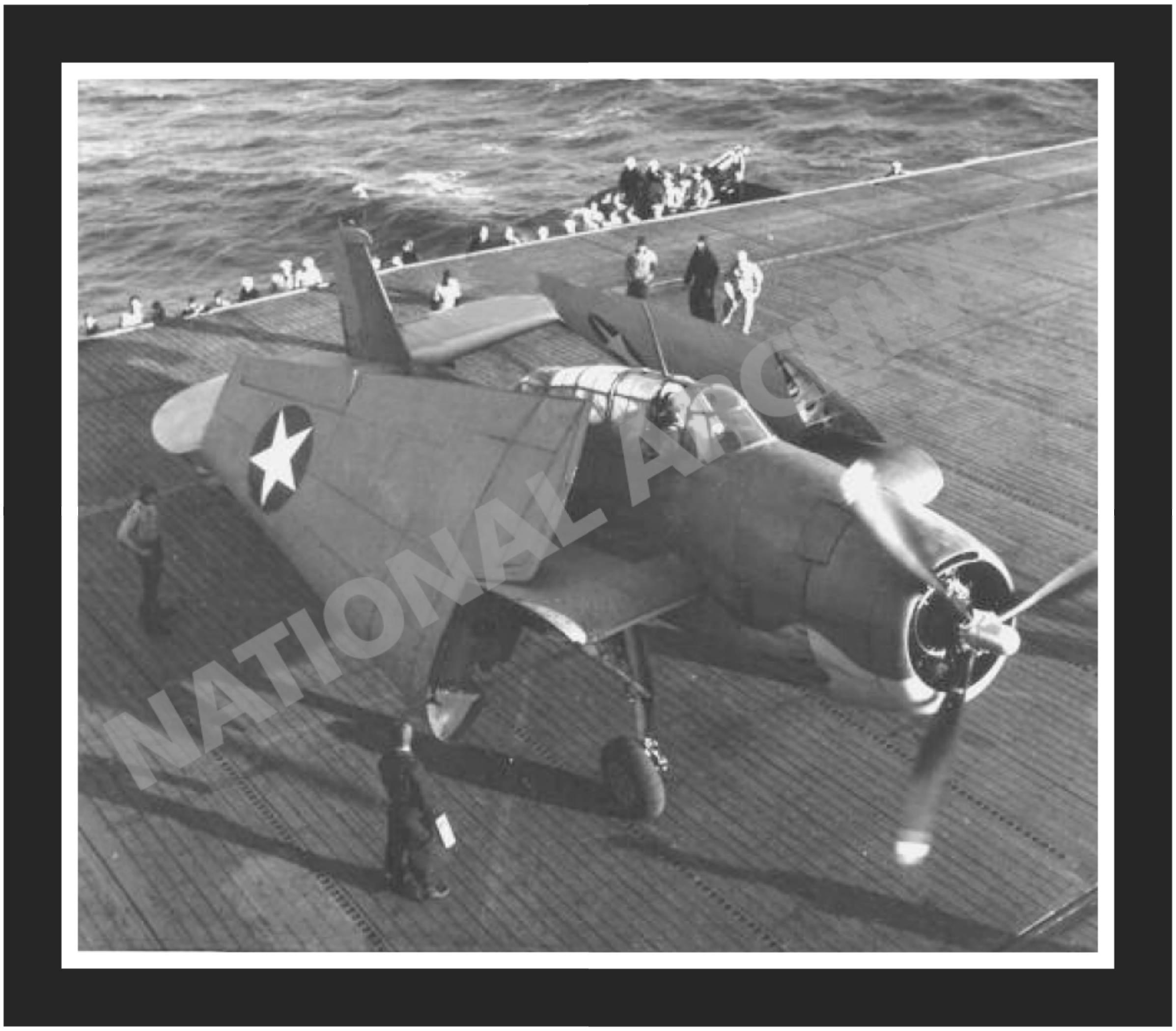
Neural networks continued: when I was working for the Naval Electronic Systems Command in Washington, D.C. as a management engineer my interest was piqued by the following idea as an application for a neural network. Electronic equipment had reached the point where devices consisted of circuit boards containing (many) electronic integrated circuit chips. My thought was to develop a decision table for this device (radar set) where each horizontal line in the table (each vector) would be the voltage values at many defined points (variables) throughout the circuit board or device (radar set, etc.) Thus [5 16 2 58 18 ....] would be the vector, the exemplar, for the fact that chip #7 was defective. Another exemplar would represent the fact that chip #32 was defective and so on for all the chips on the board/device. These values would be obtained by replacing, in turn, each chip with a defective one and then reading the voltages at the defined, fixed points. The table would be dozens and dozens of lines of voltage values, as many as there were (defective) chips. The NN would be trained to learn this table (but not over-learn which would prevent its being able to interpolate) so that when presented an unknown vector it could indicate that line #47 was the closest match thus pointing to chip #47 being defective.


ATIONAL ARCHIVES

PAY ATTENTION

I can't explain why this TBM Avenger is perpendicular to the length of the flight deck. (Actually this picture was probably taken on board an escort carrier by the looks of the catwalk and the position of the photographer.) The reason that this picture was included is the clear example of a typical hazard on the flight deck; to wit, the Airdale, middle bottom with wheelchock in hand, is in mortal jeopardy if he's not paying attention should the Avenger suddenly pivot on its right wheel (pilot applies the right brake with engine fired up). The aircraft will swing around such that the propeller will sweep the Airdale in its arc of motion. "Scratch" one Airdale. But this wont happen because all(?) Airdales are attentive to their job (or else they'll be gone, one way or another). As a teenager I went to Young Peoples every Sunday evening at my Congregational Church. A Bible passage was read and then we had an open discussion about the passage's significance. One of the passages dealt with setting your mind to your job at hand and not be desultory about it. No job can be done well without paying attention. Earnestness is a quality in short supply.

Neural Network reprise: the NN has not been described as to its workings. Suffice it to say that the HNet software is modeled on the biological neuron in so far as it accepts a set of stimuli and outputs a corresponding response. However, where the NN has many outputs the biological neuron has but one (but many millions of these neurons; the analogy goes no further. A computer software program does not a biological neural network make). The concern here is how the NN can solve serious problems. The method of NN is based on the values of multiple variables as input directly associated with a given output. Thus, IF the condition A42 and B7 and C25 THEN the decision/diagnosis/control action X where "42" is the value of the variable "A" If you will, a set of specific conditions (syndrome) representing a specific situation. The lookup table is just a (large) set of these IF-THEN statements (exemplars). The creative part of this method of problem- solving is the generation of the lookup table into which is entered an unknown vector (A16 and B45 and C9), producing an output (decision/diagnosis/control action) that most closely matches one of the exemplars in the table. These exemplars are developed by experts usually with the help of measuring devices such as the blood-analyzing machines. Training a NN to learn the lookup table is routine and very quick, being careful not to memorize the table which would prevent the NN from interpolating the table (which is done "instantaneously") Its been over 10 years since I've considered myself with NN, so I must admit to being "out of the loop". However the reader should not feel so constrained.


NATIONAL ARCH

ONE BIG AIRCRAFT

Were we so disheveled looking? Probably not because we all uniformly wore royal blue T-shirts and cloth helmets which gave us a modicum of decorum. Not that we weren't "weathered". But even with that we no doubt were not models of fashion because we were "working stiffs". When there's much to be done who can be even slightly fastidious? Such a thing would be close to repugnant on the busy flight deck. It was almost a "badge of honor" to be somewhat scruffy. So much for sartorial comments. It's clear that though this TBM was the largest (40 feet) and the heaviest (10,000 pounds unloaded) it was also the one with the least "pushable space". How many Airdales can push on one wheel-strut? But why doesn't someone push on the wing-end? Plane-captains liked to ride "their" aircraft, wether on the wing as here or in the cockpit where he should be in rough weather. Are they prima donnas? Some were but then they were rated mechanics and we Airdales were at the bottom of the totem pole (not rated seamen). How proud could I be when it was a year before I received my S 1/c from S2/c? Well at least I received a few more dollars in my pocket each month for when and if we had liberty call. All of the above meant absolutely nothing to me. The ONLY things I cared about were doing my job well, staying alive and Going Home (to who knows what disappointment. At least I stayed focused this way. but never did I think I'd be doing these books. Not even an inkling.

Engineering: engineering, that endeavor without which our society would be completely different (and even unpalatable). So much of what we take for granted is the direct result of the creativity and knowledge of that band of workers we call engineers. The word has been misused repeatedly but for them I would bend the meaning of the word "hero" to include our productive engineers. In no particular order here is the primary honor roll: aeronautical, automotive, electrical, electronic, electric power, electric railway, steam railway, railway equipment, radio/TV, telephone, communication, power generation, illumination, steam plant, nuclear, mechanical, machine design, naval architect, refrigeration, heating, marine, metallurgic, pneumatic, hydraulic, chemical, petroleum, smelter, mining, agriculture, civil (bridge, road, highway, subway, tunnel, water supply, sanitary, structural), agricultural (.......), and construction (buildings/architects). Where do we find such people who are directly responsible for making our lives more livable? This is not to short-change others who are necessary such as in the medical profession, business profession and you name it. Do not take ANYONE for granted, at our diminution.


NATIONAL ARCHIVES

SPECIAL DELIVERY

One F6F Hellcat on order, but nothing special here, What is unusual is that there aren't a group of Airdales at the ready to push the hellcat somewhere. (It too needs its "support" group –what's it like to have a support group?) Since the railing around the elevator is not up you know that the elevator is coming up. This deckedge elevator is 60 feet by 34 feet with about 20 feet extending beyond the flight deck. (The other two elevators were 48x44 feet). The outer 20 feet of the elevator was supported (there's that word again) by a modest truss structure which not only has to hold up the weight of the extended elevator but also the weight of the aircraft, a remarkable task I would say. Consider the TBM Avenger at 10,000 pounds unloaded and 15,000 pounds loaded. Now try to comprehend the power required to lift this load 30 feet in 4 seconds. To use the vernacular, "awesome!" Frankly though, I (we Airdales) just took it for granted. Typical. Typical. On closer examination it appears that all the Airdales are up forward after having pushed that Hellcat there. Now they'll return to this one on the elevator to in turn push it up forward. And then the next one , and the next one, and ..... However, shouldn't they be moving them back aft for a launch.? "Yours is not to reason why, yours is but to do and ....."

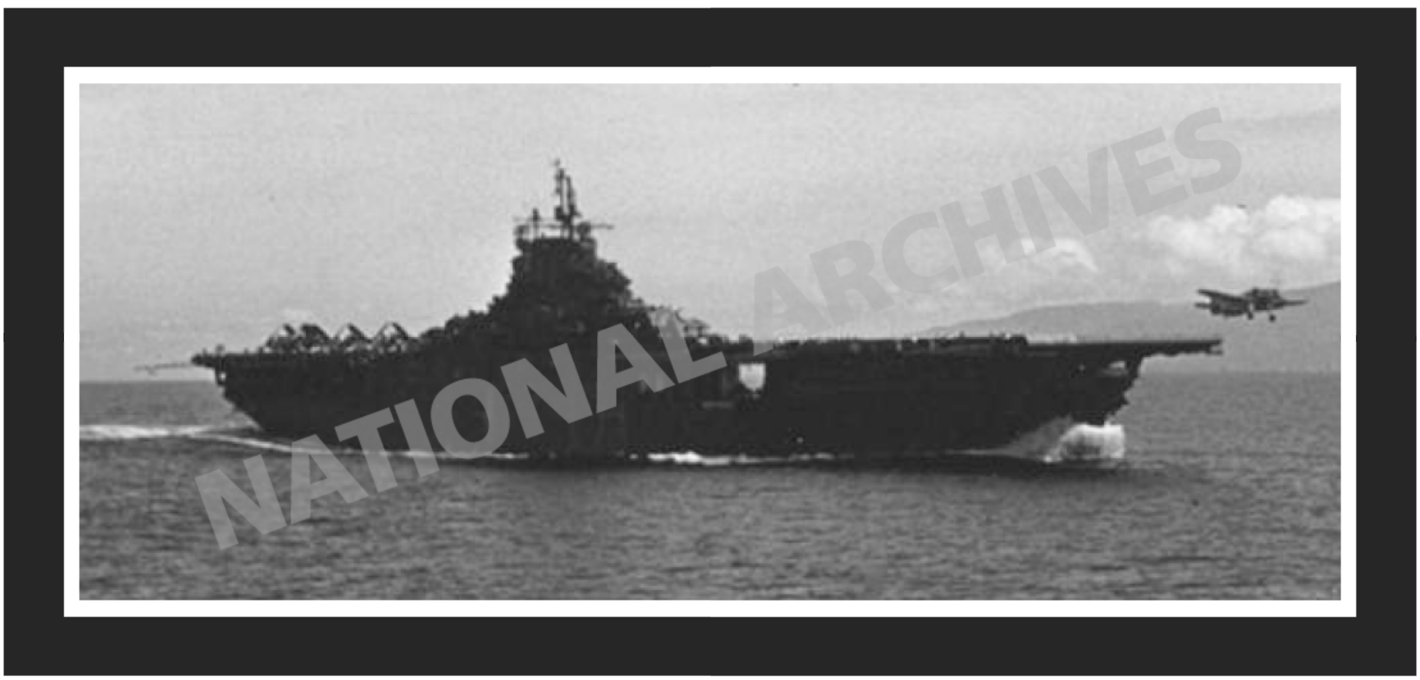
Aeronautics: there are basically four forces on an aircraft when in flight: lift of the wings, thrust of the propeller, weight due to gravity and drag due to air resistance. If the lift is equal to or greater than the weight and the thrust is greater than the drag by a certain amount, we have flight. Only the lift-force is not intuitive. This force can be explained by Bernoulli's Principle: if a fluid is forced through a pipe with a narrow section, the pressure at that section is diminished. Thus an aircraft wing is designed with a flat under side and a curved top side which causes the air (molecules) to move faster on top than on the bottom. Thus there's less pressure on top and this pressure differential causes an upward force which is called lift. // An aircraft has a dihedral angle wing configuration; there is a slight upward angle of the wings from the horizontal. If a gust of wind pushes the left wing upwards, the right wing will be in a horizontal position thus providing it with additional lift and so righting the aircraft. These two explanations are very basic to aerodynamics and are the starting point for sone complex mathematics that describe various aspects of the science of flight. There are other techniques to improve the handling of aircraft flight such as flaps at the trailing edge of the wing and slots at the leading edge of the wing. These two devices improve the lift of the wing making safer shipboard landings. Slower is safer and safer is better.


60

THE LAST ONE OFF

It must be cold because the hanger deck is all buttoned up except for that one opening which is necessary if they have any engines "fired up". Topside the wind-chill factor becomes an added burden at times such as these (the Korean waters during winter definitely demanded cold-weather gear). Each of the openings such as the one seen here can be covered by steel roll-down curtains which are also necessary to maintain darken-ship integrity during wartime. Should an enemy submarine be in the area it would "salivate" at such generosity. The hanger deck was usually alive with activity as the mechanics worked on disabled aircraft to make them ready for the next day. This is the last flight of this launch as it seems that there are four remaining Corsairs with wings up in repose. Who knows why? Perhaps they're being held in reserve to intercept any lurking bogies from the adjacent land-mass, for why would a carrier allow itself to be bereft of any self-protection? // The adjacent mountains brings to mind the fact that we (the Antietam) were en route to the coast of Japan at which time hostilities were mercifully halted. A couple of times I joked with my wife that when they heard that I was coming they "threw in the towel". Probably not a funny joke (because so much human misery was involved) but because it was so long after the fact I could be given a pass on it.

Aerodynamics: it's intuitive to think that the propeller "grabs the air and so "pulls itself forward". In fact, a propeller-blade can be thought of as being made of many small airfoils (wing-sections). These cross-sections have the typical flat bottom surfaces and the curved top surfaces found in aircraft wings. As with any wing the air rushing over it generates less pressure on the top (forward) part of the blade than the lower (rear) part of the blade. Thus the thrust (force) is directed in the forward direction giving the effect of the blade "grabbing the air and pulling itself forward" (pressure differential equals force). The blade twists from hub to tip to provide a greater angle of attack to those elements (sections) nearer the hub. (The "angle of attack" is that angle between the wing's chord and the horizontal.) This is necessary because since the tip of the blade moves faster than the those sections near the hub, the tip has greater effect. Therefore the effect of the sections closer to the hub are increased by the increased angle of attack thus equalizing the forces from hub to tip. One further point: the hub has a set of gears (that "nose" in front of the propeller-blades) to alter the angle of attack of the blades. This accommodates the changing air density and affects the gasoline consumption. It is too technical to be discussed in these pages and is an open invitation for further inquiry by the reader, In fact the invitation is open to all discussions herein.


NATIONAL ARCHIVES

"MOMENT OF TRUTH"

Because the length of take-off is so short this is indeed the "moment of truth". The flaps are down thus providing additional lift at the relatively slow speed of take-off, but is it enough to sustain the aircraft airborne until it reaches sufficient speed ? One thing in its favor is thee large area of the wings that give s it considerable lift even at the slower speeds. Very quickly the pilot will raise the landing gear to reduce the considerable drag that they present. Even before the TBM has left the ship the green-shirts rush out to retrieve the cable that slung the TBM off the ship. (A single cable was attached to two hooks next to the landing gear and looped around a shuttle in the catapult slot. As the shuttle was slammed forward it pulled the TBM and slung it as if it were a shot in a sling-shot.) Did the green-shirts think this was a "moment of truth"? Probably not; they are too intent on their job at hand. Less dramatically, do we know what is and what is not important? Or do we fritter away our time with not even a few precious moments of thought about what is and is not important? Is "truth" important as in "moment of truth"? Is truth important at all? In this day and age it seems that it is but a bagatelle, merely an inconvenience to their (self-defined noble) purposes. Deceit and deception forever tarnish whatever purposes could have been noble. So if it is to err, err on the side of truth (where truth is objective, honesty subjective).

Aerodynamics: the basic maneuvers of an aircraft are turn right or left, dive down or climb up and roll right or left (bank). The rudder moved to the right swings the tail to the left causing a right turn, The elevator (on the tail section) moved down will raise the tail causing a dive. The ailerons at the outside trailing edge of the wing are moved in opposite directions causing the aircraft to roll to the right when the right aileron is moved upward. The lift on the wings is upward perpendicular to the chord of the wing (the chord is the line parallel to the flat underside of the wing, leading edge to trailing edge). With these basics, we can say that in level constant speed flight that the lift equals the weight and the thrust equals the drag. Any change of these forces will alter the path of the aircraft. When the pilot wants to land on the ship he must slow the aircraft's normal speed. However this reduces the lift derived from the wings. The remedy requires that, to compensate for the reduced lift at slower speeds, the pilot must raise the nose of the aircraft to increase the angle of attack. This in turn increases the lift because the airflow over the top of the wing has further to go. However if the angle of attack is too steep turbulence of the air over the wing will increase and lift is lost. This causes a hard landing and perhaps a ruptured fuel tank and ensuing fire. Bad news all round including the pilot and the Airdales who must extinguish the fire.

CATAPULT (FOR THOSE IN NEED)

Just over the upraised arms of the directing yellow-shirt is the catapult-slot. To the left touching the front edge of the wing is the shuttle to which this TBM will be attached by a sturdy steel cable as in a sling-shot. It's apparent that the pilot is completely dependent upon the yellow-shirt as he's being directed to the precise position over the catapult. This process requires a 5 foot long, 4 inch diameter steel pipe placed parallel to and about 4 feet from the catapult -slot. At the angle of the TBM its right wheel will contact the pipe and then the TBM will pivot on the right wheel. It will now inch forward to the precise spot at which point the green-shirts will attach the steel cable. The yellow-shirt now passes control to the flight deck officer who verifies that the wing flaps are down. Then he calls for the pilot to rev up the engine to its maximum, listening for the right sound. After about 4 seconds he hears it at which time he signals the green-shirt to energize (activate) the shuttle. Off the TBM goes at a speed of about 40 mph. Now we are at the "moment of truth" of the previous page. (Mother Nature determines and confirms Truth but unfortunately Man is not nearly as forthcoming, to the detriment of all.) It should be understood that the operation just described takes place in a matter of about 90 seconds. There are two catapults allowing for staggered catapult launches about 30 seconds apart. Once enough aircraft are launched, making room for a standard launch, the rest of the aircraft start their launch about 4 feet from the front of the flight deck.

Jet Engine: Compared to a gasoline engine the gas turbine jet engine is simplicity itself: a compression system, a combustion system and an exhaust system. Air is taken into the front of the engine and compressed by multiple compressors (turbines) consisting of many narrow blades in a fan-like configuration. This high pressure air is passed into the combustion chamber where it is mixed with a specific metered and continuos amount of liquid hydrocarbon fuel such as kerosene. The mixture is ignited and thereafter burns in a continuos manner. The explosive force of the burning gas mixture is expelled from the exhaust tube to provide thrust. Some of exhaust turns a turbine which is mechanically connected to the forward compressor to drive it. The residual exhaust gases that are expelled is the thrust that propels the aircraft. This is an example of Newton's Law that for each action there is an equal and opposite reaction (think of a balloon expelling its air). A jet engine provides tremendous thrust to power today's aircraft to speeds unheard of not that long ago but at the price of consuming fuel in a voracious manner. Oil products are in short supply but what is there to replace it for the aircraft of the future?

ON GUARD

This is the Douglas SBD Dauntless dive bomber that preceded the Sb2C Helldiver. The former was responsible for sinking four enemy carriers at the Battle of Midway on 4-5 June 1942. This battle was pivotal to the war in the Pacific. This picture was chosen because the Helldiver had a similar gunner facing rearward (except that this is a .30 caliber machine gun).These gunners were rated enlisted men who were also called Airdales (there being no similarity between them and us whose "office" was the flight deck). However, how would you like to be sitting there with a "hot" aircraft dipping and weaving toward you as it was spraying you with "hot lead"? (I suppose that steel shield was a help.) The job of trying to hit a fast maneuverable aircraft that was constantly changing its x-y-z coordinates as you were changing your x-y-z coordinates must have been extraordinarily difficult. The only help available to you was the fact that your cartridge-belt had tracer bullets every six or so bullets. Also, I wonder at the problem of the aircraft "jumping" as rounds were fired. This alone would make aiming the guns problematical it would seem. Then, how did they judge the distance to the target to establish an effective range of the .30 caliber guns? Not an easy job, this, this battle of the gunners. I'm curious as to whether he had a "seat belt" to hold him securely? Then again, the SBD was not an aircraft likely to make extreme turns: it was a "bus" rigged to take a load of bombs to a target, unload them and then return to base. (Note: later aircraft did not have round-headed rivets which added drag.)

Electric Motor: while the are many types and varieties of electric motors, we will discuss a basic, popular motor called two-phase induction motor. A coil of wire that passes an alternating sine wave current through it will generate an alternating magnetic field about it. A basic law of physics states if a second coil of wire is brought near this field there will be generate a current in this second coil of wire: a transformer. Now two stationary coils are placed at right angles to each other and a third coil that is a closed loop is put on a shaft to rotate within the first two coils. When an alternating voltage is applied to coils 1 and 2 an alternating current is produced in coils 1 and 2. These two currents are 90 degrees out of phase causing the two magnetic fields to rotate as one composite field. This composite fields in turn cut across coil 3 inducing a voltage in it which in turn generates a current. Since physics says that the current induced in a coil by a voltage lags the voltage by 90 degrees, the current will lag the rotating composite magnetic field in coils1 and 2. Thus field 3 lags the rotating field 1 and 2 and their interaction causes field 3 (the rotor) to "chase" the composite fields 1 and 2. Visualize, visualize, visualize.


NATIONAL ARCHIVES

ALL TOGETHER NOW

Notice the damaged leading edge of the right wing. Probably this Hellcat hit the 5-inch gun mount aft after an errant landing. A crash, even a minor one such as this, seemed to bring out a crowd (plane-captains, arresting gear/catapult, fuel and munitions, and aircraft directors – on the Antietam but not here, brown, green, red and yellow shirts). Most all of the blue-shirt Airdales are unnecessarily pushing a towed aircraft, but they too are animated by a crash. This Hellcat probably is going to the deckedge elevator so that it can be repaired on the hanger deck, the main workshop of the ship. In short order order will be restored and landings can be continued, to the relief of those still airborne and circling the ship. // If I were to pick out one of those Airdales as representing me, I would certainly put the finger on that Airdale next to the fuselage pushing on the wing: I did my job diligently but usually somewhat apart from the rest of the crew. (In fairness I should say that I had two quasi-friends: one a freshman from Princeton in the Navigation Division and one the editor of the ship's paper from the University of Chicago. However we seldom saw each other but at least I was not completely "antisocial". In retrospect it's easy to fault the fact that I chose to stand alone, sulking and brooding and not trusting, in response to having always been "on the outside looking in" (it's called the Exclusionary Rule, that practice which is such a popular intellectual plaything of those who like mind-games. Why do I think of the psychiatric profession? Because I don't know any better).

Photosynthesis: it is the process by which green plants create carbohydrates (a food) from water via the roots and carbon dioxide from the air , using the sun's energy. This energy is used by the chlorophyll in the plant to split water molecules (H-O-H), giving off oxygen and converting carbon dioxide and hydrogen into carbohydrates. Thus the chlorophyll uses electromagnetic energy (sunlight) to enable chemical energy that in turn splits the water molecule. The chemical process requires enzymes to facilitate the chemical reactions. (One can say that the atmospheric oxygen has been derived from this process of photosynthesis.) The carbohydrate sugar is converted to starch for storage and called upon later as sugar to provide energy for growth. In effect plants generate their own food and at the same time provide us with the oxygen that is essential to us. The photosynthesis process is a combination of chemistry and physics and botany that similar to so much in nature goes unnoticed (and unappreciated; the sarcastic quip "watch the grass grow" ignores the remarkable happenings as the sun bears down onto the vegetation below. Do we ever stop for a moment and wonder? I dare say we do not, unfortunately.

EARNESTNESS IS GOOD

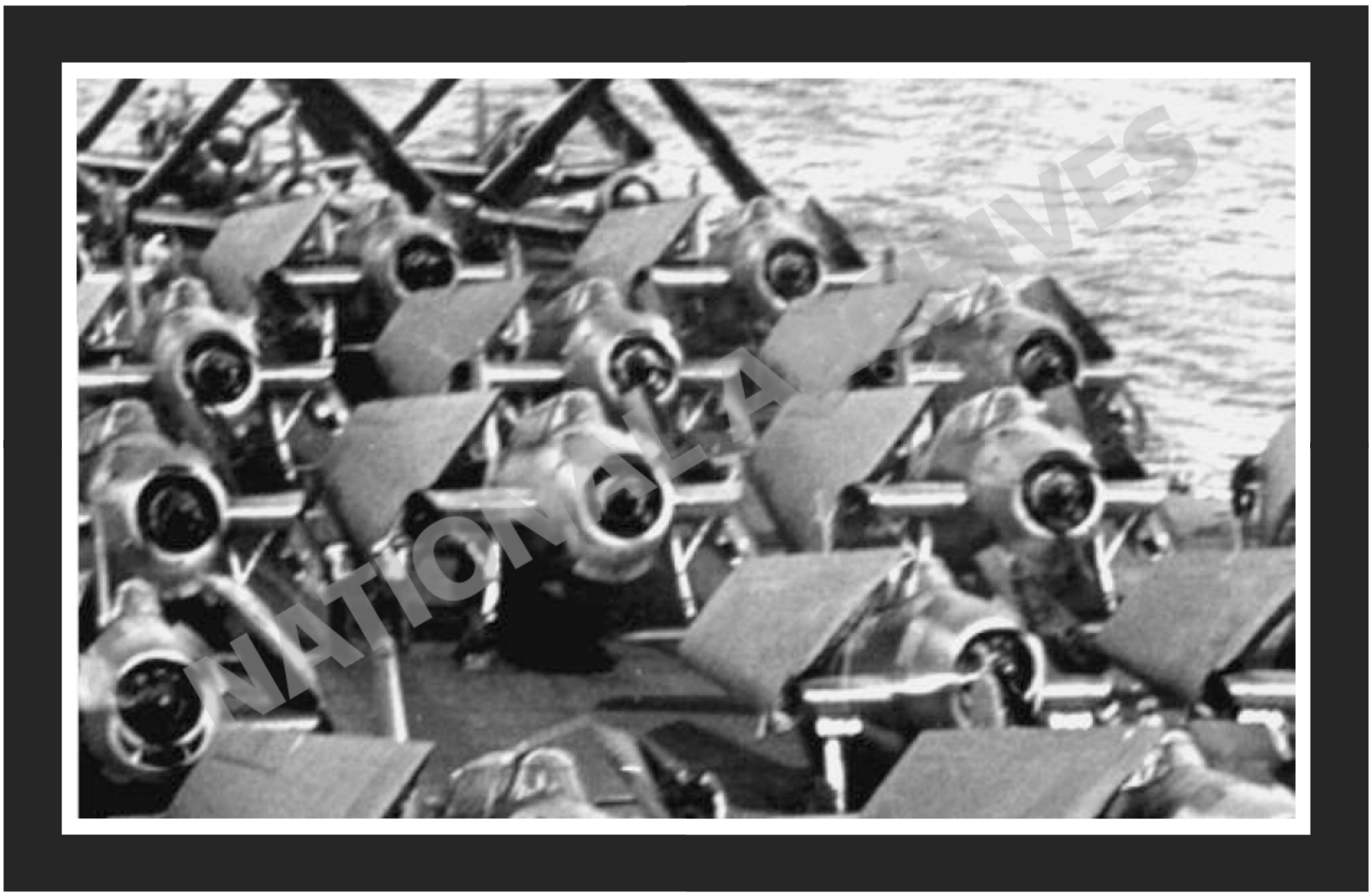
This Hellcat has just arrived from the hanger deck below (notice the inside edge of the deckedge elevator to the left of the tractor's rear right wheel; also note the wheelchock on the fender). The Hellcat was facing inboard as it came up the elevator but was immediately pivoted about on its left wheel, by Airdale power, to its present position 90 degrees CCW. A tow-bar was then attached between the tractor and the tail-wheel (obscured by the shadow) and off the Hellcat goes back aft to take its place with the building phalanx of large military flying machines (TBMs, SB2Cs, F6Fs and F4Us) in preparation for the big event that will launch some 90 aircraft in 30 minutes. The Airdale driving the tractor properly projects intent and earnest (and even grimness). Perhaps I have a mistaken recollection of this but I seem to recall that most all of the Airdales had similar visages. It was a serious business there on the flight deck, to be sure and if you will, there was a kind of spell that permeated the venue, the flight deck. Should I say, to be more dramatic and less in character, there was a pall of foreboding that overarched the entire flight deck during flight operations. (And there wasn't a shred of that sin of self-aggrandizement that, without at least some substance, is suspect to the point of untrustworthiness, which is the sin.)

DNA: the following excerpt is taken from the book "The Essential Dictionary of Science", Barnes and Noble. DNA is an abbreviation for the deoxyribonucleic acid, the molecular basis for heredity. It is a complex giant molecule that contains in chemically coded form the information needed for a cell to make proteins. In other words it determines the order in which amino acids are joined to make a specific protein in a cell. DNA is a ladder-like double-stranded nucleic acid which forms the basis of genetic inheritance in an organism, except for a few viruses that have only RNA (discussed later). DNA is organized into chromosomes and, in organisms other than bacteria, it is found only in the cell nucleus. DNA is a ladder-like molecule which means that it is made up of two halves (the ladder sides), formed of chains of nucleotide subunits. Each nucleotide contains deoxyribose sugar, a phosphate and a base. A set of three bases—known as a codon—acts as a blueprint for the manufacture of a particular amino acid, the subunit of a protein molecule. The two halves are joined together by the bases—a purine (adenine or guanine) or pyrimidine (cytosine or thymine)—forming pairs (the rungs). The bases form into two specific base pairs: adenine with thymine and guanine with cytosine. (This account will be continued on the next page with no break in the account.

A FORMIDABLE "LANDSCAPE"

A formidable "landscape" this, where Airdales must go between the aircraft row on row. Oh Ye Gods up on high in the sky do your bidding as You chose who's to live and who's to die. Extravagant? Yes. Fanciful? Perhaps. Yet this was not a time for delusions. Just because the furiously thrashing propellers could not be seen was no cause for feeling this was not real. The very torrents of wind-blasts and the ever deafening roar of the engines ensemble put that notion quickly to rest. Static, soundless pictures are surely a fanciful portrayal of a reality that can well be a hundred, yea a thousand times more wrenching as YOU make your way among those "voracious beasts" in array. To be honest (remember, truth is objective while honesty is subjective) this is a mentally difficult time as YOU approach this ragged phalanx of aircraft: when there among the aircraft your racing mind is so occupied with how to manage your route that you have little time to be traumatized. But as they are wont to say, you become acclimated to whatever conditions in which you find yourself and so you carry on, and on, with this your lot in the scheme of things. (Besides, who wants to be a "cry-baby"? The psychiatrists will say that " you don't have it so badly, look at that with which so-and-so has to contend" (they even use proper English instead of colloquialism)). Well, "I can buy that" (they're right, to a point). But at that time and that place, one isn't prepared to quibble. Hindsight allows for that.

DNA continued: the sequence of bas-pairs along the DNA acts as a code carrying information about the sequence of amino acids in the proteins. These base-pairs in sequence (triplet) name an amino acid and the next three name the next amino acid that needs to be joined and so on, to make a specific protein. The specific way in which the pairs form means that the base sequence is preserved from generation to generation. Hereditary information is stored as a specific sequence of bases. It is important that inherited information is passed on correctly. In the process of DNA replication which takes place before any cell divides, the two halves of DNA separate and new halves are made. Because of specific base pairing, the inherited information is copied exactly. Despite this a mistake sometimes occurs and the sequence of bases is altered. This changes the sequence of amino acids in the protein. This is mutation. Ionizing radiation increases the risk if mutation. In plants and animals DNA is organized into chromosomes and is found in the nucleus of cells." Transcription of DNA will be considered on the next page along with the description of the living cell.



SPECIAL ATTENTION

While not true when I was an Airdale on the Antietam in 1945, now when I look at the Hellcat head on I sometimes have the feeling that it's grinning at me with what can only be called a malicious smile hiding there behind that object of my contention and consternation and discontent, that intimidating set of blades that stretched so far as to reach the wheel-strut (and that put the tips of the blades only feet in front of the face of the Airdale attending the wheel during launch and parking operations). (A long sentence but one that ends with a hint of happier times in that poignant, captivating song "The First Time Ever I Saw Your Face". What a pleasant transition!) The ship along side allows its crew to have a close-up view of what frequently happened between flights. The big-ticket items were handled down below on the hanger deck but the more routine repairs were frequently done here on the flight deck. The one in the tan clothes is probably the pilot of that particular Hellcat who has an understandable interest in what's happening to "his" aircraft. The training that the pilots received to earn their "wings" included a good familiarity with the construction and operation of not only the engine but also all aspects of the aircraft. They better know it if they're going to fly it. I was impressed with the relative youth of the mechanics that had the responsibility for maintaining these aircraft: lives were literally at stake dependent upon their knowledge and competence. My hat's off to them.

DNA continued: each human cell-nucleus contains 45 chromosome-pair strands in a ladder-like configuration as previously described. Each strand (side of the "ladder") in turn consists of genes, in sequence, perhaps 1,000 per strand. The strand is called DNA and is composed of many, many nucleotides which consist of purine (adenine or guanine) or pyrimidine (thymine or cytosine) base linked to a sugar (deoxyribose or ribose) and a phosphate group. The unique sequence of a set of nucleotides (a gene) are codes for the creation of specific proteins. These genes determine one's physical characteristics. With this background the cell-function is considered. It is the locale of among other things the formation of proteins that are used to regenerate the material body and as such it is a "chemical factory". These activities are accelerated and controlled by catalysts called enzymes. The instructions that specify the order of the amino acids that compose the protein is found in the strands of DNA (deoxyribonucleic acid). The cell uses the genetic code of the DNA to read the codons (three bases in sequence where a base is either a purine or a pyrimidine (see above; there are 64 possible codons). The protein synthesis follows on the next page.


NATIONAL ARCHIVES

CENTER OF ATTRACTION

At the center of attraction is a rear-gunner of either a TBM or a SB2C aircraft. He has apparently shot down an enemy aircraft and has been brought up to the flight deck PA system to tell the tale to the topside crew. At the beginning of the war this accomplishment had impact on the morale of the crew. We're standing facing aft with the hatch (door) to the pilot house to our left and PRI FLY just behind that officer, hand on railing, going down the ladder to the admiral's bridge. Note the bugle below the PA box; it was used to blow flight quarters or General Quarters (enemy encroaching our space). // Today being the Fourth of July I will recite the Pledge of Allegiance: "I pledge (not temporize) allegiance (not rationalization) to the Flag(not a cut of clothe but an emblem of what we hold dear) of the United (one for all, all for one) States (a congregation of common goals) of America (that land of utmost, God-given bounty from sea to shining sea) and to the Republic (that group of freely chosen, by us, representatives) for which it stands (and stands and stands), one nation (not two, not three, but one, under God (He who forever looks down on us in all His glory), indivisible (not separated by differing views), with liberty (we shall knell to no one) and justice (even the least among us shall be heard) for all (not only me and thee, but every he and she) ". Lest we rest on our laurels, this is a dynamic country that always allows for and has room too improve. It is this strength that makes us a shining example of the possible. Dare we shirk this charge?

DNA continued: protein synthesis (the regeneration of our material selves) occurs in the cell by using the instructions from the DNA. Now begins the transcription (copying) process: the two strands of DNA are separated at the bases (each rung of the "ladder" breaks in the middle such that the two strands are "unzipped"). The DNA's code is read by the sequence of codons (three bases) as the strands are unzipped. A set of these codons make up one gene. These bases are a template for approaching messenger RNA (mRNA) which match up to the exposed DNA in complementary order (as is the wont of the DNA). These RNA nucleotides are linked together to form strands which are identical to the original DNA strand-segment. This mRNA copy of the DNA base- sequence now leaves the cell's nucleus. The translation process now causes the mRNA to attach itself to a ribosome that "reads" the mRNA bases one codon at a time, linking the amino acids which were brought by the transfer RNA (tRNA) in the correct order. We now have a protein specific to a particular part of the body, be it the hair, the skin, the liver, whatever. We are indeed "Fearfully and Wonderfully Made", a book of many, many years ago.

EVER VIGILANT

Even as the radars search the skies for those of hostile intent where "the contest" is reduced to "kill or be killed", these ever vigilant and anxious gunners stand and wait, stand and wait with nary a tree nor trench to conceal and shield them from those who would render them asunder. At the very least, this floating platform is their home and their refuge: it would cause them to take great umbrage (serious objection) to have it brought to the bottom of the ocean. (Is not one's home one's castle?) Yet to talk with these gunners one might be led to believe that this is just another day of watching and waiting with no resolution. That's fine, but yesterday was then and today is now, perhaps the day of rude awakening. The final months of the war were just such days, with unmitigating vengeance. It was the time of frenzied Kamikaze attacks, those enemy aircraft that were the first "guided missiles" in that the pilots deliberately flew into our ships, ("with malice aforethought"). This drastically changed the nature of the war at sea in the Pacific. It now became a matter of those fighting to die against those fighting to live. It was so bad that a story was authored about "The Fleet That Came To Stay" through daily assaults on the exposed ships that would not be deterred from supporting the troops on the ground. Naval battles tend to be "toe to toe" as exemplified by these Kamikazes' attacks in which you look "eye to eye" with the enemy. But now it's watch and wait, watch and wait.

Electromagnetic Induction: this phenomenon pervades our society in innumerable ways: all motors, tape recorders, electric and electronic equipment of all kinds, to name but a few, depend on this law of Nature: an electromotive force (emf) is produced when a magnet is moved within a closed electric (wire) circuit. There must be relative motion between the magnetic field (flux) and the closed (wire) circuit. Thus as a magnet is moved in and out of a coil of wire an emf will be generated which will drive an electric current through the coil of wire. All generators produce electricity this way (and which energy must be used as it's produced – except for the limited storage as provided by batteries).Electromagnetic induction takes place when the magnetic field around the conductor changes and the quicker the change, the larger the emf and the resultant current.. The term "magnet" refers to natural magnets and those electromagnets created by wrapping a coil of wire around an iron core. The direction of the induced current will be in a direction as to oppose the motion producing it (Lorenz's Law). Faraday's Laws are 1) a changing magnetic field produces an electromagnetic field (emf). 2) the emf is proportional to the rate of change of the magnetic field. 3) the emf depends on the orientation of the magnetic field.

WELCOME ABOARD

The green-shirt, to the left, scrambles back down onto the cat walk after disengaging the TBM's tailhook from the arresting-wire cable stretched across the deck and there to await the next aircraft 20 seconds later. In the meantime a yellow-shirt officer uses his hands to beckon the pilot to advance at the same time looking over his shoulder to determine if there is any obstacle behind him (such as another aircraft that had not sufficiently cleared the area. The pilot during this tim is completely at the behest of the yellow-shirt (it's "a law"!) There's no danger of being struck by that huge 55 foot wingspan because it's so high. One might ask why the other yellow0shirt is only standing and watching. My answer would be that he is being trained to do this job that is always done by a rated enlisted man. That he is new seems to be evident by his new-looking dungarees. This is not a job that one learns just by doing. There is too much at stake here in terms of safety and efficiency. As was said, aircraft arrive every 20 seconds and if there is not a clear deck, there will be wave-offs and the attendant delays to bringing every one aboard. The only other thing that should be said about this picture is that an Airdale will (should) be approaching the aircraft right now, wheelchocks in hand, to escort the aircraft to its parking spot. This also is "a law"!

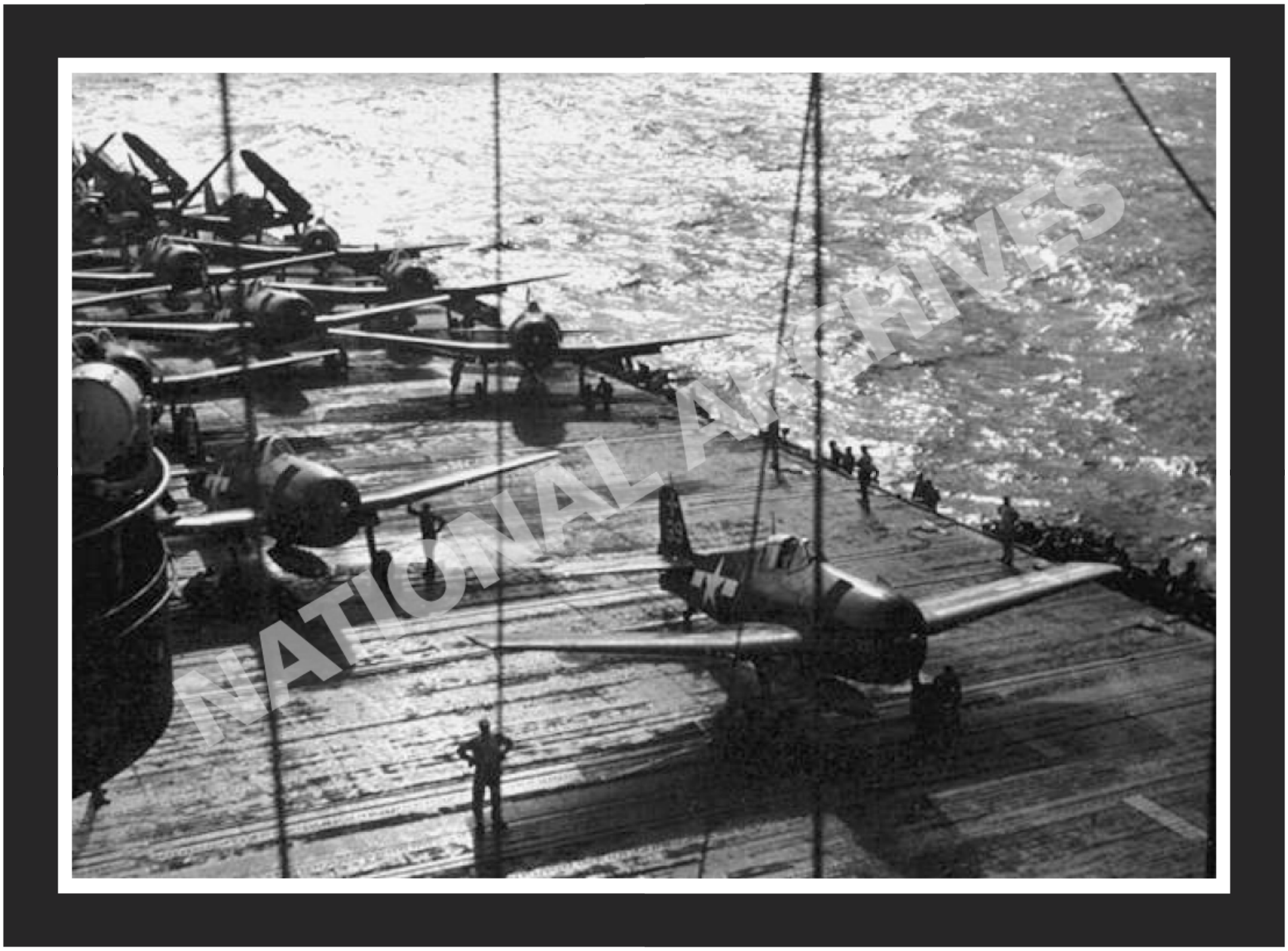
Petroleum: petroleum, or crude oil, is a natural mineral oil found in permeable rock It consists of hydrocarbons mixed with oxygen, sulfur, nitrogen and other elements in varying proportions. It is thought to be derived from ancient organic material that has been converted initially by bacterial action followed by heat and extreme pressure. From crude petroleum products are made, by fractional distillation, products such as fuel oil, gasoline, kerosene, diesel, and lubricating oil. (Fractional distillation is a process to split complex substances into their constituent parts. This is done by repeated heating and boiling and condensating (cooling). This process depends on different components having different boiling points and thus different condensation points. The heated vapors pass up a fractionation column where the different components are cooled and condensed at different temperatures.) Chemicals are used to produce things such as detergents, artificial fibers, plastics, insecticides, fertilizer, pharmaceuticals and synthetic rubber. Petroleum was formed from the remains of marine and plant life millions of years ago when they were decomposed anaerobically (without oxygen) by bacteria into fatty acids and in turn into kerogen which was put under heat and pressure over millions of years to eventually form petroleum were it now resides in sandstone and limestone. Natural gas collects over this petroleum.


NATIONAL ARCHIVES

“THE TABLE HAS BEEN SET”

Looking down on our “field of ply” here’s what we did when we did what we did, dat by day by day. While the dazzling sun light shines brilliantly off the differently textured deck and sea the silhouetted Airdales strike their individual poses. “The table has been set” and the aircraft are positioned for an impending launch as they growl their impatience to be released and set free on high. Airdales are at their usual attendance ready to pull wheelchocks to “get the show on the road”. Despite their disparate postures taken by the Airdales it was my firm impression that each Airdale was intent on doing his job to the best of his ability. (And dare I say “with dedication”?). Taking a flight of fancy, this scene brings to mind that it was as if despite the Airdales’ ministrations to the aircraft the aircraft returned the favoritism with nothing but growling and howling. To carry the simile much further, one could say that sometimes unconditional love is met with unmitigated scorn and disdain, even endlessly. All that can be said here is that “it takes two to tango”, so don’t be a complainer (be an Airdale who’s not self-absorbed.

It’s fitting and proper to now recite the a portion of the Biblical passage of Corinthians I:13. “If I speak with the tongues of men and angels, but have not love, I am become sounding brass, or a clanging cymbal. And if I have the gift of prophecy, and know all mysteries and all knowledge; and if I have all faith, so as to remove mountains, but have not love, I am nothing. And if I bestow all my goods to feed the poor, and if I give my body to be burned, but have no love, it profiteth me nothing. Love suffereth long and is kind; love envyeth not; lone vaunteth not itself; is not puffed up; doth not behave itself unseemly; seeketh not its own, is not provoked, taketh not account of evil; rejoiceth not in unrighteousness, but rejoiceth with the truth; beareth all things, believeth all things, hopeth all things, endureth all things. Love never faileth: but whether there be prophecies, they shall be done away; wether there shall be tongues, they shall cease; wether there shall be knowledge, it shall be done away......When I was a child I spake as a child, felt as a child, I thought as a child; now that I am become a man, I have put away childish things. For now we see in a mirror, darkly; but then face to face; now I know in part; but then shall I know fully even as also I was fully known. But now abideth faith, hope, love, these three; and the greatest of them is love.” While it should not be necessary, I feel constrained to say that this passage does not refer to romantic love (but how could one exclude this kind of love from that kind of love? (Ans.: they cannot.)


NATIONAL ARCHIVES

THE BARE ESSENTIALS

Often it takes the bare essentials to elucidate (make clear) the essence of a matter. Sometimes we become so involved with the nuances (minute details) of a subject that we don't notice the underlying cause of a situation (we don't see the "big picture", we only see the forest for the trees; however, I would certainly not discount the felicity of considering the nuances; in fact I would consider myself to be a "nuanced" person). But we digress. The essence of the Essex-class carrier can be seen here in all its (what I would say) majesty, if a ship of war can be so called. Consider that on and within that great length is the home of 100 large aircraft. That entire length is a working-space all overseen by that imposing superstructure. That almost 1000-foot deck is the work-place of the Airdales who are fairly unique in the array of shipboard sailors in that most all of his daylight hours are spent up topside out in the elements, be they good or bad. For the latter, it's a matter of tying down the aircraft in the presence of an impending storm (not excluding a typhoon which is another name for a hurricane). You can definitely believe that this, this titan of the fleet, is a working ship, one that "never" rests (at least so it was with the Antietam): the bare essentials of a magnificent ship.

Stem Cells: we are on new ground here so only the "bare essentials" will be recited. A stem cell is a single cell that can regenerate to become "any" of the many specialized cells that make up the body. Within it are the "makings" of a skin cell, a hair cell, a nerve cell, all the different cells that make a person. (That they have a unique heredity would seem to imply that they would not be acceptable to others; keep posted). There are evidently three types of stem cells that can be "harvested". The first is called an embryonic stem cell which is unspecialized and that can turn itself into any type of tissue such as muscle or nerve cells. They are derived from frozen in vitro fertilized embryos. These are the most versatile type of cell. Next is the adult cell: it is found in many kinds of tissue such as bone marrow, skin and the liver. They can't become all types of cells . The third type of stem cell is the umbilical-cord cell. This is a rich source of precursors mature blood cells drawn from the umbilical-cord blood. It may contain other types of stem cells. This has become a controversial subject. I come down on the "save the existing lives" side. To say that life begins at conception is a ramification of one's faith which should not be imposed on those of a different view. Here nuances are primary as is the case whenever religion is considered. But even more important is the necessity of maintaining one's intelligent tolerance.

USS *Bunker Hill* (CV 17) in September 1946

PATIENCE

This Helldiver has just charged down the flight deck, accompanied by two Airdales (look closely), after having landed and having been unhooked. It is now under the control of that yellow-shirt with arms upraised and just to the right of the left gun-barrel. He will direct the Helldiver to the right one of the two available spots in the last row. The two Airdales accompanied the Helldiver from the final landing spot up to this point (which was a real challenge against the wind-blasts) and they will remain next to the Helldiver until the engine has been shut down (thank God!). Since an aircraft lands every 20 seconds, time is of the essence. Now starts the pilot-director "adagio" of placing this large machine neatly in its space only inches from the aircraft in front of it and beside it. The adagio choreography starts out gracefully enough but it quickly become a "hiccuping" motion as the pilot alternately "guns" the engine and brakes the wheels in a staccato of motion that brings visions of catastrophe irrepressibly to the imaginative mind. But it's those last 10 seconds and 6 inches that has one on the grip of the worst outcome. It is now that one thinks, "Patience be damned". Patience is a virtue, yes, but that quality is seen differently by the beholder and the "beholdee". Who's to measure patience's duration?' Is it the objective beholder or the subjective "beholdee"? Those last 10seconds and 6 inches were a LONG time.

Photovoltaics: is the process by which the sunlight that strikes the earth is converted to electricity. Using PV, an area of 256 acres could generate 4,000,000,000 watts (4,000 megawatts) of electricity (using today's (2005) technology. This is enough to supply the heat and light requirements of a small town. There are no waste-products due to this electric generation (though the purists will say that pollution results from the manufacture of PV). However, once fabricated the PV panels last at least 30 years and they require next to no maintenance, partly because there are no moving parts in the system. Unfortunately the electricity generated is direct current DC) and so an inverter is required to convert DC to alternating current (AC). A distinct advantage of PV is that the source of energy is completely free and inexhaustible (if the sun dies, we all die). To have even a small idea of the source of energy, consider that the sun generates 13 million times the amount of energy in one SECOND as is generated in the United States in one YEAR.. Of course the earth receives only a fraction of that energy since we are in only a small cone of the total energy. Yes, solar energy is truly God-given. To be continued.


52

FRATERNIZATION, NO WAY

While the pilots seldom loitered on the flight deck, here they do until they climb into their aircraft when flight quarters sounds shortly. Except for work-related duties, commissioned officers did not fraternize with the enlisted men, ever. This was military protocol. But let's be honest: they had no desire to talk to a seaman and his ilk because they had very little in common but discrimination was a definite non sequitur. With navigation-boards in hand and "game-faces" on, they are topside a little early for a little fresh air. Before I became an Airdale I was in the Navigation Division. When off duty I would roam the flight deck (when there was no flight operation) drawn by the aircraft and the activity. It was both interesting and curiosity-quenching. Because of this and while I certainly wont swear to it, that sailor under the 3-bladed propeller could well be me as I wandered around and about. This is what I did and that was the way I dressed and looked. A plebeian amongst the talented, a novice wanting to improve. But I also wasn't shy about being in their company while at the same time I can assure you that I was fully deferential to their abilities (not their status; that's built in). Actually, their comprehensive training and experience made me feel somewhat like a "babe in the woods". While you should show respect for every one, here you gladly gave that respect. (Completely incidental to anything, "my girl's" brother was a marine fighter pilot at Guadalcanal during WWII. That demands respect.)

PV: unfortunately the efficiency of the PV panels is not very high, being only 15% if that (at this time, 2005). Also the costs to make the panels is relatively high, making the amortization relatively high. During WWII the atom bomb was developed under the Manhattan Project aegis. This was a top priority effort for obvious reasons: do what it takes to end the war. Perhaps the same urgency is needed now to increase the efficiency and reduce the costs so that we all can benefit as soon as possible from the tremendous amount of energy that befalls us daily. (Yes, clouds are an impediment but impediments are to be overcome. Even with clouds, light is transmitted to earth, meaning that efficiency is essential. If "every" house and building were clothed with PV panels or the like, what a wonder that would be. However it would seem that the petroleum infrastructure that is in place is a drag on this effort. And yet, a gradual phase-in of PV energy would not be disruptive. This is becoming a political discourse not appropriate in these pages.) Economic feasibility should probably be the driving force here Along with the PV efforts should be a search for methods of storing electricity. I suppose this is the Holy Grail of electric usage. Who has the brain-power out there!?

TRACTOR-POWER VS. MAN-POWER

The tractor is pulling the larger TBM Avenger while the Airdales are pushing the smaller F6F Hellcat. However, Airdales are just as likely to push the TBM as they are the F6F. The difficult part was overcoming the inertia of the large TBM. Again, if I were to pick an Airdale that was most likely to be me it would be that earnest one giving it his all on the right wheel of the Hellcat. This was always my modus operandi on the flight deck because "if something is worth doing, it's worth doing well". One area where this served me well was when I was thirty-one years old and disenchanted with my career I quit my job and went back to school to earn an electrical engineering degree. Since I had all my electives fulfilled I took only engineering courses, five per term. This was a load and a half but I stuck to it for two years and two summers (that were HOT). It was so hot that the walls in our apartment were too hot to touch for more than a few seconds. This of course made studying a real challenge: but "if something is worth doing, it's worth doing well". To this day I feel close to remorse for having to put my wife through that ordeal. (Fortunately she worked for a bank in New York City on Wall Street and so was spared the daytime heat.) One must realize that one's future is in large measure determined in youth. Bank on it.

PV: photovoltaic panels are based on the physics of semiconductors, the same as the physics used in transistor technology except that transistors use three terminals and PV uses only two terminals. A crystal of pure silicon has four electrons in its outer shell that are only loosely held to the nucleus of the silicon atom. When they are given extra outside energy (such as light) they become free and can flow through the crystal as an electric current. To form a diode small amounts of the elements boron and phosphorous are added. The former creates P-type silicon by having only three electrons in its outer shell (instead of the four that silicon has) and the latter creates N-type silicon by having five electrons in its outer shell. Thus P-type silicon is slightly positively charged and the N-type silicon is slightly negatively charged. The former has "holes" (a lack of electrons) and the latter has extra electrons. When an electron moves into a "hole" to complete an outer shell of four electrons, the "hole" effectively moves to the place from which the electron came. Thus "holes" act as if they were positive charges with movement just as do the electrons. With this background we can describe the semiconductor diode, the basis of the PV phenomenon. Inside a diode, P-type and N-type silicon form a P-N junction which is made from an appropriately doped (with boron and phosphorous atoms) silicon crystal. To be continued.


36

"MAKING TRACKS"

Looking at the cruiser's wake, this carrier is also "making tracks". An Essex-class carrier was capable of traveling at 33 knots for extended periods of time, certainly long enough to accomplish a 30-minute launch or landing operation (when 30-knots over the front of the flight deck was necessary). There's usually always a prevailing wind so the carrier always uses that by turning into the wind. Here pilots have manned their aircraft and are awaiting the command over the flight deck PA system to "start engines": many cracks of starter-cartridges quickly followed by the plaintive whines of the propellers "winding up" then immediately turning into the guttural sounds of roaring engines. After 10 minutes of this, intermixed with engine at full-power creating overwhelming wind-blasts. You begin to wonder if the command "Launch aircraft" will ever be sounded. You wish that there were some hole there in which to crawl to avoid that wind that "wants to tear you away from your position and throw you like a rag back toward those other slashing blades". But no, you cling to the wheel as the life-line that it is. [One can imagine that this situation is akin to the odious practice of those who enjoy controlling and manipulating others for their nefarious purposes.] So, let the action here begin!

PV cont.: P- and N-type silicon form a P-N junction in the silicon diode. At the junction boundary is formed a depletion slab in which electrons from the N-type region have filled the "holes" in the P-type region. This slab acts as a barrier to any movement of charges (electrons) within the diode. That is, there are no free electrons or "holes" in the barrier region. A diode conducts an electric current only when a voltage is applied in one of two directions, namely the forward direction (when a positive voltage is applied to the P-type side of the diode). In this situation the electrons from the N-type region are attracted across the barrier and flow around the now closed circuit. The barrier formed by the depletion slab is reduced and charge (current) flows easily through the crystal from negative to positive voltage terminals. [The electric current is not actually a current as the flow of water in a stream. Instead, an electric current is comparable to a long row of dominos all standing on end, facing each other and but an inch apart. Push the first domino (a voltage) and each domino (an electron) falls (a current).]. The junction (barrier) then allows current only in one direction and at the same time, due to doping, the silicon cell forms a potential "battery" with positive and negative terminals. When a photon (light) strikes the cell it imparts its energy to eject an electron from a silicon atom which in turn is attracted to the positive terminal: this is current.


35
21
2
3

ONE AILING AIRCRAFT

Because this Hellcat is going forward it's going down to the hanger deck for repairs. If it were being towed to the left it would be going there as part of the respotting process for the next launch. Thus one could say that whenever the tow-bars are connected to the front wheels that aircraft has a problem and when its being towed by the tail-wheel it's going to be placed (spotted) for a launch. Even with four tractors on board we pushed aircraft more than we pulled them (with tractors). Airdales and tractors were equally adept at pushing and pulling aircraft so it was just a matter of availability of tractors or Airdales. (It was a case of "equal opportunity" on the flight deck" just as it should be everywhere else. With that, the "cream rises to the top." Now who among you are going to be the "cream" who will contribute to the achievements that this, and all countries, require?). This process of rearranging the placement of aircraft is not always so benign as it would appear here. Whenever these large machines are being maneuvered near the edge of the flight deck, caution is the word, especially if the sea is active thus making the flight deck is not horizontal (simply put, when the ship is pitching and rolling more than a little). It is then, especially when the aircraft are moved by manpower, that the plane-captain sits in the cockpit to apply the brakes if necessary.

Metals and nonmetals: Most elements are metals and are good conductors of heat and electricity. Metals are found in the left side of the Periodic Table. The prime characteristic of metals is that they have few electrons in their outer shell. They easily lose electrons to form cations (positive ions). Their compounds usually form ionic bonds (give up electrons to elements that are missing electrons in their outer shell). Most nonmetals are gases at room temperature and generally form anions (an ion with a negative electric charge). Many simple ionic compounds are formed by metal atoms losing electrons to nonmetals, the resulting ions binding to form macromolecules. Sodium and chlorine react in this way to form sodium chloride (table salt). Most metals in nature are found in compounds called ore and most metals easily combine with oxygen to form metal oxides (ores). By removing oxygen the metal is made available. In the generation of salt two metallic sodium atoms are heated and placed in the gas of nonmetallic chorine. Each chlorine molecule (Cl(2)) has two chlorine atoms. The two sodium atoms react with each chlorine molecule to form sodium chloride. Electrons are transferred from the sodium atoms to the chlorine atoms: 2Na + Cl(2) –> 2NaCl. When the metal cation loses its outer electrons it becomes more stable (you might say its much more satisfied). This subject to be continued.

ON GUARD THEY STAND

There they stand, those sentinels of security guarding our ship against those of hostile intent who would harm us (such as the infamous kamikazes who would streak across the shy to crash into our flight deck loaded with armed and fueled aircraft). Not a pretty apparition, this, to those who sleep on it. The gun-mounts are there each and every day, reassuring in a subtle way. They provided a semblance of security without "shouting it out"In a way they provided something of an emotional counterbalance to the turmoil of the incessant flight operations. And yet this symbol of security can play you false (as can the ones whom you considered your tried and true friends who abandoned you when you needed them the mos; this argues for the imperative of learning to be self-sufficient should such occur). Enough digression. Before I was an Airdale, I was walking on the hanger deck when I heard a loud explosion that sounded like the report of a 5-inch gun. I quickly made my way to the flight deck arriving right in front of the gun-mount to the left in the picture. Asking the first person I saw, he said that a 5-inch shell exploded right over the flight deck as the Airdales were respotting the deck. One was killed and several wounded by this rogue shell fired during the beginning of gunnery practice: the one you depend on was not to be trusted on this day. There would be no more gunnery practices during necessary activity on the flight deck from that point onward. Can trust ever be unimpeachable? We should all strive to make it so.

Chemical Reactions: in a chemical reaction the atoms or ions of the reactants are rearranged to give products with different chemical and physical properties. For example, a solution of lead nitrate and potassium iodide react to produce a solid precipitate. Many reactions are reversible. A nitrogen dioxide gas decomposes at high temperatures to form a colorless mixture of oxygen and nitrogen monoxide. As the mixture cools, nitrogen dioxide forms again. The reactants and products are said to be in an equilibrium situation which depends on the temperature. Reaction rates depend upon several factors, including temperature and concentration of reactants. During a chemical reaction, matter is neither created nor destroyed; it merely changes form and the total mass of the products always equals the mass of the original reactants. There are many, many possible combinations of reactants and their products, but they always follow the laws of chemical reactions.

U.S.S. BUNKER HILL (CV-17)

It's not clear whether this is a second launch in the making or a launch interrupted or what. The deckedge elevator seems to be bringing aircraft up from the hanger deck but who knows? It can be very uncomfortable when you don't know the facts of a personal situation and even more so if those facts are available but deliberately withheld (by those of "authority" .Your stoutness will, and must, prevail as does good over evil). However, we do know about the Bunker Hill, that intrepid ship that would not die. It saw honorable action at Bougainville, Gilbert Islands, Kwajalein, Truk, Hollandia, Mariannas, Palau, Leyte, Iwo Jima, Okinawa, and Pacific raids from 1943 to 1945 including the first assault on the Japanese mainland on Feb. 10, 1945. It was at Okinawa on Mar 10, 1945 that the Bunker Hill met with a disastrous blow. Within 30 seconds two kamikaze aircraft crashed onto its after flight deck, one first having dropped a 500-lb bomb onto the aircraft-filled deck. There was a mighty conflagration with dense smoke billowing up to obscure the ascendent flames of burning aviation gasoline. The aircraft were ready for launch and most of them were consumed in the intense heat of combustion. Human life in the area was snuffed out with the first impact those not killed or seriously wounded were impelled to fight the fires that engulfed the back third of the flight deck (think of a football field). Yes, we know of this, don't we? There are some REAL things that we should know, and this is one of them.

Chemical Reactions: a typical reaction occurs when iron is extracted from ore. Here the iron oxide is decomposed by heat. The oxygen atoms produced bond to carbon atoms, forming carbon dioxide gas. This is a redox reaction: any chemical reaction that involves the transfer of electrons (reduction and oxidation). Almost all reactions can be considered a redox reaction (more later). The formula for this reaction is: 2FeO +C –> 2Fe + CO(2).Another common reaction occurs between metals and oxygen: pure magnesium is combined with oxygen diatomic molecules (air). During the reaction bonds form between the magnesium and oxygen atoms thus: 2Mg + O(2) -> 2MgO. A double decomposition reaction occurs between solutions of lead nitrate and potassium iodide. The iodide ions react with the lead ions to form a solid yellow precipitate while potassium nitrate is left in solution. One metal cation of an anion-cation pair has been exchanged for the other metal cation. The equation for this reaction is: Pb(NO(3)) + 2KI -> 2KNO(3) + 2Pb(2). The reaction of nitrogen dioxide gas at temperatures above 285 degrees F. forms oxygen and nitrogen monoxide gas: 2NO(2) <–> O(2) + 2NO. Below the temperature of 285 the reaction goes the other way. Oxidation and reduction will be discussed next.

THE "SMOKING LAMP" IS OUT

The smoking lamp is out as the red-shirt refueling crew pump high octane gasoline into this Hellcat. As soon as the aircraft have been respotted these red-shirts appear and immediately start this process for each aircraft that was out on a flight. There are large tanks at the bottom of the ship that hold the gasoline. These tanks could become a huge bomb if they were higher up and were struck by an enemy bomb. I never saw anyone smoking anywhere at any time on the ship. It was a non-factor just as it was a nom-factor to me when I was growing up. The society then was pervasively saturated with advertisements on billboards, on the radio, in the movies, in the print media and by smokers wherever you went. My best friend smoked when we went on double-dates as did others in the evening. From virile cowboys to sophisticates they smoked. With all of this I had absolutely no interest or desire to smoke. The point to be made is that in my view peer-pressure, societal-pressure, are not valid for excusing bad (and stupid) behavior such as over-drinking and taking ANY drugs and fast-driving and indulging in youthful sexual activity. No, no way can one blame one's shameful and destructive behavior on the excuse that others are doing it. Do you have a properly functioning mind or are you a programmed, mindless automaton? "Wake up and hear the birdies sing", and, poor dears, don't cope out with the "peer-pressure" ploy. That's for weaklings. (In the name of full disclosure I admit to having on occasion succumbed to the third item above. I did it because I was STUPID!! pure and simple).

Oxidation and Reduction: in many chemical reactions electrons are transferred between the atoms or ions taking part in the reaction. For example, when nitric acid reacts with copper metal, copper atoms lose electrons to become copper ions while the acid gains electrons. An atom or ion that loses electrons (or gains oxygen) is said to undergo "oxidation" while an atom or ion that gains electrons (or loses oxygen) undergoes "reduction". These are called "redox reactions". Oxidation represents the number of electrons it loses or gains. Copper + nitric acid –> copper nitrate + nitrogen dioxide + water, or, Cu +4HNO(3) –> Cu(NO(3)) + 2NO(2) + 2H(2)O. The rusting of iron is an example of a redox reaction. Iron is oxidized iron (Fe(2+)) with an oxidation number of +2 when it reacts with water and oxygen. The resulting compound is known as rust. It is hydrated iron ore. A more involved redox reaction is shown by the following formula: 2C(18)H(38) + 55O(2) –> 38H(2)O + 36CO(2). Here two hydrocarbon molecules react with oxygen molecules to produce molecules of water and carbon dioxide.

DIMENSIONS

This picture provides a clear idea of the “dimensions of death” (if I may be so bold as to use such “over the top” hyperbole); yet there it is, plain as can be): It’s clear that the yellow propeller-tip reaches as far as the folded wing of this Hellcat. Therefore when two Hellcats are spotted (placed) next to each other for a launch with but four feet of space between the folded wings, there is precious little room for an Airdale to transit that narrow passageway between the wings when going to a wheelchock further back. Consider that you are 20 inches wide; this will leave but 14 inches from your shoulder to the propeller-tip (48-20=28 and 28/2=14). Thus it’s imperative that an Airdale be a vert good judge of distance because the first error he makes is the last error and thus the “dimensions of death”. Now reconsider: is that hyping the situation? I can absolutely guarantee that this little numerical calculation in mo way allows one to comprehend the emotional impact one feels as he approaches such a situation. Add the elements of an ambient wind of 30 mph (BEFORE being in among the aircraft) and the discombobulating noise of the engines and you have a recipe for anxiety tending toward sheer terror. Well, maybe not terror, but something akin to it. As they are wont to say “keep a stiff upper lip”; translation: “stay cool, stay loose” and you’ll weather the storm even though you walk alone.

Acids and Bases: in chemistry an acid is defined as a molecule or an ion that can donate protons, or hydrogen ions H+ while a base is a substance, often an oxide or hydroxide, that accepts protons. An alkali also is a base that is water-soluble (can be dissolved in water). Some substances , such as water, can act as either an acid or a base depending on the other substances present in the solution. Acids and bases undergo characteristic reactions together, usually in an aqueous solution, resulting in a salt and water. In solution acid-base reactions involve the transfer of hydronium ions, or hydrated protons H(3)O. These ions form, for example, when hydrogen chloride gas dissolves in water. The pH scale indicates the concentration of hydronium ions in the solution. If the pH is below the value of 7 a solution is acidic. If the pH is greater than 7 the solution is basic (alkaline). Thus, pure water is neutral (has equal amounts of hydroxide ions (OH- and hydrogen ions H+. Some of these become hydrated (H(3)O). Since at standard temperature and pressure there are an equal number of these ions the pH value is 7. When an alkali is added to the solution it removes protons H+ from some of the hydronium ions H(3)O forming more water molecules. The lower the concentration of H(3)O+ the higher the pH. Adding acid (adding protons H+) has the opposite effect. The water thus acts as a base. Hydronium ions increase, pH decreases.


NATIONAL ARCHIVES

LIFT OFF

No diverting details here. Here is naught but the pure elemental essence of th moment where less is more. With this picture we understand better beauty: of broad wings giving birth to lift off. What we don't comprehend is the force required to throw this 14,000 pound loaded aircraft from a standing start to about forty miles per hour in less than four seconds. What we don't comprehend is that this force is imparted by a mere cable that is barely discernable under the wheels of this TBM Avenger. What we don't see is the group of blue-shirts and green-shirts to the left who are at this moment jockeying another aircraft over the catapult-slot in the deck. Actually, this picture is the same as that of 21 pages previous but from a more personal perspective. Both show the two green-shirts racing to retrieve the cable so as to return it to the shuttle which in a moment will be sliding back to the starting position. This is so because every 30 to 40 seconds another aircraft "must" be catapulted. This requires well developed teamwork which is accomplished without a word being said. No shouting here. No posturing. No gesturing, only smoothly accomplished results. On a less dramatic scale, this teamwork is being implemented daily in all parts of our society. For example, consider the prosaic example of how those groceries appeared on your kitchen table. Many, many people made this possible by working as a "team". Think about it.

Chemistry (Salts): salts are formed whenever an acid and a base neutralize each other. A salt, chemically speaking, is a compound made up of cations (positive ions) and anions (negative ions). The cation is usually a metal ion such as sodium ion Na+ while the anion can be a nonmetal such as the chloride ion Cl-. More often the anion is a radical (which is a combination of nonmetals that remain unchanged during most reactions (chemistry keeps one on one's toes). For example, when sulfuric acid and copper oxide are added to each other the sulfur radical becomes associated with copper ions forming the salt copper sulfate. [H(2)SO(4) + CuO –> CuSO(4) + H(2)O]. Salts are widespread, appearing in many common reactions. There are salts in mineral water which are formed when slightly acidic rainwater dissolves rock such as limestone (water will dissolve almost everything, given enough time.) Large amounts of certain dissolved salts cause the water to become "hard". A class of salts called acid salts contains a positive hydrogen ion in addition to the usual metal cation. Acid salts can be prepared by careful titration of an acid and a base. (Titration is a procedure in which a measured amount of one solution of known concentration is added to another solution (to determine the latter's concentration.)


NATIONAL ARCHIVES

FLETCHER-CLASS DESTROYER (DD)

This U.S.S. McDermut, one of the 175 ships of this, the largest class, is stepping out smartly as it slices through the sea on one of its missions: (a) support the fleet against surface attack, (b) against air attack. (c) against submarine attack, (d) provide shore bombardment support to troop landings, (e) early warning radar picket against fleet air attacks, (f) act as aircraft fighter-directors by means of CIC [Combat Information Center], and (g) to protect itself against the first example of the guided missile, the kamikazes. To accomplish these tasks this class was fitted with five 5-inch guns, various 40-mm and 20-mm AA guns, four torpedo tubes, 32 depth charges (anti-submarine), various radars, sonar, a CIC, a top speed of 35 knots, a range of 4,700 miles at 15 knots, and 270 officers and men. The Fletcher was about 2,000 tons fighting weight. Being a picket ship, the destroyer was savaged by the kamikazes starting in October 1944 at the Battle of the Philippine Sea through the rest of the war (August 1945). Many were sunk and many were severely damaged, necessitating the addition of the CIC. This required the augmentation of the communication gear and was the precursor to the present day Aegis system that closely ties together the fleet in an electronic web that improves protection markedly. With these added equipments of radars and communications gear and radar-directed guns such sd the Mk 12/22, the top speed decreased by a few knots as did the range. Yet stand clear! Here comes the McDermut.

Catalysts: catalysts are the hurry-up guys of the chemical world. More succinctly, a catalyst is a substance that increases the rate at which a chemical reaction occurs without itself being changed. However, some catalysts are used up in the beginning phase of a reaction but are regenerated at a later stage. Light can be considered a catalyst even though it is not a substance in the usual sense. Photosynthesis is a prime example of sunlight being a catalyst. An automobile catalytic converter speeds up the process of changing harmful pollutant gases into less harmful ones. A substance called an enzyme is a biological catalyst. Most of these are proteins (as opposed to carbohydrates and fats). For example, a substance called "ptyalin" in the saliva helps to break down starch in food to make sugars that can be readily absorbed by the body (listen to mother, don't gulp your food!). The sugar glucose C(6)H(12)O(6) is catalyzed into ethanol 2C(2)H(5)OH and carbon dioxide 2CO(2) by the enzyme zymase in yeast. Catalysts mean life.


NATIONAL ARCHIVES

THE EASY ONES

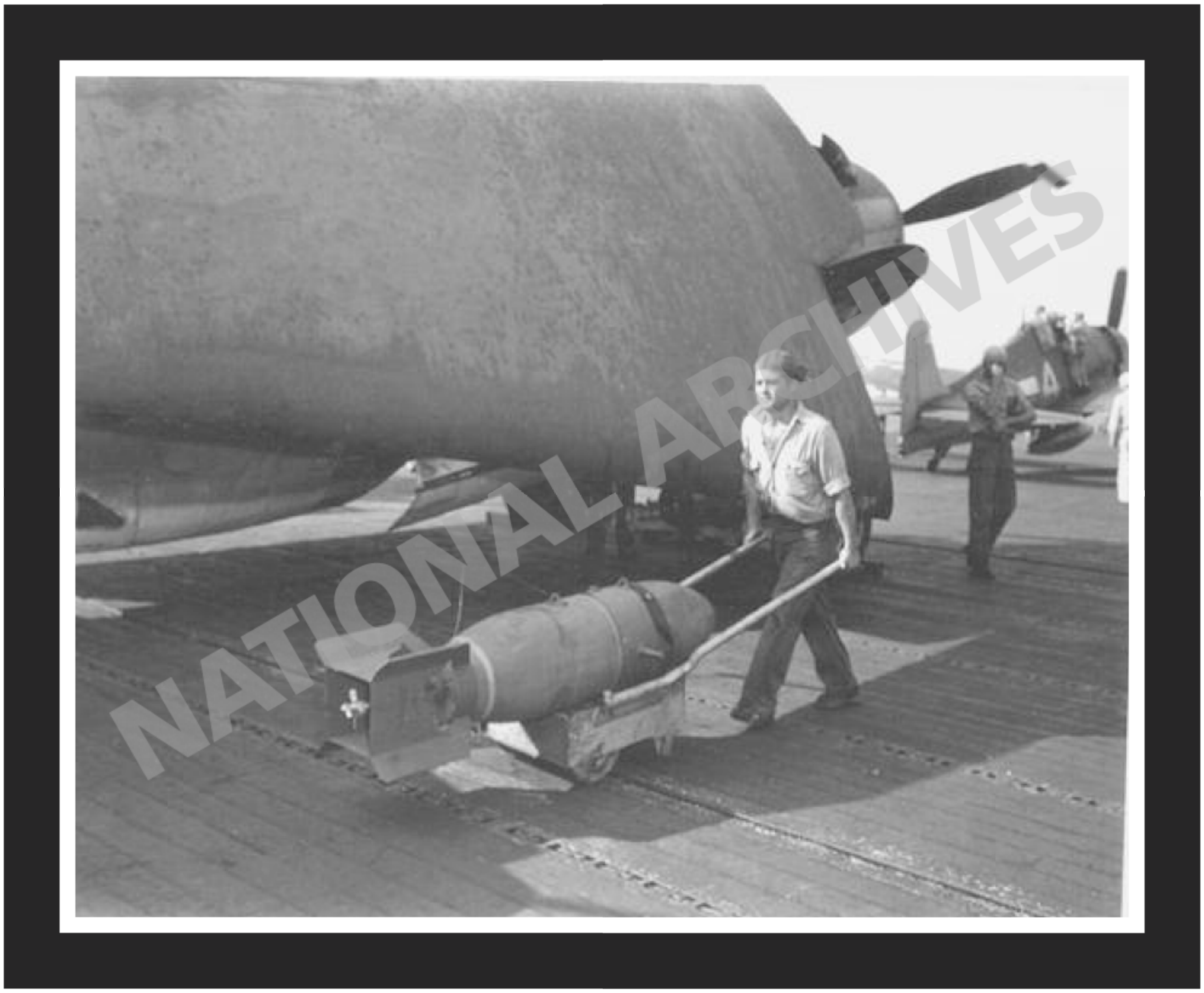
These are the easy ones, the ones spotted up front with wings spread, space permitting, where an Airdale has room to negotiate his way to a wheelchock at launch-time. (To negotiate at launch-time is to contest your efforts to reach a wheelchock as against the counter-efforts of the wind, the noise, the spinning propellers, your nerves (what's worse, to see the furiously spinning props or not to see them? Sometimes it's the former, sometimes it's the latter. You can measure the former but you're dealing with the partially known with the latter.)) When it comes time to start engines, who takes the easy ones? The answer to that is whoever happens to be the closet. And no, no one "camped out" next to one of the "easy ones" because that was not what an Airdale did. I never saw an Airdale take self-serving advantage of anyone such as this would have been. Call it an unspoken Code of Honor, call it what you will. The Airdale had long since given up such school-boy activities. Dare I say that they acted "like a man" despite their youth. Young though every Airdale was, they invariably acted in a grown up manner that the situation demanded. There was no carping, there was no complaining, there was no self-absorption. This perhaps sounds as if an Airdale was a paragon of the virtues but this is not the intent of the above which is to assert that the Airdales of whom I was familiar were business-like in their duties that, though they were simple-minded, they were definitely not simple.

Chemical Heat: a substance that is hot contains energy due to the agitation of its atoms and molecules and ions. The temperature of a substance is a measure of this agitation. All chemical reactions involve energy (heat) changes. Light and electrical energy can cause chemical reactions or can be the result of a chemical reaction. A chemical reaction is either endothermic (internal) or exothermic (external). There is an entire science called thermodynamics that is partly in the domain of physics and partly chemistry. The heat of aluminum reacting with a metal oxide can produce so much heat (exothermic) that it is used to weld metals. Aluminum is a very reactive metal and has a greater affinity for oxygen than does iron. The reaction products have much less energy than the reactants so the result is exothermic. If the energy of the products of a reaction is more than that of the reactants then heat will be taken from the surroundings as an endothermic reaction. This occurs when ammonium nitrate is dissolved in water. Heat is produced by the friction of a match-head rubbed quickly against a rough surface. This heat activates the reaction between chemicals of the match, generating a flame. Remember, heat is agitated atoms.

1,0000-LB. BOMB

How does a 170-lb. red-shirt move a 1,000-lb. bomb from here to there? (Beyond that, how does he move a 2,000-lb. bomb that the TBM Avenger next to him carries?) Wheels are a great invention but it's the long handle-bars that give him leverage that allows him to lift the carriage a few inches off the deck. There remains the problem of a deck that pitches and rolls since this system has no brakes. Usually the deck is relatively stable but if the load starts to accelerate the red-shirt "merely" redirects the carriage "uphill". But a crowded flight deck doesn't allow for much maneuvering room. Once at his destination, how does he (they) raise a 1,000-lb. load? First, they do it very carefully. Even with that, how is it that this load can be raised by such a thin set of wires? And once raised into position in the bomb-bat, how could such modest fasteners hold it in place? These thoughts intruded on my other thoughts as the roaring engines caused the entire aircraft to vibrate to what I considered was an excessive amount. (That always unnerved me when I was kneeling next to the wheel of an aircraft; this was especially so when the ship turned into the wind giving the deck a certain amount of tilt: the fuselage would tend to bounce on the slightly flexing tires so that I had the uneasy, and unreasonable, sensation that it would somehow topple over on top of me. I should have, but didn't, realize that under duress the imagination plays nasty tricks on your senses. And under duress one thought faculties are woefully inadequate: don't make important decisions when scared.)

Chemistry and Water: each molecule of water consists of two atoms of hydrogen bound to an oxygen atom. Water reacts physically and chemically with a wide range of elements and compounds. Some compounds called dehydrating agents have such an affinity for water that they can be used to remove water from other compounds. Sulfuric acid has such powerful dehydrating ability that it can remove hydrogen and oxygen from certain compounds thus making water where there was none previously. Water is often held in the crystals of certain compounds and if it loses this water when highly heated it is said to be anhydrous. Hygroscopic compounds are able to absorb water from the air and are thus drying agents. If given enough time water will dissolve most substances and/or physically scour them (consider the Grand Canyon). When ammonia gas in a flask is in contact with a dish of water through a glass tube the ammonia dissolves in the water. This generates a partial vacuum in the flask so outside air pressure pushes on the dish of water to cause a fountain of water to appear in the flask. Water (H(2)O [two hydrogen atoms] is the "engine" for much of what is called chemistry. It is the life-blood (the carrier, if you will) of many necessary chemical reactions, either as a reactant or a reagent.


NATIONAL ARCHIVES

REPLACEMENTS

These aircraft are being ferried to the forward areas as replacements for damaged or destroyed aircraft. Thus they're packed together with no wiggle-room between them but truth be known our pre-launch deck was not that much less packed than this deck. Those aircraft with wings upright are Helldivers while those in front askew are Hellcats. Why the engine cowlings are covered is not known because we never did use coverings (but then we never ferried aircraft either.) That big dark object left middle is a covered searchlight that was never operated and so was removed from all the Essex-class carriers (as was its platform; this is an early picture). When a carrier returned to the forward area from the States after refurbishment/overhaul it usually performed this service of bringing new aircraft to the forward areas. We never did do this on our way to Pearl Harbor because we were a training carrier. I sometimes wondered if the Antietam launched and landed more aircraft than the ships-of-the-line: those ships which had flight operations only when carrying out periodic raids against the enemy. However, be it understood that I make no such positive assertions; I'm only surmising, based on my very strong recollections of having had flight operations every day, twice a day, consisting of around 90 aircraft per flight (as against a flurry of attacks against the enemy followed by periods of inactivity to regroup and recoup. But then I'm not a history- technocrat; I was just a nose-to -the-grindstone Airdale who did his level-best letting the rest do their many manifests. In other words, you take responsibility for your actions and expect the same from others.

Chemical Activity Series: all metal atoms lose electrons somewhat easily and become positive ions (cations). The ease with which a metal loses its electrons is a measure of its reactivity. The metals on the left side of the Periodic Table (Groups1 and 2) have one and two electrons, respectively, in their outer shell and are usually the most reactive. Aluminum in Group 3 is a reactive metal but less so than calcium in Group 2. The order of activity is: potassium (K), sodium (Na), calcium (Ca), magnesium (Mg), aluminum (Al), zinc (Zn), iron (Fe), tin (Sn), lead (Pb), copper (Cu), mercury (Hg), silver (Ag), gold (Au). This series helps to predict the behavior of the metals' activity. It also allows the prediction of the relative stability of compounds formed: the more reactive the metal the more stable its compounds are likely to be. An example of this series is that zinc is more reactive than copper so it can displace ions from a solution. Similarly, copper displaces silver from a solution because electrons from a more reactive metal transfer to the less reactive metal ions in solution. Because electrons are transferred in these reactions they are called redox reactions. A more reactive metal will corrode, protecting an iron structure.


10
3
2

LAUNCH COMPLETE

In mere moments, from that incessant uproar to this thankful tranquility. It was as the calm after the storm. An d so another launch sent on its way (to leave us be, to spare us further assault on our senses —— until this afternoon and tomorrow morning and.....). Here we see the Helldivers to the right, the Avenger to the left and the Avenger set over the catapult while the yellow-shirt officer (khaki pants) strides purposefully to some job yet to be done. The stack can be seen making smoke (the OOD ordered the engine-room to "blow the stacks" [clean them]) so we know that we are not in enemy waters. Notice the arresting-wires flat across the deck until raised four inches by flush brackets in the deck. You soon learn that as long as the respites are sure to follow the tumult, the tumult can not defeat you or your resolve to do what must be done (such as pull wheelchocks). We all know that we can endure the difficulties and the struggles given the known times of relief that are in store (as in this picture). There are times of woe, there are times of reconstitution. There are times of tension, there are times of release. There are the bad times, there are the good times. There are disappointments. These are normal, but there are depressions which are not. Since all our disappointments are amenable in one way or another, why then don't we "upgrade" our depressions to disappointments? (which are amenable), for every mountain has a peaceful valley on the other side. This I know, this picture says so.

Electrochemistry: because all atoms consist of electrically charged particles all chemical reactions are electrical. A current is a flow of charged particles (similar to the row of upright dominos one falling on the other in turn). This "flow" is touched off by an electromotive force (voltage). Ions in solution (a liquid) are the charge carriers in electrochemistry. A solution containing ions is called an electrolyte. There are two types of electrochemical systems or cells. In an electrolytic cell two metal wires called electrodes are dipped into the electrolyte and connected to a battery or some other source of voltage. Such a cell can decompose the electrolyte in a process called electrolysis. These electrolytic cells are used to electroplate metals. In a voltaic cell electrodes of two different metals are placed in an electrolyte. The electrodes produce a voltage that can initiate an electric current between them. A common battery consists of voltaic cells. In both cells, oxidation occurs at the at the anode and reduction occurs at the cathode. The cathode of the voltaic cell is positive but negative in the electrolytic cell. Voltaic cells are used commercially to provide for flashlight batteries to large automobile batteries.


NATIONAL ARCHIVES

PILOTS ON DECK

As the ship smartly makes a 90 degree turn to port (left) to head into the wind the pilots assemble on deck to man their aircraft. In about 10 minutes the Air Officer will monotonically intone in steady cadence, "Stand clear of propellers. Prepare to start engines. Start engines". Meanwhile, the usual group of spectators are on the catwalk to watch the spectacle of the flight deck coming alive as large, noisy aircraft fire up for ten minutes and then wheel about positioning themselves in line to reach the launch point 400 feet from the front of the flight deck. At present a brown-shirt plane-captain is helping a pilot adjust himself in the cockpit of that Avenger (notice his head above the engine). No matter how many times one goes through this process of awaiting the launch operation it still generates a stirring of the "emotional juices" as you feel stranded in that little world of your own. You can almost calibrate the progress of the preparations for launch by your palpable sensations (it was the mental calculations (anticipation) that was the culprit). In brief, the thought of the deed overcame the reality of the deed. The moral here is not to let your imagination ride roughshod over your good judgement (a clear head). Not to do so is debilitating (which can be a mortal sin during flight operations). But why let a mere picture elicit this kind of response? It's long gone and nobody cares; why should they? (unless it's about lessons learned).

Voltaic Cell: By placing two electrodes of different metals in an acidic solution a voltage is created between the electrodes. Connecting an external wire between the electrodes will cause an electric current to "flow" (there must be a load, such as a lightbulb, in the circuit so that the cell (battery) does not completely deplete itself). An example of a cell is one in which zinc atoms are oxidized to zinc ions at the anode (negative). Electrons from this oxidation "flow" through the wire to the copper cathode (positive) where hydrogen ions in solution are reduced to hydrogen gas. The solution consists of sulfuric acid [H(2)SO(4)] which disassociates to sulfate ions SO(4)- and H+. At the zinc electrode zinc atoms dissolve in the acid losing electrons to form cations. Oxidation occurs so this electrode is the anode. At the copper electrode (cathode) electrons arrive from the zinc anode through the external wire. They reduce hydrogen ions from the acid, forming hydrogen gas molecules. An alkaline dry cell consists of powdered zinc while manganese oxide is the other metal. The electrolyte is ammonium chloride. Cells are rated as to voltage and current capacity with many practical cells ranging from 1.5 volts to 9 volts. (Note: always place a load (a lightbulb, etc.) between the battery terminals.) Developing large, efficient batteries is the "Holy Crail".

A PERFECT LANDING

No need to tense up for this one: the height's right, the attitude's right and if the speed is right this is a perfect landing. The LSO (Landing Signal Officer) thinks so too by the stance he's taking. No barriers will be needed for this one though most often there are four barriers erected for landings. Not only are two barriers missing (there are five barriers in all) but also the two 5-inch gun-mounts plus the two 40-mm gun sponsons are missing. Therefore I must assume that this is a post-war Essex-class carrier. The LSO, in his small silhouette, perfectly epitomizes the lonely nature of his job. He feels a direct responsibility for each and every pilot who brings his aircraft aboard. While he does have assistants there at his station, the responsibility is solely his. In fact he gives a critique of every landing to a recorder next to him. After all aircraft are aboard he sits down with the pilots to discuss what was unsatisfactory about the landing. Being an accomplished pilot himself, he knows whereof he speaks. But his is not the only lonely job out there on the flight deck. Each Airdale has his own demons with which to deal. There is no buddy next to him as he crawls to a wheelchock with a wind at his back that does its utmost to take him where he would not, should not, go. It's when in among the aircraft trying to reach a wheelchock that a fear takes hold. This is the only time that I felt raw fear. It doesn't last that long, but then how long is "long"? Too long I'd say, especially when it is not the last time. "Will it ever end in my lifetime?" (I seem to very often bring it back to myself. I can't seem to avoid it, and for that I apologize. However, it's what I know the best.

Alkali Metals: the elements on the most left column (column 1) of the Periodic Table are, top to bottom, Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb), Cesium (Cs), and Francium (Fr). These elements are called the alkali metals. The atoms of these elements have one electron in its outer shell which is easily lost forming cations such as the lithium ion Li+. All the elements in this alkali group are highly reactive metals which react violently with acids and even water to form alkaline solutions The most important element in this group is sodium which forms many compounds including sodium chloride (table salt) and sodium hydrogencarbonate (which is used in baking powder). A very important commercial product is sodium hydroxide, a strong base which reacts with the fatty acids in fats and oil to produce soap (which is a salt). The reaction for sodium hydroxide is sodium [2Na] + water [2H(2)O] –> hydrogen gas [H(2)] + sodium hydroxide solution [2NaOH]. Sodium atoms lose electrons [Na+] while water molecules each gain an electron [h(2)O-] to form the sodium hydroxide [NaOH]. Because of their reactivity alkali metals are found only in compounds in nature.

SPREAD YOUR WINGS

Hellcats require help from the Airdales to spread their wings (the others don't). As seen here the Airdales have accomplished this function with the Hellcat's left wing and just about done the same with the right wing. When spread, an Airdale pulls a latch to lock the wing in place. As this process proceeds the yellow-shirt to the right is holding the pilot with upraised arms and closed fists. When ready to proceed forward he will direction the pilot's attention to the yellow-shirt to the left who will in turn direct the pilot up forward to the Launch Officer (a pilot). In this way an aircraft is passed up forward from yellow-shirt to yellow-shirt. The Launch Officer is standing about 400 feet from the front of the flight deck (opposite the Air Officer, commander of the Air Department) up in PRI FLY just back of the bridge/pilothouse. After checking that the flaps are down, the Launch Officer signals the pilot to rev up the engine. After about 5-6 seconds and if it sounds right and the engine isn't sputtering, he'll lunge forward onto one knee pointing up forward which signals the pilot to release his brakes. The straining aircraft jumps forward and another aircraft is launched 20-30 seconds after the one before it. So it goes, one after the other, until all 90-95 aircraft are airborne. As each one leaves the ship they form up into groups and squadrons, leisurely circling the ship until all aircraft are in place in their echelons. It's an impressive spectacle, those 90-95 aircraft all in ranks overhead. Someone's going to be in trouble! Who knows, it might be us.

Alkaline Earth Metals: these are the elements of the Periodic Table in the second group (vertical). These elements are active because their atoms easily lose the two electrons in their outer shell. They thus become doubly charged cations (attracted to the cathode). These elements are Beryllium (Be), Magnesium (Mg), Calcium (Ca), Strontium (Sr), Barium (Ba) and Radium (Ra). Hard water contains large amounts of dissolved ions, including calcium ions. It is formed when slightly acidic water flows over rocks containing calcium salts such as calcium carbonate. The dissolved calcium salts can precipitate from hard water forming scale in pipes. Hard water makes the use of soap difficult. Calcium compounds are used in the manufacture of cement. Concrete is calcium hydroxide Ca[OH(2)] dissolved in water and mixed with sand (silicon) to give it bulk. As the mixture dries calcium hydroxide crystalizes out of solution and slowly reacts with carbon dioxide in the air to form hard calcium carbonate. The reaction is: carbon hydroxide Ca[(H)(2)] + carbon dioxide [CO(2)] –> calcium carbonate Ca[CO(3)] + water H(2)O. (The chemical engineer, beside being very smart, can seem the wizard.)

24

AND ONE CAME BACK

And one came back from the launch just completed due to a malfunction of some kind. Better now than when 100 miles from home-base. If this Hellcat went down into the sea so far from the ship it would no doubt have required another name be scratched from the roster-board. The malfunction has gained the attention of this group of plane-captains gathered to greet the ailing Hellcat. These brown-shirts (all flight deck personnel on the Antietam wore their respective colored shirts, unlike here) understandably take a personal and professional interest in this disabled Hellcat. However, interest or no, it's the mechanists who would do the actual repairs down on the hanger deck below. (That sailor with the steel helmet perhaps knows something we don't know such as an impending enemy air-raid or maybe he just likes to always be prepared or perhaps he likes steel helmets. In any event, the only topside personnel who wore steel helmets were the gunners (40-mm and 20-mm. The rest of us were on an exposed deck with no protective gear of any kind (not that it would be of any use if a 500-lb. bomb landed nearby.)). As ever, there's an Airdale, wheelchocks in hand, at each wheel. They will stay by those wheels as long as the engine is "fired up", no matter where that aircraft may go. It's as if they were tied to the aircraft in a symbiotic relationship that seems bizarre to those not in the Airdale fraternity (there is such even though unspoken).

Transition Metals: about one half of the Periodic Table is made up of these elements consisting of the last two rows and the left half of the rest of the rows (excluding the alkali and alkaline metals) of the Periodic Table. These metals all have more than one oxidation number (valency). These metals include iron, silver, gold and copper. Iron is alloyed with various elements to form steel (without which we'd be living an entirely different life-style). Steel is produced primarily by the oxygen process: molten iron is poured into the oxygen furnace and then oxygen is pumped into the furnace to purify the iron by combining with carbon impurities. The newly formed steel is then poured into a vat for further processing. Because transition metals have more than one valency (number of electrons in the outer shell of an element) they are able to form many compounds. Lead is also a transition metal with many uses and characteristic of this group of metals such as being solid where the alkali and alkaline metals are not. The metals are all conductors of electricity to one extent or another. The solid metals can be characterized as being ductile (capable of being drawn into wire) or malleable (capable of being hammered into shapes and sheets). All metals are "precious" and we should thank God that they are there for our use.

ONE OF THOSE DAYS

This is one of those days that the sea takes charge of what will and what will not be done. It's one of those days that the sea shows us not only its power but also what can only be called its foul demeanor. It's as if the sea were in a funk and we were going to pay for it. Unfortunately a storm traveling at 20 knots can overtake a ship that's lucky if it can make10 knots in such a sea. Furthermore we had not the weather-prediction equipment back then. So you must "stand and take it". The wind, at perhaps 60 knots, is whipping up the froth that reaches us at about 70 feet above the water here at the second tier 40-mm guntub looking aft. At times it seems as if the sea is only half that distance from us as the ship surges forward, then upward, now downward, all the while rolling and pitching. A carrier's dimensions do not favor a sea whose "wavelength" does not march it. We watch the roiling sea with fascination and a certain amount of trepidation as the wind-swept spray finds us up at our perch. The Antietam was in only one bona fide typhoon so I am hardly an authority about such things. I can only say that I went topside because I considered it an opportunity to witness such a storm first-hand. I was both fascinated and somewhat concerned, but not too much because there was absolutely nothing I could do to change things. The only one who could realistically change things was the helmsman by not keeping the bow of the ship headed into the wind. With the inevitable yawing (horizontal motion of the ship right and left) the helmsman had a difficult job. To broach a ship(turn sideways to the wind and waves) is to court disaster if the waves are big enough (though a carrier was never so endangered, to my knowledge). Some though received heavy damage.

Carbon, Silicon and Tin: these elements are in the vertical group 14 of the Periodic Table. The complete list is: Carbon (C), Silicon (Si), Germanium (Ge),Tin (Sn) and Lead (Pb). Carbon is a nonmetal that is the basis of organic (living) chemistry. It can be found in three distinct forms, or allotropes. One form is called fullerenes where the carbon atoms join together in a hollow spherical cage. The more familiar forms of carbon are graphite and diamond. Many carbon compounds form a tetrahedral structure (four-sided). Silicon is used in many electronic devices. Quartz, the source of silicon, is the main ingredient of sand which is used to make glass. Silicon is the basis of many photovoltaic devices in the form of a semiconductor that has been doped with elements to give it positive or negative characteristics. Of group 14 carbon must be considered the most important because of its appearance in all living things due to its valence of four orbital electrons at the outer shell. Silicon, being used in all the glass products and most of the electronic products is a close second (fortunately it is one of the most, if mot the most, prevalent element available in solid form.


NATIONAL ARCHIVES

LONG MAY SHE WAVE

A stiff breeze allows for the showing of the flag: long may she wave. Just to the right and above it is the Mk 37 5-inch gun director for the guns below and to the left. Just this side of the flag-pole and out of view (to the right of the sailor with the head-phones) is the Mk 51 gun director for the 40-mm quads directly below the flag. Now directly below the platform occupied by the two sailors and above that 40-mm quad, out of sight, is the after navigation bridge on either side of the after pilot house (used when the forward pilot house is damaged and out of commission). It is on this after navigation bridge that I would occupy one of the two lookout chairs on the port and starboard sides of the bridge. In the evening this area, and in fact the entire topside including the flight deck, would be completely clear of any personnel. These two seats became my place of repose, my veritable "sanctuary" after a full day of sound and fury. It was a God-send to me as I looked out over the ocean and up at the lowering big sky of eventide as I ruminated about home and "my girl", agonizing that what I had devoutly wished for was slipping away and not to be. And I kept dreaming the dream of fruition and even as I commiserated with myself to a fare-thee-well. What I didn't realize was that I was not old enough nor smart enough to realize that it was never to be. This is irrelevant and trite now but then, then it was pure agony. I can only thank my lucky stars that I was afforded that "sanctuary" on the after navigation bridge of the Antietam with nary a soul to interpose on my repose. As I look back on this it seems a mini-miracle that such should be so. I was sincerely grateful, to be sure.

Nitrogen and Phosphorus: these are the most important elements of Group 15 of the Periodic Table. Phosphorus (P) is a solid at room temperature while nitrogen (N) is a gas at room temperature and makes up about 78% of the atmosphere. Nitrogen can thus be derived from air after the oxygen, water vapor and carbon dioxide is removed. The most important compound of nitrogen is ammonia which is used in the manufacture of fertilizers and nitric acid. Phosphorus reacts violently in air so it is kept in water (although it does not dissolve). Nitrogen can be prepared by the Haber process in which nitrogen and hydrogen are combined to form ammonia. This in turn forms a positive ion called the ammonium ion [NH(4)]+ which acts like a metal cation (is attracted to the cathode). Ammonia can be prepared in the lab by heating ammonium salt with an alkali such as calcium hydroxide. Air is composed of nitrogen (78%), oxygen (20%), water vapor (0-4%) plus other gases. Air is passed through sodium hydroxide solution dissolving carbon dioxide, passed through concentrated sulfuric acid removing water vapor and then over heated copper metal to remove oxygen, leaving nitrogen. To be converted to ammonia.


NATIONAL ARCHIVES

LAST FLIGHT

A definite, though quiet, air of relaxation overtakes and even pervades the flight deck as the last of the aircraft are landed AND parked. The milling yellow-shirts, brown-shirts and blue-shirts (Airdales) will deferentially part to allow these two pilots to pass on their way to the ready-room and a debriefing. This is done not only as common courtesy but also as a mark of silent admiration for those who climb into those large vibrating machines called aircraft to fly to inhospitable locations over the wide expanses of the trackless ocean (and return). These flight deck personnel, in an unspecified way, pay tribute to these warriors of the air. Their daring deeds are done on a voluntary basis. True, they receive extra flight pay and true, they receive the adulation of the home-front, but also true is the fact that they do it. (As they say, "Somebody has to do it".) So why are there some who begrudge them the admiration that they do receive? And why are there some who are outright jealous of those they perceive to exceed them? What comes to mind is that they have a bad case of inferiority complex where pulling someone down somehow elevates them. It would be sad if it were not so destructive and ugly. (Those who belittle others, without just cause, are themselves (very) little.) If only the corrosive and negative jealousy could somehow be transmuted to useful and positive admiration. Are not jealousy and admiration two sides of the same coin? The former represents pulling someone down to "elevate" yourself while the latter represents pulling yourself up to elevate yourself. (These comments are so basic that I feel somewhat embarrassed putting them to paper, but I did and I'm glad to do so.) Let's be honest here: an admirable person should inspire you, not engender jealousy.

Oxygen and Sulfur: these are the two most important elements in Group 16. Oxygen is easily prepared in the lab by decomposition of hydrogen peroxide. Sulfur occurs in several different forms, or allotropes. These two elements combine to form many compounds. Oxygen is found in many organic compounds (to follow). Hydrogen peroxide 2H(2)O(2) –> Oxygen O(2) + water 2H(2)O. Hydrogen ions in hydrochloric acid combine with the sulfur from iron sulfide to form hydrogen sulfide and iron chloride: FeS + 2HCl –> H(2)S + FeCl(2). Oxygen is the most abundant element extant. The oxygen in the atmosphere (20%) is constantly being recharged by the process of photosynthesis. Oxygen is very reactive and combines with all other elements except the noble gases (inert gases: helium, neon, argon, krypton, xenon and radon) and fluorine. Burning and rusting are two reactions that oxygen makes possible. Carbon dioxide, silicon dioxide, iron ore, calcium carbonate (limestone) are but the beginning of a long, long list of oxygen compounds (not even mentioning organic chemistry).

EXERCISE TIME

This was a scene never seen on the Antietam for two reasons: there was never an exercise-time and the aircraft were never parked so loosely (so much space between the aircraft). It could be that these personnel were below-decks types because the topside crew had enough activity to keep them physically tired. The sun is low so flight operations are through for the day but no, this never happened on the Antietam. Each ship had its own "personality" I presume and when I look at these various pictures throughout the book I can usually tell whether it was taken on board the Antietam or not. Each ship had its own nickname and ours was given to us by the lady who christened our ship. It was perhaps somewhat "corny" but it was a good try ("Go Get 'Em Antietam"). However, corny is not compatible with the name itself: "Antietam" is the name of the Civil War battle that made possible Lincoln's Emancipation Proclamation and in which in one day 26,000 casualties were suffered by both sides, the bloodiest day in American history. It did not sit well to go to war on a ship so named especially when the kamikaze "guided missiles" had already started their suicide missions in October 1944 (we were commissioned in January 1945). While on duty somewhere in the Pacific we would have available daily newsletters giving the previous day's accounts of ships hit, ship's damage, ships sunk, personnel wounded, personnel killed, aircraft lost, and any other news that served to raise alarm in the minds of the uninitiated such as myself. "What kind of a world is it that we're entering? Would we even get out of that world unscathed? How would I react under fire?" However, this was in the background: there was activity aplenty on the flight deck to distract one's mind. I wondered about the personnel below deck who had no such distractions.

Halogens: these are in Group 17: Fluorine (F), Chlorine (Cl), Bromine (Br), Iodine (I) and Astatine (At). Atoms of this group are just one short of a full outer electron shell so they easily gain one electron to form singly charged anions (attracted to positive anodes) such as the fluorine ion Fl. These atoms are thus highly reactive. Chlorine is prepared in the lab by the oxidation of hydrochloric acid. Small amounts of chlorine in the water supply kill bacteria. Too much chlorine is unhealthy and too little is ineffective. Bleaches are made out of sodium chloride. Chlorine can be derived from the following formula: manganese oxide plus hydrochloric acid forms manganese chloride plus chlorine plus water: MnO(2) + 4HCl –> MnCl(2) + Cl(2) + 2H(2)O. The halogens combine directly with most metals very easily to form salts (table salt sodium chloride, NaCl. Each halogen has 7 electrons in its outer shell thus making reactions similar with each other.

AFTER THE STORM

After the storm, first thank God for our survival. Then assess the damage. There below is the stark evidence of the tremendous forces that can be conjured by the wind on the water. Consider how great an amount of water must have fallen from a goodly distance to have caused such damage. Also consider that the flight deck is about 50 feet above the water under normal conditions. Now consider that when the ship pitches downward while in a trough, how big must that wave have been to have crushed the flight deck in such a manner? (Surmising only, if the bow of the ship dipped 30 feet into the water while in the trough then the wave's crest must have been 30 feet to bring it to the level of the flight deck. Now add 30(?) additional feet higher to give the wave enough height to fall sufficient to crush the deck below it. Thus the wave's height, crest to trough would be 30 + 30 = 60 feet. Now let the experts have their say). In any event, during "our" typhoon the Antietam would shudder markedly under the waves' pounding . Being long, a carrier would overlap two adjacent crests and so be punished more than a shorter ship that would "ride" a crest. (However, woe unto it if it were to be caught in a trough with a crest hovering over it.) No pun intended, I'm out of my depths here. However, one thing can be ascertained, a ship at sea in a large storm is a ship that requires the ministrations of the Navy Hymn: "Eternal Father, strong to save, Whose arm hath bound the restless wave, Who biddest the mighty ocean deep Its own appointed limits keep; Oh, hear us when we cry to Thee, For those in peril on the sea!"

Organic Chemistry: this is the study of organic compounds which surpass the number of inorganic compounds by orders of magnitude. (However it excludes compounds of carbon dioxide and the salts such as calcium carbonate.) The reason this is so is that carbon atoms easily bonds with other carbon atoms and so form large and long chains and rings of compounds. These bonds can be single, double or triple. A fundamental part of organic chemistry is based on hydrocarbons. There are three main families of hydrocarbons based on carbon chains: alkanes, alkenes and alkynes. Ethyne is the simplest alkyne with two carbon atoms. One of the reasons for the large number of hydrocarbons is that they can have the same constituent parts but have varying configurations (structural forms). These are called isomers. For instance, the hydrocarbon butene has two isomers that differ in the position of the double chain hydrocarbons which is separated industrially in a fractionating tower and cracked (heated) with a catalyst to produce more useful short-chain compounds. This large subject will be continued.


NATIONAL ARCHIVES

BOFORS 40-MM AA GUN

This gun was developed in Sweden in response to the WWII situation. It required an 11-man crew: 4 loaders, 4 servers, 1 train controller, 1 elevation controller and 1 communicator (to the gunnery officer). There was an electric motor for each of the train and elevation motions The guns were trained and elevated, all four, in unison with each barrel firing 160 rounds per minute. I believe each clip of four rounds had an incendiary in it so that the gunner could watch these tracer rounds as they "fetched" the target. Later in the war the Mk 14 gyroscopically-controlled computing gun sight was added to the standard Mk51 gun director so that the gunner had "only" to keep the target in the cross-hairs letting the Mk 14 account for the required lead angle (in both train and elevation). There were 15 of these 40-mm quad guntubs on board ship: 2 at the bow, 2 at the stern 2 at the forward island, 2 at the aft island, 2 on the port side and 5 added on the starboard side (totaling 60 guns). The range of this gun was 11,000 yards at a 42 degree elevation and a range of 22,800 feet at a 90 degree elevation. The effective range was 2500 yards (with some degree of success). This is a posed picture but when in operation the racket they make is indescribable. I wondered, during gunnery practice, how the ones responsible for aiming the guns could function adequately. Watching the tracers arc up toward the target-sleeve, I gave them high marks and I unexpectedly felt reassured. But then, after all , they were professionals, and young at that.

Organic Chemistry cont.: to produce ethyne, calcium carbide is added to water to produce ethyne plus calcium hydroxide: CaC(2) + 2H(2)O –> C(2)H(2) + Ca[OH(2)]. Some families of hydrocarbon are alkanes (methane, ethane, propane and butane with one, two, three and four carbon atoms respectively). The alkenes are ethene, propene, but-1-ene and but-12-ene with two, three, four and four carbon atoms respectively. Finally there are the alkynes (ethyne, propyne, but-1-yne and but-2-yne with two, three, four and four carbon atoms respectively). In the catalytic cracking (heating) oil hydrocarbon chains , fifteen carbon atoms long break into smaller chains with between two and nine carbon atoms. However, many possible reactions can occur. An example of one of them follows: long chain alkane breaks into nonane plus propane plus ethyene plus carbom soot plus hydrogen gas [C(15)H(32) –> C(9)H(20) + C(3)H(8) + C(2)H(2) + C +H]. In organic chemistry each carbon atom forms bonds covalently with each of its neighboring carbon atoms in a chain or ring fashion and equally with other atoms such as hydrogen, oxygen, nitrogen or sulfur. It's this ability of carbon which allows for such a multitude of possible compounds and with that of life itself.

HOUSEKEEPING CHORES

Fighting ships also have chores to do. I suspect that this ship is in port and it is moving materiel in both directions top to bottom and bottom to top on the aft elevator. (If the ship were at sea the supplies would be arriving directly to the hanger deck from the supply ship. Here the supplies are being deposited to the flight deck by the shore-based cranes.) Clearly seen in this picture is the location of the gallery deck immediately below the flight deck. That space from the flight deck to about eight feet below the flight deck is occupied by the gallery deck that contains among other things the captain's quarters, the admiral's quarters, ready- rooms for the squadrons (pilots), radio rooms, etc. This picture puts me in mind of the three week period between my move to the Airdales from the the Navigation Division when I was in the breakout crew of about ten sailors. Our job was to carry produce, crates of canned goods and sides of beef from the refrigeration rooms on the bottom deck to the galley (kitchen) four decks up. The boxes were large and unwieldy, the sides of beef were large and bony and the produce was just large. None of this would have been a problem except for the fact that the ladder (a very steep stair) was very steep and narrow, and the ship would not hold steady . Thus climbing four decks with these loads presented problems, especially when going from the freezing refrigeration rooms to the hot galley. One problem we did not have was the right-of-way: just before we went up the ladder we'd say, without stopping, "clear the way". Everyone, including officers, immediately made way for us, the lowly non-rated seamen. ("Cool, huh"?)

Organic Chemistry: simple organic molecules are based on chains and rings of carbon atoms. Carbon atoms are very versatile in that they can combine with (bond) not only itself but also with a multitude of other atoms and molecules. Carbon can form into very large and complicated molecules which make them the basis of life itself. Small organic compounds often combine with other organic compounds or with other elements to form large compounds. When the carbon compounds join with other similar compounds they are called polymers such as nylon and other synthetics of great strength. Molecules of glucose join to form sucrose which in turn join to form starch, a carbohydrate (the other two constituents of food are proteins and fat). Thus polymers exist both synthetically and in nature. Our messengers of heredity, DNA, are composed of hydrocarbons which form the four bases of the DNA helix: cytosine, guanine, thymine and adenine. These four compounds, along with supporting structures, are the basis of the genetic code. A group of four of these bases are called a condon which "spell out" the gene composition. (What could be more fascinating than unraveling the code of our very life itself?)

LIMITED PARKING

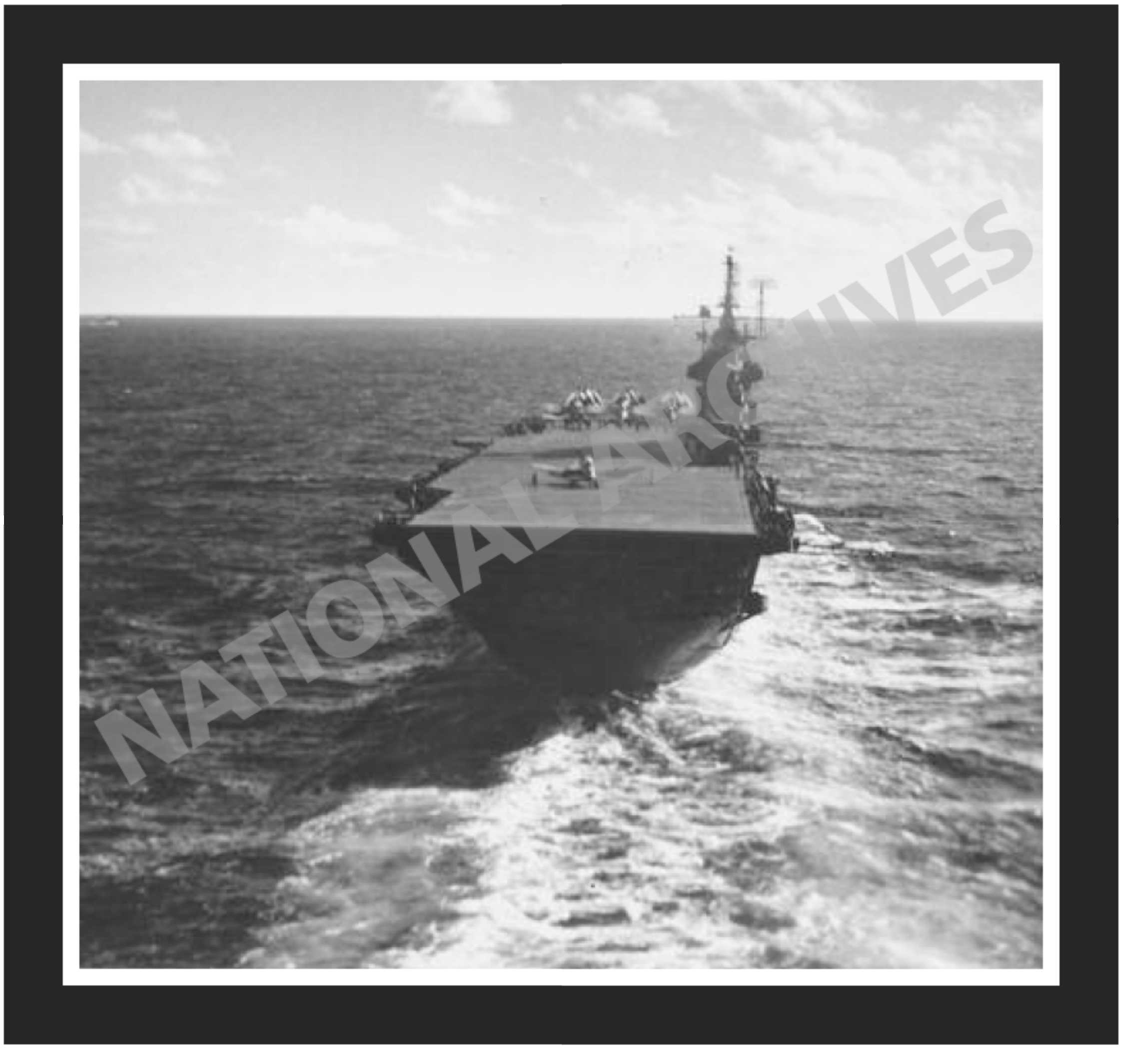
The Airdales are about to respot the aircraft back aft(note the Airdale pulling on a tow-bar attached to one of the Hellcats which is to be attached to a tractor). Here are seen only Hellcats and Helldivers, and only a limited number at that. The Airdales take it upon themselves to move the aircraft back aft but it's the yellow-shirts there who will determine where each aircraft is spotted. We have a good view of the span of the Hellcat's tail-section (17 feet). This means that the 13 foot diameter propellers of adjacent aircraft can be no closer than four feet to each other. That is, when they're packed together cheek-by-jowl the propeller-tips of adjacent aircraft are 4 feet apart (17-13)/2=2 +2 of the adjacent aircraft=4 feet). Your being 1.5 feet wide leaves only 15 inches between your shoulders and the propeller-tips on either side. This is dicey at best especially when the propeller is spinning so fast it's invisible. Such a situation occurs frequently when there are up to to 90 aircraft to be launched at one time. To be balanced about this the Avengers and Helldivers did not present such a daunting prospect. In fact when they were reached you could let out a small sigh of relative relief. However there's something unnerving about having to deal with an unseen "adversary" (we are of course talking about the propellers but why exclude the two-legged kind of adversaries? It's to be commendable to be forthright about your conflict with others. Be a "man" about it. Be above board with those with whom you have contentions. It's the right thing to do.

Chemical Analysis: there are many situations that call for the chemical analysis of unknown substances. These substances may be available only in very small amounts and nay be mixtures of many compounds. Separation techniques such as chromatography are often the starting point in an analysis. Simple laboratory tests may follow. These normally identify one part of a compound at a time. For example flame-tests are used to identify cations (ions attracted to the cathode) of metallic elements in a compound. Radicals may be identified by heating the compound to decompose it thereby releasing signifying gases. (Radical: an ion normally consisting of two or more nonmetals that generally remain unchanged during a chemical reaction. An unknown substance can be crushed and dissolved in water and other solutions such as ammonium hydroxide or silver nitrate are added. The color of any precipitate (solid) formed indicates the presence of a specific ion. Or, a sample to be tested can be vaporized then ionized. The ions are separated by a strong magnetic field and identified according to their electric charge and mass Chemical analysis activities range from geological surveys to forensic investigations, a fulsome enterprise and one that should bring satisfaction: my brother was a chemical engineer at DuPont

A PILOT'S PERSPECTIVE

The ship churns ahead at about 20 knots moving out from under you. The deck's fairly stable now with no heaving and only a very lazy roll now and then. But this is the LSO's problem as you rivet your eyes on him (and sharp eyes they must be).You have about 10-12 seconds to touchdown, enough time for those two green-shirts to unhook the Hellcat so that it can accelerate down the flight deck to be guided by yellow-shirts all the way (note one of them next to the aft 5-inch gun-mount). Presumably the green-shirts will do their job properly so that the LSO wont have to wave you off to go around another time. From an Airdale's perspective, the question is, "where are they?" Right now two of them should be running out, wheelchocks in hand, to the Hellcat so as to escort it to the parking area, staying with it until the engine is shut down. We should be able to notice them on both sides of the flight deck either awaiting the next aircraft to land or they should be up forward attending each aircraft as it is "shoe-horned" into its parking spot. There was never any problem of Airdales not being front and center during flight operations. I wont vouch for their mental attitude but I will vouch for their apparent dedication to doing their job in an expeditious manner. It was simply a matter of there being a job to do NOW and so doing it. Malingering was not in the Airdales' vocabulary. It was simply a non-factor. Initiative was truly an unstated modus operandi. Grandstanding also was not in the vocabulary. Things went smoothly, things went well, things happened now and little was said to make it so. It was good (and it was even satisfying).

Basic Physics: physics is the study of matter and energy where matter is anything that occupies space and energy affects the behavior of matter. Everything that happens requires energy which comes in various forms: heat, light, electrical chemical, potential, kinetic (motion), gravitational and nuclear. Energy can change its form from one kind to another such as electrical energy causing a motor to generate kinetic energy and heat energy. The total amount of energy never changes; it only changes form. The same applies to matter (it only changes form). Thus the Principle of the Conversation of Energy and Matter. Another example is the conversion of chemical energy in gasoline to kinetic energy of motion of the car plus electrical energy in the battery plus heat energy of the engine plus the heat of braking plus th e potential energy of the car driven to the top of a hill (and is equal to the height of the hill and the mass of the car). Then there's the important conversion of the sun's energy being converted to electrical energy by means of photovoltaic cells. To be continued.


NATIONAL ARCHIVES

RELAXATION AREA

This never happened on the Ahtuetam while we were at sea: snow-fence to keep the below-deck personnel secure on the flight deck, the sun-bathing on the flight deck, he canvas coverings on the engines , the spectators crowding around the elevator as others worked and the general transposition of the flight deck into a "playground". But hold on, this is the venerable U.S.S. Intrepid (CV-11), the ship that was there from the beginning (and is now a museum ship in New York City harbor). This was a ship that saw action at Kwaajalein, Truk (the Japanese Pearl harbor base), where it was torpedoed, Palau. Letye, and other assorted raids in the Pacific. It was severely damaged by kamikaze aircraft off Luzon (the battle of the Philippine Sea, the biggest naval engagement ever) and again by kamikazes off Okinawa. So give them a break. They deserve their R & R time, for sure. After all it was the Intrepid that accompanied the Antietam (or is it the other way around?) from 5 September 1945 to 11 October 1945 in Task Group 72 as we provided air cover over Korea during the displacement of Japanese troops from there. Even though we continued patrolling this area after the Intrepid left for stateside, we never made port there. Actually, it felt like we never made port anywhere what with flight operations that seemed to go on and on and on without R & R. But the food was good.

Basic Physics cont.: force is a push or a pull. Force can be applied to objects without contact and from a distance. The effect of several forces acting on a body is resolved into one resultant force that considers both direction and force applied. A stationary object on a flat surface is in equilibrium because an equal and opposite force is being exerted by the surface. If the surface tilts and the friction is negligible the object will move downward. Forces can be transitional or rotational. A force applied to an object that can rotate around a point is called a moment and the force required to turn the object decreases as the moment (or lever-arm) increases. The eminent scientist Newton derived three laws of motion:1) When no force acts on an object, it will remain in a state of rest or continuous uniform motion in a straight line. 2) When a force acts on an object the motion of the object will change. This is called "acceleration". The acceleration generated is equal to the size of the force divided by the mass of the object on which it acts (F=ma). 3) If one object exerts a force on another object, an equal and opposite force (reaction force) is applied by the second object on the first object. These Laws describe the motions of the planets and were derived to explain these motions. To develop these ideas Newton also derived the subject of calculus, a bulwark of all engineering and science. To be continued (a a basis for all engineering).


NATIONAL ARCHIVES

THE "BEASTS"

There they stand, now so docile, these "beasts" as the pilots are wont to say of their Helldivers that have taken them far and wide and back again so many tines. But soon, in about an hour, these same Helldivers will turn into those beasts as they're fired up for the next launch. It's then that the Airdales are provoked to call them names that reflect on these now animated machines as they're whipping themselves into a frenzy. But at this time all is calm as we bring the aircraft back aft for respotting in front of the already respotted Avengers. This process of respotting, while quiet, is not all that simple since it's necessary to pack the aircraft tightly together. The Airdales do this for the most part by themselves (once told what aircraft goes where) while the yellow-shirts provide overall supervision (that's a yellow-shirt with the "U.S. Navy" on the back of his jacket. I brought mine back home as I did my other personal belongings. It was; if you will, a sign of appreciation by the Navy for my service to it. At least that's my "take" on it. In a larger sense, appreciation is a superior attribute of those who feel it. It indicates a lack of self-indulgence. Much more importantly, an appreciative person can in no way be an arrogant person. In fact, the more appreciative a person the less arrogant that person and the more agreeable the is the quality of life for everyone.

Basic Physics: momentum is mass of an object times its velocity (direction of speed). Force is mass times acceleration. Work is force over a distance. Power is work over time. Kinetic energy is ½ the mass times velocity squared. All these quantities (momentum, force, work, power, kinetic energy) require energy to dissipate them. Thus a car can be stopped only by the expenditure of the energy of the heat of friction between four relatively small brake-pads, making your life dependent on some 16 square inches of friction-material (of course if the speed is sensible (and we all know what sensible is) then we'll all live longer.) Friction impedes motion of all kinds. Even air provides friction (to cars, aircraft and a feather (in a vacuum a feather falls as fast as a stone). Friction is a detriment to the piston sliding in the cylinder (oil decreases this waste by physically separating the piston from the cylinder wall.) But not all friction is bad. Consider the problem you'd have if walking on a surface slicked up with oil. Think of car-tires on ice. Think of that brake-pad. Think of a world without friction. Ooads are roughed up to increase friction, decreasing skidding. Still, speed is what kills (other drivers).

THE CHALLENGE

This pilot, all pilots, have to set up their plotting-boards for the dead-reckoning problem with which he must soon deal. The dead-reckoning problem consists of being able to go from here to there and BACK again after traveling over an empty ocean even as the home-base (the ship) is moving, sometimes in an "erratic" course. This requires that he record pertinent data such as wind speed and direction, starting longitude and latitude, course direction, anticipated speed, compass declination (magnetic north is not geographic north) , and other things that are too technical (suffice it to say that all pilots attended navigation school). As he flies his course he must keep track of elapsed time so that he'll know his "dead-reckoning" position at that time. That round object and rectangular object are calculators. The latter one is a slide rule and the former one is a circular slide rule, easier and faster to use. (In prep school we took a mini-course in aerial navigation but what do I know after 61 years? I know enough to know that it is a challenge to do it properly while also expeditiously. If it weren't a life and death situation as here, it would be enjoyable to meet and overcome a challenge. Surmounting a difficult challenge takes you into the realm of the pleasurable. Too many of us eschew these challenges for fear of failure. Well, if every challenge were surmounted, you'd be king.

Basic Physics: in physics a machine is a device that can be used to transmit a force and thus change the size and /or direction of that force. A pulley, a type of machine, can be used to move an object that could not by manpower alone. Multiple pullets multiply the force exerted so that large loads can be lifted, albeit slowly. An inclined plane is a machine in this parlance because force is multiplied. An ancient Greek said that he could move the earth if he had a long enough lever-arm (he would also need the fulcrum around which the force is applied. The plain screw is a machine as is the wheel and its axle. All these machines enable work to be done as a force moves an object a distance. The applied force is the effort while the force it overcomes is the load. The purpose of the machine is to allow a small effort to move a large load. This usually means that the effort must be over a relatively large distance. This is called the mechanical advantage supplied by the machine. As the inclined plane allows a load to be raised upward so too is a screw a circular plane. The force that turns the screw is converted by this "plane" into a larger force moving a shorter distance. The radius of a wheel is similar to a lever-arm so the larger the wheel the less effort to move the load. The "machine" called a wheel has made civilization orders of magnitude more amenable. (Simple is not always so "simple"; in concept, yes, in effect, no.)


NATIONAL ARCHIVES

THE HERO OF MIDWAY

On June 4-5, 1942 the SBD Dauntless dive-bombers dispatched four large Japanese carriers (and their squadrons) to make that the turning point of the war in the Pacific. Having done that they were shortly replaced by the much larger SB2C Helldivers. Besides carrying a larger bomb-load the Helldivers could fold their wings giving them a smaller "footprint" than that of the smaller SBDs. These SBDs made an Airdale's life easier when he had to go to a wheelchock at launch time and he escorted them to a parking spot as here in this picture where only the yellow-shirt and that one Airdale seem concerned. However, the approach of any aircraft towards another aircraft in front of it is an exercise of the anxiety-genes. The yellow-shirt with hands raised and opened is stopping the SBD #27 probably because he wants to reassess the situation before bringing #27 any further (since he doesn't have eyes at the back of his head). Even with wings spread the parking process is touch and go (touch the brakes then go, touch the brakes then go, ...). Notice the 250-lb. bomb under the wing. The only reason it is there is that it couldn't be released and so it had to be brought aboard. This is definitely an aberration of SOP (Standard Operating Procedures) because the impact of the touchdown could jar the bomb loose, sending it careening down the deck to do who knows what mischief. Thus the officer in the foreground to have an examination of the situation.

Basic Physics: when an object moves in a circle (for instance, a propeller) its direction is continuously changing and any change in direction requires force. The force required to maintain circular motion is called centripetal force. The amount of this force depends on the size of the circle plus the mass and speed of the object (propeller). When the centripetal force ceases the object will fly off in a straight line because no force is acting on it. Gravitational force is the centripetal force that keeps planets in orbit. A gyroscope is a spinning wheel constrained by a gimbal inside another gimbal. The spinning wheel provides stability to the wheel's attitude due to angular momentum. Centripetal force is always directed toward the center of the circle and the smaller the radius of the circle the larger the force needed. When a motorcycle turns in the bend of the road the centripetal force that keeps it on the road is the friction of the tires on the road. Without this force the motorcycle would continue on a straight line (and into trouble). The tighter the curve the more friction required. Leaning inward takes advantage of the gravitational force to add to the frictional force and lowers the center of gravity. Cars are subject to these same forces of centripetal action. They all derive from Newton's Laws of Motion mentioned earlier.


27
8

SERIOUS FATIGUE SETS IN

Pilots aren't the only ones who feel fatigue. Airdales do too, and the deck is not so hard as to prevent taking few moments of respite. There are of course two kinds of fatigue: physical and mental. The former kind is certainly not a problem for healthy teenagers but it is the latter type that can lay one low. I was once taking some "shut-eye" under the mast in the superstructure when the bugle sounded for flight quarters. I once was so fatigued I literally could not move a muscle except those of my eye-lids and those necessary for almost nonexistent breathing. Being a healthy teenager, I was seriously concerned that something catastrophic had happened to me. I was fully conscious and aware, buy as "weak as a wet dish-rage" After an exceedingly strenuous effort and a few minutes I could very tenuously rise up on my elbow and very slowly work my way onto and down the ladder. It was to me an Herculean effort done in super-slow motion. I finally made my way down a couple of ladders—steep stairs—to the flight deck where I gathered up my composure and went on my (tremulous) way to a wheelchock. This was an anomaly, this kind of fatigue. Though I was constantly fatigued with a combination of the physical and mental, I never had that episode repeated while on board ship. By sheer force of willpower I would not allow myself to endure that again (for it was an unhealthy environment for such a condition).

Basic Physics: simple harmonic motion is displayed by an unimpeded pendulum making constant and equal excursions to the right and left. If plotted on a graph with the horizontal axis being time, the curve would be what is called a sine curve with a crest and a trough. The distance from crest to crest is the wavelength. This is a transverse wave with maximum energy represented by the crest of the wave. A longitudinal wave also has "crests" and "troughs" but they are called compressions and rarefactions. A sound wave is a longitudinal wave depicted as a sine wave. Sound is the rarefaction and compression of air molecules which impinge on the eardrum and then are transmitted to the brain. A pure sound tone is one in which the sound is one frequency only (a sine wave of a fixed wavelength). The voice sound wave is a mixture of several pure sound waves superimposed on each other so that if displayed on an oscilloscope ("TV monitor") it would be a jagged curve over the time axis. The longer the wavelength the lower the pitch (bass) and the shorter the wavelength the higher the pitch (treble). This can be observed by blowing over a tube filled with varying amounts of water in it (less water, longer the wavelength). Any solid substance can transmit sound waves. Electrical currents display waves similar to sound waves displayed on an oscilloscope. Thus the electric current through the loudspeaker's voice coil will appear jagged.


NATIONAL ARCHIVES

PRI FLY

This is PRI FLY where the Air Officer and his people reside during air operations (which are underway right now as indicated by the white flag just in front of the Air Officer). Just forward of this location is the bridge/pilothouse where I stood watch during a two week period as a messenger (in addition to another two week period on the breakout crew before joining the Airdales on the flight deck below). This was good preparation before becoming an Airdale because I had a full view of all the activities during both launch and landings. When I did go below to the flight deck it was a whole new world where I was not above the fray but fully immersed in it. It even sounded louder down there on the flight dec (though that was probably my imagination working overtime). Furthermore, it wasn't all that easy being "the new boy on the block": no one, and I mean NO one paid any attention to me. I didn't mind being ignored though. In fact I liked it that way (having been a "natural" loner). What I did want though was a little "inside scoop", a little guidance, about what it was that I should be doing, what it was that I should not be doing and even how I should be doing what it was that I should be doing. But no, I was completely on my own. In fact, I could have been in Detroit and no one would have taken notice. But I was not to be denied; I interjected myself wherever and however I could until I slowly became a bona fide "Airdale", a member of a very small fraternity that parted the scene not many years later (1952), never to be seen again, ever.

Basic Physics: heat is one form of energy. This energy is the average kinetic energy of the motion of the atoms and molecules of a substance. Heat is measured by temperature where cold is the absence of the motion of the particles and hot is the vigorous motion of the particles. Most substances can exist as a solid, a liquid or a gas. If two substances are in contact they share their energy of particle-motion and thus reach the same temperature. The temperature of the air can be at one value while the skin feels colder than that because the wind removes the heat from the body (Airdales know this well). Latent heat is the heat energy that melts a solid or vaporizes a liquid while not raising the temperature of the substance. Thus when an object melts its temperature does not change (all the ice in the glass must melt before the liquid increases its temperature.). Sublimation occurs when a substance changes from a solid to a gas or a gas to a solid. Heat is transferred by conduction (in a solid), convection (in a gas) or radiation (electromagnetic (radio waves, but does not require a medium for this transfer)): the sun radiates energy through a vacuum). One of the big engineering problems is the dissipation of heat (engines, motors, etc.)

"KEEP 'EM FLYING"

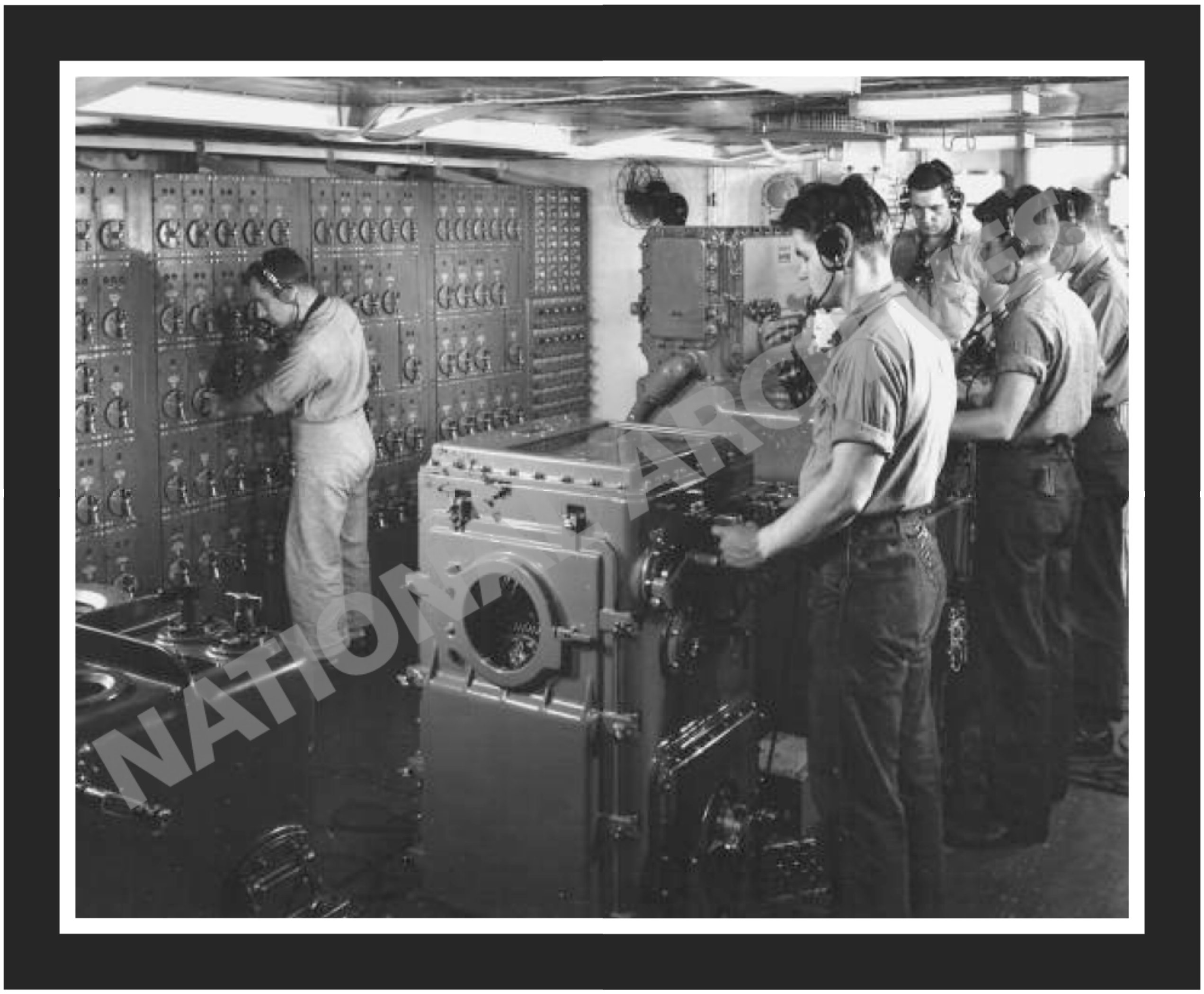
It seemed as if we could never move an aircraft without the red-shirts jumping up onto the wing and putting a hose into the fuel-tank to pump that high-octane (volatile) gasoline into those voracious Hellcats et al. I was always amazed at how cavalierly the red-shirts scrambled around on the aircraft as if the aircraft were a child's jungle-gym. I knew those aircraft weren't fragile but "jungle-gym"? The aircraft held up well even though we were told to never push an aircraft on its ailerons because those were fragile. Come to think about it, I never recall having heard a yellow-shirt admonish a blue-shirt about anything. Such words didn't seem to be in their vocabulary. Maybe it was because they felt that the Airdale's life was "no picnic" and thus deserved a certain amount of deference (but I wouldn't vouch for that sentiment for sure). For the most part the red-shirts stayed to themselves and the blue-shirts to themselves. Well, "birds of a feather flock together" and that's fine. Most of us prefer being with those of like mind and interests, and that's fine. Most of us chose friends who enjoy and admire the some things, and that's fine. Then there are those who like to be ecumenical and participate in a variety of diverse groups, and that's fine. The point to be made is that understanding others does not require immersion in unlike groups. Understanding is in the domain of interest of any person of common sense. But what's not fine is not respecting EVERYONE. Not to do so is plain and simple blasphemy (not to mention a clear indication of low self-esteem. How can one have self-esteem and not at the same time respect others?).

Basic Physics: the atoms of a solid are closely packed (like the aircraft on the Antietam). The strong attraction between the atoms are what give the solid its rigidity. Tension is the force that opposes the forces trying to pull the solid apart. A force pushing on a solid pushes the atoms closer together. This is called compression. Most solids are crystals (have regularly spaced set of atoms of which there are seven patterns). Glass does not have a regular pattern and is called amorphous. When the atoms of a solid move apart the solid becomes larger and visa versa (causing a house to creak during winter). This is called elasticity. The rails in a railroad would expand and buckle when it became very hot. This was remedied by using shorter rail-sections. By contrast a liquid's atoms move almost independently of each other. Forces of attraction called cohesive forces act between the particles of a liquid. These forces create surface tension which pull liquid drops into spherical shape. Soap will reduce this surface tension allowing the drops of liquid to form bubbles. To be continued.

RAMPANT TECHNOLOGY

I wont burden you with a semi-technical description of the equipment in this compartment, one of many throughout the ship. (I must say though that it's the technology of this remarkable ship that I find endlessly fascinating. Almost as fascinating is that such a ship could be built. I have immense admiration for those who devised this ship and equally for those who built this ship.) For all the radars and communications antennas and gun-directors that festoon the topside of the ship there are multiple compartments such as this one to process the data collected from topside. That's an officer to the left but those to the right are all rated enlisted men who have undergone intense training to not only operate this complex equipment but also to maintain and repair these complex equipments. Remember, we are back in the time-period of 1945 when all you see before you is equally mechanical equipment as it is electrical and electronic. There are gears and linkages and levers and synchros and generators and cams and other mechanical devices to do such things as add and subtract and multiply and divide. There are vacuum tubes, some as large as a light bulb, to do individual functions that now can be done by a chip a fraction its size (one chip the size of your little finger nail has a million equivalents of that one vacuum tube the size of a salt-shaker). Now that's orders of magnitude thanks to technology that so many take completely for granted and that has so transformed our lives. Are you grateful (for your blessings)? Or are you so self-absorbed that you think the world revolves around you. It doesn't and you should be grateful for that too. "Get a life".

Basic Physics: forces of attraction of particles in a fluid are called cohesive. Those forces between particles in a fluid and matter outside are called adhesive forces. The balance between these two forces is called capillary action which accounts for the rising and falling of a liquid in a tube above or below the surface (the more narrow the tube the higher the rise). Pressure in a fluid acts in all directions and increases with depth thus providing an upward thrust on any submerged object (including floating ones). An object floats due to its being buoyed up by a force equal to the weight of the fluid displaced by that object (the larger the ship the more water displaced). Due to Newton's Second Law water forced out the stern of a ship will create an equal and opposite reaction. Thus a ship's propeller provides for this reaction. Gas atoms and molecules are more energetic than liquid ones. This causes them to fill any container in which they are placed. The particles of two different gases will mix at random. This is called diffusion. Of course the higher the temperature the faster the gas particles are moving. The faster the particles move the more pressure the gas exerts. Three simple laws describe the behavior of the gases. To be cont.


NATIONAL ARCHIVES

YOU'RE NEXT

The closest Avenger is in line to use the catapult to the right while the other Avenger is being held until all is clear to the left catapult. It's being held by that yellow-shirt with arms upraised and fists clenched. It will be passed on to the yellow-shirt with hands on knees so he can withstand the wind-blast of the aircraft now on the catapult. Notice the Airdale crouching down next to the wheel to present a low profile to the wind generated by the revved up engine. As soon as the yellow-shirt beckons the pilot ahead the Airdale will pull the wheelchock. There on the catwalk is the usual assortment of spectators to watch "the show" on the flight deck after being restricted to their duty-posts down below. It must have been nice to have been able to go topside where the air was fresh and, for an aircraft carrier, the flight deck was the place where the "rubber meets the road" (to use the vernacular for the ultimate point of action). I used the metaphor "show" to refer to the activities on the flight deck. But be assured, this was no show and there was NO "showboating" there during flight operations. In fact, there was no such thing on the flight deck at any time. The entire atmosphere was very business-like at all times on the flight deck. It was a serious job that was being done and the conduct was appropriate to the mission. Everyone took responsibility for his own actions and those actions were confined to a specific set of parameters with the ultimate parameter being, "Do NOT walk into an active propeller". Signs such as "Stand Clear of Propellers" and "Beware of Propellers" had a funny-serious ring to them. We took heed, to be sure, even though it wasn't all that natural for a teenager.

Basic Physics: the three Gas Laws are Boyle's Law, Charles' Law and the Pressure Law. Boyle's Law states that the volume of a mass of gas at a fixed temperature will change in relation to the pressure. That is, the pressure and volume are inversely proportional. Charles' Law states that the volume of a mass of gas at a fixed pressure depends on its temperature. The Pressure Law states that pressure exerted by a gas at constant volume increases as the temperature rises. A hot-air balloon applies Charles' Law in that as the gas is heated in the confined volume of the balloon the pressure expands the confined gas to give the balloon greater buoyancy, so it rises. More precisely, since the balloon is open at the bottom some air escapes. Because air has mass, and therefore weight, the balloon weighs less when air escapes although its volume is large. The presence of the air outside the balloon produces an updraft which (if enough air has been lost from the balloon will be great enough to lift the balloon. Gas can be liquified by being compressed sufficiently. Without gas-pipes this simplified transportation.


NATIONAL ARCHIVES

THE REMAINDERS

The squadrons have departed and these are the remainders. The Hellcat to the left is on the catapult ready to launch while the one to the right is being readied on the port catapult. The others are being brought forward to be put in the queue. Since the ship is heeling over and the sea is calm, it must be making a sharp turn into the wind for an imminent launch. Here we have a good view of the superstructure rising from the deck all festooned with communications antennas, radar dishes and screens and the 5-inch gun directors. Clearly silhouetted is the large searchlight that was removed from all the Essex-class carriers since they were unnecessary. We also see the 5-inch dual guns as they point defiantly skyward in opposition to any marauders that might find them in an ocean that affords no place to hide for this relatively slow-moving giant of a ship. Still, the big radar dishes and screens turn, turning at about one revolution every six seconds, stopping now as it dithers at a particular position trying to determine if that blip on the radar screen is that sacrificial kamikaze. It is such of what bad dreams are made. However, it's also axiomatic that hard work and a busy mind keeps those hobgoblins at bay. So "roll up your sleeves" and lean into that Hellcat not just for your country but also for your peace of mind. Besides, hard work is good for the soul (and that's not just a homily). [Need I say hard work is also good for the mind (who you are).]

Basic Physics: some substances can have their electrons rubbed off the atoms that compose it. This is now a charged substance of positive polarity. This charged substance can in turn induce a charge on another substance by attracting the opposite charge of the atoms of the induced substance (the charge induced is only apparent because it is only a shift of electric charge within the induced substance). Charged substances have an electric field about them with the lines of force from positive to negative. This is similar to the magnetic field around a magnet. In an electromagnetic wave, such as a visible light wave, these lines of force are at right angles to each other. Opposite fields (plus and minus) attract each other while similar ones (plus and plus or minus and minus) repel each other. Electrons in a battery seek the positive terminal and by convention electric current goes from positive to negative. Iron has small magnetized regions called domains. When the domains all line up the iron becomes a magnet with external lines of force outside the magnet from the positive pole to the negative pole. Electric currents are conducted easily in metal because the electrons of metals are held in the outer shell very loosely. These electrons travel through(the domino effect) a wire at the speed of light (186,000 miles per second.

JUST ANOTHER PUZZLE

I'll admit it, I too can't understand what's happening here. It's clear that the LSO (Landing Signal Officer) also can't understand what's happening (his staff of two there told him that the just landed Hellcat was still in place and chocked). The pilot up in that other Hellcat isn't so much mystified as annoyed by this wave-off by the LSO. It must be something of consequence since the Airdale is chocking the wheel. Could be that the Air Officer in PRI FLY gave the order to hold fast because chocking the wheel means that nothing is going to happen for who knows how long. This delay upsets not only the orderly progression of the landing operation but also has an effect on the fuel remaining in the aircraft now circling the carrier. Since the engine has not been shut down it implies that the problem is up forward. Could be that an aircraft overtook another as it taxied forward in its haste to clear the area after being unhooked and chewed up the aircraft in front of it, laying waste to men and machines. "WHO KNOWS?" Come to think of it, it seems as if that has been my mantra ever since I can remember. To say this of Mother Nature is fine. That's the human experience, to endeavor to unravel the mysteries of nature. But when people are deliberately devious, to say nothing of deceitful, "who knows?" is a pejorative (a bad word) and is perverse as well as a deleterious (harmful) iniquity (sin). It's almost as bad as a calumny (a false and malicious statement designed to injure someone's reputation –-"He who steals my money steals nothing. He who steals my good name steals everything". [Big words , but bigger ideas.]

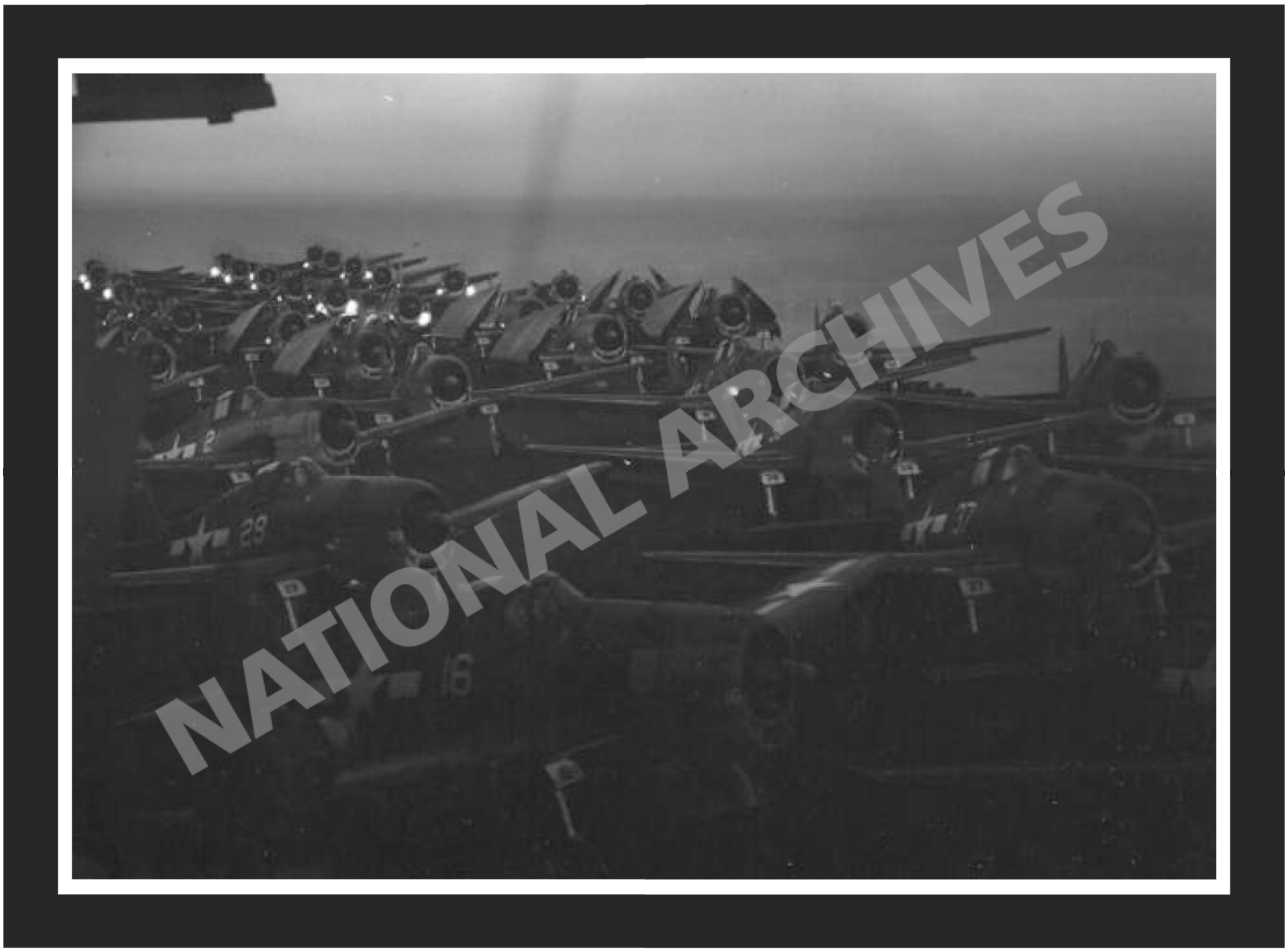
Basic Physics: an electric circuit is a closed loop of conductors of electricity (metal wires, semiconductors, resistors, capacitors, inductors, transistors and any other electron-conducting element). To send electrons through a circuit there must be an electric pressure (source of voltage such as a battery). So the voltage source wont neutralize itself there must be some kind of resistance in the circuit. Thus the amount of current equals the value of the voltage divided by the value of the resistance. Electric power is the product of voltage times current. Some currents are one way (direct current, DC) while house current is two way (alternating current, A(C) which varies between maximum positive and negative values. Capacitors are storage devices of electrons and stop DC current and allow AC current, providing a resistance based on the frequency of the AC. Inductors (coils of wire) also impede AC dependent on the frequency of the AC. Current leads voltage by 90 degrees through a capacitor and lags voltage by 90 degrees in an inductor. An electronic device called a diode restricts current to one direction only and transistors act as a gate to either allow or prevent current through it. Electronics controls electrons.

NATIONAL ARCHIVES

“BY DAWN’S EARLY LIGHT”

With first light the horizon is now becoming visible . Some enemy beyond it are in for a rude awakening. Such are the ramifications of those endeavors called “armed conflict”, the hellishness of war that in some damnable circumstances cannot be avoided. To that end there are arrayed back aft the SBD dive-bombers, the precursor to the larger Helldivers. In front of them are the Hellcats, some spread-winged (thus allowing the Airdales space in which to move unencumbered with the fear of unseen propellers). It is at times such as these that an Airdale had to know well the configuration of each type of aircraft: how far was a wheel from the outside diameter of the propeller. For the Hellcat and Corsair the wheel was close in towards the prop while the Avenger provided a little more space and the Helldiver even more distance between the wheel and the prop-tip. When the wings were spread-eagled as are the Hellcats up front there was not much of a problem. But with wings folded the “game” became more tense. Tension is built into the job under normal conditions of daylight but at dawn’s early light the tension was definitely palpable; it was racket-up several notches. While somewhat dramatic, the flames flaring from the exhaust pipes were a welcome marker: they defined the precise location of the fuselage. Now you could mentally back away from there by four feet and you were “safe”. (Who am I kidding?)

Basic Physics: all electric currents generate a magnetic field around itself t such that iron fillings will line up orderly in parallel. This magnetic field forms a “sleeve” around the wire carrying the current. If the wire is formed into a coil the magnetic field is strengthened and if the coil is wrapped around a magnet the field is even stronger, One end of the coil is positive and the other negative. The more coils and the larger the current the stronger the field. An electric motor is a coil on a rotating element within other coils that are energized with a current and induce a magnetic force on the rotor’s coil. As the rotor seeks to align itself with this field motion is also induced. Continually changing the inducing field causes continuous motion of the rotor. Devices called synchros were used in analog computers to electromagnetically send range and bearing angle data. Electromagnetism is used to operate the voice coil in a loudspeaker of a radio: sound waves are converted to a varying electric current which in turn is applied to a voice coil. As the current courses though this electromagnetic coil a very thin metallic disk is attracted and repulsed by the magnetic forces of the voice coil. The motion of the disk moves the air molecules in direct correspondence with this current thus reproducing the voice. Electromagnetism is pervasive in society.



THE WAY WE WERE

Both the starboard and port watches are being inspected but only one of them, the one in whites, is going ashore on liberty while the Avengers, the Corsairs and the Hellcats are already there. This is an inspection in name only since the inspecting party almost never stopped to "look you up and down". That was done beforehand by the lower ranked division officer (Air, Navigation, Engineering, Communications, Radar, Gunnery, etc.). The port here is unknown but to a sailor any port is a good port (at least in my opinion). There is a certain nostalgia for those days and I'm not speaking specifically about those in this book. As you age there's an underlying feeling of "the good old days" when there was a much greater sense of stability in relations and relationships. The bizarre was bizarre and not just another life-style. In this age of loudness, of frenzied activity, "motor-mouth" talk, music that is certified noise, self-absorption, win-at-any-cost sports (and I was a good athlete who received essentially no coaching OR support whatsoever), dissembling (artful lying), the rude, crude and socially unacceptable conduct, the constant drum-beat in the media of every disturbing medical disorder extant, the "good old days" seem golden by comparison, but also far away and long ago. Stop. I know what the problem is: the news pervaded on a daily basis that seems contrived to discombobulate and emotionally disrupt by dredging up every conceivable misdeed by every miserable miscreant. Only the psychiatrists are winners in this quest of catering to the ghoulish nature of many. The disaffection would probably dissolve if there were no media doing these stories (are they merely "stories"?) (Yet we need the useful kind of reporting). By stark contrast look at the well behaved , the discipline of these youth embroiled in a bloody war. Don't let our society degenerate toward the lowest common denominator. Instead, look to the Families of the Fifties which were a bulwark. We are at peril if they perish. THINK about it, devoid of self-obsession and gross materialism (we're awash in "things" provided by two jobs per family).But economic theory is not of consideration these pages.

Basic Physics: electricity is generated in many ways In one way, whenever a magnet is moved relative to a metallic wire a voltage is inducted. This is what an electric generator does on a large scale. The motion is imparted by a gasoline engine , water falling over a water-wheel, a fan turning in the wind, a car rolling down the road and so forth. Sunlight generates electricity by stimulating electrons in a photovoltaic cell to leave the outer shell of the atom. They form a bucket-brigade (current). Coal or gas is burned to create steam that turns the magnets within a coil of wire thus generating a voltage which must be used as it's generated. If not, the electricity is lost.


NATIONAL ARCHIVES

5.25" ROCKET DELIVERY SYSTEM

An interesting view of the Hellcat, this, as a red-shirt (armament) adjusts one of the rockets. There are three racks on each wing plus two 20-mm (200 rounds) machine guns. This armament is in addition to a bomb-load of up to two thousand pounds under the fuselage. Quite a delivery system for an aircraft that "small". The rockets were of course to be used against surface targets while the 20-mm machine guns were for use against other aircraft. The bombs were dropped to be "guided" by the combination of gravitational force and the forward motion of the aircraft. The resultant path was thus a convex parabolic one in which the bomb reached the ground essentially at the same time as the aircraft was over that target. On the other hand the rockets were aimed by pointing the aircraft somewhat beyond the target to account for a small component of gravitational force but relying mostly on the forward motion as imparted by the rocket's propellant and the 300-mph plus speed of the aircraft. It was as if the aircraft were a 5-inch gun that had to compensate for the fast forward motion of the aircraft. It was also as of this speedy aircraft were carrying six 5-inch guns. Now that was a "delivery system" even for this day and age. It should be said that this capability was not available until the latter stages of the war (but who knew how long the war would last?)

Basic Physics: electricity and magnetism are directly related: a changing electric field will produce a changing magnetic field, and vice versa. Whenever an electric charge such a that carrier by an electron accelerates it produces energy in the form of electromagnetic radiation. For instance, electrons moving back and firth in a radio antenna produce a radio wave which is radiated into space if the frequency of the electric current is high enough (the wave expands outward from the antenna as the current increases and then contracts back into the antenna as the current reduces back to zero. If the frequency is high enough the current changes direction before the wave ca return to the antenna and thus is radiated outward). Electromagnetism consists of oscillating electric and magnetic fields that move at right angles to the direction of the radiated wave. Both fields oscillate as sine curves, increasing outward, then receding and expanding outward in the other direction. To reiterate, the wave is propagated northward as the fields expand, con tract and expand in the east direction (electric field) and west direction (magnetic field). The frequency of these oscillating electric and magnetic waves varies from 10(+4) to 10(-17) meters. This frequency spectrum represents an energy spectrum from very low at low frequencies and very high at high frequencies. To be Continued.

“.......NOR GLOOM OF DAY”

I chose this picture because it effectively portrays that sometimes damp dark days were an integral part of life on the deck at sea. The flight has left and left this lone Hellcat . What could be the topic of discussion among these Airdales and plane-captains? I don't know. All I do know is that this is one of the carriers that preceded the Essex-class carriers. I also know that I came down fairly hard on our society two pages back. But I failed to be equally hard-nosed about the issue of drugs and excessive alcohol use. They are a true blight and a tremendous drag on our society besides representing very low- watt light-bulbs of those who so partake. Also, violent video games have no place in a civilized society and catharsis is no excuse. There are an unlimited number of games of skill that don't "kill". Last but not least, abstinence is not only right and proper and sensible but it is also a multiplying factor for future happiness (and near eradication of divorce). Why in the world would anyone want to jeopardize future happiness for a series of momentary pleasures? If they had sufficient intelligence they'd realize that sexual pleasure is actually 10% physical and 90% mental. They almost completely obliterate emotional love. (It will help if one listens to the song "Wind Beneath My Wings). [Heterosexuality derives from discovering the opposite gender when arriving at puberty.] Now for the positive: Our society has progressed markedly in the sciences and medical capability. This is good as is the fact that discrimination has been decreased greatly (however, unfortunately some still remains. This I know). In addition this society apparently is a caring one. This is good also (if it doesn't create dependency which would be bad for both the individual and society).

Basic Physics: the electromagnetism spectrum varies inversely in frequency and wavelength. Radio wavelengths (in meters) vary from 10(4) to 1. Microwaves vary from 1 to 10(-4). Infrared from 10(-4) to 10(-6), visible from 10(-6) to 10(-7), ultraviolet 10(-7) to 10(-9), X-rays from 10(-9 to 10(-11), and gamma rays from 10(-11) to 10(-17). The higher the frequency (the shorter the wavelength) the greater the energy. Electromagnetic waves may be considered as waves or as particles called photons (that stimulate photovoltaic cells). When a metal is heated enough its electrons give off visible light (electromagnetic radiation). The frequency (rate of vibration) and wavelength of this radiation determines the color of the light radiated. The rate of vibration of the electrons (in the outer shell) is determined by the temperature of the applied heat. Low heat (625 degrees) generates red radiation, medium heat (1225 degrees) produces yellow radiation and high heat (1525 degrees) produces white radiation. Electromagnetic radiation literally fills the air with all kinds of communication,

THE PAYLOAD

This is what a 2,000-lb. bomb looks like. Ugly, eh? Ugly in appearance but even uglier in its effect on man and machine. The two collars around the bombs are there to enable the red-shirts to roll them from here to there. However if the ship starts to roll and/or pitch there will be problems in controlling their motion. Once in motion it tends to stay in motion. Much better to hoist them onto dollies and so be able to wheel them from here to there. Presumably this is why the red-shirts are using the chain-hoist: to deposit the bombs onto the dolly. What puzzles me (there I go being puzzled again) is that where here they use a very substantial chin and pulley, they use only two thin wires to lift and then hold the bombs in the bomb-bay of the Avenger or Helldiver. "It doesn't compute" to my way of thinking. But there you are: they did it that way. Even more puzzling was that they would use a curved bar, with two unimposing, clamps at each end, to hold the bomb. These two bars are then clamped to the bomb and the two bars were then affixed to the under-fuselage of the Hellcat or Corsair. That these to sets of two clamps could possibly hold the 2,000-lb. bomb was incomprehensible to me. That the fuselage frame could hold the bomb was also incomprehensible. (I needed a course in Strength of Materials to understand how this could be.) The locale of this picture is of course the hanger deck which had ready access to the munitions compartment below. These bombs came up to the flight deck via the inter-deck elevators while the 500-lbs. and smaller bombs had their own "personal" elevator to the flight deck.

Basic Physics: the eye sees only a small section of the electromagnetic spectrum. Each color has its own wavelength (or frequency). There are cells in the eye called cones. These cones are sensitive to different wavelengths of electromagnetic energy. Thus we have cones sensitive to the red wavelength, cones sensitive to the green wavelength and cones sensitive to the blue wavelength. Red, green and blue are the primary colors. Any color can be derived from a combination of these colors in various amounts. This is called an additive process. When a colored light shines on a different colored object, some colors are absorbed and some are reflected. The color of the object as you see it is that color which has been reflected (the color you don't see has been absorbed). If the incident light does not contain a certain color it will not of course be reflected so that the color of an object depends on the incident light-source. This is called the subtractive process. The sun generates the entire spectrum so all wavelengths are available to be reflected.


NATIONAL ARCHIVES

"FATHERLY ADVICE"

I of course don't know what's being said here but it could be something as simple as an "atta boy" (derived from the encouragement, the support, that the elders gave to the youngsters as they tried to improve their athletic prowess.). Even a competent, well trained pilot could use such support after an ungainly landing. Sometimes a bad landing wasn't the pilot's fault, sometimes it was. In either case an "atta boy', a pat on the shoulder, was all that was needed to make the flight deck a little more safe. In fact we could, all of us, use some timely support throughout our lives. It would be interesting to know if there's any relationship between those who do well and those who don't given only the difference of the number of "atta boys"they received. Support is useful but not essential. This I've known throughout to this point. Airdales didn't receive any to my knowledge but then Airdales didn't expect any (to my knowledge). Airdales were looked on as automatons, those devices that were programmed to do certain things. This tongue-in-cheek remark is not all that farfetched but nevertheless an Airdale was his own-man, independent but dependable. As to support, yes, we could all use some. If support, encouragement, energizes you, that's good. If it causes you to be dependent, that's bad. But it can't be denied that the "spirit" of support on the flight deck made for a more efficient operation. The Airdale to the left is carrying a dual tow-bar that's used for front-end toeing. Also, note the circular calculator at the upper left corner of the navigation board the pilot's carrying.

Basic Physics: light is an electromagnetic radiation. When a beam of light strikes an object a portion is reflected and a portion is absorbed. If the struck object is transparent the light will be transmitted through the object. Without reflection we could only see objects that generated their own light. Light reflects from smooth surfaces at an angle equal to the angle of incidence (approach). Thus parallel lines striking the surface will be parallel when leaving that surface. A beam of light striking an irregular surface will be reflected from the surface in a scattered pattern. Light that passes through a substance will be refracted (bent). It will be bent back to its original direction after having passed through the substance. The angle of refraction depends on the angle at which it strikes the surface and the material of the substance. Lenses can either converge or diverge parallel light rays striking them. When the rays converge to a point (of focus) an image is formed on the surface. Radar dishes of parabolic shape focus electromagnetic energy reflected from an aircraft thus magnifying the returned signal) energy.


NATIONAL ARCHIVES

"THERE'S A STORM ACOMIN'"

There's a storm acomin' for sure and its cold and raw up here topside. The air is cold and the wind is raw. Cold and raw and damp, that's what it is as the Airdales lash down the aircraft (Hellcat to the left and two Avengers to the right). Notice the tie-down ropes encircling the cleats in the deck. Each and every aircraft is so secured. What comes to mind here is the fifty-foot drop off the end of the flight deck to the water below. A heave of the ship upward, a sudden blast of wind at the same time and an Airdale tumbles into the sea fifty feet below(trailing battleships are not designed to retrieve sailors from the briny deep). Well, the storm hasn't actually arrived yet so we're OK., so far. But remember, when the ship heaves up and down by 20-30 feet a cycle the footing becomes unstable even ignoring the pitching and rolling motions. This is a concern near the front and back ends of the flight deck. By the sides, the gun platforms and catwalks are the "safety net". Here we are able to note the extent of the Hellcat's propeller vis-a-vis its wheel (wheelchock). In the same view can be seen one of the two 20-mm machine guns pointing downward from the leading edge of the wing. On the other side there's a clear view of the radar dome protruding from the forward part of the wing. These are search radars for when the Avenger is used to provide extended search from the ship. Hellcats and Corsairs were also fitted out with these radars. The Navy had some smart people.

Basic Physics: electrons of an atom do not circle the nucleus of the atom in definite paths. They move as if a cloud occupying space around the nucleus. The outer shells have more energy than the electrons in the inner shells. An excited electron releases energy when falling to an inner shell, giving off electromagnetic radiation (light). A device called a laser (light amplification by stimulated emission of radiation) uses the above principle. Laser light can be generated by atoms of a substance known as the lasing medium (ruby crystal). An intense flash of light excites electrons to a higher energy level. Some of these electrons emit photons of light which stimulate other excited electrons to do the same resulting in a chain reaction. The result is an intense beam of light with a precise frequency. A laser beam can travel over long distances without dispersion. It can be focused to provide very large power densities at a very small point [10(8) watts per square centimeter]. A laser beam can carry much more data than can radio waves. Lasers are used for cutting, drilling and welding metals because of the tremendous heat at the focused point. Sound wave vibrations from window glass can be picked up by a reflected laser beam. Free electrons in a cathode ray tube (TV) are attracted by a positive potential and controlled in the x and y directions by an electromagnetic field.


NATIONAL ARCHIVES

"WELCOME ABOARD"

As an unofficial semiprofessional near amateur LSO (Landing Signal Officer) I would judge that this Hellcat is coming in too high and is about to bounce over at least three of the four barriers up ahead. Airdales and anyone else in the area take heed. But then we don't know the Hellcat's speed, we don't know the ship's speed, we don't know the urgency of the landing (how much fuel remains) and we don't know the condition of the pilot (whether another go-round is in the best interests of the ship and pilot). We don't know much so who are we to be making judgments as to what is the proper evaluation and decision? Too often in life we, you and I, make judgments willy-nilly with the least of understanding of a situation. Such conduct verges toward the realm of hearsay (and petty rumor) and subsequent misguided actions (again, "He who steals my money steals nothing. He who steals my good name steals everything.) [Naturally, stealing money is a prime sin.] Note that the flaps are down giving the Hellcat added lift thus mitigating the "controlled crash" aspects of a landing on board a carrier of relatively small area for a "hot" military aircraft. If one were to read the LSO's "body-language" one would detect a certain amount of anxiety about the next five seconds while we can only imagine the pilot's "body-language" (and of course the Airdales').

The Human Cell: All living organisms are made of cells, self-contained units of life that require a constant supply of energy to maintain themselves. Cells have an outer membrane, a control unit called the nucleus, and a jelly-like substance (cytoplasm) in which are found components called organelles each of which carry out specific tasks to keep the cell functioning properly. The cells take in "food" to obtain energy to reproduce themselves as needed. The external membrane is porous to provide for the intake of nourishment and the outflow of waste products of the living cell. To be sure, there are many different types of human cells. One type of organelle, the mitochondrion, carries out aerobic respiration to break down "food" and so release energy for the use of the cell. There are also granules of glycogen which store glucose for energy. There are vesicles that engulf extracellular material. Endoplasmic recticulium stores and transports proteins and also carries various enzymes needed for the synthesis of fats. (Enzyme: catalyst that speeds up a chemical reaction.) Organelles called ribosomes carry out the production of proteins. Another organelle in the cell is the Golgi body that also produces enzymes. Lysosome contains enzymes that break down foreign particles and damaged cell components.


NATIONAL ARCHIVES

POST WAR

This is a modified Essex-class carrier in that all the guns have been removed, the superstructure has been modified in both configuration and radar suites and it has an angled deck at 12 degrees from the centerline (on the port side of the ship. All the Essexes were modified after the war and are not the ship that I "knew and loved" (strong words these but only for their effect). Since, I believe, there is only one other picture with this view I thought it would be a good addition. As the pilot approaches the stern of the ship he will have to turn about 30 additional degrees to port to be lined up with the center line. This isn't as abrupt as it would seem because the ship is moving out from under him. It wasn't until the Navy started landing jet aircraft that they kept the angled part of the deck always unoccupied so that if the hook failed to catch any wire the pilot would just apply the throttle and keep going for another go-around. Actually, as I understand it the pilot would land with full throttle so as to make his lift off, after failing to catch a wire, more certain. But all of this post-war discussion is taking me out of my realm. Thus, just take in the view and pretend that you're the pilot with 10 seconds to touch down.

Holography: this technology produces images that take on a 3-dimensional appearance when the picture is illuminated by a coherent light source (laser light is coherent because it is of one frequency while sunlight or incandescent light is not coherent: it is made up of many frequencies). One way to make an holographic picture is to shine a laser light onto a diverging lens. This diverged light is then allowed to strike a mirror so that the light is reflected onto a photographic emulsion. The same light from the laser that was diverged is also allowed to shine upon the object to be photographed. Thus the emulsion has two sources of light shining on it: the light reflected from the mirror and the light reflected from the object being photographed. After the emulsion has been developed it will appear as concentric circles of black and white circular bands. However, if the same laser light source is shown on the emulsion one will see the object in 3-dimensions (as if by magic). [Many credit cards have small holograms on them but they use sunlight to illuminate them; they are not though a very good hologram.] Holograms can also be used to store huge amounts of data and the amount would seem astronomical. Photographic lens are not required for this process: the image is not focused on the emulsion through the lens. This is a big advantage in that good lens are expensive and critical while the lens in the holographic technique only needs to diverge the very narrow laser beam. However, the holographic photograph requires very fine emulsions for proper results.

NOT GOOD

This is perhaps an accident in the making. From the looks of things it appears to have been a good approach but for some reason the LSO thought otherwise. As a consequence seem more than likely that this Hellcat is going to shortly make a water-landing not far from where it is now: the angle of attack (the aircraft's attitude) is such that at its low speed the wings will not provide sufficient lift. Even though it would be contrary to one's natural instincts the correct maneuver here would be to level the aircraft to enable more speed which in turn will provide for more lift. But then who am I to critique a Navy pilot? Maybe he already had applied full throttle some distance back and has sufficient speed at this time and attitude. However, ... Notice the three individuals to the left and the two to the right. If I'm correct they are from back to front, a green-shirt, a yellow-shirt and a blue-shirt (no yellow-shirt on the right (port side)). The green-shirts of course unhook the aircraft, the yellow-shirt takes control and the blue-shirts bring a wheelchock to the aircraft as it accelerates forward. That "dot" in the upper right corner is the following aircraft and is much too far away (in my humble opinion). He should be seen just over the tip of the Hellcat's left wing. This would put him about 20 seconds following the Hellcat. [We have a good view of the outline of the aft elevator.]

Navy Electronics Technician 3rd Class: Since this book is about the Navy, albeit of 1945 vintage, I'm going to spend the next many pages on the training you would have received (and which I wish I had received) if you were a seaman 1/c about to enter the Navy's Electronics School which used the Navpers 10145-A training manual. This training could have put you on this ship at the lowest level of the radio division of the Communication's Department. It will be somewhat hard for some to follow but who's afraid of hard work? To the contrary, we LIKE hard work. It gives us a sense of achievement that can not be bought at any price and it's our birthright. So let's roll up our selves and get to it. (Shirkers need not apply.) We are going to talk about wireless communication. In 1888 Hertz opined that energy can be transmitted through space in the form of a magnetic field (it turned out to be an electromagnetic field; check back seven pages). Recall that the alternating current in the antenna had to be greater than a certain frequency to enable the energy to continue outward instead of returning to the antenna. Thus we start with a high-frequency alternating current generator to generate radio waves: 30-300 khz, 300-3,000 khz, 3,000-30 mhz, 30-300 mhz and 300-3,000m hz where hz is cps, k is i,000 and m is 1,000,000. The ranges are low, medium, high, very high and ultra high. With radio used on board ship, we are medium range.

CAP (CARRIER AIR PATROL)

The air's throbbing, the aircraft is vibrating from wingtip to wingtip and the sound of an impatient engine has reached a crescendo. The yellow-shirt officer is still twirling the flag and is about to lunge forward pointing the flag to the front of the flight deck. It's then that the pilot releases the straining brakes and the Hellcat races forward to gain height as provided by the lift of the depressed flaps. By now the other yellow-shirt to the left has control of the next aircraft advancing to this position. (The object under the fuselage is an external fuel tank, not to be ejected and thus a possible source of fire in bad landings.) The heads you see in the background are of those who are standing on the catwalk (fifty feet above the water below). Apparently this Hellcat, and probably others, are going up to circle the ship on patrol on the lookout for any "boggies" (enemy aircraft). They are always in communication with the ship whose radars scan the sky and relay any potential trouble to the CAP aircraft. Being out on the large expanse of the ocean the threat might come from any direction (enemy carriers). If it happens to be a large squadron of enemy aircraft the ship itself will have to provide the bulk of protection with there are the 5-inch guns, then the 40-mm guns and finally the 20-mm guns. The guided missile kamikazes were particularly insistent and turned out to have devastating effects on the fleet as it approached closer and closer to mainland Japan. But it was "the fleet that came to stay".

Technician: the transmitted wave of radio energy travels outward in all directions as the waves do in a pond when a stone is thrown. These waves are not unimpeded just as the ripples in a pond are disrupted by a wind that blows across the pond. This energy is intercepted by the receiver's antenna. As the radio wave cuts across this antenna it sets up a voltage in the antenna thus generating a current in this antenna of the same frequency as the transmitted wave. In voice communication the transmitted wave is modulated by an audio frequency (100 to 20,000 Hz). The process of modulation imposes the audio frequency onto the much higher radio frequency wave (which acts as a carrier of the audio wave). At the receiver the audio portion of the transmitted wave is detected (demodulated, stripped from the carrier wave) to be amplified and sent to the voice coil that moves a metal disk in unison withe audio wave. This moving disk in turn moves the air molecules in correspondence with the audio wave thus producing intelligent sound (if the spoken word at the transmitter is intelligent). All radio waves travel at the speed of light (186,000 miles per second), circling the earth over six times per second.


41

LAUNCH ONE AVENGER

Even before leaving the sanctuary of the flight deck this Avenger has lifted off, with the help of the flaps. The pilot will now quickly retract the flaps to gain the speed that will provide the secure kind of lift. The item t at the end of the left wing is a pitot tube to measure this speed by detecting the pressure differential between the air rushing into the tube (dynamic air) and the ambient pressure (static air) within the aircraft. That other item at the end of the other wing is an antenna for some kind of communication while one end of the radio antenna can be seen right over the head of the pilot. Now why would that person be running out onto the deck while flight operations are in progress? He is one of the green-shirts who retrieves the catapult cable after each catapult launch. He and another green-shirt on the port side of the deck drag that fairly substantial cable to be attached to another aircraft which is being directed to the catapult as we speak. While normal launches are made from a point opposite the island superstructure 400 feet from the bow at essentially 20 second intervals, the catapult launch takes a little longer. Usually it's the Hellcats and Corsairs that are catapulted because the flight deck is loaded up with aircraft and 400 feet is not available. Since the TBMs are most always at the back of a pre-launch loaded-up flight deck they did not require a catapult launch (at least not on the Antietam).

Technician: the low frequency (long) waves can circle the earth as previously stated while the very high frequency (short) waves are line-of-sight and are used for ship-to-ship communication. It has been previously stated that radio waves are modulated by audio waves that are superimposed onto the carrier wave. There is another prime method of modulating the carrier wave and is called frequency modulation: the frequencies of the audio wave are used to vary the frequency of the carrier wave while the amplitude of the audio wave is represented by the frequency deviation of the audio wave. Very briefly this is explained by what is called the "modulation index" which is the frequency deviation divided by the audio frequency. Thus if the maximum frequency of the unmodulated wave is 75 K Hz and the audio frequency is 15 KHz then the modulation index is 75/15=5. To sum up: 1) For any given audio frequency the modulation index will vary DIRECTLY with the audio frequency sound level. 2) For any given sound level the modulation index will vary INVERSELY as the audio frequency. 3) Both of these effects occur at the same time. Thus the audio sound wave can be sent via amplitude modulation (AM) or frequency modulation (FM). The former has the disadvantage of picking up extraneous noise such as lightning but FM is limited to shorter range.


T6

THE BIG ONE

Looking closely one can detect that 2,000-lbs bomb tucked under the TBM as it towers over us in that upward and domineering manner. Apparently, because it has other bombs in the bomb-bay, it is too loaded down to be able to start it's take-off run from the normal 400 feet mark. I would judge that its position is at the 600-foot mark. The yellow-shirt officer is holding up the launch process probably because that yellow-shirt phone-talker to the left has received word from PRI FLY that things are on hold. (I never saw a yellow-shirt phone-talker as here. Maybe he's a trainee. We all have to train first especially those who have a job as critical as a yellow-shirt.) While this is going on the TBM is thrashing the air and raising the decibel level of noise. That fixture on the right wing is a type of radar and its specific use is not in my domain. There are many types of radars for many types of uses. Because of its range the TBM was used as a search and reconnaissance aircraft using search radars. Through its career the TBM had small numbers modified for special purpose functions built into it such as special electronic capabilities or as a camera aircraft or as a submarine chaser with a searchlight under its fuselage. This was true for all the aircraft: uses other than the original one were derived and the TBM was no exception.

Technician: conventional current travels from the positive terminal of the battery to the negative terminal. (The military has taken it upon itself to declare that the current direction is the opposite: negative battery terminal to the positive terminal. We shall use the conventional direction, positive to negative. Thus when a current goes through a resistor there is a voltage drop from the entered end of the resistor to the other end, which is negative. Thus we always speak of voltage drops as we trace an electric current). Direct current (DC) has only one polarity, either plus or minus. It can be steady or fluctuating irregularly or pulsating or changing at a uniform rate. Alternating current (AC) can be either positive or negative with a wave form that is sinusoidal or pulsed such as a square wave or sawtooth or irregular or with a dc component. A sinusoidal wave completes one cycle in 360 degrees (a circle). Thus an AC current or voltage can have a phase between 0 degrees and 360 degrees. This is important when talking about the impedance (resistance) to current by elements called inductors (coils) and capacitors (two metal plates separated by air. Therefore a current can lag a voltage by a certain numbers of degrees when the current passes through a coil, or a voltage can lag a current when it passes through a capacitor. These two elements are important in electrical and electronic circuits.


309
NATIONAL ARCHIVES

WHAT'S WRONG?

What's wrong, the yellow-shirt wonders, the brown-shirt (plane-captain) wonders, the launch officer wonders (and I wonder)? When the aircraft is in this launch position 400 feet from the front of the flight deck the pilot usually affixes his eyes on the launch officer awaiting his signal to release the brakes and GO. But here the pilot is looking down at his instrument panel and the launch officer is not twirling his arm as a signal to rev up the engine to the maximum (he's already done so and in response the engine did not put out the correct sound). The launch officer so indicates this and signals the pilot to check his rpm or oil pressure or manifold pressure or whatever. If things don't improve very quickly this flight will be scrubbed (terminated) and this TBM will quickly taxi to the forward elevator to be taken down to the hanger deck. Thus a quick decision must be made by both the pilot and launch officer with the latter having the final say. Even the Air Officer in PRI FLY can't (?) Overrule the launch officer. Better safe than sorry. Better to "ground" this flight than to lose an aircraft (the pilot would in all likelihood be quickly retrieved by one of the following plane-guard destroyers). Now on closer look there's seen someone crouched down next to the tail-wheel. What can be the trouble there? And what could that Airdale do about it? I don't know and I prefer my initial explanation. [Taking the next step can be laudatory but what if it has a good chance of going awry? Or disastrous? The former, OK, but the latter "?". How determine the chance, the odds? These must be INTELLIGENTLY measured. Remember that old but reliable maxim, "Wisdom is the better part of valor". I might also usefully add the old saw, "A word to the wise is sufficient" (or certainly should be).]

Technician: the most basic law is Ohm's Law: I=E/R, or the current I is equal to the voltage E divided by the resistance R in the circuit. This equation is usefully written as E=IR (voltage is the product of the current times the resistance and again, when current flows through a circuit there is a "voltage drop", or diminution of, the voltage that existed at the source. This is a simple but important concept. Keep in mind that there is no such thing as a circuit without resistance of some kind (and there are many kinds). Voltage is in volts, current is in amperes and resistance is in ohms. When a current completes a circuit all of the voltage is expended by being "used up" across each resistance. Thus it can be said that there are voltage drops across each resistance in the circuit as the current travels from the positive terminal of the voltage source to the negative terminal. The above applies to both DC and AC currents. As has been said, when considering AC the above becomes a little more complicated when there are inductors and capacitors in the circuit. Inductors and capacitors will be defined next (again).


NATIONAL ARCHIVES

ANOTHER SIGH OF RELIEF

Although landings seem to become routine there is always that silent sigh of relief upon a good landing such as here. It would be a mistake to assume the next landing will be as good as this one for each one is an event in and of itself. As in life, observers are much more cavalier about what the other person is doing or enduring than they would be if THEY were that pilot as he became a little more agitated and tense the closer he approaches the deck. And why not? These landings are not automatic as are the present-day landings with their autopilots and backup systems. When observing "the other guy" give him a little slack as he struggles with difficult situations. It hardly seems necessary to say, before you pontificate, "Walk in the other person's moccasins for a mile before being so judgmental". We all, you and I, are guilty of not doing so to one extent or another. Here two green-shirts run out to disengage the cable (arresting wire) from the hook before this Hellcat accelerates up the deck thus clearing out before that next aircraft 20 seconds behind him comes in for a landing. Missing here are the Airdales on both sides of the Hellcat helping to fold the wings. Also where are the two Airdales with a wheelchock ready to escort this Hellcat to its parking spot? All I can do is describe the standard operating procedure (SOP) and let the picture speak for itself. It could be that this pilot is making multiple landings and launches. This means that he's transitioning into the launch mode momentarily (but who knows? That has a familiar ring to it.)

Technician: an inductor is a coil of wire that passes DC current in phase with the applied voltage. However, when AC current is applied to a coil of wire (an inductor) the current lags the voltage as a function of the frequency of the applied voltage. The higher the frequency the greater the lag of the current behind the voltage and the greater the inductive reactance ("resistance") the coil presents (X(L)=6.28xFxL where X(L) is the inductive reactance ("resistance"), F equals the frequency of the voltage wave applied and L equals the inductance of the coil which is a function of the number of turns of the coil, among other things). A capacitor is two metal plates separated by a small amount of a nonconductor. When an AC voltage is applied to a circuit containing a capacitor the voltage lags the current as a function of frequency and its capacitive reactance ("resistance") is also a function of the frequency of the applied voltage (and the capacitance of the capacitor): (X(C)=1/[6.28xFxL] where X(C) is the capacitive reactance ("resistance"), F is the frequency and the C is the capacitance). The number 6.28 represents one complete cycle of the AC sine wave. The term "impedance" is the combination of inductive/capacitive reactance and resistance. Somewhat confusing but further discussion will clarify the above.


NATIONAL ARCHIVES

LET THE PLAY BEGIN

The first thing that caught my attention here, foolish though it sounds, is the posture of that Airdale crouched beside that Avenger towering over him: when I was on the football team at Newark Academy I plated on the line of scrimmage. As the opposing team was in their huddle calling the next play, I, we, would take this precise posture until the other team came up to the line of scrimmage at which time we'd take the normal three-point posture. The other team did the same thing when we were on offense (in those days we would play both offense and defense). In fact if that Airdale was not wearing white socks I would avow that " he was me", exactly. However on second thought he doesn't have his chin-strap buckled nor is he wearing his goggles as I always did. Oh well, but I did nave a mild jolt when I first looked at this picture of a launch just prior to the command, "Stand clear of propellers; prepare to start engines; start engines" boom over the P.A. system. It's instructive to note the proximity of the propeller to the tail-section: the parking arrangement was just as close and sometimes in the haste to complete the parking process (other aircraft are landing 20 seconds apart) this distance became even smaller. That was the time that a little prayer was not out of place (though to be fair and honest I would on occasion go the other direction by using language directed at the yellow-shirt best left silent.

Technician: power (watts) equals the current times the voltage (P=IE). It turns out that the greatest power in a circuit is when the external resistance equals the internal resistance of the voltage source. [The internal resistance is fixed and as the external resistance increases the voltage drop across the external resistance also increases even while the current decreases. Making the arithmetic calculations it is found that maximum power occurs when the internal and external resistances are equal.] The above applies to DC circuits but AC circuits are the same except that instead of referring to resistances one considers impedances (resistance plus reactance). We have stated that maximum power is obtained when resistances/impedances of source and load are matched. Thus maximum power results when the voltage source impedance matches the impedance of the primary of a transformer while the impedance of the secondary matches the impedance of the load. [A transformer consists of two coils in proximity to each other such that the field created in the primary coil induces a voltage (and current) in the coil of the secondary.] We can also say that the voltage of the primary is to the voltage of the secondary as the square root of the ratio of the two coils impedances. [No one said this would be particularly easy but you're not made of fluff.]


NATIONAL
ARCHIVES

A DARK AND STORMY DAY

It was a dark and stormy day and all about us on the flight deck were shadowy figures trying to coax large angular objects from one place to another despite the pitch/roll/heave of the ship which was in the thrall of an angry sea. I judge a 15 degree roll to port at this moment (with the bow to the right). This is not calamitous except that the edge of the flight deck is but a yard or so away from a drop of 50 feet to the roiling sea below (after the 2.5 foot catwalk 5 feet lower). Since the ship usually heads into the wind during a storm the wind is probably head on and so the Airdales are protected from that trouble (for now). The Airdale closest to us, that nonchalant one hands on hips, is tall for an Airdale which means that his center of gravity works against him when the wind takes a notion to slap him down. This doesn't seem to be the best time to be nonchalant (maybe he was "posing" for the picture). For myself, I was never blase when near the edge of the flight deck during rough weather. Most prudent people aren't. Who cares whether others think you brave or not? (Now "stupid", that's a different story. Bravery is fine, stupidity certainly is not.) If this were the Antietam then that carrier in the distance would be either the U.S.S. Boxer (CV-21) or the U.S.S. Bon Homme Richard (CV-31) but not both at the same time. Sometimes we would part company only to then seek each the other out as part of a tactical exercise. It was somewhat "thrilling" as an aircraft from the Boxer zoomed down on us on a bomb-run. We would, I suppose, also have competition as to which could launch and land aircraft faster. If nothing else, it's a matter of professional pride.

Technician: impedances in series are additive while impedances in parallel follow this rule: $Z=(Z1xZ2)/(Z1+Z2)$. Anything that consumes power is a "load". (Power is work done in unit time). When you increase the load you increase the power required. If you reduce the impedance of a circuit (by placing an impedance in parallel) you increase the current drawn from the generator. This in turn increases the load on the generator to furnish more current. Therefore an increased load means an increase in the current required from the generator. You can increase the generator output by decreasing the load of the circuit by adding impedances in parallel with the load: you can refer to the impedance of the circuit as "the load" but increasing the load does not mean that you increase the impedance. It means that you decrease the impedance so that more current is drawn from the generator. Confused? "Load" means the current drawn and not the amount of impedance in the circuit. One reason this is important is that the more current drawn the more the circuit components heat up and thus the more elements that might become defective. Electrical engineer designers are always concerned about "the load".


16

NOW THAT'S A WARPLANE

Momentarily the flag will flash downward, the straining brakes will be released as the thunderous roar gives voice to this powerful Corsair about to be given full rein down the open flight deck. Immediately the following Corsair will present itself and the process will be repeated 20 seconds later. Notice that the take-off point is the after elevator which is 580 feet from the end of the flight deck rather than the usual take-off point 400 feet from the bow. Why? I suppose because it was there (there having been fewer aircraft in this particular flight since this might be a CAP operation (note that there are no bombs under the wings or fuselage — but there is an auxiliary fuel tank). The Airdale to the left is not holding his hand to his ear (a natural gesture) but rather he's holding the microphone of the sound-powered phones to talk to another phone-talker up in PRI FLY where the Air Officer resides during flight operations. (Notice the wire at his feet.) This picture provides a good view of the dihedral angle that all aircraft use to maintain stability: the wing slopes upward from the fuselage by about five degrees. Thus when the aircraft rolls slightly the wing on the up side of the roll has less lift and the wing on the down side ha more lift. This is a function of the airflow over the wing being less disrupted over the lower wing than the upper wing. In this way the lower wing, with greater lift, rights the aircraft. (Stability is essential in life!)

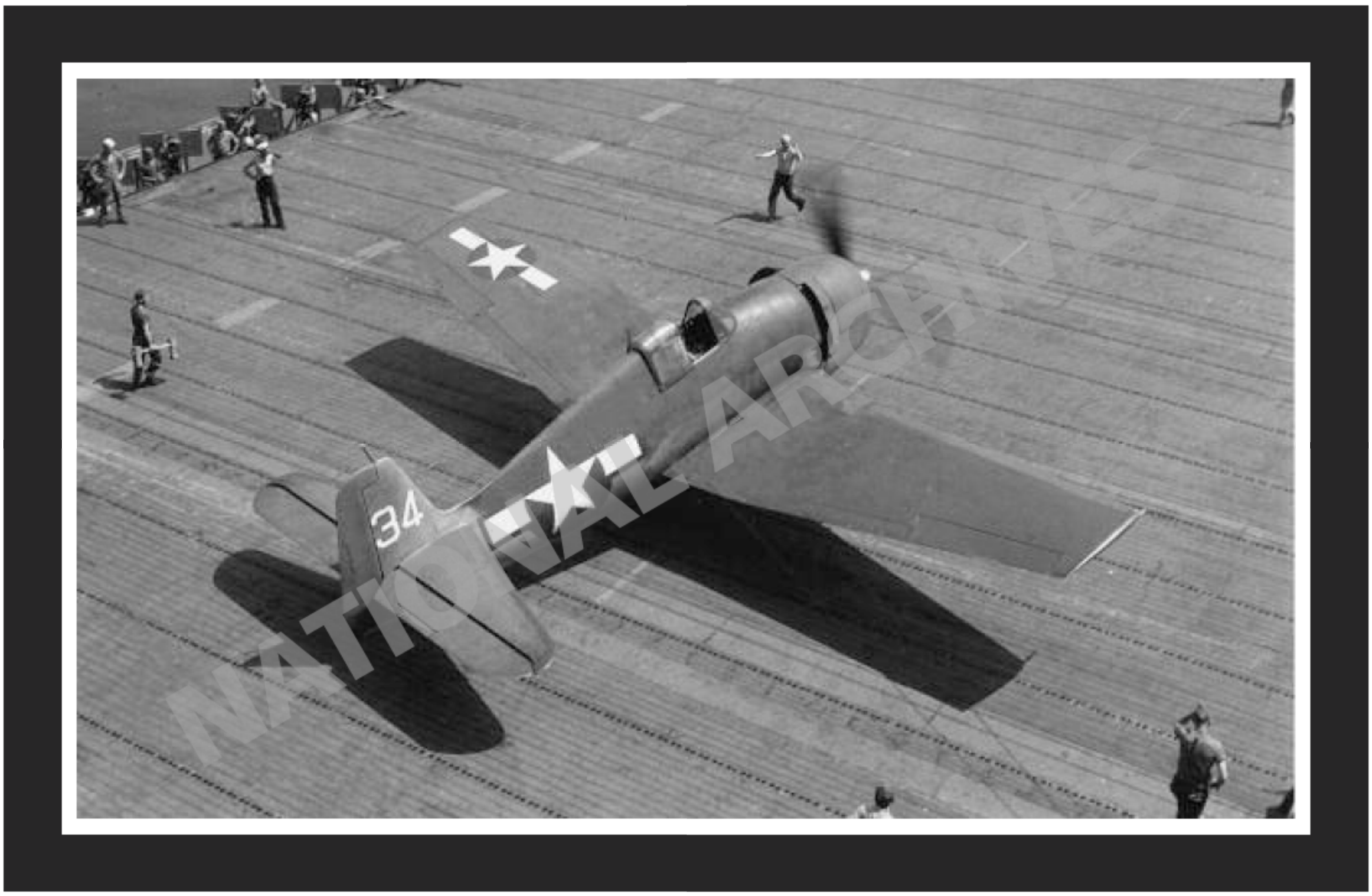
Technician: Before going further Kirchhoff's Laws must be stared": 1) At any junction in a circuit the total current flowing into the junction must equal the total current flowing out of from that junction and 2) The voltage drops around a circuit are equal to the applied voltage. These laws are intuitively understood and of great importance when examining any circuit. Thus if the battery is 12 volts and there is but one resistor in the circuit all the voltage will be dropped (used up0 in the resistor. If there are two series resistors of equal value the voltage drop across each resistor will be the same and total the value of the source battery. With parallel circuits you take their equivalent impedance [(Z1xZ2)/(Z1+Z2)]. A current going into a parallel circuit will split in an inverse ratio to the values of the impedances of the two branches. That is, the larger impedance receives a smaller current but the voltage drop across the two parallel impedances are equal. Verbalizing all of these very basic concepts without the attendant diagrams and arithmetic causes mild distress for most of us. Be assured that if you put pencil to paper to display the diagrams and arithmetic the vale of obscurity will lift markedly (you'll understand much more easily). Some circuits become quite complicated but if you proceed in parts it will simplify life (and the simple life is not a bad thing in this day and age of motor-mouth talk and raucous "music". Try a change of pace) .


NATIONAL ARCHIVES

THE “GHOST-RIDER”

No, this isn’t the “ghost-rider” making a visit on the deck of a U.S. carrier (although yes, it is somewhat eerie). In fact, the pilot of this Hellcat is leaning back and to the left to such an extent that you can’t see him as he peers intently at the yellow-shirt to his left. Moments before he was looking at the yellow-shirt to the left, hands on hips. I’m very sure this is not a scene from the “Antietam Story” because we Airdales were “always” right next to the wheel, wheelchock in hand, as the aircraft made its way up the flight deck to its parking spot. Here this Airdale is much too distant from the Hellcat should it need to be immediately chock ed for some untoward happening. Right after an aircraft lands you accompany it until it’s safely (engine shut off) ensconced in the parking area. Likewise there’s no Airdale at the right wing. To my way of thinking this is sloppy operating procedure. The Hellcat needs help folding its wings and this will be done a little further forward although often it was done as it was being unhooked from the arresting-wire. Presumably each ship had its own “personality” as concerned the procedures on the flight deck. I can only relate those that were performed on the Antietam but I do observe others’ actions via these pictures. [Incidentally, and apropos of nothing in particular, the Antietam was used as a “prop” in the well done movie “Task Force” with Gary Cooper. The movie was essentially a history/story of the U.S. Navy’s aircraft carriers through the WWII]. (The movie was made in 1952, well after the war but also well worth viewing.)

Technician: resistors perform essentially five functions: drop a voltage, develop a voltage, isolate one circuit from another, provide a source for several different voltages and couple together two units of a circuit. A voltage can be developed across a resistor by sending a current through it (E=IR). This also “drops a voltage”. If a large current-carrying resistor is placed across a voltage source (generator) with taps placed physically along its length then voltages can be picked off at each tap. This is called a voltage divider. There are fixed resistors and variable resistors (rheostats). Resistors can have the same value of resistance but different current-carrying capacity (handle more power). Resistors are made with various accuracies, from 5% to 10% to 20%.. A conductor carrying a current is surrounded by a magnetic field. If the current flows upward in a vertical wire the magnetic field will encircle the wire in the clockwise direction when looking down from above. When the current producing the field stops the energy of the field collapses. That is, the field returns the energy to the circuit. When a wire is moved across a magnetic field a current is induced in the wire. If the wire moves with the magnetic field no no current is induced. This phenomenon just described is called self-induction, a very important effect in electronics.


34
NATIONAL ARCHIVES

CROPPED AND ZOOMED

This picture was cropped and thus in effect it was zoomed in to give a closer look which in turn gives it a grainy appearance (gain here, lose there). These are the last of this flight (note the LSO's screen at upper left). To the right are a group of Airdales ready to help that Hellcat spread its wings when it "steps out" at the behest of that yellow-shirt to the left with arm(s) upraised. From the looks of things the Airdales will have to move in FRONT of that Hellcat to facilitate spreading its right wing. "Careful now, the back-draft of this up-front Hellcat will be 'urging' you in the direction of the Hellcat to your right". They'll be careful because its ingrained in their subconscious due to their having done these sorts of things so many-many times. Airdales and spinning propellers, spinning propellers and Airdales, there's a definite but peculiar symbiosis between the two. They're "old friends" as in being well acquainted with each other and well they should be. Helping them spread their wings when the Airdales receive in return naught but a threat of mortal injury is a relationship unbalanced. Some machines protect while others threaten. But as they say, "Life isn't fair". Now that's a motto to live by! (Do we even know what's fair?) To the right just beyond the edge of the flight deck is a platform of six 20-mm machine guns that provided a semblance of security (the 5-inch guns were more reassuring when kanikazes make their appearance.

Technician: moving a conductor across a magnetic field converts magnetic energy to electrical energy via mechanical energy. However in electronic circuits there is no physical motion. Therefore it's the magnetic fields that have to move to generate the electrical energy (currents). This is accomplished by AC currents which are constantly increasing and decreasing thus producing an increasing and decreasing magnetic field. This changing field is cutting across its own wires (conductors) and so generates a voltage. According to Lenz's Law the induced voltage is in such a direction as to oppose the original current (and voltage). That is, if the applied voltage is reversed (decreases) the induced voltage will be in such a direction as to maintain (sustain) the current flow. This important concept can be stated: the induced voltage opposes any change in the circuit condition (Lenz's Law). The ability of a coil to induce a voltage in itself is called self-induction and is one of the most useful capabilities in electronics. The inductance of a coil is determined by the following formula: L=[1.2{A(2)N(2)}]/(3A+9B+10C) where A=average diameter of coil, B=length of coil, C=radial depth of coil and N= number of turns of coil. Self-induction tries to maintain the status quo. Self-inductance equals the average voltage induced x the time of change all dived by the total current change. (Don't memorize this. You're not designing circuits.

“FLAPS DOWN, TAILHOOK DOWN”

“Flaps down, tailhook down” so says one of the LSO’s assistants standing there on the catwalk in front of him. Actually this picture is about two seconds preceding the picture of twelve pages back. Then there was a question as to the quality of the landing but here all looks well. Even the LSO’s “body language” is more at ease than twelve pages previous. Since we don’t know this Hellcat’s speed we don’t know if it’ll overshoot that desired arresting-wire seen in the foreground or if instead fly over it, and others, to “catch” one of the five erected barriers. The pilot’s not too high so he wont bounce over the barriers and in the worst case scenario he certainly wont fly right over the barriers and into the traffic up forward. To reiterate: the pilot could catch the foreground wire, catch a following wire, catch a barrier, bounce over some or all the barriers, or fly right over all the barriers into the parked/parking aircraft ahead. The most probable outcome here will be that the foreground wire will catch him. A further consideration is that usually the pilot will apply a slight flare to the aircraft just before touching down. This will slightly slow the forward motion (by creating a semi-stall) and allow the tailhook to catch a wire at the same time as the wheels touch the deck (the angle of the tailhook is such that this will occur in any event.) Note the bracket that raises the arresting-wire. They are always recessed except when an aircraft lands. They are recessed to to allow aircraft to taxi forward, then are immediately raised for the next landing 20 seconds. hence.

Technician: the self-inductance has been shown to impede the flow of current. This is called inductive reactance and is represented by : X(L)=6.28 FL (as previously defined). The frequency F of course is a variable so as the frequency increases so too does the reactance (also remember that circuit impedance Z=X(L)+R). In addition, the coil itself has impedance since even wire conductors have resistance to current flow. To determine this value place the resistance on the x-axis and the reactance on the y-axis; the inductive impedance is the resultant of these two vectors (the diagonal of the rectangle formed by the resistance vector and the reactance vector). The angle formed by the impedance vector and the resistance vector is called the phase angle which happens to be a very important item in all electronic work, especially control system design. Thus the current lags the voltage in a circuit with an inductor, the larger the inductance of the coil (its reactance) the greater the lag. Since the power of a circuit is the product of voltage and current the phase angle (the lag) determines how much less will be that power. Remember, all that has been said here about inductors (coils) is in terms of alternating current (AC) and most every electronic device operates with AC.


NATIONAL ARCHIVES

BIG BOY

With flaps down and tail-elevator up this Avenger has applied the flare a little early (in my humble opinion). The tailhook of this TBM extends downward more so that does the tailhook of the Hellcat (preceding page). Actually, the Avenger with its large wing area (490 sq, ft.) has a slower landing speed than did the Hellcat and certainly the Corsair. The latter two, being fighters, had more mobility and agility and speed than the more "lumbering" bombers (Avengers and Helldivers). For this reason the bombers, although larger, did not engender such a feeling of uncertainty that the two fighters did when landing. It was definitely more of a guessing game when the fighters came aboard. The Hellcats and the Corsairs kept you on your toes for a longer time until they were hooked by the arresting-wires. As I have said at various times throughout these books, the Avengers were the largest single engine aircraft of WWII (and they had to be carrier-based – although they were used by many of the services and by other nationals). The officer standing behind the LSO is training to become an LSO and so observed first hand how it's done. Or, it could be that the one with the paddles is the trainee and the one behind is proctoring the trainee. Who knows? One thing that is known though is that all LSOs are trained pilots so it's one pilot bring in another pilot. Presumably this TBM will be on the deck within 30-40 feet; this represents a DROP of about 20 feet, putting a strain on the landing- gear (even though they're hydraulicly constructed).

Technician: instead of inducing energy within itself (self-induction) a coil can induce energy in another coil. Such an arrangement of adjacent coils is called a transformer. There are many and varied transformers and only the basic ones are discussed here. If iron is inserted within the coil greater flux is greater. However, because of the huge energy losses in the iron cores are not generally used with high frequencies (radio frequencies RF) coils and transformers: energy is used to create the magnetic field so when the polarity of the transformer is reversed additional energy is required to "destroy" the original field to cause it to expand in the opposite direction, thus wasting this energy as heat. With RF the reversal is so frequent that a great deal of heat is built up which burns out the transformer (the wire is opened by the heat). The relationship of voltage to number of turns of the coil is: $V(S)/V(P)=N(S)/N(P)$. Thus if the coil ratio is 2:1 the voltage induced in the secondary is twice that of the primary winding. Furthermore, the current and voltage are inversely proportional: $[V(P)/V(S)=I(S)/I(P)]$. Again, Lenz's Law states that the voltage (emf or electromagnetic force) of self-induction opposes the change in current flow. This voltage usually is called "back emf". Electric power companies use huge transformers to step down voltages.


NATIONAL ARCHIVES

NOT SO OBVIOUS

In life there are some things we just don't understand (and I don't refer to things technical). In fact life presents us with much that we are not meant to understand and that's certainly a travesty (but again, life's not fair: shrug your shoulders and carry on to better things). However to the point, why is it that the Helldiver with the broken landing-gear is there while the other four Helldivers are back-side of it? Presumably the closest Helldiver was damaged when it landed and the moveable derrick was moved in to drag it to an elevator. That part's fine. But certainly the other four Helldivers were not able to land with it sitting where it is. So how did they find themselves on the far side of the damaged Helldiver (which has its wings spread for a landing)? I divine no plausible explanation and I feel the lesser for it. The one possible but low probability reason could be that this was the last aircraft to land and the others were simply pulled where they are by the Airdales to that peculiar arrangement. No, I'm afraid I have to pass on this scene and perhaps it will dawn on me sometime hence. For now, that's it. On to the solid stuff.

Technician: a coil has a Figure of Merit Q. This is the inductive reactance at the frequency of interest divided by the DC resistance of the coil or X(L)/R. As the frequency increases so does the Q because the inductive reactance is a function of frequency: [X(L)=6.28FL]. The power factor of a coil is the DC resistance of the coil divided by the impedance (which is X(L) +R. This ratio is equal to the cosine of theta: (R/Z=cos(theta) where "theta" is the angle between the Z vector and the R vector (x-axis). [Again, these simple relationships are confusing textually but as diagrams they are clear, as well as important and fundamental.] Magnetic energy, magnetic force, magnetic induction are somewhat complex subject and somewhat difficult to grasp when presented in text alone. Also, you only see the effects of magnetism; you don't see it itself. We have just touched upon the subject as entire books are written about magnetism. We have discussed it because it is integral to all things electronic (and non-electronic such as electric motors at al.) Before moving on, a word about resonant circuits. Here we consider capacitive reactance as well as inductive reactance. For now consider capacitive reactance X(C) as the mirror image of X(L). They are both a function of frequency. In radio it's desired to tune a circuit to a given frequency (station). A resonant circuit is one in which X(L) is in parallel with X(C). As the field decreases in the coil the capacitor receives this energy and as the energy decreases in the capacitor the coil receives the energy. This subject of resonant circuits is an important one and is considered next.

WARBIRD QUEUE

With the squadrons out on a mission these warbirds were left behind to provide protection should hostile marauders threaten the ship. Apparently we're in enemy waters now as indicated by that Airdale to the left wearing a steel helmet (not cloth). These were never worn when working in among the fired up aircraft because the wind would catch the helmet and take your head, along with the rest of you, to places that should be avoided. Note that he's also wearing his life-preserver around his waste. It's my recollection that we wore these often, enemy waters or no (I still have mine). The situation here is "stand and wait". They know what it is that they await (the "boggies") but they don't know when or whether the waiting will come to fruition. (From the looks of things the boggies are nearby). That is, enemy sighted, action imminent. Waiting is no fun especially when the outcome is not clear. Yet sometimes waiting is not only appropriate but also beneficial. As an example, someone of note wrote to me, long ago and far away, that "you must sublimate those desires you can't fulfill" (then). Having been young, I understood (and agreed) but was not particularly pleased. I was more than willing to wait but "how long?". How long indeed. There's always the tendency to say "tempus fugit", over and over. But does the time fly toward you or away from you. Regardless, it was good advice. Said another way, we should redirect our energies and thoughts to other more appropriate pursuits that are equally enjoyable (when the original desire is not manageable (deferrable). It's called "strength of character.

Technician: reiterating, capacitors are two metal conductors separated by a thin dielectric (nonconductor such as air). Also previously stated, the capacitive reactance ("resistance") is 1/(6.28FC) where C=KA/25.12d (K=dielectric constant, A=area of the two metal conductors and d=distance between the two metal conductors). Now the resonant circuit of an inductor and a capacitor in parallel which is placed in a circuit. The formulas for capacitive and inductive reactance can be considered "mirror images" of each other in that as the frequency increases the X(C) decreases as the X(L) increases. For given inductor and capacitor there is a certain frequency at which the X(C) is equal to and opposite to the X(L). At this frequency the two reactances cancel each other leaving only the resistance of the capacitor and inductor and connecting wires. These values are minimal so that the current in the resonant circuit is high. This effect is similar to a pendulum that would oscillate indefinitely if only the resistance would go away (it never will of course). With this, a radio is tuned to a certain frequency (station). [Coils also have capacitance between their windings which mist be considered, but not here.


NATIONAL ARCHIVES

A “FORCE-FIELD”

During a launch operation the flight deck is a veritable “force-field”: the fierce wind when generated by a n aircraft “flexing its muscles” as it revs up its engine the force of the noise as it physically assaults your senses and of course the ferocious force of a propeller “gone ballistic” during warm up as here. The total force created defies nature by being more than the sum of the forces, or so it certainly seemed. It’s an overbearing force that has the effect of diminishing you to a mere after thought in the total scheme of things. You’re there but who are you? You are close to nothing in relation to the “force-field”. That field is not so imposing in the spread out situation here. There was enough space to pre-spread the wings thus saving time when launch started. We never had a launch such as this on the Antietam because we always had a full deck. But here, again they stand and wait (until they’ve completed a turn into the wind?). Note that there are three yellow-shirts, one for each of the first three Hellcats. To the lower left is a phone-talker wearing an oversized steel helmet (can “boggies” be in the area?). The steelhelmet is a signal to all of the helmet-less Airdales that something is afoot unless of course General Quarters has already sounded. If it had the Airdales would have seen the gunners running to man the guns and the 5-inch guns “flexing their muscles” as they trained and elevated the gu-barrels at a quick rate. “Be Prepared”, the Boy Scout motto, is not only appropriate here on the flight deck nut also in life in general. A large part of that is the process of reading and LEARNING. How can one say one’s living if not learning?!

Technician: we’ve discussed an inductor and a capacitor in parallel. Now let’s discuss a capacitor and resistor in series to form a timing circuit accurate to microseconds. Place a source of voltage across both a capacitor and a resistor and close the circuit. When the voltage source is turned on the current charges the capacitor by pushing the electrons of the source to one metal plat e of the capacitor which in turn forces electrons on the other plate to be drawn to the other side of the source. Thus the capacitor becomes a source of voltage itself. One plate has the value and polarity of one terminal of the source and the other plate has the value and polarity of the other side of the source. This is called charging the capacitor to the source’s voltage. This takes a finite amount of time. Initially the capacitor starts to charge quickly but as the charge builds up this charging process slows down. As the capacitor approaches full charge the rate of charge is very slow because there is already a charge (an amount of electrons) on the plate tending to oppose the still charging process. Both the capacitance and resistance determine the rate the charging process. To be continued.

ONE HELLCAT TO GO

The cast of players is as follows: to the far left is the last controlling yellow-shirt; tot the right is the launch officer with the flag; front right is a standby yellow-shirt; to the left front is an Airdake with a data-board showing weather conditions at the target and any other pertinent data the pilot needs to know. The pilot has his eyes fixed on that twirling flag ready to momentarily release the brakes for his run down the flight deck. Where the Hellcat looks somewhat "stout" the Corsair appears "svelte". However to look at the specifications they are comparable. The Hellcat had a 2,000-hp 18-cylinder engine (later 2,2000-hp) with a 13-foot propeller and weighing 9,100-lbs. (15,500-lbs. loaded) while the Corsair had a 2,000-hp 18-cylinder engine (later 2,250-hp, 2,450-hp, and 2,800-hp at the end of the war) with a 13-foot propeller and weighing 8,800-lbs. (15,000[lbs. loaded). The Hellcat's speed was 375-mph, the Corsair's was 395 mph. But there are a lot of variables that skew the equation such as performance at different altitudes and rate of climb and the like that become too involved, interrelated and technical for these pages. Nevertheless, the Hellcat looks like a "rotund, inoffensive conveyor" while the Corsair appears to an opponent as a "lean, mean fighting machine". So it can be in life where appearances can be deceiving. Preconceived notions turn out to be completely misconstrued. Life will be much simpler and mare balanced if we all at the first (and the second) give others the benefit of the doubt. It's much harder to remedy a wrong after than before especially if we are the recipients of the wrong.

Technician: the time constant is defined as the time it takes for a capacitor in a series RC circuit to charge to 62.5% of the voltage applied across the RC circuit. If the applied voltage is 100 volts the voltage after one time constant is 62.5 volts across the capacitor. That leaves 37.5 volts at the source. During the second time constant the capacitor will assume an additional voltage of 37.5x62.5=23.44 volts. during the second time constant period. This continues with the capacitor gaining more and more voltage in smaller and smaller amounts. At the end of the fifth time constant there is less than 0.75 volts remaining at the source of applied voltage. The charging curve rises steeply at first and then levels off almost horizontally by the fifth time constant. By the same token the current in the circuit is a mirror image of the charging voltage (the voltage across the capacitor). This is because the growing voltage across the capacitor opposes the current only slightly within the first time constant period. This opposition grows as fast as the voltage across the capacitor grows. That is, the voltage across the capacitor subtracts from the driving voltage of the source. The subject of time constants is to be continued.


NATIONAL ARCHIVES

WAVE-OFF?

Wave-off? This Avenger's position doesn't auger well for a safe landing. I would say that most probably the Avenger has already received the wave-off, and a late one at that. If so, and it probably is so, it's for sure that the pilot has "put the pedal to the metal" as the youth would say (increased accelerate to the maximum I'd say). Right now, if this is a wave-off (and it probably is) you're hearing a deep pitched roar of the engine which will reach a higher pitch as it passes you as the propeller thrashes the air in its effort to pull the big load forward and upward. It was a chore even with a 55 foot wing-span. It's a critical time, these moments right after the signal to accelerate and go around again. At the low landing speed any abrupt maneuvers are anathema to an aircraft's stability. And air-worthiness is in jeopardy. The lift, even with flaps down and a long wing-span/wing-area, is marginal. I'm not a pilot and they could take exception with my comments. If I'm wrong I stand corrected. Would that this willingness to stand corrected would not be such a hard thing to do for so many. Personally I'm glad to be corrected. Who wants to go through life being mistaken about things, especially important things? Those who love the truth would be pained to carry the "baggage" of being misinformed. The reverse of this is to be enlightened. Life is much happier that way, is it not? If not, one needs to have a SELF-examination. You know yourself best.

Technician: the value of the voltage across the capacitor for the first six time constants are 62.50, 85.94, 94.73, 98.02, 99.27, and 99.73. This bears out the rapid rise and the quick leveling off. The voltage at the source is very low and Ohm's Law says that as the voltage diminishes so too does the current (due to the voltage source). The voltage across the capacitor and the current in the circuit are the inverse of each other. When the voltage across the capacitor is maximum the current through the capacitor is minimum. Thus the current and voltage of a capacitor are 90 degrees out of phase with the voltage leading the current. The length of the time constant in seconds is dependent upon the value of the capacitor and the resistor. Thus five megohms (5,000,000) of resistance and three microfarads of capacitance equals 15 seconds. A value of 0.1 megohms times 0.01 microfarad equals 0.001 seconds One megohm times one microfarad equals one second. Thus the time constant of a series circuit of those two values of resistance and capacitance will charge the capacitor to 62.5% of the applied voltage in one second. The amount of time to charge a capacitor does not depend on the applied voltage; it depends on the values of the capacitor and resistor. In electronics time usually uses units of microseconds (1/1,000,000) so ohms and microfarads are th units used.


NATIONAL ARCHIVES

ANOTHER FLY-BY

Another fly-by because of another problem with unhooking the tail-hook. The Flight Deck Officer is holding the Hellcat in place until the arresting-wire is disengaged while the LSO can only stand and watch, again. At least the top Hellcat was waved-off soon enough that it didn't have problems with altitude. [Note that the Hellcat's landing gear (wheels) fold backwards while the Avenger's fold to the side (six pages back). This even though the two aircraft were built by Grumman Aircraft. The Avenger just folds its wheels into the wing while the Hellcat has to turn the wheels 90 degrees in addition to folding them into the wing.] The Flight Deck Officer is holding the Hellcat with his left fist but what the one finger on the right hand means is not clear. Is he saying "one minute"? In any event he is not ordinarily at this place during landing operations; the yellow-shirt rated enlisted man performs this function. As has been said there is little if any talk on the flight deck during air operations because the noise completely dominates. Hand-signals are the mode of communication and they are not always understood, sometimes leading to problems if not outright accidents. How fortunate we humans are in that we can verbalize our thoughts and how frustrating it can be when we are misunderstood (even when we express ourselves with well crafted sentences). The concept of not being "on the same wavelength" is a source of much of the miserable "human condition". Understanding does not necessarily mean agreement or acceptance. Certainly not.

Technician: to summarize the concept of the time constant: 1) The time constant is the time it takes a capacitor to assume a charge of 62.5% of the applied voltage to the series unit of a capacitor and a resistor across the voltage source regardless of what the applied voltage may be. For each succeeding time constant the capacitor will charge 62.5% of the REMAINING applied voltage. 2) The length of a time constant is measured as the product of the capacitance and the resistance. If the resistance is expressed in ohms and the capacitance in microfarads the time constant will be expressed in microseconds (capacitors with values in the microfarad range are of manageable size such as a thimble). Time constant RC circuits are used frequently to develop the ability to accomplish functions at unique, precise times. Of course the components must be accurate depending on the purpose of the timer. Electron beams are swept across the screen in a TV set based on RC timing circuits. Radar sets have multiple timing circuits. Imagine what a complex electronic device would do without timing circuits. Beyond that these circuits in turn must be synchronized, and with precision. But also imagine the fun to be had to be able to understand how all this works. It's the fun of satisfaction/accomplishment in overcoming difficulties.


NATIONAL ARCHIVES
LIGHT
DECK
OFF.

CURIOSITY

"Curiosity killed the cat, satisfaction brought him back". Apparently while repairing an aircraft below on the hanger deck some oil leaked into the cylinders and generated volumes of fumes. A hurry-up call went out to lower the forward elevator to ventilate the hanger deck. However, there were aircraft on the elevator so in quick time the Airdales cleared the area and in the meantime, since there were no air operations all of this drew a crowd. Never had I seen such a crowd on the flight deck but curiosity took over. We are at a lookout platform next to the 5-inch gun director. There's a 40-mm gun quad directly below us which is sitting atop the pilot house/bridge. The two radio towers to the right are erected and at the port side can be seen the two 5-inch guns pointing outboard. This side of them is a 40-mm gun quad. The aircraft are in disarray and when the "excitement" is over the Airdales, who are only a fraction of those seen here, will have to respot the deck Since helmets are being worn the enemy presumably is within striking distance. If General Quarters sounds right now there'll be a wild scramble of people, for sure. When things are dull in the area curiosity is easily piqued as here. This is a good sign. It indicates an active mind and if one does not have an active mind one is in effect without life (with all due respect and heart-felt sympathy for Alzheimer's patients and the like). Cherish life by living it well.

Technician: many filters are used in radio and other electronic circuits. A filter passes current of a given frequency range and stops currents of all other frequencies. Thus there are low-pass filters and high-pass filters. For instance, a power supply generates DC current (voltage) from oscillators. A filter is used to eliminate (shunt away) all varying components of the output of the power supply by using low-pass filters. The filter consists of an inductor in series with the output and a capacitor in parallel with the output (from the output line to ground (0 volts)). The inductive reactance [6.28FL] of the inductor presents a large impedance to the varying voltage in the output line while the capacitance reactance [1/6.28FC] of the capacitor C presents a low impedance to the varying component of the voltage. This component is shunted to ground. These filters can be placed in series to get rid of all varying components in the output line of the power supply. With a high pass filter the inductor and capacitor positions are reversed. A band-pass filter passes a given range of frequencies and excludes all others. This filter consists of a capacitor and inductor in series in the line with the load resistor and an inductor and capacitor in parallel together shunted to ground. Both are in resonance at a given frequency, the series L and C impedance being low and the parallel L and C impedance high. The higher the Q of the inductor L the narrower the band.


NATIONAL ARCH

BROTHERS-IN-ARMS

While protocol prohibits fraternization between commissioned officers and enlisted men this does not apply during working hours. (It seems foolish to call the youths on board "men". Yet when does one become a "man"? (One solid definition is to be found in Rudyard Kipling's poem "IF".) Here we see the pilot sharing a joke with the plane-captain, all of whom were (?) rated mechanics (but he looks so darn young). Each aircraft had its own plane-captain who considered that aircraft "his". They kept an accounting of the condition of "their" aircraft and kept the pilot appraised of this, (Of course the mechanics' shop was the real "accountant" of each aircraft.) In any event the pilot was interested in keeping a good rapport with his plane-captain. It was, if you will, the knight and his squire. The figure under the Helldiver is loading it with bombs and will also make sure that the 20-mm machine guns jutting from the wing is fully loaded also. (Those guns, one in each wing, were used to strafe the enemy ship as the pilot made his bomb-run at a 45 degree angle. This view gives a good impression of how "beefy" was the Helldiver bomber. On the Antietam we had 20 of them (and 20 Avengers and 30 Hellcats and 39 Corsairs). I don't remember having noticed any particular camaraderie between the pilots and enlisted men except on a business basis. That was the way it was on a warship. However I think that it is said best by Kipling's poem: "If you can talk with crowds and keep your virtue, Or walk with Kings–nor lose the common touch". True, one seeks one's own "people", but just as true is that one never should feel "above" ANYONE else.

Technician: we'll close this "Technician" set with a description of a very important tool for those working on electronic hardware. It is the oscilloscope, a device similar to a TV or computer monitor but that primarily displays the waveforms found in electronic circuits (of which there are many varieties such as sine waves , pulsating DC waves, square waves, pulsed waves, sawtooth waves, sound (audio) waves, parabolic waves, and so on). The primary components of an oscilloscope are the cathode ray tube (CRT) and its supporting circuits. The components of the CRT are the electron gun consisting of the filament and cathode, the grid, the first and second anodes, the deflecting plates, the fluorescent screen, the centering controls, other controls, the vertical amplifier, the sweep generator, the horizontal amplifier and the synchronous control. This seems somewhat complicated and so it is. But it can be explained in a straight forward manner that makes it understandable to most of you. To the others, WORK at it. It's within the grasp of everyone with a little healthy "sweat". Besides, this can be fun! and better than a cross-word puzzle.) No offense to the crossword puzzle advocates is intended.)


NATIONAL ARCHIVES

GOOD-BY AND SAFE JOURNEY

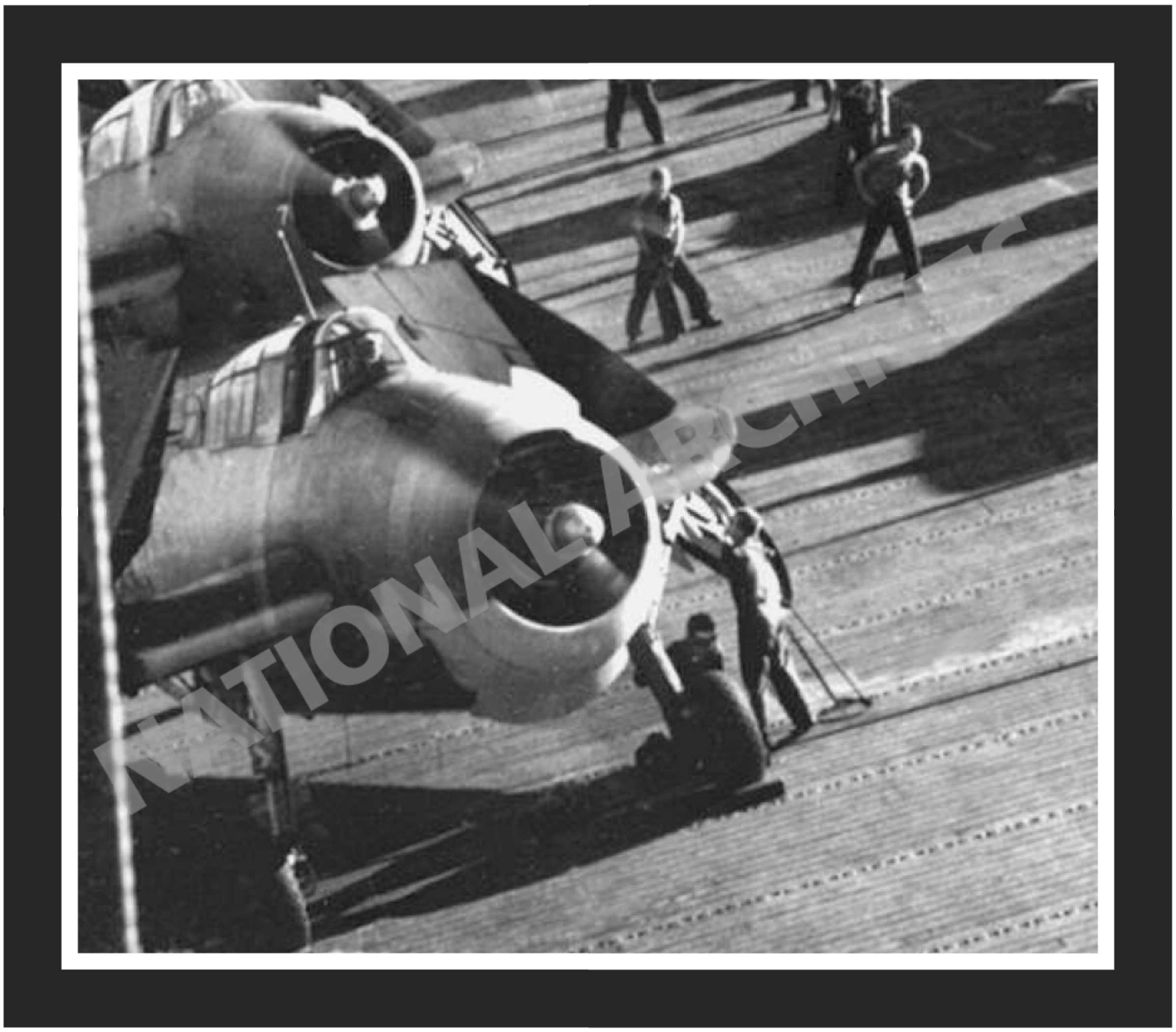
Not that it's important but I can't identify that aircraft. It doesn't have the gull-wings of the Corsair, and the wings seem too low to be a Hellcat but surely it's not an Avenger nor Helldiver. No matter, it's a good view of a typical launch. Each type of aircraft had different launch characteristics. The Avenger, with its large wings, lifted off quickly while the Helldiver was more ponderous as it flirted with wetting its under-side. The two fighters (Corsair and Hellcat) I recall were in between those two boundaries. I wonder how many readers skimmed over this picture and didn't notice that this ship has only the starboard catapult. Six of the first Essex-class carriers had only a starboard catapult, but also had a catapult on the hanger deck amidships. This catapult turned out to be ineffective and so it was removed and replaced with a port catapult on the flight deck. Those ships were all installed with two catapults on the flight deck. This was mentioned as an example of how most of us are not particularly observant. This shortcoming, in my opinion, causes us to make mistakes that we shouldn't and ordinarily wouldn't. To the point' it's an inefficient mode of operation. But perhaps even more important, we don't learn as well as we should. This is just another way of saying we miss much of interest in life. Figuratively speaking one walks right by a wealth of intriguing aspects of life. Be alert. "Wake up and smell the roses"!

Technician: the oscilloscope is built around the cathode ray tube (CRT). Very briefly, the CRT has an electron gun that shoots a beam of electrons at a florescent screen to form a pattern on the screen that replicates an electrical wave such as a sine wave. The beam is deflected in both the x- axis and y-axis directions by voltages sent to the plates. Now we will discuss each of these elements in turn to provide greater insight into the operation of an oscilloscope. The CRT glass tube is in the shape of a large funnel with one end consisting of a long neck and the other end enclosed and sprayed with a florescent material on the inside. The small end has a socket fitted with several electrical contacts. Only the large screen end is visible to the operator. The tube has been evacuated (a vacuum inside) to allow the easy transit of electrons. The left most part of the long neck is the cathode of the electron gun which "boils off" electrons by being heated with a high voltage to the encased filament. The electron gun consists of the cathode (barium oxide), the filament, the grid, the first anode and the second anode. Just to the right of the electron gun are the two sets of two deflection plates mounted horizontally and vertically. These electrons boiled off the cathode form an electron cloud around the cathode. To be continued.

“STAND FIRM”

Everyone seen here on the deck is a plane-captain (brown-shirt) standing next to “their” aircraft. The one exception is the Airdale crouching next to the wheel of the Avenger. Next to him the plane-captain is undoing the tie-don rope that inexplicitly is still in place. Normally these ropes are used only in bad weather (the bright sun rules this out). The brown-shirt top middle is straddling a fire-extinguisher which they used at their discretion when the aircraft were started. This was always done when checking out a repaired engine but when it’s on the line as here it should already have been checked out. The brown-shirts are out on the flight deck for only a short time before the launch actually starts so evidently some of them take this opportunity to show their mettle by “standing firm” and “showing their chests”. I suppose it was a “macho thing” for them while a somewhat amusing thing to us Airdales who were out there exposed on the deck for a living. But mind you, I definitely admired the plane-captains’ know-how vis-a-vis the mechanics of these machines with wings (in spite of their youth). Regardless of personal opinions we all had our job to do and as far as I could determine each and every one did his job to the best of his ability. There was no attitude of being better than others because of the type job someone did. Instead, the prevailing attitude was only one of pride in doing a good job whatever that job was. The pride was internal and not worn on the sleeve. There was no belittling another’s job. Not an iota.

Technician: scope continued. The grid covers the cathode except for a small hole. The value of the negative voltage applied to the grid determines the number of electrons that exit the confines of the grid and are allowed to travel to the florescent screen. It’s a “gatekeeper” that regulates the electron stream quantity. The first and second anodes have a positive voltage applied to them. They function to form a sharp electron beam before it travels to the florescent screen. They focus the beam. The anodes also accelerate the stream of electrons to a speed of several thousands of miles per hour. [Some electron guns use a negative voltage for all elements except the second anode which is set at zero volts (“ground”). Here the relative voltages are what determine the electron beam characteristics. One only needs to recall that electrons travel to a more positive voltage.] When the fast moving electrons strike the florescent material it glows at that spot for a fraction of a second. Thus this spot must be struck at least 30 times a second. When this happens the spot appears to glow continuously (movie film works on the same principle: 30 images are displayed a second). Various screens are designed to have different values of persistence for different purposes. The “scope’s” description will be continued a few more pages. “Stand firm”.



SHORT HULL

I included this picture because it clearly shows how a "short hull" Essex-class carrier looked. The first six(?) carriers had this configuration but were soon changed to the "long hull". This change consisted of adding two 40-mm quad gun sponsons at both the bow and stern of the ship. . This in turn gave the Essexes their beautiful "clipper bows". The flight deck was not extended to cover the sponsons thus giving the guns unobstructed views 90 degrees upward. If the guns did shoot down an aircraft at that elevation, that aircraft would have already have dropped its bomb-load. If the ship was hit with these bombs the gun would be called what the 20-mm guns were called "revenge weapons" (weapons that enacted revenge on the aircraft that dropped the bombs that struck the ship). It's the philosophy of "getting them before they get you", also known in the political parlance as "preemptive strike". There are four Avengers in a row up front (two rows) where normally there are five Hellcats or Corsairs. In fact there's space for six in a row, leaving precious little space between aircraft. (This "space business" is of crucial interest to an Airdale. Those spaces are his "working spaces"). I presume that those aircraft behind the Avengers are the SBD Dauntless dive-bombers, the heroes of the Battle of Midway on June 4-5, 1942 (the word "hero" is bandied about shamelessly and so dilutes the word. The pilots at Midway were true heroes!!) Words have specific meaning and we must learn to use them properly and ALSO appropriately.

Technician: to produce the movement of the electron beam over the face of the CRT use is made of two sets of deflection- plates. These are just to the right of the second anode (with the screen to the far right). These four deflection-plates form a square box configuration through which the electron beam passes. The vertical plates deflect the beam vertically and the horizontal plates deflect the beam horizontally. Thus when voltages are applied to the plates the beam, and the spot it makes on the screen, can be placed anywhere on the screen that it's desired. As the beam passes through the deflection- plate section, a positive voltage on the upper plate will deflect the beam upward. A positive voltage on the lower plate and the bean is deflected downward. So too for the horizontal deflection- plates. Voltages acting in unison will place the spot at any x-y coordinate. Controls allow you to adjust the beam for centering. What is needed is a sawtooth generator that produces a voltage that's applied to the horizontal deflection-plates. As the sawtooth voltage rises the beam is swept across the face of the screen. This is done periodically and at a controlled frequency. Thus the beam sweeps across the screen at a fixed frequency but is very quickly swept back by the downward part of the sawtooth wave. To be continued.

TRANSITION TIME

The time-period here is between July 1942 when the TBM Avenger shown closest to us replaced the ill-fated Devastator and January 1943 when the SB2C Helldiver replaced the redeemer SBD Dauntless dive-bomber shown here up forward. [The Devastator squadrons were decimated in the initial attack at the Battle of Midway and a very short time later the Dauntless squadrons redeemed that loss by decimating the enemy carriers.] Here are seen two yellow-shirts controlling the two Avengers (yes, that yellow-shirt near the Dauntless aircraft has his arms raised). We also notice two Airdales, one next to the wing (middle bottom and one between the two Avengers. Usually both of the Airdales are close to the wheel where they should be. (The Dauntless aircraft can not fold their wings.) The landing process is in progress at this time if for no other reason than that that battleship in the distance is leaving a long trail behind it. The sea seems calm so the ships have to make their own wind over the front of the flight deck. This is a good example of doing for yourself and not expecting others to do for you (unless you're incapacitated). It's called "standing on your own two feet" regardless of your station in life. Help is fine if it's helping others to help themselves. This is about as basic as it gets.

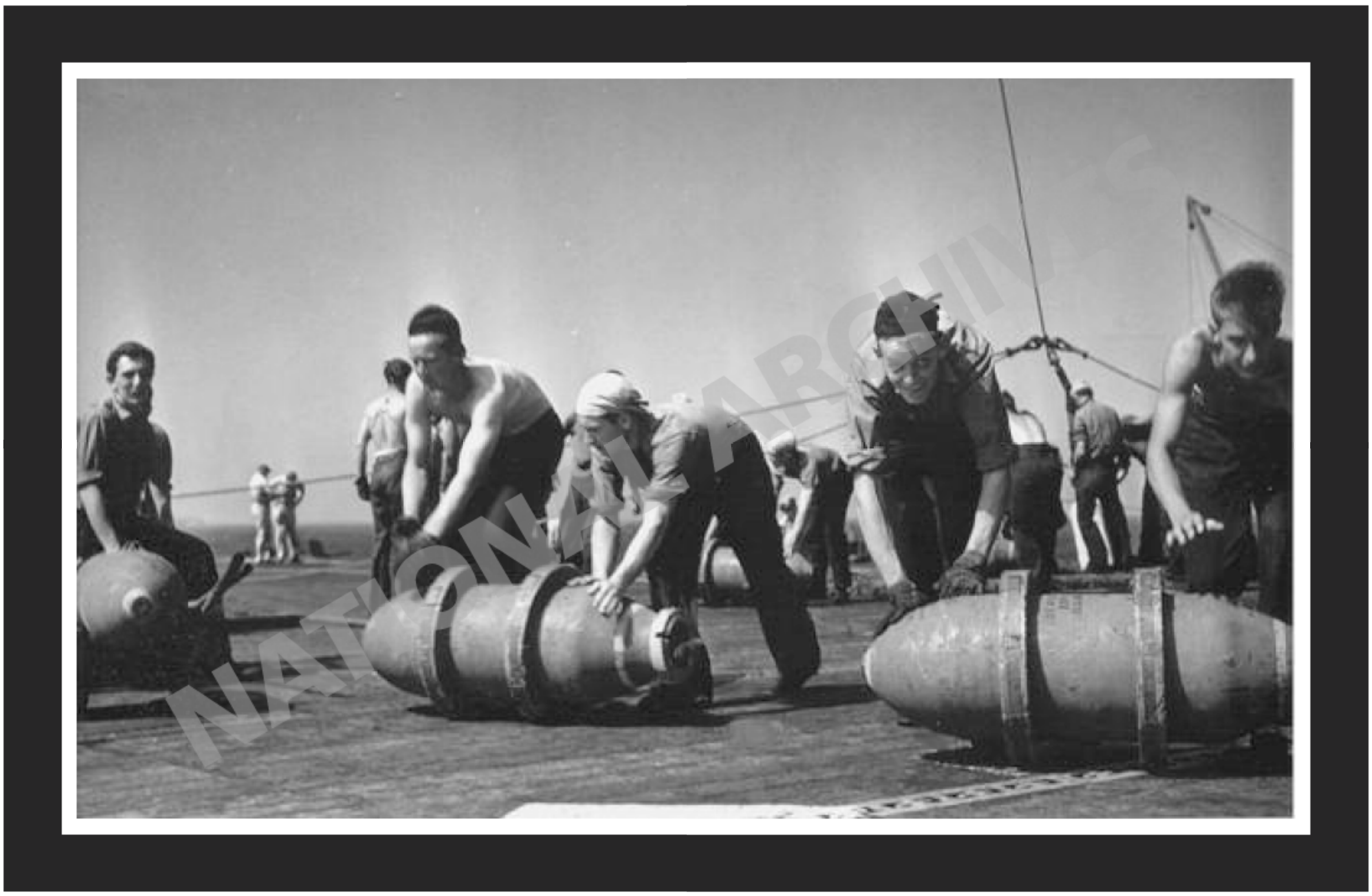
Technician: the gradually increasing voltage of the sweep generator is applied to the right-side horizontal plate. As this voltage increases in value the beam is swept across the screen at a uniform rate (because the sawtooth voltage is steadily increasing). When the beam reaches the right side of the screen the sawtooth abruptly falls to zero volts causing the beam to immediately return to the left plate from where it started. It does this so quickly that the beam is not "recorded" on the screen. Now if at the same time that the sweep is operational a sine-wave is applied to the vertical plates, a sine-wave will appear on the face of the CRT at the same frequency as that of the applied sine-wave. The higher the voltage applied to the vertical plates the larger will be the sine curve on the screen. To widen the sine curve increase the horizontal voltage. A small amount of voltage from the vertical amplifier is fed to the sweep generator. This will synchronize the sweep voltage with the sine wave applied to the vertical plates. The oscilloscope is extremely useful for many purposes with the analysis of electrical waves being foremost. This ends the very brief and abbreviated tour of the Electronic Technician 3/C.


NATIONAL ARCHIVES

"ROLL OUT THE BARREL"

"Roll out the barrel, we'll have a barrel of fun.......". So goes the WWII song that was assuredly not about rolling 1,000-lb. bombs as here across the deck (nor the 2,000-lb. variety). These are the red-shirts (ordnance) who are taking the bombs down the elevators to the hanger deck and thence to a special compartment below. In the background is the cable and netting that brought this ordnance aboard. I could only marvel at the aplomb (nonchalance) of these young red-shirts as they handled these big ugly objects of death and destruction.

Drink and Drugs: (what is said about the one applies equally well to the other). "To get high" is a euphemism for reaching for the dregs. "To get high" is to reach a level of ugliness that is not only physical but also mental in that one's acuity (sharpness) is trashed, one's mind is literally diminished never to regain its former level (unless one deliberately wants an excuse for dullness). That colloquialism "getting smashed" is supposed to be "funny, cute" but it's ironically apt and appropriate more than they know. What rational person would want to be "smashed"? (because their mind is literally going down hill with little chance of recouping. Let's get serious here: irrationality is not funny. Misusing one's God-given attributes is not just sacrilegious (and since half of you unfortunately do not have a religious bent) it's also seriously detrimental to your continued good health. Perhaps a drunk, a person on a drug-high, is simply a coward who's afraid to face the reality of their inadequacy. (The obvious solution here is to LEARN and so not be inadequate. But sometimes that takes pure unmitigated "guts" and those on a "high" just plain don't have the wherewithal to stand on their own two feet. (Are you a coward? Be honest with yourself, for that is the ONLY way you'll make the grade.) When you're "high" you've abrogated all claim to control of your destiny. In the Navy there was a phrase, "Shape up or ship out". I believe that a person who "gets high" is in fact waving a flag that says in effect that he's completely devoid of any self-respect or self-confidence and that he needs this "security-blanket". Where's your pride? ("Security-blanker"!) Or did you ever have any? Isn't it long overdue to gain pride? Only a bona fide idiot would fry his brain (which is what drunkenness and drug-taking are doing, "big time"). Wise up, you who over-drink and take drugs: don't you notice that people think you're ugly and NOT cute or "cool"? FAR from it. (And yes, I've been drunk, twice Not purposefully, but stupidly because I didn't realize what was happening. I've only done one other thing more stupid and that's for another page that will also come pouring out free-form as this is here. Just remember, the good times are had when SOBER! Shun "Joe College's" childishness. Don't be a loser the way he actually is!


NATIONAL ARCHIVES

THE QUINTESSENTIAL LAUNCH OPERATION

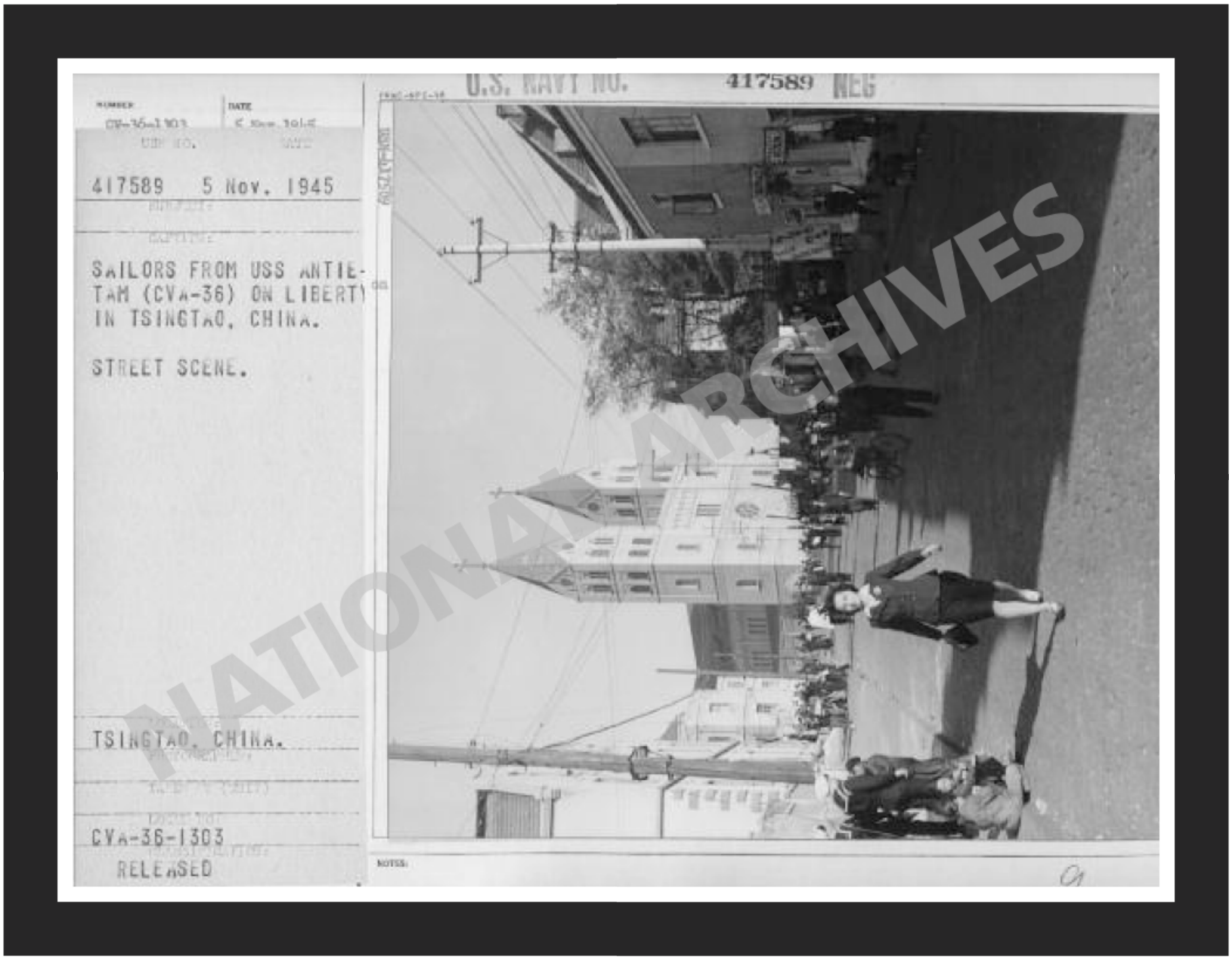
Here's the quintessential launch operation, day in, dat out, twice a day (on the Antietam). Actually, what we see here is not what we would have seen on the Antietam: where here there are 18 Helldivers, we had 20. Where here there are 4 Avengers, we had 20. Where here there are 15 Hellcats, we had 30. And where here there are 0 Corsairs we had 30.While it's true that this is a launch in progress, the configuration is what I can only say is peculiar. Without exception our (the Antietam's) configuration was, starting from the front, the Hellcats, then the Corsairs followed by the Helldivers and finally the Avengers. The fighters might have been interchanged as well as the bombers, but not normally. The front Helldiver is controlled by the yellow-shirt to it's right while the yellow-shirt to our right is controlling the Avenger to the far right. Notice that mildly amusing Airdale at the center of the picture, hands on hips, feet astride, absent cloth helmet and goggles while all the other Airdales are in their normal position next to a wheel. Perhaps he's a brown-shirt plane-captain trying to "make a statement" by "baring his chest" and posturing "I'm macho man". It was probably his first and last such demonstration before beating a retreat to calmer territory away from "the action". [What would I do without quotation-marks? However I feel remiss `using colloquialisms without quotes. Proper English permits only a few such and I've been peppering them willy nilly, but sometimes youth must be served.) And now I take leave of this traveling "thunder storm" that locale of one long-lasting thunderclap that will not go away and give you respite until that very last war-bird.

Thunderstorm: a thunderstorm is characterized by the violent vertical movement of air that has been heated at the surface of the earth. This rapidly rising air takes the shape of huge cumulonimbus clouds that resemble an anvil at its topmost portion. These clouds can rise as high as 75,000 feet. This phenomenon is characteristic of the eastern and midwestern portions of the U.S. In addition to ground heating, these clouds are due to an advancing cold front (air mass) or temperature differential between a warm ground and cool water. These cumulonimbus clouds have both updrafts and downdrafts and can be the precursor to hurricanes. These drafts shear off electrons from the air mass, charging them both positively and negatively. When the difference in charges is high enough there is a sudden violent discharge which in turn renders the air in the path of the discharge. This happens so rapidly that the adjacent air is heated and expanded and then collapses to such an extent that shock-waves are generated. This is the sound of thunder that we hear. Since the speed of sound is about 1,200 feet per second, if the sound of the thunder reaches you 5 seconds later the lightning would be about one mile away. Take cover.

PORT OF CALL

I kept this picture in its "raw" form as evidence that we, the Antietam, made a port-call at Tsingtao, China while we were patrolling the coast of Korea after the war (Japan had occupied Korea during the war). Almost all of the pictures at the National Archives are 81/2 x 11photographs in landscape format. However a set of these taken by the Antietam photographer was in this format. I expanded all of them to full size (see the next ten pictures all of which were taken at Tsingtao by the Antietam photographer.). I'm particularly attracted to this picture because it's very similar in rendition as a pencil-drawing I drew of a similar scene. Strangely enough I met a hometown buddy here at Tsingtao. He was a marine stationed here in Tsingtao and when he saw the Antietam on the harbor he came out to visit. (The ship's PA system was used only for official business so when I heard my name and the order to report to the quarterdeck I was startled and more than a little quizzical. That turned to complete surprise when I saw him standing there because I had no idea that he was stationed at Tsingtao. He wanted to go to the flight deck to see the aircraft. When be saw them he opined "Wow, I didn't think they were so BIG")) I never visited the location in this picture and with only an afternoon's liberty I didn't cover much ground (But it was GROUND.). Interestingly, a substantial church is prominent in this picture. I'll make no more comments about what can be seen in this picture because it's the overall impression depicted that I want to be retained.

Weather: weather is the condition of the atmosphere in terms of heat, pressure, wind and moisture. Where the atmosphere thins to nothingness (a vacuum) there is no weather. Space has no weather. Yet near the surface of the earth the atmosphere is dense and heavy (yes, air has weight that in turn gives it the characteristic of pressure—14.7 pounds per square inch.) Down here on earth one sees and experiences the ever changing, often idyllic, sometimes dramatic and certainly too frequently violent "weather shows". And yet it takes no more than air to make this multivariable show. Were the earth's atmosphere never heated , mixed or moved about there would be no change in the weather. There would be no wind, no change in air pressure, no storms, rain or snow. (And there would be no rainbows that come to us as the sun is reflected from and refracted by millions of raindrops). Heat can be thought of as the spoon that stirs the atmosphere to make weather. All weather can be thought of as the result of temperature differentials between adjacent regions. Weather can also be thought of as the giver of life as bestowed upon us by a generous God. Weather is indeed God-given and so shall it always remain. I should close this section by singing a hymn of praise to that Eternal Father.


417589 5 Nov. 1945
SAILORS FROM USS ANTIE-
TAM (CVA-36) ON LIBERTY
IN TSINGTAO, CHINA.
STREET SCENE.
TSINGTAO, CHINA.
CVA-36-1303
RELEASED
U.S. NAVY NO. 417589 NEG
NATIONAL ARCHIVES

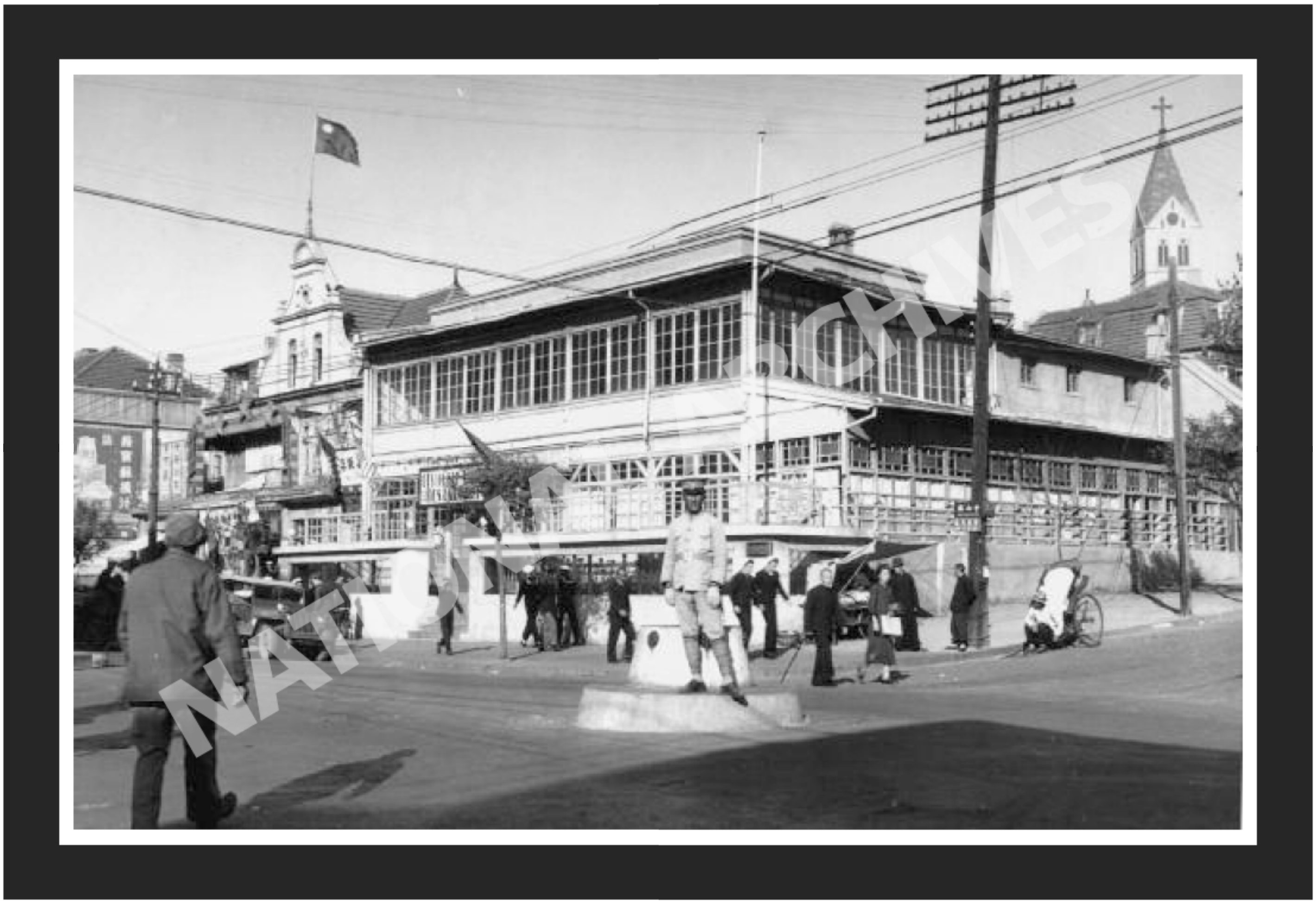
STANDARD SIZE

Here then we have the standard size. It also makes clearer some of the details such as that sign to the right: "Jack Bar". This is not an example of the "Ugly American" in a foreign country because the military did not support or even condone such establishments. No, this was a home-grown enterprise for the "benefit of the Americans" far from home (under local management). The woman striding down the street could have been dressed in Western garb to attract the American GI. Who knows? I'll make no such assertion. Even the little boy to the left could be "advertising" the availability of "female companionship". Who knows? What I do know though is that being away, and even far away, from home is no excuse to besmirch one's values and standards of conduct. Abstinence counts, way beyond the circumspection of a youth. It's of real and lasting value not only for one's self but also for society in general. Sailors away from home have a reputation and WWII was no exception but also no excuse. For my part, I had a liberty at Tsingtao for the afternoon. Once on shore I saw nothing of even slight interest so I walked straight ahead. The area was open and barren and I wondered what was the profit of continuing when there in front of me about 100 yards was a one story building of modest size with no person, nothing in the area. As I approached a lone sailor left the building. "This requited investigation" my curious mind opined. A short distance into this completely nondescript building I entered a square courtyard about 30 yards to a side. A moment later a small man in "pajamas" appeared and immediately clapped his hands. Just as quickly three young girls appeared, cute as a grown up doll. The little man motioned to me to choose one of them. Inwardly flustered I did and off we went to a side room, small and unadorned with only a mat on the floor. My purpose was curiosity. I had no intention before entering, and none now, of engaging in any "personal" conduct. What I really wanted was to see what would happen. Would this actually lead to a physical encounter? I wanted to find out how a girl in these circumstances would act. I wanted, unrealistically to "communicate" with her and learn about her. All this was of course to no avail. It was clear though that she was, how can I say this without sounding foolish, a "nice, cute, unsophisticated, even lovely young girl" who under different conditions would have been a pleasure with whom to socialize. Communication was not possible and so I was out of there in about 2 ½ minutes. We didn't so much as touch each other and I observed a quizzical look on her face as I "bowed out" as gracefully as I could (also feeling very foolish "for her sake").The "identical" scenario played out in Yokohama, in Manila and in Hong Kong. And I'm glad I "ventured forth". I truly have a soft spot for all those girls: I'd have gladly embraced them.

TSINGTAO, CHINA (1945)

I regret that I went back to the ship right away rather than looking around more, having missed this. (Note the church tower in the background). Tsingtao was (is?) the third largest port in China, being on the Shantung peninsula three hundred miles north of Shanghai. In 1898 China "gave" Germany a lease on Tsingtao which was relinquished after WWI. It produces cotton and silk material. The Western influence caused Tsingtao to have a relatively modern flavor. To the left can be seen a military vehicle which provided the military presence until the area was cleared of all Japanese forces. Also note the two pairs of sailors. This was something I never did because I was never buddy-buddy with anyone on the ship except someone from the Navigation Department (and he was on the other watch). Thus I did all my liberties alone which was no problem to me. In fact I preferred it that way because then I could go where I wanted when I wanted to go there. It was never a bar or an area of "ill-repute". (I'm afraid I'm coming across as a "goody-goody two-shoes". To some this is true. To myself it was merely a matter of searching out things of interest that I would probably never have a chance to do except gratis Uncle Sam. A good time is measured in different ways and my way suited me best. In fact some of those locations included places where it was foolish to go alone. Yes, I've done some dumb things in my life. Loners often do, and I'm certainly not proud of it. At the time it seemed alright; on retrospect it was probably foolish for sure.

The Sun: the sun, the source of most of the earth's heat, is a sphere of hot gases 93 million miles away. This gigantic atomic furnace bombards the earth with 126 trillion horsepower every SECOND. Yet this vast energy is but a half of one billionth of the sun's total output. Most of the solar energy is lost to outer space. The sun's energy is transmitted as electromagnetic waves (radio waves are electromagnetic waves). We learned that only a very small fraction of electromagnetic waves are visible(our eyes respond to only this small part of the electromagnetic spectrum). So, these waves turn into heat when absorbed by material such as soil or skin. About 43% of the radiation reaching the earth's surface is changed to heat (much of the radiation is absorbed by the atmosphere or is reflected back away from the earth). It males one salivate to think of all that energy reaching us every day yet almost completely untapped; (but " no politics in these pages" —— or religion). While it's true that only 25% of the sun's energy reaches the earth on an overcast day, 25% of a lot is a lot. Snow absorbs 25 % of radiation; grassy field 80% to 80%; dense forest 95%, water 60% to 95% depending on the angle, dry sand 75% and plowed field 75% to 95%. These different levels of absorptions are what make the weather engine function.



RICKSHAW

I missed this also. But it would have been a good way to have toured the city. Somehow "city" and "rickshaw" don't seem to go together and yet back then there was no disconnect. The locales treated the Gis very well wherever they were overseas for the most part. (The term "GI" was the moniker pinned on all the servicemen during WWII. It was short for "Government Issue" in that he was issued this uniform, that rifle, this jeep, etc. This rickshaw certainly is not an example of the GI "lording it over" the poor locales. To the contrary, the locales sought out the GIs in their efforts to "cash in" on all the money they thought every uniform represented. The fact was that the GIs didn't have all that much money although relatively speaking they did (or so the locales thought). This brings up an interesting concept: we tend to measure everything against our own situation. Every one is either well off or not well off based on our standard of living. If some people are living in conditions less than our own they are automatically unhappy when if the truth be known they may well be very happy with their lot and consider themselves to be the ones well off (without crime or congestion or living by the clock, etc.). They have their families, their friends (who are friends), their familiar surroundings (their home) and they sympathize with our plight. Being "poor" usually is a relative term (starvation is not relative; a small room is). Be careful here.

Weather: the earth's atmosphere resembles a greenhouse that lets the sun's short-wave energy in and retains that energy that has been converted to long-waves when the vegetation absorbs the sun's short- wave energy re-radiating it as heat energy. Let's restate that: the glass of a greenhouse lets the short- wave solar radiation pass through. These rays are absorbed by objects inside the greenhouse and are re-radiated as long-wave heat. But the long heat waves cannot pass through the glass of the greenhouse. The heat rays (waves) are continually reabsorbed and re-radiated inside the greenhouse. However some heat is lost through the glass by conduction. As a greenhouse the earth's atmosphere allows energy in but traps most of the ensuing heat that is generated by the objects on the earth. Without this blanket of atmosphere we would all reach the temperature of outer space. There is some heat loss just as glass loses some heat by conduction . Recall that there are three ways of heat transport: conduction, convection and radiation. But this is a matter to be considered by the theory of thermodynamics, an important subset of physics. Here, only remember that the atmosphere acts essentially as does glass: short- wave radiation in, long- wave hear reflected with some loss by conduction.


NATIONAL ARCHIVES

COMMERCIAL ENTERPRISE

These Chinese merchants were a curiosity to us while we were a market to them. By means of ropes the transactions would be completed (money going down, product coming up). Someone wasn't keen about this arrangement and so the Master-at-Arms (the policemen) would train a high-powered steam of water at the boats. When I made some disparaging remarks about this a master-at-arms told me to follow him to the master-at-arms shack (compartment) whereupon he took me to task for speaking out as I did. After a little one-on-one dialog in which I thought they could have sprayed to one side to warn and persuade the boats to leave, he let me leave (now they call those hoses "water-cannons" because they're so powerful). What bothered me was that these "merchants" were invariably little old men or women. Here they were making a honest effort to make a legitimate transaction and in return they get swatted down by this huge artifice towering over them. I know, "life isn't fair", but here , with a hose? Since there was no airfield at Tsingtao our aircraft stayed on board. You'll notice several of the sailors are in undress blues and not work clothes. It was up to the Division Head as to which you'd wear when in port. When I was in the Navigation Division it was undress blues but when in the V1F Division (Airdales) it was work clothes (dungarees, not blue jeans). Tsingtao is at the 36th parallel and so could be cold as indicated by those officers on the Flag (Admiral's) Bridge one deck below the Navigation/Pilot House. The white strip on the shoulder represents Seaman First Class, and "striking" to gain a rating (such as Radioman Third Class up to First Class. The next steps are various grades of Chief Petty Officer, they who seemed to run the Navy).

Weather: the atmosphere controls the earth's temperature in an automatic manner (if not we'd all be in trouble). It protects the earth from too much radiation from the sun during the day and it retains much of the day's heat at night. It also screens out dangerous radiation from the sun. It's a moderator of temperature. By contrast the moon's daylight temperature is 212 degrees and post nighttime temperature reaches 240 degrees below zero. A cloudy nighttime sky will retain more of the day's heat than a clear shy. The air receives most of its heat by its contact with the earth and is less dense and so rises, to be replaced by the cooler dense descending air. In turn this cooler air is heated and rises thus setting in motion a semi-constant circulation top to bottom, bottom to top. This motion of the air is called convection. This circulation of course is from the cold poles to the warm equator. Since the earth rotates the direction of motion is more complicated and will be considered later. All of the foregoing is straight-forward and required for coming discussions (easy but important material, this).

WEST MEETS EAST

This location at the fantail (stern) offers better “communication” for the transfer of goods and money. I never did find out what the “merchandise” was and still don’t know. I do know though that those boatmen were very persistent. Even the hoses would not initially deter them from their appointed task of making a sale. The boatmen knew only enough English to bargain over the price. How do you bargain over something you essentially don’t “see”? For the boatmen this was serious business while to the sailors it was a matter of curiosity and change of pace. This diversion was as good as any after having been at sea for at couple of months. I didn’t care to become involved because I could only feel sorry for these poor boatmen who led a life so different from mine. And yet to them this was probably a bonanza of which to take advantage. This then generated another feeling toward them: with so much enterprise and persistence how could you feel sorry for them? We all, all of us, should take note of those who have little (by our standards at least) but who nonetheless “take up arms” to redress the situation. My hat’s off to them and so I take leave of them with mixed emotions: sympathy and admiration. And Godspeed.

Weather: the differences in heating of the surface of the earth due to water or plowed fields or forests etc. are the sources of local winds. Convection currents are also affected by day and night conditions: breezes rise up a mountain during the day and down during the night. Winds blow from the land during the day and from the ocean during the night (the ocean and large bodies of water act as reservoirs of heat). Water in the atmosphere is responsible for humidity (naturally). The warmer the air the more water it can hold. Thus a useful measure is the relative humidity: 4.35 grams/cu. meter of water would represent 100% humidity at 32 degrees while at 86 degrees the same amount of water in the atmosphere would represent only 86% humidity (humidity is relative to the temperature). Remember, temperature is the amount of heat present. When air is cooled below its saturation point (4.85 grams/cubic meter at 32 degrees) the water vapor in the air condenses to form clouds. Your warm moist breathe forms a small cloud in cold weather. So, clouds form by cooling below its saturation point. Fog is a cloud on the ground. Clouds form in many ways and one of the most interesting ways is a column of warm air rising and forming the puffy cumulus clouds. Often one notices that right above an industrial vent huge billowing cloud form. These are the result of very warm vapors quickly rising and just as quickly forming these dramatic clouds. If one will but look up one will see a constantly changing show overhead, sometimes magnificent ones.

A GATHERING OF THE CLAN

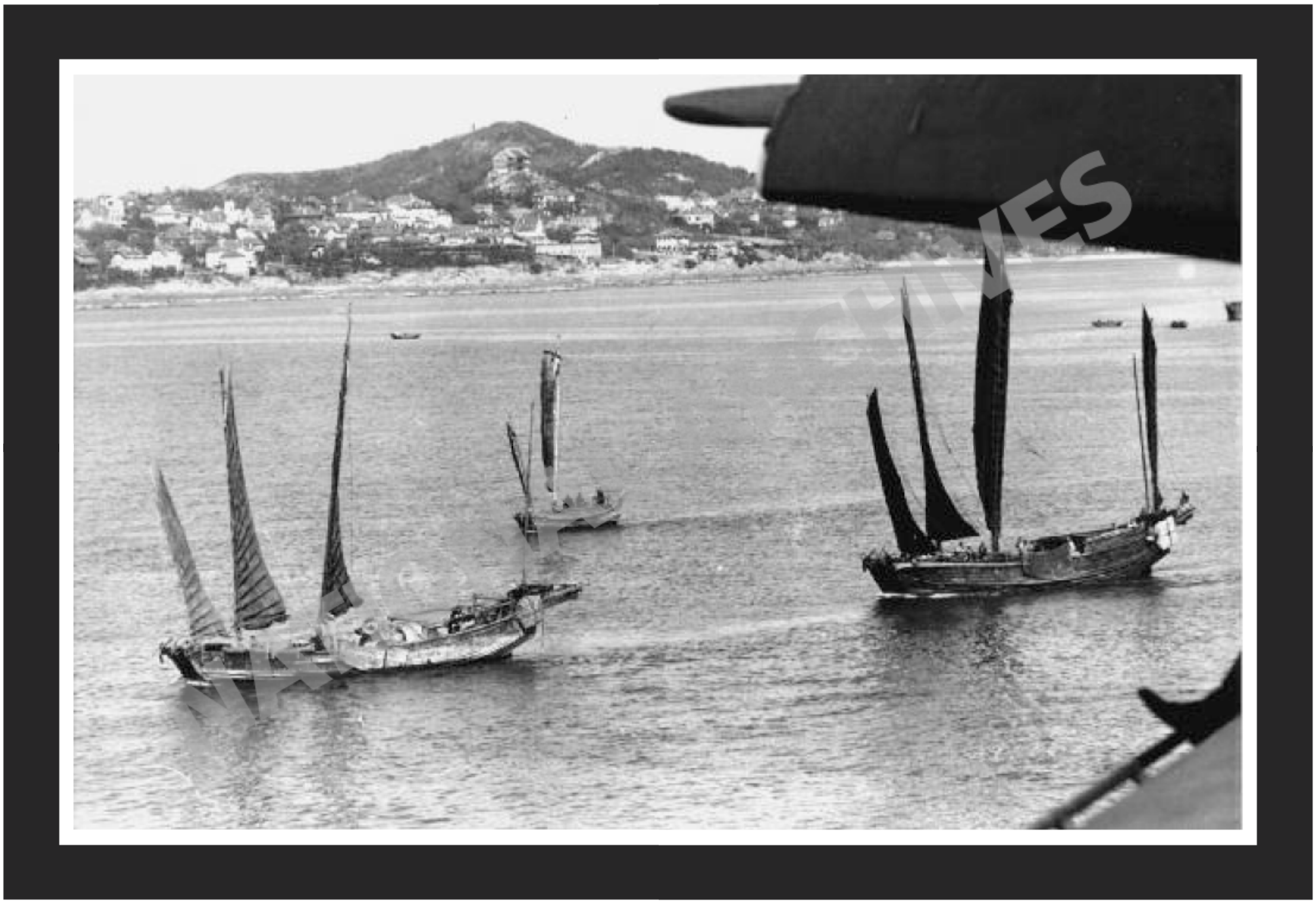
A whole clan of sampans gathers under the arching benevolence of a huge visitor. Can there be a more stark juxtaposition than here? Probably not, at least not in the real world (where we're so awash with so much fantasy "out there" gratis the movies, the TV, the Internet, the news (?) that we should rejoice (positive) reality when it's available). A liberty-boat pulls away from the landing-platform after depositing personnel to the ladder that leads to the quarterdeck where is stationed the OOD (Officer of the Day/Deck). Above this location, outboard the catwalk, are seen the "baskets" that hold the kapok- strung ropes that are available to personnel when the ship is sunk from under them. Beyond them are the life-rafts for the same purpose. Right above them is the flight deck with the tail-sections of the aircraft showing Outboard of everything we have a different view of the deckedge elevator with a sailor standing gingerly at its outside edge. Fear not, there can be seen the safety net at the edge of the elevator specifically there to prevent a fall. "Fear", an integral part of many military functions, including aircraft carriers. To a point this fear is good for those in such situations because it keeps one alert and aware which in turn increases their longevity. But fear artificially engendered is "the work of the Devil", or so it can be argued. If fear, real fear, is engendered for nefarious purposes by means of lies, then yes, I believe it is very close to that. The other side will argue, "What is nefarious?" And "What is a lie?" A charade's a lie. There are those who would like anxiety, and the attendant depression, to be pervasive. Resist this and remain positive. I've mentioned this subject before and am reluctant to do so again (plus chagrined to feel the need to do so again).

Weather: heat evaporates millions of tons of water into the air daily. Lakes, streams and oceans provide a steady supply of water vapor while an amazing amount of water transpires from the leaves of green plants. Tropical areas have a great deal more water vapor than desert areas. A single apple tree may move 1,800 gallons of water into the air in a six month growing period. As moist warm air rises it slowly cools. Finally it cools so much that its relative humidity reaches 100%. Clouds then form and under certain conditions rain or snow will fall. This continuous process of evaporation, condensation and precipitation is called the water-cycle. There are two basic types of clouds. The first type are those clouds formed by the water-cycle just described. This type of cloud is called "cumulus" which means piled up or puffy. The second type of clouds are those that form when a layer of air is cooled below its saturation point when no vertical motion is involved. These clouds are called "stratus" because they are sheet-like. Clouds are further classified by altitude: high, middle, low and towering.

LOOK US OVER

Be our guest. Look us over just as we look you over. The sampans have turned into much more elegant boats under the cantilever tail-section of one of the aircraft. Again, old meets new. While Tsingtao was a substantial and natural harbor it could not dock a ship of our size. Thus we anchored off shore a fairly good distance away from land. When we had liberty we rode a boat such as seen on the previous page. There were always boats of various sizes and descriptions close by "surveying" us. And providing us with an interesting diversion. What you see in this picture is not where we put ashore which was flat and to my recollection nondescript. The memory I have is not of Tsingtao but of Hong Kong which we visited twice. There too we anchored in the harbor very close to land because the body of water separating Hong Kong from Kowloon was only a quarter of a mile. The land rose vert steeply rising to 1800 feet The lower level was thick with office buildings and further up covered with various size houses. It provided a very attractive sight at night when all lit up from top to bottom. It was there that I bought a camphor that was intricately carved and smelled its distinctive aroma. I carried that box home with me to give specially to "my girl" (she accepted it with reluctance and I knew then that we would never be— but hey, she was already engaged, you dimwit!). Having been young, too young, hope sprang eternal. Not a bad thing, then.

Weather: not all kinds of clouds can produce precipitation. Temperature, the presence of tiny foreign particles or ice crystals all help determine if precipitation will occur and what form it will take. Foe example, snow will not form unless air is supersaturated (cooled below its saturation point or dew point without its water vapor condensing) and is considerably below the freezing point of water. Rain falls because the earth's gravity pulls it to earth. And yet all clouds are made of droplets or ice crystals. So why doesn't rain or snow fall continuously from all clouds? Since the droplets are so small gravity has no effect. The droplets are in constant motion in random fashion and direction. For comparison, dust particles are much larger than water droplets. On average, water droplets are only 1/2500inch in diameter. In fact, it would take 16 hours to fall a half mile in still air. In moving air it does not fall at all. Only when the droplet reaches 1/125 inch can it fall from a cloud. A water droplet contains only 1/1,000,000 th that of a raindrop. Only when enough water droplets combine does rain fall. This process of combining water droplets is called coalescence. This coalescence occurs in two ways. This will be discussed on the next page because it will require more than a couple of lines. Carry over the knowledge that water droplets are minuscule compared to a rain drop.



EAST MEETS WEST

We're still visiting in Tsingtao. Here are two parties who are inadvertently acculturating each the other. I'm far from an expert in these matters but my understanding was (is) that the East prefers, even desires, to haggle (bargain) over the cost of items while the West looks at the price-tag and either pays it or leaves. I've even heard it said that if one doesn't haggle (bargain) then that one is being dismissive (impolite to) of the other. I never became involved in such transactions: when the merchant said the camphor box cost such and such I paid it because I definitely wanted it. The same applied when I was in Kamakura, Japan to see the great bronze statue of Buddha (it was huge). A middle-aged Japanese man told us in broken English that he'd take our picture with the Buddha in the background. We said yes. The picture was taken and we paid him. Now the remarkable thing was that the next day it arrived at the Antietam. How it traveled from Kamakura to the Antietam in Tokyo Bay in one day was something . We trusted him and he didn't let us down. Bargaining is a distant cousin to arguing (your case or cause). To my way of thinking those who do so in a shrill and agitated manner are in effect implying that they in fact don't believe their case. Pleading and earnestness are not at all bad traits but a modulated tone and manner are more effective and convincing (though a modest earnestness is the best when the cause is just). [People should learn that "browbeating" is most usually counterproductive to a rational difference of opinion.]

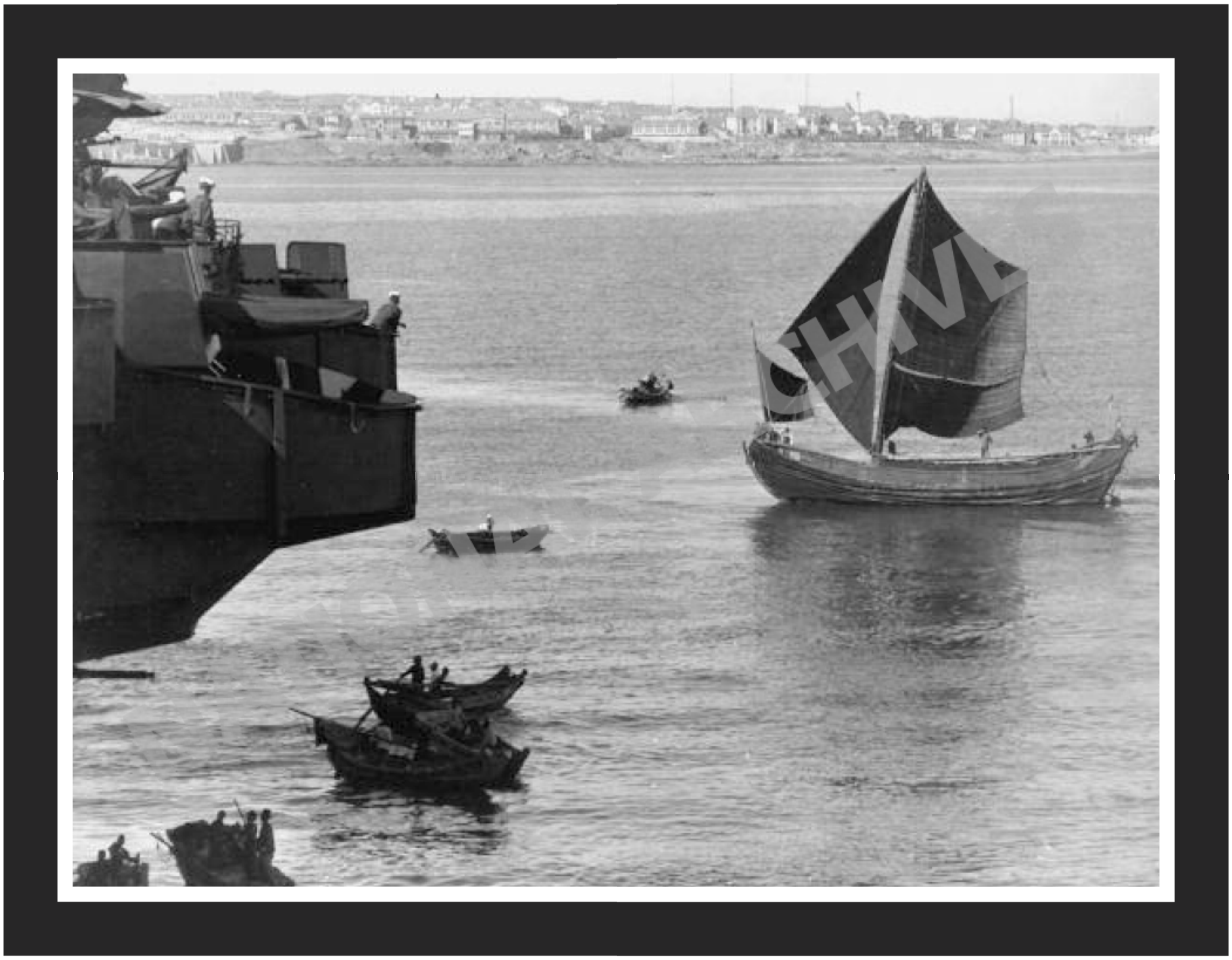
Weather: rain fills the lakes and rivers but a large amount becomes "ground water". (Snow of course is "water" where 10 inches of snow equals one inch of water.) Topsoil holds an immense amount of water. Some of this is transferred into the air by transpiring green plants. However most of it seeps through the soil and porous rock until it reaches impervious rock and clay. It forms a massive subterranean reservoir by filling all the cracks and pores below. There are even "rivers" down below and artesian wells feed from this water. Just as does surface water, it flows downhill and seeps out into streams and springs. Eventually this water evaporates or reaches the ocean. There was a time when hopes for "making rain" depended on spreading dry ice (frozen carbon dioxide) onto a cloud to provide the tiny nuclei on which water droplets could coalesce. The clouds had to be below 32 degrees. A piece of dry ice the size of a grain of rice produced a trillion ice particles. Each one would grow using the supercooled cloud droplets to form snow. The falling snow would turn unto rain at the warmer lower levels. Silver iodide was also used in place of dry ice. However the conditions must be just right for rain to occur and work is still taking place to find the technique required to produce what is now God-given rain.


MONEY
NATIONAL ARCHIVES

"BUCOLIC" TABLEAU

Again, the old meets the new, the East meets the West. The Chinese civilization dates from ages past while the American nation is figuratively speaking still in knee-pants. Does the wisdom of age trump the technology of the present. In this particular case it does not but now that the war is over does it still? Does the Land of Buddha with its age-old philosophy have something to teach us, we of our fast aircraft and mighty ships? Yes, of course it does. We are situated on the port side up forward looking back at a 40-mm gun quad and the 20-mm machine guns beyond it. Our ship, almost alone in the vast harbor, attracts a fleet of sampans as if we were a magnet. They continuously circle us seeking out interested buyers for their wares. There are not many if any takers and one feels sympathy for these water-borne vagabonds. Or am I taking that for granted? I don't know. But bucolic this is, a thankful respite after the frenetic activity of "a day in the life of an Airdale" when out to sea., day in, dat out.

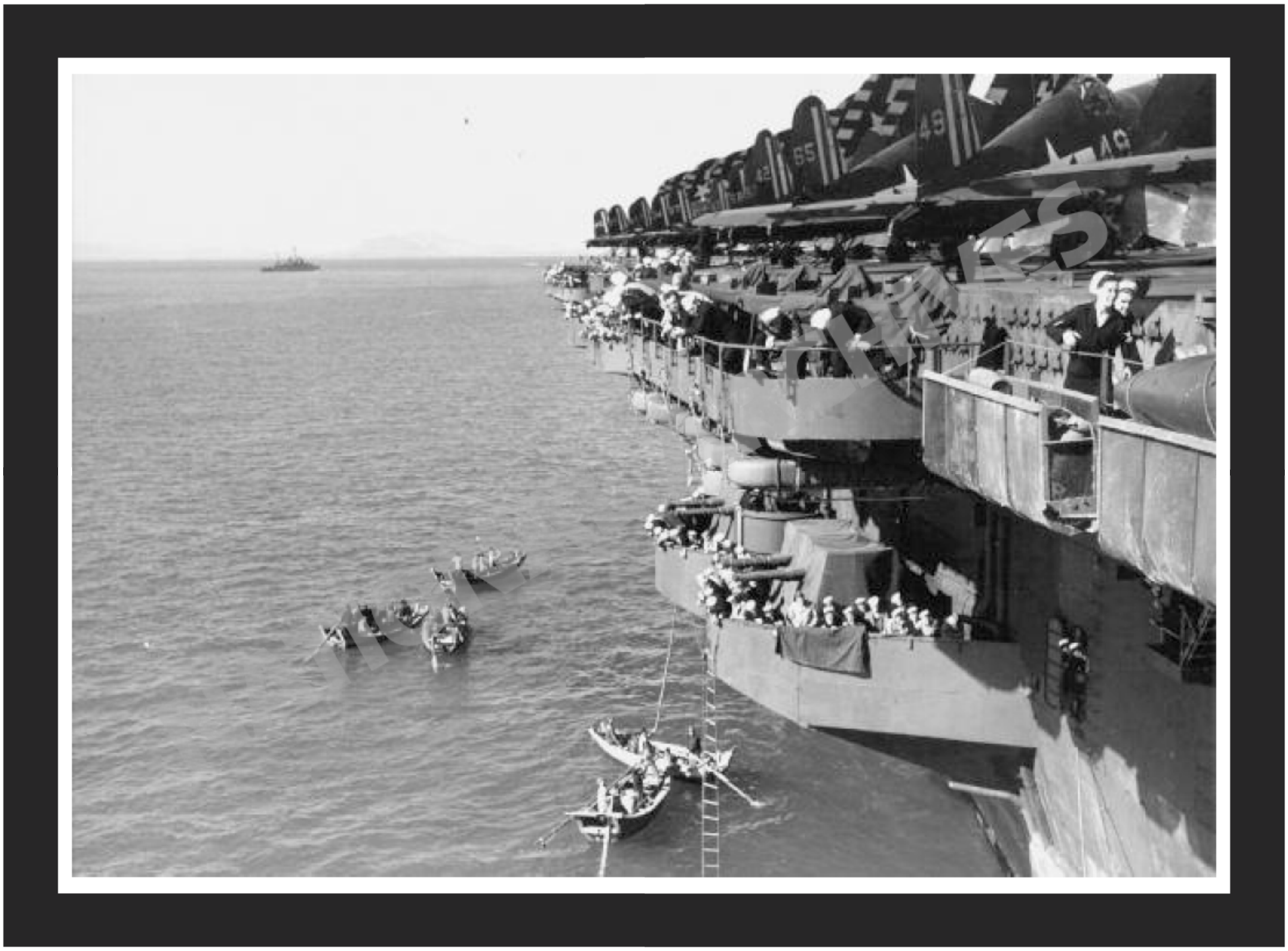
Weather: a full understanding of the weather requires knowledge of the atmosphere. We live at the bottom of a virtual ocean of air extending perhaps 1,000 miles. This massive, restless ocean is far different and far more tempestuous than the watery ocean that covers three quarters of the globe. A narrow band of compacted air about three miles deep lies above us from the surface of the earth. This is the region of continuous winds. Here the rising and falling air currents sometimes develop into violent storms. The ocean of air differs in one major way from the ocean of water: water is nearly incompressible while air is compressible. A cubic foot of water on the ocean bottom weighs much the same as a cubic foot at the surface (because water is essentially incompressible; however, the pressure increases with depth). Thus a cubic foot of air at the surface of the earth weighs billions of times as much as a cubic foot of air at the outer edge of the atmosphere. The atmosphere thins so rapidly as one leaves the earth that at only three and one-half miles up over half the atmosphere by weight would be below you. It is chiefly this three and one-half miles of atmosphere in which all of our weather occurs. The atmosphere 500 moles up is so thin that there are only 22 million molecules of air per cubic inch compared to billions upon billions at the earth's surface. Within the lower atmosphere warm air at the equator rises creating a zone of low pressure. This air moves towards the poles, losing energy and cooling thus becoming denser so to descend to the earth at 30 degrees latitude creating an area of high pressure. At the surface the air moves from the high pressure zone to the low pressure zone at the equator thus completing the cycle.



TSINGTAO FAREWELL

Four pages back it was the port side. Here it's the starboard side about sixty yards from the stern showing us the two covered 40-mm quad gun sponsons at the hanger deck level with twelve 20-mm machine guns right above the 40's and going all the way back to the stern. Potent stuff for a training ship (twelve 5-inch guns, eighteen 40-mm quads (4x18=72) and sixty 20-mm guns). Below the 20's are life-rafts and this side of the 20's are the baskets containing the roped kapok nets. Why the rope ladder ? I don't know. On deck is a row of Corsairs, the raison d'etre of an aircraft carrier. (We trained these squadrons even still when I left the ship in May 1946.) This picture was probably taken from the forward radio antenna tower that was lowered to its horizontal position. That would allow the photographer to crawl out to about 30 feet outboard the ship. And now it's time to take leave of Tsingtao after only two days. The stay was brief but the interlude was appreciated. We wish the sampan people well but we have duties to keep and places to seek. There was little time to tarry and learn something about this part of the world. While the garb of these sampan people was different and their appearance unlike ours they came across as being just as self-serving, in a good way, as us. Their enterprise, their exertions, were both sad because of their condition but yet admirable, even inspiring, at the same time. You wanted to encourage and support their efforts yet felt completely inadequate to do so. I thought they were brave. I thought they were worthy. I thought I was very lucky. Will the time ever come when we can say "we" instead of "us" and "them"? "We" and "they"?

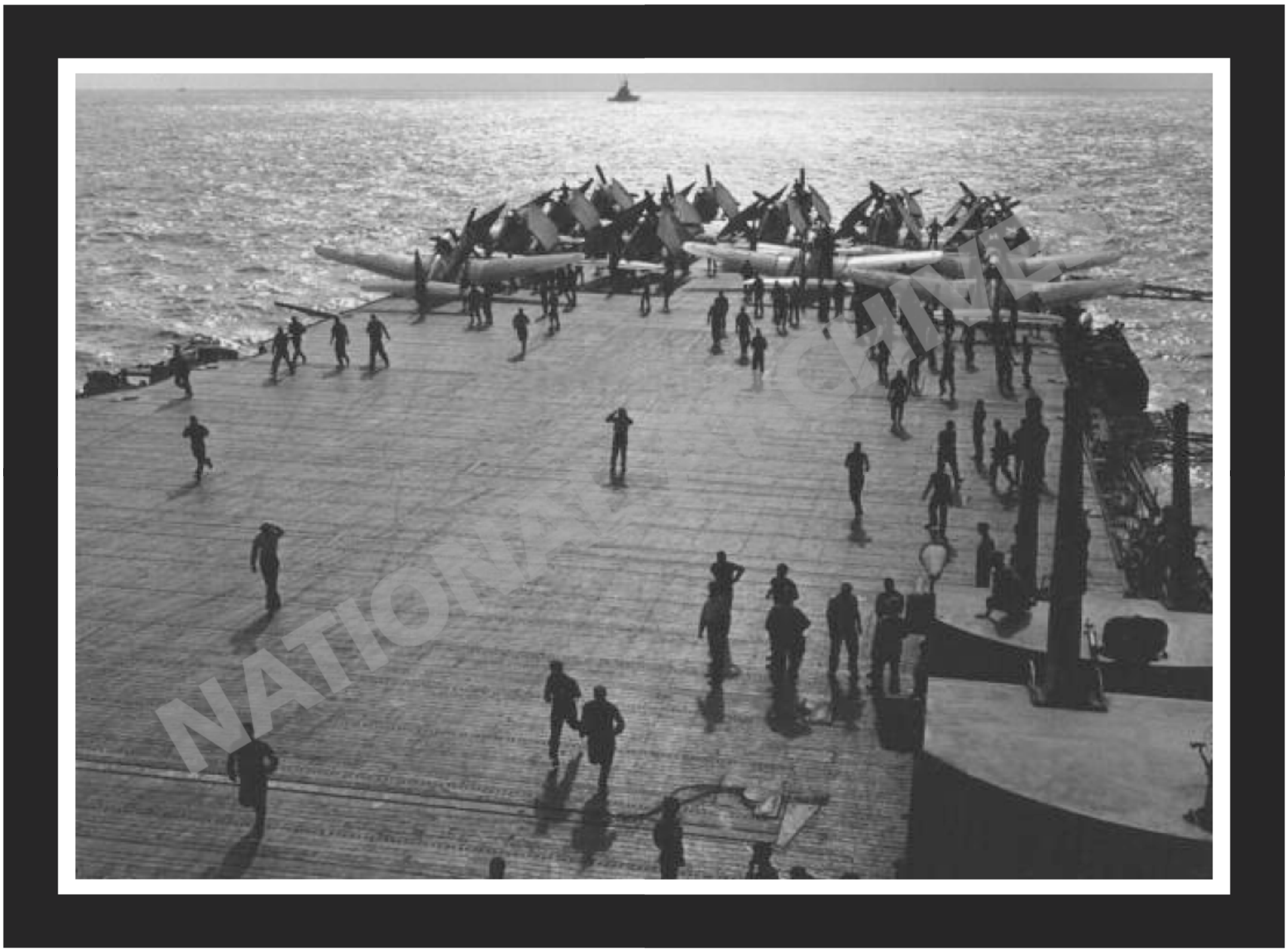
Weather: just as with an air conditioner when a gas expands it's a cooling process and when a gas is compressed it's a warming process. The cylinder of a tire-pump heats up as you pump it. The sudden release of air from a balloon is a cooling process. [An air conditioner works as follows: A compressor outside the house compresses a gas. The heat generated is blown away by a fan. The now compressed gas is in the form of a liquid which is pumped to a valve where sudden expansion takes place. The cooling effect is sent to the coils where another fan blows the air around the cooling coils into the hose distribution system.] To reiterate, air is warmed by the earth. It rises and is replaced by cooler air. These vertical currents create horizontal winds at or near the surface. Water, evaporated from the land and sea rises with the ascending warm air. As the air rises the surrounding pressure lessens so it steadily expands. Expansion is a cooling process. If the air rises high enough it cools until condensation occurs thus forming clouds. Clouds, being composed of water vapor, are candidates for the source of precipitation.



SEPARATION OF FUNCTIONS

Those who are walking/running back aft are the Airdales while those loitering up forward are for the most part the plane-captains. Actually I'm somewhat taken aback by all the personnel around and about. The Antietam was not so "flush" with so many people to my recollection. This might have been because I was so involved and immersed in what I was doing that I didn't notice that many others on deck. The Antietam of course did not have SBD Dauntless dive bombers, with fixed wings, on board as here. To be honest, it looks like a convention out there on the flight deck and not the lean efficient team of doers who made for a tightly run flight deck. What's prompting those two Airdales (bottom middle) to run is certainly not clear unless it was a barrier crash, or worse, back aft. As an example of what's important to one person is unimportant to another person, and visa versa, consider the following: Mist people would look at this picture up front and wonder what's going on. On the other hand I was immediately drawn to those two Hellcats furthest forward (on the deck) and to the right. There I further notice the distance between the two adjacent wings realizing that there is just a little more space available to an Airdale as he passes between the two spinning propellers. (Measure that space against that proverbial Airdale, astride with hands on hips. This is the normal packing-factor at launch-time. It's the Airdales' nemesis.) We all have different perspectives, we all see things differently, so give others a little slack in life.

Weather: the weather depends in large measure on the motions of the earth. It has four motions in space: it rotates on its axis once every 24 hours; it revolves around the sun once every 364 1/4 days; it travels with the rest of the solar system toward the star Vega; it rotates in space with the entire galaxy. Only the first two motions effect our weather. The first motion gives us the primary wind belts and the second motion gives us our seasons. This is due to the earth's axis being skewed to the plane of rotation by an angle of 23 ½ degrees. During the summer the northern hemisphere tilts toward the sun and during the winter the southern hemisphere tilts toward the sun. The sun reaches us from a shorter distance in the winter. However, for two reasons the sun's energy is more intense during the summer: striking the earth from directly overhead rather than at a slant angle as in winter the radiation has a shorter path through the atmosphere (losing less energy). Second, rays striking the earth at an angle forms an ellipse on the earth instead of the circle of the overhead summer sun. The ellipse covers more area and thus there is less energy per square area. Furthermore, the sun shines for a longer time during the summer than during the winter. Remember, it's the sun that is responsible for all of our weather plus the earth's motions.



A LITTLE THINLY SPACED

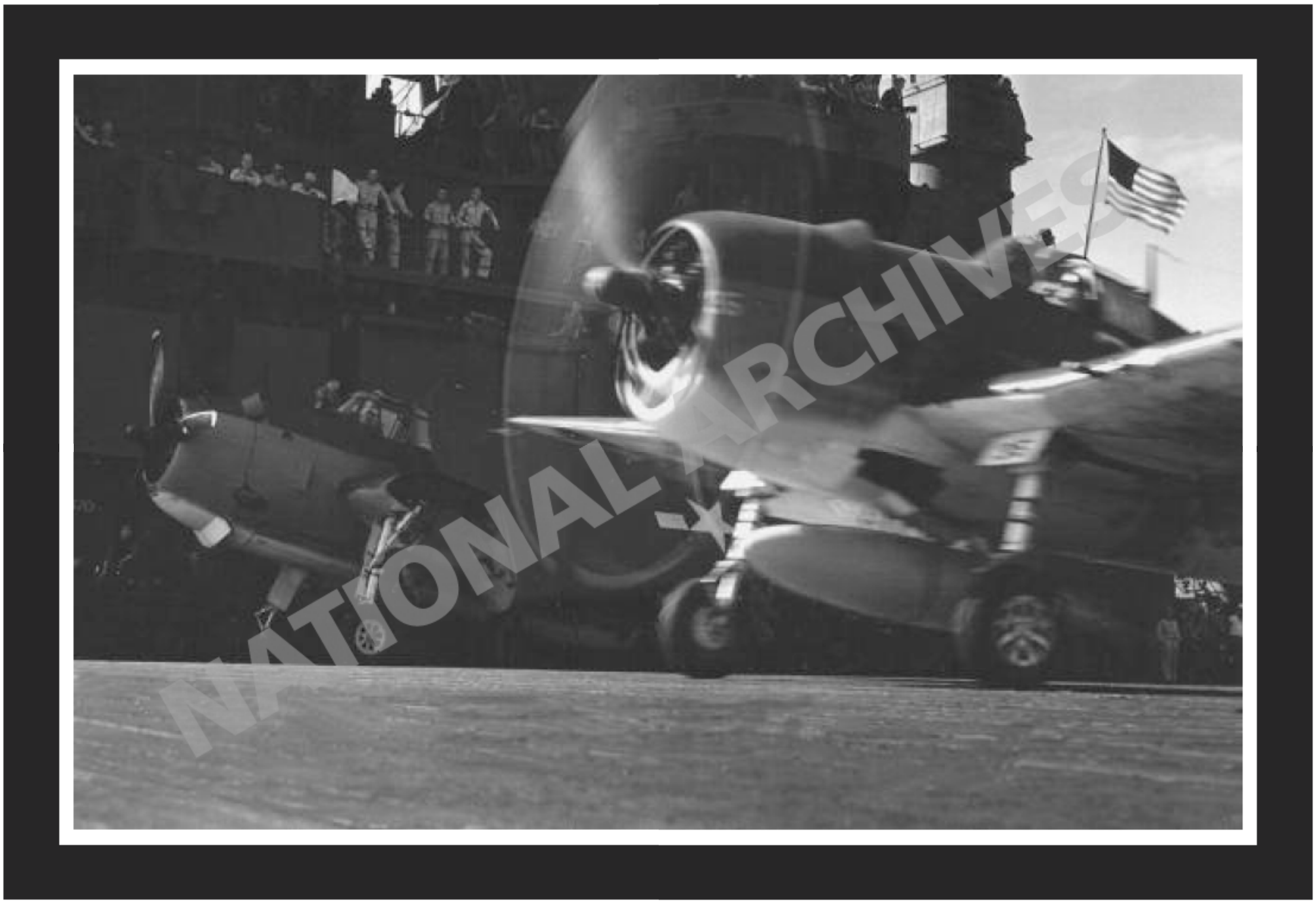
The flight deck is a little thinly spaced and oddly placed. Never did we have the Helldivers spotted in front of the Hellcats as here and almost never did we have such open "real estate" as here. (But first, this picture was taken from the derrick that will soon be removed.) The order to start engines has been given but only the closest pilots can here the order over the PA system. The others follow suit (respond) when those in front start their engines. That Helldiver to the right is having some trouble which requires a motor-generator to give it a start (next to its left wheel). At its right wheel the plane-captain waits dutifully. Why those plane-captains are loitering on the wing is not clear (but I suspect that it's merely a matter of those who "like to be seen"; you find them in every crowd and they're especially noticeable when contrasted with all the Airdales who are "laying low" beside a wheel reflecting the fact that this is a serious, even deadly, daily business, not a show). This picture portrays the heart "of a day in the life of an Airdale", the quintessential essence of what it is to be an Airdale. Yes, he has a simpleminded job to perform but also be assured that it was not a simple one. This picture, as are others, seem benign, deceptively so. Again, we are looking at a "Force-Field" made up of noise, wind and slashing blades all in close proximity. My words are grossly inadequate to impress the pervasive anxiety engender here under the "broken wings" of these powerful machines. I repeat, it is that triumvirate of wind and noise and blades that prevail over the frayed psyche of that lowly seaman called an Airdale (who will never trod this earth again).

Weather: a person standing at the North Pole is not moving at all while a person at the equator is moving at 1,000 mph (due to the rotation of the earth). If the earth did not rotate on its axis (constant day or night depending whether you were on the sun's side or not) the heated air at the equator would rise then move to either pole. There it would cool and descend forcing air to the equator. On a smooth surface this circulation of winds from poles to equator to poles would be at a constant speed. Since the earth rotates the speed of a point on the equator moves at 1,000 mph while a point at 45 degrees latitude (½ distance to the poles) moves at about 700 mph. The poles move at zero mph. These differences have a marked effect on the winds above the earth. If you looked down on the earth right over the North Pole as it was sinning (CCW) a bird flying a straight path to the equator would trace out a path on the surface which was curved CW (clockwise). General air movements in the Northern Hemisphere begin with air moving north high above the equator and slowly shifting toward the east because of the earth's rotation. This topic will be continued next page. The descriptions of weather must follow to maintain continuity.

A 2,000-HP POWER PACK

The color scheme of this Hellcat was standard for most all aircraft (although the Antietam;s aircraft were invariably a solid dark blue). The somewhat dark blue on the top of the aircraft was to cause it to blend in with the ocean when viewed from above while the white underbelly was meant to make it less visible when viewed from below (skies are often moisture-ladened and so are not the blue seen in picture postcards). The personnel seen up in the superstructure were said to be in "Vultures Row" appropriate for the landing operations. (Could they be any different than the spectators at a car-racing event, many of whom are there only to see the crashes?) Well, I'm a fine one to talk: before I was an Airdale I would spend a lot of time up in the superstructure watching the events below. Little did I know at the time that I'd soon be down there participating. This was actually good because when I was transferred to the Airdales I wasn't a complete novice about what transpired on the flight deck during air operations. Fortunate that was because when I did start my job on the flight deck I was given not a word of advice or guidance whatsoever. It was somewhat as if I was thrown in and I sank or swam. My days of observation were invaluable. (A word to the wise: keep alert to what's happening, you could well use that knowledge. It's called LEARNING. She her stand out in the wind, ever there, Old Glory. Do not dishonor her by desecrating the flag. Too many people have died in her name. Can we in good conscience do less?

Weather: to reiterate, general air movements in the Northern Hemisphere begin with air warmed at the equator rising and moving north high above the equator and slowly shifting to the east because of the earth's rotation. By the time this upper air has gone about 1/3 of the way from the equator to the North Pole it is moving eastward. As more air from the equator arcs north and east at about latitude 30 degrees it piles up forming an area of high pressure. Some of this air is forced down to the surface of the earth. There a portion of it flows southward turning west as it goes. This portion forms what is called the "trade winds" that blow rather steadily from the northeast. But some of the descending air moves northward and is deflected to the east. This air forms the prevailing westerlies which blow over the middle latitudes (30 to 60 degrees N). Not all of the high air sinks to the surface of latitude 30 degrees. Some of it continues to the north high above the earth. It cools by radiating heat as it goes and finally contracts becoming so heavy that it sinks down to the surface near the North Pole. The air pressure builds up in that region and the cold heavy air moves southward at the surface shifting towards the west as it goes.


NATIONAL ARCHIVES

SPREAD-EAGLE

A flight must have previously departed to allow this much room to spread out. The first Hellcat has just started its engine , the second one can't, the third one has barely started its engine, the fourth Hellcat (obscured) has started and the fifth one is inert. "PRI FLY, we have problems. Returning to the first Hellcat an Airdale at the left wheel is untying the tie-down rope (tardily I'd say) at the right wheel the Airdale is keeping his distance while the plane-captain observes what;s happening to "his" aircraft (You can always tell a plane-captain by the rag he always stuffs in his back pocket.) On the wing of the second Hellcat is another plane0captain relaying info from the pilot to the mechanic standing on the deck next to the wing. Also Airdale "3" is standing outboard as another Airdale by the right wheel is making his way under the engine to the left wheel. Aircraft three and four both have Airdales standing outboard the when they should be right next to the wheel. I believe I've covered all bases here and so will move on to the lesson for the dat.

Weather continued: at about latitude 60 degrees the cold heavy air runs into the prevailing westerlies traveling northeast. The line of collision is called the "polar front". The warm air from the south pushes up in a wedge over cold south-moving polar air. The rising warm air is rapidly cooled and unsettled weather conditions result. This polar front is the source of much of the changing weather in the United States. The air mass breaks through in cold waves that may go as far south as Florida. The earth's general circulation, its winds and weather are modified by many things such as winds caused by uneven local heating, differences in heat absorption by oceans and land, and seasonal changes. However some general conditions are worth noting such as what is happening in the southern hemisphere. // Highs and Lows: very basically high pressure areas occur where the cold air descends to the earth at 90 and 30 degrees latitude and circulate clockwise while lows pressure areas occur at zero and 60 degrees latitudes and circulate in a counter clockwise direction. There are many variables that enter into these statements but that is the very basic definition of "highs" and "lows". Highs give us fair weather, light winds and extended periods of either warm or cold. Lows on the other hand cause cloudy, rainy or snowy weather. A high can cover the U.S. east of the Rockies. Highs tend to form over the cool oceans instead of the warm land (remember, oceans act as reservoirs: they maintain a given temperature while land temperatures vary widely from season to season). Highs move NE between 30 and 60 degrees and SW between 60 and 90 degrees. The study of highs and lose is an important segment of understanding weather.


NATIONAL ARCHIV

THE "RITUAL" OF THE GIANTS

There they stand, vibrating with impatient energy, those mastodons of the flight deck. With upraised arm the launch officer twirls his hand as the Avenger revs its engine to the maximum. At the proper "shriek" of sound the officer will throw his arm downward to signal the green-shirt to push the button that causes the shuttle to accelerate down the deck as it pulls the Avenger to lift-off (the cable is wrapped around the shuttle and hooked to the underbelly of the Avenger; this is a veritable slingshot.) In the meantime to the left the yellow-shirt is holding the other Avenger also "straining at the leash". Not clearly seen is an Airdale at the left wheel, wheelchock on hand, as he dutifully accompanies the Avenger to the catapult (where is the Airdale at the right wheel?). A further anomaly is the complete absence of Airdales in the area to push the aircraft either forward or backward to the precise required position to accommodate the catapult cable (could be they were cleared out so as to take this picture (?)). To me these are gaping holes in what should be Standard Operating Procedure (SOP). Some things are right and proper (and others are not). To some the word "duty" is onerous, as if they are "put upon". Well, this old world couldn't function without such. Try the word "obligation". Is this word more amenable? No one likes a "freeloader". Come on, have some self-respect by doing your job, whatever it might be (such as LEARNING; but this should never be considered a job; it should be a JOY). Wake up to what's importance and beneficial to you.

Weather: air flows from a high pressure area (a high) to a low pressure area (a low). Since the earth rotates, in the Northern Hemisphere the flow of air goes not only downward but also spirals clockwise (CW). Weather maps show highs and lows as concentric irregular lines. The closer the lines are to each other the more rapidly the pressure changes. This in turn means that the winds are faster in those areas. Winds at 2,000 feet are affected by rotation only while those at and near the ground are affected by friction with the irregular terrain. Therefore winds aloft move more regularly and at a faster pace. To determine a rough estimate of where a high and a low are, follow this rule: Stand with your back to the wind. Now turn about 45 degrees to your right. Now your back is to the wind as it's blowing well above the ground. The high pressure center is to your right and the low pressure is to your left. This rule will not hold for local breezes due to locale heating differences. Since both highs and lows move generally in an easterly direction (Latitude45 degrees North) in the zone of prevailing westerlies any high or low to your west will likely move over you.


NATIONAL ARCHIVES

"THAT'A WAY"

One could suspect that this is a posed picture and that could well be. However it's also precisely how it's done by the yellow-shirts: this Hellcat has been unhooked and is being sent up forward to the parking area. Immediately after it clears the area the green-shirt raised the barriers, one of which can be seen to the left. Note that this Hellcat has just passed the deckedge elevator indicated by the net-railing on the other side of the Hellcat. Even this single aircraft makes an horrendous racket (noise) as it revs up to reach the parking area post haste (there is another aircraft just about to touch down on the deck at this moment). From all my comments throughout about the noise-level on the flight deck one would have the impression that I have a fetish about noise. Point well taken but it's honestly derived (this fetish). To this day I have ringing in my ears and the most likely the noise on the flight deck was the culprit. Mind you there are no complaints, only a rationalization for this "fetish". Recall that these aircraft are unmuzzled (there is no word for "unmuffled"). To me the noise made by the aircraft was a "big deal". It was lacerating to one's sensibilities. It felt as if one's mind was being rendered asunder. It had a visceral impact. Strong words, yes, but appropriate words to my thinking which at the time would become discombobulated (extremely discomposed). However , there wasn't a chance that I would have allowed any inkling of this. Absolutely none. [I'd like t to say that I won't mention this subject again, but I wont because it hurt, a lot.]

Weather: lows are formed by a horizontal wave-like action between two highs of different temperatures. The wave becomes larger and finally breaks like an ocean wave. The whirling air creates a low-pressure cell (more when air masses are discussed next). A local low may form when air under a cumulonimbus rain cloud is rapidly rising. This low pressure area is filled by surrounding air moving in and twisting CCW because of the earth's rotation. Such areas are about 20 miles in diameter. Hot air rises, expands and spreads outward higher up. Thus less air piles up in the area. Pressure drops and surrounding air rushes in at ground level with a swirling motion. // Air masses typically are a huge body of air often covering hundreds of thousands of square miles and in which the temperature and moisture at a given height is similar. An air mass takes on the characteristics of the surface over which it resides. The area of contact of a cold and warm air mass is called a "front". An air mass carries with it the temperature and humidity of the region from whence it came. At the same time an air mass is influenced by the conditions over which it moves but its original characteristics tend to predominate. There will be more to say about air masses because they determine for the most part our weather.


20

HOW NOW?

The pilot looks askance at the LSO (Landing Signal Officer). (Or is it incredulous?) The pilot, an Ensign or Lieutenant j.g. (Junior Grade) has the same question I have: is the LSO going to bring this Avenger on board? If he's going to do so it means that the ship is moving forward at a fast speed or the Avenger's air speed is marginally slow. In either case the Avenger's struts (landing gear) are going to be put to the test. Now it's true that the landing gear is an oleo strut (which use hydraulic oil to cushion the impact of a landing, it's also true that this very feature will possibly produce a hefty bounce upon contact with the flight deck. Thus, depending on what spot the Avenger touches down will determine if it will in turn jump the barriers and continue on into the parked/parking aircraft ahead (including the yellow-shirts, the green-shirts, the blue-shirts, the brown-shirts and even some red-shirts milling about. So yes, I agree with this pilot looking askance at the LSO. However, however, the LSO is a pilot himself with a great deal of experience so who are a newly minted pilot and an old blue-shirt to be quizzical? And yet, a healthy questioning is a good thing. One would be remiss to automatically accept everything presented to him. There are those, unfortunately, who seek to hoodwink others. But more importantly, how is one to learn effectively without an inquiring mind? This is more than curiosity, it's a basic aspect of the process of understanding what puzzles you. (There are those who enjoy working out (cross-word) puzzles, every day). Will you do less? No, not if you're interested in becoming proud of yourself. Self-assurance is not easy.

Weather: let's talk about fronts and frontal weather. Fronts form when air masses collide because air masses do not mix unless they are very similar in temperature and moisture content. What usually happens is that a boundary, or front, is formed where they touch. The colder air mass pushes under the warm air mass and lifts it. Then, if the boundary doesn't move, the front becomes stationary. More commonly it does move and one air mass pushes the other air mass along. If the cold air mass pushes the warm air mass back there is formed a cold front. If the cold air mass recedes with the warm air pushing over it, a warm front is created. In either case frontal weather is either unsettled or stormy. Fronts usually bring bad weather. When a low pressure air mass is seen from above, to the west of and adjacent to the high pressure air mass, the CCW of the low is in the same direction as the CW around the high. These winds are the harbinger of unsettled weather. When the lines on a weather map showing constant pressure are close together, there will be found strong winds and unstable conditions approaching. There are six primary facts about fronts and these will be enumerated on the next page.

“STAND BY”

As the “little boy” plane guard follows us and those 20-mm machine guns are being manned, this group of aircraft await the call to “start engines” which is in the offing: if one looks closely one will be able to detect that more than half of the aircraft have a plane-captain standing on the wing in communication with the pilot. What they talk about probably concerns the condition of the aircraft (although if it weren't in tip-top shape it wouldn't be there on flight deck in the mix of this operation. There seemed to be a genuine bound between the pilot and the brown-shirt. I wouldn't call it a friendship necessarily but rather a mutual respect for each other in a common cause: getting the aircraft to and from devoid of any mechanical problems. A brown-shirt takes pride in this while the pilot takes gratitude in it. As the Old Glory stand up in the breeze we think of country, honor, duty and commitment. Is not commitment related to the friendship of above? But what's friendship? There are as many definitions of friendship as there are people. Some say, rightly, that “a friend in need is a friend indeed”. Others might say that a friend is a source of dependable and genuine emotional support without a shred of fecklessness. A true friend cares. A true friend is an honest keeper of the ties that bind and is forthcoming when times are bleak (where truth is the correct presentation of the facts and honesty is correct presentation of one's thoughts and feelings). Is it any wonder that sincere friendships are hard to come by? Those lucky enough to have them should cherish them and be grateful. Amen to that! (Are you fully appreciative of the friends you have? Think about it.)

Weather: six facts about fronts follow: 1) fronts form at margins of high pressure cells. 2) Fronts form only between cells of different temperature. 3) Warm air always slopes upward over cold air. 4) A front is found along a low-pressure ridge so pressure drops as the front approaches and rises after it passes 5) Wind near the ground always shifts clockwise (CW) in the Northern Hemisphere as the front passes. 6) A front always upward over cold air either ahead of or to the rear of its direction if advance. We'll close out this section on weather by discussing cold fronts, warm fronts and occluded fronts. First though a description of what they look like on a weather map. Weather in the U.S. generally moves from SW to NE. Cold fronts move on average at 20 mph, warm fronts at 15 mph. Cold fronts are indicated by lines with peaks on the forward side of motion. Warm fronts are shown by a line with rounded bumps on the forward side and stationary fronts by a line with peaks on one side and bumps on the other side. Occluded fronts are lines with peaks and bumps both on the same side. Thus you can judge the kind of weather approaching by studying the weather map instead of the easy way on television; check their accuracy.

QUIET BEFORE THE STORM

The pilots file out of their ready-rooms from on the gallery deck just underneath the flight deck. There is no great rush to their aircraft as we have seen in the movies; just an orderly, sober but determined stride to their assigned aircraft that are being tended to by the plane-captains. The plane-captains are always there, standing on the wing awaiting the pilots so as to help the pilot strap himself in the cockpit as required by extreme maneuvering if and when they were in a "dogfight". (Back then it was, as is said today, a "mano a mano" contest with possible dire results; it was the next thing to the personal duels of yore). It's too early yet for the Airdales to attend to their posts but you can be sure that they're close at hand, probably next to the island (superstructure). This was the only time they had to "shoot the breeze" while on duty on the flight deck. Again, I envy all the vast open "real estate" that these Airdales had available to them. It's a sight to behold, relatively speaking. Mind you, I don't begrudge them this a single bit but still, it was a "present" we never enjoyed. That's life and not worth but a mere passing comment. As is evident in the news locally, nationally and world wide, there are real tragedies that pale ours.

Weather: cold fronts wedge their way under warm air as they advance. The typical thick wedge of a cold front develops as friction with the ground holds back the bottom of the advancing mass of cold air. So the cold air aloft tends to pile into a rounded prow as it advances against warm air. In the northern hemisphere major cold fronts lie in a NE to SW direction and move toward the east or southeast. As the general movement is east the cold air masses advance in that direction. Cold fronts (easterly edges of cold air masses) are almost always oriented NE to SW. Cold fronts usually advance at speeds of about 20 mph (faster in the winter than in the summer because winter air is colder) and exerts greater pressure. Although the sloping edge of the cold front may extend over several hundred miles horizontally the steepness of the advancing edge means that frontal weather is limited to an extremely narrow band. The steep sloping edge also produces abrupt lifting of warm air so that storms of a cold front are generally brief though violent. Slowly moving cold fronts differ from fast moving cold fronts in the following ways: if the warm overtaken air is stable nimbostratus clouds (combination of flat and puffy clouds) will form almost directly over the front's contact with the ground and rain will fall through the cold air mass after the front has passed. If the cold front is weak neither rain nor clouds may form. If unstable and very humid air is pushed over a slowly moving cold front cumulonimbus clouds ("thunderheads") will form and thundershowers may fall. (The next page will complete cold fronts and move on to warm fronts.)


65

THINGS ARE AFOOT

The pilot, pistol on hip and navigation board in hand, is carrying the camera that will be used by his gunner/radioman trailing behind as he carries his parachute (the plane-captain accompanies them). This trio walks, not runs, to their Helldiver among the others seen here. As part of their mission they take photographs of the results of their preceding bomb-run. The analysts back on board the ship will study there pictures to determine if another bomb-strike is necessary. This is an arcane activity trying to identify the damage done from pictures taken from afar. Nevertheless, what's the alternative? The more the naval air "softens up" the enemy the fewer casualties absorbed by the invading troops. A nasty business this. Back on the flight deck we note the plane-captain in touch with the pilot of Helldiver #23. (Note the pitot tube extending from the outer front edge of the left wing.) To the lower right can be seen a red-shirt wheeling a box of 20-mm ammunition to one of the aircraft (one of these guns can be seen just above and to the left of the numeral "23"). I've said it before and I'll say it again: I was (and am) impressed with the youthful age of the mechanics, the munitions people and the gunner/radiomen on the flight deck. True, they had a couple of years on us Airdales because of having attended trade schools. Nevertheless, their ages were not commensurate with the serious responsibility placed on their shoulders and it showed in their countenances: mistakes were not an option, just as they weren't for the Airdales.

Weather, continued: However the chief rainfall will be through the cold air mass after the front has passed. Typically a steady downpour nimbostratus clouds (flat rain clouds) at the lowest levels alternates with rain in sheets from cumulonibus clouds ("thunderheads") towering above. // Squall lines: they may precede fast moving cold fronts. They are an unbroken line of black, ominous clouds towering 40,000 feet or more into the sky, including thunderstorms of great intensity and occasional tornadoes. Such squall lines are extremely turbulent, sometimes more so than a typical hurricane. From the ground a squall line looks like a roiling, boiling black fog. Winds shift and sharpen suddenly with the approach of the squall line. Downward pouring rain may carry the cloud right to the ground in sharp , vertical bands. Torrential rains fall behind the leading edge of the squall line. Flash floods are common and dry ravens may become raging torrents within minutes as runoff water rushes through. Squall limes occur when winds above a cold front, moving in the same direction as the front's advance, prevent the lifting of the warm air mass. This is why little bad weather occurs right at the front's surface.


18
2
23

FLAPS DOWN

With flaps down, at this very moment this Hellcat's 2,000-hp engine is making an horrific noise as it strains to gain speed for a launch. It's moved about thirty feet from its starting point 400 feet from the front of the flight deck. The launch office makes a reflexive duck under the wing but that was unnecessary since the tip of the wing is about nine feet above the deck. On the other hand perhaps he's just presenting a lower profile to the wind so it wont knock him flat. The heads along the edge of the flight deck are those of spectators to the twice daily show (I didn't realize the catwalk was that low but then I didn't use the catwalk all that much). The Hellcat could carry 2,000-lbs. of bombs so that amounts to one horsepower per one pound of bombs. The mission of this Hellcat is not clear since it's not carrying bombs or the six 5.25-in rockets it's capable of doing. That brings up the thought that too often (not here) we do not do that which we're capable of doing. It's not a matter of shirking our responsibilities but rather not performing up to our capabilities. That brings to mind my father's saying to me, when I was about fourteen years old and we were walking home (from Union Congregational Church, being on Norwood Ave. about 50 yards from Inwood Ave. in Montclair, NJ), "You should do twice as much as anyone else". It didn't make any sense to me because in my mind I was after all no different from anyone else my age. He didn't explain and for my part I thought he was only trying to encourage me (a capital idea for every one).

Weather continued: one hundred to 150 moles ahead of the front the strong winds force the warm air up with almost explosive force, producing the squall line. The weather sequence within a strong cold front is usually the same. First one notices a sharpening of the winds from the south or southwest and the appearance of altocumulus clouds (high puffy clouds) darkening the horizon to the west or northwest, The barometer (pressure) begins to fall. As the front approaches, the clouds lower and cumulobimbus ("thunderheads") clouds begin to tower overhead. Rain spatters down then increases and the barometer falls even lower. With the actual passage of the front over the observer (you must observer and be observant), the wind the wind shifts rapidly to west or north, blowing in strong gusts. Squall-like rain continues and the barometer hits its lowest level. Passage of the front usually results in fairly rapid clearing but in most or mountainous regions cumulus (puffy) or stratocumulus (high puffy) may stay overhead for some time. The barometer rises rapidly; the temperature drops. Winds generally become steady from the west or northwest.

ADVANCE BY COLUMN

The sea's choppy, the wind's sharp, the air's cold and damp as the broad expanse of the flight deck, unstable and reaching fifty feet high, , provides no protection from the elements. Foul-weather gear is the order of the day what with the cold wind being so insistent and persistent. We never saw this configuration on the Antietam, this advance by column. Here is clearly seen the system of passing an aircraft forward as each one is controlled by a yellow-shirt. To the right is the launch officer with his trainee right behind him. To his left is the yellow-shirt who just "delivered" the first Hellcat and has turned to "take" the following Hellcat. So it goes down the line with each Hellcat being passed forward. To the left are two Airdales watching their "handiwork" unfold. It's quite evident that even discounting the orderliness that requires the yellow-shirts the pilots require the directions of the yellow-shirts because of complete lack of the pilot's visibility straight ahead (due to the slope of the fuselage).True, it's a case of an enlisted man "controlling" an officer but conditions absolutely require it. This is true in our lives as well. We all must take directions from others regardless of the age or status differential. If a policeman says "stop", you stop (if his order is unlawful he will be held accountable to the full force of the law). Our first response should be based on the supposition that the officer is acting responsibly. Most always this is so and we as a society can not in the first instance "second guess" a policeman. Orderliness requires it. First things first. Redress should necessarily follow (if called for). [This is important, this is vital], this is imperative.

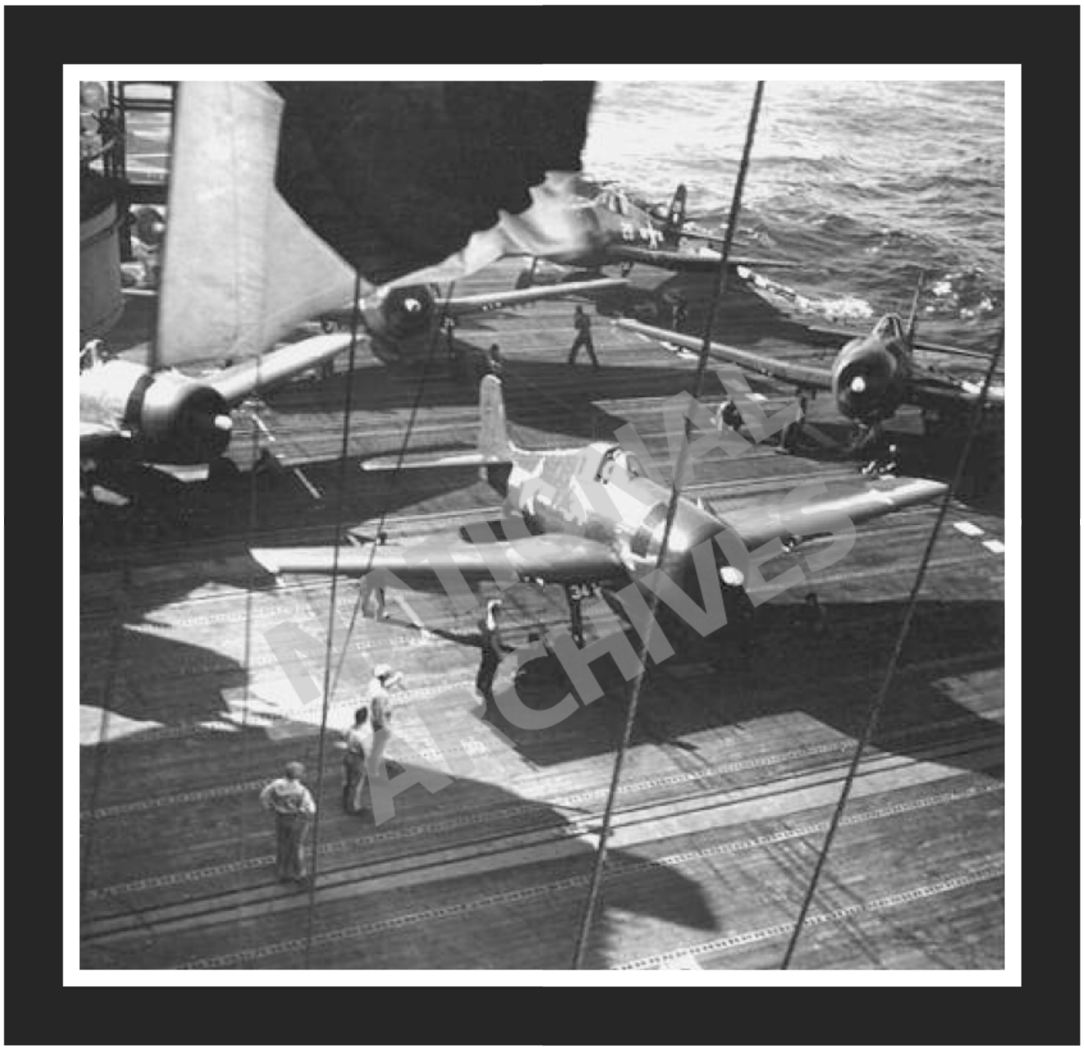
Weather continued: After passage of the cold front for a few days we experience the typical weather of a high, Then steadily increasing cloudiness usually indicates an approaching warm front. // Warm fronts are those in which warm air advances, replacing colder air. In the Northern Hemisphere warm fronts occur on the east side of low-pressure cells and are usually followed by cold fronts as the prevailing westerlies move the low eastward. The horizontal advance of warm fronts is usually at a pace of 15 mph or slower (about half the speed of cold fronts). The vertical slope between warm and cold air masses in a warm front is much less steep than in a cold front. The warm air moves gradually up the slope without the typical cold front bulge. Warm front weather extends over an area hundreds of miles in advance of the front line at ground level. Typical cloud sequences may be noted 1,000 miles in advance of the front and often 48 hours in advance of its arrival. The clouds and precipitation typical of a warm front develop along the contact zone of the warm and cold air above the ground.


37
37

FOX-FLAG HOISTED

From PRI FLY we look down on the deck as the Fox-Flag flutters in the breeze indicating that flight quarters has sounded ("whoee whoee whoeeeeee" sounds the boatswain's pipe who then intones over the flight deck PA system, "Now hear this. Now hear this. All hands man your flight quarter stations"). That call was made about ten minutes ago when a short time later the Air Officer, from this spot, in turn intoned in rapid succession, "Stand clear of propellers. Prepare to start engines. Start engines". The engines have been warming up for some minutes and after about ten minutes of having done so the action will begin. (All personnel in khaki are officers and those in dungarees are enlisted.) Looking closely you notice Airdales at the wheels of the aircraft. One unusual situation can be detected at the left wheel of that Hellcat directly facing us. There the Airdale has positioned himself right next to the auxiliary fuel tank and the Hellcat's left wheel. Why he has done this is peculiar. But as is said, "different strokes for different folks". We all have our idiosyncracies, each and everyone of us. Therefore is it fair to "flog" others because of theirs? Of course not. We've become so accustomed to our own foibles that we don't notice them. As long as it's not against the law who's to judge? At the very least these "peculiarities" are what give people their unique personality and provide an interesting milieu (environment). So "buzz off" all but the most egregious idiosyncracies. (But what's egregious? It's similar to "beauty is in the eye of the beholder".)

Weather continued: stable warm air, lifted over cold air as a warm front advances, produces stratus-type clouds because the uplift of air is slow and little turbulence results in the stable air. As the air lifts it cools to produce stratus, nimbostratus, altostratus, cirrostratus and cirrus clouds in that order (stratus are low flat clouds and cirrus are high thin clouds). Precipitation is heavy at the beginning of the lift but decreases gradually leaving relatively dry cirrus clouds at 20,000 feet or higher. // Unstable warm air produces more violent weather. Turbulence is high and the unstable air sets up ascending air currents creating cumulonimbus clouds and thunderstorms ahead of the front line. The precipitation is therefore spotty, alternating between heavy downpour and slow drizzle. With thunderstorms interspersed. // Stationary fronts are those which move little or not at all. Conditions are much like those accompanying a warm front but are usually milder. Stationary fronts with rain may linger for days. Weak fronts often pass unnoticed, occurring when air masses are almost identical in humidity and temperature. Usually they are noticed only by a weak wind shift but may regenerate to strong fronts.



RESPOT

“Flt DK CHIEF” yellow-shirt he is but “chief” he is not. As has been said, “chiefs” are enlisted men. This is the flight deck officer himself in charge of everything that happens on the flight deck. He didn’t like the location of this Helldiver so he’s respotting it himself. Right above his head is the cowling that covers the gearing that changes the pitch of the propeller blades. It will be remembered that the blade is a curved replica of many airfoils (wings). That is, each cross-section of the blade is a miniature wing that has the characteristics of a wing. Recall that a wing provides lift by passing air over the top of wing faster than the air passes under the wing (because the upper part of the wing is curved upward while the underneath part of the wing is flat). Bernoulli postulated that the faster the air travels the less the pressure. Thus the faster air over the top of the wing has less pressure there and so the net pressure is upward (lift). The forward part of the blade is the “top of the wing”. Thus thrust (increased pressure or force) is forward (in direction of aircraft’s travel). As the gearing varies the angle of the blade (variable pitch propeller) that force is directed either forward or slightly upward. This upward direction provides more power for slow launching speeds and the forward direction provides more speed in the forward direction once the aircraft is freely flying. Thus the pilot sets the gears (pitch of the blade) for launch or free flight. Naturally his choice is easy. In life yours may mot be easy. It’s thus incumbent on you to think clearly so as to make the right choices. The pilot adjusted (chose). There are choices to make. Make yours intelligently.

Weather cont.: the warm weather sequence begins with displays of cirrus clouds which have been lifted farthest up the cold-air slope. These change into cirrostratus and become denser as the front advances. If cirrocumulus clouds (“mackerel sky”) appear the warm air overhead is unstable (check previous page for description of ensuing weather). If the warm air overhead is stable cirrus clouds are replaced by middle-height altostratus clouds (leaden sky). Unstable cirrocumulus clouds are also replaced by altostratus clouds. Rain or snow begins as the altostratus clouds become dense and continues until the front has passed. Stratocumulus, nimbostratus, stratus and in unstable air, cumulonimbus clouds finish the warm front sequence. However, rain falling through cold air adds to its moisture content producing lower stratus clouds. That often obscures the higher clouds. The sky clears as the warm front passes. Stationary fronts are much like warm fronts that don’t move but are milder. If rain is present it lasts several days. Weak fronts have similar temperatures and humidity. And are marked only by wind shifts. However they might well develop into string fronts. We’ll take a weather hiatus now.


20
FL DK
CHIEF
18

SOBER MOMENTS THESE

This picture definitely takes me out of my realm (so I'll need a little help here). On looking at this picture I'm reminded of my wondering why a pilot needed goggles. Well first of all, notice his harness (straps). These are to be buckled to the cockpit seat (as well as to attach his parachute to himself. Should he subsequently have to bail out (jump from a damaged non-airworthy aircraft) he would be subjected to a blast of air at maybe 200 mph. This would in turn require shutting his eyes for protection. This wouldn't be the best of conditions, and so the goggles. (Why the goggles aren't ripped off I don't know.) I'm out of my depth here and need some help. To obviate the possibility of being hit by the tail-section when ejecting I suppose the pilot puts the nose up and then pushes off from the aircraft. Again, I need some help. This clearly brings the subject of requiring the help of others. There are valid times when people need help in one way or another. The just passed hurricane (or tornado or earthquake or blizzard or whatever) requires aid and support. These are understood. What is not so clear but important is the reluctance of many to shrink from seeking help. This is most vividly represented by those who are afraid to ask for help in school. This is a fool's journey. Let it be known in no uncertain terms that it's the dumbbells who won't ask questions, even dumb ones. The smart ones and those who will become even smarter are the ones who ask questions and become intellectually engaged. You can "book on it", for sure. Besides probably most of the others where too afraid to ask the question you want to ask. I know whereof I speak. I was once young and afraid to ask questions for fear of appearing "dumb". I wish I wasn't such a "dumbhead" back then. Hindsight, great but late.

GPS (Global Positioning System): the GPS is a satellite system used to determine one's position anywhere on earth. Neither rain nor snow nor clouds can deter it from its assigned task of telling you where you are. It's both a marvelous device and now an essential device. It will track any vehicle anywhere for both safety and efficiency. It's accurate now to within 10 feet for commercial and private receivers (the military, which developed GPS, has more accurate receivers). If a car has an accident "in the middle of nowhere" it can be found. GPS will not only provide longitude and latitude but also height. It will give sailors on the "trackless" ocean precise position at all times (the previous method which used a sextant required a relatively calm sea and a cloudless night). A remarkable feature is the ability of certain programmed receivers to provide audio directions when making a trip by simply keying in the start and destination points. They will even warn you of an impending turn necessary to allow you to "stay on course". (Think of all the gasoline you'd save for those too proud to ask for directions.)


NATIONAL ARCHIVES

ANOTHER DAY ACCOMPLISHED

Yes, we made it through another day of sound and fury. However, this is not the Airdales' compartment which had four-tier bunks. Mine was one of the top bunks which meant I had to climb over three other bunks but never had an objection from the three below me. We had no springs, only canvas strung between the bunk-frame. With a thin mattress this was fine. During the day our compartments were off limits so this was hardly "home". The lockers were perfectly adequate for our meager belongings: 2 pair of dungarees and 2 work shirts, several scivvies (underwear) and t-shirts, shoes and flight deck shoes, a couple of white caps, blue dress cap (which no one wore), peacoat (jacket), socks (plain navy blue), whites, undress blues, dress blues, toilet articles and of course blue shirt, blue sweater, blue cloth cap, goggles and foul-weather jacket. In the confines of the compartment there wasn't much to do except play cards and "shoot the breeze" (talk). Since cards were a bore and the conversations were not to my liking (all about their exploits with the "fair sex"). No, my time after "chow" (supper) was to go to the small library or roam the hanger deck to watch the mechanics do their repairs on the aircraft (which I found to be intriguing) or most often to go topside to the lookouts' chairs at the after bridge. For some reason the topside, including the superstructure where I was, was almost always deserted (which was just the way I liked it because it was there that I could "agonize" about the distance "my girl" was putting between us). [There's probably a lot to be said for, a lot of truth in, the idea that we are as happy as we set our minds to be so. We can CHOSE to be happy and resist others' nay-saying. There will be those who mutter, "Easy for you to say". (No, it's not easy). Being unhappy rarely improves matters,. Be good to yourself, be positive about yourself and smile convincingly.]

GPS: this is a system of 24 satellites circling the earth in synchronous orbits (the satellites remain stationary over the earth and in so doing act as "stars"). These satellites transmit radio signals (at the speed of light (186,000 mph) to any and all receivers on earth. [The concept of GPS was introduced in 1960 by the U.S. military service.] The receivers on earth can be hand-held devices that detect the radio signals from the satellites and then calculate its position by triangulation. [To locate your position on a map draw a circle around a point of known location with a radius of known distance. Do the same with a second point on the map. Where the two circles intersect is your position on the map (which is read from the map's coordinate system. GPS does the same in three dimensions. Thus the satellites' positions are known and the distances are determined from the speed of light and a very precise atomic clock in each satellite (rate times time equals distance).] To be continued.

PRI FLY

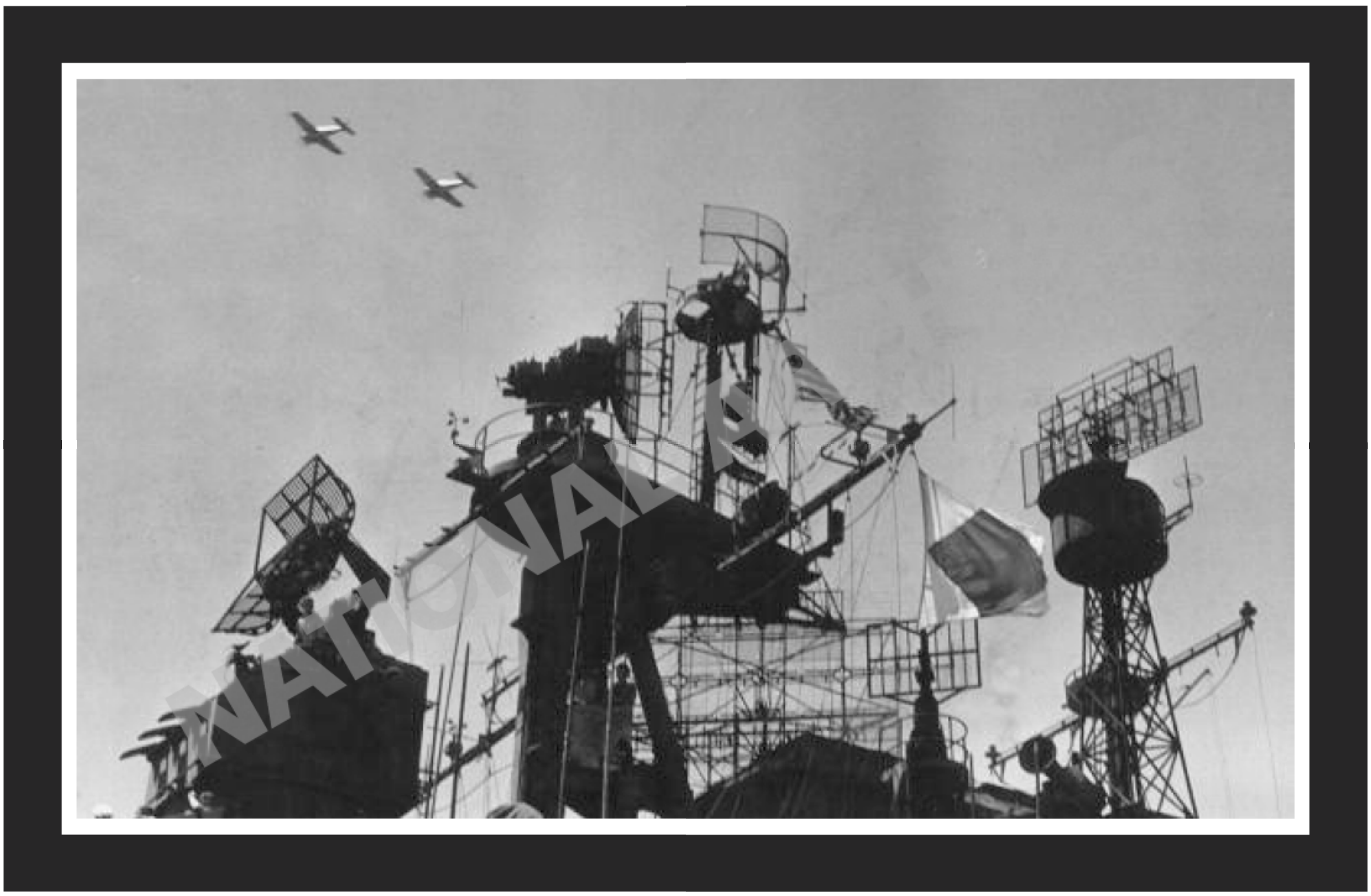
This is PRI FLY, that perch overlooking the flight deck and just aft of the bridge/pilothouse. It's from here that the Air Officer, a commander (ensign, lieutenant j.g., lieutenant, lieutenant commander, commander ("scrambled eggs" on his visor), captain and then several grades of admiral which doesn't concern us enlisted me) oversees the operations down below and if need be uses the "squawk box" (PA system) to make known his orders (he seldom did this though). Yet the flight deck was his domain, that "field of action" played out daily was the game of wheeling here, charging there, always with emphatic and insistent sounds of unbridled power. Down there everything was the same yet nothing was the same. Here apparently a squadron leader (lieutenant commander, see collar insignia) is describing a tactical maneuver made over the target. It could be the Air Officer listening intently (see collar insignia). While I was on the flight deck during air operations I was never conscious of anyone up in the superstructure. But I was definitely aware of the superstructure at all times. In fact in a strange way it was a source of reassurance there towering up high above. That's one of the reasons I put a picture of it on the cover of the first volume. It was a place of refuge, a bulwark of support, so I felt. Strange that such an inanimate object could do that. Without meaning to stretch this concept too far, it was similar to the feeling that one feels when in the presence of a magnificent cathedral. Far fetched, yes but nevertheless valid. At least it was to me then (and even now as witness the first volume). It's for this reason that I personally feel that the museum ships are but a shell of the original ship. I'll admit, its somewhat strange to be attached to a ship (what about you and your car?).

GPS: the GPS system is divided into three parts: space, ground control and ground receivers. The space segment consists of 24 satellites orbiting the earth in synchronism such that they are stationary over the earth. They are distributed so that every part of the earth is covered by four satellites, three of which send data giving distance from the receiver and one providing an accurate time (atomic clock). The satellites are orbiting at 20,200 mile up and are generating two signals (L2 at 1,227.6 MHz and L1 at 1,575.42 MHz). The speed of light (radio waves) and the precise time of transmission provide the distance the satellite is from the receiver. The ground station segment has stations in five places around the world. These stations provide any necessary adjustments to the functions of the satellites. GPS receivers are the third segment of the GPS system. There is no limit to the number of receivers in operation. Every one in the world could have one. The radio receivers will be discussed on the next page where some repetition will be discussed.

CAP ON HIGH, FOX UNFURLED

There are two of the CAP aircraft on high patrolling the skies for boggies as the Fox flag indicating flight quarters flutters in the breeze. On the Antietam the U.S. flag flew from Bat Two (Battle Station Two, the after pilothouse where I had my General Quarters station when I was in the Navigation Division. This was the con of the ship should the forward pilothouse be taken out by enemy action.). Most of the hardware seen in this picture are radar antennas. Prominent to the left is the Mk37 5-inch gun director with the Mk4 eire control antenna on top ("fire control" of course refers to the control of the firing from the 5-inch guns.; the biggest guns in the navy were the 16-inch guns carried by the battleships). All of the radar antennas seen here are of course rotatable as they searched for the enemy. The bigger antennas were surface search and the smaller ones were sky search. Also in the nix here were the communications antenna, all straight and vertical, some of which are small for high frequency transmission and reception. In the Navy when they communicate they "darn well better get it right". Do you? And if so, how do you do it? Do we talk to someone or do we talk at them? Do we make listening an equal partner of talking? Of babbling? Do we know how to express ourselves so that we're properly understood? Do we "overtalk" others because what we have to say "is more important than what they have to say"? Do we express ourselves clearly and do we use words correctly? Do we "measure" our thoughts and not "blow smoke"? Do we use appropriate words for given situations? Do we think before we utter and sputter a word, a sentence , a harangue? Do we communicate? "We damn well better get it right"! [Enthusiasm is fine, even recommended, but within the confines of the above. There are very sensible people who tend to dominate and thus lose their effectiveness. It's also clear that many people want to "get their two-cents worth in". So, be precise/of few words].

GPS: to reiterate, consider a straight line of a fixed length from a point above a globe (satellite) to a fixed point on the globe (you). Now rotate this line about the fixed point overhead (satellite). It will trace a circle on the globe below. With the circle going through the fixed point on the globe (you), do this two more times from two other fixed points above the globe (2 satellites). The common intersection of the three circles on the globe is your longitude and latitude on the globe (earth). The calculation of this point on the globe requires known distances from each point overhead (satellites) to your location. This is determined by knowing the time it takes for a radio signal to reach you from the satellite (using a VERY accurate atomic clock in each satellite). Since the speed of light (radio waves) is known, distance can be calculate (Rate times time equals distance———RxT=D).



"THE BRAIN-TRUST"

This is the CIC (Combat Information Center), comparable to what we now call Command and Control (or euphemistically, "The Brain-Trust"). The enlisted men to the left are in contact with the various radar rooms that display data as detected by the various search radars shown on the previous page, This data thus obtained is plotted onto this large plotting board to provide a view of the area out to 150 miles in the air and to the horizon 20 miles away. However, its prime purpose is the air space. After all, aircraft can go up to 250 mph cruising speed while the ships move at the "snails" pace of 30 mph maximum. When "boggies" (enemy aircraft) are detected in the radar plot rooms and displayed here, the air combat control officer must vector the CAP to intercept them. He and his staff must make the decisions that could protect or jeopardize the welfare of the ship. He has many variables to assess in real time (a neat application for a neural network discussed in earlier pages). At stake here is whether or not the ship will sustain serious damage from enemy bombers (perhaps dooming 3,000 men. (That happened to the Japanese, times four, at the Battle of Midway on June 4-5, 1942.) As I understand it, it was a "simple" lieutenant who was in charge of making these command and control decisions (to me, that's definitely young for such a responsibility). So how about you, are you up to the responsibility to make "command and control decisions" concerning your life? Your effectiveness? Your efforts? Your study habits? Your demeanor? Your attitude? Your desire to improve yourself ? (Your temper?). Your will to do well? Your work-ethic? Are you strong enough too even look at these things? For your sake, for the sake of all of us, I certainly hope so.

GPS: while the satellites are in synchronous orbit, it is not the position of the satellites but rather the distance that is used to calculate the receiver's position. The ionosphere also plays a part: the satellites' signals must go through the ionosphere at 93 to 560 miles high. Doing so slows down thee the signal a measurable amount and since time of travel of the signal is so crucial to the operation of the system compensation must be made (the receiver makes its calculations based on time not position). There are three ways to know how much the signal is slowed. 1) Only the military has this method. 2) Each receiver has a model of the varying ionosphere loaded into its memory. It uses this to make compensations to the time it takes for a signal to transit the ionosphere. 3) Differential GPS provides more accurate measurement of time by using two different measurements of time: one from the receiver and one from an earth station. GPS is an amazing technology and is constantly improving.

CASUALTY MANAGEMENT

This is an exercise in casualty management. The ladders (stairs) in the island superstructure are narrow and steep and so this is considered the most expeditious method of moving a casualty to the flight deck. (In truth, I believe a couple of husky sailors could manage this casualty down the ladder but who knows what the situation is here?) The catwalk shown here is directly over the signal bridge (left center) and leads to the bridge/PRI FLY to the left and BAT TWO to the right. Also seen are the "squawk boxes" (loudspeakers of flight deck PA system). Apparently we're in a frigid clime as witness the foul weather gear being worn by the flight deck crew. There were several of these "casualty baskets" located around the island for accidents on the flight deck but surely not enough should the ship take a direct bomb hit. The Navy undertook many practice sessions for various contingencies such as the one seen here. The Boy Scouts motto of "Be Prepared" is well taken and should be a part of not just organizations large and small but also of us all. Being prepared not only mitigates future possible diverse setbacks but it also requires that we practice whatever it is that we do. "Practice makes perfect" is not a cute saying, it's a foundation of our being responsible for our own future success. It's usually applied to athletics and sports but be assured that it equally refers to everything else. Sports are a good training ground for imprinting us with the will to learn how to play the piano, to learn mathematics, to learn civics, to learn the things that will make us solid and accomplished citizens (and what's a society if not saturated with solid citizens?) We must learn to be responsible for ourselves (as did our forefathers when this country was given birth. We can do no less.)

Engineering: the profession of engineering consists of molding the resources of nature into useful means of production that create our goods and support our services. The profession of engineering involves the use of money, materials, machines and energy all of which is managed to produce our standard of living. It's differentiated from science in that it uses the theoretical discoveries of science to work its will on the natural resources provided by nature. Engineering requires the creative imagination to develop and then fabricate our material wealth. We all are too prone to take this for granted. The engineer evolves by starting as a college graduate with a broad and rigor underpinning of the basic "first principles such as Newton's three Laws which are then developed into practical applications such as designing devices. In industry an engineer gravitates to a specialty such as "control engineer". Postgraduate study, followed by interdisciplinary work, leads to management responsibilities. Only those with a solid work ethic bolstered by the youthful efforts of PRACTICE will succeed.

“DISORDER ON DECK”

There were times when all seemed disorder on deck verging on a feeling of disquietude (marginal anxiety). Except for the plane-captain talking with “his” pilot, all else appears in disarray (especially that sailor apparently floating above the Helldiver’s cowling). Everyone seems to be going his own way which is not in “harmony” with anyone else. It’s not even clear whether this is the beginning or the end of a flight operation. Everything appears random in intent and doesn’t seem to have purpose. It’s a busy deck but what’s being accomplished? Yet who am I to look at a mere picture and make perhaps rash statements? For one thing, often things are in no way what they seem. For another what we see here probably is as well ordered as it should be. Do we have the same problem when things do not go the way we expect them to go? It would seem that the human condition almost craves orderliness (not neatness; that’s a whole different “ball of wax”). Orderliness would seem to be based on the premise of purposefulness. This is the crux. Do we have a (satisfactory) purpose in life? Naturally the meaning of purpose as taken here is what we envision for ourselves over the long term (and not “what ‘s my purpose for spending next weekend). Your purpose becomes your underlying guide for your activities and to which you hold yourself accountable (“accountable” , one of the golden words on our lexicon). Without the guide of a semi-specific purpose we go through life rudderless, careening off of bumps and boulders. This is no fun at all (and who doesn’t want to have fun?). [Our purpose should be clear: our life conducted to present that purpose of goo will to all.]

Engineering design: engineering is concerned with the creation of systems, devices and processes useful to and used by society. Engineering design begins the process of achieving these goals. This process can be characterized by a sequence of events that include concept, task specification and representation, solution specification, analysis, all of whose purpose is a specific goal or product which leads to the actual manufacture of the product. It all starts with defining the requirements to fulfill a need. The first obligation of the engineer is to develop more detailed quantitative data which defines the task, whether it be to build a car, a building, a radio, a bridge, whatever. Generation of ideas is the most creative part of the process. The concept derived is not a solution, only a guide for actual implementation. It is now that the job is broken up into segments each of which has its own design team (and teamwork, though perhaps overused, is definitely important and necessary). Engineering design can be considered a refining process where ideas are further and further honed to a final design. Groups of engineers throw ideas back and forth, eliminating poor solutions and augmenting good ones.


18
NATIONAL ARCHIVES

ORDER REGAINED

Just as the previous page seemed to imply disorder this picture tells a different story: even as the pilot is climbing out of the cockpit after having landed and parked the red-shirts (armament and fuel) are "working this Hellcat (pumping fuel and loading bombs). It seems that the brown-shirt plane-captain on the right is joined by a mechanic who has just received immediate word from the pilot concerning a problem of some kind. This scene's not only orderly but also normal: reprovision the aircraft immediately so as to be prepared to launch at a "moment's" notice. Furthermore, there are many other aircraft also requiring service. "Off the top of my head" I'd say that there were about 10 fuel-men and 20 armament-men. With 100 aircraft they were busy considering that they were to have finished "10 minutes ago". My recollection is that they did "their thing" with the dispatch required of them (and in a business-like manner). No, there was nothing lackadaisical about them nor for that matter anyone else on the flight deck. It was a sobering job to be working among those imposing aircraft. In a way it was easy to be so. What is called into question is wether without the imperative of those large machines dominating us does one have the gumption to do those things that one ought to do? Things such as being polite, being appreciative, being proactive, being inquisitive, being responsible, being accountable, being "you name it". Not to be left out is the will to be interested in the larger world around you and so having the will to LEARN.

Engineering design cont.: concepts are accompanied by evaluation, judgment and decision. It's this testing of ideas so generated against physical, economic, and practical reality that represents the bridge between the art of engineering innovation and science. The process of engineering analysis is sometimes intuitive and qualitative, sometimes mathematical, quantitative and precise. Production considerations have a profound effect on the development of products: the means of production often determine the course of development of a product (what machines are available or will be required to fabricate a product? What should be, and often is not, considered is the requirement to have easy access to the vital parts of the product to facilitate maintenance and/or repair (we all know of the frustration of fixing that device that must be largely disassembled first). Ease of assembly in the first instance is important. Automatic production using machine tools is an integral feature of any product development. Most often engineers from various disciplines are all involved at each step. These include but are not restricted to electrical chemical, mechanical, industrial, process, production and other engineers. Depending on the product one of them takes the lead in the design process. Yes, it's a team process for sure.


NATIONAL ARCHIVES

STAND CLEAR

Stand clear! One large Avenger charging up the deck after having landed. It has just been released from the arresting-wire cable and has accelerated to about 25 mph right now. Its wings will be folding momentarily so as to allow it to "wedge itself into one of the parking slots (they are not marked as in a car parking lot). I remember trying to keep up with an aircraft as it accelerated up the deck (but not at 25 mph!) I'd grab hold of the wheel-strut, wheelchock in hand, and in effect be dragged along hardly letting my feet touch the deck. I didn't do this if the trip was to be long (100 yards) but if the distance from inhooking to the parking area was moderate (50 yards) then yes I would do it Theoretically this process was standard but sometimes we honored it in the breech (such as here where there is a long way to the parking area). Good sense must supercede SOP (Standard Operating Procedure), at least when the spirit was willing but the flesh was weak. // The following aircraft will aim directly at the LSO as seen here and when it's about 200 yards from the ship it'll be lined up with the ship's forward motion (because the ship is moving at about 25 knots (by the look of the water devoid of whitecaps indicating only about a 10 knot wind). // Was it proper to disregard the SOP. Well if you couldn't physically fulfill the requirement there is no option but to let the aircraft come to you at the parking area. These are questions at the margin and if you act in good faith you are legitimately given "a free pass". I did the best I could and I fulfilled my obligation, one way or another. This I believe is all that can be asked of one who makes an honest try in a non-critical situation. Don't be afraid of giving it your best shot and failing. Failing to try is the demerit.

Systems Analysis: this is the application of mathematics to the study of systems. The basic idea of systems analysis is that a , mathematical model of a system is developed and then a mathematical analysis is performed on this model. The results of this analysis is then applied to the system under consideration. The more complicated the system the more difficult the generation of a mathematical model, naturally. In fact there are those systems that allow only the most general of models . This in turn requires other techniques such as actual physical models or the development of neural networks (a special type of computer program). Further expertise is required to interpret the results of the analysis. Computers are usually essential in this interpretation. The construction, analysis and interpretation may be done by the same group or by separate groups. The above implies that systems analysis is a subset of mathematics: applied mathematics. One difficulty in systems analysis is that the system involves people. To be continued (this is an important subject besides being extremely interesting).


NATIONAL ARCHIVES

A SILHOUETTE OF RESTRAINED POWER

A thing of beauty or a thing of fear? Beauty in a mechanistic way or fear in a destructive way? Pondering this picture in the repose of our easy-chair is far, far different than kneeling beside this repository of overwhelming power as it revs up to a unendurable assault on one's senses (generated by up to 2,800-hp during the last stages of the war). From "head to toe" this large machine vibrates with almost animate energy, straining to be set free. The blasts of wind are a force that treats you with utter disdain, almost as if this "animate" being is mocking your relative frailty. An inevitable anxiety is numbed by the inexorable repetition of this exercise day in, day out. The mental fatigue so generated drains one's physical energy surreptitiously, sometimes to the point of exhaustion even when the physical work done was of not much consideration. Those damnable propellers so prominent and so necessary to the pilot made an Airdale's life one of grinding apprehension that seemed interminable, without respite. They defined an Airdale's attitude while on deck, closely followed by the raging wind and the calamitous noise. There, that's what this picture elicits, and not pretty at that. Nevertheless, we all have our "demons" to one extent or another and except for our closest friends (hopefully we do have such friends) we should not have the prerogative of burdening others with our problems. This is not to tout the cult of "Pollyannaism" but rather to say that unless a complaint is substantial and substantiated we should "be strong" (understanding that there's a place for stoicism). [It should be clear by now that these pages essentially set up straw-men for the reader. I don't back off but I also don't mean to in any way impose. That would be foolish even if possible: : you're free thinkers.]

Systems Analysis: applied mathematics used here is different in that the systems considered often include people (who are not susceptible to mathematical representation except as statistics). There are difficulties in representing qualities involved in systems analysis. One is that there may be many variables that are difficult to encompass in mathematical formulas (enter here neural networks). Another is the inclusion of "soft" variables (number of employees is "hard", quality of management is "soft"; here include fuzzy logic). A desired system may have many objectives and they in turn may be conflicting one with the other. Thus it is not feasible to establish one criterion against which to measure performance. In place of" hard" mathematical equations the techniques of computer simulation comes to the fore. Nevertheless, these too present problems when trying to adequately represent a system. A particular advantage, among others, is the fact that simulations can be run in computer-time where days can be compressed to seconds. This is a relatively new and vast field of great interest.


NATIONAL
ARCHIVES

A NEAT TABLEAU

A neat tableau to enlarge and frame as it captures well the ambiance (the theme) of the final minutes of a launch almost completed. That there are Corsairs still on deck at this time is a puzzle but as has been said, puzzles abound in the theater of wartime activity. A Corsair to the right is making its launch run, to be followed by two Avengers. There are yet Corsairs and Avengers to be brought forward while it appears that the Corsair to the left is a possible scratch as the plane-captain stands on the wing at the pilot's beck and call. There are plenty of yellow-shirts down on the deck but the Airdales have already pulled the chocks and now are up forward next to the island superstructure. The deck looks hot in the midday sun but the wind generated by the aircraft remedy that. It was the nature of the yellow-shirts to remain on deck until the last aircraft was launched. In other words they stayed the course until the job was done which was their collective charter (responsibility). But collective or not we should all "stay the course" until our task is complete. To do otherwise would be to shirk our responsibilities which too often seem to be honored in the breech. As has been said before, "if a job is worth doing it's worth doing well". That includes staying with it to the end, successful or not. This is a mark of a good athlete: they don't give up until the final out, the last second has elapsed or the last ball has been hit (tennis). Sometimes it's hard but it is the cloth of which winners are made win or lose. [I like this picture because it provides a pleasing view both near and far.]

Simulation: simulation encompasses development and use of computer models for the study of actual or postulated dynamic systems (static systems are much less complicated and do not take advantage of a computer's computations over time and its handling of many variables). The basis of computer simulation is the use of models that represent the system under study. One of the advantages of a simulation is the capability to run "what if" scenarios. Thus one can input a desired set of values, run the simulation and immediately see the results. If they are unsatisfactory one can key in a new set of values and again run the simulation, and so on. Both actual and postulated systems are run on a computer because a model can be developed for either type. Thus hypotheses can be tested and retested indefinitely. Simple models can be postulated and if successful they can be refined and made more complicated, thus working up to a very sophisticated design. There is hardly a field of study that can not be simulated. This includes engineering applications as well as things such as business models, marketing models, medical and physiological systems, transportation systems, almost anything that varies with time (because computers run "against a clock". And without a doubt the technique will perform even mire "magic".

SWEET SUCCESS

It's sweet to see a successful touch down. The Hellcat is making what appears to be a picture-perfect, pristine landing, and how an Airdale relishes that (though true be known most of the landings were without incident even if not "right on". Bounces and barrier crashes may have spoiled the day for the pilot but no one was hurt. This is said when it is to be recalled that the pilots considered a landing on a smallish, moving, unstable platform a "controlled crash") Overhead is seen the CAP on patrol ready to vector to any intruding "boggies". There must be the possibility of such as witness the gunners at their stations wearing helmets (a "luxury" not afforded the "expendable (?) Airdales. Though not apparent, we're looking at two 40-mm gun quads and two dual 5-inch gun-mounts which are the last zone of defense if the "boggies" break through the CAP perimeter. What I have elucidated (discussed) here are the facts. However "in the course of human events" such as politics and hurricanes and such, too many people are too prone to form judgments based on "facts" that are no more than hearsay which leads to often to erroneous conclusions. Too often people speak and think thoughts colored, no, swathed in preconceived notions to arrive at outrageous statements which only serve to expose them as themselves being bigoted (instead of visa versa). It's not easy to "get the facts straight" or to substantiate "facts" as presented. Mist often we have no reliable way of verifying "facts" It is thus incumbent (necessary) that we understand a modicum of the "hard" sciences to diminish our being hoodwinked by charlatans (liars) who are motivated by a narrow agenda (and thus are again bigoted). LEARN to analyze the "facts". This is good citizenship. It's essential to good citizenship. As the computer scientists, and others, say, "Garbage in, garbage out". That's one law of science you'd do well to embrace. (This is a large subject and a few lines are woefully inadequate to examine this most important of subjects. It would seem best to step back and be more circumspect without losing criticality.)

Simulation: mathematical modeling can be valuable to, and often is the precursor to, computer simulation. However the subject to be modeled must be well understood to enable the rigorous use of mathematical modeling. Sometimes the functional relationships are developed without specifying precise mathematical relationships. This is the building-block approach for which analog computers are most useful (an analog computer makes use of continuous values while a digital computer deals only in digital data: either 1 or 0. This latter enables far greater accuracy than an analog computer). It's possible that this functional approach will enable the development of precise mathematical relationships.

"AU SECOUR!"

"Au Secour!" Help! One Avenger in the water. With those broad wings and semi-watertight fuselage there is no early wetting of the crew. The gunner fro the lower turret is able to climb out from above and somewhere along the fuselage is a hatch from whence an inflatable life-raft will be produced. This picture was probably taken from a plane-guard destroyer two of which trail the carrier during flight operations. This is not an emergency but it is one of those proverbial "bad days" that do occur during military operations. On looking more closely at this picture one can make the conjecture that since a plane-guard was in the area this represents a botched landing attempt. Looking at the wings we can notice that the flaps do not appear to be down, meaning that at a relatively slow landing speed the aid of increased lift from depressed flaps was not available. Further, the ailerons are set such that the Avenger was put into a right bank. This could have been an indication that the pilot over corrected for a too steep left bank as it was turning for a final adjustment in lining up with the flight deck. Hence the lack of flap-lift and overcompensation of the banking action combined to reduce lift to the point of a water-landing. Too bad, still all were saved to fly another day. It's a hard way to learn but that's why they had a training ship such as the Antietam. Practice, practice, practice. Learning involves practicing your multiplication tables, your composition skills, your memory recall. As has been said, "Rome wasn't built in a day". (Hey, our practice doesn't threaten our getting our feet wet in the Pacific Ocean so shape up and PRACTICE).

Simulation: the advantage of analog computers (speed due to parallel processing) has been overtaken by the now super fast digital computers which in most cases can process data in near real-time. There are machines which combine the parallel speed and ease of representation of the analog computer with the precision and memory capacity of the digital computer. This capability now makes possible simulations that were unavailable with either the analog or digital computer alone. Simulation is very effective if a solid mathematical model can be derived for a problem. An equation is a model and as such there are all gradations of complexity of computation based on primarily the number of variables in the equation. (A variable of course is anything that varies, from time to the location of a moving body (in physics). Not mentioned here is the power of simulation in the field of medicine and physiology. Models have been developed for everything including bodily functions such as physical disorders to mental disorders. There have even been simulations of business and manufacturing production lines. Computer simulation is ubiquitous and we are its mountainous beneficiaries whether we like them or not.

FULL HOUSE

Who could be blamed for saying, "Look at all those toys neatly lined up". (Some toy! Talk about perspective.) One has a good understanding that the moniker "flat top" was well taken. This concept of carrying aircraft anywhere desired on the high seas revolutionized naval warfare from WWI to WWII. When it was demonstrated shortly after WWI that a group of aircraft could sink a battleship it in effect marked the demise of the battleship and made every naval vessel the handmaiden of the carrier. A new "Queen" was coronated: "Long Live The Queen!" // I estimate that there are 55 Hellcats, 20 Corsairs and 20 Avengers populating the deck while our normal complement was 30 Hellcats, 30Corsairs, 20 Avengers and 20 Helldivers (different missions, different complements). There's no room for tractors here: an Airdale's work is "never done". This is an early carrier because it has no "clipper bow" (no pair of 40-mm quads on the bow). It does though have the pair of 5-inch guns and a 40-mm quad located at about 60 yards from the bow just below the catwalk (plus multiple 20-mm guns along the catwalk). Just as no aircraft stands out in that crowd on deck so too should we not seek to stand out in our crowd. If one's talents or ability cause one to stand out, that's all well and good because it's a natural progression of "cream rising to the top". However, to primarily seek that status, to bully one's way to that position, is repugnant in varying degrees. It's the goal accomplishment that's important, not the position or status. Modesty is a good, false modesty is not. Talent is good, "pushiness" is not. Those who require, who crave, adulation are poor souls indeed. And probably more important, they sap their energies from the important things such as improving themselves. It would be the height of stupidity, would it not, to think oneself is not improvable.

Operations Research: this methodology makes use of the techniques that allow decision-making conclusions when there are two or more alternative courses of action each of which may lead to an unknown result (this is not very pretty). Operations research can also be used to maximize the utility of limited resources. The objective here is to select the best alternative given the existing conditions. In operations research there may be a solution space with many feasible solutions. The idea here is to find the best solution from all the possible solutions as represented by the given parameters (conditions). To do so some measure of merit, some prescribed objective, must be established. Operations research has been profoundly aided by the advent of high speed digital computers making many intractable problems tractable. [I spent a fair amount of time trying to determine if the technology of neural networks, a form of computer programming along with fuzzy logic, would surpass op research capability.]

TO THE VERY EDGE

The pilot applies the left brake, guns the engine as it growls its response and so the Hellcat wheels hesitantly to the left as if feeling its way. Just as well because the edge of the flight deck is very near. The yellow-shirt will have to step back smartly as he reverses this maneuver to bring the left wheel alongside the edge of the flight deck not a foot away. The Hellcat will not topple into the sea below if the left wheel goes over the edge but if it does so it could easily rupture the auxiliary fuel tank, starting a fire of unknown severity. This is thus a serious situation, one for which both pilot and yellow-shirt are well aware. By the same token are we aware of the seriousness of our actions and their consequences? Most everything is consequential, carrying with it an accountability. The phrase "live life to the fullest" sounds good (and perhaps it is good) but also it can be insidious (beguiling). "Living near the edge" is almost never going to be good (and this pilot and yellow-shirt would agree). Many youth would do well to sequester themselves and with a well tuned ear listen to the song "Yesterday" (When We Were Young). It could be a lesson well learned. For my part I recall listening, as a boy, to my minister Dr. Vincent at the Union Congregational Church in Montclair , NJ. When he spoke from the pulpit his voice and tone and manner were the epitome of caring with a no-nonsense sincerity far removed from being patronizing or condescending. I found that reassuring. Somehow this brings haunting reminiscence of days gone by that resonate with the song "Vincent" (which has nothing to do with the person Dr. Vincent). The aloneness (not loneliness) was akin to a quiet desperation that was fundamentally and completely intractable. And yet life must go on even with but a faint hope of resolution. One way to look at it is to consider it a challenge, odious though it is. Why mope?

Operations Research: it was previously said that operations research was fundamentally involved with decision-making. Integral to this charter is the most important of concepts, namely cost-effectiveness or cost-benefit. That is, it's necessary to measure the cost of a project or undertaking against the benefit of accomplishing that project or undertaking. If the cost is too high vis-vis the results to be obtained, a new approach is sought. However, it's possible that the benefits are so great that the higher than desired costs are more, sometimes much more, than compensated. A very desirable outcome sometimes negates to no particular significance the costs involved in a project. When I worked for the Navy Department at the Naval Electronic Systems Command and the Naval Sea Systems Command this was strongly featured. I can't say that I or any one I knew used operations research in their work and perhaps that was a glaring omission. This subject will be continued further.


NATIONAL
ARCHIVES

OBSERVATIONS

Two observations can be made here. First, and most egregious, is the condition of the Hellcat #K1. Looking at Hellcat #19 clearly shows that its flaps are in the down position (inboard of its wing). Now observing the #K1 Hellcat shows its flaps are not down which will assure a botched launch (because it doesn't have the added lift provided by the flaps). On the other hand this Hellcat could be on its way to the catapult about 40 yards ahead where the pilot will be signaled to lower his flaps (and all will be well). The other observation is that the Hellcat on the deckedge elevator has his wings unfolded but the engine is mute. It's rote that an aircraft must have its engine energized to enable it to spread its wings. In any event the pilot will soon fire up its engine and be directed from the elevator to the flight line by one of those two yellow-shirts (Airdales are now unnecessary, here). Being observant allows us to unbundle cause-and-effect and thus come closer to the truth (a result that should be devoutly desired by all). True, sometimes the truth is not what we would want or like but it's far better over the long-run than basking in "ignorant bliss" because sooner or later (and usually sooner) the truth will be set free and you will have a jarring letdown that is to your detriment and not always so easily recouped. Better to deal with the truth "up front" than to have accumulated untruths that at some point will overwhelm you. In any event, being observant opens up a new and undiscovered world to you that will enrich your life in a mental, emotional and intellectual way. Observation opens a world otherwise unavailable to you and your satisfaction (usually).

Operations Research: there are six simply stated rules applied to this field: 1) Formulate the problem. 2) Construct a model of the system. 3) Select a solution technique. 4) Obtain a solution to the problem. 5) Establish controls over the system. 6) Implement the solution. The first item above is usually done in a relatively vague manner. It may include a cataloging of observable facts. The parameters of the problem must be stated (such as restricted dimensions of a box, etc.). As a rough guide to the formulation of the problem the following statement applies: Given the system description, the problem is to optimize the object function (the amount of a product, the size of a box, the cost of an item used to produce a product etc.) by choosing the decision variable(s) subject to a set of constraints and restrictions (cost of a product would be one of these including for instance the number of items used in producing a product, etc,). Mathematics is of course a prime tool to be used but also graphical techniques are probably just as useful and necessary. Analog models are also used to implement a solution.


22
19
19
NATIONAL ARCHIVES

"ALL HANDS FORWARD"

This Helldiver has just landed and is taxiing smartly up forward to the parking area, tail-gunner "in tow" (he also was called an Airdale but of a very different kind certainly). The Airdale of these books are seen running against a stiff wind up forward to the parking area to lend a hand if any of the aircraft need additional help nuzzling their way into the "excruciatingly" limited space available. The Airdales are running into probably a 40 mph wind (30 mph ambient plus residual wind of the parking aircraft which will increase exponentially as they come closer to the acute action that the pilots play by applying full rpm to the engines as against their off-then-on, on-then-off, pressure on the brakes; it's a "delicate game" they "play"). By rights that Airdale carrying two wheekchocks should be carrying only one as he grabs the Helldiver's wheel-strut. The Airdale to the left appears to be the "new boy on the block" because his dungarees are mint-new. He's following the others as he learns the ropes which is exactly what I did when I was transferred to the Airdales. The gunner in the Helldiver looks like the junior partner sitting back there and so he is. But lest you think he is not a very important member of the team consider an attack on the Helldiver from the rear. Now he's a crucial member of the team. Don't let anyone diminish you because you're the "junior member" of the team. Everyone is important in their own unique way and just because you're "in the back seat" it doesn't mean that you're not of real value. Be proud of yourself regardless your station in life.

Operations Research: the most distinctive aspect of operational research is the techniques of linear programming. This implies that the mathematical functions are all linear (vary in a linear manner, i.e., are straight lines on a standard plot (x and y-axes are arithmetic, not exponential or logarithmic or the like)). The largest area of operations research is found in business planning and industrial engineering. It has also found extensive uses in the sciences and social science. The purpose of linear programming, the basis of operational research, is to find the maximum or minimum of a multifaceted function represented by multiple linear equations. This involves the subjects of algebra and geometry and is visualized by imagining a convex polyhedron (a box with more than six sides in the general form) each of whose edges are represented by a linear equation. The idea here is to find that point on this box that represents a maximum or minimum. The good news is that digital computers do all the computations. This summary of operations research was not all that "comfortable" but life tends to be that way.

BATTLESHIP, PORT QUARTER

An Iowa-class battleship, perhaps the U.S.S. Missouri of peace-signing note, flanks us on our port quarter helping to frame this bucolic scene that obliquely puts one to mind the song, "Summertime (and the living's easy "). Certainly no urgency here as this appears almost "wickedly" indolent (lazy) in purposeful activity. But appearances deceive. Much work preceded this relatively idyllic tableau and purpose was served. In a fanciful way this picture presents a case of the black-shoe Navy (Ship) in synergy with the brown-shoe Navy (Air). While the former provides the protection of its AA guns the latter delivers the "blow" to the enemy (defense plus offense equals victory and hallowed peace and eventual return to normalcy). Thankfully the colic of a fired up flight deck is overtaken by the bucolic scene seen here. Without these periods of mental and emotional respite the body flags (droops) along with the spirit. It's a cumulative thing, something that cannot be measured. Machines, with the proper care and attention seem to go on indefinitely but not so the relatively frail body composed of nerves and sinew. Who can hear the spirit "break"? Who can calibrate the level of stress and strain? Who can truly understand another's heartbreak? Do we, do you and I have the understanding of "what it's like"? Probably not. Our concept of empathy is probably sorely underdeveloped and only the holy can realistically fathom the unfathomable. True empathy is probably the least well developed sense in our makeup and only the certifiably ignorant consider "empathy" and "effete" the same. [Compassion is emotional empathy. We all need some of it sometime, even the strong and stalwart. Even they cry,——-and why not? (when things don't require action).]

Hydrogen: is derived from the Greek word "hydro"+"gen", or "water generator". It is colorless, odorless and gaseous. It's a nonmetallic element, atomic number 1, and relative atomic mass 1.00787. It's the lightest of all elements and occurs on earth chiefly in combination with oxygen as water. Hydrogen is the most abundant element in the universe where it accounts for 93% of the total number of atoms and 73% of the total mass. It is a component of most stars, including the sun, whose heat and light are produced through the nuclear-fusion process that converts hydrogen into helium. One of hydrogen's industrial uses includes the hardening of oils and fats by hydrogenation. It's also used to generate the high temperatures required for wielding metals. There have been efforts to use it as fuel for automobiles. Water has been generated by the combustion of hydrogen. Hydrogen's isotopes deuterium and tritium (half-life 12.5 years) are used in nuclear weapons and deuterium nuclei is used in synthesizing elements. Hydrogen is highly reactive, requiring utmost care.


21
20

AVENGER AWAY

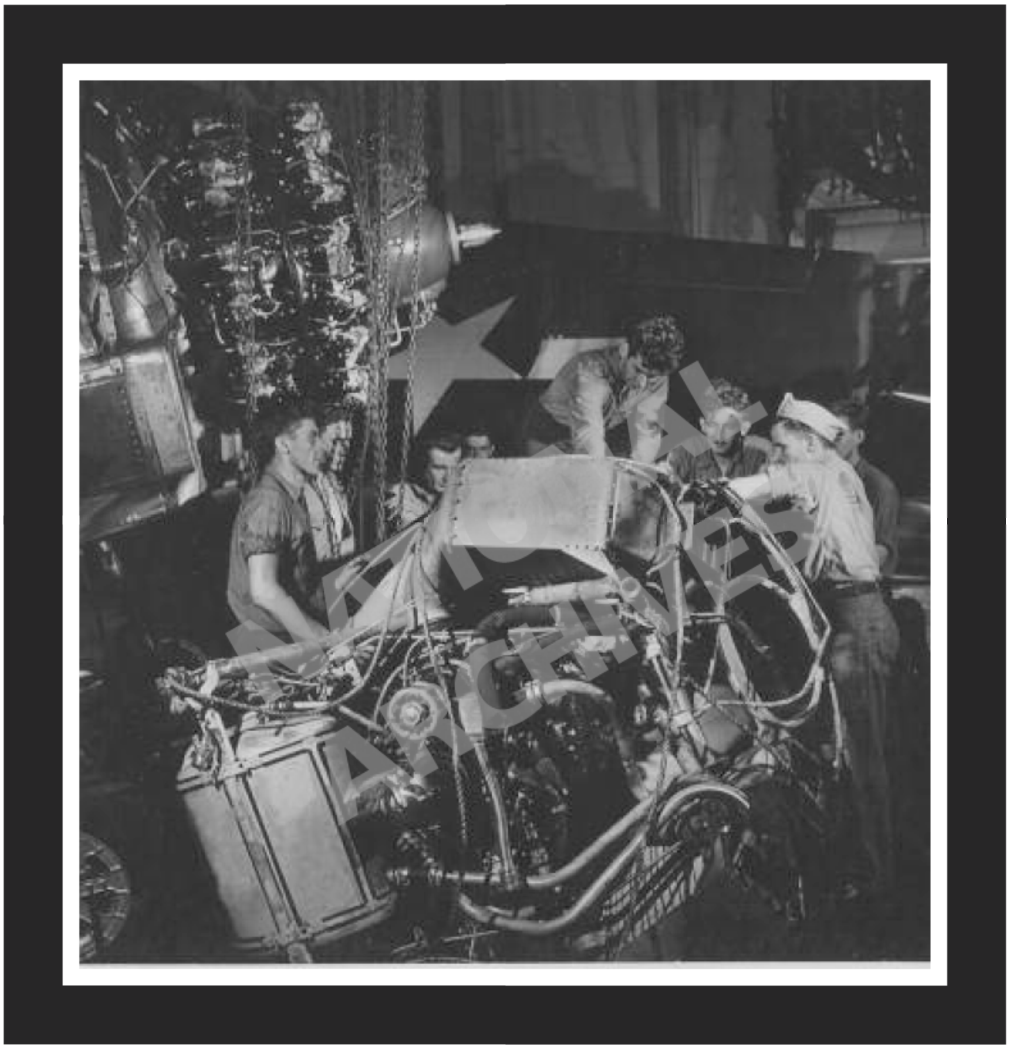
This Avenger starts from about 500 feet instead of the normal 400 feet. This is possible because most of the other aircraft have already been launched. While the bombers are launched last they are also landed last and so the time in the air is about equal for all aircraft. Note the cowling flaps are open to allow engine-heat to be expelled. Also note (how can you miss it?) the exhaust-pipe to expel the combustion products. When the fuel mixture is rich these exhaust-pipes flash flames which are fairly dramatic during low-light early morning launches. The usual list of characters (Air Dept. officers, yellow-shirts, Airdales, plane-captains) stand on the sideline to "make sure it's a satisfactory launch". This is a reconfigured ship, post war, as can be noted by the absence of the two 40-mm gun quads and the re-placement of the inboard 5-inch dual gun-mount to the left by some 20 feet. We didn't have this reconfiguration while I was on board the Antietam so this is new to me. This brings to mind the fact that there are those who need to "reconfigure" their lives because of bad, sometimes very antisocially bad, behavior. This immediately raises the question as to what is bad and really bad behavior? For the most part most know who they are and what it is that is bad. One of the large problems is that there are those who want to justify the excuse of bad behavior. For starters, to justify excusing bad behavior is bad behavior. There is no justification of bad behavior. What is in question is, "what is bad behavior"? Those things that harm or hurt others is usually by definition bad behavior ("tough love" by definition is excluded). In such a limited space it's impossible to do this subject justice. YOU must carry on. From here. Right and wrong can tricky but in a basic way it's simple.

Computer Machine Code: a set of instructions that a computer's central processing unit (CPU) can understand and respond to directly without any translation. Because machine code instructions consist entirely of binary digits (ones and zeros) most computer programmers write their code (programs) in easy-to-understand high-level language. These high-level languages must be translated into machine language interpretable by the CPU. This is accomplished by an interpreter program. However, the lower the level of the language used the more efficient is the code. For this reason many programmers use what is called an assembly language code. This is one step removed from machine language and thus is the most efficient language that can be used (no one would program in machine language although way back when the digital computer was first being developed the scientists actually wrote simple little programs in machine language. Now that was tough but back then they were tough because this was an exciting new technology. Are we still tough?

MECHANICS AT WORK

I'm not going to pretend that I know what it is that we're looking at in the foreground. I can say with some assurance that at the upper left we're looking at a radial 18-cylinder air-cooled aircraft engine suspended from an overhead beam. Everyone in this picture is an enlisted man, with a chief to the right. I dare say that this is a combination repair/training job done as a way of providing for "hands on " training (done throughout the military). It was one of the ways I spent evenings, standing at the periphery yet close enough to feel as if I were immersed in the activity (I didn't want to get too close for fear that they would take exception to that and send me packing. Actually though, I had the feeling that they quietly enjoyed showing their acumen to the "illiterati" (the illiterates concerning the difficult technical "stuff"). I was glad to oblige in this respect because I in fact respected their abilities (and at such a "tender age"). As a matter of fact they had gone to Navy technical school(s) and were thus knowledgeable about these matters. I was impressed and frankly that was tinged with a certain amount of jealousy (not the corrosive type). After the fact and these years later I marvel at the opportunities so many of these young people were given. AS I've said before I originally had the desire and intention of learning a trade in the Navy in spite of the fact that I was already accepted at Yale and would not take any vocational training in any way after I was released from the Navy. I can only "salivate" now at the opportunities that were available then before I was beguiled by the siren call of duty in the pilot house, the "nerve center", by joining the Navigation Division. Don't waste your youth by ignoring the opportunities that abound! One of the professions is below.

Mechanical Engineering: the Engineers' Council For Professional Development has defined engineering as the profession in which a knowledge of the mathematical and physical sciences gained by study, experience and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the progressive well-being of mankind. It is a profession in which study in mathematics and sciences is blended with experience and judgment for the production of useful things. The formal training of a mechanical engineer includes mastery of mathematics through the level of differential equations including but not limited to algebra, (spherical) trigonometry, (solid) geometry, calculus, and statistics. Training in the physical sciences embraces physics, chemistry, mechanics of materials, fluid mechanics, thermodynamics, statics and dynamics. Then of course one must take electives in the non science disciplines such as English and various social sciences such as history, a language, and the like. This is not easy and one must be committed to hard work and staying-power.



ALRIGHT, WHAT'S THE JOKE ?

I wonder what joke the photographer told to make these pilots laugh? It seems somehow somewhat incongruous that there would be laughter in such an environment of day-to-day engagements with those determined to "eliminate"you. Perhaps they're on their way home and they're relieved that they survived. Who knows? (Can't get away from "who knows"). Well, in any event, it's fortunate that they could have such a relaxed demeanor in such an environment. I could be wrong, but I don't remember there ever having been laughter in my environment (but then I was moping up in the superstructure most of the evenings).Even so, laughter was not a commodity to have been found in the chow line, in the compartment and certainly never, never on the flight deck. I don't mean to say that all was morose and glum because it wasn't but as a general statement there was no cheer to found in my environment. There are those, especially in TV movies, who seem to think a n excessively light-hearted manner in the face of physical danger is "chic". I don't. It seems inappropriate and "pseudo-macho". Humor is fine to break the tension of most everything except bodily harm. There, I'm of the opinion that other techniques should be used that aren't diverting. Strange as it may seem, intellectual analysis is one of these. Tension-breakers are good if and when they're appropriate to the situation. However, each to each's own. These are my views; others have other views. So what say you? Enlisted men had no such quarters where they could have "pin-ups" plastered all over. It's interesting to note the differences in appearance and style between then and now. Guys will be guys wherever and whenever they are. I will say that then things were much more discrete and shall I say, discriminating. (as for my choice for most alluring,, hands down, it's those two girls in their white dresses. Now that's perfect. It's not in the charter of these pages to define what is and what is not beauty, but there you are).

Electrical Engineering: this segment of engineering encompasses many aspects of the engineering sciences as well as the physical sciences. It includes research, invention, development design, and application. Many phases of electrical engineering are based on the use of higher mathematics (but much can be done by using simple equations such as E=IR and P=EI). Electrical engineers are involved in many projects that are not primarily electrical. There is hardly a field of technology in which electrical engineering is not a part. This field directly encompasses such sub-fields as communications, computers, controls, instrumentation, systems engineering to name a few important ones. Our world could not function without electricity, from electric motors to electric lights to electric pumps for our water to electric household devices to you name it.

A DIFFERENT "BALL GAME"

Unlike the previous page where there was mirth and laughter, here there is thoughtfulness and pensiveness, the "intellectual analysis" to which I mentioned there. It's logical, it makes sense that one should try to set emotions aside so that they don't intrude on one's cognition in times of mortal danger. The mental must dominate the emotional knots that accumulate with bodily jeopardy. Talk to athletes, talk to performers, right down to the junior level, and they will tell you of those "emotional knots" even though there is no mortal threat involved. However, it's foolish to cast but one mantel of response over all people and yet, where life is involved, it would seem to be valid. (I'm referring to one's own life; how a surgeon handles this is beyond my keen.) There's one important thing in favor of their position: they have a great deal of control over the outcome of their actions. Lack of this control makes for a sometimes fatalistic attitude which on balance does one no good (remember "intellectual analysis). //There's always someone around to make a liar out of you: an Airdale (aircraft type, third in line) is wearing black shoes. I said all Air Dept. personnel wore brown shoes. So there are exceptions. One way to distinguish a pilot from those Airdales is that 45-cal. pistol on the hip of the second pilot. The idea, I suppose, is to fight your way through enemy territory if shot down there. If anyone saw the movie "The Bridges At Toko-Ri" (excellent) they would have seen the futility of such a weapon (the carrier in the movie was the ubiquitous Essex-class carrier, that marvel of the sea). [Sometimes I feel embarrassed by my "flag waving", but it's in all honesty.]

Chemical Engineering: that branch of engineering serving those industries that chemically convert basic raw materials into a variety of products. Starting with ores, salts, limestone, sulfur, coal, natural gas, petroleum, air, water and so forth these industries , by chemical processing techniques, produce widely diverse products such as aluminum, magnesium, and titanium metals; refined petroleum products such as fuels and solvents; synthetic fertilizers; synthesis of resins and fibers and plastic; antibiotics, wood pulp and paper; petrochemicals. To bring about the conversion of raw materials into such a broad spectrum of products the chemical engineer relies on the basic scientific data as derived by research chemists. He then creates a small-scale model to develop engineering data for the various progressive steps required to produce the desired product. Now he might run the actual steps of the process to assess his calculations. This simulation will be the precursor to the final commercial process. Using computer simulations the chemical engineer is able to fine-tune the process to achieve optimum performance of the plant and the product. He must now constantly monitor the shifting variables for best product.

FIGHT THE GOOD FIGHT

For all I know this sailor is recounting some of his exploits as a means of bolstering sagging resolve. It's a pep talk. In any event he's talking into the flight deck PA system (note one of the "squawk boxes" overhead). To his left is the bridge/pilothouse and to his right is the PRI FLY with the Air Officer (?) to his right. There are no other officers in sight and the sailors have 'taken over the place" , a rare occurrence indeed. This is one of the early Essexes because it's carrying SBD Dauntless dive-bombers seen in the background and there is that large searchlight platform, upper right, still in place (soon to be removed). The sailors in the foreground are standing on the ladder (steps) leading from Flag Plot below. Note the cabling on the bulkhead that contain wires going to the multitude of communications gear and radars and fire control equipments up above. It's one complicated ship! // I don't know whether or not he's telling his story to ease the anxieties of the sailors but worrying can be a detriment to anyone trying to do a job properly——including school work. I know. I've "been there". Worry will sap one's energies and concentration to a fare-thee-well, sometimes literally to the point of incompetence. Why carry this inexorable burden wherever you go and let it crush your ability to study effectively, if at all, and prevent you from learning? Consider worry to be your enemy-number-one. All else fails when worry holds sway. Go to someone who's wise to help you unload this unholy burden. Unless you do, all else is essentially moot.

Industrial Engineering: a branch of engineering concerned with the design, improvement and installation of an integrated system of people material, equipment and energy. It requires the skills in the area of mathematics, physics and social sciences along with knowledge of management techniques, engineering analysts and design are integral to the work of an industrial engineer. They must be able to specify, predict and evaluate the results obtained from the system. The following lists the duties: work methods analysis and improvement, work measurement, establishment of standards, job and workplace design, plant layout, materials handling, wage rates and incentives, cost reduction, suggestion evaluation, production planning, and scheduling, inventory control, maintenance scheduling, equipment evaluation, assembly line balancing, systems and procedures, overall productivity improvement and special studies, machine tool purchase and analysis, numerically controlled machine installation, programming, linear programming, simulators, use of robots and automation, value analysis, management information systems (as recorded from McGraw-Hill's Concise Encyclopedia of Science and Technology). The industrial engineer is the one who "puts everything together" and makes a factory hum.

“BEARING........”

We’re standing on the Navigation Bridge that surrounds the pilothouse on three sides and overlooks the two duel 5-inch gun-mounts which are just in front of the Flag Bridge below us. The officer is probably the Officer-of-the-Deck and the two enlisted men are quartermasters in the Navigation Division (in the Army quartermasters are in the supply unit). This is where I stood my watch when I was a quartermaster striker (working toward earning a Quartermaster 3rd Class rating). (On the Antietam we always wore our white caps when on duty.) To the right is a magnetic compass and to the left is a stadia, a device that measures bearing and distance. An object (ship) is lined up with the two vertical rods and the bearing is read off the markings circumscribing the instrument. By means of reading a ratio of distances on the two vertical rods one is able to calculate the distance to an object (ship). The formula to do so is D= (aR)/b where a/b is a ratio measured on the two rods and R is the distance between the rods. Below the stadia is a drawing board to record data as seen fit. There is also a speaker-tube obscured by the officer which allows him to communicate with personnel in the pilothouse. Just as the OOD had to take bearing so too should you take your bearings periodically. How does one know where one is going if one doesn’t know where one is? How can one put purpose in one’s life without taking an inventory of one’s good points and one’s bad points (and we have our bad points), one’s goals, one’s likes and dislikes so as to adjust and readjust one’s bearings? It wouldn’t be a bad idea to keep track of those changing bearings because it helps to know where you’ve been to refine where you’re going because where you’re going is certainly of utmost importance.

Manufacturing Engineering: this is an extremely important aspect of our country’s strength and vigor. Without it we would be living much less well than we are fortunate to be doing. Sadly we are all guilty of taking so much of our material well-being for granted. In a very genuine way I believe the manufacturing and industrial engineers are literally “heroes” in our society (I also believe that “hero” has a much more well defined definition than this: a true hero is one who jeopardies one’s own life to save another’s life. Nothing less will do. Don’t dilute the term. But I digress.) A manufacturing engineer is one who works in all aspects of the production process. He (also implying she) develops and optimizes the production (creation) of products. This will be described by following the process of going from a design idea to final product: 1) The product design team develops a concept for a product. Drawings and prototypes are developed. This is usually done with the aid of computers which will visually emulate a completed product from all angles. To be continued.

A DIFFERENT PERSPECTIVE

Here's a new perspective worth considering. Here also one is able to judge the wind velocities: the sea-state appears to be such that the ambient wind is about 10 knots and the ship's wake indicates 20 knots, providing the 30 knots required over the front of the flight deck. In a way the wake offers a path for the pilot to the center-line of the flight deck. Everything seems to be proper in this picture except for that person sitting on the catwalk just below the flight deck. That was a restricted area during landing operations because if the aircraft for some reason dropped down too low and crashed into the edge of the flight deck all hands in the area would be killed. There's absolutely no point in taking unnecessary risks (and the emphasis is on the word "unnecessary"). All I can say about the phone-talker is that he has poor posture. What his function is I don't know. It's beneficial to occasionally look at things from a different view as here. (To repeat) there are many perspectives by many people and it's instructive to try to see things from a different angle (point of view). Who knows? You might even learn something new and useful, and you will most probably come to understand things you didn't previously. Understanding others does not mean you're necessarily agreeing with them. Instead, you're learning "where they're coming from". Unless and until you do there will be little diminution of the frictions that keep people apart. Differences can be good especially if and when they're understood. The world would be "sterile" without these differences that make our world a much more satisfactory and satisfying place. (And, "Vive la difference!")

Manufacturing Engineering: 2) With a finalized prototype in hand along with the engineering drawings the manufacturing engineers begin designing and building economically feasible means of production such as machine tools, instrumentation and computer support. 3) When these equipments have been proved out the system is turned over to the production department which is now responsible for producing the item. Thus the manufacturing engineering department is the bridge between the designers of the product and the production department. It accomplishes activities in the areas of support functions such as process engineering, tool engineering (i.e., machine tools and automatic machine tools that form the actual production line——which complements the industrial engineers), materials handling, plant engineering, and methods and standards. There is no distinct line between the industrial and manufacturing engineer and this relationship is determined by each company. Obviously, the costs involved in a manufacturing enterprise is one of the vital components of a viable manufacturing process and ongoing cost analysis along with strict cost accounting must be "engineered".

HEAVE TO

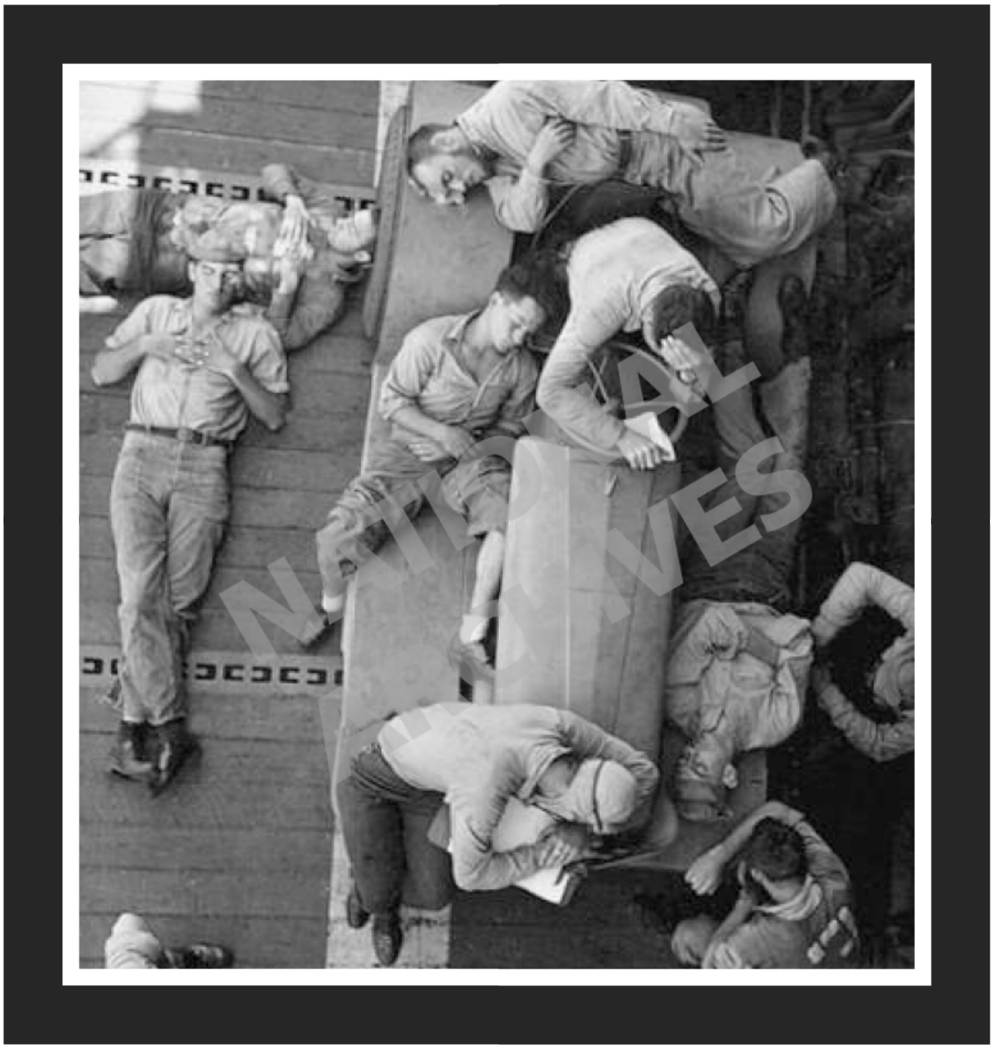
It's my considered opinion that we're looking at one plane-captain (brown-shirt with open shirt exposing his white shirt) lending one hand to a group of Airdales. He of course is not wearing a brown shirt and apparently it's too early in the war for the Airdales to be wearing the standard-issue tan flight deck boots with the serrated rubber soles. I included this picture to show the lack of surface area against which an Airdale could push. The only Airdales that have such an area of purchase are those three Airdales behind the wing of this Hellcat. The rest of the Airdales are essentially only providing moral support by merely being there. One of the things that seemed to be universal throughout was that no Airdale would just stand around and watch the others do the work. When there was an aircraft to push everyone contributed their effort if there was room to do so. If there wasn't they would look elsewhere to see what needed to be done. In addition there was almost never any "orders" given to do anything. It wasn't even so much initiative as it was the fact that things had to be done and the sooner they were accomplished the sooner an Airdale would be free of the job. Would that it were like that with our everyday chores whether it be mowing the lawn or doing our homework. Initiative is a learned trait and once learned it stays with you. Self-starters naturally "gravitate" figuratively to the top of whatever is being undertaken. It not only reflects a good attitude but it also sets one on the right course for a lifetime. (You can bank on it.)

Weather: an occluded front occurs when a cold front, closely following a warm front, finally overtakes the warm front and lifts the warm air mass off the ground. Either the warm front or the cold front goes aloft. As the cold front approaches the warm front high cumulonimbus clouds precede it. Preceding the cumulonimbus clouds are in ascending order nimbostratus, alto stratus, cirrostratus and cirrus (recall that the names of the clouds identify their height and character: cumulo is puffy, nimbus is rain, stratus is low and flat, alto is high, cirro is vert high and thin). When the cold air overtakes the warm air the warm air is pushed up with altostratus clouds between the two air masses and cumulonimbus above those. The altostratus clouds and cumulonimbus clouds produce steady rain. Winds blow in a CCW direction. Warm-front conditions are quickly followed by cold-front conditions. The occluded area is one of low pressure with cold air rushing in. // Storms are the next topic. There are three main types of storms: thunderstorms, tornadoes and hurricanes (in the Pacific area hurricanes are called typhoons). Each of these storms will be considered in turn. While they tend to have a similar derivation they develop differently depending on various different conditions.

FATIGUE HAS TRIUMPHED

The fatigue has finally had its way and the Airdales are brought low. It's a physical condition, yes, but more than that, much more, it's a fatigue of the emotional mind that grabs you as if in a virtual vice. This is a chance to try to shut out all that has gone on before, even if but for a few too short minutes that will assuages the battered nerve-system. It's a time to recoup, it's a time for the anxieties to subside. This brief respite is not for nothing for it's the NOISE, the WIND, the BLADES for which these Airdales sprawl. There are no sweet reveries in this, these few short minutes of repose in which all the world must be shut out till that refurbishment of the sinews of the mind has begun. The WIND, the BLADES, the NOISE, these, these are the trio that lay us low. Never again will a mere mortal be subjected to this onslaught against the comparative frailty of man vs. machine in rank on rank, column on column, a veritable phalanx seemingly immutable. No man, no "David" can long confront and then enter that "field" of of BLADES, of NOISE, of WIND without submitting to a few precious moments of respite. Never again will there be an Airdale to trod the planks of a flight deck. That lowly but honorable hard-scrabble we see below has long since been extinct. His stint on the stage of war was brief but noble. Noble? Yes, for such a motley group did enter a place of turmoil, DAY-IN, DAY-OUT, with never so much as a word of complaint. That is why they were noble, that is why they were not really "at the bottom of the totem-pole". Bravo Airdales!

Weather: thunderstorms represent violent vertical movements of air. They occur as a result of strong uplifting air, sometimes building the clouds to heights exceeding 75,000feet. This rising air may be due to heating of the air at the ground-surface (which had been heated by the sun). This is especially prone to happen in the Midwest. Thunderstorms are also initiated by the actions of an encroaching cold front. Thunderstorms can be generated by differences between cold and warm air masses such as are found at the border of land and sea (common in Florida and the Southeast Gulf states). Thunderstorms seldom occur on the West coast because the water-land contrast of temperatures are not so great. Cumulus clouds represent air updrafts while cumulonimbus clouds (thunderheads) have both updrafts and downdrafts simultaneously. In fact, hurricanes are thunderstorms magnified. One can judge the distance of a thunderstorm from the fact that light travels at 186,000 miles per second and sound travels at about 1,100 feet per second, or about one mile in 5 seconds. Thus count the seconds between the lightning and the sound. The downdrafts push cold air down thus announcing a storm's approach.


NATIONAL ARCHIVES

CARRY ON

The "blades" are dispersed but the "wind" is still in evidence while the "noise" is a function of the number of aircraft. The Helldiver's status is in doubt as the plane-captain, barely discernable on the far wing, stands talking to the pilot about the problem at hand. Something is amiss with this Helldiver as the yellow-shirt officer leans into the wind to turn his attention to activities up forward. Closely following him is an Airdale (minus the helmet, the goggles and the blue shirt). Following him is another yellow-shirt as he also gives a passing glance to the Helldiver in "inoperatus". The show must go on and so it does because tide and time wait for no one on an operational carrier. This is just good management and management is the "name of the game" on the flight deck full of aircraft that have a mission to keep. One could extrapolate this concept to one's own life: a setback does not a failure make. We all at one time or another meet with impediments to the goal(s) we set for ourselves. A pertinent quotation can be found in one of my all-time favorite poems ("IF" by Kipling) which says in part,"If you can make one heap of all your winnings And risk it on one turn of pitch-and-toss, And lose, and start again at your beginnings And never breathe a word about your lose: If you can force your heart and nerve and sinew To serve your turn long after they are gone, And so hold on when there is nothing in you Except the will which says to them: 'Hold on'!.........And——which is more——you'll be a Man, my son!" I do not support the idea of wagering all on one pitch-and-toss. Kipling was probably using the most extreme example to make a point of never giving up no matter what the odds. [The opposite gender is included in this by definition.]

Weather: lightning is caused by the attraction of unlike electrical charges within a thunderhead or between it and the earth. The earth normally has a negative charge (a surplus of electrons as compared to the atmosphere around it). Friction of rapidly moving ice-crystals and rain in a thunder cloud strip off electrons and build up strong electrical charges. Negative charges concentrate between 32 degree and zero degree levels. The lower part of the cloud has positive zones surrounded by negative zones. When electrical pressure (voltage) becomes high enough charges between parts of clouds or between cloud and ground (earth) are released by the flash of lightning. First strikes are within clouds (65% of all discharges are within or between clouds). Lightning strikes to the ground are initiated by a relatively thin "leader" strike from the cloud followed immediately by a heavy return strike from the ground. A single lightning discharge goes back and forth many times in less than a 1/10 second. A discharge, while very short in duration, can be 30 million volts or 100,000 amperes.

WELL DONE

In about 3 seconds this SB2C Helldiver will touch down on the deck at about 30 yards from this position over the flight deck (realizing that the deck is moving under the Helldiver). In any case the Helldiver will have to drop about 30 feet in those 3 seconds which is going to put a strain on the hydraulic oleo wheel- struts (its not for nothing that the pilots call this a controlled crash and that carrier aircraft have to be built more ruggedly built than other aircraft). We know by now that hard (not difficult) landings put a bounce in the touch down and thus the possibility for missed arresting-wires and barrier crashes (or worse). Speaking of arresting-wires, we have a good look at the brackets that raise them. Immediately after the aircraft is stopped the brackets are recessed into the deck to allow the aircraft to proceed up the deck and then the green-shirts immediately raise the brackets for the next landing. So it goes: the brackets go up-down-up-down———. An Iowa-class battleship (BB) is riding "shot-gun" for the carrier (CV) instead of a destroyer (DD). Why, I don't know but in any event this is a nice picture of Navy Air joined by Navy Surface. It also provides a nice view of flaps-down for added lift. Navy Air plus Navy Surface makes for a potent punch. This cooperation in the military services also makes for added and multiplied impact in their missions. We individuals could learn a lot by this example of cooperation to the mutual benefit of all parties. In fact this is an admirable (think "admiral") way of learning by way of example. Athletes do it all the time and if they can do it why can't we concerning our studies, our skills and definitely our (GOOD) conduct (behavior)? [I thought so much of cooperation that I wrote my college thesis about cooperation after WWII.]

Weather: a thunderstorm packs a punch: the total energy of a major thunderstorm far exceeds that of an atomic bomb (however its energy is spread over a wide area). Nevertheless the devastation of a thunderstorm (which is a mini-hurricane) can be appalling. [Has the diminution of these storms been given the attention that was given to the creation of the atomic bomb? Will some group of physicists someday find an answer to this "devastator" called a hurricane? Cloud seeding was a futile (but tepid?) attempt to do the opposite. Who's game?). The sudden tremendous compression and decompression of the surrounding air caused by the discharge of lightning is responsible for the sound of thunder. Lightning strikes thousands of times in the U.S. each year and several hundred people are killed by it. With a few basic precautions this likelihood should be virtually nonexistent. Lightning takes the path of least resistance and tends to hit the highest point. Never stand under a tree in an open space: this is a target for lightning. Certainly never fix a TV antenna during a thunderstorm. To be cont.


NATIONAL ARCHIVES

MAXIMUM RPM

The yellow-shirt to the left has just "delivered" this Hellcat to the launch-line where the launch officer had called for maximum rpm. He is now in the process of "throwing" the flag forward as he looks down the flight deck. The pilot then releases his brakes and within moments the Hellcat will be roaring down the deck at about 40 knots when it reaches the end of the flight deck over which there is already 30 knots of wind from the ship's speed plus the ambient wind. (Remove another Hellcat cutout from the flight deck board sitting on a table inside the island superstructure.) Note the pilot's head is just about the same height as the cockpit-canopy meaning that pilots were restricted in height to six feet. Here's another example of not having to be tall to "stand tall". We have a good view, to the right of the yellow-shirt, of the" buckle-belt" of which there are about four across the flight deck. They enable the flight deck to flex at those locations during rough weather. I've already mentioned the time I stood at the after part of the flight deck during a typhoon to watch this flexing (the aircraft were safely ashore). It was an amazing sight in addition to the 40 to 50 foot waves (that didn't "break"). Speaking of flexing, how many of us are flexible in our relationships with others? Or are we the "hard-nose"type? Are you able to adapt to situations that can not be modified? Can you adjust to others without giving up your moral compass? Do you know how to compromise with someone with whom you do not agree without being malleable to the point of temporizing your basic beliefs and the verities of life such as honesty and liberty? Are you willing to think hard about what it means to be honorably flexible? Are you willing to think hard? Your future depends on it.

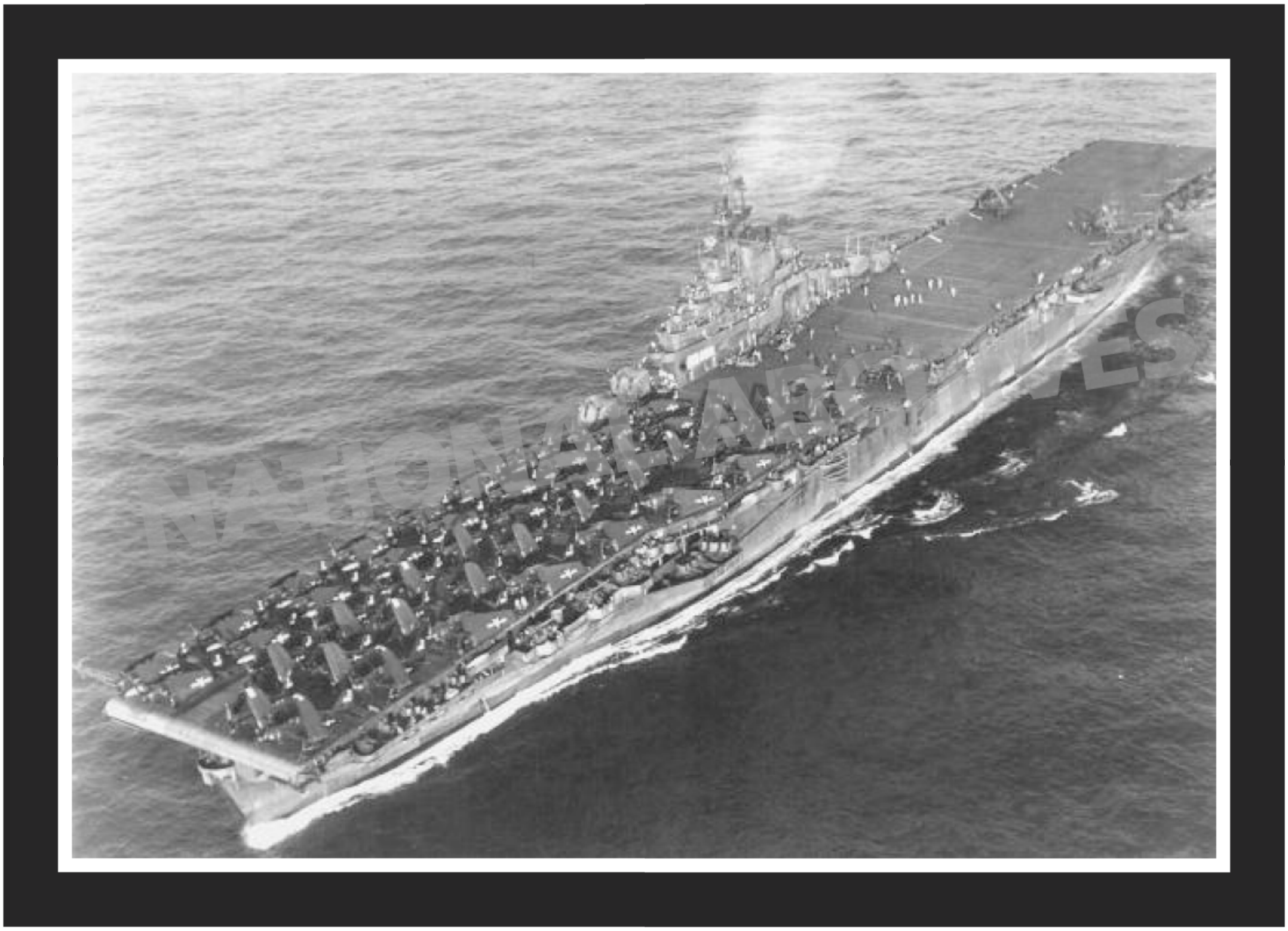
Weather: tornadoes are by far the most violent of storms. They're whirlpools of such violence that little can withstand their fury. Wood-frame houses are rendered asunder and even railroad trains can be lifted off the tracks. Fortunately their diameter is rarely over 1/8 of a mile but their path can cover a sizable distance. An average of 125 tornadoes hit the U.S. each year. They result from almost explosive instability in the air and they accompany heavy thunderstorms and heavy rain. These are conditions of strong cold fronts and squall lines. Studies have determined that they precede a cold front at an average distance of 160 miles. The development of a tornado is in four stages and travels from 20 to 40 mph over the ground. First mammolocumulus clouds form (stratus clouds with bulbous protrusions facing downward). A funnel forms reaching down to the ground. It then starts is destructive course and moves along drawing debris into its vortex of low pressure. The whirling winds can reach 300 mph, the strongest known of any storm. To be continued.


24
NATIONAL ARCHIVES

IDLE TIME

The tractors sit idly next to the island and the personnel are away from the aircraft. The "birds are home to roost" but things seem to be at a standstill. The "only" explanation is that there are other aircraft yet to return and until they do there will be no activity to speak of except to move those two aircraft up forward to clear the deck for landings. The aircraft have filled the space to the deckedge elevator thus requiring its use to keep a landing area clear for those aircraft yet to return. It appears to be midday which normally is "chow-time for the troops". However, not so now: there are still those errant (?) aircraft to bring aboard. Life on a carrier is built around the "care and feeding" of pilots/aircraft and all else is secondary, as it should be. This in turn means that it is the Air Department that determines the ebb and flow of life aboard a carrier and "a day in the life of an Airdale" is a sub-text to the life of the pilots/aircraft and their missions. We were, very specifically, a service group to always be at their beck and call, whatever the conditions, whatever the time, day-in, day-out, day-in, day-out. In general, serving under duress is not service at all. It's my opinion that there was no Airdale who considered his activity on the flight deck as under duress (our small pay notwithstanding). One could say that if we didn't "serve" we'd be thrown in the brig, and that's duress. No, I sincerely believe that most all the Airdales considered what they did was not done under duress but rather was dome in the spirit of serving a useful cause. [Is it possible to "serve" a cause not useful? What is a useful cause? What do you think it means to serve? Must it be gratis? Not necessarily]

Weather: the air whirling around a tornado is the most violent of winds while the air pressure within the funnel is so low that a hose with closed windows can literally explode from the pressure differential. Tornados form when a fast-moving, dry cold air mass collides with a warm, moist air mass. Instead of the cold air mass wedging under the warm air mass as it usually does there's formed a tremendous imbalance of air masses. The warm air rushes upward, sometimes at 200 mph. Air flowing in from the sides gives the updrafts a twist. The vortex begins to spin accompanied by rain with almost continuous flashes of lightning. The duration of most tornados is short, minutes only, but in those few minutes tremendous destruction occurs. It's Mother Nature at her most fearsome. Learn more about them if you live in areas of tornado activity. // We'll close our discussion of weather with a condensed compilation of the most destructive of all storms, the hurricane. (In the Pacific it is called a typhoon that lashes the seas into mountainous waves). All hurricanes are identified by their low pressure. The most severe hurricanes have winds up to 150 mph cover an area averaging 400 miles in diameter.



A MULTITUDE OF HELLDIVERS

Lost in this multitude of Helldivers are a couple of errant (?) Hellcats. Unusual, but who's to say so with authority? To the left are two yellow-shirts drifting away after having brought the wayfarers to rest on this their sanctuary. A group of officers, joined by a plane-captain, confer on something of importance while some other plane-captains "talk shop" with the pilot still in the cockpit (the tail-gunner makes his way out of his cockpit.). Seeing all this "hardware" assembled, one is impressed with the feasibility of accomplishing the seemingly improbable: placing them in their element of being airborne. After all, right now they are 16,000 pounds (loaded) of inert ponderousness. How in the world is it possible for such a load to lift off such a confined space? We all know how but it's nevertheless impressive. With wings unfolded and engine fired up and the will to lift off these behemoths do in fact do so, each and everyone in turn. To look at them now one would not be of a mind that this could be so. It really isn't trite to say "where there's a will there's a way". Sometimes there isn't an obvious way and sometimes there is in fact no way yet to remain inert and wring one's hands is as sorry as it is foolish. Even in love "it's better to have loved and lost than not to have loved at all" (I can vouchsafe for its validity). When things seem (reasonably) insurmountable go after it as a challenge to be enjoyed. Meeting and overcoming a (reasonable) challenge is one of life's true joys learning something new can certainly be one of those challenges. Not to be trite again, the Antietam went to war with the motto "Go get 'em Antietam". Can you do any less?

Weather: hurricanes move slowly traveling in an air mass of uniform temperature rather than between air masses of different temperatures. Hurricanes are usually quite symmetrical with the central isobars (limes of equal pressure) forming almost perfect circles. They develop only over open ocean areas covered by extremely warm, moist air masses. They break up soon after moving over land. All hurricanes have a calm, non-energetic central area averaging about 20 miles in diameter. The southwestern part of the North Pacific has more hurricanes (read "typhoons") than anywhere else on earth. Ranking second are those of the South Indian Ocean. The third most frequent place of hurricanes are those over the West Indies that originate off the west coast of Africa. These strike the Indies, the Mexican Gulf area and the east coast of the U.S. This is not a complete picture but it is the main one. Hurricanes are born in regions of contrasting winds similar to those of fronts. The genesis of a hurricane is in a hot moist air mass over the ocean that favors a good deal of the sun's rays. To be continued.

ALL IN A ROW

All in a row, the biggest single-engine aircraft of WWII. These Avengers are being attended to by the brown-shirt plane-captains on the wings, the blue-shirt Airdales on the deck and the yellow-shirts standing by. One of the Airdales is manning a fire-extinguisher for start-up time and another is untying the tie-down ropes securing a wheel while two officers to the left are contemplating the situation. All in all this is a leisurely preparation for an ensuing launch that is not momentary. One of the Airdales has even "staked out his claim" at the right wheel of the middle Avenger even as another Airdale unties the rope at that wheel. Whatever. In a way this is the face of war: stretches of leisurely activity punctuated by short stretches of sometimes violent activity. Yes, "war is hell" but war can also be a tedium. As they say, the ammunition doesn't last that long. War has grand designs and marches and countermarches of huge masses of men and machines and materiel in the large scheme of things but it also has long periods of tedium and preparation that make time drone on. Even on a carrier with frenzied bi-daily flight operations time drags on and on. In peace we would be terribly amiss to let such ennui overtake us. [Ennui: a feeling of weariness and discontent resulting from satiety or lack of INTEREST.] Ennui is the enemy. Avoid it as if it were the plague and you'll be happy. You can bank on it. However perhaps of even more importance, you'll LEARN, which in turn will make you even happier. Now that you can definitely bank on.

Weather: in a hurricane the cyclonic motion is often started as opposing trade winds (at the 0 and 30 degree latitude) whirl around each other. This can only happen when the winds normally at the equator are displaced northward so that the twisting effect of the earth's rotation can take place. Thus the NE trade winds collide with the SW trade winds from the equator. The rotating low pushes air toward the center forcing hot moist air there to be lifted. This lifting causes the moisture to condense. The heat thrown off as the moisture condenses further warms the rotating air which becomes even lighter and so rises more swiftly. As more and more moist tropical sea air sweeps in to replace the rising air more and more condensation takes place. Thus air inside the storm rises faster and faster. It's not unlike a helium-filled balloon that rises rapidly. This column of rising air is fed from the sides to accelerate the process. Hurricanes are so violent because of the tremendous energy released by the continuous condensation. At first the storm is similar to a giant thunderstorm but unlike a thunderstorm over land there is an inexhaustible supply of moisture. The heat given off by the condensation causes the air in the column to rise faster and faster. Surrounding air sweeps into the rising column until the hurricane is a giant whirl.

RIGHT- AND LEFT-FACE

The coverings over the cowlings and propeller-hubs imply that these Hellcats are being ferried to some forward theater. Presumably the placement of the Hellcats provides a better packing-factor. What is particularly noticeable to me is the lack of the large SK-1/SK-2 Air Search radar antenna. Also yet to be removed is that 40-mm gun quad just below the Navigation Bridge which is imposing on the admiral's view from his bridge to say nothing of the extreme racket made by those guns as the OOD and staff stand just above it (those guns had to be heard to appreciate the complete distraction they generated; when I was assigned one day to pass the ammunition at a 40-mm gun quad (after the war when the personnel were thinning out) I was thoroughly impressed that the gunner aiming those guns was able to concentrate on the target while firing). // The configuration of the aircraft looks just plain stupid (to an outsider). Just so do we consider others' actions, but we DON'T know the circumstances. We jump to conclusions not knowing the facts. This mode can be considered endemic for the vast majority of us. We have lost all ability to give someone the benefit of the doubt until proved otherwise, We have lost the art of giving one some e "slack". It turns out that WE are the "jerks". We are the ones who show our stupidity by not LEARNING the facts and making sure that they are actually the facts. There are those who pride themselves for being "hard-nosed" when in truth they are only showing lack of intelligence. Don't we all want to be intelligent? Yes, but it requires work and the fortitude to "stay with it". Be assured that it's definitely worth it. And remember this well, being different is of course not necessarily being wrong while it could be right (and proper and correct) and you're wrong. Use your intelligence first, your emotions second. Then everyone will be happier.

Weather: During a hurricane surrounding air sweeps into the swirling vortex rapidly until the hurricane is a giant wheel of violent winds. The eye of a hurricane is at the center of the storm and is a zone of near calm or light breezes with clear or lightly clouded skies overhead. This "eye" moves with the storm and will give a second blow to the survivors of the leading edge of the eye, the most violent part of a hurricane. The eye could be caused by centrifugal force outward from the eye. The centrifugal force acting on a rotating body doubles when the radius of the rotation is reduced by one-half.


NATIONAL ARCHIVES

TEAMWORK

This is such an obvious example of teamwork that one might think it was staged. In fact it probably was. At least I hope so. First though the green-shirt from this side properly raced to the tailhook and raised it as the other green-shirt from the other side unhooked the arresting-wire from the tailhook. So far so good. At the same time a group of three Airdales race out on the far side to apply a push to the Hellcat's wing as it swings back All Hellcats required this assistance (while the other aircraft did not). Everything is still as it should be. However, the three Airdales racing to the Hellcat from this side are in a position to be whacked by the wing as it swings backward. Thus it's likely that the photographer persuaded these three Airdales to approach the Hellcat to the left so that the picture contain all three groups in one photograph. Picky on my part, maybe, but accuracy must also be served. I give the photographer kudos because in one picture he captured the essence of what happens for each Hellcat landing. This brings up the concept that most all endeavors in life require some sort of mutual aid, a.k.a. teamwork. Except for a singles tennis player everyone and everything benefits from teamwork. For the sports-minded, how many times has a play run afoul when only one player "fell down on the job"? The answer is all too often and maybe all the time. Teamwork is of the essence in everything from industrial enterprises to a "mom and pop" retail store. The examples are legion and so voluminous that it's futile to list them here. As a mental exercise try to think of those cases that do NOT require teamwork (except singles tennis that requires fortitude plus).

Weather: as air spirals in toward the center of a hurricane the centripetal force increases greatly. The cloud-wall of the eye is where the centripetal force exactly balances the pressure forcing air inward to the low-pressure center. Friction with the ocean surface slows down the whirling air and decreases the centrifugal force. Thus the eye is small at the surface. Aloft where the winds speeds are great the centripetal force is higher and the eye larger (making the hurricane storm funnel-shaped with the entire storm about 300 miles in diameter). The life history of a hurricane can be traced from its birth as a tropical low through maturity and then decay as an extratropical cyclone in the westerlies. A storm starts west of the Cape Verde Islands as a tropical low with winds less than 32 mph. This storm increases in intensity to perhaps winds of 75 mph as it approaches the northern coast of South America and the West Indies. Now a hurricane it moves at about 10 to 12 mph. Its winds increase and its forward motion does the same. It is now that its path can only be guessed: due west, northwest or north and then northeast. Beware of hurricanes: winds up to 200 mph. Torrential rain, flooding, wave surges and tides, no water/electricity.

DAVID, MEET GOLIATH

"Where's a sling-shot when you need one?" When you find yourself in such situations such humor is the last thing on your mind which has a way of becoming numbed by that all-pervasive noise. If there should be a blast of wind behind you (and you ARE facing this "behemoth") your mind needs to work very hard to concentrate in that sea of surround-sound. And you're scared witless because you know for a certainty that there's no chance for a "replay" of this situation. Naturally you try to avoid such serious situations but such is not always possible. When you find yourself up really close and personal with these machines for those extended moments you're in a semi-stunned condition. Once extricated out of harm's way you wipe the slate clean and look for the next challenge, for these are indeed (unwanted) chess-board challenges (or should I say out and out confrontations?) Well, enough of the dramatic "stuff". Note an Airdale at each wheel, one inside and the other outside the wheel. I never saw anyone on the inside where he's taking the full force of the prop-wash (to each his own). Also of note are those Wildcats behind the Avenger. They preceded the bigger Hellcats. // We all have difficult situations to face up to now and again and how we do so is important. It would seem that becoming over-exercised about our problems would be counterproductive. Usually objectivity trumps subjectivity in situations that require careful thought. Emotionalism is fine when one reads a book or goes to a play but otherwise it will probably lead to confrontation and pugnaciousness, both of which are bad, bad. Who wants to be around such people? [Earnestness is emotionalism under control. Earnestness is thoughtful emotionalism. Earnestness is salutary.]

Jet Engines: the turbojet engine obtains its power from the escape of expanding gases. Air sucked in from the front of the engine is first compressed, then forced into a combustion chamber where it is mixed with fuel. The ignition of the mixture produces a rearward rush of expanding gases which in escaping propel the aircraft forward and also drives the turbine's compressor to maintain the process. The turbofan engine processes greater quantities of air than the turbojet. A substantial portion of the incoming air is shunted around to the rear of the turbine where it merges with the heated gases. The cooler bypass air combines with the heated gases to improve the engines efficiency. The ramjet paradoxically is both the most advanced and most simple of the jet engines. It is powerful enough to be at and beyond the speed of sound. Remarkably it has no moving parts. Since in-rushing air is naturally compressed upon entering the carefully designed intake, the need for a compressor and turbine is unnecessary.Rocket engines can be solid or liquid fueled engines and do not use outside air.


20

EARLY LIFT OFF

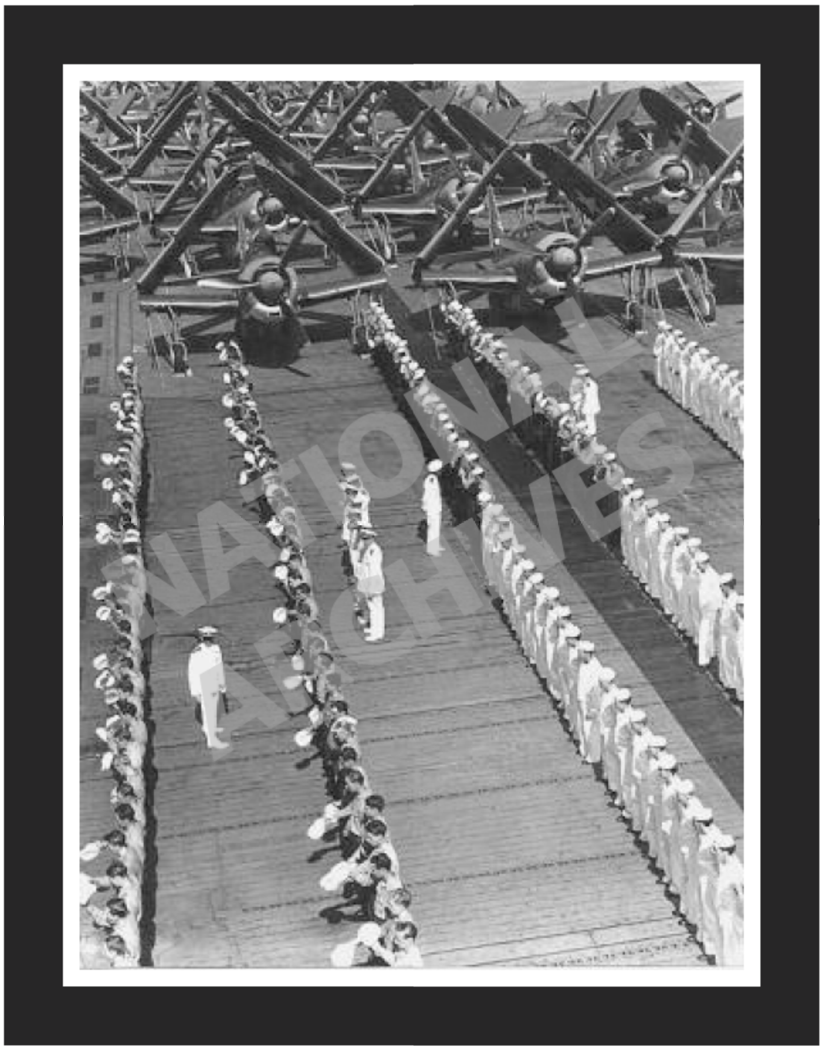
This TBM Avenger is just about ready to lift off the deck as can be detected by the extended wheel-struts. When the aircraft is motionless on the deck the weight of the TBM compresses the hydraulic oleo (oil) struts. It is the "play" in the struts that cushion the shock of a hard (not difficult) landing. It always seemed strange to me that it was the large bombers (TBMs and SB2Cs) that were launched last, presumably because they needed a longer runway due to their size (and less powerful engines than the Corsair and Hellcat). However it was the bomber that was airborne well before the end of the flight deck. Perhaps this was so because they started further beck. In any event, looking at the wing-span of the TBM implies a large lift-factor (including of course the flaps in the downward position). Apparently this launch is abbreviated because some of the aircraft are not powered up. This was completely unlike the Antietam where we "always" had a full deck pf aircraft all of which were launched. It was (mentally) tiring but also it was satisfying in knowing that you were doing a solid job for a solid reason. It's been my experience that one of the true enjoyments in life is to do something, preferably useful, that was also done well. It's one of the satisfactions in life. I've always admired those who create things such as for instance building a house. They must have a tremendous feeling of satisfaction in seeing something there that was not there before. Imagine the sheer joy those masons must have felt to have created something as substantial and beautiful and meaningful as those cathedrals of yore (and with not much more than their hands and a strong back). Now that's satisfaction! Would that we could know such satisfaction! We can at least make the valiant try.)

Math Modeling: engineering is about solving physical, practical problems by creating mathematical models that can be manipulated. These mathematical models male possible a better understanding of the problem at hand. Mathematics is the means, not the end, of the engineering disciplines (note the word "discipline"; it is well considered.). There is a great simplicity in the mathematical representation of all the engineering disciplines: an equation for a problem in electrical engineering is in some cases identical to that of a mechanical engineering problem. As part of modeling, analysis follows close on the creation of the model. Many engineering situations are a combination of the electrical, mechanical, fluid and thermal conditions so that learning for one discipline stands one in good stead for dealing with another one. Much of the process of building a useful product involves the combination of individual components. These components are "meshed" into a useful whole at the same time that you generate specifications. Let's begin.

"BARE HEADS"

No, they aren't bearing allegiance to the man in white. Instead they're showing their haircuts (or lack thereof). If nothing else they look fit and trim and almost as if they were from a mold. This is not bad where the military is based on regimentation. The uniqueness can await the civilian life. Personally, I find this regimentation, here, as satisfying and satisfactory: it implies, fancifully, all for one and one for all. But yes, uniqueness in civilian life is not a bad thing. (This is especially so in that each country has its own unique culture and customs; it makes for an interesting and dynamic life). Going back to this world of ship and planes, again, the crew is being inspected after which one of the watches (starboard or port) will have a 12 hour pass while the others stay aboard to man the ship. In the background are the raison d'etre (reason for being), the aircraft. The pilots called the SB2C Helldiver the "beast" but I think it looks not only like a neat package but also it presents an imposing stance (especially when up close and personal). Just because someone is in the background that's no reason to feel slighted. Naturally not everyone can be in the forefront nor should they: it would be much too crowded. Good and important work is done especially by those in the background of life's endeavors. You should know this and feel satisfied (as long as you're doing a good job of at least living if not also producing). In this I'm reminded again of that pertinent, and poignant, song "Wind Beneath My Wings". [You might even find an inkling of th meaning of the word "love".]

Math Modeling: an engineering project begins with a need. This leads to a concept /design along with a prototype model. These are combined to simplify the project. Now follows analysis and experimentation which combined is "rung" against the need. The prototype is modified and the cycle is repeated. Finally specifications and engineering drawings are compiled (and also put into a computer data base). Tools such as oscilloscopes measuring waveforms in electrical engineering) as well as computer simulation programs are available. However of primary importance are the "tools" of engineering and scientific knowledge. These tools are mostly mathematical in nature and it's an article of faith that mathematics undergirds all engineering and scientific endeavors. There are many specialties in the domain of mathematics but the one most used in engineering is the area of the calculus and differential equations. In the days of the slide rules the calculations were a trial and tribulation. In these days of computers and calculators life has been simplified. However, however, without a solid grounding and understanding of mathematics these devices are merely "toys" and we're not about toys. The work is rigorous but entirely satisfying. Go for it! It could be the best thing you ever did for yourself.


NATIONAL
ARCHIVES

IT'S EITHER THIS OR THAT

I'm in a quandary: is this Avenger launching or landing? If it's the former then why are the flaps not down? Why is the propeller "at ease"? Even why isn't the launch officer lunging forward with arm thrust ahead? Why is the pilot looking at the officer instead of looking forward? So if it's the latter why isn't it an enlisted man yellow-shirt who's directing traffic? And why is that other officer standing there with a tote-board that's used to provide last minute info to the pilot before launching? Launch or land, it doesn't really matter because the object here is to impress upon the viewer the serious bulk that must be lifted off or landed on a relatively small "piece of real estate" (whose value per square foot is quite high). Airdales on the other side of the Avenger are bracing themselves against the blasts of wind coming from up forward, launch or park. I find these pictures gratifying simply because they represent the real world, the world that actually existed and not the super-hyped "dramatic" stuff (and I mean stuff) that is served up in our various media. The problem with the media is that whenever an "adventurous" film or presentation comes out you can be sure that there will soon be something that "trumps" it in its hoped for impact on the already jarred and jaded and sated sensibilities. They try very hard to reach for something even more dramatic than what went before and in the process they make fools of themselves even while thinking they're clever (technically its tremendously impressive–but I guess that's the point). Adventure's fine, mocking reality is not, at least in my book. How long can one live in a dream-world? You can be absolutely sure that everything in this book is "for real". Would you want it any other way when discussing WWII?

Math Modeling: in addition to specific computer programs a computer spreadsheet can be used to accomplish complex simulations. As has been said the dynamics of all engineering systems, whether electrical, mechanical, fluid or thermal, can be described by the same mathematical equations. In general terms there are only three basic types of engineering building blocks: two can store energy and one that dissipates energy. These concepts are deceptively simple yet extremely powerful. Before going further we will use some physics to derive the building blocks to be used. Voltage is the work that must be done to move a unit of electrical charge from one point to another. Now V(12)=dW((12)/dq(12). [The conventions used here are as follows: (12) means from point 1 to point 2. The letter "d" will always refer to a very small amount such as a small distance; it is a differential of amounts and is the basis of the derivative in the calculus; thus dv/dt equals a very small amount of velocity per a very small amount of time which is a very small amount of distance.] We'll now return to derivations.


NATIONAL ARCHIVES

A MARCH OF THE GIANTS

Here they come, one by one. The yellow-shirt in the foreground is looking over his shoulder to make sure the area is clear as the pilot keeps a sharp eye on him. Sometime soon the pilot will lower his flaps (often not done until having reached the take-off point). Directly behind this Avenger is another one in the process of swinging its wings forward to the spread position as two Airdales are ready to pull the wheelchocks. Another yellow-shirt is taking control of the Avenger second from the left with wings folded but wheelchocks already pulled. He's standing directly in front of the Avenger to the left and is presuming it will hold fast until he's moved "his" Avenger out (it's the responsibility of the yellow-shirt out of sight to the left to hold fast). An Airdale to the left is also clearing out of the area. It's quite apparent that with the Avenger's long wing-spans the yellow-shirts have to be careful about when to call for the pilot to spread-wings. With a span of 55 feet these "largest single-engine aircraft of WWII" have, care is the watch-word. How often are we aware of the consequences of our actions? Not enough I'll warrant. Sometimes there are those who act and talk as if they were a bull in a chins shop. Some people call it "cute", some call it a lack of finesse. Others call it a woeful aggregation of crudity and stupidity. Conduct outside the home does not benefit others when its done as if it were done in one's own home. In public it wouldn't hurt to act as if you were in someone else's home. Is being considerate of others so difficult? Only if you're a dunce. A good rule of thumb is to not act in such a way as to call attention to yourself. Is that so hard?

Math Modeling: It wouldn't be a bad idea to jot down these simple formulas as they occur. Again, V(12)=dW(12)/dq(12). This says that dW(12) is the work that must be done in order to move the electrical charge dq from point 1 to point 2. Electric current is defined as the flow of electrical charge per unit of time: i=dq/dt. Power is defined as the rate at which work is done: P=dW/dt. Power P is also equal to the voltage differential across an electrical element times the current flowing through that element: P=EI (electrical current can be thought of as a line of dominos all standing on edge a short distance from each other; it flows when the first domino is pushed. The effect is very quickly felt at the last domino but each domino (electric charge) moves only a very small distance. Actually the charges drift along eventually reaching the positive terminal. Thus V times I, or V(12)xI=[(dW(12)/dq)x(dq/dt)]=dW(12)/dt=P. (Again, writing these simple equations on paper will vastly simplify things.) Another form of nomenclature is that of integration where things are summed over time or distance etc. We'll use the symbol "{(12)}" as an integration sign and "dt" as a small interval of time.


NATIONAL ARCHIVES

WHITE CAPS

My attention was immediately caught by those two sailors to the right with the standard whit caps. Standard elsewhere but certainly not standard on the flight deck during air operations. I presume one of them is removing the wheelchock in as much as the Airdales are pushing the Avenger. Why they're pushing when the propeller is turning is just another unknown. [Unknowns in mathematics is one thing but unknowns on the flight deck during air ops are quite another. In fact unknowns in life are unsettling in general and sometimes they lead to unmitigated grief. Certainly not always but definitely often unknowns can be countered by LEARNING. We can seldom distance ourselves from this ever present requirement of learning, nor should we.] These large Avengers (and Helldivers) have a way of making you feel small, especially when they're fired up. This in turn engenders the feeling of helplessness. At one time or another we all know this feeling and this is not unnatural. However, were we to let this become a mindset we would be rendered fairly useless. Our conduct would suffer and our capacity would diminish to the point of "empty". This is no way of living, or should I say existing. Nothing good will ever come of it. It's not enough to say, "Be positive". The feeling of helplessness soon turns to hopelessness which is the figurative abyss. Shake yourself by your lapels and walk smartly forward, head held high. Yes, be positive!

Math Modeling: the foregoing has been somewhat esoteric (mystifying) because the math symbols are not standard ones found in textbooks. This text's nomenclature is limited by this keyboard but as has been said, if the formulas are written on a paper they will be much clearer (besides, doing this is a learning function). Also, we are dealing with the very basics of engineering representation (first principles) from which more complex systems can be fabricated. True, the emphasis is on the first principles of electrical engineering but the system of building blocks derived here applies to most all engineering applications. We'll quickly consider the work, power and energy of a translational mechanical system to provide a little more scope to our study. If a force F is applied over an incremental (small) distance ds (where distance is "s") in the direction of the force a (small) amount of work dW is done equal to dW=Fds. This equation can also be expressed in terms of the velocity of a point moving in the direction of the point. That is, dW=F(ds/dt)dt=Fvdt. [Note that (ds/dt) is a small amount of distance over a small amount of time which is a small amount of velocity as represented by (vdt).] The use of the "d" expresses a small differential of a quantity (here that quantity is "time") and is a fundamental part of the branch of mathematics called calculus. This is a step up the mathematical scale but it is not an insurmountable step at all.


NATIONAL ARCHIVES

DOUBLE THE ATTENTION

I suppose it must be said that we're looking at a conscientious group of Airdales what with their pushing a towed aircraft, or it could be that they just want to keep busy. In either case, kudos to them. We never had the problem of lack of work on the Antietam and I'd like to think that we also would have been just as conscientious. I like that word. It goes well with another nice word, "earnest". If you're earnestly conscientious you're top drawer in my book. Is it possible to conceive of such a world consisting essentially of earnestly conscientious people? Think of the progress that would be made with such an environment. This certainly doesn't imply a lack of mirth and good humor. Far from it. Laughter is good for what ails you and is healthy for mind and body. As always, in all things, it's balance that counts, that's important. // That bulbous appendage affixed to the wing is a radar antenna dome. It was my understanding that it was used to detect boggies at night. That always puzzled me: how is a pilot going to visually detect an aircraft even if the radar tells him there's one "over there"? "For crying out loud" it's hard enough just getting to and following an aircraft during daylight hours. I'm also puzzled by the fact that an aircraft could land on a carrier deck at night. We certainly had no lights on deck and in any case it was a strict rule to keep the ship dark at all times. There were red colored lamps in any open space such as the bridge so as to maintain the ship darkness integrity. Where there was normal illumination there was a cut-off switch which turned the light off when a hatch (door) was opened to the outside. "Darken ship" was a strict rule offended only at your personal peril. It was no problem though because everyone was sensible enough to understand the reason and the consequences. It's a form of intelligence to understand future consequences based on present conditions.

Math Modeling: from the previous page W={Fvdt}(12). That is, the work W is equal to the integral (sum) of the force F times the velocity v of the force F times an increment of time t, where all the increments are integrated (summed) over the time period t=1 to t=2. Thus the verbal description is succinctly stated in a modeling notation of an equation. Since power is the rate at which work is performed it is clear that power P=dW/dt=(Fvdt)/dt=Fv (since the previous page stated that dW=F(ds/dt)dt=Fvdt). Continuing with first principles we consider the model for electrical current which is the flow of electric charge per unit time: i=dq/dt. Electric power is the voltage drop across an element times the current through that element: P=Vi. Since work is a transitory form of energy and since P=dW/dt we can write P=dE/dt. This can be integrated (summed) over time to obtain the energy stored in, or dissipated by, an electrical element over a time-interval t=1 to t=2: dE=Pdt amd E={Pdt}, or E(1)-E(2)={Pdt}(12).


NATIONAL ARCHIVES

FLAPS DOWN, RPM UP

With flaps down and RPM (revolutions per minute) up this Hellcat starts its run from the left of the deckedge elevator (seen at the upper right corner. This will give it about 500 feet of runway as opposed to the normal 400 feet. Looking at the pilot one discerns his leaning forward in perhaps a subconscious desire to will the Hellcat to forge ahead even faster. Starting at 500 feet he'll have no problem (since his flaps are down; if they weren't it could well be a spoiled day for him). We have a fairly good view of the Hellcat's wing. In spite of the perspective notice its somewhat stubby appearance, at least compared to the elongated wing of the Avenger. This brings up the topic of wing-loading (weight of load to wing-area) and aspect ratio. This is an example of a particular form for a particular function. Fighter aircraft such as the Hellcat and Corsair require the function of agility of flight while the bombers are designed to be steady and stable. Thus the aspect ratio of the wings' length to median width is small for the fighters and large for the bombers. Furthermore the fighters, in their agile maneuvers (in dogfights: aerial combat) require a stronger wing structure which is found in the shorter, stubbier wing dimensions. We also have form and function requirements: certain forms of the "social graces" are required for certain functions (activities). For example, it isn't appropriate, to stand up and cheer when the contralto hits a high note at the opera. A nonsense example to make a low-level point in the shortest space possible . The below presentation, as all of them, are meant to inform and not to confuse. If so, I've rendered this book moot if considered uninteresting.

Math Modeling: the next "first principle" subject is the most basic of electrical engineering subjects, resistance. Every circuit has electrical resistance whether wanted or unwanted. Resistance R can be defined as the voltage drop divided by the current flowing through the circuit: R=V(12)/I (convention has it that direct current (DC) is represented by "I" and alternating current (AC) by "i"). Most often resistance is considered linear (plotting V against I on an x-y graph is a straight line). The above formula is called Ohm's Law, a first principle's law. The energy delivered to a resistor is E(1)-E(2)={V(12)idt}(12). This looks complicated but it's not: the energy differential of a current flowing through a resistor is equal to the integral (sum) of the voltage drop across the resistor times the current through the resistor from time t=1 to time=2. [Mathematical nomenclature is more concise and is not possible with this keyboard. I apologize.] We'll finish with the resistor on the next page and then finish this segment with the other two primary elements of an electrical circuit (capacitors and inductors). Though the concepts are straightforward the presentation is admittedly not. Again, use pencil and paper.


9
9
9
NATIONAL ARCHIVES

SPECIAL DELIVERY

The pilot here in the foreground, carrying his navigation board, is on his way to the aircraft to the right probably to escort the Avenger which is being readied to ferry someone to another carrier (maybe an admiral). The yellow-shirt, standing with his back to us, has just brought this Avenger to this point as an Airdale puts a wheelchock around the right wheel (another Airdale is approaching from the right to put a wheelchock around the left wheel). The yellow-shirt remains in place because the launch will take place soon and as long as the engine is fired up he will stay there as will the wheelchocks. Note the inflatable life-preserver being worn around the yellow-shirt's waist. We wore them only occasionally. Also note the hooks on the pilot's harness used to secure him to the seat. These are required even for the "stodgy" bombers where the fighters were "flighty" by going upside down and every which way. [It would be interesting to know if the personalities were a reflection of the aircraft they flew. This will probably be argued on both sides.] While not wanting to embellish it, one is fully aware that danger lurks there even if invisible (if nothing else, the terrible sound signals it's presence). While no one would show concern everyone would show a profound amount of respect for that which could not be seen. [On a tangent, it's pathetic that there are those who think that they're so clever that their iniquities are "safe" just because they can't be seen. It's a pervasive character trait held by the teaming multitudes, but let's not act superior even if justified.]

Math Modeling: First, $V(12)$ means the voltage drop from point 1 to point 2. Voltage is actually "dropped", or used up, as it is traced from point 1 to point 2. Tracing the voltage from the positive terminal to the negative terminal "uses up" all of the voltage. We've already stated Ohm's Law as $V(12)=Ri$ or $i=V(12)/R$ or $R=V(12)/i$. Likewise we've derived $P=dE/dt$ and $E(1)-E(2)= \{[V(12)i]dt\}$. By using simple algebra we can state the following other identities: $E(1)-E(2)=\{V(12)[V(12)/R]dt\}$ which equals $1/R\{[V(12)^2]dt\}$ where "V^2" is "V squared". Also $E(1)-E(2)=\{(Ri)idt\}=R\{i^2dt\}(12)$. Finally by using the formula for power we obtain $P=[V(12)^2]/R=(i^2)R$. The current i squared and multiplied by the resistance R is the most useful of the power formulas. A resistor only dissipates power while the capacitor and inductor both store power (energy). That is, energy can't be retrieved from a resistor. In fact, if the heat of this dissipated energy is not removed the circuit could burn out (become a permanent open circuit). We'll next consider the electrical element called a capacitor. It is a device that stores electrical charge on one metal plate separated by a nonconductor from another metal plate whose charges are repelled from it. [Note; resistors are the most prevalent of all electrical components.]

HEAD BACK, SHOULDERS BACK

Head back, shoulders back, eyes front, engine-cowling vents open, flaps down, catapult-wire taut, deck clear and the arm is down. Now is the time for the green-shirt to push the catapult-launch button. With that there's a sudden jarring jolt as the pilot catches his breath and the Hellcats hurtles forward as the shuttle in the catapult-slot sling-shots this 12,000-lb. load down a 240 foot runway at a speed of 40 mph within about 2 seconds. So it goes for all of the six Hellcats on this right side. Over on the left side there is the same routine with Airdales jumping forward after each "shot" to muscle the next Hellcat precisely over the slot. This adagio takes place every 30 seconds almost like clockwork. The Airdales doing this are standing, right now, just out of sight to the right. It's a routine drill well rehearsed, this catapulting of Hellcats and Corsairs and Avengers and Helldivers. The ears wilt under the incessant, insistent noise whose assault on the ears has become the norm over time. Pretty picture, so tranquil. "Fat chance" with all that overpowering energy saturating the area. That blessed tranquility will have to await the coming eventide. The example of the catapult helping the Hellcat is a good one. We all need to give (and receive help). While we all applaud those who give aid and comfort to those in need what of those who deliberately impede the well-being of others? What is it that "makes them tick"? Why harm the innocent and the vulnerable?

Math Modeling: The second fundamental electrical element is the capacitance. It's found intentionally and unintentionally in all electrical circuits. Again, a capacitor is formed by two conducting materials separated by a nonconducting material with the separation usually measured in fractions of an inch. An electrostatic field (positive charge on one side and a negative charge on the other side, similar to a battery) is set up when a capacitor is charged. Only an alternating current can "flow" through a capacitor; direct current only charges the capacitor as if filling a cup full of charges to create a "battery" (a storage of electrical energy in an electrostatic field). This energy can be retrieved from storage (again, the Holy Grail is the massive storage of electrical energy). An ideal capacitor has the linear relationship of charge equaling capacitance times a voltage drop ($q=CV(12)$. Differentiating (taking very small amounts) both sides gives us $dq/dt=C[dV(12)/dt]$. Using this equation and the already defined $i=dq/dt$ we arrive at the describing equation for an ideal capacitor: $i=C[dV(12)/dt]$ or $V(12)=1/C[\{V(12)idt\}(12)$. Energy delivered to a capacitor is $E(1)-E(2)=\{V(12)idt\}=C\{V(12)dV(12)\}$ since $idt=CdV(12)$. Thus $E(1)-E(2)= C[V(12)^2/2]$ or $C[V(1)^2/2]-C[V(2)^2/2]$.This will be unraveled on the next page. The quantity $C[V(2)^2/2]$ is the initial and $C[V(1)^2/2]$ the added energy.

ALL HANDS, FRONT AND CENTER

From the right, from the left, they all stream in, front and center. Here's a classic portrait of a typical landing made by the genre Hellcat. As has been said before Hellcats, of all the aircraft, is the only one that requires help in folding its wings. As a group the yellow-shirt, the two green-shirts and the several blue-shirts converge on the just landed Hellcat. The yellow-shirt holds the pilot in place as the two green-shirts unhook the arresting-wire (one is now lifting the tail-hook as the other green-shirt on the left is about to grab the wire) The Airdales are running somewhat behind the Hellcat to avoid being struck by the wing as the Hellcat plays out the arresting-wire. With the brakes firmly applied the yellow-shirt will in a moment indicate to the pilot to energize the wing-folding system at which point the Airdales will lean hard on the wings to snap the cwings in their folded configuration. All of the above transpires in about 10-12 seconds at which time the yellow-shirt gives a vigorous "come on" motion to the pilot so as to clear the area for the next aircraft some 20 seconds after this Hellcat had touched down. Obviously the pilot depends on all of these personnel shown here to complete his flight. Are all of us any less dependent on others for our well-functioning lives? Of course not. We are seriously dependent on others: who provides the lights, the water, the groceries, the heat, the "you name it". And yet one of our most precious jewels the the capability to be as independent as is otherwise feasible. The less we depend on others the better. It's a somewhat delicate balance of which we speak. We must be very vigilant about maintaining that balance.

Math Modeling: the third and last electrical element is the inductor. Similar to the resistor and the capacitor it too is found in electrical circuits both intentionally and unintentionally. The inductor can be thought of as the opposite of the capacitor. All electric conductors are surrounded by a magnetic field. This magnetic field can be concentrated by configuring the conductor in the form of a coil. The more coils the greater the strength of the magnetic field. This field can be increased even further by wrapping the coil around an iron core. However, doing so makes the inductor nonlinear (not a straight line on an x-y graph) and thus makes for more difficult mathematical modeling. The describing equations for an inductor L are similar in form to those of the capacitor. They are: i=1/L{V(12)dt} and V(12)=L(di/dt). [Recall that di/dt is a small change in current i for a correspondingly small change in time t; "d" represents a differential, a small change.] The strength of a magnetic field around and the voltage across an inductor are related by Faraday's Law: V(12)=d(N*)/dt where N is the number of turns in the coil and * is the number of magnetic flux lines through a circuit. To be continued.

CUTTING IT CLOSE

My first thought about this picture is , "You're cutting it close" as witness the left wheel and the edge of the flight deck. There's a small "lip" at the edge of the deck but not so prominent as to stop a large wheel from overrunning it. I f the wheel did go over the edge it would drop down to the catwalk about 4 feet lower than the deck and not (necessarily) the 50 feet to the water below (the catwalk is about 2 1/2 wide). It would of course ruin the prop, ruin the pilot's/yellow-shirt's day and provide additional work for the Airdales. In all likelihood there will be no such scenario. What that officer is doing pointing I don't know unless it's to indicate the parking spot he wants this Avenger to occupy. Since the yellow-shirt is also an officer (khaki pants) it seems superfluous (never did I observe anyone wearing a garrison hat on the flight deck during air ops; this is a landing operation). For some reason the Airdale has no goggles and thus with a lowered head is limited in knowing what's going on. Bad procedure. Note the diminutive size of the pilot in the cockpit. One is better able to have a better sense of proportion vis-a-vis the size of the Avenger. With nothing against which to measure it the Avenger looks like just another aircraft. With the pilot there one is impressed with the sheer bulk of this aircraft (on a deck filled with other aircraft). In life we often don't appreciate what's appropriate because we've lost all sense of proportion. For instance, is it appropriate to "have a fit" (be extremely angry) because someone cut in front of you on the road? No and no. No because it won't accomplish anything useful and no because you might do something dangerous to yourself and to OTHERS. "For crying out loud", you aren't the only one on the road or are you so self-centered?

Math Modeling: if no iron is used inside the coil of wire then the magnetic field is linearly dependent on the current flowing through the coil. That is, d(N*)/dt=L(di/dt)=V since V(12)=d(N*)/dt. The energy delivered to an inductor in the interval t=1 to t=2 is E(1)-E(2)={V(12)idt}. Thus E(1)-D(2)={[(Ldi/dt)]idt}=L{idi} which equals L[(i^2)/2](1)-L[(I^2)/2(2)](2). Admittedly all of this looks like jargon. It is not but it is difficult to unravel as presented (as best I could). The point to be made is that these things, esoteric though they appear here with limited space and nomenclature represent real world phenomenon. Here it's similar to a puzzle; in a basic text is will become clear. This paragraph, and the others, are meant to whet the appetite hopefully without "turning you off". Look at it as a new adventure in learning about a fascinating subject, for it is truly that. The second term of the above equation is the energy initially stored in the inductor and the second term the energy (magnetic field) stored at the later time. Energy in the interval is added to the original energy. Next will be simple electrical circuits

WHERE'S EVERYBODY?

Two seconds ago this Hellcat touched down on the deck and has played out about 60 feet of arresting-wire (notice it in the foreground). The curled wire on the far side of the flight deck is probably defective arresting-wire temporarily put out of the way. Apparently there's only one green-shirt this time to unhook the tailhook while the rest of those in this picture are Airdales. But where are the rest of them? They should be johnny-on-the-spot available to help the Hellcat fold its wings. It could be that they're out of sight to the left because the Hellcat plated out more cable than expected. However if it's a "hot" landing they should know this will happen and should already be on their way to the right to "intercept" the Hellcat. I must admit though that I spent almost all of my time up forward where the parking activity was underway because there always seemed to be adequate numbers of Airdales back aft to handle these Hellcats. Some people are quick to respond to a situation and others are more measured in their actions (or should I say inactions?) That's always a question: are they more deliberate in their reactions to situations or are they simply indecisive and/or tentative? Deliberate is fine in most cases but responsiveness is called for at times. On the flight deck it's ALWAYS called for as shown in this picture. As in everything else there needs to be a balance between quick response and deliberate reaction. The one feeds the other in a useful synergy (combination). [Note the barrier is half way (45 degrees) down to let the Hellcat pass.]

Electric Circuits: to close out this subject of electric circuits there will be explained the experimental laws on which circuit theory is based. These topics are;1) Kirchoff's Current Law, 2) Kirchoff's Voltage Law, 3) Ohm's Law (resistance), 4) Faraday's Law of induced voltage, 5) the law of capacitance, and 6) a law concerning electric power. Only items 1 and 2 are new so this will be essentially a review (an important one). Circuit analysis, like all science, is developed from experiment and observation. (We've mentioned the importance of observation in everyday life. It's the life-blood of science.) Theory is the generalization of experimental evidence (observation). The vast and powerful theoretical structure of electric circuits is based on the above six experiments. This is truly remarkable (and satisfying). It's stimulating to realize that there's so much available "out there" if you have a good understanding of the concepts of electrical and electronic topics. It's almost as if the world's "your oyster".


NATIONAL
ARCHIVES

HIGH FLY-OVER

This Hellcat was afforded fair warning that a high fly-over was in the offing (thus allowing a safe wave-off). It was, we presume, about 20 seconds following the Hellcat on the deck. Evidently that Hellcat was unable to fold its wings as note the Airdales returning to the side of the flight deck. This problem must be removed by taxiing to the deckedge elevator and down to the hanger deck to clear the area for the following aircraft. It should take only 10 seconds to fold the wings and start taxiing forward. This didn't happen here so the LSO (Landing Signal Officer) had no choice but to give the wave-off. This was an easy wave-off. Sometimes the pilot is not "in the groove" (too high, too low, too fast, too slow, too tipped, whatever) which might require a late wave-off causing the aircraft to pass overhead much lower and thus much more unsafely for the pilot (and the personnel on the flight deck). Here though he was given fair warning of a wave-off (since the landed aircraft was still in place. This alludes to that sometimes emotional word "fair". What is it to be "fair"? Let's try some interpretations for evaluation: The present-day jargon is that there should be a "level playing field" (that will appeal to the sports-minded). That is, treat everyone equally without prejudice aforethought. Favoritism has no place as does not the disadvantage of having separate starting lines in a race. However, however, to expect equality of outcome is just as unfair as showing partiality or prejudging. So it's equality of opportunity not equality of outcome that would seem to be a good single-sentence definition. (Now what's equal opportunity? This can be a tricky question.)

Electric Circuits: first, let's establish the simplification of impedances in a circuit. Impedances in series are algebraically added while impedances in parallel are determined in this manner: Z1 in parallel with Z2 equals (Z1xZ2)/Z1+Z2. Now, 1) Kirchoff stated that the sum of all currents to a junction equals zero. This is the same as sating that the sum of all currents flowing to a junction equal the sum of all currents flowing from that junction. 2) Kirchoff's second statement says that for a circuit containing a voltage source and impedances the voltage drops across all of the impedances equals the voltage of the source. This makes sense for as one proceeds from the positive terminal of the voltage source voltage is dropped as one proceeds past each impedance. By the time one arrives at the negative terminal of the voltage source all the voltage has been dropped (used up). So, all the voltage that was dropped when added together equals the voltage of the voltage source. 3) As has been stated Ohm's Law says that the voltage is equal to the current through a resistor times the value of that resistor (v=iR). The resistance mean impedance which is the capacitive reactance X(C)=1/[2(pi)fC] & inductive reactance X(L)= X(L)=2(pi)fL.

STARTING A NEW JOURNEY

The static friction of the brakes overcame the furious wrath of the fired up engine but at this very moment the pilot has released the brakes to set in motion this overcharged Hellcat as it take its cue from the demonstrative launch officer. Navy carrier aircraft were either this dark blue color or a light blue top over a cream underbelly. Both colors were to provide camouflage (the Army Air Corps used olive drab or nothing at all, i.e., silver). It's my distinct recollection that we on the Antietam carried only this dark blue color which gave the aircraft a somewhat menacing appearance, or at least a very business-like countenance. Nothing fancy here: it's all business being undertaken when the Fox flight-quarters flag flies. That was the prevailing attitude that seemed to permeate the flight deck when air ops were underway. Somber and "heavy". And yet, how can any one deny that friendly smiling face that the Hellcat always carries with it wherever it goes? Will the face belie the function? Not likely but it's not a bad idea to be alert to the happy incidents in life. It would be a drab life were it not for such humorous insights to counter the overbearing amount of reports put out by the "bad news bears" (the purveyors of gloom). At our peril do we ignore the deleterious (dark news) but, "may the Saints preserve us", we all need some balance in life where joy and gladness are given equal time. Life was not meant to be stern except if necessary.

Electric Circuits: 4) We've already derived, after a fashion, the formula for self-inductance. To refresh, it is di=1/L(vdt) which when rearranged equals i=1/L{vdt}. Faraday also found that a changing current in one circuit (coil) will induce a current in another circuit (coil): v(1)=L(12)[di(2)/dt]. Note the use of lower case (AC) because the current must be CHANGING. We have Faraday to heartily thank for making possible all of our electric motors. Another researcher, Lenz, determined that the induced current is in such a direction as to oppose the flow of current and oppose the change of the magnetic field that produced it. The voltage that opposes the change is called back emf (electromotive force).One could say it acts as if it were a mechanical brake. [Incidentally, an electric-gasoline engine generates electricity for its motive battery whenever the car slows down.] Remember, all wires have a magnetic field concentric around it. The magnetic field of a coil is through the core of the coil and back to its starting point. This is called a magnetic flux and is visible if iron fillings are placed on a piece of cardboard that has been pierced by the wire. The inductance of a long coil is L=[u(N^2) A]/l where L=inductance, u=permeability (a constant 12.6(10^-7 for air), N=number of turns in the coil, A=cross-sectional area and l=length of coil. A short coil is the same except that it is divided by 0.45(diameter). We will now consider capacitance.

PERFECT PICTURE

This is an excellent picture in that it shows a view of the near perfect process of a landing operation. I would amend that somewhat by saying that to be perfect there would have to be another aircraft to the right just about over the left wing tip of the Helldiver in the foreground. Also, there would have to be an Airdale approaching on either side of the Helldiver with wheelchock in hand. Then it would be perfect. In defense of the Airdales, this Helldiver is taxiing up the deck at about 30 mph (folding its wings as it goes). It's a little much to stay with an aircraft at that speed as you run into a blast of prop-wash. I did it more than I wanted to by grabbing the wheel-strut and letting myself be semi-dragged (young people sometimes do dumb things: why not await the Helldiver at the parking area? The reason was, as I understood it, no aircraft should move under power without a wheelchock nearby. I sometimes was just too close.) This is the last of the Helldivers and the first of the Avengers (in the air). Note the two yellow-shirts to the left and the helmeted gunners in the 40-mm gun-tubs (must be enemy in the area) If I were in this picture I might well be running out to that Helldiver right now. Trying to run with those aircraft was probably dumb (that is, not smart) but perhaps the dumbest thing I've doe was to put all my faith and trust in a friend only to have that friend, to my honest bewilderment, withdraw hers to the point of being adamantly unfriendly. I did no wrong and she was well within her "rights". Ah, youth in full bloom.

Electric Circuits: 5) We've discussed capacitance before so we'll only skim it here. Whenever two electrical conductors are at different potentials (voltage levels) there will be a n accumulation of electric charge. This differential of electric charge is said to be an electric field (as opposed to a magnetic field). "Fields" are forces and not tangible, material things. (This in turn makes them more difficult to visualize and thus more difficult to conceptualize but do so we must. Maxwell's four laws of electromagnetic fields, so important to communications equipment, is somewhat esoteric and wrapped up in higher math; this we will not discuss). As refreshment, i=dq/dt=(Cv)(d/dt) and Cv={(idt)(0->t)} or v=1/C{idt(0->t)}=q/C. (We've been using both differential and integral calculus throughout these last pages. This math capability is required for serious work in the engineering disciplines (note the word "discipline") but most all of you are up to the task, for it's a task which you'll enjoy because it's a challenge. Right? Capacitance was found to be C=eA/s where "e"=dielectric constant, "A"=area of conducting plates and "s"=the space between the plate (this implies that the plates are large compared to the distance between them. The potential difference v={Eds} where "E" equals the electric field. One more page.

NO TIME TO SPARE

With flaps down and a 56 foot wing-span with an area sufficient to provide enough lift to raise this 16,000-lbs. (loaded) Avenger airborne, it is able to reach the end of the flight deck after an 80 yard run. That's as good if not better than either the 12,000-lbs. (loaded) Hellcat or Corsair with their 2,000-hp or higher engine vs. the 1,700-hp engine of the Avenger. The larger wing-area (490 square feet) of the Avenger vs. that of the Hellcat ((335 square feet) explains the difference. The green-shirts are racing to retrieve the catapult-cable and return it to the next aircraft being prepared on the catapult at this very moment. The cable is heavy and time is of the essence which is about 40 seconds per catapult-lunch. Thus two of them are required. Also right now the pilot will retract the wheels to the wheel-wells in the wings to decrease resistance to the speed of the Avenger. Without adequate speed there will be a water-crash as the Avenger falters and loses altitude (realize that the aircraft at this point are 50 feet above the water). This is a picture that bespeaks of action. Nothing is said because there is nothing that needs to be said on the flight deck during air operations. Are we the same? To use the current jargon, do we "talk the talk but not walk the walk"? Can they deride us by saying that "action speaks louder than words". What's the good of saying without doing? While procrastination is considered a pejorative word by most everyone, it is the one who says he will but actually wont who is to be scolded (or is that too mild?). It all comes down to, "Just how good is your word? It touches upon that golden word, "honorable". Is it worth going through life not being honorable?

Electrical Circuits: 6) There is an electric field E, a constant, between the plates of a capacitor. The integral (sum) of this field E times the differential distance ds between the plates s is the potential difference v. So v={Eds}. If a charge q is placed on the negative plate there will be a force on it: F=qE. As the charge moves to the positive plate work is done on the charge by the electric field E. Using the mechanical force equation we obtain work equals force times distance: w=Fs. Since F=qE then w=qEs and since v=Es then w=qv (just take it slowly; I remember when I was young I wanted to absorb these type equations in staccato time, and it usually didn't work the first time through, By taking my time in the initial stages things worked out fine, so take it slow(ly) at first). Therefore, w=Fs=qEs=qv. Power equals work per unit time: p=dw/dt=dq/dt(v)=vi (power= volts times current). Thus the total energy (work) is the integral of power from time t=0 to time t=t which equals the integral of volts times current in the same time interval: w={pdt}={vidt} from t=0 to t=t. The work (energy) is supplied by a battery/generator and is dissipated as heat. With the previous pages one is now able to work with electric circuits.

IN THE PALE EARLY LIGHT

In the pale early light of a crisp morning we start the orderly progression of launching one aircraft after another, one by one, till all 90 of them are in ordered echelons high overhead that seem to fill the shy as the four stalwart 5-inch guns stand on guard against those damnable marauders that seek naught but our demise. The sentence may be long but the thought is even longer, trailing hopefully on into a brighter day. Danger can be overt or it can be covert. On the flight deck at launch-time it's open and brash; over that wide horizon it's but stealt. The watch-word here on board "always" seems to be "en guard!" A close look just above the horizon to the right will show the preceding aircraft which is properly about 30 seconds ahead of the near aircraft. Thirty seconds times 90 aircraft mean a 45 minute launch-time, if all goes well (which it usually does). The photographer for this picture is located in the position of the 40-mm gun-director Mk51 (with a Mk14 gunsight) which is just in front of and below the flag (admiral's) bridge. As these pilots fly off into the gray dawn of a an unknown hostile place how fortunate are most of us to reside in the comparative comfort of an essentially nurturing world. The question arises, "Do we appreciate it and do we in turn take proper advantage of our situation"? Looking back over time we are the most fortunate of anyone who ever lived. We of course take all this for granted and in so doing we become spoiled (some would say, "spoiled rotten"). Hey, get off your duff and do something to deserve your good fortune!

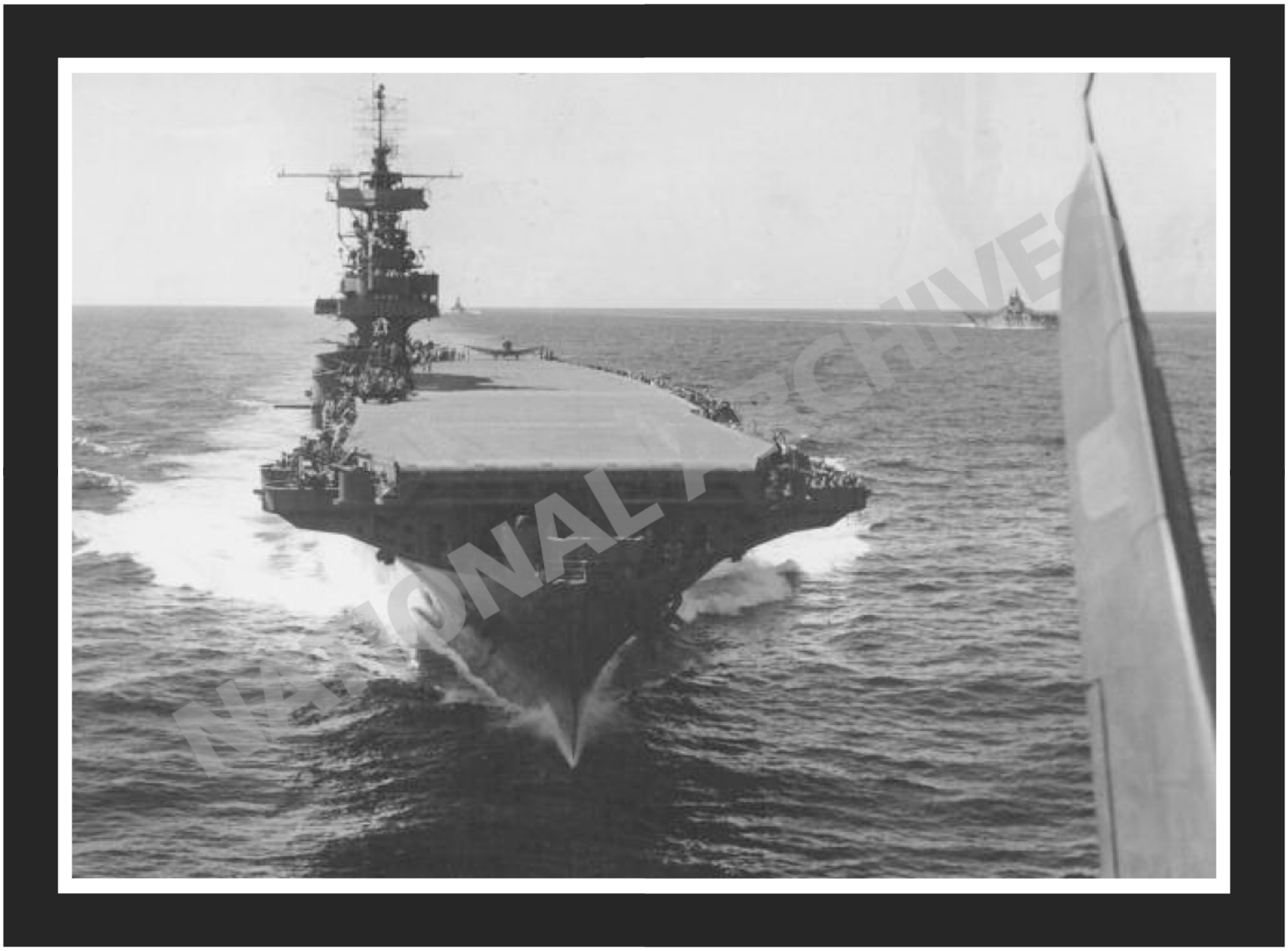
Robotics: robotics is a well-defined area of study and use that includes the knowledge and techniques of various disciplines including electrical engineering, mechanical engineering, mathematics, machine design, system analysis and computer programming and computer use. It also makes use of feedback control systems (my "first love"). A computer-controlled mechanical arm is probably the most definitive example of robots today (we've all seen the mechanical arm that covers an automobile with spray-paint). While the popular press likes to show robots as "replicating" humans the real use of robots is in the arena of manufacturing production lines. They are essentially an advancement of the standard machine tools that make possible the vast material wealth of any industrial country. These machine tools (and by extension, robots) are one of the main pillars of what is called the infrastructure of society. People have different things which give them a thrill. The one that I find most "thrilling" is the view of a manufacturing plant whose floor is filled with machine tools "doing their thing". (Imagine an atm picking up a small chip and placing it precise over and into tiny holes in a fraction of a second..That's thrilling!)


NATIONAL ARCHIVES

PRE-ESSEX

This ship that's knifing through the water straight at us is a pre-Essex-class carrier (if I'm not mistaken it's the U.S.S. Hornet or U.S.S. Wasp). It's carrying an SBD Dauntless dive-bomber, the hero of the Battle of Midway of June 4-5, 1942 when they sank four enemy carriers. As has been said it was this battle that turned the tide of the war in the Pacific. To the right is an Essex-class carrier with a battleship brings up the rear. It was the former that took the war to the enemy with its relentless island-hopping campaign (with of course the marines doing most of the land fighting). Since we're in the aircraft that just left the ship it might be instructive to mention the wing-loading (weight per wing-area) of the various aircraft. The SBD (9,500/325=29.2) , Corsair (14,700/315=46.6), Hellcat (15,500/335=46.2), Helldiver (16,600/422=39.3) and Avenger 18,300/490=37.3).This shows that the smaller, more agile fighters have larger wing-loadings than the heavier, more ponderous bombers. The fighters also have the more powerful engines even though smaller (lighter) than the bombers. I can't attribute any significance to these figures unless its to say that the smaller wing-loadings would be more reliable. Reliability is of course important in any aircraft and perhaps that's reflected in the fact that the bombs carried by the bombers require them to be more reliable. I'm out of my depth here and so will only comment that in our lives as you would have those on whom you depend be dependable so too should you be dependable. Not being able to rely on others is most often felt as a definite negative. Why make things more difficult for others and so in effect on yourself? Dependability, reliability, bespeak of someone who cares about others in a non-obsequious manner.

Robotics: robotic arms have several degrees of freedom (joints). Each degree makes the design of a robot more complicated in an exponential manner. This causes the mathematical representation of such complexity that a computer and its program are required for both the design and analysis of the robot. Many applications of robots make use of an end effector in the form of a gripper (hand) which causes the robot to take on many of the characteristics of a human with all its muscles and ligaments and nerve and even intelligence. In short, a robot can be very simple all the way to very complex. To those interested in robots it's this complexity that makes them so intriguing. Also the many articulations (joints) make it difficult to supply power to these mechanical joints (which power may be electrical or hydraulic (oil) or pneumatic) (air)). The bulk of these motors and their gearing make for awkward "contraptions" and mich work is being applied to miniaturizing these items. The field of robotics is certainly a ecumenical undertaking and one of the reasons they are so interesting (and fascinating).


NATIONAL ARCHIVES

AFT ELEVATOR

If one looks closely it's noticed that there is no railing around the elevator (as there should be). Normally when the elevator goes down, the railing rises up from around the elevator (about four feet high). The first clue was that no one was leaning over (on the railing). Some are close to the edge, some are not. Some don't mind heights, some do. The drill here is to bring aircraft from the hanger deck below and spot them on the flight deck in preparation for a launch. My observation is that there are very few bombers in evidence: they are usually the furthest back in the pack (back aft) in addition to the fact that the packing-factor (closeness) is minimal. "On the Antietam", that training ship, we packed them cheek-by-jowl to fit most of the 90 aircraft to be launched. Our complement was usually 100 aircraft starting with 20 Avengers all the way back, then 20 Helldivers, next 30 Corsairs and finally 30 Hellcats (that equals 100, some of which remained on board for various reasons). The packing-factor was the Airdale's nemesis, the bane of his existence; he just had to live with it. He didn't like it but that was completely immaterial (to the big and little picture). You quickly learn that there are some things in life you can't change, so you adjust. It might not be understandable (as a lost friendship) but "that's life". As they say, "deal with it" which means turn your attention and interest to other things (that are productive). ["God give me the Serenity to accept the things I can't change, the Courage to change the things I can change and the Wisdom to know the difference".]

Robotics: a robot control system usually consists of electronic circuits which control the motors and gearing of a robot. Sometimes these controls merely sequence a set of steps to complete a program. This approach is found in the production lines of machine tools that perform a sequence of mechanical steps to form and machine a metal part that is to be used in a larger piece of equipment. At the other end of the spectrum are those robots that have a limited amount of intelligence inserted into their programs so that they can perform actions based on (somewhat) arbitrary actions that preceded the present situation. All systems require the use of so-called servosystems. These systems feed back a portion of the output signal which is compared to the desired signal which in turn generate an error signal that is used to correct the original control signal. This is also called feedback control. It in fact replicates the idea of a human control systems: a driver compares where he is to where he wants to be. The difference is the error signal which is used to correct his present position. This concept has been with us a long time but now it has become very sophisticated and mathematical and computerized. As has been mentioned previously, neural networks, a computer program, are being used to address this problem of complexity.

LAST FLIGHT ABOARD

With this last Avenger aboard the Airdales turn to and start the process of respotting the flight deck for the next launch. There's an Airdale on either side with a wheelchock in hand to follow and then chock this Avenger at the furthest spot back aft. No time to let the brown-shirt plane-captain on the wing finish his conversation with the pilot. "Time's awasting" and there are many aircraft that need to be respotted. This will include the retrieval of those aircraft that were taken down below via the deckedge elevator during the landing operation (perhaps every third aircraft went directly to the deckedge elevator to go below (since that elevator is not in the flow of traffic going up forward. That operation of taking an aircraft below requires about 5 seconds once it has taxied onto the elevator. Once down below the hanger deck crew push the aircraft off the elevator and its back up topside in another 5 seconds (5+5+10=20 seconds total). During the landings promptness is required. Now that promptness is less urgent but the sooner the job is finished the sooner we go to chow. Then shortly after chow the entire process of launch and land is repeated. Promptness and punctiliousness are watchwords on the flight deck as it should be everywhere where others are concerned. For one thing it's polite. For another it promotes good work habits (and study habits) which in turn make for a more smooth (prosperous) enterprise, whatever that enterprise is (including homework study-habits for professional and student alike). The very essence of efficiency is found in promptness. No nation can be great if it is not efficient. No Navy can be its best without this attitude, this frame of mind. [You don't like to be kept waiting so why should you make others wait? It's annoying to wait. Be polite.]

Robotics: the servosystems that mechanically control a robot require sensors to detect the physical positions of the sections of the articulated arm. These sensors send back position data which are the actual positions of the arm segments. It is this set of actual positions that are compared with the desired position that in turn develops the error-signals to properly position the arm segments. As was said when there are more than two segments to an articulated arm the mathematics becomes extremely complex and other methods of control must be derived in place of these mathematical models. One very soon appreciates the marvel of a human doing rather simple things and the not so simple ones that a basketball player performs while in motion. Most all of us have no appreciation of how "fearfully and wonderfully made" were. The study of robots will quickly disabuse us of all notions that what we do physically is "simple". There's a popular idea that robots are a mechanical representation of man. Wrong. The vast majority of robots are of the variety of articulated arms and it is this that is called "robotics".

AT LAST FINALLY LET LOOSE

Right now, at this very moment, there are Airdales ensconced, one at a wheel, in among those Corsairs roaring their impatience to be set free to mete out a just punishment to those who would have us submit to their damnable domination. It is writ large in the form of these Corsairs that that domination shall not happen, now or ever. Each and every man on this flight deck is committed to such an outcome. Rest assured of that even while their life and limb are in jeopardy. This that we observe on this, a sovereign piece of our country, is dedicated to the fulfillment of that end where here the means do unfortunately justify the ends. Though we tire we will see it through to the inevitable end. (Hear our prayer.) // The launch officer is about to let fall the "launch" flag while a yellow-shirt, just to the left of the Corsair's right wing-tip, is holding the following Corsair in place (not too close to the tail-section of the near Corsair, thankfully). The personnel in the foreground are being buffeted by the prop-wash of the Corsair that just took off (this added to the normal 30-mph wind over the front of th flight deck). While the Hellcat has a "smiley" face the Corsair is pure aggression and "all business", the business of aggression and retribution. This is its job, odious though it may be. "Aggression" is a pejorative word while "aggressive" need not be as long as it's constructive rather than destructive (by "walking all over someone"). Benign aggressiveness can be the means of accomplishing good and beneficial things (such as doing a thorough job with homework). We need that kind of aggressiveness, truthfully. This is called being proactive as opposed to being reactive.

Robotics: a more sophisticated control system for robots may generate trajectories of the articulated arm which are not fixed but vary with the state of the external world as detected by the robot's sensory system. These devices may be optical or mechanical but in most all cases they generate an electrical signal which can be modified and adjusted and filtered by electronic components. The most advanced robotic systems make use of hierarchical control in which there are different levels of functions(move the arm that moves the hand that moves the finger). In this way the succeeding lower stages receive their control signals from the preceding higher level. Each level has its own interpreting device which at the higher levels are microprocessors. To achieve this derived control signal each level must have sensors that define the status (state) of itself and the outside world. Just as in the human nervous system, these robots (machines) must decompose the pertinent command from the delivered command (move the finger decomposed from move the hand decomposed from move the arm). This allows the robot to be controlled with very general commands at the highest level of control. Sensors next.


NATIONAL ARCHIVES
168

TEST-TIME

It's test-time to verify the quality of work done on the mechanism that folds and unfolds the wings. These wings are so wide (56 feet) that it can only be done conveniently on the flight deck. I never saw it done at a 90 degree angle as here and I can't give a suitable answer why this is so. That's no doubt a high rated mechanic in the cockpit and probably the brown-shirt plane-captain of this Avenger closely watching what they're doing to "his" aircraft. What a feeling to consider this "your" aircraft! (And so young——-probably about 20 years old and striking for a rating as a mechanic; a "striker" is someone who is trying to achieve the qualifications of a given rate: 3rd class, 2nd class, 1st class, and chief of various grades). I noted the other day that the U.S.S. Washington, a ten year old carrier which is100,000 tons (compared to the Antietam at 30,000 tons) had a crew of 6,000 where we had a crew of 3,000. The Washington carried 75 aircraft, we carried 100 aircraft. Their air department was 1,600 and ours was I'm guessing one half that. The point is that there was a much larger burden on our mechanics than those of today. (Caveat: today's aircraft are much, much more technical, primarily in the area of electronics). Nothing but quality work is allowed here on the flight deck. Lives are at stake. Even though lives are not at stake in our normal rounds we should nevertheless do our work with the highest quality we can muster. Anything less is a derogation of our obligations to ourselves (if not also to others).Working hard, with pride in ourselves, is just plain good sense (and fun). It almost seems that it's a given that one would take pride in doing one's best. Right?

Robotics: the purpose of a robot's sensory system is to gather specific data needed by the control system. In the more advanced robotic systems data is required to maintain an internal, predictive model of the robots environment. These inputs are visual, tactile, proximity, acoustic and mechanical force or torque (rotational force). The most common type of data used is the sense of the visual. This might be done by computer analysis derived from data from a television camera. If the shape and and orientation of the object being worked on are known then the computer derives the required motion of the robot using this data. It's a complex process that a human does all the time with ease (again, we're "fearfully and wonderfully made"). A relatively new technology is being used to guide the robot through it's paths. This technology is called "artificial intelligence" and it has many facets (including neural networks, those computer programs that very partially emulate the human nervous system in the most rudimentary of ways. There are those who have tried this technology and have found it to be too artificial. However, time will tell as scientists apply themselves to these problems. To whom can we turn?

“IT’S YESTERDAY ONCE MORE”

Strange, as I write this “it’s yesterday once more just like before” that “melt the years away” (prompted by listening to Karen Carpenter’s rendition). [When I hear her also sing “For All We Know” it’s (perhaps) usefully instructive to realize that “only time alone will tell” whether or not you’ll make it through the trials and tribulations]. While these songs are (perhaps) usefully poignant, impact-full images make for impact-full memories. How many “high bouncers” as here did I “experience” back then when they were for the first time? Yesterdays have a way of being dull or being vivid. Here it’s the later. Whether the aircraft was high or low, fast or slow, an Airdale comes to know what will and will not transpire, thus determining the level of anxiety that this time will present. While the launch process is more visceral what with the wind “trying to” move you toward those terrible, terror-filled flashing blades, the landing process is essentially an intellectual exercise in that one learns the possible result of a present aircraft landing by having observed the many that preceded it. Here, depending on the Hellcat’s height at throttle cut-off time and its speed, one can make a determination as to whether or not the Hellcat will make a barrier-crash or hurdle the several or all the barriers to crash into man and machine up forward. Being observant not only is a learning process but also can be most useful in making “a day in the life of an Airdale” much more satisfactory. Keen observation, every day, is a learning technique that will serve one and all. Learning can be, no, IS, considered the nourishment of the mind just as food is for the brain.

Servomechanism: this is a system in which a sample of the output is sent back to the input to control the (usually) position of a physical object .A common example of a servomechanism is the system that controls the position of the rudder of a large ship. With only a minimum of physical effort a large rudder follows the position of the wheel in the pilothouse. This is also called a feedback control system based on the foregoing mention of feeding back a sample of the output. This sample in turn is compared to the desired input (position of the wheel) to generate an error signal which is used to drive the amplifier which drives the motor which moves the rudder. The output can be a function of velocity or acceleration (which are related to distance (position or rotary position). Servos are used to correct for deviations in position, speed, acceleration, correction of load variations, environmental changes, power supply variations, changes due to aging, deterioration of mechanical and electrical components, and various other problems of controlling mechanical devices. Another application involves the regulation of power output as well as the control of one shaft by another without mechanical linkages.


25
7 F25

CLOSING IN

Apparently this Avenger is closing in too fast for the likes of the yellow-shirt officer as he holds up his hands in a slow-down signal. He quickly considered the situation and deemed it a little too chancy what with the Avenger's left wheel being fairly close to the edge of the flight deck (notice that we can see the shadow of the Avenger's cowling on the deck meaning that the wheel is mot all that close to the edge. However it's close enough that there are no spectators here at this location. They know that if the wheel goes over the side there will be debris thrown about and maybe even a flash-fire. As has been mentioned there is virtually no "lip" at the edge of the deck, nothing to stop the wheel from rolling over the edge (there's only a 6 inch wide, 2 inch deep scupper there (a channel for rain-water, certainly not capable of stopping a wheel that size). There are presumably Airdales at each wheel with a wheelchock in hand. This is always so during a parking process as they watch (or don't watch) as thee aircraft move forward, as here, about as fast as a normal walking-pace up to about three feet from the aircraft's's tail-section in front of it. It's then that Airdales "earn their pay" as those last inches are closed inexorably, in jerky movements, to as close as 6 inches from the aircraft in front of it. You look away, you look ahead and gnash your teeth, you mutter imprecations, you pray and maybe you do all that at the same time. As for those absent curiosity seekers, they eschew the parking process because no good would come of their (ghoulish) curiosity. However, instructive curiosity is not only good, it's downright good. It's not only an excellent learning tool but it's also your stepping-stone to achievement of which you can be proud. [Quiet pride that's earned is invaluable. Nobody can take that pride away from you (as long as it's earned). It's your treasure.. Don't tarnish it.]

Servomechanisms: the objectives of a servomechanism could be achieved if the components in the system were very accurate and reliable. These are prohibitively expensive though. The salient advantage of the feedback system (servomechanism) method of control is that it permits the economical deign and production of accurate systems using comparatively inaccurate components for the most part. The first servo of note was the speed control of a steam engine: the faster the engine operated the more would two iron balls fly out due to centripetal force (the iron balls were of course restrained by levers). As these balls extended further and further outward the more they would restrict the fuel input to the engine thus limiting its speed. Mention has been made of the fire control systems of large naval guns. The detected error between the desired direction of the gun and the actual direction was used to diminish that error. Servos are found in almost every industrial application of production.

"OWW, THIS HURTS!"

I can vouch for that, having spent part of a day passing ammunition in a 40-mm gun-tub. Each time the gun-barrel recoils your mind recoils in protest (you realize that these are four machine-gins in staccato parallel). He's a sky lookout working in tandem with the target designator behind him. They're part of the fire-control system for those four 5-inch guns whose barrels can barely be seen in the smokey haze below left. They seem to be pointing at the same targets are those 40-mm guns which are perched atop the pilothouse. (It was this lookout chair(s) back at the after bridge in which I'd camp myself after evening chow, there with all the vast expanse of sea and sky to be my own alone. It was during these evenings that I was fortunate enough to be able to watch the sky as if it were a gigantic canvas on which Mother Nature painted in either a bright or subdued palette her most glorious tapestries of illuminated cloud presentations. The sorely tried soul received succor and was released to soar heavenward unfettered by the rigors of the past day. How much do we take for granted, how much do we not appreciate?) That "compass" in front of the sailor is used to indicate the direction of an object relative to the ship's direction. All bearings for both navigation and for the fire control problem (here) are made relative to the ship's direction so as to have a point of reference. Even though the ship changes direction the bearings are always compared to a fixed reference. We do the same in life: something is right or wrong relative to our "fixed" moral compass. There are those who are very uncomfortable with "relativity" (Mr. Einstein, rest assured we speak not of your work). Absolutes can be unnecessary stumbling blocks and even represent a lack of will to consider, and then reconsider, in depth one's hard-held opinions. This requires effort. Are you capable of that effort? (Yes some things are in fact "immutable": honesty, truthfulness, trust, responsibility, accountability, respect and on. You do know, but do you do?) While some things don't (seem) to change, some things do change (called growth), hopefully for the better.

Servomechanisms: servos are used in many fields and applications such as computer disk drives, automatic machine tools, high-speed printing, robots and remote manipulators, all kinds of positioning systems, stabilization and guidance of space craft, mechanical prosthetics and so on and on. These are all mechanical devices. Some of the concepts of servos can be found in the nonmechanical world such as the business world. Desired output compared to actual output generates an error which is used to correct the situation. There are even applications to be found in the area of human-factors engineering. The fact of the matter is that without feedback (of the output) there is no real control of a system. Control can be bad, very bad, and it can be good, very good. Control control.

CONSPIRING TO WREAK HAVOC

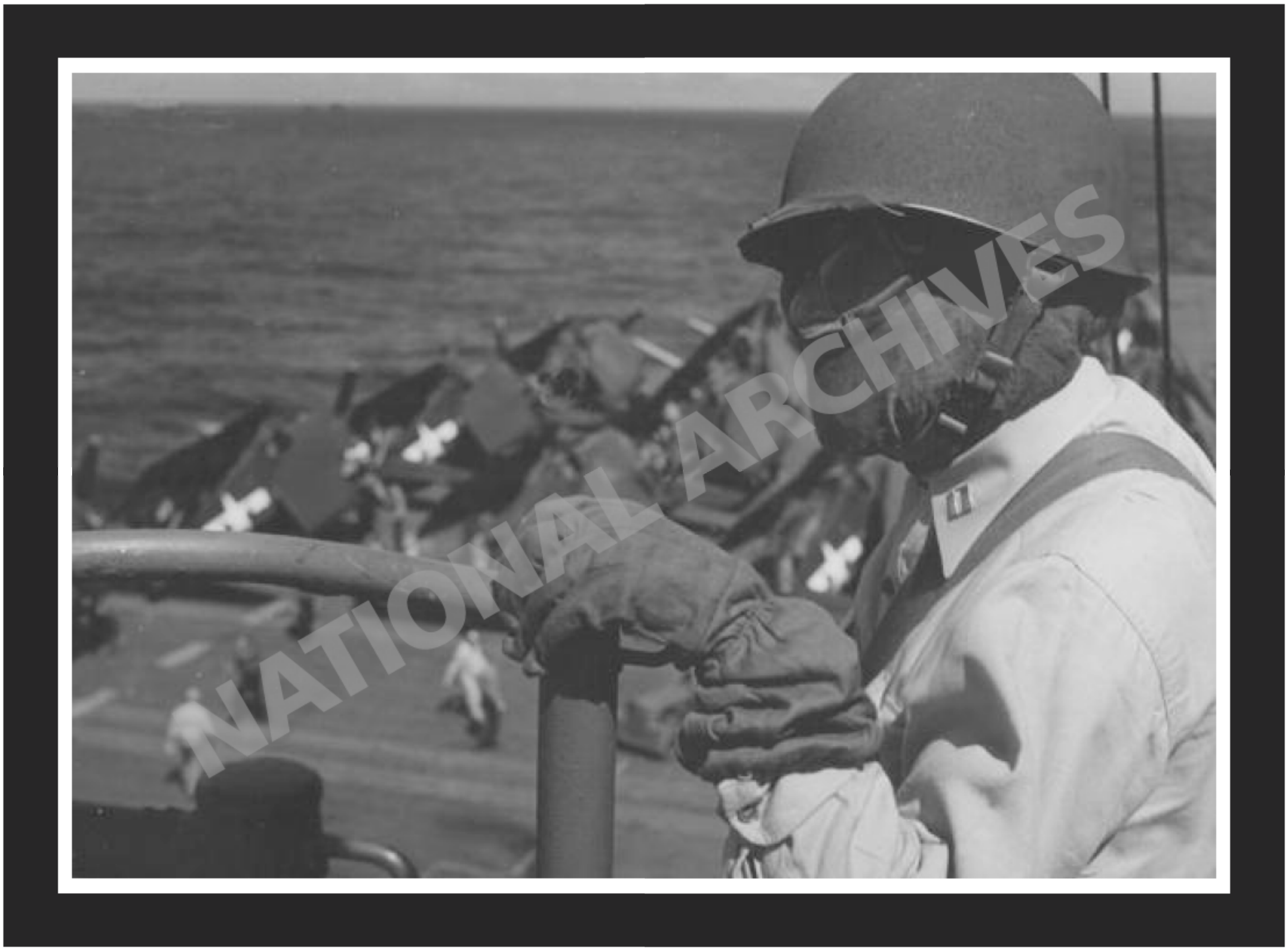
To get close to the "action" I zoomed into the original picture by cropping it around the three red-shirt armament personnel (one of whom, sitting on the mechanism that raises the bomb, looks as if he should still be in school). I make no claim to be particularly knowledgeable about bombs but it appears that this is a 2,000-lb. bomb. It's clear that the "wheelbarrow" was made specifically for this type bomb. Aerial bombs are a different breed than an artillery shell in that the latter must have a casing strong enough to withstand the impact of firing while the aerial bomb has no such requirement. Thus it would have more destructive explosive in its casing (and the artillery shell would have more casing to act as shrapnel). This is a depressing subject so let's "can it". This is a SB2C Helldiver aircraft whose purpose was to dive down on its target. It's ironic that at the end of the war the "svelte" Corsair, a fighter and not a bomber, could carry up to 6,000-lb. of bombs: six 500-lb. bombs under its two wings (3,000-lb.) plus a 2,000-lb. and a 1,000-lb. bomb under its fuselage. Now that was a load even by today's standards. My main question was, how could those thin wires hold those bombs in place? I still wonder. The "holes" under the wings are the wheel-wells. Talk about a responsible job by a "schoolboy"! And you complain about how tough is your responsibility for your homework. I know. I was a schoolboy once upon a time (but I didn't return home from football and basketball practice until 6:30 in the evening, after spending an hour and a half commuting on a bus and a trolley while carrying five major courses). It's tough but you're (soft-edged) tough, aren't you?

Grammar: what could be more dull than grammar? Well, what could be dumber than going through life with a handicap? While not much of a scholar, I'll present a very short primer on this subject. We can consider it an adventure of sorts. Ten to fifteen short paragraphs should not tax anyone to any extent. Who knows, it might even be fun. In large measure we are what we say and how we say it (though words certainly do not a man make). The English language has over 400.000 words (I'm told, more than twice the number of any other language). Those words have specific meanings (in addition to how they're used in a sentence). Inappropriate use of a word can cause the listener/reader to misconstrue what you mean t to convey. [Incidentally, we appreciate the fact that there are those who like to speak in a rapid, staccato manner; it implies "intelligence" I suppose. However, if they speak so fast that it becomes incoherent, what good is it? It's almost as if the speaker wants to hurry on so that the listener can not absorb what (controversial idea) was said before racing on with the rant, not allowing your thoughts to be expressed (or is that their purpose?). [True, they want their say before time's expired.]

MAN FROM MARS

There's danger afoot and this lieutenant is garbed for the worst, the worst being a bomb-hit in his area. The helmet protects (to a degree) against shrapnel and the mask and gloves against fire. The Airdales below have no mask or gloves and they have no steel helmet (the cloth-type helmet he wears is of course worthless against whatever a bomb offers). I would judge that this officer is a part of the fire-control team for the forward 5-inch guns below to his right. His type of fire control has nothing to do with fighting fires and everything to do with firing on incoming enemy aircraft. Not so the Airdales: their fire control has to do with the control of fires generated by those bombs that the enemy drops onto the flight deck. They are Airdales first, fire-fighters second (but that's a big second). There's no fire-fighting gear for them. There's only a fire-hose and a gut-wrenching willingness to attack the conflagration, usually in confined, restricted space because of the constraint of a finite deck area. Sometimes they are literally between the devil (the fire) and the deep blue sea. Once overboard, all is lost and eternity beckons the moment contact with the water is made. This could be the sailor's lot in time of war. While such thoughts are not on the "front burner" they do linger on the "back burner". In any event, right now they are too busy with the parking-process to be concerned with such things. The moral of the story is to not concern yourself with what night be; rather, throw yourself into what is. Why place yourself in a world of doubt?

Grammar: if you don't speak or write in a clear manner that's meaningful and conveys your thoughts properly, all's for naught. There are eight parts of the English language: nouns (cat), pronouns (they), adjectives (medium), verbs (run), adverbs (fast), preposition (out), conjunction (and), and interjection (ah). Adjectives always modify nouns and adverbs always modify verbs. [Before continuing, I must interject something that has annoyed my sensibilities: "ouch". What is disturbing is the proclivity of too many to use the phrase "me and Mary went home". Wrong! It's "Mary and I went home" where Mary and I are the subjects of the sentence. They have called the 1960's the "me generation". A reflection of that attitude was (is) the usage so consistently of the word "me". They even place "me" ahead of "Mary" because they are predominantly thinking of themselves (?). Mere politeness would have it the other way around. Pardon my airing my pet peeve.] Now there are three groups of words: sentences, clauses and phrases. A sentence basically contains a subject and a predicate and always expresses a complete thought (emphasize "complete"). A simple subject is usually a single word (noun or pronoun) such as "house" or "we". [Note: "big words" are usually not appropriate or useful. Save them.]


NATIONAL ARCHIVES

BIG DEAL

This is a 2,000-lb. big deal being loaded into this Helldiver. When this bomb was brought up from the ship's bomb-bay to the hanger deck the fins were affixed to it. It was more convenient to do it there than on the flight deck. The same thing applies to the device on the front of the bomb. To my limited knowledge this device consists of a small propeller as a part of a detonation spring (the propeller can be seen in this picture if one looks closely). Presumably (and you experts correct me if I'm wrong) after having made a certain number of revolutions the coiled spring is released allowing the detonation-pin to initiate the detonation of the bomb. This implies that the bomb should be dropped from a certain prescribed altitude so as to explode before the propeller has turned the correct number of turns. Again, this could be "all wet" and I stand corrected.. At least it's plausible. We didn't have too many of these occasions on our flight deck because our mission was to train the pilots. However, part of that training involved practice bombing runs with live bombs. After all, that was one of their prime missions. One thing the Antietam had that this ship doesn't are the red shirts worn by the armaments people (big deal). It made for a colorful flight deck though. However, we came along later with the new look.

Grammar: let me clarify one thing before going any further: while I discuss grammar as a carefully drawn subject my own words here in these pages are mot the sterling renditions one might look for because of the constraints of space. It is not conducive to sparkling text when as much as possible is to be said about any of these subjects in the limited space of one page. Shortcuts must be tolerated to make a point in as few words as possible. This is one reason that I use so many quotes that would not be tolerated by linguistic scholars. I plead guilty to the charge. Also sometimes my sentences are excessively long, also a demerit by those who would edit these pages. Good English can not be "fallen into" (now there's an example of which I speak; I used the quotes to simplify the thought to save space). But I digress (my wife tells me I should not start a sentence with the word "but" (poor form, BUT what can you expect from an old engineer? Proper English, that's what). // The most basic sentence with content contains a subject followed by a predicate followed by the object of the predicate (noun–verb–noun). The dog (subject) went (predicate) home (object). That's a sentence. The second group of words is a clause: "which my wife (subject) owns (predicate)". More completely, "The small dogs which my neighbor owns (subject) bark early in the morning before my alarm clock rings (predicate)". The last group of words is the phrase: "in the early morning", or, "walking the dog". Phrases have no subject or predicate; they are just a group of words.

A STUDY IN GRAY

This study in gray, this tableau with its soft gradations from dark to light, is one that claims your attention. You don't tire letting your gaze slowly wander over all the subtleties of texture served us. Even that forbidden smoke from the stack adds its contribution. One of the aspects of a carrier that appeals to me is the symmetry of the superstructure, no matter what the view. Turning mow to the harsher realities we detect the catapult-cable strung taut in preparation for an explosive sling-shot. Yes, his flaps are down, ready to provide that extra lift that spells the difference between success and failure. Also notice the radar-pod on the right wing: he's going out "ahunting for the bad guys". Standing upright above the pod are the defiant 5-inch guns searching the sky for those same "bad guys". On either side of the Hellcat are the Airdales who helped the Hellcat spread its wings in anticipation for that moment of launch. This seems to be a single launch since there's no activity at the right catapult. Don't jump to the conclusion that that's a bomb underneath the Hellcat. No, it's the external fuel tank that allows the pilot to stay aloft longer searching for those "bad guys". I can't help commenting on the proclivity of so many to jump to conclusions to the detriment of all concerned. If nothing else it's the mark of sloppy thinking that sometimes leads to atrocious results (that can not be rescinded and thus atrocious). Everyone deserves the benefit of the doubt: the law requires it; one is innocent until proven guilty. It's too difficult to rectify an error once made. Yes, there are bad guys out there who require being strongly quashed. "Shooting from the hip" concerning opinions is not only gauche but also does serious harm that is inexcusable. "For drying out loud", THINK!

Grammar: nouns identify people and things. Proper nouns are a particular identity: "Mary". Pronouns are representatives of nouns: "it". Personal pronouns refer to people: "she". Other pronouns are "another, any, anybody, each, either, everyone, few, none, several, some, that, this, these, what, which, who, whom, whose" (there are others). Adjectives describe, define, modify nouns. ["Good" is an adjective, or noun, so "That is a good book" or "Look at the good she does". However, it's "It works well", NOT "It works good". Also, "I'm well, thank you", NOT "I'm good, thank you". (Who said you're good? You're good at what? Baseball?)]. Remember, adjectives modify nouns and adverbs modify verbs. Many adverbs end in "ly". Verbs define the action or in effect "announce" the purpose of the sentence. They make a sentence whole. The verbs have tenses (time) that refer to past, present or future events or thoughts [I've been remiss in interchanging the tense on some of these pages done to get more purchase from my accounts.(The present tense is more immediate.) I apologize for this faux pas.]


NATIONAL ARCHIVES

WELL DONE

Another smooth, soft yet finely detailed gray tableau unencumbered by a disparate palette. It's a winner. This Hellcat made a good landing if but a little too far down the deck. It's forward motion has just about stopped if not already don so. Yet again, where are the Airdales? They should be in view racing to the Hellcat to help it fold its wings. This, not even to mention the absence of the two green-shirts who should be the first on the scene. While it's true that the Hellcat will be pulled back somewhat by the partially retracting cable, it wont be so far as pull it out of view of this picture. (Com'on guys, where are you?) In mere moments those three barriers now upright will be lowered to the deck to allow passage of the Hellcat to the increasingly packed deck (there are at least four more aircraft overhead to come home and probably others in a more ready landing pattern. The catwalk to the right is about five feet below the flight deck, more so than some of the other catwalks. Another observation that can be made is that 17 foot circular search radar antenna SK-2 to the right, up high. It replaced the flat 15x5 foot rectangular search antenna SC-2 and 3. The Antietam never had but the SK-2 antenna as here. Usually the new is better than the old but not always: for equipments, yes, but for social mores and customs, not necessarily. For instance, to someone who grew up in the 40's, Big Band music, especially the ballads, are in a higher league than anything since (there are of course noteworthy individual exceptions but as a genre, it's no contest. My sympathies go out to the generations since, and that's not in jest (but we'll pretend it is even though it isn't)).

Grammar: prepositions are usually in front of nouns: he went to camp, where "to" is a preposition (prepositions precede nouns (to, with, from, beside, before, in by, into, of, over, under, etc;). Conjunctives: and, or, but. They join two words or phrases or clauses. Subordinate conjunctives join things of unequal significance (after, as, because, before, how, if, that, though, unless, until, when and while). There are compound words such as: each other, one another, daughter-in-law, according to, instead of, as if, so that, thirty-nine, etc. Verbs are also compound: had written, hope for, was walking, could have been lost, etc. Words are often used in different ways. For instance, a word can be used as either a noun or an adjective (what each (noun) needs; each (adjective) person) Some words can be either an adjective or an adverb: I am a well (adjective) person or you played well (adverb). As has been said, many adverbs end in "ly": you sang loudly (adverb) but that was a loud noise (adjective). [The dictionary always provides all the various usages of a word, whether it's a verb or noun or adjective or adverb or several of them: play (noun) and play (verb). [My presentation here is of course not grammatical because I'm trying to present as much as possible in a vert limited space Bear with me.]

PHOTOGRAPH CUM PAINTING

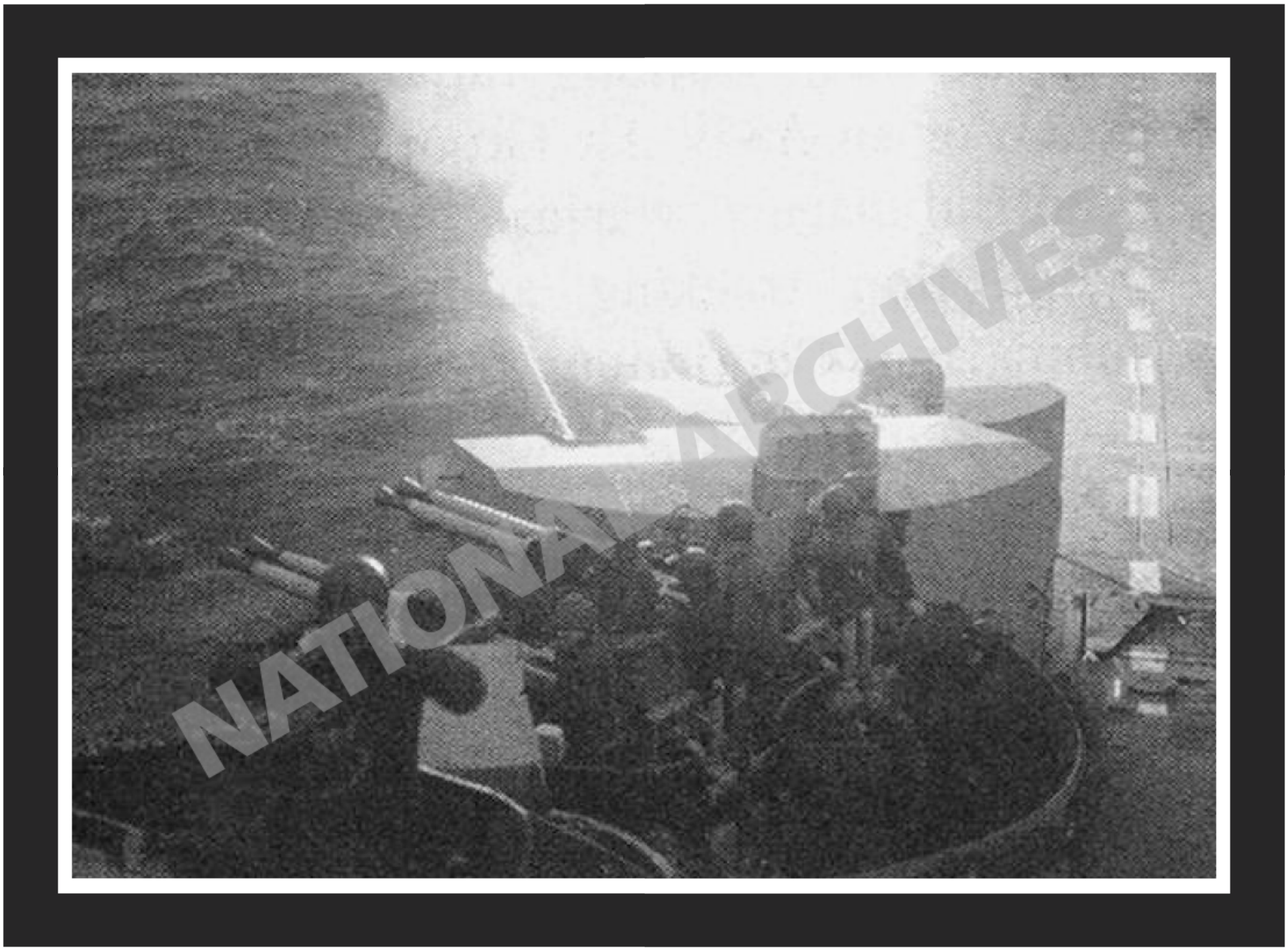
Think of this as a painting and you'll appreciate it the more. Here we stand in awe looking up at the power of the mighty Corsair as its 2250-hp engine starts its run down the deck from 40 yards back. It's almost as if it metamorphosed from its earth-bound folded-wing configuration into an eager spread-wing high-flyer. Well, actually it did. The backdrop of the superstructure seems to lend strength to the Corsair (as if it needed it). From the heights of the backdrop one looks down on the teeming "mass" of other Corsairs and its brethren. Taking a flight of fancy one could say of that "mass" below, look at "The Land Of Adventure Of The Flashing Blades". Yes, but how define "adventure"? The dictionary has it thus: 1) an undertaking of uncertain outcome,: a hazardous enterprise, 2) an exciting or very unusual experience, 3) participation in exciting undertakings or enterprise, 4) to risk or hazard, 5) to take the chance of; dare, 6) to take the risk involved, 7) to venture; hazard. What with the above, I daresay it's not a stretch to say that EACH venture to a wheelchock during launch operations was an adventure, albeit a short one. What made it so was the proximity of one aircraft adjacent another aircraft. Discount the wind and the noise, those forays into that "sea" of aircraft to reach a wheelchock fulfilled well the definition of #1 above. Now add the discombobulating noise and the hurricane-like winds and it fits #1 to a fare-thee-well. I exclude #5 out of hand from these comments and I'll only acknowledge the others. Even though it was not a matter of "rolling the dice", it felt as much (what with that damnable wind and those unholy noises).

Grammar: sentence structure has well defined rules that allow for a great deal of originality (if I had sufficient space I feel as if I could show a little more originality in my text on these pages. The constraints of space will not adequately permit this though). Before continuing, it should be said that verbs, those workhorses, have two basic forms: transitive and intransitive. The former are such as: Mary likes Sally. The later is: The birds sing. Thus "likes" is transitive and "sing" is intransitive. Some verbs are both. A special verb is the verb "to be'. This ha its own function in the world of grammar. Now to continue. It can be said that sentences are "constructed" and the "tools of the trade" are knowledge of the eight parts of speech already mentioned: nouns, pronouns, adjectives, verbs, adverbs, prepositions, conjunctions and interjections. Words used in various parts of a sentence have functions dependent upon their placement in the sentence. That is, words must fit properly in a sentence just as the parts of a machine must fit together. The parts of a sentence will be discussed on the next page. Be strong.

BOOOOOOOOOM!!

It was this precise gun-tub to which one day I was assigned because after the war the ranks of the gunner's mates had thinned to such an extent that they had to "dragoon" some of us Airdales for gunnery practice (between flight quarters). My job was to pass the 40-mm ammunition clips to the loader who in turn dropped them into the breech of the gun (which then "spit" them out in staccato fire). After the practice was over everyone disappeared. I thought that strange but since I had nothing better to do I started kicking the shell-casings down the chute. No problem. I was content doing this. I happened to be on the far side of the tub where I could have reach over to touch the this 5-inch gun-mount (second level, aft of the superstructure). It so happened that the 5-inch gun-barrels were pointing out just as are these 40-mm barrels are. With pleasant weather abundant and no aircraft about I was feeling at ease and even content. Then, without a scintilla of warning, BOOOOOOM!! The 5-incher let loose with a blast that felt as if I had been hit by a quick, sharp, hard blow to the body. That very instant I lifted my feet about a foot and in the same motion I then threw them back of me so that within 1 ½ seconds I was in the "push-up" position on the deck. After a few seconds to figure out what had happened I peeked over the side of the gun-tub, ascertained it was the 5-incher and then scrambled from here over another gun-tub and to cover. No one told "that dumb Airdale" there was to be 5-inch gunnery practice. That made me "mad" (not crazy) as a hornet, but why bother. I quickly walked it off and "crossed gunner's mates off my list". Here, I know whereof this gunner's mate holds his ears. However, if the coming blast is unbeknownst to you it's a double "whammy" that stuns you to from head to foot to the point of "seeing stars" (I've "seem stars" only once before).

Grammar: I would first like to say that the first sentence above is long. The purists would probably object. However, as said, with limited space one tries to say a lot in one sentence (here again the purists would complain about my usage of the word "lot": a "lot" is an entity in real estate or it's a certain quantity of fabric; instead of "it hurts a lot" say perhaps, "it hurts a great deal"). One other aside that is important: be careful about using too many commas. Doing so could unnecessarily break up a sentence and thus break the smooth- flowing, seamlessness of your thoughts. Don't require a reader to "dwell" in your sentence-thought too long. The reader might lose contact with the beginning of the sentence or lose interest or feel "put upon". I believe that if one rereads a sentence one is better able to know when a pause by a comma is beneficial. Tend to write as you would speak using pauses to clarify and not cloud. Don't overdo./overwork because spontaneity can often be best but it can also be the worst.


NATIONAL ARCHIVES

GENTLE GIANT

Foe all the world this looks like a gentle giant what with its wings folded back in repose and the "little people" gathered round it tending to its needs. The needs right now appear to be a recalcitrant engine that seems not to want to finish its job. As a result the Airdales must move it forward to its parking spot, not an easy job in view of the fact that there is little against which to push. Not only was the Avenger the biggest aircraft on board but it was also the most difficult to move because of the limited area available for pushing. At times there would be help from the swells of the sea that would allow for "going down hill" enough so that the static friction would be overcome. Once moving it was not that difficult to keep it moving (with a plane-captain on the brakes). Of course "going up hill" was another matter. Take these inconveniences in stride. We notice an Airdale trying to do so at the end of the left wing and others up forward while an Airdale stands by with a wheelchock in hand. Already the plane-captain is up on the wing talking shop with the pilot as he climbs out of the cockpit. Similar to this engine, people are sometimes inert and ineffective because of their lack of gumption (initiative, aggressiveness, resourcefulness). How much better it would be if they were, like an engine warmed up, vibrant and energized to start and then finish the job they set out to do (unlike this engine that couldn't quite finish its job). A person's "spiritual engine" is every bit as important to them as this Avenger's engine is to it. Don't flag at life's impediments. (Dare I say "homework" as an impediment or that your "engine" is so ineffective as to balk at a little hard work. Now that's really "being a wimp". I take that back: casting aspersions is not being first class.

Grammar: Again, tend to keep your sentences sparse and to the point. If this isn't possible, don't "overdress" them; they also deserve good taste. Err on the side of understatement, not overstatement. Even sentences can be garish. Again, go light on the big words unless they are superior to the little words (which they often are). [I hope I'm practicing what I preach and don't "drop the ball" in my haste(?) to finish this third book before who knows what. Also, be it known that these are friendly admonitions.] There are eight ways to "build" a sentence: 1) Subject of a sentence or clause, 2) Predicate (verb) of a sentence or clause, 3) Object of a predicate, 4) Predicate noun or pronoun, 5) Predicate adjective, 6) Modifier (adjective or adverb), 7) Object of a preposition, 8) Appositive (Mary, my sister). To expand: 1) Every sentence must have a subject. The subject of a sentence or a clause is a person, place or thing being considered. A subject usually is a noun or pronoun which may have modifiers. (A clause has a subject and predicate but doesn't express a complete thought as does a sentence.)

AN INTERESTING VIEW

An interesting view this, one all too familiar to the beleaguered Airdale trying to find a place to push. It's clear here that there's room for only two Airdales to push this Hellcat. This indicates that there are not many pairs of hands to push this 9,100-lb. (unloaded) aircraft from here to there. Right now it's not going anywhere as it's tied down to the cleats in the flight deck: we're in port and the ranks are being inspected on general principles because it's evident that no one is going anywhere since they're not wearing their black neckerchiefs (to make undress-whites into dress-whites). [Darn, I wish I'd stop giving forth with these long-winded sentences! It's positively gauche (awkward, lacking astuteness).] The ranks aren't the Rockettes but I guess they'll do (for the uninitiated the Rockettes are the fabulous chorus-line at the incomparable Radio City Music Hall in NYC that was overwhelming to me as a boy). The bar on the wheel of the hatch (door) is pushed upward thus securing the hatch with no access from the outside. It's a one-way hatch. Don't let your life be one-way (my way). It's truly the road to oblivion. Just like the ranks here, are we sufficiently attentive to the world outside ourselves or are we so consumed with self that we look but don't see? Are we oblivious to what's really important? (such as doing our level best in understanding the world outside of our small world AFTER we have assimilated the true FACTS). [Nobody said life would be a bowl of cherries so "stay with it" and be proud of yourself. You'll be glad you did.]

Grammar: continued from previous page: 2) Every sentence has a predicate. This is the assertion that is made about the subject. The simple predicate is always a verb or a verb phrase ("was going"). The complete predicate consists of this verb (phrase) together with its modifiers , object and any other words not in the complete subject. 3) The object completes the predicate. The object of a verb is the person, place or thing that receives the full action of the verb. The object usually is a noun or pronoun; it completes the predicate. 4) The predicate noun is where the subject interjects itself into the predicate. The predicate noun is a noun coming after the predicate verb but it explains the subject by giving another word or name for it. This may be a predicate noun or pronoun. Such a word completes the predicate. Only a few verbs are followed by predicate nouns or pronouns. Some of these verbs are "to be", become and seem. 5) The predicate adjective is an adjective coming usually after the predicate verb but describing the subject. Verbs that can be completed by predicate nouns can also be completed by predicate adjectives. The complete predicate includes the verb, or simple predicate, the predicate adjective and any adverb modifier. The next building block concerns modifiers. This follows on the next page.


NATIONAL
ARCHIVES

LANDING THEN PARKING

Land then park, land then park, land then park ....and so it goes for the next 45 minutes (90 aircraft x 30 seconds). The constant roar of the fired up engines as the aircraft race up the deck to be "nudged" into its parking spot is incessant. Yellow-shirts and pilots, at their turn, doing their precise and well evolved "tango for two" as they meticulously and gingerly guide (wedge?) what are now big, heavy, bulky, even awkward machines into the ever close quarters of five abreast across the deck. Here we notice an aircraft on the deckedge elevator going down to the hanger deck to allow room for the following aircraft now circling the ship in a large race-track pattern. At this time there are about 25 aircraft snugly placed in their assigned slots. Two aircraft now adjacent to the superstructure have slowed down to a walking pace as they approach the, shall I say, the "moment of truth" when feet become inches, literally. Yes, at least to my way of thinking, they were those moments of momentous import when all was in the balance. One may scoff now; then it was different. The after elevator is being used because presumably this is not a large flight. Ordinarily, with many aircraft to land, there wasn't time to slow the process by using the after elevator (it took about 30 seconds to go down, unload and return to the top). By the looks of the ship's wake it would appear that the speed of the ship is close to 30 knots. Sometimes speed is of the essence but in life this is not at all necessarily so. Slow down and relish the good things around you (such as listening to GOOD music. A little contemplation in life along with good music has much to recommend it. Try it and grow.)

Grammar: 6) Modifiers point out differences. They "fine-tune" a noun. They add precision to words and thoughts. However, one must be careful using adjectives (and adverbs). The precision must take you in the right direction because if an adjective is used willy-nilly the meaning of the modified word or thought might mislead the reader, There are those who consider "subtle" a "dirty word". To the contrary, subtlety can prevent others from misconstruing your intent. [The same may be said of words: words not only have specific meaning but they ought to also have precise meaning. Two words might both convey essentially the same thing but one word could be much more appropriate for a given situation. If your thinking is careless and sloppy so too will your writing. Most often the spoken word flutters off into the great unknown while the written word is emboldened in print indefinitely. Conciseness and frugality of words, though initially more difficult, will force you to be precise and therefore accurate to your intent. Conciseness should be required while secondarily seamlessness gives it style. The way to conciseness is through the proper choice of words. Conciseness could be considered a semi-synonym .

DEFENSE

It's come down to the 40-mm guns now. The CAP (Carrier Air Patrol) didn't get them, the 5-inch guns didn't get them so now it's the 40's that need to do the job. That of course is a simplification but the 40's don't have the range the other two have. Finally it'll be the 20-mm guns that start their contribution to the fray. There are those who say the 20's are the "revenge weapon" because by the time the enemy aircraft are in their range the bomb has already been dropped. This 40-mm quad is on the port side forward opposite the forward elevator. (Note that the scuppers are covered here,) As has been said, these 40-mm guns are trained and elevated in unison as if it were one gun-barrel. We can't see the enemy aircraft but we can see the tracers at the top middle of the picture. It's from there that the danger comes. It's my understanding that every sixth projectile is a tracer thus allowing the gunners who elevate and train the guns to lead the target. If the automatic, electronic gun-director becomes inoperative, the gun is elevated and trained manually. One of the two can seen at the left (only his helmet is showing. Of course back then there was no such thing as protective vests. Here it's "Praise the Lord and pass the ammunition and we'll all be free" (so the song went). We all must make our contributions to society in one way or another. Hey, just staying out of trouble is a contribution of sorts. Not much but it's something. It's your way of "passing the ammunition. Seriously though, contribute by always doing your very best. Again! Be proud.

Grammar: 7) The object of a preposition is the noun or pronoun which follows the preposition and which the preposition joins to some other word. The preposition is similar to a hook that is used to catch and hold its object. For instance, "Restaurants have comfortable chairs for their patrons".The noun "chairs" hooked the object "patrons" with the preposition "for". A bird flew over us (the verb "flew" hooked the pronoun "us" with the preposition "over"). 8) The final building block of word construction is the appositive. It is a noun that is usually placed soon after another noun for the purpose of explaining it. These two nouns are different names for the same thing, much as are a subject and its predicate noun. However there's no verb or other connective between a noun and its appositive as there is between a subject and its predicate noun. Any noun in a sentence may have an appositive. "I'll see you next Thursday, Thanksgiving". Appositive are set off by a comma because the appositive tends to interrupt the train of thought. The appositive itself may or may not have a modifier. This finishes the brief discussion of the eight building blocks required to construct sentences. Obviously there are many, many ways to express the same thing and in this way a writer can show his/her versatility in using these blocks. Don't overdo it.


ARCHIVES

RED-SHIRTS ON THE JOB

Usually there are only two red-shirts on a job such as this: loading and maintaining the guns of this Avenger. Its total armament consists of the following: two forward-firing 0.50-inch (12.6-mm) machine-guns, one in each wing, one rear-firing 0.50-inch machine-gun in the dorsal turret (aft of the cockpit) and one 0.30-inch (7.62-mm) machine-gun in the ventral (under-fuselage) position). The guns of course all have tracer-rounds. It carries one 2,000-lb. torpedo or an equivalent load of bombs. It's also fitted out to carry 5.25-inch rockets under its wings. What we see here isn't all that apparent. First, the "corner" of the wing just above the wheel swings 90 degrees upward to join the fixed part of the wing just below the upright propeller-blade. Now we are able to understand how those cartridges are fed to the gun, the breech of which the red-shirt is adjusting. Notice that the red-shirt to the right has in his left hand the rod that is used to clean the barrel of the machine-gun. It's not clear to me what purpose these guns provide because this aircraft was not designed to strafe targets (it was too slow). However, the dorsal and ventral guns were essential to defend against enemy fighter aircraft approaching from the rear at high speed. Though we don't understand it, these red-shirts are all contributing to the job that has to be done. How fortunate we all would be if more of us had this same attitude of wanting to contribute to whatever enterprise of which we are a part. It does no good to stand aside and "let the other guy do it". Guess who's going to succeed?

Grammar: initially one would do well to learn the technique of diagraming a sentence. This consists of placing the eight constructs of sentence-building in a diagram of horizontal and downward-sloping lines. In fact, it can be said that all sentences can be built on one of four models. Model 1 has only a subject and a predicate. Model 2 has a subject, a predicate and an object of the predicate (verb). Model 3 consists of a subject, a predicate and a predicate noun. The last model, Model 4, has subject, a predicate and a predicate adjective. Examples are: 1) Mary sings. 2) John tackled Harry. 3) Mary was valedictorian. 4) Harry is popular. These of course are augmented by modifiers (adjectives, adverbs, prepositions, prepositional-phrases and appositives). These modifiers are placed on slanting lines drawn from that which it modifies. These diagrams allow you to distinguish the eight building blocks of a sentence. We'll take a break from grammar and compound sentences, etc. Before closing, a word about punctuation that can be significant. A comma can make or break a sentence: 1) Yea there, but for the Grace of God go I. 2) Yea, there but for the Grace of God go I. The first sentence is almost flip in its connotation while the second provides the proper meaning. Be alert. Punctuation is your helper when trying to convey your thoughts.

A LAUNCH SCENARIO

This is a launch scenario, with Helldivers to the left and Hellcats to the right. These scenarios, these "games" if you will, are never played fairly: the frailty of man is never so pronounced as when he is confronted by these large machines with flashing blades in an environment of overpowering winds and demoralizing, demonic noise (this picture even looks sinister). The "game" of course is to go and then survive a completely one-sided "contest". It does no good to say "good luck". Only nerve and sinew will serve you when you embark on what feels like a journey of seriously questionable results. This was how it felt at the time, plus its seeming to be (unnecessarily) interminable (actually, until May 1946). [These laments are becoming tiresome, but valid and necessary.] Though this picture is of a launch I included it primarily because it shows well the way it was after a parking process. The proximity of tail to prop shown here does not properly indicate that the aircraft are "sitting back" so that the bottom part of the propeller's path is close to extending as far as the nose-cone. Thus we measure the forward extent of the propeller by the location of the nose-cone. This is useful, nay essential, when keeping track of the advancement of the aircraft. The nose-cone was the measure of your distance from a face-full of shrapnel. At the time I intensely felt this. Now, oh well. [I return to these "details" over and over because there will never be any others to recount the situations on the flight deck of a WWII carrier during flight operations. If there are other Airdales who would provide their experiences and thoughts and feelings, that would be good. I personally know of no such person. I've done my best, my very best, to be both objectively and subjectively accurate and honest and truthful so that anyone who reads these volumes will have an accurate idea of "A Day In The Life Of An Airdale (tiresomely repetitious though it is. While there it WAS tiresomely repetitious but ALSO it was fearsome.]

Television: first it's necessary to summarize the aspects of vision so as to better understand what the engineers must accomplish to send vision at a distance. When the eye views a scene the data conveyed from the scene to the brain of the observer is based on five characteristics: 1) relative brightness, 2) geometric structure(relative size, shape, boundaries and positions, 3) motion of these structures, 4) colors of the scene, and 5) their apparent positions along the line-of-sight. These five characteristics correspond to the following: 1) tonal content, 2) structural (detail) content, 3) kinematic content, 4) chromatic content, and 5) stereoscopic content. These are in order of importance. Items one and two alone serve to depict a static scene in monochrome. When the scene depicts a connected series of events the third characteristic is required. To be continued.


25
32
NATIONAL ARCHIVES

MAKING TRACKS

Making use of my 4x magnifier I make out, starting from the left, a cruiser (CL), a battleship (BB) between the gun barrels, a destroyer (DD) dead ahead, a large carrier(CV) just beyond and to the left of the battleship (BB) making waves and finally a cruiser (CL). The naval enterprise certainly covers a large "chessboard". This is a Task Group within a Task Force so that the chessboard becomes even larger. This expansiveness of course is to make more difficult the aims of the enemy. We have a fairly docile sea at the moment thus requiring flank speed as detected by the foam being thrown about seen trailing the ships. Our particular modus operandi was to have either the carrier U.S.S. Bon Homme Richard (CV-31) or the U.S.S. Boxer (CV21) to our port quarter with a pair of destroyers following during landing operations or preceding during launch operations. After the war we also accompanied the illustrious U.S.S. Intrepid (CV-11) now in New York City Harbor as a museum ship. The ship in this picture is the U.S.S. Randolph. Unless an aircraft was catapulted from the left side the aircraft always made a turn to the right as here. It will be another 10-15 seconds before this Hellcat has achieved enough altitude to safely retract its flaps. Some of the carriers had "whip" antennas as here instead of the aerials strung between to towers (that could be lowered as here). It's a large expansive ocean on which these operations are conducted. In the same way why can't we conduct ourselves in as wide and expansive a way as concerns our relationships with other people? Why must so many of us be so parochial in our dealings with others? Who's to say that we have the only way? It's much more than giving someone a little "slack". It's a matter of "walking in another's moccasins". And that's a fact that should be plain to those who have a modicum of good sense. Common sense surely is gold.

Television: the five factors in recreating a picture are to be found in the human eye. Essential parts of this system are the lens which focuses the scene on the retina, the light-sensitive layer. The retina consists of about 140 million "rods" which collect the low-level illumination. A small area at the center of the retina where the lens focuses the scene, called the fovea centralis or macula, consists of about 7 million "cones" which are responsible for the detail and color of the scene. Groups of these rods and cones are connected to nerve fibers which together make up the optic nerve. These groups are capable of operating independently which is the basis for the engineers' development of picture reproduction (looking at a picture with a high-powered microscope will indicate many independent dots, also called pixels. Looking at this picture with just a 4x magnifier shows that it is indeed made up of individual dots, or pixels. A few more biological facts and then on to the engineering of television.


15
NATIONAL ARCHIVES

UNVENTED DEFIANCE

As this Avenger looms over the "cowering" Airdales it vents its defiance to all that would stand in its way. This engine of 1,600-hp will truck no obstacles to its intimidating bulk. With wings spread this Avenger dominates the deck. Between the prop-wash, the guttural noise and its imposing heft this Avenger is that which makes one feel diminished to complete impotence. The above narration is a fairly accurate expression of how it feels to be an Airdale at that point in time when he's still "wet behind the ears". Now if one were a "grown up" of all of 20 years old with two years experience of this regimen under his belt, why then all this is taken in stride. // My guess here is that this is a small carrier on duty in the Atlantic on submarine patrol with few aircraft and a lack of equipment such as goggles and cloth helmets. However they'll soon "get with the program" and be fully equipped after the big carriers of the Pacific Fleet are provisioned (but then what do I know? I know only what happened on the flight deck of the U.S.S. Antietam (CV-36) from April 1945 to May 1946). There on the catwalk is the usual assortment of spectators. If I wasn't an Airdale I'd no doubt be one of them because it's up topside on the flight deck where the action is to be found. That's good. It's fitting and proper that one be involved and engaged. That's how one learns, and what good are you if you're not learning? (at whatever age; here I am having reached four score years of age and still trying to learn in spite of vision problems; can you do less? You wonder why such a person would expend his time and energy of learning things. It's obvious: because it's interesting—read "fun").

Television: the rods and cones of the retina have extraordinary powers, the most important of which are: 1) The ability to distinguish between degrees of light and dark. That is, its ability to evaluate the brightness of the scene: its tonal acuity. 2) The ability to distinguish between colors (light of different wavelengths). This is the chromatic content of a scene and is effective only with a given level of brightness. 3) The ability to maintain a certain amount of persistence of vision. This enables a continuity of motion. Further capabilities are made possible by the two-dimensional arrangement of the retinal layer at right angles to the line of sight: 4) The ability to perceive separately the position, size and shape of the illuminated areas of the scene (the structural content) focused on the retina. This is based on the fact that groups of rods and cones are separately sensitive. 5) The ability to recognize the dimensions of the scene (width, height and depth). This item will be discussed further because of its importance. (Not considered here, but fully as important, is the ability of the brain to interpret. It takes what's presented to it as registered by the retina and in a mysterious way constructs a moving picture.)


NATIONAL ARCHIVES

ONE TRAPPED HELLCAT

This is how it's supposed to happen, nicely and neatly. Notice that there are no spectators on the catwalk who would be in jeopardy should it not be so nice and neat. Also note that the engine is in the idle mode (the propeller being essentially in a quiescent condition yet still energized so as to be able to taxi forward when released and wings folded). The pilot closed down the throttle to enable this idle mode when the LSO gave the "cut engine"signal when the Hellcat was at about 60 yards distant from the end of the flight deck. Before the trap the tail-hook was hanging downward at about 45 degrees in a position to scoop the arresting-wire. Once the wire was caught it played out about 30 yards. It was at this time that the green-shirt manning the barrier-controls must be ready to quickly lower the barriers should the trap occur too far up the flight deck (not good to tangle the propeller in the barrier if the trap is good). Once the aircraft has stopped, the wire will automatically pull back (rewind) a little to enable the green-shirts to disengage the hook from the wire. Once released, the wire is fully retracted and the brackets are also lowered to cause the wires to lie at deck level. The barriers are also lowered to allow passage of the aircraft and then these two operations are reversed to be ready for the next landing 30 seconds later. So it goes, hopefully without a hitch. Up forward where the aircraft are being parked it's an entirely different "ball-game". Back aft here or up forward there all the parts must work in unison. So it should be in our daily lives: our work complements our leisure just as well as they must be coordinated. Perhaps a better word is "balance".

Television: 5) The ability to recognize the dimensions of the scene and its parts (width, height and depth) is basic. Width and height are recognized directly by the two-dimensional excitation of the retina. Depth can be recognized indirectly by the brain's perception of geometric perspective of th e relative sharpness of focus of different portions of the scene and of converging geometry (stereoscopy). The brain develops this capacity over time. 6) The ability to distinguish motion and other dynamic changes in the scene is the final attribute. The changes in the structure of the scene as illuminated areas change position excites successively adjacent groups of rods and cones . This is the dynamic content. Ideally the television should possess all of the six abilities of the eye enumerated above. Television has not yet attained the stereoscopic capability but otherwise it has.The adaptive brain has made this omission of no particular import. With this biological background we'll now delve into the engineering aspects of television.


NATIONAL ARCHIVES

ONE ON HIGH

Just who's at fault: the one on high or the one taxiing up the flight deck? The answer can only be, "We don't know" because either the high one cut the landing interval to 20 seconds instead of 30 or the other Hellcat had trouble being disengaged from the arresting -wire. The grounded Hellcat is opposite the two 40-mm guns forward of the two 50inch gun-mounts. This is so because the Hellcat has passed two of the five barriers (the moment it passes the other three barriers they will be raised as are the two seen now. Evidently this Hellcat wont fold its wings until it arrives up forward (usually this is done as the wire is being unhooked: best to get those wings out of the way as it makes its way about on the deck; for instance that yellow-shirt officer ("BOSS") might have a problem with the approaching wing if he keeps looking upward). Notice the trailing hook of the Hellcat on high. The pilot will retract it as he rejoins the landing "race track" pattern. Evidently this Hellcat on deck has "gunned" the engine to such an extent, in order to clear the area after the delay, that the second "BOSS" is telling the pilot to slow down (by raising his arm). The next yellow-shirt in the progression of this Hellcat's course must be standing right where we're standing right now. We too will have to watch our heads though if you're less than six feet you'll probably be alright (no tall men on deck; the wind will make life difficult for you (although I was 6'2")). [You see, you don't have to be ""big" to be useful. In fact some of history's greatest inventions were conceived by "little" people. Everyone should "go for it" regardless of circumstances. "Right shall overcome Might"]

Television: basic to the television process is the concept of picture elements (pixels) that are also integral to photography where minute silver grains are the elements of full-blown photographs. In a photograph, if we look closely, there are millions of tiny black dots on a white background. These dots, or elements, vary not in tone but in size and separation from each other. The process allows for variation of tonal value and detail. In photography the size of the silver grains is fixed by the emulsion, the exposure and the processing so that the number of the picture elements increases in direct proportion to the negative size. An 8x10 inch glossy contact print reproduced by contact printing from a fine-grained negative of similar size contains about 150 million picture elements. While the pictures in this book are for the most part 8x10 inches the detail is certainly less than 150 million. To me, that's all to the good. To my way of thinking excessive detail serves only to distract from the picture as a whole and if detail is of interest there's enough of it for the brain to "create" it. This picture provides a good example whereof I speak. Foe example, observe the struts: detail enough but not to the extent of distraction (soft detail).


14

CALM WATERS

We must be in calm, non-hostile waters what with the two Avengers tied down and the personnel cavorting in only their shorts. Never once did this happen when we were out to sea (or is this in port? Probably not because if possible whenever we made port the squadrons would fly to the "beach" (shore-based airfield)). This is again an interesting view because it brings up the question of how the control linkages can go from the cockpit to the ailerons and flaps on the trailing edge of the wing. If you will, the wing is formed of a small shoulder and a large arm. The controls must somehow pass through the "joint" of the shoulder and arm. Smaller aircraft make use of wire cables for control of the ailerons from the cockpit while the larger aircraft make use of electric cables, synchros and electric motors. The cable can twist and turn at will while the synchros (converters of mechanical position to electrical signal) can reside in the cockpit. If it were a steel cable from the control stick in the cockpit to a lever in the wing that shoulder-joint would pose severe problems: do the cables have slack to adapt to the turn of the shoulder? And if so, how do they then become taut to give proper purchase to the motion of the cable when the wing is extended? This is a crucial problem but to the uninitiated (such as most of us) it is of no consequence that the wing is folded. Do we in our lives realize and understand and appreciate that there are many things "out there" of real consequence but about which we have little interest or knowledge? If no, then shame on us. However, brow-beating is not my purpose; it must evolve from within each of us. We're no mentally inert.

Television: for comparison purposes a professional 35-mm movie-frame has about one million pixels and a home-movie frame about 150,000 pixels. Rods and cones register the scene continuously but picture-frames are static albeit slightly different than the preceding frame. Thus each frame is viewed for a moment before the next frame is presented. The eye receives each frame , one after the other. Due to persistence of vision we retain that static image until the next image is presented. It has been found that if the repetition rate is 24 images per second for movies there will be no perceptible flicker. If the rate of motion in the scene is excessive there will be flicker. As will be stated later the television repetition rate is 30 frames per second. The brighter the scene the more apt there'll be flicker. Television has a trick up its sleeve: it interlaces the scan-lines of a scene This will be discussed in more detail later. Now we move into the subject of the electrical transmission of visual information. // The discussion of flicker brings to mind the calming effect of the flicker of candlelight on the wall as one listens to the first half of the melody "Piano By Candlelight" when it was "The Way We Were".


NATIONAL ARCHIVES

A VISIT TO A "BABY FLATTOP"

This is one of the "baby flattops" that carry Avengers loaded with depth charges to be dropped on enemy submarines. These Avengers are idling in preparation for a launch. No, those wheelchocks are not made of iron but rather of heavy wood (which presented no difficulty for an Airdale). As always, there's a nonchalant Airdale in every group and that one to the rear is no exception. However with that aircraft in the idle mode there's no need to "hunker down" in the face of the wind. What still causes wonderment to me even after all these years is the mechanism that swings those huge wings out straight and then is strong enough to hold them there under adverse conditions such as a torpedo-run. Consider the sheer weight of those wings and then the mechanism to operate the unfolding process. To my understanding the method is thus: there is a joint similar to the one we have at our shoulder. In place of muscles and the tendons that attach them to the bone and the ligaments that tie the bones ti each other there is the metal ball and socket joint (like ours) and the connecting tie-rods that are energized by an hydraulic pump driven by an electric motor (together comparable to our muscles). According to Pascal's Principle when a liquid is at rest the addition of a pressure (force per unit area) at one point results in an identical increase in pressure at all points. There is a closed reservoir of hydraulic oil which is impressed upon by pressure at one relatively small valve by an electric motor. This pressure is transmitted as a much larger force at another valve which is much larger. The output of this valve pushes the wing to its spread position. Thus in life a moral imperative by one solid person can have a similar multiplied effect on a large number of people (I say "solid" so as to distinguish from a rabble-rousers).

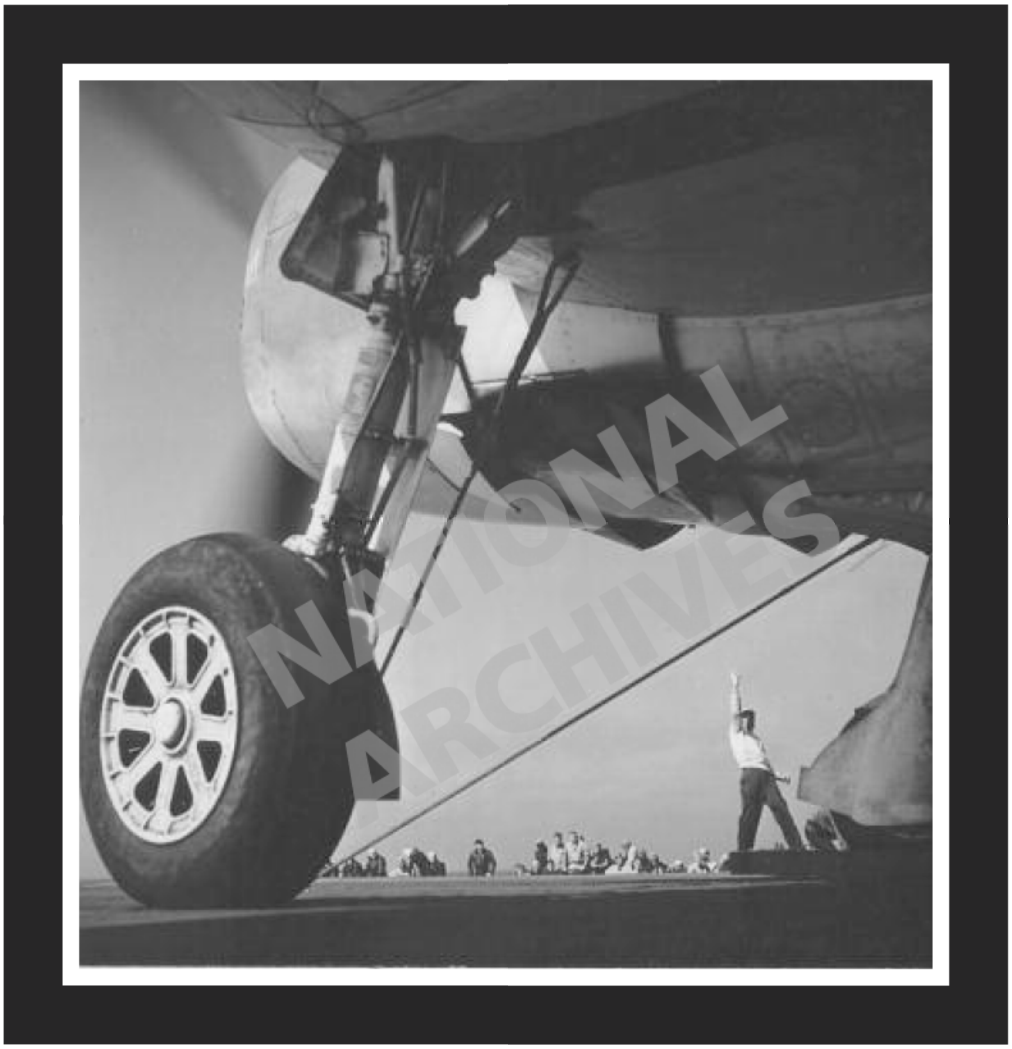
Television: while the eye perceives a scene in parallel (each rod/cone has a fiber that's combined into many, many groups of fibers that are in turn essentially a pixel of the scene) the television system must deal with pixels in series (one pixel at a time down an electrical cable; sequentially). The eye's persistence of vision makes this sequential method feasible. Thus the pixels comprise one continuous picture. It's been found that if all the 150,000 pixels are transmitted in 1/30th of a second there will be no apparent flicker. This in turn requires a transmission rate of several million pixels per second. Actually, the standards require a transmission rate of 8.5 million pixels per second. A given scene is scanned by an electron beam in a way that must be replicates by the receiver (your TV set). As this very narrow electron beam sweeps across the scene, left to right, it passes over all gradations of tone, from white to black (with B/W TV here. A signal proportional to the B/W is generated.


NATIONAL ARCHIVES

THE SLING

This is the best view yet of the sling that "shoots" an aircraft down the deck. Two backward facing hooks accept the cable which is wrapped around the shuttle in the catapult-slot in the deck. The engine is ramped up to full throttle that perceptibly shakes the Hellcat from stem to stern as the launch officer (out of sight) listens to the precise (horrendous) sound that will tell him that this one is "good to go". In mere moments there will be a sudden, violent acceleration and off this Hellcat goes into the wild blue yonder. Take two paces forward and you'll be positioned next to the wheel, the Airdales post. When airborne, that wheel is retracted into a wheel-well in the wing. The wheel we see is rotated 90 degrees counterclockwise and then swung backwards into the wing. Simple enough, yes, but place yourself at the engineers' desks when told that this was their next job. Realize that these wheel-struts have to take the full impact of a 12,000-lb. load dropped from about 20 feet (wing lift now is minimal) onto the deck. Yes, the oleo struts take most of the impact but nevertheless between that and the hydraulics to operate the brakes makes for a complicated design when also considering the wheel-retraction problem. Then there's the mechanical mechanism of turning and swinging the wheel upward in addition to the strength of the component parts of the joints. I thoroughly respect mechanical engineers who deal with structures (while electrical engineers are immersed in the unseen world of the electrons). No one said engineering was easy but think of the wealth of satisfaction it provides when you accomplish a project. Money can't buy such satisfaction. Think about it. You might find that you like it (who wouldn't enjoy its immense satisfaction?).

Television: the beam of electrons is generated by the CRT (cathode ray tube) "gun" which operates in the following manner: an element is heated by an electric current which "boils off" electrons. These electrons, being in the vacuum of the CRT, are just milling about until a strong voltage is set up at the face of the CRT. This causes a strong current of electrons to impact the face of the CRT. A small cylinder around the "gun" is given a negative charge which causes the current of diffuse electrons to become a narrow beam. This beam in turn is controlled in the horizontal and vertical directions by two pairs of plates with negative polarity. By precisely controlling the horizontal and vertical voltages the beam can be controlled to sweep the face of the CRT in the horizontal dimension. After each sweep the beam is lowered a very small amount and then swept across the face again, etc. The scene to be televised is focused onto the face of the CRT by optical means. Thus, to reiterate, the electron beam is swept across the face successively moving downward: it samples the scene electronically.


NATIONAL
ARCHIVES

PICTURING A PICTURE-TAKER

If I'm not mistaken this is a scene of a Navy photographer taking pictures of a catapult operation for use as a training film or maybe even a publicity film. The photographer can be seen to the left standing behind a camera-tripod. There are more yellow-shirts and officers seen here than there are Airdales. Notice the Avenger that's already been launched. It's about 30 seconds ahead of the one just now lifting off (with wheels about two feet above the deck while still over it; it's thus airborne within about 220 feet). To the far right are the antenna towers in the reclining position taken whenever there's a catapult operation. Today appears to be somewhat hazy because the horizon is limited, less evident, more diminished. Thus the visibility of other ships "out there" is not the 20 miles of a clear day. The wind's picking up and a new weather pattern is developing as indicated by a somewhat choppy sea. The morning shadows are sharp but change is in the offing. Perhaps that admonition "'Sunset' in the morning, sailors take warning; sunset at night, sailor's delight" is in play. I of course have taken liberties with this weather-deciphering but only to show how a sailor's thoughts go if he's constantly topside. An horizon might diminish but that's the work of Mother Nature. Diminishing others, demeaning them, belittling them, denigrating them, that's the work of "small" people. In some cases of deliberate aforethought it's the work of contemptible people. We all criticize and that's valid as long as it's things and not people who raise our ire and dissatisfactions. One must realize that people are complex and we are not nearly as smart as we think we are vis-a-vis "people". We are not clairvoyants, not a single one of us. Here, "Do unto others as you would have them do unto you".

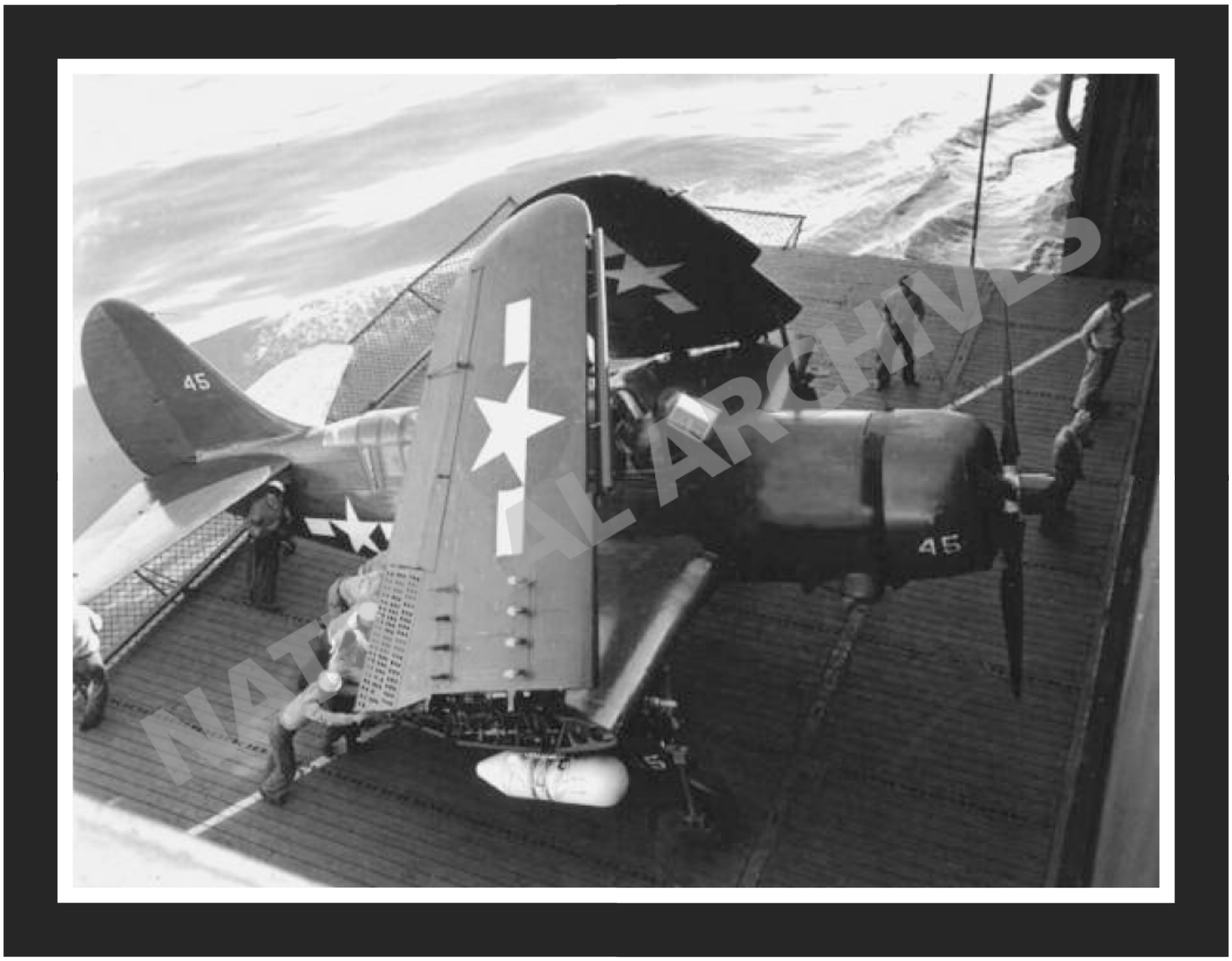
Television: optics has placed a focused scene on the face of the Crt. The scanning voltage is applied to the vertical plates of the electron-gun. After each horizontal scan of the scene (one line) the vertical voltage is applied to the horizontal plates of the electron-gun to lower the beam one line downward. This continues until the entire scene has been scanned. Thee above process is then repeated again and again. To decrease flicker the scans are interlaced: all the even lines are scanned and then all the odd lines are scanned. This brings up the Tv standards for these operations: 1) there are 525 lines to a full screen. 2)There are 30 full screen scans per second. 3) The amplitude of the picture-carrier waveform is divided into two regions: the upper 25% of the amplitude is occupied by the synchronizing signals (scanning signals). The lower 75% consists of the tonal values of each pixel with the lower amplitude values of voltage representing the brightest tonal values of the scene. That is, the higher the voltage the darker the picture element. The waveform is precise for the upper 25% of the carrier voltage.


NATIONAL ARCHIVES

DELIVERY TO THE HANGER DECK

Hanger deck personnel push this SB2C Helldiver onto the hanger deck from the deckedge elevator after the flight deck Airdales put it there. I immediately noticed the missing section of safety net on the inboard part of the elevator. It's only about 20 feet to the water here but up topside at the flight deck level it's 50 feet to the water below. That's a significant difference and one well marked by an Airdale. That white pod contains search radar that was used by those aircraft that had that duty. We have a good view of the various parts of the Helldiver's wing: starting at its left we observe the perforated flaps that are used to slow down the Helldiver as it makes a vertical dive on a target. The flaps extend both upward and downward during a dive but only the lower flap is extended during the slow speed launches and landings to provide extra lift (it increases the curvature of the wing). Above the flaps is the aileron used to bank the aircraft. On the other side of the wing (the leading edge) is the slot (now open) that also provides added lift at slow speeds. It too increases the effective curvature of the wing. Clearly seen is a 20-mm cannon (machine-gun) protruding from the leading edge of the wing above the wheel. Finally we see the four racks adjacent to the flaps. These racks carry 5.25-inch rockets which are equivalent to a 5-inch shell fired by the guns on the ship. Since there's no impact firing it, it can pack a larger detonation than can shells fired from guns. This is not to mention the 2,000-lb. bomb load it carries in it bomb-bay. Are we people as "loaded" as are these aircraft? Do we carry a full complement of useful knowledge? Are we versatile as is this Helldiver. Do we take on the "heavy" tasks and not complain? People shouldn't short-change themselves. Be positive and get on with it. The ones who do best are those who are self-motivators. Don't be dependent.

Television: 4) The upper 25% of the carrier amplitude is used for synchronization of the sweep voltage and return voltage (moving the beam from the bottom of the screen to the top of the screen every thirtieth of a second). A part of this pulse-structure is used to initiate a sweep. Since there are 525 lines per field the repetition-rate is 30x525=15,750 per second and the vertical repetition-rate is 2x30=60 per second (remember there are two interlaced fields. 5) The sound signal is sent by frequency modulation: the frequency varies about a carrier frequency as determined by the frequency of the sound (most sound is limited to 25,000 cps or 25Kc). The power of the sound carrier must not be less than 1/2 the picture-carrier power nor more than 1.5 of the picture-carrier. It is apparent that these signals must be in strict coordination with the receiver circuitry (actually visa versa). This requirement has more to do with proper reception than any other item. Receivers adjust to transmitters.



45
45
NATIONAL ARCHIVES

A NICE FLAIR FOR THE FLAIR

This is a good example of the use of the flair when landing in a short space. About 30 yards previous the pilot pulled back on the control-stick to slightly raise the nose of the Hellcat and thus decrease the forward speed as well as the lift, causing the aircraft to touch down a little sooner. Bringing a high-powered aircraft to a full stop within about 220 feet is no small feat. It is of course the tail-hook that does the stopping but every little bit helps. It can be seen that the engine is in the idle mode yet ready to throttle up to make a dash forward once unhooked. With the flair the hook is made more available (more likely) to catch a wire. This Hellcat will now have as much vertical motion as horizontal motion and it represents a good landing. Would that all the landings were so. Close examination will reveal the two 20-mm machine-guns just above the wheels. Since this Hellcat has no search radar pod and no auxiliary fuel tank under its fuselage we can surmise that it is returning from CAP duty (being vectored to the "boggies" by the ship's CIC (Combat Information Center). However, it could be returning from a short hop with a bomb-load supporting the troops on the ground. Who knows? Every little bit helps with a landing and every little bit helps in life. For example, doing a little studying often is usually better than doing a lot of studying once. Rather than trying to put a bid chink of knowledge into your head I believe a slower and STEADIER accumulation is much more effective (and enjoyable). Cramming for an exam is shear folly (except under dire circumstances–in my opinion. And yes., little things "mean a lot" in the affairs of the heart.

Television: the equipment used to generate a television signal was initially the iconoscope. Its purpose was to convert the light values of a scene into corresponding electrical values. It selects the impulses corresponding to the pixels (picture elements) in the proper sequence of alternate lines in accordance with interlaced scanning. This camera-tube contains a mica plate on which are deposited several million separately insulated globules of silver. The globules are treated with a surface layer of cesium and are thereby endowed with the property of releasing negative electric charges when illuminated. (This description of the camera is of my era but is given here because it describes the basic requirements of any TV camera.) The scene to be transmitted is focused by a lens system onto the mosaic plate. This television plate corresponds to a photographic film. The light on the plate releases a negative charge from the silver-cesium globules in proportion to the illumination striking them. As a result the plate assumes a positive-distribution which is the same as the distribution of the light on the optical image. Thus the optical image is transformed into an electrical image. (Does this sound familiar? Think photovoltaics.)


20
NATIONAL ARCHIVES

A TRULY UNUSUAL SIGHT

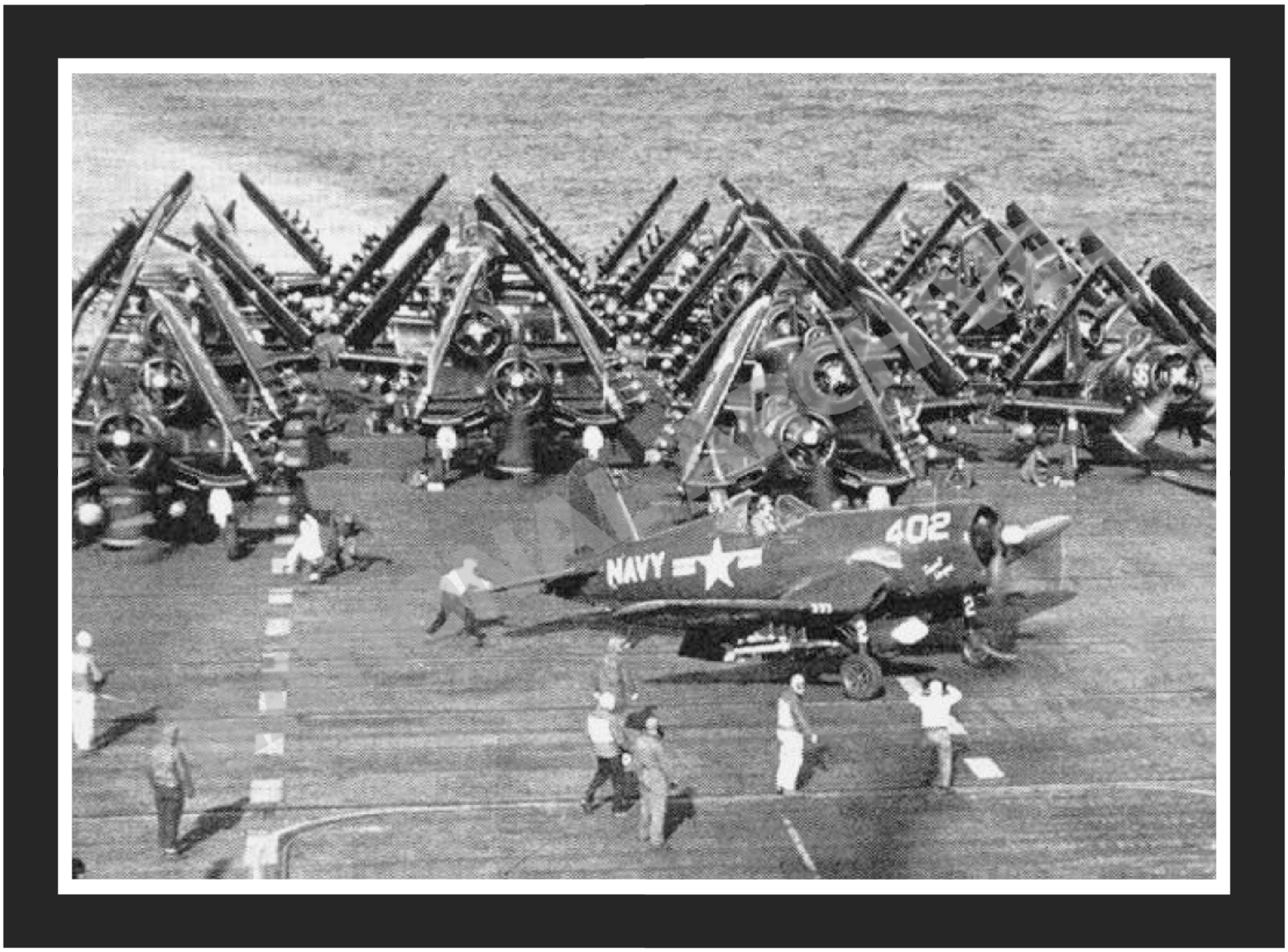
Yes, there's the usual launch officer, there's the yellow-shirt who brought the Hellcat to the launch-line, there are the other yellow-shirts "holding" the next Hellcats and there's the usual gaggle of brown-shirts to the left overseeing the process. What is truly unusual, at least to me, is first the location of the launch-line which here is about 600 feet from the front of the flight deck (instead of the normal 400 feet). Secondly, where is that panoply of airplanes in close-order ranks? I don't recognize such a flight deck with wings spread providing wide "avenues" to stroll. I recall only dense phalanxes of aircraft cheek-by-jowl with wind howling through the narrow "trails" that thread through the welter of aircraft. I remember a "primeval forest" through which we had to traverse a perilous step at a time, now clutching a cleat, now hunkering down to reassess and reevaluate the situation when going from here to there (an unoccupied wheelchock). A sudden blast of wind from a wheeling aircraft would violently impel you toward where you dreaded to go: those flashing blades seemingly not but feet way. Even if but for a minute's duration, at that moment you were overtaken by an intense, sheer panic (and even perhaps terror). You felt as if you were losing any semblance of free-will and were being bodily forced by a giant invisible hand straight to a point of "no return: it was a conspiracy, pure and simple; you felt miserably and completely abandoned, utterly alone, as those two tyrants, the wind and the flashing blades, wanted you dead". There are those who relish such situations. I am not one of them and neither should you. We have but one life to live. Make the most of it realizing that time and tide wait for no one. Waiting on yourself is a fools game.

Television: the signal from the iconoscope is transmitter by radio waves to the receiver. These waves, one for the picture and one for the sound, are modulated by the output of the iconoscope and a separate sound system (the output of a microphone in which the sound air-waves physically move a disk whose movement is transduced to an electrical signal). [Modulation involves the process of imposing on a high-frequency carrier a much lower-frequency sound or picture signal.] At the receiver the voltages induced in the receiving antenna by the picture and sound electrical signals are conducted to the receiver circuitry. There the picture-carrier frequency is separated from the sound-carrier frequency by a superheterodyne process (in which a frequency is combined with another frequency of a somewhat different frequency to obtain a lower resultant frequency). The sound-carrier is demodulated to obtain the sound signal (up to 25Kc). The picture-carrier is similarly heterodyned and demodulated to obtain the picture frequencies. These voltages are both amplified in special amplifier circuits.

TEEPEE VILLAGE

If yo squint your eyes and let your imagination take hold you'll envision an Indian village there on the deck. Reality quickly sets in though as you further hear the roaring of the impatient engines that saturate the area. Lashing wind, slashing blades raise the stress-factor as the noise unduly numbs your thought processes (that's dangerous, spelled with a capital "D"). The emotional fatigue will not set in until all is quiet again on this deck that breeds a quiet desperation. Not mentioned previously is the problem of what happens after the wheelchock has been pulled. The job is only half done: you're not home-free from the rest of the aircraft. Your path to safety is forward and then crosswise to the side of the deck. Simple enough but not without a full dose of caution because there are aircraft out front wheeling and maneuvering to reach the launch-line (this action generates various and sundry wind-blasts that come from different angles, at a minimum very disconcerting). Alertness is the watch-word. The more vertical Corsairs are distinguishable from the more sloping Helldivers. Also, this picture is an example of the reality of picture-element size. Here the number of pixels is limited, too much so. Here it's the "big picture" that must be considered with the details left to previous and following pages. Often we only see the details in life and not the "big picture" that encompasses the group and not merely ourselves which reflects an excessive amount of self-absorption to the exclusion of others. Again, and again, it's a matter of balance: a little us, a little them, a little us, a little them. Furthermore, if basic principles are intact, consensus is honorable & good.

Television: during the scanning process the voltage of the mosaic plate continually changes in such a way that the change in its voltage at any instant is proportional to the change in the brightness between the adjacent picture elements (pixels) being scanned by the beam at that instant. The electrical signal from the camera tube, with its synchronizing pulses superimposed, is impressed on a carrier electrical current and then radiated from the antenna. A separate transmitter radiates the associated sound signal. The above was important enough to have been repeated here. We have discussed the CRT which reproduces the received signal for our viewing. The scanning beam makes 525 passes from the top of the picture to the bottom. Only about 490 are active in presenting the image. There is, however, some loss of resolution if the scanning line does not fall directly over a pixel. To follow this further would be to be too technical for these pages. However the result of the analysis is that instead of a sharp black or white the resulting displayed image will be some value of intermediate gray. There is now television that purports to be "high definition" TV. This is out of this books purview.


NAVY
402

FLIGHT QUARTERS

Compared to the picture of the previous page it's apparent that this one has many more pixels per inch. They say that 150 dots/ inch is fine and most of the pictures in this book meets that specification. There are some that I scanned at 300 dots/inch but the difference is not at all noticeable for this size picture. Some few pictures are about 75 dots/inch and they are the ones that have the quality of a well defined painting (a favorite of mine). Here we are at the start of a launch operation and all is well (lots of space between aircraft which was a luxury not available on the Antietam——they were big, they were noisy and the were close together unlike here). Sometimes it's alright to lie down on the job (for a while). Those around the Helldiver to the right front can do no such thing as they try to energize the recalcitrant engine with that generator at the left wheel. Meanwhile the plane-captain is communicating with "his" pilot about the situation. If it doesn't improve the Airdales will push the Helldiver to the deckedge elevator to be worked on by the mechanics there assembled on the hanger deck. As has been said, there always seemed to be that nonchalant character in the group. Perhaps he's casual because that is "his" aircraft (plane-captains have to have a proprietary attitude). Fine-grained pictures are fine even as are the more course ones are (a "painting"). But coarseness and crudity have no place in an affable society. In dangerously tentative situations we can call off all bets. Then its survival that counts. Still, crudeness & coarseness are inexcusable.

Mathematics: this section will be covered in separate topics, the first of which is that of "functions". A function represents the relationship between two variables. Those variables can be anything that can be accurately measured, such as distance and time. Thus the distance traveled is a function of time. There would be no branch of mathematics called "calculus" without the concept of functions. The word function could be translated as "depends on". Thus a change in one variable depends on the effect of another variable. Functions can be represented as an x-y graph where the curve can be straight or curved (and curved in fanciful ways). If the curve is straight it's called a linear function and if curved, a nonlinear function (which curve makes for difficulties during calculations). Functions are most often written as equations where the dependent variable depends on various values and powers of the independent variable. Calculus, to be discussed later, can be used to analyze the graph of the function. Functions imply change and it is for this that calculus was developed. All conditions of change are considered by calculus, whether the increase of the length of an iron bar as a function of temperature or the price of a house due to the demand in that area. Remember everything changes in the physical world as a function.

ANOTHER PUZZLEMENT

A straight-forward launch has been accomplished but seemingly without the launch officer and yellow-shirt. The forward figure is a green-shirt running to retrieve the catapult-cable seen at the end of the flight deck (the cable is attached to the shuttle so that it wont go flying over the front edge of the flight deck and into the water).Again notice the height of the Hellcat when it's still over the deck. Note that the start of the catapult is to be seen just between that round object at the right edge of the deck and the closest part of the elevator detected by the 90 degree curvature seen to the left of that wide dashed line running fore and aft. (Whew). The rest of the figures there are Airdales some of whom seem to be playfully "spreading their wings" to the wind generated by the Hellcat. In the right lower corner is the bridge to the pilothouse. This appears to be a single flight at noontime because there are no other personnel in the area. The rest of the Airdales are probably heading for chow or else flaked out on the deck getting some rest from their (emotional) fatigue. Yes, while the job was not physically demanding it was draining due to a mental burden that would not go away, especially when there were aircraft after seemingly endless aircraft to be launched or landed. This is a manifestation of pessimism that is the enemy of all who want to lead productive lives. Everyone knows that your efficiency increases by leaps and bounds when you're optimistic. If and when you're strong it doesn't even have to be a realistic optimism. Remember, you're as happy as you set your mind to be so. Here, irrational emotions are the culprit to unhappiness and optimism. However, it's you who has to do this, not someone sitting here at a keyboard. Away from the fray.

Mathematics: In 1665 Isaac Newton devised the branch of mathematics called calculus. This will be the subject of our investigations for the next multiple pages. Calculus deals in the realm of dynamics as opposed to statics. Our world, our very lives, are melded inextricably with motion, or more accurately, with change (even the seasons change). As mentioned previously, there is change in the length of an iron bar that has been heated. There is change in the motion of a car, there is change in the growth of a field of corn, there is change in the money supply of a nation, and so it goes. Calculus is the king and the queen of the mathematical analysis and interpretation of change. We would be back in the age of 1665 without the capability of calculus (perhaps I went over the top with that simile; this happens when trying to impress one with the verities). Unfortunately there is (or at least was) a fear and trepidation when the subject of calculus was brought up; but fear not for there is salvation (for heaven's sake, this age of computers should be salvation enough; try using the slide-rule on a dark day).

"NEW BOY ON THE BLOCK"

After the war this aircraft, the Douglas AD Skyraider, replaced the heavy-duty Avenger and Helldiver. It was essentially the same size as those two aircraft but it had a stronger engine (2,700-hp) and it had a heavier load-carrying capacity (8,000-lbs.). It also has a 20-mm machine-gun in each wing and racks for four 5.25-inch rockets under each wing. It was about 50 mph faster than the other two. It could climb at 2,800 ft/min vs 1,500 ft/min and 1,800 ft/min for the Avenger and Helldiver respectively. Like the Avenger it was hard to push because the wing was so high off the deck. The Skyraider saw action in the Korean War but was soon replaced by the more powerful jet-propelled aircraft. Its length was right between the 40 foot Avenger and the 36 foot Helldiver. This is mentioned because since the deckedge elevator is 60x 34 feet it's clear that the tail-section of each of these aircraft must be swivelled so as not to go over the edge of the deckedge elevator. (Note the apprehensive plane-captain in the cockpit operating the brakes). We never lost an aircraft this way but what's transpiring here is not trivial. When an aircraft is replaced it's similar to (but not the same as) losing a friend. You came to know the aircraft "from head to foot". Now this doesn't even remotely resemble a friendship (which are in point of fact rare for some of us). What's worse than not having a friend is to have had a good friend who, to your honest bewilderment, turns to an active hostility toward you. I know whereof I speak for the hurt was beyond the telling. What to do? What else but to sadly shake your head, turn away and move on, looking to a happier future and not the disappointing past. Each new day is the beginning of the rest of your life (that's not original but it's valid).

Mathematics: Newton didn't work in a vacuum: he made use of the technique of the ancient Greeks of slicing an object into very thin strips. He also borrowed the graphical system of Descartes that allowed him the mental tool for operating on an equation in order to access the infinitesimals. The ability of the calculus to explain why any moving object reacts as it does to outside forces such as the tension of a spring or the push of an Airdale against the mass of an Avenger or Helldiver is manifest. Calculus today has become the principle conduit between the practical science and engineering of every dat and the wealth of mathematical thought. We would not have the televisions, the automobiles, the aircraft, the radios, the you-name-it without the existence of the "Rosetta Stone" of the science and engineering fields. If any phenomenon of change can be put into the form of an equation then calculus will unlock the ramifications of that change. [In its basic form an equation is a dependent variable being set equal to the independent variable in terms of arithmetic and various powers of the same; that is, $y=f(x)$.]


T
52
T52
T
52

ANOTHER FLIGHT LAUNCHED

Another flight has been launched and the Airdales now transfer the wheelchocks up forward to be available for the parking process when that flight returns. As has been said before we on the Antietam often left the wheelchocks back aft after a launch so as to have them there when we escorted the aircraft from the touch down point to the parking area up forward. This certainly was not a hard and fast rule but with 180 wheelchocks it did save the labor of moving them forward (two wheelchocks per each of the 90 aircraft divided by 30 Airdales meant 189/30=6 trips of 150 yards each). Yes, we did this and no, we didn't do it every time. Actually we weren't pressed for time so we could have done it with no trouble. Now that I delve in deeper I believe we took a balanced approach. // The other day someone said that color pictures were better than B/W pictures. While it's true that there are some pictures that even demand color it's equally true that there are some that suffer with color. If this picture were in color we'd be caught up in the various garb being worn, not appreciating the essence of this picture: the mental fatigue that goes with the knowledge that shortly the excruciating (I say this advisedly) process of parking all those aircraft is in the offing. If the viewer were absorbed in the color scheme of each Airdale this picture would be trivial indeed. To me at least, this is a portrayal of the emotional burden and weariness that persists no matter how much defiance one tries to muster against those, the Airdales' tormentors, those all-powerful machines (maybe I was a "softie" but also maybe I was too analytical for my own good about feet turning into inches. I'll say perhaps "yes" but then I was also only being me.) [In all cases, be yourself and not put on a false mantle.]

Mathematics: we'll now consider measuring the mysteries of motion. Similar to a strobe-light that can "stop" the motion of an object so too does the calculus "stop" complex motions mathematically allowing the analysis of a changing process moment by moment. This is done by two operations called "differentiation" and "integration". They are the reverse of each other just as addition and subtraction are. Differentiation is a way of computing the rate at which one variable in a situation changes in relation to another variable at any point in the process (at any instant in time or any point in space). The actual method employed in differentiation is to divide a small change in one variable by a small change in another variable as they let these changes shrink to infinitesimal values. That is, we must find the value of the ratio as the changes become indefinitely small, i.e., approaches zero. This is called finding the "limit". Integration works in the reverse direction: it takes an equation in terms of rate of change and converts it into an equation in terms of the variables that do the changing. To be continued.

ANOTHER "PAINTING"

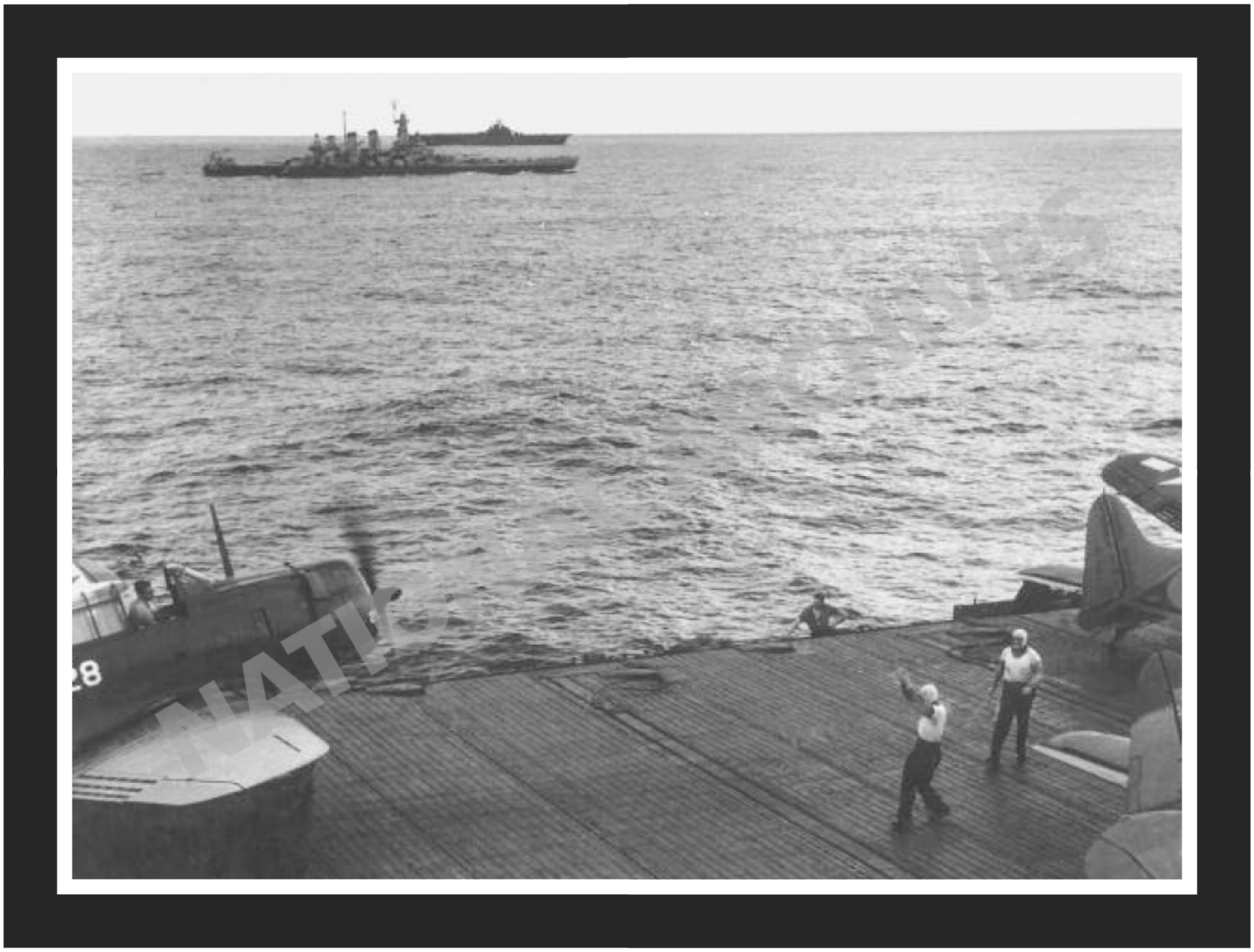
No doubt there are those who are miffed by such a diffused picture that looks like a painting when they want to be looking at a detailed photograph. Welcome to the world of art (though there are also those artists who say that such a "painting" as this is not art). Two groups who are dissatisfied while I'm pleased by this painting-photograph: everything is clearly defined without the excessive number of pixels to distract, that's how I feel about this rendition of a launch in process with all the pieces in place. Of the four Airdales up front and crouching by a wheel I identify myself as that Airdale at the left wheel of the Avenger to the right. That's my posture, that's my mode as I keep my eyes riveted on the yellow-shirt "holding" that Avenger so that I can pull the wheelchock immediately at his signal [for all I know that IS me]. The question arises, "What to do after the wheelchock is pilled?" It depends, such as what's that yellow-shirt to the left going to do about that Hellcat to the left? Remember, there's a 30 knot ambient wind plus the prop-washes of the aircraft up ahead that are bearing down on you. This situation requires that you "stay in tune" with the yellow-shirts' signals to the pilots. Your path must accommodate those signals. It's similar in life: your path must take into account and then consideration what others are doing and thinking. We don't "live in a vacuum", for sure. That's why consensus is important even though there are those who always want it "their way or the highway", to use the vernacular. [Yet don't compromise your core beliefs. That would be folly for you are how you conduct yourself. Don't fool yourself.]

Mathematics: the derivative is the rate of change of a dependent variable, say distance "y" relative to the rate of change of an independent variable, say time "t" and written as dy/dt: the derivative of y with respect to t. A derivative's counterpart is integration and is called the integral, written (here) as { representing the sum, or summation. When integration is performed on an equation which is written in terms of derivatives it converts the equation back into one in which y and t have shed their rate-of-change nomenclature and resumed the normal algebraic representation. Being a rate of change simply means the speed of an object or item (such as the money supply growth or the speed of a car, etc.). When used abstractly in an equation the derivative can most readily be thought of in terms of the curve which represents this equation on a graph. At any point the curve is rising or falling at so many units of the dependent variable (y-axis) per units of the independent variable (t-axis) (it can also be horizontal, an important point). This slope of the graph (curve) is the exact equivalent of the rate of change of y (distance) with respect to t (time). The slope can be said definitively to be the derivative. To be continued.

HERE COMES A DAUNTLESS

I included this picture because at the beginning of the war, when the SBD Dauntlesses held sway (as here trying to negotiate its way into that small area with wings straight out) the Essex-class carriers had provisions for landing aircraft onto its bow by going up to 30 knots in reverse (stern first). The idea was that if an attack damaged the propulsion system such that the ship could move only in the reverse direction it would still be able to recover aircraft returning from a mission. This concept was in due course considered not necessary and follow-on Essexes did not have this capability (although it proved feasible and was actually done on occasion). The Antietam never had these provisions (I say that now but in fact perhaps I'm mistaken about this). The provisions of which I speak can be seen at the edge of the flight deck. Note the round arresting-wire reel take-up just below the propeller of the SBD. Moving to the right one detects the barrier post now flat on the deck. Further to the right is another arresting-wire and beyond it is another barrier flat on the deck by the head of the yellow-shirt to the right. Yes, there's our nonchalant character up from below, taking in the sights while on our port beam is the ever-present Essex-class carrier with a battleship interposing itself. The versatility of a carrier being able to land aircraft fore and aft is commendable and we too should seek to be the same. In a mundane way I sought one form of this versatility in participating in all the major sports. I felt more complete in doing so. I believe it's beneficial to become involved in as many things as is feasible. It broadens one's outlook and satisfies one's feeling of self-worth. This is priceless (as long as it doesn't bubble to the surface as an irritant to others). Subdued self-confidence benefits not only you yourself but also the world around you. It can be golden because (honestly) self-assured people are not disruptive to society. [Can you imagine a self-assured person giving others a hard-time?]

Mathematics: the derivative can be expressed as the height of an aircraft as it climbs from a take-off versus the time elapsed ass expressed on an x-y graph. If this graph (curve) is not straight then the tangent to the curve at a point will express the rate of change (the derivative) of the aircraft at that point in time. Further, the rate of change of those tangents are a measure of the rate of change of the rate of change, i.e., the acceleration. It should be understood that the tangent is an indication of an instantaneous value. The concept can be visualized by considering the arc of a ball thrown from here to there. At each point in its travel one can draw a tangent to its path which represents the rate of change (distance vs. time, or dy/dt). [A baseball player must make "instantaneous" determination of not only the derivative of a fly ball but also its azimuth and elevation at "lift-off".]


28

AVENGER'S REVENGE

I'm but a semi-ignorant Airdale when it comes to matters of bombs and such so the experts must be tolerant and the others not take the following as necessarily all that accurate. To wit, here on the hanger deck these red-shirts are loading two 1,000-lb. bombs into an Avenger. First, notice the long pin at a 60 degree angle "piercing" the timing device on the nose of the bomb. When this pin is pulled out just before loading the bomb it leaves access to another pin that is moved into the bomb as that small propeller turns in the wind. When it has moved far enough the bomb explodes. Thus pulling that long pin arms the bomb. The tail fins have been affixed and in moments the red-shirt to the right will turn the crank of that cranking device to slowly raise the bomb to a position that will allow the bomb-bat doors to be closed. The load here will be two of these 1,000-lb. bombs. That "stick" attached to the door is a high-frequency radio antenna. The cart on which the bomb rests is in effect a wheelbarrow whose handles have been removed. Having covered all bases I believe the foregoing is an accurate account of the contents of this picture. The only thing about which I have a reasonable, substantial doubt is the size of the bomb. We, all of us, must not be afraid of admitting lack of knowledge or ignorance about things, even if we should know. The first best step to learning is this admission, using the admission as a stimulus to learn what it is we don't know. Pride is good (if well founded) but false pride is pure folly: "pride goeth before a fall". One marvelous antidote is to this is to LEARN. You should discover the real pleasure that accrues when learning.

Mathematics: the counterpart of the derivative, the integral, can also be visualized by a graph. Suppose that y is a function of t and that this equation is plotted on an x-y graph as a curve. Now the integral of y is the area between the curve and the horizontal t-axis (also called the x-axis). If we imagine a large number of very thin rectangles filling the space between the curve and the t-axis we can determine the area by adding the areas of all the thin rectangles. The calculus does this also by making the thickness of the rectangles "infinitely" thin. Since the rectangles represent a rate of change, or simply a rate, we can find a total (or sum or integral). Thus if the rate of pay for one day is represented by a rectangle then we know the total pay for the period from t=1 to t=30 (the monthly pay). Carrying this concept further one can determine the volume of an irregularly shaped object if the equations for the shape in two dimensions is known: take the integral of this equation and integrate it through the extent of the third dimension. This process adds the areas of all the slices that are represented by the area-equation from the beginning of the third dimension to its end: {(5-z)dz from z=o to z=5. All the areas added equals volume.

"THE BEAUTY AND THE BEAST"

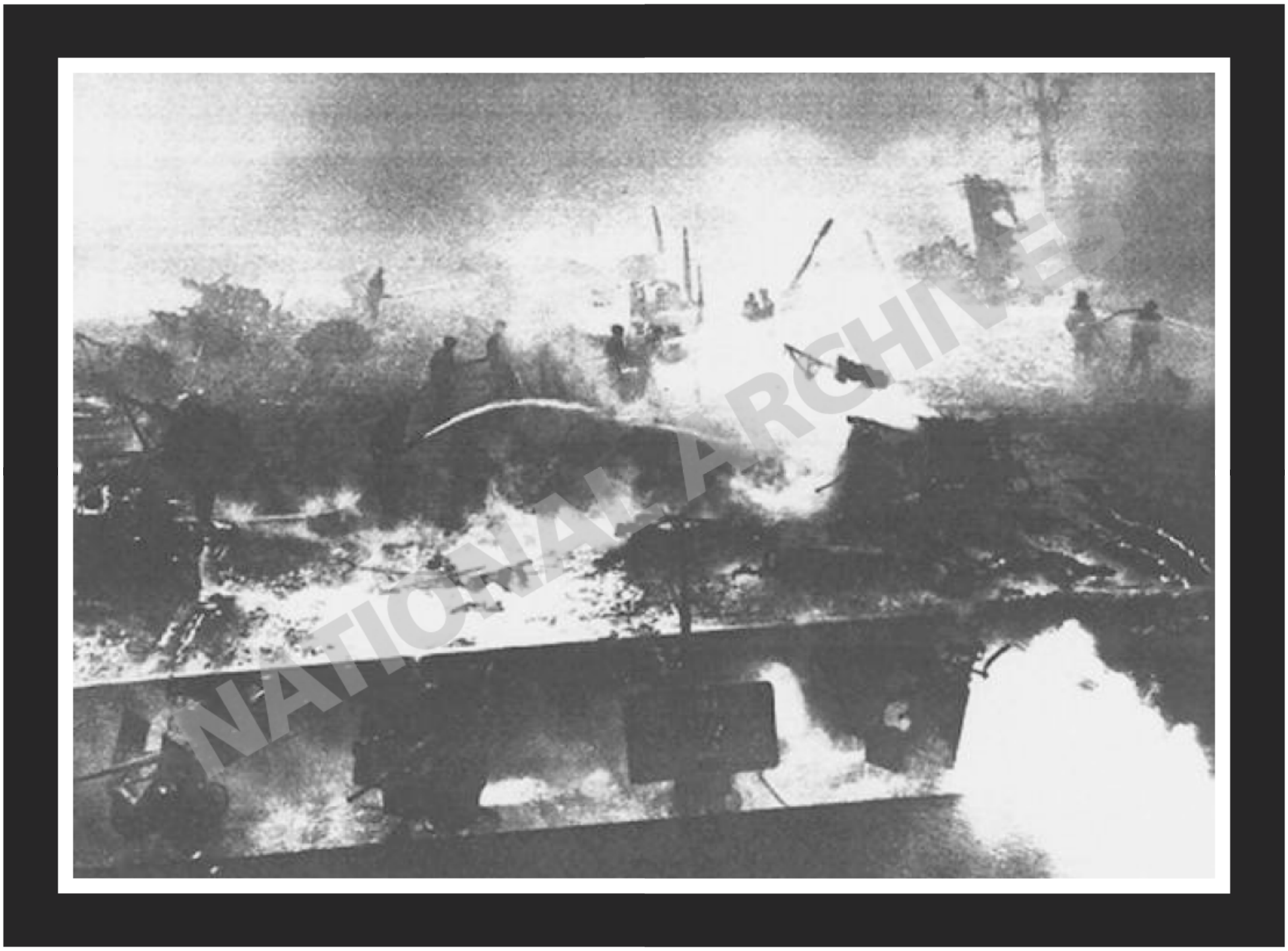
Talk of juxtaposition: the God-given beauty of a pure azure sky backing the glorious beauty of those magnificent cumulus clouds hovering over the blaspheme of the rending of human life. If one ponders this view instead of giving it merely a cursory glace one will realize that the above statement is not overblown. Not at all. Note that the brilliance of the clouds is so powerful that it gives light to the sea below. Yes, here the color of the sky would be a welcome addition. Even the far distant highlands to the left give us a feeling of the immenseness of the vista while the dark smoke jolts us to the realization that even in a beautiful world all is not well. In life our lives are filled with the good but also tainted with the bad. That's called "life". How we deal with it is one measure of the quality of our character. Most of us fall short but that beneficially leaves room for our improvement and improvement is the stuff of life. It should be our life-long goal and if nothing else it's a source of satisfaction when improvement does accrue. When magnificent clouds appear overhead think on this for we ALL always have room for improvement in mind and character. If nothing else, one should take note of the beauty in this world.

Mathematics: before continuing, it occurred to me that in this day and age the students have the benefit of all kinds of instructive computer software programs that take one through the rudiments and the rigors of subjects ranging far and wide. They provide the advantage of showing dynamic concepts that was unavailable to those of us of yore with our textbooks of little static diagrams to say nothing of the small slide-rules that have long since been replaced by pocket calculators that can produce a wealth of solutions. So don't feel put upon and "stressed out" when expected to learn things that my generation had to do by "archaic" means. The tools of the trade of learning should make the process one of relative enjoyment. Honestly. // Let's try finding the derivative of a simple function, that of the area of a sphere whose equation is the familiar A=4 (pi)r^2 (where "^" is the power of a variable; radius r in this case). We now wish to find the derivative of the area as a function of radius r: dA/dr. We arbitrarily choose a fixed value of radius and call it "r". In calculus they use a term called the "increment" which is merely a very small amount of anything (in the textbooks they use the symbol "delta ", a small upright triangle; we'll use a "#" instead); thus "#r" is a very small value of the radius of the circle). Now A=4(pi)r^2 and A+#A=4(pi)(r+#r)^2. [It would be useful to write these equations on a separate piece of paper using the proper symbols for delta (#), (pi) and a power(^). This will be constructive.] Rearranging, #A=4(pi)(r+#r)^2-A= 4(pi)(r+#r)^2-[4(pi)r^2]. To be continued and finished in one more page: rate of change of area with respect to radius.

DESOLATION

Yes, the deed is done and desolation dominates. A bomb struck a group of aircraft fueled with high octane gasoline and loaded with bombs causing devastation in close quarters. Where once were men and aircraft are now the dead and the derelicts. In the foreground are 20-mm guns abandoned by the effects of the blast and ensuing conflagration. In the background are the remains of the aircraft with the Airdales, now turned fire-fighters, doing what they are able to do to quench the flames amid the smoke that obscures. Perhaps the fire-hoses have been punctured by the shrapnel rendering them useless. Yes, the "Winds of War" have reached this carrier with a vengeance. Here on the flight deck there is little room available from which to fight the fires so the Airdales , that is those that survived the blast, must stand and fight the fire amid its confines for the constraints of the deck leave no alternative. This is artfully not made a graphic picture for who would want to be immersed in such death and destruction? However, that's the nature of fires on board a ship: you can not choose your position. It chooses you. Less dramatically, often in life we can not choose the circumstances of our situation. One must learn that sometimes one must accommodate oneself to the conditions as presented. One is "in the grip" of a difficult situation and must find a suitable solution. Cool heads and calm minds are the (only) answer for these occasions (and hopefully they'll only be on occasion). Some of us have more than our share of troubles but we persevere.

Mathematics: the average rate of change of area A with respect to radius r is #A/#R and the "limit" of this as #r–> 0 (delta r approaches zero) is dA/dr. Now #A/#r=[4(pi)(r+#r)^2-(r^/2)]/#r. Remember, "#" means delta or a small increment. Thus "#r" is a small increment of the radius r and "r^2" is radius r squared. Simplifying th above equation we obtain #A/#r=4(pi)[2r(#r)+(#r)^2]/#r. This equals 4(pi)[2r+#r]=8(pi)r+4(pi) (#r)]. Therefore by theorem, dA/dr=lim(#r–>0)[#A/#r=8(pi)r. That is, the differential of the area A with respect to differential of radius r is equal to the limit of #A/#r as #r approaches very close to the value of zero. That is, the term in the previous equation "4(pi)#r becomes zero leaving only the term 8(pi)r. Thus the derivative of (the change of) area as radius changes is 8 times (pi) times radius r. Suppose that the radius r is 3 inches. Then the rate of change of area A with respect to radius r is dA/dr=8(pi)x3=24(pi) square inches per inch of radius. The basic definition of the derivative is defined by the following equation where "y" is the dependent variable and "x" is the independent variable y=f(x): dy/dx=lim (as delta x–>0)[f(x+#x)-f(x)]/#x. A function must be continuous to be differentiable but not all continuous functions are differentiable. Generally, if smooth a curve is differentiable.



THE LAST TO GO

These leviathans of the air fleet, the largest single-engine aircraft of WWII, form a line to proceed to the take-off point about 200 feet further forward. They are apparently in a "hold" condition by the looks of the yellow-shirts and the fact that there are Airdales at the wheels of the chocked aircraft. They don't like to hold up a flight operation because there are others already airborne and the squadrons go as combined units so as to descend on the target en masse. This is not a nice enterprise, this journey to seek to annihilate the "bad guys". However, we considered it a necessary enterprise because the enemy was a flagrant threat and a blight on the aspirations of that part of the world and us who would do naught but retain and maintain our independence from what otherwise would have been unthinkable domination. That would not be tolerated. They forced us to take the path to war. As was usual the Avengers took up the end of the parade of aircraft launching themselves skyward. There are seven and a half shown here out of our complement of twenty. When crouched down next to a wheel you have little idea as to what is happening elsewhere. You're concentrating by looking for that yellow-shirt who's going to take control of "your" aircraft. This is not unlike situations in which we often find ourselves. We become perplexed by what has or is happening, We become agitated and unsettled. We worry and we fret. Perhaps we should follow the admonition of the poem: "God give me the serenity to accept the things I can not change, the courage to change the things I can change, and the wisdom to know the difference". Assemble all the facts, than carefully evaluate.

Mathematics: the previous page showed how the area of a sphere was a function of the value of the radius, and when the radius changed the area also change by a given amount That process defined one of the formulations of finding the derivative: given a functional relationship the derivative is determined by the rule: area=4(pi)r^2 and its derivative (rate of change) is 4(pi)r. The rule to obtain the derivative of any function raised to power is: cx^n –> cn(x[^(n–1)]). In words: the derivative of a constant (c) times a variable (x) to the power (n) is equal to that constant (c) times the power of the variable(n) times the variable to the power one less than the original power (n-1).Similar rules are derived for other functions such as sums, products, ratios and a host of other functions. An equation may be made up of multiple factors such as y=2X^3+5x^2+9x =7. Each term in turn is differentiated to obtain the total derivative. There are about 25such rules that can be derived as shown. They include cu, u+v, u/v, uv, the trigonometric and inverse trigonometric functions, log(u), log(e), and a few more. They are all derived as was our example. These rules are straight forward and logically derived.

HOW HIGH THE BOUNCE?

It's not just the LSO (Landing Signal Officer) glancing at this Hellcat who wonders how high it'll bounce but it's also those to the right who wonder how high this Hellcat will bounce. Obviously there's a direct relationship between the height of the aircraft and its bounce (this brings to mind the WWII song "The Jersey Bounce" and the "jitterbug" dancing that went with it; that dancing was a well defined set of motions that reflected the rhythm of the music). Since the Hellcat is about 35 feet above the deck, with the engine at idle, and since it's moving at an estimated 40 mph (60 ft/sec) relative to the deck (ship's speed of 30 knots plus 40 mph equals 70 mph air speed required for a landing) we figure that the Hellcat will touch down in 2 seconds fro this height of 35 feet (Galileo told us that gravity follows this rule: d=16(t^2) so at 35 feet the time will be 35/16=t^2 and t=2.2). Of course the lift of the wings has to be considered but what's an Airdale to do when he sees this big machine hurtling toward him? Is he to make these calculations mentally post haste and then say, "Let's clear out". Of course not but with experience one learns which aircraft will be bouncers and which probably will not. In any event, not all bouncers clear the barriers to wreck havoc among "the troops". The direct relationship of the example above brings to mind what I've always strongly suspected: there's an inverse relationship between the guys interested in and trying to "make out" with the girls and the capacity for solid intelligence and character. (This is not to be glossed over.)

Mathematics: the derivative (rate of change) a function f(x) is denoted by dy/dx. If dydx>0 then the slope of the curve of the function is increasing. If dy/dx<0 then the slope is decreasing. If dy/dx=0 then the slope is horizontal. If the second derivative (rate of change of the rate of change) is positive then the slope is concave upward. If the second derivative is negative then the slope is concave downward. We'll now consider the computation of the integral (in its most basic form). We remember that integration is the reverse side of the same coin. The integral of the derivative of a function is the function. Consider the function y=x^3. Then by our previous discussion, the derivative of the function y=f(x)=x^3 is d/dx(x^3)=3(x^2). Thus the quantity 1/3(x^3 has x^2 as its derivative. However the same thing is true of 1/3(x^3)+1, 1/3(x^3)-5 and 1/3(x^3)+C. Hence the integral of x^2 is 1/3(x^3)+C. Find the integral of c(x^n). Set dy/dx=c(x^n). Observe that d/dx[c(x^(n+1)]=(n+1)c(x^n) so that d/dx[c/(n+1){x(n+1)}+C=c(x^n). Thus y= {c[x^(n+1)]/(n+1)}=C is the desired integral. I'll be the first to say the above is somewhat obtuse in presentation but in a textbook it's much clearer. Honest. The further study of the calculus is more involved than what's been presented but if these rudiments are acquired, all will be well.


NATIONAL ARCHIVES

NEAT FROM ANY ANGLE

A Corsair in flight is not only yare (quick, agile) but it's also neat and sleek ("cool") on the ground. As an Airdale I came to know the aircraft from "head to foot", from all angles. This view here of course is all too familiar one. Upon landing an aircraft was immediately refueled with high octane fuel so as to be ready for any eventualities. The Corsair was unique, I believe, in having its fuel tank forward of the pilot which was perhaps dangerous to him. I said that I was well familiar with the aircraft, externally. For instance, I don't know the internal workings of the fuel system as concerns a fighter's maneuverability such as flying vertically or even in an inverted manner. For instance, how is the fuel contained so that it doesn't flood the carburetor (in the days before fuel-injection systems)? (I suppose it was a special fuel pump.) Just as I know the externals of these aircraft without knowing the internals so too do we tend to think we know a person because we're familiar with their external words and actions. And yet, do we really know the person? Is the person "playing it close to the vest"? Are they straight-forward with us? It's upon such a question that we do or do not have a feeling of trust. There are those who are by nature not outgoing vis-a-vis their thoughts and feelings. We must give them their zone of privacy. My friend whom I considered very dear turned adamantly hostile toward me. I know not why. Yet since I know not the basis of her hostility it's not mine to castigate. Who knows, perhaps her hostility is apparent only (but maybe not). Either way, she has her reasons which I cannot judge nor qualify. In effect I can only consider her, in my judgement, to be misguided. I can only bow to her wish to "have her space". In my disappointment I wish her "hail and farewell".

Analog vs. Digital: so much of the world is now digital that there are those who don't realize that not that long ago almost everything was analog. In the "real" world everything IS analog (except for among other things the propagation of nerve impulses which are a form of digital). Analog signals are characterized by their continuous nature. A graph of an analog signal is smooth and consists of an infinite number of points while a digital signal is made up of a discrete number of points. In fact, engineers deliberately break a smooth, continuos wave into a digital wave. Why? They do it because digital equipment that handles digital signals are far more accurate than their analog counterparts. In addition, a digital signal can represent as small or large a quantity as is desired. Furthermore, digital equipment can count digital pulses to almost any fineness. A scene consisting of discrete pixels is not true digital because they don't represent a known number of pulses. True digital counts pulses. This precise counting of digital pulses is what makes possible the fantastic capability of digital computers.


R57

ACCOUNTABILITY

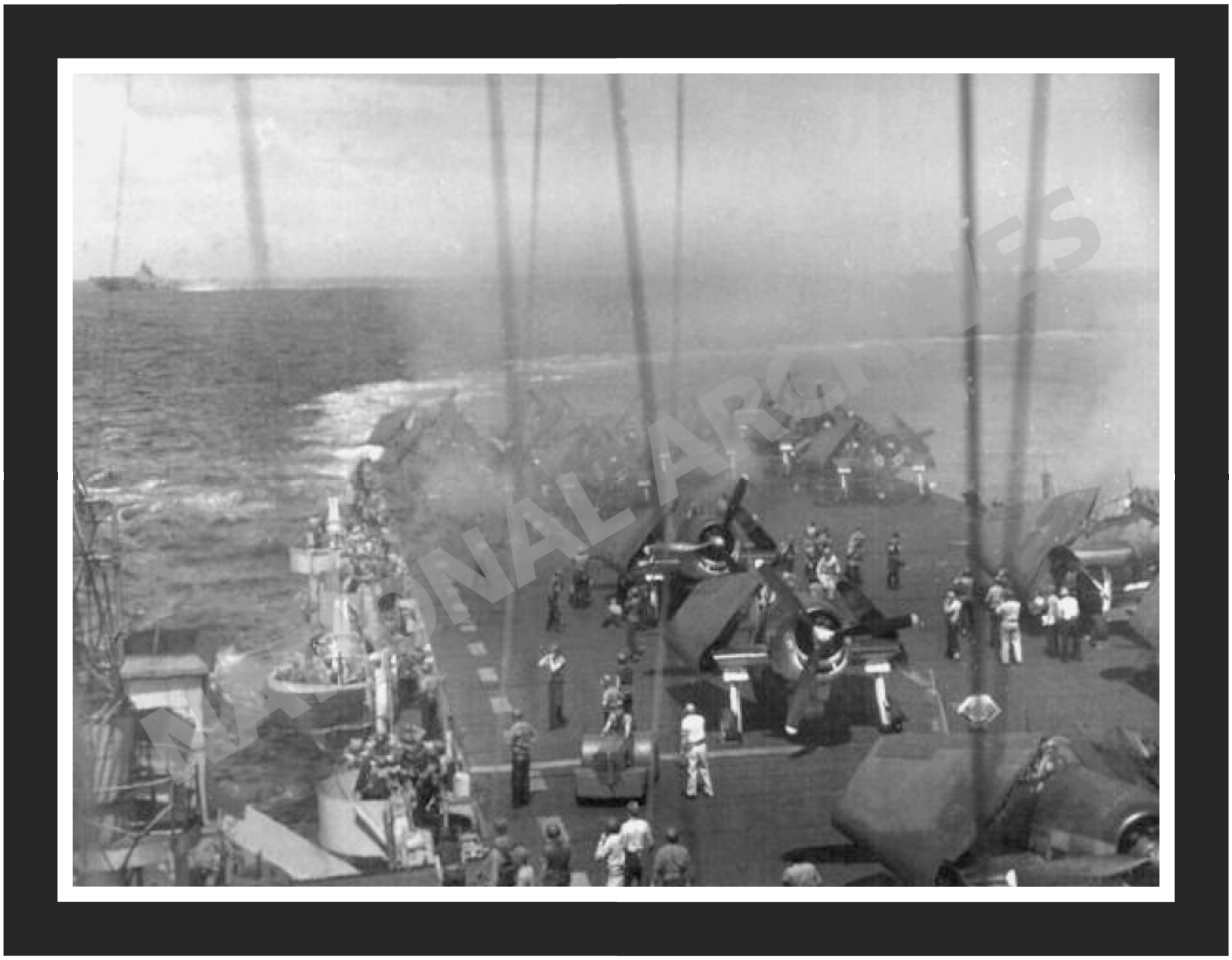
The men seen here are some of those who are accountable for shooting down that kamikaze before he crashes into the ship (note that two of the three are wearing life-preservers around their waists). This is a view from the top of the pilothouse looking at a 40-mm gun quad that frames the Mk 37 Director for the 5-inch Mk12 guns in the Mk 32 twin gun-mounts forward of the superstructure. Atop the Mk 37 is the Mk 4 parabolic radar antenna. Just to the right of this antenna is a thin vertical "pipe". It's the cross-level connecting bar that generates the existing roll-motion of the ship which is used by the electromechanical analog computer in the fire-control compartment. This computer occupies approximately 3x3x3 cu.ft. The director/radar antenna are responsible for generating the target range and bearing, the estimated target course and speed, the target elevation, the estimated target rate of climb. It sends these to the analog computer which calculates the bearing and elevation and fuse-set for the guns. At the same time it receives from the computer the predicted change in target range and bearing and the cross-level from the stable element (large precise gyroscope). This is just a part of the complexity of firing a gun from a moving, rolling, pitching, heaving platform at a target that's moving in three dimensions. Yes, it's a challenge and a bitter responsibility. They must be accountable, these men here connected to their sound-powered phones when on duty in the computer -compartment. Just how responsible are WE ? Do we hold ourselves accountable for our deeds? A large measure of our character can be found in how well we hold ourselves accountable for our actions rather than requiring others to hold us accountable: is our conscience well scrubbed? Most all of us have a good idea of what's right and what's wrong, what's proper and what's not. It's the conscience that measures our adherence to these standardized morals and ethics. Surely we're smart enough to understand that we live with our conscience that follows us wherever we go. Until our "better angels" hold sway society will be in deficit, an unhappy place.

Analog vs. Digital: the next pages will pick up on this subject by considering in a fairly general way the content of an analog computer and then the contents of a digital computer, that ubiquitous device that is found in seemingly everything we touch to say nothing of the infrastructure of our society (society is mentioned frequently in these pages for the simple reason that we all live in "society". The fact of the matter is that we could not exist without "society" and therefore, how well it functions calibrates how well we live in both material and nonmaterial ways.(One without the other does not make for a happy environment in which to live unless one wishes to be a hermit.) [Note: analog computers still have a place in the world of science and technology.]

EVASIVE ACTION

Gun smoke covers this Independence-class carrier as it makes a sharp turn to avoid dropped bombs. The Independence-class carriers were light cruiser-hulls converted to light carriers at the beginning of the war to provide carrier presence in the Pacific. They were 11,000 tons (15,000 tons fully loaded). There were nine of these ships each at a length of 623 feet and width of 109 feet. Their speed was 32 knots and they carried four 5-inch guns, twenty-six 40-mm guns and forty 20-mm guns. The aircraft complement was forty-five with a crew of 1600. This is the CVL-26 with the U.S.S Wasp (CV-18) in the background. It's my understanding that these ships carried only the Hellcats seen here and the Avengers. This is not a drill as evidenced by the wearing of helmets by all hands except the flight deck crew. We were never issued helmets and with the close proximity of us and the aircraft I don't believe they would have provided much in the way of anything but a possible emotional protection from a bomb-blast. Here the smoke only obscures the view of the gunners and doesn't provide any cover. Just so in life: "smoke and mirrors" (read "lies and damn lies") can only make life more complicated and diminished. There are those who believe lying can have a beneficial effect but more often than not , "ye shall reap what ye shall sow". On a more nostalgic note, that classic song "Smoke Gets In Your Eyes" is a melancholy lament that doesn't lies but for too fully plucked heart-strings will obscure even the most rational of thought. I believe I know this well. It's hard, very hard, at first but one eventually learns to move on because one believes in oneself.

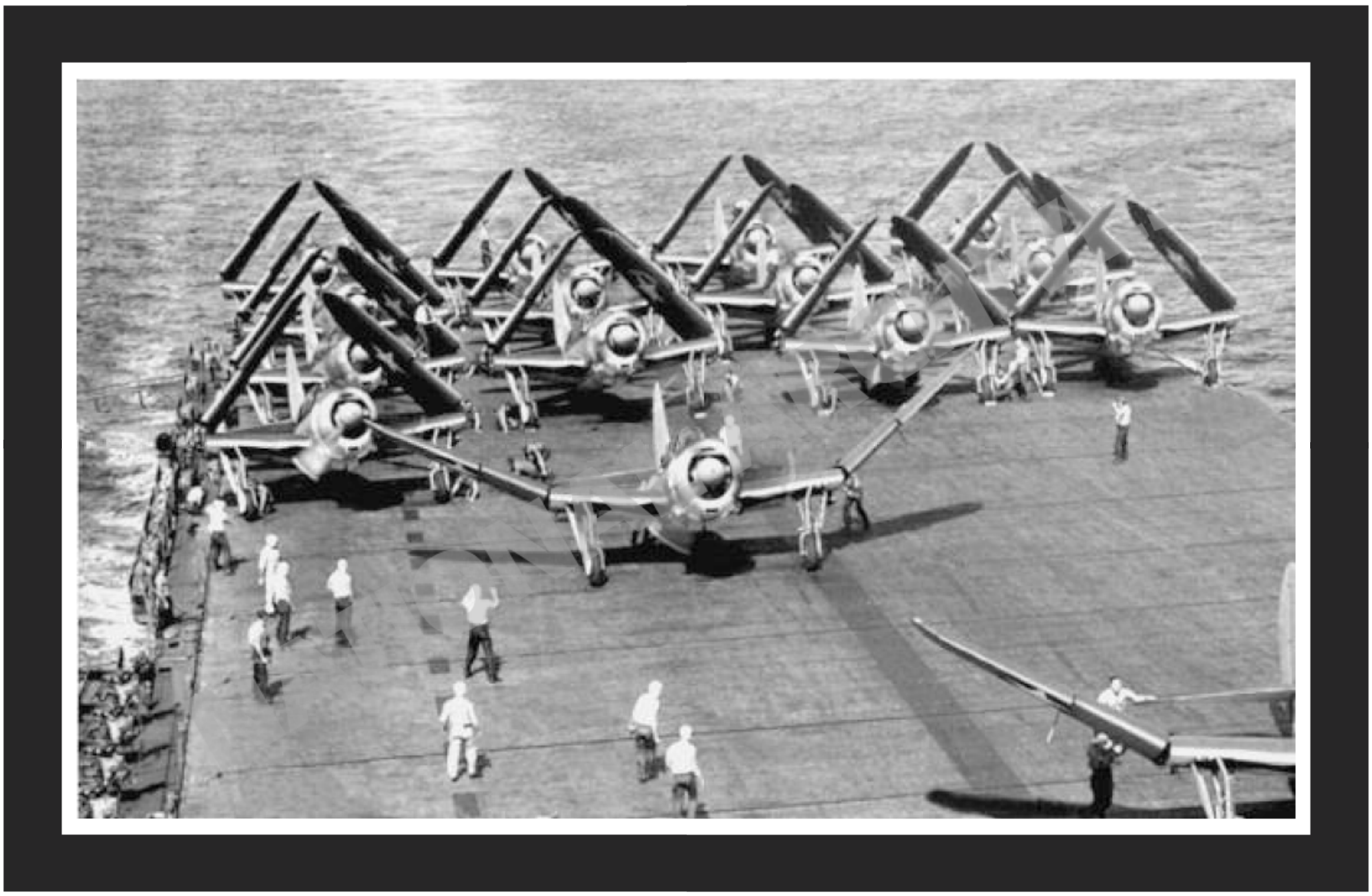
Analog Computers: an analog computer represents the variables of a given problem by corresponding physical quantities such as continuously variable voltages or shaft rotations. These machine variables are made to obey mathematical relations analogous to those of the original problem. The desired relations are established by a set of computing elements capable of enforcing suitable physical relationships. The conveniently measurable machine variables will then vary so that records of their values or behavior constitute solutions of the given problem. Analog computers may be classified according to the nature of the physical quantities used to represent mathematical variables and according to the computing elements used. There are mechanical, electromechanical and electrical analog computers. The most common analog computer of my day was the d-c analog computers in which the variables are represented by d-c voltages which may vary with time. Time is usually used as the independent variable in problems involving differential equations. The principal computing elements are d-c amplifiers with resistive and capacitive feedback networks. These machines were the precursors.



"THE OFFICE"

"Welcome one and all to my office, welcome to my desk here at a wheelchock. Let's spend the day, just like every other day, doing business (seemingly without end)". Corny? Smart alecky? Presumptuous? Probably "yes " to all three yet not without some modicum of validity because each day we would perform the same exercise, every morning, every afternoon without fail. With about 90 aircraft per flight operation this was hardly a sometime-thing. Here we see the Helldivers in arrears when usually it was the Avengers that took up the rear. No matter, they all had to go. We're down to the point of the operation where the yellow-shirts bunch up, and if I'm not mistaken, every visible wheel is covered except for that Helldiver to the far right. Note that the Helldivers spread their wings when and while they move out from the pack. In fact it's only the Hellcat that doesn't do this on its own for it's only the F6Fs that require the Airdales' assistance to spread their wings. These aircraft are peeled off from the group in a very orderly fashion. First from the left then from the right. Things usually occur smoothly with the only problem being the possibility that one aircraft overtakes another one which translates into shredded aircraft and flying debris (shrapnel). The flight operations, as I said, occurred without fail. We normal people obviously are not able to not fail on occasion (or even often). It's the strong of spirit who say "hold on" and try again. Persistence toward a worthy goal is an attribute that is to be greatly admired and nurtured. Sometimes it takes "intestinal fortitude", but the more one accomplishes and overcomes, the more likely it will happen in other (suitable) endeavors. A good athlete is not a "quitter" nor should you (concerning worthy goals). Define "worthy".

Analog Computers: the following excerpt is from a book written in 1956 titled "Electronic Analog Computers" by Korn and Korn: the really important contributions of the d-c analog computer to modern research and development techniques go beyond mere numerical computations. In many applications, the analog approach functions as a direct aid to a research worker's or engineer's thinking process: an analog computer setup serves as a model (emphasize model) which helps to bridge the gap between mathematical symbolism and physical reality. In this sense, analog computer representation of a process may be useful to both engineers and scientists even in cases where analytical methods apply". (I would replace the word "even" with "especially".) That was 1956. Today the digital computer surpasses the analog computer in every way: in speed, in accuracy and in ease of use. The first two items are important but it's the third one, using software, that makes it no contest. It will be discussed next as to how they work and what can be done with them. [What a tremendous advantage they are.]



DOOM, GLOOM AND DESOLATION

This tableau shows a ship broken but unbowed, with guns thrust upward in defiance. Where once was life and thriving activity is now a welter of broken, twisted metal charred to unrecognizability (while proudly the superstructure stands tall and strong against the now lightening smoke). We can imagine the terrible toll in men and machines that remain amid the billowing smoke that bespeaks of events too intense to adequately describe merely with words alone. How to define reality without the view? We do this reality a disservice to think we can enumerate its essence in prose alone. Study this picture well and then perhaps you'll understand the fabric of disaster. In this day and age of instant carnage at the flip of a switch it's an insult to the reality of actual disasters. Flip the switch again and you get another improbable portrayal of reality in another "action" film. Let's be frank, film-makers have trivialized tragic events and made the viewer inured to the reality of others' suffering. Truth is the victim in these "popular" depictions of "action" films. We "all" know it's only fantasy but with repetition there are too many who see it as all too real. Perhaps it's understandable in that they have yet to grow up. (To paraphrase, "When I was a boy I did boyish things; now that I'm a man I conduct myself as a man who's grown into a modicum of maturity). Real men don't act as if they were boys "in men's clothing". Boy's fantasize. When I was a boy I fantasized, just before I fell off to sleep, that I was "Buck Rogers Of The 25th Century". He was my hero and as him I did many gallant and brave things. But well before that ill-defined age of manhood I put away those adolescent thoughts of being someone else as I tried to find my own identity without the handicap of fantasy. [Except for creative artists fantasy is a slippery slope. It takes a well honed imagination to master it as a mature adult.] Is it true that those who favor things that are not realistic are by turn more prone to lie? Think on it.

Digital Computers: I have a computer software program that allows me to interactively simulate continuos, discrete, and hybrid mechanical, electrical and electromechanical systems and to develop process models. We'll go through some of these applications to show how versatile digital computers have become. All of my work will be done on a laptop computer with sufficient storage and memory to do very sophisticated applications. These are all dynamic systems with real-time control of operations. We can build and simulate models of very complex systems, all "on our lap". We can control and manipulate the blocks at will. The functions can be linear or nonlinear, of which there are many in nature (referring to the above systems). Thus, blocks that are defined can be moved and connected at will in the process of constructing a complicated system such as a chemical process.


NATIONAL ARCHIVES

"MY DOMAIN"

And this, my domain, shall never again pass before the presence of man. Imposing rhetoric, yes, but it's said for that little band of dark figures tense betwixt and between: to the right, a fired up Hellcat; to the left, a fired up Hellcat; up forward a fired up Hellcat adding its 60+ mph prop-wash to the existing ambient wind of 30 mph over the bow; and to the rear those potentially voracious Hellcats grinning their grins behind their thrashing blades. "Ye verily I say unto you, we are narrowly and fearfully surrounded by powerful and hostile forces". After absorbing this rhetoric, understand this is not hyperbole (hyp to the hip). It was a very real predicament that could not be avoided because, as has been said previously, the Hellcats required assistance in spreading their wings. These Airdales here handle the wing on their side while that group to the right handles the Hellcat's other wing. There they stand and stay in the middle of the deck as these "transactions" take place, one after the other: large and violently energetic machines wheel and accelerate around and about in close quarters on the shifting deck amidst the destabilizing roar of multiple engines. It was not something to which one became accustomed. It was, frankly. a dangerous situation and not something palatable to normal people. Yet sometimes we normal people do (rightly) feel surrounded by (unseen) hostile forces making for a feeling of desperate aloneness. This is just the time to present oneself to the world with the equanimity of spirit in spite of our stresses. Yes, it's hard, damnably so, to do but yes, it also becomes a more natural mantel with time until you imperceptibly arrive at ease with life's panoramas. It's a big, abundant world out there and you can find your niche in it away from the serious exasperations of life's servings. We can go only so far in our picking and choosing so we need to be resilient.

Digital Computers: before continuing with the techniques of computer simulations the basic hardware of the digital computer will be considered. There are of course the input and output devices such as keyboard, monitor, printer and disk storage. All computers have a means of storage of the computer programs and data such as a hard drive which permanently retains the programs and data. The control section obtains the program from storage/hard drive (which programs are sequential instructions to carry out a given action such as print a file to the printer). The primary part of the control section is the decoder which interprets each instruction in turn the program. The final section is the arithmetic unit which performs all the calculations on the digital data all of which is in the form of a unique series of ones and zeros (any number or quantity or word can be represented by a series of 1/0 to any degree of accuracy desired). The speed of operation of a simulation can be speeded up or slowed down.


NATIONAL ARCHIVES

FLAPS DOWN

We have a good view of the flaps in their downward position thus giving the Hellcat added lift because the air-flow over the top of the wing travels a greater distance than does the air-flow under the wing. Therefore, as has been said, the air pressure on top of the wing is less than that under the wing with a net result of an upward force (lift). In about four seconds the pilot will retract the flaps to gain more speed without the impediment of the drag of the flaps. It's all a function of speed. Speaking of speed, that battleship in the distance is probably making close to if not 30 knots. Below to the right are the gunners for a 40-mm gun quad a short distance away. This displacement of gun-director and gun makes for both horizontal and vertical parallax. These displacements must be factored into aiming the gun-quad by the manually operated Director Mk 51 with a Mk 14 gyroscopic stabilizer. It has a synchro elevation unit to provide data to the internal electromechanical computing unit. There are Mk 37 directors for the 5-inch guns and these Mk 51 directors for the 40-mm quads (the 20-mm guns are manually sighted). Certainly these directors were mandatory for effective air defense but in life we tend to shy away from being directed by others (on our jobs it of course is a necessary part of our job). But otherwise, unless it can't be avoided we want to be "our own man". This is understandable yet how can this be if we aren't knowledgeable? And how do we become knowledgeable? By learning, that's how. The moral here is to be as independent as possible by learning, by applying yourself diligently to your studies. Otherwise you'll be "a dummy' and a dependent one at that. Wouldn't you rather be educated than dependent? Civics requires it.

Digital Computers: in this simulator you build system models in the form of block diagrams using the familiar point-and-click method. Blocks (that represent math functions such as multiply and integrate——but not differentiate) and connecting wires are your primary design tools. You can drag blocks anywhere on the screen, flip them 180 degrees and drag connecting wires to tabs on blocks. Each block corresponds to a specific function from a sine function to a function as complex as a 10th order transfer function (read "differential). You can deal with both linear and nonlinear functions. When the simulator program simulates a model it numerically solves the equations that define the system and computes model output with no intervening steps. If you vary the parameters as the system progresses the program immediately computes the modifications and incorporates them into the simulation. There are seven integration algorithms used in this simulator as provided by the software program called "VisSim". This discussion will be continued concerning this remarkable simulation package.


NATIONAL ARCHIVES

THE RED-SHIRTS ARE HERE

This is a posed picture that features the armaments people of this enterprise formed to throttle the enemies who attacked our country. They were senior to and more elite than we Airdales were since handling explosives was more critical than pushing aircraft. That this picture can be presumed to be posed is seen in that the red-shirts are packing 0.50-inch ammunition while Helldivers carried a 20-mm cannon (machine-gun) in each wing. The photographer even had the brown-shirt plane captain sitting on the wing overseeing the activities. Furthermore two red-shirts per aircraft was the norm. To the left can be seen some people standing on the catwalk and beyond them are a couple of Airdales handling an aircraft on the deckedge elevator. Often times when looking at some of these pictures one is taken up by the mass of aircraft residing on the deck and thus don't appreciate the individual aircraft and all of its ramifications. For instance, "How do they install all that armament into that small space of a thin wing?" How about all the intricacies under the thin skin of the fuselage? We are sometimes called to task for not seeing the forest for the trees. It also can be asked if we see thee trees for the forest. The proper response is that we do both, and with as much precision as is possible. In fact, instead of considering only the two extremes (forest and trees) we should make the entire spectrum our domain. How? By LEARNING, that's how.

Digital Computers: the different methods of integration provide trade-offs between speed and accuracy (as has been said, integration is inherently more stable than differentiation so the equation must be expressed in terms of the integrals; more on this later). If the system contains implicit equations, one can perform static optimization at each time-step. To perform global optimization there are two methods available (these make possible such things as tuning the gains of the elements of the controller——-more on this later). VisSim also allows the approximation of the dynamics of nonlinear models by means of linearization of the system in both the time and frequency domains. [We are slowly veering into more advanced topics in the next multiple pages for those who set their sights higher than the previous material. When this subject is finished we'll revert back to a more general presentation. However one would be remiss to gloss over this material because it's not only interesting but it's also important.] [A state-space representation is used for the time domain and the transfer function for the frequency domain.) This simulation package runs on a personal computer with ease. The VisSim window has all the standard tool-bar buttons and so the transition to its use should be smooth. Also the block-set of VisSim is very comprehensive and easy to use. The fact of the matter is that using this system is more fun than "games".

ANOTHER REALISTIC "PAINTING"

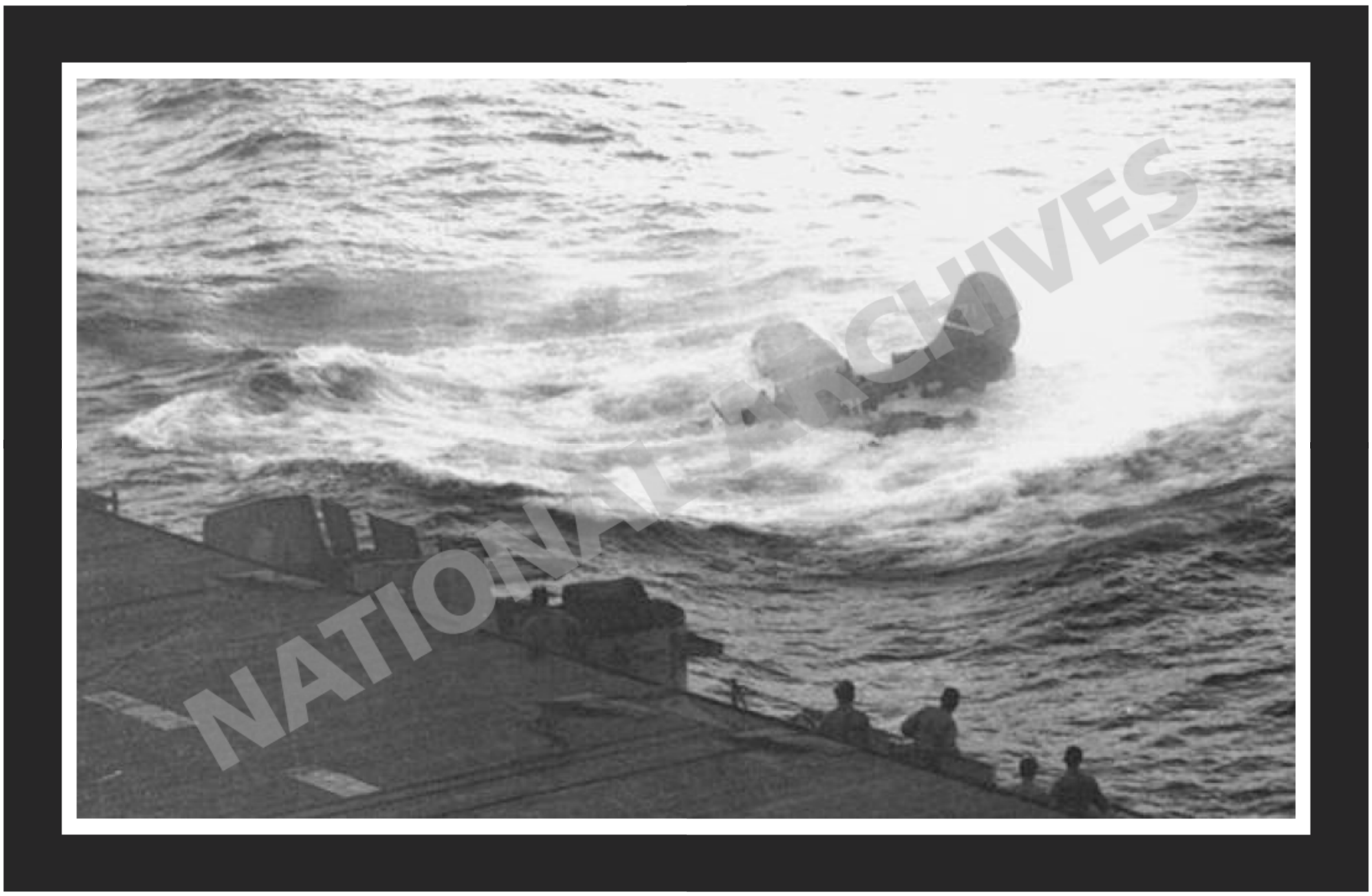
With flaps down this Hellcat is poised to accelerate down the deck for another of the multitudes of launches. Right above the launch officer with flag raised is the admiral's bridge. To its right just above the pilot's head is the signal bridge. Back above the admiral's bridge we view the captain's bridge (bridge/pilothouse) where I stood watch at the helm when I was a quartermaster-striker. To the right, being "sliced" by the propeller, is PRI FLY where the Air Officer held sway during flight operations. Just to its right is an open hatch (door) exposing a ladder (steps) going up a deck on which the mast-tripod sets. The first level of the tripod was where I'd go sometimes between flight operations for a little R&R. Once I was so "out of it" that when flight operations sounded over the PA system I couldn't move a muscle except for moving my eyes and shallow breathing. Being a healthy teenager this condition scared me out of my wits. With persistent effort I was able to make my way down that ladder and to the flight deck. I then proceeded to really annoy the yellow-shirt no end when I made my way past an aircraft he was gingerly negotiating out of the pack of aircraft assembled. (Actually I was not all that steady on my feet at that time, a perilous condition for an Airdale "going to work". However there were no mishaps at this time.) Right above the PRI FLY is the Mk 37 Director and in front of it one deck lower is a 40-mm gun quad. The imposing superstructure, strangely an emotional "pillar" of strength to me in my excursions in and among the fired up aircraft was also a "bleachers" for the spectators here seen. That was fine but what is not fine is for us civilians to stand about and watch others do whatever it is they're doing. We have to roll up our sleeves and also be doers. "Spectating" has its place but only if it inspires us. "Get off the couch" and stimulate your mind. It's fun. .

Digital Computers: VisSim has well over 100 blocks each of which performs unique functions with most of the blocks having their own windows for setting parameters. To discuss these would be to exceed the realm of our stated coverage. However this should be known to realize the great versatility available with VisSim. Yet, as the name implies, this simulator provides ease of operation since so much of it is visual. Basically, given an equation one accesses the various blocks and places them on the screen in a sequence that represents the mathematical model. This will become clearer anon. Let's model a simple mass-spring-damper suspension system. First though some simplifying notation: the first derivative of y to x is f '(x)=(y ') ; the second derivative of y to x is f "(x)=(y "). The first derivative of x to t is f '(t)=(x ') and the second derivative of x to t is f "(t)=(x "). Thus we will use (y '), (y "), (x '), and (x ") as 1st and 2nd derivatives respectively. Another simplification awaits us.

WET FEET

What we do know about this situation is that at the catwalk level is a 40-mm gun quad with its director to its right. This is located opposite the after elevator so we also know that the ship's bow is to the right. What we don't know is why the Helldiver is facing toward the stern. One supposition could be that for some reason the ship is launching (or landing) aircraft with the ship moving in reverse (this was done on occasion at the beginning of the war but was soon dropped because of problems——such as this?). We can further surmise that with the ambient wind of a low speed the ship was unable to go fast enough in reverse to give the Helldiver enough lift; thus the ensuing water landing (from maybe 100 feet altitude. In any event, the pilot and crewman were able to get out of the aircraft and presumably those are their figures by the side of the Helldiver in the process of extracting the inflatable life-raft from the fuselage (before the Helldiver sinks; they stayed afloat for a fair amount of time, being semi-watertight). The ship moves from right to left past the Helldiver (if our scenario is correct). A following destroyer will quickly pick up the pilot and crewman. Just because this idea didn't work out as planned this is no reason for us not to seek new and innovative ideas to advance our position and cause, if the ideas are not far fetched but are well crafted and thought out and not "over the top". This is similar to the enjoyment we get from facing and overcoming valid challenges. They become new experiences of the mind (while good sound sense keeps one from going off the deep end). Initiative, that's the ticket to enjoyment and progress (yours and ours).

Digital Computers: back to the mass-spring-damper suspension system, We know from first-principle physics that in our system the force of the mass equals the restoring forces of the spring and damper. That is, the mass M is attracted back to the origin by the elastic restoring force K that's proportional to the vertical displacement x, and is damped by an opposing force B proportional to its velocity. Thus by Newton's Second Law the definition of the equation of motion (the model) for the system is: Mf "(x)=-Bf '(x)-Kx where f "(x)= acceleration and f '(x)= velocity. Because integration is inherently more numerically stable than differentiation the equation must be expressed in terms of the integral. By definition of the derivative dx/dt=f '(x)={f "(x)+v(0)} from 0 to t and x={dx/dt+x(0)} from 0 to t where "{}" is the integral and v(0) and x(0) are initial values of velocity and distance respectively. Using the transform function of LaPlace we will represent the integral as 1/s. [The LaPlace transform of f(x) is denoted by F(s)={f(x)e^(-st)dt}. LaPlace transforms have been derived and we will use them as given. (It turns out at t=0 the LaPlace transform for the differential is "s" and for the integral "1/s". Unit step also=1/s.).


NATIONAL ARCHIVES

STRUT MALFUNCTION

The collapsed landing-gear could have been caused by a higher than desired cut-engine point. This collapsed condition results in a pivoting motion around the immobile left side. Depending on how high he was and how fast h e was going will determine how far he'll go before stopping. The chances of ending up in the catwalk are good. This in turn will require the use of the derrick to extricate the Helldiver from its predicament which means a longer recovery process which in turn means a longer delay and imprecations and mild maledictions all around. The pilot's unhappy, the LSO's unhappy, the Air Officer's unhappy and the Airdales aren't thrilled because it's they who have to clean up "the mess". In fact the pilot overhead is probably uttering private imprecations of his own because he has to go around and do it again. Time is of the essence during a landing operation and while "haste makes waste" (such as a wasted aircraft to say nothing of human life) the pilots and crew are trained to do the job of landing several squadrons on board as expeditiously as possible. Time and tide await no one nor does the fuel-supply nor the enemy (carriers are vulnerable during flight operations). Remember, a landing is expected every 30 seconds; anything more is cause for concern. While the analogy is somewhat weak, the above set of events reminds us of the idea of unintended consequences. One of the strong arguments in support of solid ethical conduct is that this principle of unintended consequences bespeaks for strong ethical conduct (that might be capsulized by saying that "consideration for others is the golden mean" (where consideration means concern).

Digital Computers: returning to the mass-spring-damper problem we can solve for the acceleration: f "(x)=(1/M)[-Kx-Bf '(x)]. To model this system in VisSim wire the outputs of x and dx/dt (that is, f '(x)) variable blocks through two gain (amplifier) blocks (which represent K and B) and into a summing junction block, with inputs negated. By dividing the output of the summing junction block by M (which is represented by a constant block) the value of f "(x), the acceleration, is produced. The output of any block can be applied to a window (on the screen) which is an x-y chart. Thus you are able to plot the waveform from any block. The blocks connected by "wires" is a diagram of the system model of the mass-spring-damper problem. When the simulation is run there are available the values of the distance x, the velocity v (or f '(x)) and the acceleration "a" (or f "(x)). Retracing our steps, we derived the model (equation)of the mass-spring-damper problem. We then assembled the blocks by selecting them and then dragging them into the system diagram and "wiring" the blocks together by dragging them to tans on the blocks. We'll next step back temporarily to consider the ease of operation with VisSim.

DISTORTED VIEW

With flaps down this Helldiver touches down too close to the edge of the flight deck for comfort (whoever said a landing was comfortable for anybody?). The first barrier available, the one in view, is approximately 300 feet from the end of the flight deck, opposite the after elevator while the Helldiver is probably 150 feet away. This distortion results from a telephoto lens having been used. Thus the two green-shirts to the left, operating the barrier and arresting-wire controls are not immediate danger (but the Helldiver is too close to the edge). Recall that both the barriers and the arresting-wires are lowered each landing to allow the passage of the just landed aircraft. This, and the catapult-launch, are the responsibility of the green-shirts. Note the foul-weather gear they're wearing against the wind-chill factor and against which there was no protection up on the flight deck as opposed to these green-shirts down here on the catwalk. No, it wasn't the same as being in the arctic with gale-force winds but it was the damp cold that penetrated one to the bones. In addition the shivering against this damp cold contributed to the fatigue that was most apparent on the cloudy days. Note the fire-hose in the foreground. These were spotted around the deck with most being back aft where the landings took place. Distortion or no, this were an anxious few moments for these sailors here. Distortions have a way of confusing us. At least here we understand that this is a distortion but in life we don't always realize when something is or is not a distortion which in turn can cause egregious misjudgements of others, verging on the edge of sinfulness. The admonition "Judge not lest ye be judged" is a valid one. We have to realize that sometimes only God is qualified to judge.

Digital Computers: there is a "Blocks" menu accessible from the tool-bar in a drop-down list. There are almost 100 blocks from which to chose including Add, Multiply, Divide, Sum, Integrate, etc. One has only to click on the block in the list, hold down the mouse-button and drag the block to its desired position. It can be moved at any time. To set up a block's parameters click Edit, chose Block Properties, point at the given block and click and then fill in the parameters. When entering numeric data you can use straight numbers or scientific notation. The blocks can be rotated 180 degrees to simplify the diagram. The input tabs to blocks can be set to plus or minus. The blocks can be interconnected by "wires" that are dragged from one block to another one. If a block is dragged to another location the "wires" will go with it. Blocks can be selected by pointing to a block, holding the shift key and clicking the mouse. Displays are available in various formats such as x-y graphs and they can be enlarged to fill the screen. Any block output can be displayed on the display by connecting to it.


NATIONAL ARCHIVES

WHAT NOW MY FRIEND?

It's touch and go as to whether this Helldiver will end up on the catwalk. Keep in mind that the ship is moving under the aircraft so that the relative motion is less than what we'd expect by our viewing of the situation. (This brings to mind Einstein's Theory of Relativity and relative motion in space, but that's the "big picture" while here we're concerned with the "little picture".) In the grand scheme of things, yes, this is a "little picture" but to the green-shirts standing on the catwalk at their post this is mot a "little picture". Perhaps they've been through this before and so know what to expect yet no two occurrences are just the same. Even though their "body language" belies anxiety one can only wonder at their state of mind. The Helldiver's falling down onto the catwalk could well rupture the fuel tank with the attendant explosion and fire. Who knows until it happens? Do we stand our posts and do our duty when things are problematic? These sailors didn't "cut and run" (they didn't shirk their duty). They say that when "the going gets tough the tough get going". Hey, that homework assignment is really tough. So how tough are you? Responsibilities can be tough (and if they weren't tough what kind of a responsibility is it?) but the good news is that the more often we apply ourselves to then the easier they become. This is not a fatuous "throw away". It's tried and true and it will serve you in good stead, for sure.

Digital Computers: compound blocks allow you to combine a few or many blocks into one composite block thus providing for large sized models. The compound block can also be examined by filling the screen with only the contents of the compound block. Beyond that one has the capability of "drilling" down into the compound block to expand a block within a block within a block to the most elemental block. Thus there is no part of the model that can not be examined and parameters changed. This precess of "drilling" is done with a simple click of the mouse. You can even hide compound blocks to make modifications to the model easier to accomplish. You can feature a block by altering their color. You can include graphics (pictures) in your model to give a more meaningful presentation. You can add printed labels to the diagram to clarify the contents of a display. Each block can be uniquely colored. These are just some of the capabilities of this visual simulation software program. It is "deliciously" easy to use and extremely versatile. Keep in mind that this program is apt for all kinds of applications and not just scientific and engineering problems. Yes, it's a problem-solver as will be briefly demonstrated anon. We have already briefly shown how to simulate the mass-spring-damper problem, the basis of the automobile suspension system that has been developed and redeveloped for improvement.

THE UNFORTUNATE DEED IS DONE

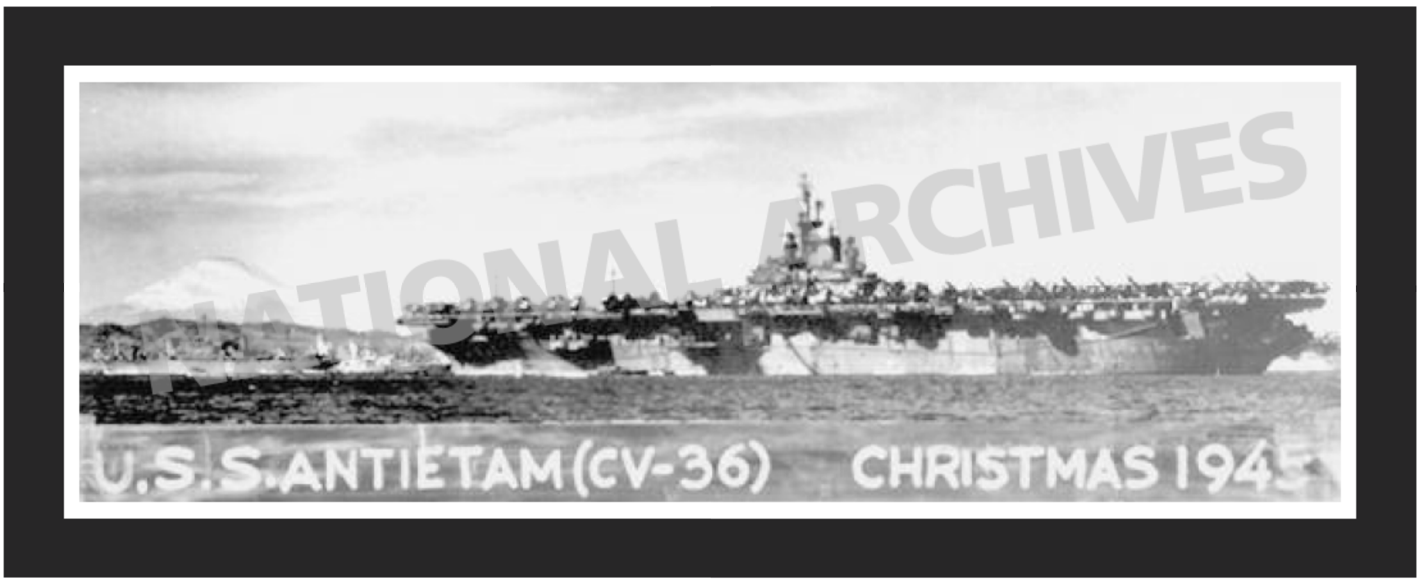
Unfortunate to wind up on the catwalk but fortunate not to be consumed by an explosion and fire. Perhaps a small blessing but we must take our blessings as they come, large or small. There's no way that the Airdales can lift this 10,600-lb. (unloaded) aircraft out of the catwalk so the derrick must be brought to the rescue. Delay is in store and expediting is in demand. Once the Helldiver is lifted onto the deck a large dolly will be placed under the left wheel-strut so that the Airdales can then push the Helldiver to the after elevator to be worked on below on the hanger deck. The propeller will of course have to be replaced and I suppose the crankshaft will have to be examined because of the stress placed on it through the propeller. The ship carries modest supplies of repair parts but there's a limit to what it can repair when at sea. This brings up the subject of my need of repair. For close to two years now I've had the misfortune of having macular degeneration, a malfunctioning of the fovia centralis (macula) of the retina. This area of the retina consists of "cones", those nerve elements responsible for color detection and detail capability. As such I've been unable to read since the inception of this disorder. So how am I able to compose these books. The beauty of technology cones to the fore: I type with the large size font (#23) on the monitor and when I've finished with the typos, of which there are many, I then have the word processor reduce the font to normal size (#14). I still need to use a 2x and a 4x magnifying glass to check my typing and maneuver my way around the monitor screen and when my spelling fails me I need a 6x magnifier to negotiate the fine print of the dictionary. This can be a trial. Finally, my wife helps me when even these devices leave me high and dry. It's an effort but as in all things, one learns to adapt. I shall finish this book and then close any further efforts because they tell me that this disorder only gets worse, not better. I hope the effort has been useful to those who might find the time to peruse these pages. If not, so be it. I can only say that though it has been an effort it ha also been a pleasure that I'm glad was not denied me. It's a real "downer", I can avow, not to be able to read normally.

Digital Computers: since little space remains here I'll revisit the dynamic mass-spring-damper problem. A model of the system was generated from physics first principles (the mass in motion was opposed by the retarding forces of the spring and damper). This derived equation was then rearranged so that the 2nd derivative was equal to the rest of the factors. The simulator was then entered to create this equation as a block diagram representing the system. Since computation by integration is more accurate than differentiation the integration block was used throughout. Parameters and constants were inserted and the simulation was run, to be displayed as an x-y plot.

TOKYO BAY, 1945

Here then, resting peacefully at anchor in Tokyo Bay on Christmas Day 1945, is the U.S.S. Antietam named after the Civil War battle of Antietam Creek, the bloodiest day in American history where were sustained 26,000 casualties. It was here on these decks that I spent 560 consecutive days and nights (except for two weekend leaves). This was my home, this was my workplace. This was where I spent a most important part of my life that in a peculiar way is an integral part of my legacy. Look closely and you'll see most of the 100 aircraft that we carried (the rest being down on the hanger deck. To launch these many aircraft we had to start with about 20 aircraft on the hanger deck which were brought up as room was made available with each launch. Note the three dark areas just below the flight deck 50 feet above the water. The first dark area, to the right, is the deckedge elevator at the hanger deck level. The next dark area to the left is a set of two 5-inch guns and one 40-mm quad and is just below the start of the catapult. All aircraft had to clear of the area to the left to allow catapult launches. Then those aircraft below were brought up form either the forward elevator for the deckedge elevator. At a nominal 30 seconds per launch it took a minimum of 100x30 seconds=50 minutes to launch all 100 aircraft. To the left is a supply ship and to its right is a battleship. I have no right to say it but I'll say it anyway: "It's a noble ship with grand lines". While what I did on that 1000-foot teakwood deck was probably the most pedestrian job in the world I nevertheless was quietly proud of what I was doing. Though I had already had a strong work-ethic concerning "important" things, as a plebeian I had an equally strong work-ethic concerning day-long "little" things. One's pride should be about bettering oneself and not about bettering others (being better than others). Whatever you do, do it to the best of your ability; this is how you grow and this should be how you live fully.

Digital Computers: it's recalled that to solve the suspension system we used only the integration, summing and constant blocks wired in proper configuration to solve the problem (what could be easier?). The result was applied to the x-y display and there we saw the waveform of the output (result). In fact any value in the equation could be applied to the display simply by connecting it, via a "wire", to the display by means of dragging the wire with the mouse (what could be more simple and useful?). If a simulation fails as a result of a math fault (say, a negative value instead of positive) VisSim displays a dialog-box stating the nature of the error and highlights the offending block. (You might have to "drill" down into a compound block to find the error.) There are blocks to monitor the system performance in process. In fact, there are many such "niceties" in VisSim.


U.S.S. ANTIETAM (CV-36)   CHRISTMAS 1945
NATIONAL ARCHIVES

TOKYO BAY II, 1945

I offer my apologies for the poor rendition of this second picture of the Antietam which was enlarged from a less than satisfactory print (the next picture/page will have the same comments). Actually this picture should have preceded the one on the previous page in time-sequence: here we are loading up the flight deck with aircraft from the hanger deck. In another 20-30 minutes the flight deck will be wall-to wall aircraft. The only reason for this clearing of the hanger deck that seems reasonable is the need to have space on the hanger deck to take on supplies. Normally when in port the squadrons have already left to land on "the beach" (shore-based airfield). With the aircraft out of the way the barges can unload supplies directly to the hanger deck now vacated. Note that the after elevator will soon be "overrun" with aircraft so that only the deckedge elevator can be used to transfer aircraft topside (there's an aircraft on the deckedge elevator right now). It's strange to think that as this picture was taken I was somewhere on that white area of the flight deck. One derives satisfaction from being a part of an enterprise that's accomplishing something useful. Many would scoff at the "usefulness" of pushing aircraft from here to there. The point to be made is that you're contributing to a worthwhile project that has been deemed necessary by others more knowledgeable than you. One day it will be you who will have to make those determinations. Therefore work to prepare yourself for such eventualities by "keeping your eyes and ears open" so as to LEARN.

Digital Computers: a simulator is useful for solving the global optimization problem. As a simple example consider manufacturing a grocery paper bag at the lowest possible cost where each bag has a volume of at least one cubic foot (1728 cubic inches). To minimize the cost of material you must determine the optimum bag dimensions that minimize the amount of paper used for each bag, To simplify the problem, additional paper for folding the bag is ignored. The problem can be expressed as follows: find the bag dimensions w (width), d (depth) and h (height) in inches which will minimize the surface area s of the bag. Thus surface s=2(wh+dh)+ dw. This is called the cost function (or objective function). This in turn is subject to the restraint of the volume v=whd >=1728 cubic inches. Logically, the dimensions w,h,d are all >0. The following blocks will be used to solve this problem: constant, multiply, sum, integrate, variable, display and the special blocks called cost, and parameterUnknown. The variable blocks w&h and h&d are multiplied and then summed and then multiplied by 2, to be summed with the product of d&w (see equation for s). Now s, when squared, is the cost function. The w&h&d are multiplied and summed with the negative "1728", then squared =cost function To be continued.


NATIONAL ARCHIVES

TOKYO BAY III,1945

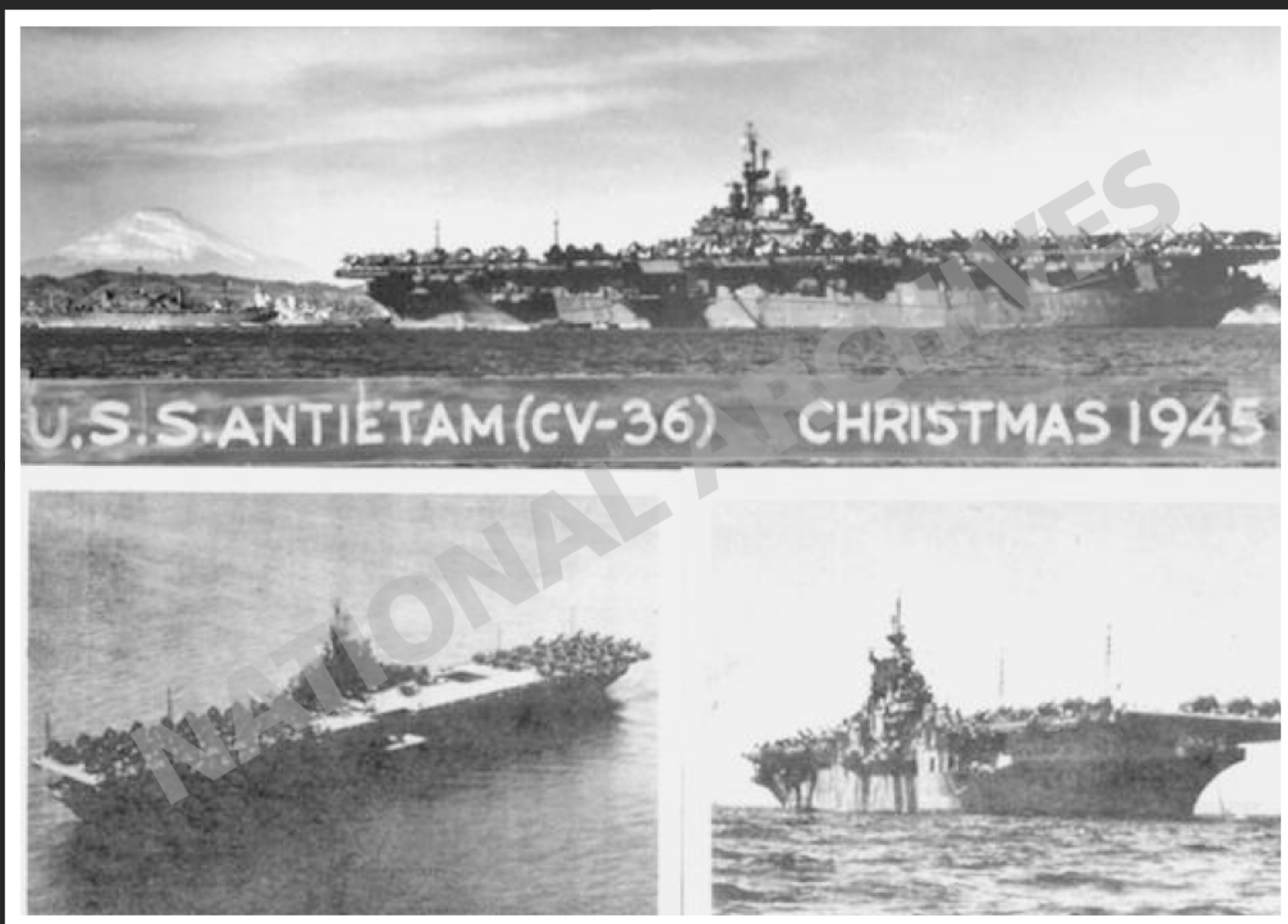
This view of the Antietam shows off her beautiful clipper bow. All of the later Essex-class carriers had this clipper bow by virtue of their having a pair of 40-mm quad guntubs located just below the flight deck. Note the apparent overhang of the flight deck. Actually the deck is set back somewhat to allow the guns to have a vertical sight-plane. This view also indicates that six Hellcats or Corsairs could be lined up across the flight deck leaving essentially no room for an Airdale to transit between them during air operations (but this was seldom done because we're talking about literally inches to spare between the prop and you). Next, note the five vertical shadows on the side of the ship. These shadows are of five of those ubiquitous 40-mm guntubs "tacked" onto the side of the ship at about hanger deck level. This was done only when we arrived at the Pearl Harbor Naval Shipyard because with them in place we could not have passed through the Panama Canal. Incidentally, our Airdale compartment had a hatch (door) to the forward guntub where I sometimes stood after chow (supper). Yes, this was my "home" for a year and a half, a home most often at sea but at times it made some two-day liberty calls (one for the port and one for the starboard watches) at Pearl Harbor (several), Yokosuka (Japan), Tokyo, Tsingtao (China), Manila and Hong Kong twice. True, I visited some "ladies of the night" (to avoid the vernacular) at these ports-of-call but its equally true that I did not "engage" them because I felt I'd be tarnishing the sanctity of the physical relationship (my ideals would tolerate it) because that was part and parcel of who I was. (Who are you?)

Digital Computers: continuing, we multiply w&h&d and sum it with the negative value of 1728 and then square that result. This too is the cost function. On a separate part of the screen we apply trial values of 12 for each of the components w,h and d. Each of these values is then applied to a parameterUnknown block and each of the three values are then applied to an "absolute" block. These then are sent to the variable blocks w,h and d which are fed to display blocks with our answers of w=16.762, h=4.812 and d=18.521. The foregoing sounded complicated but in fact is easy All we did was mechanize (set up and wire) the blocks for the trivial surface and volume equations with output-display blocks and then applied trial values (arbitrary) to the three parameterUnknown blocks that did the integration. The cost blocks enforce the conditions of the specifications for the bag. The simulator interactively updates the parameter vector (value) such that the cost vector (value) decreases until it finds a minimum. These are the optimum values because the cost is minimized. It's the ease of setup recounted that is important here. These pages are to stimulate interest, not make scientists and engineers.

MY TRIO

These 3x5 and 3x10 cards were given to us at Christmas time as a remembrance one day of days gone by. The Antietam, what a mighty ship she was with her flight deck brimming with a "century" of aircraft, each one of which was a force in its own right. You felt that force to your very marrow when standing next to one when fired up. A fanciful thought occurs: what if, when the ship's engines were stilled, all 100 aircraft revved up their engines to top rpm; would the ship then move ahead? (At an average of 2,000-hp per aircraft we're talking about 200, 000-hp (now that's real wind-power!) while the ship's engines generated 150,000-hp at the shaft.) And at what speed? A quaint thought this. // Here we have a better idea of the Mt. Fujiyama, the mountain held in great reverence by the Japanese. That such a sacred mountain should be a witness to the engines of war is in its way a blaspheme. For our part we were departed within a couple of days, only long enough to take on supplies and have a day's liberty for both watches. My day puzzled me in that downtown Tokyo seemed to be untouched by war while on a train ride out of the city we passed a devastated and leveled Yokohama. However what can be accurately determined with such a brief visit? It was also a strange visit in that I boarded a local train and for all the world it was as if I was on the local commuter train, except that I was the only American in a train-car chock-full of Japanese. Did I feel ill-at-ease? No, not in the slightest and yet here were a people who only a short time ago were in a death-struggle with us. Yes, it was a strange day indeed for an essential neophyte such as I was.

Digital Computers: VisSim can perform the important process of converting a nonlinear system to a linear one. Functions are not "well-behaved" if they are not linear and thus analysis is moot. The simulator finds a region of linearity about which analyses can be made. Systems are analyzed in either the time-domain or the frequency-domain. There are specific techniques for both: state-space representation for the former and transfer functions for the later (these are mentioned only to be complete and not for the readers' edification). To be even more complete, VisSim can be used for performing the following mathematical operations: pole-zero and gain analysis, root-locus analysis, Bode magnitude and phase analysis, and Nyquist stability analysis. These four techniques are very basic to the analyses of dynamic systems in the field of engineering. We'll look at just the Bode analysis for the sake of limiting too much involvement in more advanced mathematics. The vehicle for the basic evaluation of th Bode technique will be the importance of controlling dynamic systems such as, specifically, servomechanisms after which we'll move on to subjects other than computers (we've had a pretty good dose of them I'd say).


U.S.S. ANTIETAM (CV-36) CHRISTMAS 1945

PICTURE-PERFECT TRAP

This is a picture-perfect trap of a Hellcat that touched down about 35 feet to the left. No bounce, no swerve, no problem. In mere moments the two green-shirts will arrive to disengage the tail-hook and moments after that the Airdales will turn to to help the Hellcat fold its wings. In the meantime that bracket to the right of the wheel will be lowered into the deck with all the other brackets to allow the Hellcat to advance up the deck. So another bird's aboard. Just beyond the edge of the flight deck can be seen a set of 20-mm guns next to the catwalk. As has been said, no spectators were permitted thee during a landing operation: too much chance for an errant aircraft that would crush or otherwise injure anyone in the area, especially if there was an ensuing fire. To my knowledge that white object under the wing is a rack for a large-sized bomb but in fact I never saw one on our aircraft. In truth how much more content we are when things go well such as this neat landing. The same applies to all we do: do it right and thus be content. In the great majority of cases we know right from wrong, so why do we not do right all of the time? Probably because one seeks advantage over others as if climbing up on others' backs will promote their cause (even while knowing that it's wrong): self-centeredness rears its ugly head again. (Self-serving can only be considered good if it doesn't impair, impede or bring down others—and you're smart enough to know what these things are; as the old Navy-hand says, "Shape up or ship out; Here! Here!). [Is there redemption?]

Digital Computers: we'll close out this section on digital computer simulation by considering a Navy problem in its most basic form: training a 5-inch gun on an attacking kamikaze aircraft trying to beat the living daylights out of one of our majestic Essex-class carriers. The basic system (for train only; elevation is similar) consists of a controller feeding a signal to an electric motor which moves the gun in the train dimension (the plan view). [The radar system that provides the required data is similar to the "train" and "elevation" systems.] The radar system provides the desired train-angle while a synchro device (moving coil) provides the actual train-angle data. The positive desired signal and the negative of the actual signal are applied to a summing device to generate a difference signal between the desired and actual signals. This is the error signal. [All devices are electromechanical as opposed to present-day integrated chips.] This signal is part of the controller and it's sent to an amplifier after which it is applied to an electric motor (called an amplidyne). As stated the output is detected by a measuring device whose output is sent to the summing device in the controller. We thus have a closed-loop which in familiar jargon is called a servomechanism, or closed-loop system. To be continued.


13
NATIONAL ARCHIVES

A STRANGE CALM

This Avenger banks into the "groove" as it's framed by a battleship to the left and a destroyer to the right. Note the vertical 5-inch gun-barrels to the left. This clearly shows that they have a 90 degree elevation range if need be. However, hopefully they will have either shot down or diverted enemy aircraft before having to elevate to this angle because by then the bombs will have been dropped. Also note that the first barriers, at the middle of the gun-barrels, are lying flat, being used only if the other barriers further forward are out of order. The strange calm referred to concerns the lack of both ship's wake and ocean waves. The former imply a slow ship speed and the latter a light ambient wind. Thus how much wind can be going over the front of the flight deck? Enough (30 knots) to sustain a satisfactory landing? This seems not to be so. I worry about this Avenger. People tend to worry about things of which they know little. If there might be a possible epidemic, people rightly worry (and only the psychiatrists are winners). Some things, such as this, are beyond our ken but other things, such as the workings of a computer, are well within our purview. It's a very comfortable feeling to be at least moderately knowledgeable about the world around us. No, I'll amend that: it's very satisfying to be so informed. And how do we come to this pleasant state of affairs? That's's right, by learning. No, actually by diligent learning. Why suffer the pangs of ignorance? Enjoy the process of acquiring knowledge and you'll be glad you did. Others will be also.

Digital Computers: we've considered the servomechanism which its very basic form consists of a summing device that generates an error voltage that drives an amplifier that drives an electric motor. The output (the direction of the gun in the train (plan) view) is inverted and fed back to the summing device as the actual output (summed with the positive signal representing the desired signal). To improve the performance of this system an additional unit is added to the system. It is a filter that modifies the error signal generated by the summing device. The filter in effect "tunes" the system just as an automobile engine is tuned. There are three main parts of the tuning device: proportional, derivative and integral. Some filters use only one or two or all three of these methods. To understand the process of tuning one has to convert the system equation into algebraic form from its traditional differential equation form. Recall the conversion of the differential and integral to an algebraic format by the LaPlace Transform. To be continued using some algebra (which is easier than differential equations).

HELL ENGULFS A HELLDIVER

With a battleship making tracks it watches the Helldiver being engulfed by fuel-fed flames. This is not merely a fire, it's an explosion resulting in a fire. We can only surmise the cause but a good guess would be that the Helldiver made contact with the deck too forcefully thus crushing the landing gear which in turn ruptured the fuel-tanks with the ensuing fire. Present-day carriers have a special squad on hand at all times during flight operations, they all garbed in fire-fighting gear of all descriptions (seemingly almost immobilizing them). At their beck and call are all manner of fire-fighting equipment with all the latest foams and fire-suppressing materials. They have had extensive training and are thus fire-fighters par excellence. On the other hand, on the Essex-class carriers of WWII (and all other carriers) the fire-fighter de jour was the bereft Airdale, he of limited or no training with but some standard fire-hoses distributed around at the catwalks. His gear, his garb, was only the shirt on his back. He jumped to the catwalk, pulled a hose from its rack and put water on the flames, hoping for the best to beat the beast. It's true that we had foam applicators but they were useful primarily for localized fires. It was the application of water that was the main tool available. All this calls forth the need to be prepared for such eventualities. What can one do about this? One can do what one should always do: learn the verities of life to form a buffer against unforeseen eventualities. More specifically we can and should, as always, apply ourselves to knowledge found in our (substantial)books (no trivialities here). The sooner we realize that learning is our salvation the better This is said both realistically and figuratively. It cannot be overemphasized. (It's fun too.)

Digital Computers: the next few concluding pages will be somewhat more esoteric than the preceding ones but that's all right, the reader by now is strong. This material is not apprehended in one reading, so stay with it. The ability to obtain linear approximations of physical systems allows the analyst to consider the use of the LaPlace Transform. This method substitutes the easily solved algebraic equations for the more difficult differential equations This is accomplished by three steps: 1) Obtain the differential equation of the system. 2) Obtain the LaPlace transform of Step One. 3) Solve the resulting algebraic transform for the variable of interest. The LaPlace Transform exists for linear differential equations for which the transformation integral converges. The LaPlace transform for a function of a time-function f(t) is F(s)= {f(t)e^(-st)dt} from 0 to infinity. The inverse transform is f(t)=(1/2Pij){F(s)e^(+st)ds} from minus infinity to plus infinity. These transforms have been used to derive Tables of LaPlase Transforms. Now you can set aside all of the above for what follows.


NATIONAL ARCHIVES

JEEP-TINE

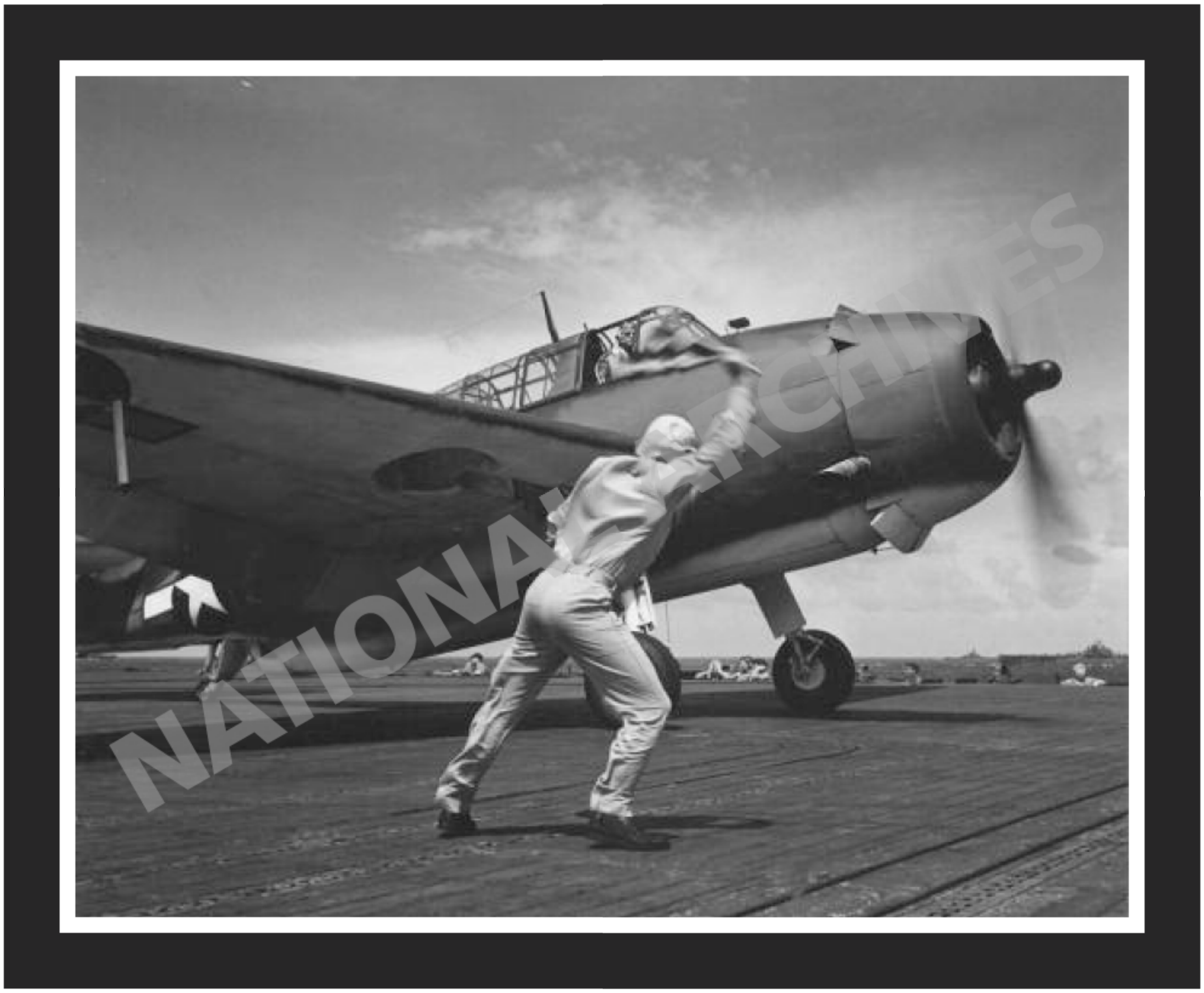
We never had jeeps on the Antietam. Instead, we had tractors which were about 2/3 the size of a jeep. I suppose the idea was that tractors took less space and space was at a premium. Aircraft were pulled from either the back, as here, or from the front. Theoretically, the fastest way to move the aircraft was with it always facing forward, using the dual tow-bars. This obviates the need to manually turn it around as will have to be done with this Corsair. Small thing but large when considering 100 aircraft. The markings on the deck tell us that both the jeep and the Corsair are on the after elevator, having just arrived from the hanger deck below. Why the personnel below didn't put the Corsair on the elevator in the other direction, I don't know. Less work for them, more work for us here topside. This is an older version of the Corsair as indicated by the canopy. Later models had a "bubble" configuration that allowed more visibility for the pilots. Navy aircraft were unique in that they had folding wings and a strong tailhook. Also, they were more rugged than comparable aircraft because, of necessity, they had to make a harder landing, being restricted in the amount of space available to them. Pilots called these landings "controlled crashes". Whatever, but the restrictions were mot fanciful. They were real. Sometimes in life we have to face up to real and difficult situations that are not of our doing or choosing. On the flight deck at launch-time the Airdale had to face up to an array of aircraft aligned against him. Sometimes life presents these same situations. We can only adapt and make the best of it. We must LEARN to adapt. Our whole life sometimes seems to be one big learning process: one needs to learn to love it (the challenge that is). [Don't adapt to oppression.]

Digital Computers: the LaPlace variable "s" can be considered to be the differential operator "dt". In addition, the integral variable "1/s" can be considered to the time-integral {dt} from zero to time t. Before moving on the transform of the mass-spring-damping equation follows: M(f "y)+B(f 'y)+Ky=r(t). The transform of this is: M[s^2Y(s)]+B[sY(s)]+KY(s)=R(s) when initial conditions are zero. This is of course an algebraic equation which is much simpler to handle than the differential equation that preceded it. Moving on, we now consider the automatic tracking system closed-loop problem. We need to add a compensator to the loop right after the error signal is generated. That is, we need to modify, or tune, the system. There are several basic types of compensation used in classical single-input/single-output systems such as we're considering. Our compensator, as are most of them, will be placed directly following the error signal as generated by the summing junction. Our compensators are Proportional(P), Proportional-Derivative (PD), Lead, Proportional-Integral (PI), and Lag. To be continued.

LAUNCH !!

This Avenger, the biggest single-engine aircraft of WWII, will in one second be rumbling down the deck for points unknown with a load of probably 2,000-lbs. of bombs. Occasionally we'd notice a pilot, as here, of a casual demeanor (at the time of launch). Is this a pose or is it a natural mannerism? One would think a person in such a situation would be so emotionally tense that it would show in one's "body-language". On the other hand, he's probably done this so often, being now on an operational carrier after many months of training, that it's almost "ho-hum" time. No; we just elucidated the two extremes. Right now the pilot has his left hand on the throttle (I believe) and with his casual right hand he'll immediately place it on the control stick. This is not , after all, a catapult launch during which there's a sudden and violent jerk that forces one's head against the head-rest. The launch officer is now taking 30 knots of wind but in seconds he'll be engulfed in hurricane-force winds. [As an aside, it occurred to me that I'm frequently referring to "this to the right" and "that to the left". Some would foolishly impute a political connotation in this. Not by any stretch of the imagination is this so. These pages are absolutely apolitical as well as nonpolitical nor does religion play a part except in so far as the Almighty at times is called upon. Besides, we're ecumenical, are we not?] Let us now consider the subject of anti-chaos, the servomechanism that has a large part in controlling this Avenger, the behemoth.

Digital Computers: a control system, any control system, requires three things: accuracy of output following the input, speed of response of output following the input, and stability of the output retaining in its called-for position. Thus, accuracy, speed of response and stability, those are the big three. To briefly review, a control system has a desired input signal R, the system of amplifier and motor G and the output C. This is an "open-loop" system. To obtain control we send a Negative sample of the actual output, through a feedback element called H, back to the summing device where the actual and desired signals are combined to form the error signal E. This is called the "closed-loop" system because the open-loop is closed by sending back a sample of the output to be compared to the desired input. When the closed-loop system operates correctly the error E will be diminished to a minimum. Considering the closed-loop system, the error $E=R-C$ when $H=1$ (which we can set) while the output of the open-loop system is $C=GR$. The output of the closed-loop system is $C=EG=GR-HC$. Thus its output $C=GR/1+GH$ and $E=R/1+GH$. These are the controlling equations for a closed-loop system. We assign values to the above two equations and we're set to compensate the system. It gets a little tricky now but stay with it.



ANOTHER CRASH, ANOTHER GO-ROUND

As the Airdales survey the damage the Corsair overhead does the same. He can only hope that the Airdales will expedite the clean-up in a "timely fashion". As of now I don't notice anyone in charge such as an officer or a yellow-shirt (though there is one peering into the cockpit, maybe to check the ignition-switch which the pilot, in his haste, forgot to shut down because fire is still a possibility). Usually when an aircraft crashes the Airdales are promptly on the scene with fire-hoses and fire-extinguishers in hand. Perhaps this is minutes and not seconds after the crash and such equipment has been secured. (The "go-round" aircraft is probably the second in line and so there was no need to wave him off). Notice the barrier-stanchion in the background. It's still upright. It appears that this Corsair bounced over it and as its speed was slow at this time there was no lift provided by the wings. Thus it was nose-heavy and so it nosed into the deck. Who knows? We do know though that the Airdales have to get busy to clear the deck for the following aircraft. Time's "awasting". My experience has been that the Airdales were self-starters and along with that, conscientious. In time it becomes a natural eventuality. Would that all of us were as conscientious as were those lowly Airdales on the Antietam. Conscientious, having a conscience: upholding what's known to be proper and being just, upright, honest, faithful, careful, particular, painstaking, devoted and dedicated, that's what conscientious is. Where do all of us stand? Is a society possible without it? Do we set an example? If the lowly Airdale can be conscientious how can the rest of us not be so also? (Don't slough this off. You owe it. If you try hard enough. The question has to be asked, "Do you want to learn enough"

Digital Computers: let's plot on an x-y graph the equation of the open-loop control system whose transfer function is GH(s)=18/[s(s+2)(s+5)]. The vertical axis y is in terms of [20 log (GH) and the horizontal axis is the frequency. This provides the magnitude of the GH as a function of frequency. We also plot the phase between the input and the out put with the phase in terms of angle in degrees and the same frequency scale as the magnitude. Thus we have two graphs: one of the magnitude of GH and the other the phase difference of GH's input and output. We are now ready to compensate this system for accuracy, time of response and stability. We are going to discuss the system in terms of gain margin and phase margin. The gain margin will be derived but first a few definitions are in order. First, when the gain (magnitude) of the system is greater than one (1) and when the system phase angle (angle by which output lags input) is 180 degrees then the system will become unstable (any unstable system is worthless). The next page will define an important concept in automatic control systems.


2
NATIONAL ARCHIVES

SCRATCH ONE DEFIANT CORSAIR

Even in defeat this Corsair does not go quietly. Apparently the tail-wheel collapsed on landing (which might be prone to happen if it flared upward too much and too rapidly just before touch down). In any event, it appears that the tail-wheel gave way causing the auxiliary fuel-tank to scrape along the deck thus rupturing and spilling fuel onto the deck. While it's true that the deck consists of teakwood, there are metal tie-down cleats that run crosswise across the deck every six feet or so. These could provide the spark that ignited the high octane gasoline that in turn caused the fire to break out. The fire has been contained but the Corsair is lost. It's a sad sight, at least it is to aircraft enthusiasts. It's not often that a yellow-shirt and an officer are seen manning a fire-hose: I don't understand where the Airdales are. There should be many of them in the area at least giving moral support to the hose-handlers and even ready to relieve them. The yellow-shirt is using a spray applicator-hose. During the one day I spent at a fire-fighting school at Pearl Harbor this is the device the instructor used as we went into a compartment set ablaze by troughs of gasoline throughout the compartment. The fine, steady spray not only protected us but it also quenched the fires that was besieging us. Giving moral support to someone is a gift in disguise. We all need this kind of support (though it need not be so definitive as supporting and relieving a hose-handler). People need to know that they're not alone, for to be alone is to be greatly diminished.

Digital Computers cont.: : this follows from the fact that when the fed back signal from the output of the system is 180 degrees Negative, and this signal is then Negated (remember, the summing junction receives a Positive desired input signal and a Negative actual output signal that generates a Small error signal) the result is a Large additive signal that will drive the system into saturation and oscillation and instability, the prime defect of a feedback system (or any system). Therefore, "gain margin" is the difference between the system gain of one and the system gain when the phase angle (amount of phase difference between input and output) is minus 180 degrees. This is easily determined from the graph of the magnitude and phase curves of the open-loop system: at the frequency at which the phase angle crosses the minus 180 degree point is the frequency at which the magnitude curve is marked. This magnitude will be less than one (1) and it is this value subtracted from one that is the " gain margin". Admittedly this is somewhat obtuse but when seen on a graph it is trivial. "Phase margin" is the difference in phase where the magnitude is equal to one and minus 180 degrees. It's the amount of system phase shift allowable up to the point of a gain of one. Using the open-loop Bode graph above, it too is trivial.

U.S.S. BUNKER HULL (CV-17)

On 11 May 1945 the Bunker Hill was severely damaged off Okinawa by two kamikazes 30 seconds apart (an aircraft, loaded with bombs, that deliberately and with forethought crashes itself onto the deck of a ship with malicious and murderous intent, naturally). It hit the Bunker Hill just aft of the after elevator where were assembled many aircraft. The ensuing fires and explosions covered the after half of the ship in dense smoke making the fire-fighting extremely difficult. Much of the fire-fighting equipment was rendered useless and the situation seemed hopeless. The toll of this attack was 348 killed, 43 missing and 246 wounded. What is one to make of the term "missing"? One must realize that the space was very confining and that there were those trapped between "the devil (the fire) and the deep blue sea". That is, if the devil didn't get them the deep blue sea did (hoping against hope that somehow they would be picked up. // A lonely scene, this. However, if we were to expand it somewhat we'd see an aircraft at the middle right following this Avenger by 30 seconds and below middle an aircraft taxiing up forward to the parking area. Keeping in mind that the ship is moving forward we can be assured that this Avenger will shortly be lined up with the center-line (and not askew as it now is). Do we determine that sometimes, somehow, our lives are askew? And if so, do we align ourselves with what we know, deep down, is right and proper? It's not so much whether we're askew, rather it's whether we aright ourselves in a timely fashion. You'll find that being upright greatly simplifies life (yours and ours too). Why not be smart?

Digital Computers: we now understand the meaning of "gain margin" and "phase margin". Again, the simple feedback system is an error signal fed to the controller which sends a signal to the "plant" (the amplifier and motor and things such as gearing, etc.). The error signal is the resultant of summing (combining) the positive desired input signal with the negative actual output signal. We also plotted the open-loop (no feedback signal) Bode diagram on an x-y plot. This plot shows both the magnitude and phase angle (two separate curves) of the system with the x-axis being frequency and the y-axis bing the logarithm of the magnitude of the system gain and the degrees of the system phase angle. We will now compensate the system: adjust the gain (amplifier gain). This is called proportional compensation. It has been found that the system will be stable if the phase margin value is between plus 30 to 45 degrees. This will provide a well-damped system (the system output will have decreasing oscillations when a step-function is applied to the input; actually, the output should closely follow the step input with a momentary delay and then a smooth curve that is in effect a somewhat rounded step. To be continued.

A HELLDIVER LOST ITS HEAD

As per the previous page this Helldiver did not find and stay on the centerline. Instead, not having caught an arresting-wire, it smashed into the 5-inch gun-mount and demolished its engine. The residual gasoline in the engine has burned off but so far the fire has not reached the fuel-tank. I suspect that this accident occurred only moments ago because there's no one in sight: when an aircraft comes on an errant path the personnel (officers, yellow-shirts, blue-shirts, brown-shirts, red-shirts and any other shirt that might be in the area) scamper for safety into the island, behind the gun-mounts, down the flight deck, onto the catwalks, wherever. In moments they will appear with hoses and applicators and fire-extinguishers at the ready. In the meantime those up there in the 40-mm guntubs are out of harm's way and so they merely watch the spectacle below. Apparently the pilot and crewman have vacated the Helldiver and are on the other side of it, out of view. Speaking of views, this photo was taken from the lookout's chair next to the after bridge (Bat Two–> Battle Station 2). This is the precise spot I used to occupy after chow with a panoramic view of the ocean and the evening sky. It was my "sanctuary" because no one would be topside to interrupt my reveries. To me it was a God-send, a place to relieve the emotional stress of the preceding day and do some basic reminiscing about the "home-front" with the song "Love Letters" swirling through my mind (to be followed later by the song "All The Things You Are"). If reminiscing is ameliorative it's good; if it is deleterious it's bad. I heartily recommend the former while vehemently discrediting the latter; this was my experience on the Antietam circa 1945/6. [I can't resist referring to the poem "IF": If you can keep your head when all about you are losing theirs... and which is more you'll be a man my son".]

Digital Computers: the previous page referred to a step input signal. This is the standard test signal as being the most stringent possible input: from zero to a constant magnitude in "zero" seconds. Also, our problem is to create a system that points a gun at a moving target. This can only be done adequately by a closed-loop system (feeding back a sample of the output to be compared with the input). The measures of capability are accuracy of pointing the gun, speed of response of following the target and the stability of the system once on target (an unstable system is a useless system). Our compensation schemes are to reduce the error in tracking the target. The compensator will cause the system to track the target even more closely. To be continued.


NATIONAL ARCHIVES
212

HELLDIVERS ON PARADE

I detect four Avengers among this group of Helldivers and the two all the way back are not even fired up. This is not standard procedure in my experience (not that I'm so experienced). Normally, all the aircraft of the same type are assembled together, squadron by squadron. If nothing else, it makes for a neater rallying of the aircraft by squadron once airborne. The aircraft operate by squadron, have their own squadron ready-rooms, attack by squadron, are given assignments by squadron, and for all I know they pal around by squadron. This is not so facetious as it sounds. A certain type of personality gravitates to a certain type of job (and it is a voluntary job). While these Helldiver and Avenger pilots tend to be more equanimous, the fighter pilots who fly the Hellcats and Corsairs are the free-spirits of the air. They have the "go get 'em" attitude (which happened to be the Antietam's motto: "Go get'em Antietam"). This is merely my light-weight supposition but it seems reasonable. The scene below is the essence of the world of the Airdale, a world of excessive noise and sharp wind-blasts and flashing blades, day after interminable day. In a still such as this, all seems so simple and benign, a Sunday walk in the park. Instead, it's a wolf in sheep's clothing which is ready, willing and able to devour you if you make a misstep in an hostile environment. No need to make this a contest of "who has it worst". People are all too prone to compare your dire circumstances with their's. Forget it. A dire circumstance is a dire circumstance no matter who or where or what. Besides, there's always someone who has it worse than you, no matter what your circumstance. Self-pity is a complete waste of time and effort. Shuck it off, square your shoulders and venture forth. You'll be glad you did. (This comparative-type thinking is self-defeating and it's a negative form of self-absorption.)

Digital Computers: we start with gain compensation (to satisfy the phase margin requirement of 30 to 45 degree margin). However this method can not affect the frequency at which this margin is attained. The steps to be taken are: 1) Generate the Bode magnitude and phase plots of the system under consideration (plot the system open-loop magnitude and phase with the abscissa (horizontal axis of the frequency parameter). 2) Determine the frequency w(pm) at which the desired phase margin occurs (read from the graph (plot). 3) Determine the magnitude GH(s) corresponding to w(pm). This magnitude is !G(jw(pm)H(jw(pm)! which in simple terms is the absolute value of the system open-loop gain (the feedback element H is commonly set to one (1). Simplifying, we'll call all of that "GH". On a graph this GH is similar to a 45 degree downward sloping curve, left to right. Again, it's graphical and so very easy with which to deal. Then, use a gain of K(compensator)=1/GH approx.

READY TO SEARCH

This Helldiver, with diving-brakes/flaps down, is sitting on the right-hand catapult ready to launch. First though, notice that the two lower blades seem to be longer than the upper two (measure them to verify). This is only an optical illusion because of the oft mentioned concept of perspective: since the Helldiver's tail is lower than its nose we're closer to the lower blades. Thus closer means bigger. When viewing life we need must consider perspective, always. Also notice the iron bar next to the Helldiver's left wheel. To aid in the precise positioning of the aircraft on the catapult the aircraft approaches the catapult at an angle (so that the tail is seen to the right of the nose from our position). It continues forward till its left wheel hits the bar, stopping that wheel and allowing the right wheel to swing around until the Helldiver directly faces us, as here. The Airdales then push the aircraft forward or backward so that it's precisely positioned over the catapult. That white radom contains a search radar used to search beyond the ship's surface search range which is limited by the horizon about 30 miles away from the top-most SK surface search radar. Do we ever do any soul-searching to ferret out what meaning our lives represent (if any)? Are we created for a purpose? If so, what's that purpose? Is prayer an aspect of that search? Is a contemplative life sufficient to fulfill a meaningful life? Do we help others so that we'll have a better world in which to live? Do you dislike having someone probe you like this? If so, why? Can anyone doubt the existence of a God, by whatever name, when one observes the fantastic order in the material world? [The danger in these questions is that one will become too self-absorbed.] Prayer is enriching by reaches out to that perfect being.

Digital Computers: we click a button on the screen to generate a Bode plot of the magnitude and phase angle of this system. The phase margin can be read from the graph to determine if it's satisfactory. If not we fine-tune the system by modifying the values of the gain K and rerunning the simulation. This is laughingly easy to do: click on the menu to call up the integration window and then key in the values of the system. For example, say our system is the following transfer function: 5K/(s^3+6s^2+7s). We then key into the window the numerator:5 and the denominator: 1 6 7 0 (notice the "0" for the missing constant in the system equation). The one drawback here is that both the magnitude and phase angle curves are on separate plots but that should not be that much of a problem because, with the mouse, you can interrogate any location on the plot and have a display of the actual values at the position in terms of log magnitude, phase angle and frequency. The frequency for a 45 degree margin is read from the phase plot. The magnitude at this frequency is the desired gain.


NATIONAL ARCHIVES

THE LULL AFTER THE STORM

It would appear that this Hellcat had engine trouble such that its launch was scrubbed. The engine, as it was lead out of the pack to go to the launch-line, faltered but not before it spread its wings (requiring engine-power). It's now being towed to the elevator to go to the hanger deck for repair. Until then the wings remain extended. Can it ride the elevator with wings spread? Yes, because its wing span is 43 feet, its length 38 feet while the deckedge elevator is 60x 34 feet. By pushing it a little askew on the elevator the Airdales are able to place it on the elevator and then work it off the elevator. On the other hand, maybe this Hellcat was held back to be placed over the catapult for a later launch. In any event, we had five of these tractors on board the Antietam and with 100 aircraft to "play with" they came in handy. No, I never drove a tractor . For one reason, I was the "new boy on the block" and these assignments were long ago set while I was a quartermaster striker ("striking" to achieve the third-class rating). Little did I know that I'd be transferred to the Airdales where there was essentially nothing for which one could "strike", unless it was to be a yellow-shirt). ["Strike" is a euphemism for "seek". Certainly no one in the Navy struck for higher wages et al.] Do you have any idea for what you'll "strike"? It's not good enough to live only for the moment. In fact it's bad to do so. One thing it implies is that you do little serious thinking. This is a ticket to nowhere. If you have no interests, do you have a life? It's hoped that these pages will interest those individuals in finding their interests. For without interest there can be little or no learning (and this can only be considered an egregious "sin"). There is danger here in that one might become so self-absorbed that one is dull.

Digital Computers: this will close the subject of closed-loop systems. It is a complex and complicated subject when considered in depth. The main purpose in these pages was to show the ease of use of the simulation software available to analyze and design such systems. I'm afraid I went to far afield in such a difficult subject but it's so fascinating, I believe, that I had to make an attempt to present it to the uninitiated. Actually, the concepts are pervasive in our modern society, not just in the engineering areas but also such places as the business world. The human body is replete with feedback systems although we are not free to modify them. The main point to keep in mind is that feedback systems close the loop by feeding back to the input through a summing device a sample of the output. The output of the summing device is then the error signal to bring the output in alignment with the input. Compensating networks are devised to improve this signal for stability, accuracy and speed of response. These are sometimes conflicting and so the "thrill of design" in resolving them within the specifications.


ATIONAL ARCHIVES

AIRDALE COUNTRY

This is Airdale Country where the aircraft are large, the noise loud, the wind lashing and the blades flashing. This is the "ground" where the tentative dare not tread. The day is bright but the spirits are somber. So another day's contest continues from yesterday's as it will again tomorrow while the temptation to cower is overcome by the will to stay strong. Yes, that trio of wind and noise and blades have become the Airdales continuing companion, for better or worse. Such is this field of fray with sound and fury every day. // The attentive ones have noticed that this picture is about 10 minutes previous to the picture three pages ago. Note that the Corsair to the left (behind the gun-barrels) is gone and the Helldiver to the far right, wings folded and next to the edge of the flight deck, is gone as well as the three up front with wings spread. This is the evolution of an unfolding launch operation, one ponderous aircraft after the other. Those in the open are the yellow-shirts while those close in to the aircraft are the blue-shirts (Airdales). Nothing moves on the flight deck except that the yellow-shirts gives it leave to do so. Someone once said this is the "choreography of a launch operation" where body-language seems to be as important as hand-signals. Was it an art? No, but it was a precise drill with thoughtful cooperation between and among the yellow-shirts. Do we show such thoughtful cooperation in our daily lives? "Together we stand, divided we fall" as said by Lincoln is not just a good phrase. It means something sound and fundamental. Actually our lives and our very society are predicated on such a concept Think on it. Because it's important to us all.

Energy: we're now going to consider the subject of energy because its's so important to our society. We wont concern ourselves with that most elegant of all energy sources, photovoltaics, because we've already done so. This topic arises partly for this reason: this being the Fall season there are leaves to rake. It so happens that among other trees I have two very large willow oaks which have leaves about 3 ½ inches long and no more than ½ inch wide. They therefore tend to embed themselves between the grass stems all of which makes raking them a real chore. In fact, I have to in effect "dig" them out of their resting place making each and every swipe with the rake a challenge to not just my arm muscles but also those of the shoulders and back. In short it's a real effort when spending, sometimes, most of the day doing this. The point to be made is that my time in the yard today was a good example of the expenditure of energy. We all do it every day and the next section will start out with an exposition of the mitochondria of the body, those units of energy we all harbor. The body's a "Fearfully And Wonderfully Made" construct. Unfortunately we aren't enough aware or appreciative of this fact

QUIET TIME

The wide stance of the Helldiver made a launch-time a "walk in the park" as compared to moving about among the Corsairs and Hellcats and Avengers (seen here at the rear of the pack). This was only true when they were stationary. When on the move, wheeling about on the deck, all bets were off. Since the aircraft are all of them tied down and since the sailors are in their whites we can assume that we are in port. This liberty-time for the sailor, and any military man, was an opportunity to reconnect with the rest of the world: being on board ship, in camp, at a military base, and especially in action, a serviceman had little or no idea of what was happening outside their restricted zone of activity. By contrast, we of a later class graduating during June 1944 had 2 ½ years of constant reporting of all the hostilities throughout the world. We would learn of the conflicts through the newspapers, magazines, radio, movie news and the like, day after day. We would know we would go somewhere with good chances of becoming enmeshed in one of these conflicts. We were well versed in the carnage taking place and the resulting death and destruction. In effect we were "prepped" for going in harm's way while those in the service and even the actual combatants knew little of all this. After several years of having all this "served up" to us we would then have to enter it ourselves. Yes, I'll have to admit it, sometimes ignorance is bliss (but only for war and its ramifications). Otherwise, shun ignorance with a passion. No society can long endure bereft of intelligent ones.

Energy: the mitochrondron is a structure found in all animal and plant cells that is associated with the production of available energy. The enzymes that take place in the Krebs Cycle are manufactured in the mitochrondria. Enzymes are catalysts (a substance that increases the rate of a chemical reaction but is itself unchanged at the end of the reaction) that are found in, or derived from, a living organism. Enzymes (catalysts) are highly specific, usually catalyzing a particular step in a long and complex chain of reactions. Nearly all of the enzymes are proteins. The afore mentioned Krebs Cycle is a series of of chemical reactions in plants and animals that respire aerobically (read, breathe air). The most important yield of the Krebs Cycle is ATP (adenosine triphosphate) , which is a source of energy for the cells' vital functions. All cells need a constant supply of energy to maintain themselves. The mitochrondron, by carrying out the aerobic respiration, breaks down food to release energy. Mitochondria absorb oxygen and complete the breakdown of glucose (sugar) to carbon dioxide and water to produce energy in the form of ATP. These organelles (small organs) are just one type found in a cell which is controlled by the nucleus of the cell. Yes, they are wonderfully made. Does not evolution need a helping hand?

ONE-HALF READY

The catapult-sling is attached and a wing is extended but not the other wing and the chocks are not pulled. We're half ready for a launch. We also have a good view of the two 20-mm machine-guns in each wing. More importantly, we have a better understanding of the wings' dihedral angle from our position: there's a slight rise of the wing as it extends from the fuselage. This is called the dihedral angle. As the aircraft tends to dip t the right the right wing becomes more horizontal and the left wing less so. Thus the right wing develops more lift and in so doing rights the aircraft to a level condition again. The dihedral can't be too great else the lift of the wing would be diminished. All Navy aircraft have radial engines because they're air-cooled (no pipes and pumps to circulate the cooling water) and they require less maintenance. On the other hand it's clear from this view that a radial engine causes more drag by presenting a blunt configuration to the passing air (as opposed to the more streamlined in-line engines such as the Army's P-51 Mustang). Furthermore, the radial engine "covers" more of the propeller blades thus making them less effective. I'm beginning to get over my head here as concerns aerodynamics but what I say certainly seems reasonable. The interested ones can follow this up with further investigation. It is just such things that lead one to delve more deeply into a subject than if one took everything for granted. I believe taking things for granted is a mistake and even a "cop out". The thirst for knowledge is similar to pushing a large aircraft: initially it's difficult but once it starts moving it becomes easier and easier. Try it.

Energy: matter we're able to see and touch. It's an easy concept. Energy on the other hand can be recognized essentially only by its effect. No one ever saw the wind on the flight deck that pushed that person into those flashing blades. Energy is not a thing; it can only affect things. Energy generates forces whether they be a zephyr or a hurricane. With a hurricane we certainly see the results of energy gone amuck. However we're hard put to see the results of photosynthesis moment by moment. The chemical energy of the internal combustion engine is there for all to see. There are basically six forms of energy: mechanical, chemical, electrical, nuclear, heat and light (heat energy is the motion of molecules and light is the oscillation of electromagnetic motion, a fairly obtuse subject in its own right). A steam engine generates five forms of energy: burning coal is the chemical energy turned to heat energy to force the pistons into mechanical energy that turns a generator to create electrical energy that in turn produces light energy. We could even say that the nuclear energy of the sun fueled the photosynthesis of the plants that were used by the animals that formed the coal. What's your example?


NATIONAL ARCHIVES

WELL DONE

This is a nice landing on a "landing field" of about 270 feet long and 100 feet wide. Consider that he arresting-wires start at about 60 feet from the end of the flight deck with the final 16th wire at about 420 feet from the end of the flight deck. There are five barriers, only two of which are upright here. The first barrier starts at about 320 feet from the end of the flight deck and the last of the five is about 510 feet from the end of the flight deck. Thus any landing beyond 270 feet will result in a barrier landing and all that that entails (such as disentangling it, etc.). The upright barriers appear to be Nos. 1&2: perhaps the green-shirts lowered the other three because this was to be a good landing and so a little time will be saved. At the ready are the green-shirts in the distance and the yellow-shirts up close. This barren scene in front of us is complemented by the bustle behind us in the parking area. Missing from this picture is the following aircraft in the landing pattern, although it could be that this sole Avenger is returning from a search mission: in mere moments this Avenger will loom up, all noise and energy, to pass us by to the parking zone behind us while off in the distance is the endless sea and the big sky. For someone who grew up with trees, big and small, this panorama was fairly new to me and it seemed to engender , or enhance, the feelings of being alone. That was my "take"; each of us has his/her own. This only emphasizes the fact that each of us is different and unique, which beneficially contributes to an interesting fabric of life.

Energy: energy can be either kinetic (in motion) or potential (ready to give up its energy). [Work can be said to be energy expended (kinetic) per unit of time.] A book on a shelf has potential energy for if and when it falls from the shelf it gives up its energy of position. I've discussed the energy of photovoltaics and at the time said that one of its drawbacks is the fact that electricity generated by the photovoltaic cells can not be stored efficiently (storage batteries are not of much use to run a household). However one idea that has been proposed is elegant if not impractical(?). The idea proposed is to generate electricity (which has to be used as soon as it's generated) by photovoltaic panels and use that energy to raise a large, even a very large, object such as an acre of landfill on a platform, up to substantial heights. The motive power would be electric motors driving hydraulic pumps. This then is a source of potential energy that can be drawn upon in increments. In effect, the electricity generated by the PV panels is converted to potential energy to regenerate electricity just as does a lead-acid battery. Admittedly, the raising-process would be slow and the electric motors plentiful, but the general idea of converting electric energy to potential energy seems sound. Isn't energy from the sun better than that from the ground? [Forget politics.]

“ALL HANDS....”

The red-diamond-on-white-background flag (“Fox”) is run up the halyard as the bugle sounds “Flight Quarters” and the PA system intones “Now all hands man your aircraft”. We next feel the ship heel as it starts a fairly sharp turn into the wind. The Fox-flag begins to stand out in the increasing wind until it flaps vigorously in the 30-knot wind. We now receive a strong dose of salt air which seems to signal the pulse to quicken in anticipation of the imminent call over the PA system to “...start engines”. With that there are multiple, out of cadence, whines followed by demonstrative coughs and then the thunderous roar of a deck-load of aircraft. Smoke pours out of exhaust pipes to add a pungent whiff of engine fumes. Another fulsome launch is about to begin and you stand, crouch, in the midst of it all. Now you kneel next to an over-exercised aircraft that vibrates with impatient energy. It was thus, and it strange how much bigger they became once the engines fired up. They became even bigger than that when they started to “make their move”. // These pilots were a special breed, well trained not just mentally but also physically so as to withstand the rigors of flying an aircraft for hours on end in the tight space of a cockpit. They endured, and sometimes we must also. Presuming you have your health, one must learn to endure the slings and arrows of an unkind or unjust or unfair fate. Learn to weather the storm for there is a rainbow somewhere out there that you must find. I wont go so far as to say “no pain no gain” as has been said. It should not necessarily be pain if there is to be gain (gain that’s not at the expense of others, but gain honorably achieved).

Energy: I can speak in practical terms about energy because I just finished four hours of vigorous raking “fighting” with those darn willow oak leaves that have to be “dug out” of the grass turf. The page that discussed the mitochrondrion within cells should be referenced. The process of raking is definitely kinetic energy of motion but there are, as mentioned previously, other forms of energy. Heat is the energy of molecules in motion. The steam engine is a preeminent example of this, with the agitation of water molecules being converted to mechanical energy when the steam is impressed on the piston. Of course it’s the residual energy in the coal that generates this heat just as it’s the residual energy in gasoline that generates the heat of explosions in the cylinders. Light, or more properly, radiant energy is the purest form of energy and is pervasive during the day. All green growth depends on this energy which is used by the chlorophyll in the plants to generate its own energy. In passing, it’s the nuclear energy of the sun that generates this life-giving energy of light. The invisible forms of radiant energy are radio waves, X-rays, infrared and ultraviolet waves. Gamma rays are “man-made” and dangerous.


63

WITH THESE MAGNIFICENT ...

With these magnificent cumulus clouds as backdrop the engines of war drone onward toward their target ready, willing and able to make life miserable for those below (and also defiant?). Each of those Avengers has 2,000-lbs. of high explosives tucked away inside their "belly", eager to disgorge them on prescribed military targets. These aircraft most certainly will drop their bombs on military targets which is not what happened in the terrible conflict in Europe. Thus we can take some measure of satisfaction that until the home islands were reached the death and destruction rained down by Navy pilots was tactical and not strategic (where civilian casualties were not just accepted but accepted gladly. It was a vicious war where there were far more civilian casualties than military. "The price of war" they said. Words were misused during the war with a vengeance. What price for liberty and freedom? Liberty and freedom was (is) paramount. The question is not that but is that the best way? Freedom from domination is the highest priority but let us not forget the other almost equally important priority, that other freedom: Freedom From Want that was articulated by our president's other freedom (in addition to freedom from fear and freedom of religion). [I professed not to include politics in these pages but freedom from want is such an extremely important issue that it can not be ignored lest one be accused of perfidiousness (when the world's awash in such). Without basic wants fulfilled (a society primarily of middle-class—forget socialism, capitalism and the other isms) political freedom does not reach its majestic status, nor will democracy flourish without an honestly informed public (a referendum is democracy; we have a republic). Infrastructure, means of production, transportation, a sound monetary policy and an (technically) educated citizenry plus some form of capitalism IS paramount. I now sheepishly step down from my soapbox to continue subjects that should be of interest.]

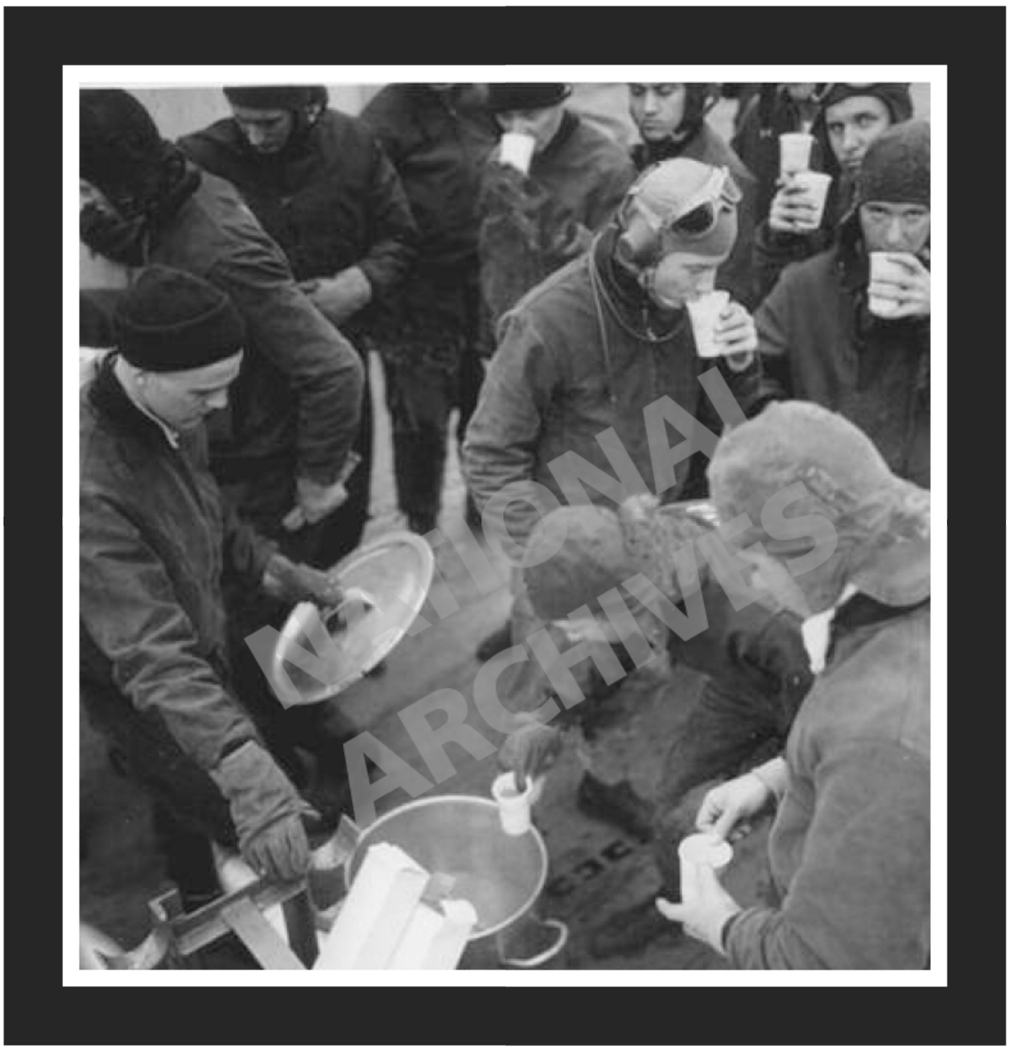
Energy: chemical energy can be found in foods and fuels, or more precisely, the energy contained in chemical molecules. The energy of coal, wood, oil and gas are released in the form of heat. Chemical reactions shuffle the combinations of the involved atoms and also give up heat. Electrical energy is represented by the energy of magnetism and electric current and their interrelationship. Electrical energy does its work with less "fuss" than any of the other forms of energy and there's no residue when it does its work except for the generation of heat. The energy to heat a house by electric current is supplied endlessly by spewing out of a copper wire no bigger than your little finger. Consider the neatness of a PV (photovoltaic) panel (architecturally diverse).


NATIONAL ARCHIVES

AIRDALES ALL ASSEMBLED

The war was fought not only in the South Pacific but also the North Pacific off the coast of Japan and in the China Sea where the latitude is comparable to New York City. The cold weather is damp and insistent and reaches to the very marrow (and the wind hasn't even been mentioned yet). Yes, the wind brought on a perceptible slowing of movement, not a happy situation when among hostile aircraft. Foul weather gear was the order of the day along with a warm beverage for those left topside. These are all Airdales of one variety with only one of another variety: he in the middle with a "radio helmet" is the gunner of a Helldiver who sits in the back of the Helldiver manning a machine-gun. When it becomes necessary to use the gun he of course must open the canopy which in turn exposes him to the elements at high altitudes. Needless to say the cold at altitude is markedly more bitter than down here on the deck. I wonder at his effectiveness controlling the gun when his extremities are frigid. On his competence could depend his and the pilot's life. // Note the cleat next to the pot. These run across the flight deck every six feet and are used to tie down the aircraft during rough weather. Also note that there's no pushing or the like to get to the beverage. Even in such circumstances civility reigns. There's no excuse for its not being so. Courtesy should never take a holiday. Courtesy is the mark of a man: he's man enough to be courteous. In fact, one could argue that the more courteous one is the more of a man one is (even a hint of obsequiousness has no truck here).

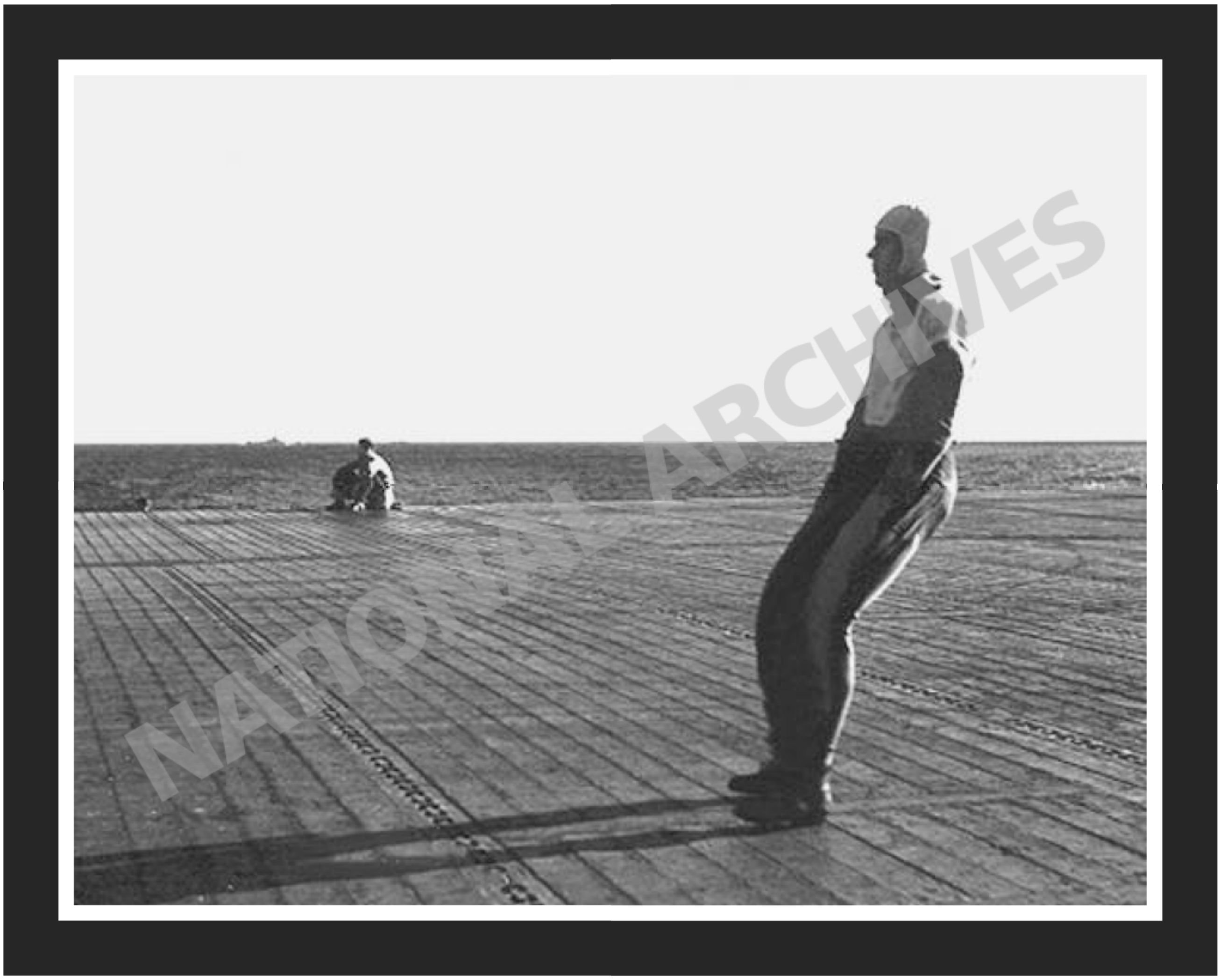
Energy: before moving on and as an afterthought of my encounter with those darn willow oak leaves yesterday, I want to say that my work ethic (of spending close to five hours of constant digging at the leaves at the same time that I did a good job of having a "spic and span" lawn) was derived from my father. Yes, at times as a boy, I would grumble when required to rake the lawn when the others were playing football. Nevertheless, I did it with such thoroughness that he gave me a well-done that I must admit gave me a quiet satisfaction. Now on to the important subject of energy (not that the above wasn't important). Nuclear energy can be the most dangerous of the forms of energy but only if improperly dealt with. It is the energy from the nucleus of the atom, from the forces that hold that tiny speck of matter together. It's possible to release this great energy in a controlled manner (that is, slowly as opposed to the bomb variety). This slowly released energy heats water that in turn is used to turn turbines that generate electricity. People are afraid of it because they don't understand it (sound familiar vis-a-vis interrelationship of people). After all, the Navy uses nuclear energy in the confined submarines. Perhaps with advanced technology they can reduce the size of the reactors, a ls submarine, and then go underground (?).


NATIONAL
ARCHIVES

INVISIBLE ENERGY

An invisible hand applies a strong force to the back of this yellow-shirt demonstrating the extreme energy that's a manifested by a 2,000-hp engine straining to pull a 16,000-lb aircraft up off the deck. When one gives it thought it's amazing that cupfuls of gasoline have enough energy stored in it that this feat can be accomplished. It's just as amazing that this energy is the result of thousands of "little" explosions per minute contained in 18 smallish tubes (cylinders). We take so much of technology for granted that it's almost sinful. We don't understand our benefactors. You wont hurt their feelings (the benefactors) but you'll be susceptible to being led down the prime-rose path by manipulative ne'er-do-wells. // One can adjust to a steady wind-blast as here. It's the intermittent wind-blasts that are treacherous: you adjust to the force of the wind and then when that aircraft wheels around you lose that force to which you had adjusted with the result that you involuntarily back-pedal (fall back) to who knows where. If "where" should be another aircraft you could be in serious trouble (it would have helped to have had an extra pair of eyes at the back of your head, for sure). // If this is a launch that sailor should be on the catwalk where he can still take in the sights. He should also turn around because just as in life we should figuratively and literally turn around and take in the "vast open ocean" to help us revisit and reassess our thoughts and feelings. I believe everyone should have available to them a vista(s) such as a mountain range or lake or ocean or field or whatever for a needed change of pace, to revitalize the spirits and assuage the mental stress and strain we all feel from time to time. Let the spirits soar unfettered by those daily pressures of life. [That is, a calming vista helps immeasurably to recharge your battery and reel in your aggravations.]In the vernacular, stay "cool".]

Energy: consider another example of the complexity of the interrelationships of the different forms of energy: the water of the lakes and oceans evaporate due to the heat of the radiant energy of the sun. The water vapor so generated forms into clouds which in time comes down as rain. This rain flows down mountains as streams into rivers which full dams which direct water to flow down and over large turbines which generate electricity which lights lamps, heats a house or charges a battery, another source of energy. Thus another "simple" example of the change of energy from one form to another. This is one of the beauties of nature. Any form of energy can be converted to any other form of energy. Mechanical energy can be converted to heat energy but we would not do this deliberately. However heat can not be converted directly to electrical energy. Instead, we go from heat to mechanical (turbine) to electrical (a generator). The energy of heat due to friction is usually avoided.


NATIONAL ARCHIVES

GALLERY DECK

We're standing on the gallery deck directly below the flight deck. We're also standing within the contours of the hull while those seated in front of us are on the perforated deck about 40 feet from the ocean below, being very near to the front of the flight deck (the part that overhangs the water below). What I don't understand is why we don't see the wire hand-rail outside the hatch (door) that runs along the catwalk everywhere there are no 20-mm or 40-mm guns. I have no answer for that (whereas everything else stands to reason). The sailor facing us, the one with the goggles, is probably a green-shirt, the one who retrieves the catapult cable after a launch. The others are too, probably. It looks as if they're reading something, perhaps a letter from home. The letters were far and few between because we were at sea almost all of the time and no ship was going to seek us out just to deliver mail. The mail came when the supply ship came, no sooner and no later. Somehow they were able to arrange it that all of Antietam's mail was sent to the location that was home-port to our supply ship. (I'll never understand how a "Dear John" letter (read, "end of the world") found me when I was on a troop ship on the way home. How did the mail system know I was on that ship that I picked up in the China Sea?) During my tour of duty I received a letter from "my girl" about once every two months, as I recall, in addition to my parents letters on occasional, and that was it. Not much but I didn't particularly expect anything more than that. I was getting used to being alone and besides, I diverted by being kept busy every day on the flight deck. No time to pout or be upset. One acclimates oneself to ones conditions, rightly or wrongly. We must accommodate to some things but NOT to others.

Energy: as a short reprise we'll refer to the energy of Mother Nature in the form of wind. The atmosphere heats up at the equator, rises and is replaced by the cold air of the high latitudes. This "orderly" rotation is disrupted by the fact that the earth is rotating on its axis. Thus wind pervades us everywhere varying from zephyrs to the blasts of Arctic gales to the appalling concentrated fury of a tornado. Sailing ships and windmills needed this wind-energy. Now to water. Every year the sun evaporates and lifts 100,000 cubic miles of moisture from the lakes, rivers and seas. Interestingly, the hot Mediterranean Sea loses more water by evaporation than is replaced by all its tributaries with the result that there is a strong flow from the Atlantic to fill the void. One third of this evaporation returns to the land as rain (the rest replenishes the oceans). Much of the rain fills our underground rivers. The flow of water generates much of our electricity but even more remarkable is the "fact" that three billion tons of rock are carried into the oceans every year by the earth's streams and rivers. Next, to the oceans.

BOGGIES IN THE AREA

I cropped this picture to effect a zooming in to show the 5-inch guns on the port side, between the 2nd and 3rd Hellcats, as they fire at some boggies in the area. Guns on the starboard side do not fire on targets on the port side, and visa versa. They pay attention to their responsibility (their side). Thus these 40-mm guns in front of us are not training their guns on the boggies.. That there are boggies in the area is stipulated by the fact that the gunners are wearing their helmets. Because there are Airdales at and around the aircraft perhaps a launch is imminent; it takes only about a minute to untie the ropes holding down the wings. After the above is all said and done perhaps all that is happening here is target practice against a drone as witness what appears to be a drone just beyond this close-in 40-mm gun-quad. The 5-inch guns shoot shells with proximity fuses but with only powder (no shrapnel) to mark the spot of the shell's detonation without damaging the drone. I can vouch for the agility of the drones which assures that they will not take a direct hit. We didn't have this type of gunnery practice often but when we did, it was quite a show. Perhaps I'm the only one to notice that all the propellers are all five in alignment. I've never seen this before and wonder if it's only happenstance. Just as the port guns concern themselves only with port-side activity and the same for the starboard-side guns, doing the same is a good rule for our own conduct: meddlers, while often meaning well, usually make things worse unless they are closely associated with a situation. Furthermore, meddlers almost without exception don't know or understand what's demonstrably outside their venue. Partial knowledge of a situation is usually worse than no knowledge at all (in which case one abstains completely). Pay attention to your own responsibilities and leave to others theirs. This will benefit outcomes. [At times meddlers meddle just to deliberately take advantage of others; this is a low-life.]

Energy: the ocean of course represents energy in the ceaseless surges of the twice daily tides and the pounding waves on the receptive shore. [A most melodious representation of the almost imperceptible tides is the song entitled "Ebb Tide". If ever there was a tune that catches the essence of something, it's that tune (unless it's the tine "Claire de Lune" that mirrors the beauty of the moon racing with the clouds as it pulls those tides to and fro]. Engineers have determined that heavy waves breaking on a rocky shore have a force of three tons per square foot. Perhaps the most abundant energy of the ocean is yet to be harnessed: the sea-water contains deuterium, the heavy hydrogen atom. Scientists are working to find a way to fuse deuterium which would supply the world with energy at our present demand for a billion years! This is not a misprint and I hope my source didn't either.

AND NOW THE REQUIEM

The explosion has occurred, the flames are subdued and now is the time to assess the damage. The PRI FLY (the Air Officer and staff) has been smashed, the deck is covered with the debris of what's left of aircraft as the hoses put the final cover on what's left. This kamikaze was aiming for the island, the "brains" of the operations. How many were killed by this ferocious crash is unknown but for certain there were many yellow, brown, blue and red-shirts plus officers who met their maker in that one terrible instant of impact: the soldier in the field knows not what hit him when a bomb explodes near him but the sailor on the deck of a ship can only stand and watch the very object of his possible demise hurtle toward him, closer yet ever closer. It ends in about 100 stupefying seconds but it takes an "eternity" to happen. Ever closer, ever closer. Who will perish, who will survive (this time)? God forbid, if not me then he and even thee. Ever closer as it howls its taunting cry of impending doom. Ever closer as it catches and then stops one's shallow breathe. Ever closer. To pray or not to pray? To explicate or not to explicate? Ever closer, ever futile of response, ever helpless of intent even as time stands still till that final terrifying impact. What the profit in cringing or even crying out the damnation felt of that engine of destruction? The end is near. The end is here, and yet, now we're in the clear and all is well—— except for those who fell, never to rise again or who were grievously broken apart. Now it is the time for the Requiem (and a debt of gratitude).

Energy: there is the principle of the Conservation of Energy that states that in all branches of physics the total energy in the universe is constant, without exception! The abiding law is, "energy can neither be created nor destroyed, only changed in form, one to another". For instance, kinetic energy of motion of the molecules of a gas can be converted to the mechanical energy of motion of a piston in a cylinder whether that gas is steam particles or gasoline molecules of combustion. Here we have heat energy generating mechanical energy. Heat energy seems to be the energy that ties the other energies of electrical, chemical, radiant and nuclear together. On the topic of heat, a distinction must be made between heat and temperature: temperature is the measure of heat. Further, all materials have a certain specific heat that is the value of the heat required to raise a certain volume of the material a specific number of degrees of temperature. It's usually expressed in calories per gram per degree centigrade (in the metric system). Water's specific heat is the value of one (1) while gold and lead are 0.03 and steel 0.11 and wood 0.42 and liquified butane gas 0.56. A glass of ice water will not rise in temperature until all the ice has melted (but the drink becomes diluted). Calorie: energy (heat) to raise 1 gram water from 14.5C to 15.5 C degrees.

WELCOME ABOARD

Depending on the speed of this Corsair relative to the speed of the ship, this is a nice landing (to be). The pilots of Corsairs have a disadvantage in that the cockpit is set back farther than the other aircraft. This in turn limits his visibility when landing because the wing impedes his vision of the LSO (Landing Signal Officer) and of the deck below. However, his main attention (in fact all of his attention) is directed toward the LSO and his paddle-signals. He's trained that there can be no landing without rigid attention to the LSO. He depends on the LSO even as the LSO grades him and every other pilot that the LSO brings in. The LSO is ruler of the landing process. Having said all that, that is not the LSO that we see. He could be a trainee, an evaluator or a concerned compatriot. The LSO is "king" and the pilots put their trust in him for he's a brethren pilot who retains the trust of all pilots. Note the white marking on the leading edge of both wings to the right and left of both wheels: this is tape that covers the recessed guns in the wings to protect them from the salt air. When fired the covering are of course punctured. The trust of the pilots in their LSO is a good thing. Would that in this day and age we could put our trust in others. To be able to do so is one of the most precious things one could possess. Think of what a beautiful thing it would be if we could all trust one another. It's a utopia of which we can dream; it's a deficit of which we must morn.

Energy: the Carnot heat cycle is one of fundamental importance because it gives an expression for engine efficiency which furnishes the theoretical limit to the efficiency that a real heat engine can have. (Heat engines are such as gasoline engines and steam engines.) The Carnot Cycle shows how it's possible to obtain mechanical work from heat by using a working substance that is carried through a cyclic process. In the Carnot engine the working substance is an ideal gas contained in a cylinder equipped with a piston. By suitable manipulations the gas is made to follow around a closed curve on the pressure-volume diagram. The curve on the diagram is a quadrilateral (four sides) made up of two isothermal curves and two adiabatic curves. (An isothermal curve is a p-v curve at a given temperature while an adiabatic curve is a p-v curve that varies with no heat added or subtracted.) The diagram of the quadrilateral consists, as said, of four sides: side 1 is an isothermal expansion, side 2 is an adiabatic expansion, side 3 is a isothermal compression, and side 4 is an adiabatic compression. Graphically speaking the graph looks like a concave dish facing upward to the upper right corner (with the volume v on the x-axis and the pressure p on the y-axis). Heat must flow from high temperature to low temperature for work to be done. Remember, heat is the product of motion (motion of molecules, of mechanical friction, etc,).

TWO OUT OF FOUR

Shown here are two red-shirts adjusting two of the four rockets that can be affixed to each wing. These are usually used by the Corsairs and Hellcats thought the Avengers and Helldivers have this capability. Just in front of the red-shirt to the right is the electrical connection to the rocket. This wire sends a current to the rocket to initiate the firing process. These 5.25-inch rockets are aimed by the direction of the aircraft as if the aircraft were a gun-barrel which is a far cry from today's rockets that are not rockets but rather they are missiles: they are guided either by a device internal to the missile or else guided by the pilot of the aircraft. They're thus used for both ground targets and enemy aircraft. Some of today's missiles are guided by tracking a target by infrared energy emitted by the missiles (heat seekers) or by standard radar emission that strikes the target and is bounced back to the missile (or the tracking aircraft) and which returned signal is used to compute the required track to the target. The subject of guided missiles is diverse and can be complex, not a subject for a one-page summary. (There are specialized books that cover this subject in varying detail.) The military's constantly trying to improve its capabilities. Should we do anything less? Of course not. For starters all of us could improve our attitude. From this will flow all kinds of beneficial results for us all (including our being more kind and more considerate). We'll be more enthused to learn not only "facts and figures" but also we'll be energized to improve ourselves intellectually (including our learning about the world around u). An intelligent society is a fortunate society in all the interpretations of that word. The desire to learn and improve is a latent life-force. Give it free rein.

Energy: as a technical aside, in an adiabatic expansion (no heat added or subtracted) the pressure drops more rapidly with volume (expansion) than it does in an isothermal expansion (constant temperature). This is because in the adiabatic case not only does the volume increase but also the temperature decreases, both of which factors contribute to a pressure drop. (This subject of thermodynamics concerns the three factors of pressure, temperature and volume and their interrelationships. It is not a transparent subject but it's an important one). The foregoing comments are integral to an understanding of the Carnot Cycle which in turn is integral to the functioning of all heat engines (including internal combustion car engines). Carnot determined that work is only done when heat flows from a hot place to a cold place and that the greater the differential of temperatures the greater the work done. Intuitively we are able to say that heat will not flow from a cold place to a hot place of its own accord. Not all of the heat applied to a piston is used to perform work unless you call the attendant heat of friction "work".


NATIONAL ARCHIVES

PRIME REAL ESTATE

This Essex-class carrier can take this prime real estate over 70% of the world but only certain people can trod its two acres of valuable "turf" that is now making tracks at about 30 knots (33 mph). That it's an older Essex can be seen in the lack of two 40-mm gun quads on the stern of the ship. Many (all?) had them later added. Just below the left rear part of the flight deck can be seem, in order bottom to top, a 40-mm Mk 51 gun director, a single 5-inch gun, another single 5-inch gun and a 40-mm gun quad. Going further up the deck is a set of six 20-mm guns outboard the catwalk. Then another set of six 20-mm guns till we arrive at the deckedge elevator on which resides an Avenger (on the outboard portion of the elevator). A Hellcat has just started to go below on the after elevator while a Hellcat and Avenger approach this after elevator. Up forward are Avengers and Hellcats but no Corsairs or Helldivers in sight. This is a very modest array of aircraft and a "walk in the park" compared to the congestion with which we always had to contend on the Antietam (I always keep coming back to the Antietam, and why not? It was my home, my workplace, my sanctuary (in the evenings (and it was the place from which I never wandered for 17 continuous months). Under such conditions one develops a loyalty to a ship that eases one's devotion to duty. Loyalty among people is also beneficial to society but my loyalty to you requires your trustworthiness to me (while my trustworthiness to you does not require your loyalty to me). The former phrase is non-negotiable and the latter one is. Loyalty needs trustworthiness but trustworthiness does not need loyalty. That is, loyalty is good but trustworthiness is irreplaceable and true loyalty can only be found where there is true trust. Said another way, loyalty can only be deserved by trustworthiness. (How many other ways are there to express this thought?)

Energy: thermal energy of a gas is the total microscopic mechanical energy (motion) of all of the molecules of the gas. If heat is applied to this gas it all goes to increasing the internal energy (motion of the molecules) provided the gas does no work (if it does do work that energy is lost forever). If the added heat causes the gas to push a piston (work) the heat energy is divided between being used for work (pushing the piston) and a part of the heat energy is used to add energy to the gas. This is the First Law of Thermodynamics. The Second Law of Thermodynamics states that it's impossible to construct an engine that will deliver mechanical work derived solely from the cooling of a single heat reservoir when no heat is given out to another reservoir at a lower temperature. That is, there must be two reservoir at different temperatures with an engine between them. This second law can be used to explain the operation of both a hear engine and a refrigerator (one reverses the other).


NATIONAL ARCHIVES

THE FIRES ARE FINALLY OUT

In the gray haze of the smoldering smoke after the flames have done their worst can be "seen" the ghostly apparitions wandering the scene of their demise. Where there was life now there is death. Where there were stalwart machines now there is but charred and twisted steel. Where there was enterprise there is now desolation. Now there are the quick and the dead, and the near dead. The fires are out but the death and destruction prevail where once there were sentient beings going about their duties. We lick our wounds and carry on. // A ship on the high seas is vulnerable to those who wish it harm. There is no place of concealment out there on the vast ocean. All that can be hoped for is the cover of foul weather, but once detected there is no sanctuary from the determined wrath of the kamikaze pilots who have prayed to their gods for the power to crush the ships that are arrayed against them. They're inexorable in their quest as witness the devastation herein. At the end of the war, at sea, in the Pacific Theater it was a battle between those fighting to die against those fighting to live. Here it was the former who accomplished his goal while many of the latter did not. It was their sacrifice that is to our benefit. D o we sufficiently understand this? Do we sufficiently appreciate this? Do we appreciate adequately the benefits that are rampart in our lives? Do we count our blessings with each day's end? Why not? Could it be because we are too self-absorbed and self-centered? Do we know those who are not thus? [A certain amount of self-absorption is not only useful but also necessary (for self-improvement) but only if we strike that correct balance, for self-evaluation leads to self-improvement and we all benefit from that happy event. It even happily encourages others]

Energy: the Second Law Of Thermodynamics is expressed as follows: engine A takes heat Q1 from a hot reservoir, delivers mechanical energy @Q1 and gives up heat Q2=(1-@)Q1 to the cold reservoir (@ is an efficiency such as 0.67). Note that Q1=Q2/(1-@). As a refrigerator, it takes (1-@)Q1=Q2 from the cold body (reservoir), is supplied with mechanical energy @Q1=@Q2/(1-@)and delivers Q1=Q2/(1-@) to the hot body (reservoir). Heat is taken from the hot reservoir (the engine) or heat is taken from the cold reservoir (the refrigerator). Thus a reversed engine becomes a refrigerator. Three theorems will be given for completeness: 1) All reversible engines have the same efficiency when they operate between reservoirs at the same two temperatures. 2) No actual engine can have a greater efficiency than an ideal reversible engine working between the same two temperatures. 3) For any refrigerator to take Q2 units of heat from a cold body at T2 and transfer it to a hot body at T1 at least W=Q2(T1-T2)/T2 of mechanical work must be done on the refrigerator's gas.

A PLANE-CAPTAIN'S ATTENTION

This brown-shirt appears to be adjusting something on "his" Hellcat. Not unusually, these plane-captains took an a very particular interest in "their" aircraft. Each aircraft was assigned a plane-captain whose job was to be the "groom of his stead". They were rated mechanics, usually first-class (not second-class nor third-class) and though they weren't responsible for big-ticket repair jobs they were the "go-to guy" whenever the pilot wanted to know the condition of his aircraft (yes, the pilots were assigned a given aircraft). When there was a launch it was the plane-captain standing by the cockpit helping the pilot adjust his seat-belts and parachute. The first thing I noticed on looking at this picture was the fact that the Hellcats were not in an even row but are staggered somewhat. This causes the propeller to be adjacent to rather than behind the tail of the aircraft in front of it. It's difficult to know the angles but the prop seems to overlap the stabilizer to its left. I doubt that this is so but if it is then the stabilizer will be ripped as it moves forward during a launch sequence. Probably there's clearance and all is well. The painted tips of the propellers were meant to make their extent more visible. It helped but when they were at full rpm it was just an invisible blur, not of too much help as to the Airdale's most pressing concern. It was meant to be a marker, just as we all need some markers when going through life. These are called standards, standards of conduct and standards of right and wrong in an increasingly full world. The Boy Scouts have it right in their Law: "A scout's trustworthy, loyal, helpful, friendly, courteous, kind, obedient, cheerful, thrifty, brave, clean and reverent" (note which are the first two attributes; I'd place "honest" with them even though it's a first cousin to "trustworthy"). Their slogan's "Do a good turn daily". Now who can write a short essay on each of these words above? [To write a short , and I mean short, essay on such a subject causes you to consider the very essence of it.]

Energy: chemical energy follows and because it's so important this will be somewhat of a review of previous pages. The chemical energy is created when the complex bonds which bind the molecules together are broken. Atoms are tightly bound together to produce molecules while molecules are bound up into larger pieces of matter that are big enough to touch. An atom of oxygen will join a partnership with two hydrogen atoms to form a water molecule. Every bonding of atom to atom and molecule to molecule is a potential source of energy. To understand why some bonds have more energy than others and why they give it up more readily, we'll have to revisit some basic chemistry. An atom can be pictured as a miniature solar system with the nucleus of the atom the sun and the planets around the sun as the electrons around the nucleus with the nucleus positive and the electrons negative.


18

BORN TO FLY

Look at it , this F4U Corsair that was born to fly. Actually, it has just become airborne as the catapult-sling pulls it down the deck to about 45 mph after a run of about 260 feet. With flaps down it will soon gradually lift upward and then angle slightly to the right to avoid being crushed by the ship should it falter and make a water-landing. This Corsair bears the label 17-F21 making it a part of the VF-17 squadron, the first operational Corsair squadron of the war to fly from a ship (it's shakedown cruise was at Trinidad, SA). It is the aircraft No. 21 of a 30 aircraft squadron which was the standard of the squadrons on the Antietam. A squadron consisted of 42 pilots, 2 ground officers and 18 enlisted men. They were a unit that went from location to location (a ship) as a group. This group, VF-17, had an admirable record in that it shot down 127 enemy aircraft in a period of 75 days. In a 5-day period it shot down 60 aircraft and with a total of 15 aces it was tops. It had the distinction of not allowing any ship to which it was assigned to protect to be hit by the enemy and it lost no bombers it was assigned to escort. It was the squadron that qualified the Corsair for operational duty on the fast carriers. The Corsair was in effect a utility aircraft in that it was not only a topnotch fighter but also it was very useful as a dive-bomber by using its landing gear as dive-brakes: an aircraft for all seasons. Would that all of us were people for all seasons. We must all specialize eventually but having more than one iron in the fire is not a bad idea at all. It's called being well-rounded. Besides, being so makes life more interesting which in turn opens up new vistas which makes life more interesting which....... It should come as no surprise that learning is the key to all of this. Get Busy!

Energy: there are as many positive charges in the nucleus as there are electrons swirling around the nucleus and so there is a balance of charges of the atom. The electrons swirl around the nucleus in prescribed orbits, but in a three-dimensional fashion: they remain on the surface of a sphere of a fixed radius and so can at any time be at any point on that sphere. Because the nucleus is positive it attracts the negatively charged electrons. However, the electrons stay in their orbit because they move at such a speed that their centripetal force outward exactly equals the attractive force inward of the positive nucleus. It is similar to a satellite circling the globe: gravity that pulls in the satellite downward is exactly balanced by the centripetal force outward of the satellite that is moving at just the right speed to generate this centripetal force. Why don't the negatively charged electrons repulse each other? They do, but since they move at random over the surface of the sphere at 1,500 miles/ sec, they can "live" with each other. Bow we have to establish the number of electrons residing in each shell vis-a-vis each element.


17-F-21

TRIPPED UP

Towing is faster than pushing especially when it's an Avenger that has to be moved. This TBM was tripped up by the barrier-wires after having smashed through a previous one behind it. What probably happened was that the Avenger caught an arresting-wire too far up the flight deck and before the wire's run-out could stop it, it smashed through a barrier and was then tripped up by this second barrier. Just as when you're tripped up and fall on your face so too did this TBM fall on its "face", damaging its under- cowling and crimping the propeller-tips. Nothing serious but definitely it puts the landing operation on hold. It doesn't take long to move the Avenger but it will take some time to repair that first, now upright, barrier that can be seen under the TBM's fuselage. It's upright now so that the green-shirts can remove the old barrier-wires and replace them with new ones. Just below the flight deck, on the gallery deck, are spare barrier-wires for such a contingency. This is not a trivial job because the wires, being steel cables, are heavy and difficult to manage. Thus there's not much to do for the Airdales while the green-shirts are the ones who have to "turn to" with celerity. While people seem to be "standing around", those who must do are doing so promptly. Apparently it tends to be human nature to procrastinate. One could well argue that this is a legitimate sin because of opportunities lost. Then the phrase "you aren't getting any younger" takes on an almost ominous tone. Why cry "what might have been"? Remember, we don't automatically have second chances, a difficult concept for the young to understand. You can chose. Do so with care for your future.

Energy: each atom has a set of concentric shells over which the negatively charged electrons swirl (trying to avoid each other). Hydrogen and helium have only one shell with the former having one electron and the latter two electrons. The second shell is at its capacity with eight electrons, the third shell with eighteen electrons and the fourth shell with 18 or 32 electrons and so no. The outermost shell never has more than eight electrons and with that we can consider the bonding that takes place between atoms of different elements to form molecules (compounds), the aggregate of which consists of the material world as we observe it (that is, the element sodium combines with the element chloride to form what we call table salt). Atoms are very discontented when their outer shells are unfilled. This is the basis of chemical bonding, of which there are two basic types: ionic and covalent. Ionic bonding occurs when an atom with a deficit of electrons in its outer shell is "given" electrons that are excess to another atom. Thus sodium gives up its excess electron to the chloride atom which has a deficit of one electron in its outer shell. It is this process in which is found the energy of chemical activity (to be continued).


NATIONAL ARCHIVES

SPACE TO SPARE

Space to spare, no problems to report. With placement of aircraft as here, especially the large Avengers, the anxiety factor diminishes markedly. Only the Airdale/yellow-shirt to the right of the center Avenger's engine is in any particularly unsatisfactory straits. All of the rest of the Airdales are "comfortably" ensconced next to a wheel ready to pull a wheelchock. This scene even more clearly shows that no aircraft will go anywhere lest the Airdale is there to pull the wheelchock. He in effect "releases" the aircraft from its position. This was a satisfying feeling: you were an integral part of a large and important enterprise. No aircraft was going to go anywhere unless and until you, the Airdale, pulled that wheelchock. How can such a trivial job be so important? (That's a philosophical question.) It was a job I did for 12 of the 13 months we were in the Pacific Theater. In a way it was strange that such a mundane job could still raise the blood-pressure and make the "juices" flow. Even with the simple-mindedness of pulling wheelchocks I did my job with as much dedication as I knew how. This was partly due to the fact that it was my duty, partly because it was important, partly because my father taught me to do whatever my job was well, and especially because I wanted to be proud of whatever it was I did. Who knows, maybe someone recognized this and in turn put forth his best effort? There is great satisfaction in having a beneficial effect on others, by example. Try it. You'll agree. Besides, the world's in dire need of good examples.

Energy: the other primary type of chemical bond is the covalent bond in which two different atoms share an electron such that the outer sphere (shell) of both atoms are filled (and thus satisfied). When atoms complete their outer shells they become more stable. When atoms combine to become more stable they release energy: chemical energy. This released energy usually takes the form of heat. When coal or kerosene or gasoline are combined with oxygen heat energy is given up in the process The energy given up by coal is 3.63 kilocalories per pound, herosene 4.99 kilocalories per pound and gasoline 5.229 kilocalories per pound. The unit of measure is the calorie: it is the amount of heat required to raise the temperature of one gram of water one degree centigrade. Food calories are determined by burning it. The number of degrees it raises the water temperature is its calorie content (the food calorie is 1,000 times the scientific calorie). Of all the compounds that exist in nature, by far the most important to mankind as a sources of chemical energy are those containing carbon. All the important fuels –coal, oil, wood, gas, alcohol– contain carbon, as do all the principal foods–sugars, starches, proteins, fats. All fuels and foods are products of once living things. These living things lived million of years ago, our benefactors.


NATIONAL ARCHIVES

FLEX TIME

This Hellcat has just landed, having caught one of the 16 arresting-wires. After the wire had run-out and stopped the Hellcat it retracted somewhat (pulled back), as seen here. This allows the green-shirts to disengage the wire from the hook after which another green-shirt at the controls at the catwalk pushes a button to reel-in the wire in preparation for the next "trap" (next landing) as these two green-shirts retreat to their respective sides of the flight deck. In the meantime the Airdales are helping the Hellcat to fold its wings as the yellow-shirt "holds" the pilot/aircraft in place. When the wings are folded and the tailhook retracted the yellow-shirt signals the pilot to move up the deck at which time he "guns" the engine as an Airdale "latches" himself to each wheel-strut with wheelchock in hand. This entire process takes about 10 seconds if all goes well (and it most always does). At about this time there's another aircraft in the vicinity of 300 yards astern the ship and in the "groove" (at the proper height, speed and attitude, lined up with the flight deck's centerline). // Again note the metal strip across the deck (the green-shirt is standing on it) of which there are (I believe) four from front to back. These provide flexibility to the flight deck in rough weather. We all could use some flexibility when things get rough. The "rough weather" is when things don't go our way. We've all experienced such times. How we handle such situations is a mark of what kind of a person we are. Do we pout, do we throw things, do we seek retribution (in severe cases) or do we weather the storm, maintain our equanimity and carry on to better times? Our character's on display. Show your better nature, your true colors (your flag). We all have disgraced ourselves in this regard, to one degree or another. Never forget that standing tall, standing strong and courtesy are never mutually exclusive. [Yes, it's hard when someone(s) deliberately aggravates, even taunts, you; humiliation reflects badly on them.]

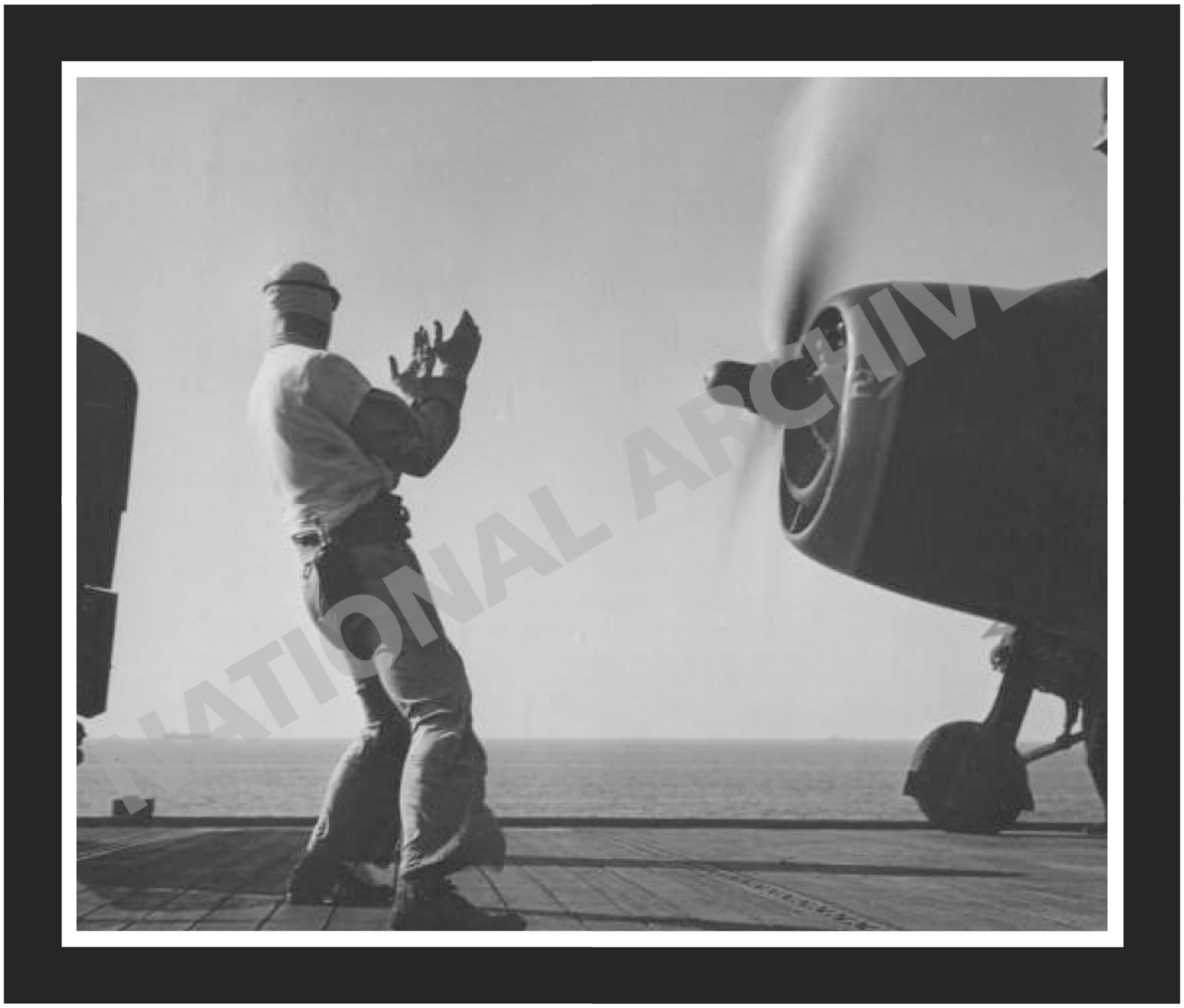
Energy: fuels and foods are the end product of plants, the primary storehouse of chemical energy which has been produced from the radiant energy of the sun. This process in plants takes place by means of the remarkable chemical process known as photosynthesis which uses water and carbon dioxide as raw materials. The water is absorbed from the soil through the roots and the carbon dioxide from the atmosphere through the leaves. The plant then proceeds to split the water molecule and splice the ensuing hydrogen into the carbon dioxide to form a new molecule containing carbon, hydrogen and oxygen called a carbohydrate (a building block of all life). With some additional fine-tuning this carbohydrate is converted into sugar, the energy source for all living things. Remarkably, photosynthesis splits the water molecule into parts while chemists require 5,400 degree heat to do so.


A
9

PRECISION PARKING PLEASE

The backward leaning yellow-shirt indicates that the aircraft to the left has not yet been de-energized. Sine the propeller diameter does not extend beyond the wheels he is theoretically out of harm's way. I don't think I can say the same about that Airdale next to the right wheel: note the size of the lip of the flight deck (about two inches) versus the diameter of the tire; it wouldn't take much misdirection for that wheel to roll over the edge of the flight deck and onto the catwalk three feet below. If this happens the Airdale will 1) be pushed over the side to the water 50 feet below, 2) stay upright on the 2.5 foot wide catwalk and be crushed by the Hellcat, 3) instantly flatten himself on the catwalk and thus avoid serious injury, or 4) pray for miraculous salvation. Only the fourth possibility is a good outcome. Presuming all goes well (and it probably will) he must contend with the onward progress of that bulbous propeller- hub. Remember that it extends no further than the lower portion of the propeller's rotation. That is, however far forward the hub is is the location of the lower path of the propeller. Thus if the hub is six inches from the tail-section in front of it, so too is the propeller. This visual progression of the propeller-hub sets up all kinds of fatalistic thoughts as well as palpitations (and even sometimes prayers—or, to be honest, imprecations). If you find prayer to be beneficial, all well and good. However, if you have absolutely no control whatsoever over an event, I found changing the subject was also beneficial. Perhaps a little of this and then a little of the that is the best policy. Who's to say? [It's not smart to let anxiety "get to you" even if unavoidable.]

Energy: the remarkable process described on the previous page is accomplished by a remarkable catalyst, a green pigment called chlorophyll. In the process of splitting the water molecule the plant expends a great deal of energy which it has previously absorbed from the sun. Excited when exposed to sunlight the chlorophyl vibrates rapidly, acting as a form of "hammer" that breaks down the bond that holds the water molecule together. The First Law of Thermodynamics tells us that the energy required to break apart a molecule is equal to the energy obtained when the molecule was put together. When we eat carbohydrates and burn them in our body we are putting back together the water molecules —and the energy we get from foods is the product of this reunion. Plants and animals are able to build up their own tissues out of carbohydrates plus a handful of other substances. For example, sugar-like molecules strung together form cellulose, the chief ingredient of wood. The formula for a simple sugar is C(6)H(12)O(6) and for cellulose it might be C(6,000)H(10,000)O(5,000). No large animal has the necessary catalyst to allow it to brake down wood to obtain its energy. But some microorganisms do.


NATIONAL ARCHIVES

WHITE WATER

Sometimes foul weather can't be avoided and this is one of those times. Keeping in mind that in a calm sea the flight deck is fifty feet above the water this picture shows an abundance of water , maybe 20 feet of it, above the flight deck. The deck's level and the sea seems relatively subdued and yet there's that wall of water. This is probably the start of something bigger because they saw fit to erect the steel-post barrier to protect the aircraft. "Stay tuned, there's more to come". Except when seeking the sanctuary of a squall for concealment the ship most often tries to avoid bad weather. All operations of course stop under these conditions and we batten down the hatches, as they are wont to say. To the right is one of the radio towers (which are lowered to a horizontal position during flight operations. Here the usual tower further forward next to the flight deck is nowhere to be seen (either horizontally or vertically). Where is it? I don't know unless it was smashed by a wave and sent to the bottom of the ocean. If you don't get seasick this is a period of respite from the rigors of flight operations. When we had our bad weather (not often) I was more intrigued than anxious. In fact I'd go topside, which was deserted, and watch the "show". Being in a hurricane at sea (typhoon) was something not to be relished but also not to be missed.(Let it be said loud and clear, I am not and was not one to tempt fate. A roller-coaster is my idea of lunacy. When things can not be avoided I'll be involved but otherwise I play it safe. To me, it's not timidity, it's just plain good sense. Dare-deviltry I believe is best left to fools.) [Sometimes there seems to be a real lack of sense and reason.]

Energy: as was said, where animals do not have the catalysts necessary to break down the wood to get its energy, microorganisms not much bigger than bacteria find wood very nourishing. These little creatures live in the intestines of termites to extract the energy of wood and share it with their host. Similarly cows eat grass, a cellulose, and microorganisms living in one of the four stomachs break down the grass so that the cow can digest it. Fats and proteins can also be pieced together from carbohydrates. In processing sugar to make fats, the body manages to get rid of part of the oxygen in the sugar. If sugar has a formula C(6)H(12)O(6), a typical fat is C(57)H(104)O(6). There are many fewer oxygen atoms per hydrogen atoms in fat than in sugar. Thus when the body "burns" fat for energy more energy is produced than when it burns sugar, since there are many more hydrogen than oxygen atoms with which to combine. Thus fats are fattening as well as being good sources of energy. A single gram of fat contains more than twice as many calories as a gram of sugar. Proteins are used primarily to build the muscles and vital organs of the body. They have many fewer calories than do fats.

MAINTENANCE TIME

This lone sailor has the duty of stripping down and cleaning this 20-mm gun. There were twenty-five 20-mm guns on each side of the ship outboard the catwalk (except that there were some 10 of them "tacked" onto the side of the superstructure's starboard side). The seagoing marines manned ten of the 20-mm's and were equally as diligent with their weapons. These guns were called the "revenge weapon" because the gun's target-aircraft was not in its range until after the aircraft had dropped its bomb(s). It was a paltry revenge to shot down the enemy aircraft if he had just dropped the bomb(s) that damaged or sank the ship: one enemy aircraft/pilot vs. one ship/multiple casualties. Even though we were in close proximity, the gunners had their little world and we Airdales had our (little bigger) world. However it was interesting, time permitting, to occasionally watch them "tinker around" with their weapons. At least theirs was a skill-job and thus much more satisfying. The fact was that neither of the jobs were "little". In their way they were both vital. But vital or not, if we a have a job to do we should do it diligently. "If a job's worth doing it's worth doing well". Ideally, all jobs should be worth doing. It's your job to make your job worth doing. Sometimes we need to "strip down" our character in terms of our attitude. We need to disassemble it, reassess it, then refurbish it and finally reassemble it. Things to consider are your determination, your steadfastness, your commitment, your dependability, your perseverance, even your sincerity. It's not always easy, but if possible, make your job fulfilling. You can chose to do so. If I could make pulling wheelchocks fulfilling, you can do the same for your job, especially if it is creative such as gaining a result that didn't before exist (a house, a garden, a clean lawn even, etc., etc.).[Being creative is one of life's joys.]

Energy: in addition to carbon, hydrogen and oxygen proteins contain nitrogen. When the body breaks down proteins it's faced with the problem of disposing of the nitrogen. Since it can't do this as a gas it combines it in a compound called urea which is then excreted in the urine. Unfortunately this product contains some of the energy of the original protein molecule and so it's wasted as concerns the body. The remains of plants and animals under sediments were "protected" them from the scavengers. With time and great pressures these fossils turned into coal and oil. They are being "harvested" at a rate that experts say will last only a few hundred years. When this occurs energy will have to be found elsewhere. Alternative sources are being developed and perhaps nuclear fusion, the opposite of nuclear fission that splits the atom, will appear in time to keep humanity's energy supply adequate. (Personally, I like photovoltaics because it's here now.) Now we'll turn to electrical energy.

“THE SHOW MUST GO ON”

“General Quarters! Now all hands man your battle stations!” Everyone is at their battle station, including these gunners with their steel helmets (and the 5-inch guns pointing to the “other”side). An enemy lurks nearby but no matter, the “show must go on”. We’re down to the last squadron, the Helldivers, as they are brought out one at a time, unfolding their wings “on the run”. (Why that Hellcat to the left is just sitting there, chocked and engine fired up, I don’t know.) Looking closely we detect an Airdale at each wheel of those Helldivers still in the pack. Yellow-shirts are positioned to direct each Helldiver in turn to the launch-point up ahead. Obviously there’s almost not a word spoken during this entire launch-process. Everyone knows what will happen next and everyone knows what to do and when to do it. It’s a pantomine conducted in a cacophony. // I went to a solid prep school (Newark Academy), I was accepted to a solid college (Yale University) and this was what was deemed by “the powers that be” to be my role in the service: to do the most mundane and menial job in the Navy for 12 continuous months, every morning and every afternoon (in a locale that never changed from day to day, i.e., the vast and never ending ocean with only a few ships to break the monotony). [I exaggerate: there were the periodic supply and fuel ships that came along side; there were the maintenance people doing their work; and of course there was the activity on the flight deck. We were certainly better off than the submariners’ locale (they received a tidy sum of pay extra).] The moral of the story is to do your very best no matter what the conditions or how mundane the task. The attitude should be that better tomes are in the offing and this is merely preparation.

Energy: electricity will be the last form of energy to be considered, and of that, the electrodynamics will be emphasized. Electricity flows as a stream of electrons in motion. Each individual electron does not “cover much ground” but its effect is almost instantaneous: one electrons repels the electron next to it and so on down the line (the wire). Think of a row of dominos, all upright, all facing each other and all close to each other. Then push the first domino. It falls forward a little bit but the effect is felt at the last domino very quickly. Thus is an electric current. Movement of electrons only occurs from a place of higher potential to one of lower potential. An analogy is a waterfall, the top being the higher potential. This potential we know as “voltage” and it’s the pressure to force the movement of electrons. The amount, or number of electrons in the stream is called the “current” and is known as amperes (or amps). Every time exactly 6,242,000,000,000,000,000 electrons “go past” a given point in one second, one ampere has been recorded. Voltage and amperes offer a widely different view of an electric current.


37
37
37
36

EASY AS IT GETS

The yellow-shirt told us to move Hellcat No. 21 over there by the catapult next to the radio tower (right in front of the forward duel 5-inch gun-mounts—note the catapult-slot). One of us took a tow-bar, connected it to the swivel tail-wheel and away the Hellcat went without the supervision of the yellow-shirt. This is not as trivial as it appears because the designated spot is right next to the catwalk, and we now know what might happen there (with the small lip at the edge of the flight deck). Otherwise, this is as easy as it gets. Actually, it was a pleasant and abrupt change of pace from the flight operations (launching and landing aircraft). This was also the time for casual talk and exchange of scuttlebutt (the passing around of rumors and the like with varying degrees of veracity). It was a mix of types and characters we had but there was no probing the background of one another. It just didn't seem important to anyone and that was fine with me. I was, and probably still am, a private person, and why not? It takes all kinds of personalities to make life interesting. // In the distance can be seen a supply ship , maybe for us, maybe for someone else. In any case it probably means that we are out of an area of hostilities and threats of hostility. Threats in wartime are to be expected. Threats in private life are not, and they are an abomination. One of the most odious human characteristics is that of (arbitrary) intimidation, especially the physical kind. It's akin to terrorism, perhaps the lowest form of human conduct extant. But hold on, we're tending toward the political, which is not to be found in these pages. [While these pages encourage critical discussion s, politics is divisive.]

Energy: voltage, difference of potential, pressure are all terms to represent the fact that there is a difference in the quantity of electrons at two different places. An analogy concerning electric current is that a large slow moving river such as the Mississippi implies a large amperage (number of electrons) but a small voltage (pressure). On the other hand a swiftly moving small stream in the mountains bespeaks a small amperage but a large pressure on the electrons. A welding machine has a very low voltage (15 volts) but a very large amperage (1,200 amps). A static-electricity machine generates a spark to jump an inch through air at 15,000 volts but with almost no amperage. The most powerful of all is the lightning bolt that generates 100 million volts and 160,000 amps. Resistance to the flow of electric current varies according to the material: copper has loosely held outer-shell electrons causing low resistance while glass and porcelain are poor conductors of electricity and are called insulators. The larger the conducting wire the lower the resistance. It was Ohm who discovered that the resistance of a wire to a current is the ratio of voltage to amperes: R=E/I. [Amperage will be called "current".]


4
21
21
ONAL ARCHIVES

CLEAN UP TIME

These Hellcats were left behind from a just finished launch for reasons best known to the Air Officer and his staff. That was something about which an Airdale never had to be concerned. “Move these aircraft over here” and we moved them over here. “Move those aircraft over there” and we moved them over there. It was all very simple. Ours was not to reason why, ours was but to do, and then do some more. However, on the Antietam there were hardly ever any aircraft left after a launch so there was very little to “clean up”. The launch was busier but the after-launch was less busy. If there were aircraft left over from a launch they were most certainly moved forward, or more likely, moved down to the hanger deck: there was never an aircraft back aft to possibly be involved with a misguided landing aircraft. The deck was always “clean” for every landing. The deck appears spacious from here but there were times when it wasn’t spacious enough for more than one aircraft. The course of a landing aircraft was not always a congenial one for either a person or another aircraft. Accidents happen even to the best of them for reasons that are not always apparent. We like things to be apparent (or transparent) so that we understand them. Thus it should be incumbent upon us to plain, not devious, with others. Everyone appreciates forthrightness in others so why not ourselves? It’s the basis of trustworthiness, one of the prime pillars of a salubrious society.

Energy: it’s the resistance of substances to the electric current that provides the energy that’s used in such things as a simple toaster to the electric stove to the electric furnace to the welding of steel (to make the huge and wonderful ships such as the Antietam). All of our incandescent lamps are the result of electric current passing through a resistive element. While this resistance is beneficial it also comes at a price: our electronic devices such as computers and radios and TVs and the like have to account for the heat generated at the risk of burning out an element of the device, not to mention the wires that conduct the electric current. Of equal importance is the conversion of electrical energy to mechanical energy. The world runs on electric motors which are energized by electricity. The basis of an electric motor is the physical motion of a current-carrying wire in a magnetic field. (The wire must be moving). True, mechanical energy must be available to move the wire (think of a water-fall turning a wheel/turbine to generate the mechanical motion). Also true, we need a magnet through which to move the wire. Sometimes a permanent magnet is used and sometimes electricity is used to create the magnet. [Of course magnetism itself is a source of energy. This raises the point that energy itself can not be seen; only its effects can be seen. Energy can neither be created nor destroyed, only converted. (Converted heat is forever lost).]

INDEPENDENCE-CLASS CARRIER

Even though this is an Independence-class carrier (that has a happy ring to it) I'm including it because it provides a clear view of the subject of the "packing-factor". That is, we have a good view of the front wheel/tail-section relationship of this Hellcat (which is extremely important to the Airdales, and who are here properly escorting the Hellcat——but where is the wheelchock??). First, though we can not see the propeller-tip, I can assure you that it reaches as far out as the wheel. When respotting the flight deck for a launch the aircraft are closely packed together to allow as many as possible to be topside for a launch. Thus the aircraft are positioned tail-to-tail. This means that in effect there will be about 6 feet between the wheels of adjacent Hellcats (the wings are within the boundaries of the stabilizers). This is not always the case but assuming it is: an Airdale, being 1 ½ feet wide, will then have but 2.3 feet from shoulder to propeller-tip as he passes between the two propeller-tips. Admittedly, this is a worst-case scenario but nevertheless they do occur on a chock-a-block full deck-load . The temptation was to crawl between the two aircraft Thus having more free room) but that would have been detrimental to our pride. This in turn raises the questions: how important is pride and when does pride become simpleminded stupidity (spelled with a capital "S")? Again, this situation didn't occur all the time but it did often enough to call into question one's thinking. // Every occasion you have, be Smart, not Stupid. Remember, "Pride goeth before a fall". At the same time, intelligent pride is a good and honorable trait. The key heret is balance. Just keep in mind, what price pride? Do not besmerch the quality of pride ny being bull-headed about it. Be proud with grace.

Energy: the previous page remarked that hear energy is irretrievable (unless it's converted to another form of energy such as the potential energy of an object that has been physically raised). But the actual heat, when used, is lost. This raises the concept of entropy: an increase of entropy is a decrease in energy. Theoretically though energy can be neither created nor destroyed, but its heat content, once used, is lost forever. Does that mean that there will come a day when there is no more energy in the world? No, because whatever happens to our sources of energy such as oil and coal, there will always be the prime source of all energy up there in the sky shining its tremendous energy down on us. The sun shining overhead is truly our connection with life. When it goes, we go, pure and simple. We've discussed photovoltaics before and this might be our ultimate connect with life after all. But fear not, the sun is and always will be there, shining on each 256 acres with the heat equivalent of 4,000 megawatts, enough for a small town. That and the capability to store electricity efficiently will be our salvation.


NATIONAL ARCHIVES

ANOTHER HEAD-ON VIEW

To amplify the previous page, we have another head-on view. Summarizing, the wheels are 12 feet apart, the propeller-diameter is 13 feet and the stabilizer is 17.6 feet wide. Thus when passing between to adjacent Hellcats, stabilizer to stabilizer, there's but 17.6/2 minus 13/2 equals 2.3 feet from each shoulder to each propeller-tip. This is certainly ample room for passage (an arm's length)but because the propeller is not visible (only there somewhere) I felt a terrible unease that it was but an elbow's distance away. The inviolate marker was that wheel—-plus that almighty one foot extra (13-12). // Note the Airdales approaching the near Hellcat. They're going to provide the required extra help to spread the wings. The closest yellow-shirt has control of this Hellcat as other Airdales await the resolution of what's going on with the next Hellcat. I don't like to admit it but I don't know why they're doing what they're doing: a rope's tied to a deck-cleat then wrapped around the propeller-hub, next looped through another deck-cleat and finally a group of Airdales pulling on the rope. Strange doing during a launch operation and something I never had seen before now. So the engine wont start; then push it to an elevator and take it below, out of the way. Don't impede progress. Certainly those pilots and Airdales at the wheels would second that. Ideas, such as mine herein, are the currency of life (not that my idea is the best or even a good one). However, we are constantly being called upon to express ideas if only for our own lives. Thus it would seem definitely incumbent on us all to learn as much as we are able so that our ideas are competent. Dumb ideas are dumb and who wants to be dumb? [Ideas will generate disagreements, but that is how we (should) learn.]

Energy: we now know that mechanical energy that moves a copper wire between the north and south poles of a magnet generates an electric current (energy in the form of electron-induced effects). We also know that we can send an alternating electric current through a copper wire in a magnetic field to generate mechanical energy (an electric motor) because there is a concentric magnetic field around any wire that passes a current through it. The key here is that there must be motion: mechanical motion in the first example and magnetic field change (motion) in the second example. It is called "induction" when a an electric current is generated by the relative motion of a copper wire and a magnetic field. [As is usually the case with energy, the effects of energy tell us that there is energy. No one can see the potential energy in the magnetic field of a magnet the way we can see the potential energy of a book resting on a table-top.] The electric generator is a true benefactor of mankind and is based on the, now, simple fact that relative motion of magnetic energy and an electrical conductor are mankind's benefactor.


NATIONAL ARCHIVES

BIG BOMBS, "BIG DEAL"

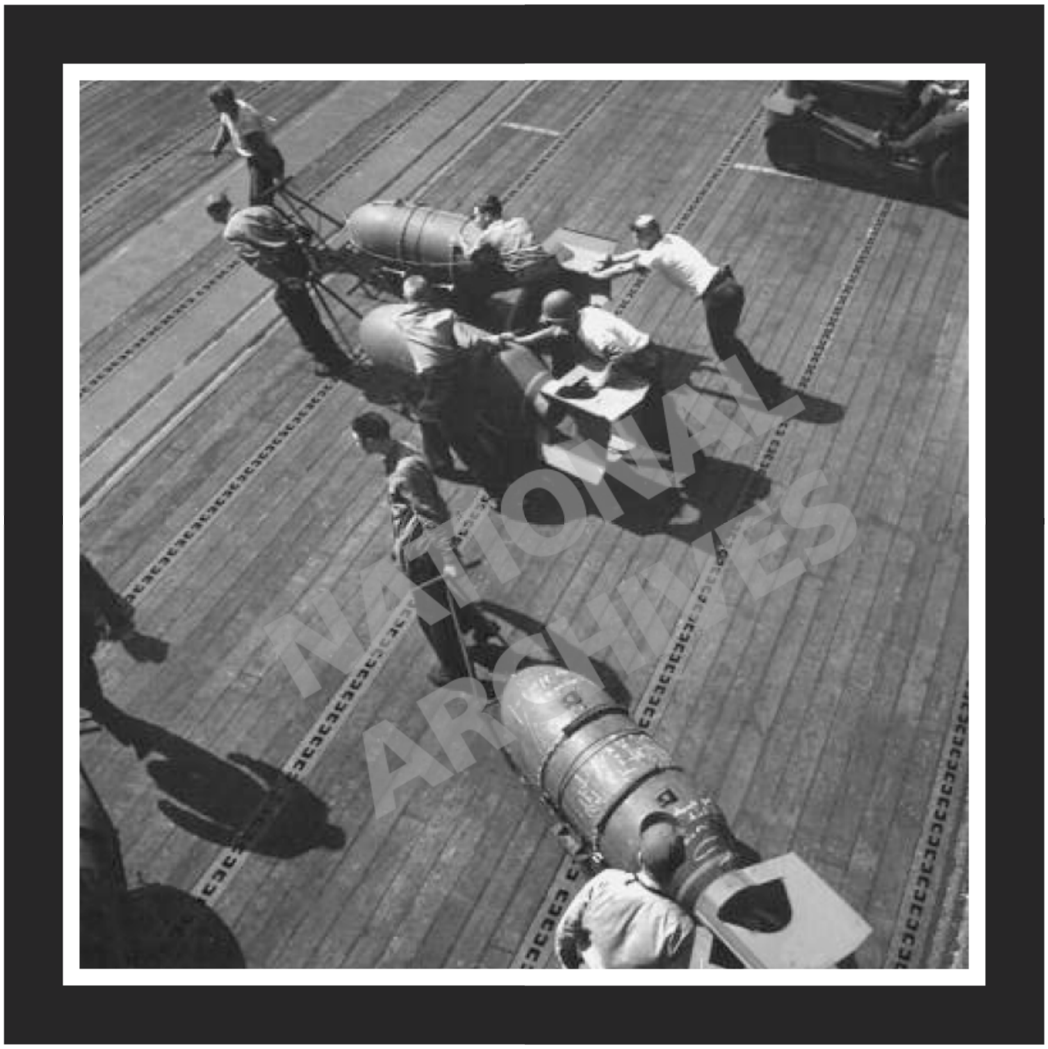
Big bombs, "big deal" and these young red-shirts seem none the worse for dealing with them, these 2,000-lb. bombs. (The wretched havoc spread over the after half part of the hapless U.S.S. Franklin was accomplished by only two 500-lb. bombs.) It can be seen that they are not yet armed as the plugs in the nose of the bombs have not yet been replaced by the fuse-mechanism. This is done just before the bomb's raised into the bomb-bay. Although I never saw it in person, I have seen a Corsair loaded with 5,00 pounds of bombs: one 2,000-lb. bomb as here loaded under the fuselage on one side, a 1,000-lb. bomb loaded also under the fuselage, and six 500-lb. bombs attached three under each wing. Now that's a "big deal"! This for the Corsair which was designed to be a fighter aircraft. Thus it was used as a fighter-bomber in the later stages of the war. Being so, it certainly lost a great deal of its maneuverability and agility that made it so lethal as a fighter aircraft. I suppose that compared to the present day aircraft this was not such a "big deal", but back then it certainly was. The foregoing places all emphasis on size of bomb-load, the quantity. It seems that the present prevailing and popular mode is quantity, such as big and bigger athletes. I say no to that; it's the Quality of the subject-matter that matters the most. For instance, it's the skillful athlete that personifies athleticism the best. It's the skillful athlete who's most enjoyable to watch. I know I speak the unspeakable when I say I'd rather watch the skillful player who loses rather than the unskillful one who wins. "It's not whether you win or lose, it's how (well) you play the game that counts" and counts and counts and is the most admirable. Chose quality over quantity every time and you'll be way ahead. Quality trumps quantity every time (or should do so). Wouldn't you prefer one picture of quality than many of no quality?

Energy: the electric motor is one of the most efficient of all energy converters. It does so by transforming into work over 90 % of th energy that reaches it. By contrast the steam engine is only about 30% efficient while the gasoline engine is about 50% efficient. One of the beauties of electric motors is that they can be used in almost any location, and in all sizes. There have been made electric motors as small as a grain of sand, consisting of 13 parts. The main problem is to find practical uses for them. At the other extreme there are motors as big as a small room whose rotor (the part that spins) weighing 170 tons and is capable of generating 65,000-hp . That's energy conversion on a grand scale. Magnets for a motor are made by winding a wire around an iron bar and sending a current through the wire. This electromagnet is the basis for most electric motors and is a prime way to convert electrical energy into mechanical energy. In closing this section on energy, consider, heat energy, once lost, is lost.

THE BIG ONES

These are the big ones, the 2,000-lb. bombs that will turn your head. It's all well and good to launch aircraft, to land aircraft, to park aircraft, to push aircraft, to mange the comings and goings of aircraft but when the heavy ordnance makes its appearance one comes face to face with the extremely serious business at hand: this really is a war and not an exercise of putting on an "air show" twice daily, every day. True, people can and do get hurt on the flight deck during these flight operations, but when these huge and ugly objects present themselves you know that someone out there will get hurt, badly if not permanently. The implications of what you're doing come into sharp focus with the arrival of these bombs that you always knew were there. However, "out of sight, out of mind" was the prevailing attitude. Yes indeed, this is a serious business we're in and it'll be worse if the "favor" is returned. At least you're not these red-shirts whose purpose in life is the "care and feeding" of these now icons of war. Handling and fusing all the bombs certainly is a big responsibility for people relatively so young. How would YOU like to be a red-shirt and do so. Don't just imagine it, immerse yourself in it. Fantasy is one thing, reality is quite another. I don't know what they might do wrong to cause a bomb to detonate but the consequences would be a great deal more than enough to make any responsible person shudder. True, our lives have no such consequences but nonetheless, just how responsible are we not only for the effects we have on others but also the effects we have on ourselves ? (which always seem to affect others in deleterious ways). Responsibility demands accountability and we're only as good as we're accountable. Accountability is the bellwether of society.

Packet Switching: this is a computer software method of transmitting data throughout the country (read, Internet). The data's digitally encoded to make it computer-compatible (that is, all numbers and text are converted to groups of ones and zeros). Switching and transmission of the date is the basis of this communication system. The system consists of many geographically spaced nodes that are a large configuration of computer equipment. These nodes, in addition to having the switching capability also have storage and processing capabilities. There are two forms of switching methodologies: circuit-switched communication and store-and-forward communication. The latter in turn has two categories: message-switching and packet-switching. In circuit-switching there is an end-to-end path of a fixed bandwidth (or speed) for the entire duration of the communication. In store-and-forward switching the message, either as a whole or in parts, transits through the nodes one node at a time. The message, complete or in parts, is stored at each node and then resent forward.



MARCH 19, 1945

On March 13, 1945 the U.S.S. Franklin rejoined the Task Group 58.2 after having been repaired due to damage sustained in a Kamikaze attack off the Philippines Is. on October 30, 1944. Six days later, with a deck-load of aircraft, a single enemy aircraft was able to drop two 500-lb. bombs on the after part of its flight deck. The aircraft there were fueled, loaded with bombs and rockets and waiting for the order to launch aircraft. A series of explosions erupted as one aircraft touched off the next aircraft. So it went with each additional detonation adding to the carnage and destruction. Soon the 5-inch ammunition magazine blew up and, life, what life was remaining, became a living hell. "Anything not secured was hurled the length of the ship. Jagged steel was flying in all directions." The entire after end of the ship was a wall of fire with smoke so dense that vision was impossible. The Damage Control Manuals specify the particulars of handling an emergency. The problem was that the fire-fighters (the Airdales) were either dead or dying or so badly wounded that the manual was moot. The crew from other parts of the ship turned to and manned the hoes, or what was left of them. The only chaplain to receive the Congressional Medal of Honor was Lt. Cdr. Joseph O'Callahan, USNR, as he administered last rites to the dying. The sailors, the officers, all those who died were given a burial at sea as is the naval tradition. No cross to mark them, to be visited on Veterans' day, only the memories of the good old days gone by. And so the stage has been set for the Requiem to be. {It's hard to imagine the horror experienced by those subjected to what happened here.]

Packet Switching: in message-switching the message retains its integrity as a whole message at each node as it passes through the network from the source node to the destination node. For very large messages this requires very large buffers (storage) at each node. In situations where there are several nodes between source and destination this requirement may result in unacceptable delays. On the other hand, packet-switching breaks a message into fixed-size small packets and then sends the packets as separate units. This approach reduces the need for large buffers to handle large messages. Thus packets of a message can be routed through several different routes to the destination at which point they are reassembled in the order in which they were sent. This reduces significantly the time to send any given message. This feature also assures that network resources are being used only when they are required. These computer controlled data communication networks are fundamentally different from those of normal voice traffic. However, like most any form of data, analog voice can be converted to digitally-formatted data. The advantage of digital data is that it can be disassembled and then reassembled.


NATIONAL ARCHIVES

ARMING A HELLCAT

The red-shirts are out in force arming this Hellcat (when I say "red-shirt" it's a generic term: on the Antietam all the personnel concerned with arming the aircraft wore red shirts; all the personnel who refueled the aircraft wore red shirts; all the personnel who operated the catapults and the arresting gear wore green shirts; all the ones who pulled wheelchocks and and put wheelchocks and pushed aircraft wore (royal) blue shirts; everyone who was assigned an aircraft (mechanic) as his responsibility wore a brown shirt; all the ones who directed the aircraft at launch and landing and parking procedures wore yellow shirts; this was how it was on the Antietam; however I can not verify the foregoing on the other carriers; this ship, at this time, did not distinguish tasks by colors nor did most all of the other pictures in these books; so there you have it: red, green, blue, brown and yellow "festooned" the deck of the Antietam and eventually all the other carriers). Here the red-shirts are arming this Hellcat with 20-mm ammunition as well as installing 5.25-inch rockets. Also note the fuel-line passing behind the red-shirts. Using the larger sized ammunition and rockets (and bombs) makes the Hellcat (and Corsair) more than a fighter: it's also a "delivery system" of significant ordnance so it has multiple roles to play. The Hellcats (and Corsairs) are not one-dimensional nor should we be. Broaden your horizons and seek out the new and different (without necessarily accepting all you find. In fact, learn what it is you do not find acceptable). Versatility, if achieved, is to be desired (and in the process, set your sights high. Don't be satisfied with less than your best, whatever the deed.)

Biology: only 13 of the 92+ elements enter into the composition of the human body in any significant way. As an example of the complexity of the human body there are 16,669 atoms united in a gigantic "solar system" of blood pigment molecule. We don't know what "life" really is, for when do the inanimate elements form into animate ones? Likewise we don't know the origin of "life" with any certitude (but that's a subject beyond our ken). The body is made up of all kinds of unique cells. So what's a cell? In biology a cell is the basic unit of an organism of whatever size. It's the smallest unit capable of independent existence. The single biological cell is the smallest unit that shows the characteristic features of what we call "life". Some would say that life is any organism that is able to take in and utilize "food", respire, grow, respond to external stimuli and reproduce. (A virus is not a cell: it can only reproduce by using an organism's resources.) Humans are made up of specialized groups of cells all of which are organized in a "fearfully and wonderfully made" organism. All cells have a membrane within which are contained its constituents for life: a nucleus and the supporting cytoplasm, composing the protoplasm.

40-MM GUNTUB, PORT SIDE AFT

My first reaction here was the complete lack of ammunition-clips in the racks of the curved bulkhead. To put it mildly, I would think this would engender a certain amount of disquietude on the part of the gunners. Not so, apparently, by the looks of the "body-language" of the gunners. To the far left can be seen the gunners passing ammo-clips to the loaders, facing fore and aft, who drop the clips into the breech of the guns. The two looking out down the gun-barrels are the ones who aim the guns, one for elevation and one for train (the four guns move in tandem). These two are actually on stand-by as this gun is being aimed by the Mk 51 Director out of view (this arrangement requires a great deal of correction for parallax). The gunner facing inboard is the gun-crew captain, the senior member of the crew. This is "his" gun and he's responsible for the smooth operation of the gun which is now horizontal , implying a torpedo-run by an enemy aircraft (presuming this is not a practice session). I know well how much these guns vibrate when operating. Knowing that, I wonder the emotions felt by the gunners knowing that they are only "tacked onto" the side of the ship. Will the vibrations become so great that the entire guntub will break off and drops into the sea? Practice here or not, "practice makes perfect". This applies to that hook shot in basketball, that drop shot in tennis, that punt in football and that math class that's being so troublesome. There are very few "naturals". We all must learn by doing and then doing again. Practice, practice and then practice some more. Nobody said it'd be easy., and if it was easy it wouldn't be any fun.

Biology: protoplasm consists of 50% water. Actually it's a fluid in which various salts are dissolved. These salts have a large number of functions. For example, they conduct electric currents and are consequentially the bearers of electrical energy in the protoplasm. The dissolved molecules of these electrolytes are constantly in rapid motion, exerting a pressure outward. This is known as osmatic pressure: a semipermeable membrane separates two solutions; the solvent with the lesser amount of solute exerts greater pressure on the membrane than that of the other side of the membrane. This process of osmotic pressure allows the passage of some solutes and denies the passage of other solutes. Various sugars are also in solution and are transmitted to the cell where they are combined with oxygen, burned and thus provide energy to the cell. Cell metabolism and its functions are an involved process, beyond the level of these pages. However we'll revisit the description of a cell as a basis for the following pages: the cell is surrounded by a flexible, semi-porous membrane through which food is taken in to provide the energy for the cell. The cell has a nucleus, the control center for all its functions.

FURIOUS POWER WAITING TO BE UNLEASHED

Just to look at these Corsairs one can feel their impatience to be unleashed because they were "born to be aggressive" with their lean lines. They were indeed "lean mean fighting machines". It's somehow strange to affix personalities to a large inanimate object (though one sometimes comes to assign life to them). Where the Corsair is all business the Hellcat, with its round lines and "smiling face" is a congenial type. Well here, its stand back as these Corsairs, with their load of rockets, go off one by one to do their worst. The yellow-shirt has just handed off the lead Corsair to the launch officer and has turned to retrieve another one as that other yellow-shirt holds the second Corsair. The pilots have their eyes glued to the yellow-shirts because among other things they have no way of knowing what's in front of them. It's the yellow-shirt who has the responsibility for preventing the second Corsair from chewing up the first Corsair (presuming the pilots meticulously follow directions, which they invariably did). But who knows? Accidents do happen on a flight deck with about 100 aircraft wheeling to the right and left as they "impatiently" reach for the head of the line while trying to maintain that 30 second interval between aircraft. Aircraft don't have personalities but people do, like it or not. Therefore isn't it sensible to at least not have a harsh or unpleasant one? Whether or not you think you have no impact on others, you do. If it can't be a good one at least make it a neutral one. I know because I've been a grump in my time. In a way it's similar to adding either positive or negative energy to those around you. It should be incumbent on you to be the former. I rue the fact that for a time I was the latter (and excuses don't count), even though I thought I had legitimate ones).

Biology: the nucleus of the cell is its control center in the form of DNA (deoxyribonucleic acid). This provides the cell with its operating instructions. Within the cell there is also a jelly-like substance called the cytoplasm in which are found cell components called organelles which organelles carry out a specific task as they together maintain the cell as a living entity. There are all kinds of cells that together form the various parts of the body. The cells take up "food" to obtain energy that allows them to function and reproduce. The enveloping membrane is semi-porous to take in the nutrients it requires. One of the organelles is the mitochrondrion which carries out aerobic respiration to break down food to release energy. Another organelle within the cell is the nucleus. Others are the glycogen granules for long term storage of glucose (energy storage). Golgi bodies transport secretory products; ribosomes translate the instructions from the DNA and consist of RNA and a protein by which the cell's proteins, the building blocks of life, are formed. [WE'll move on.]


101
F

THE HELL OF IT ALL

There they are, what's left of them, the poor beleaguered Airdales fighting a fire that seems too overwhelming and insurmountable for a few individuals whose only accessory is the basic hose. No helmets, no protective clothing of any kind, only the work-shirts on their backs. How uneven the odds these few remaining Airdales have to confront. The entire after part of the flight deck is an inferno and they are but a holding action till the flames and explosions have done their worst. A handful of "men" holding forth for the rest of the ship's personnel as they wait and wonder their fate. Be assured that those fire-hoses "have a mind of their own" and for one "man" to handle a hose by himself, as is the Airdale to the right, a fight of its own. Again, all pilots and most all of the Airdales on the after half of the flight deck are gone and unrecognizable. Only after all has been controlled and a muster taken will who won and who lost be ascertained (though many of the "winners" can hardly be considered "winners"). How does one respond to such a catastrophe? Does one seek safety and so remain? Or does one dash headlong to the fray, garnering whatever device is at hand and fight this monster oblivious to the dangers? From the ships in the area is seen this "funeral pyre" and they can but stand and watch and wonder. Such a picture puts one's reactions to the test. Would you hold back or would you tighten your belt and pitch in to quash this monster oblivious of your own safety? Yes, we can take heart that there are those who respond to such an extremity as does our intrepid Airdale all alone to the right. How do we, the safe ones, measure ourselves? Be brave, try it.

Biology: the source of energy for both the mechanical machine and the organism (us) is combustion; that is, the splitting of large food molecules with the aid of oxygen. Combustion in a machine is essentially the "same" as that in a living body but the manner in which it takes place is of course different. During combustion in inanimate nature the splitting of the molecules is a violent rendering process. On the other hand, in living organisms it takes place in the form of an orderly systematic breakdown of the fuel (food). The lighting of a match is in fact a catastrophic event: the internal energies are set free with explosive force creating heat, light and flame. Combustion of substances in an organism's metabolism is by contrast a much more benign event. The results are precise and well-regulated. The metabolism proceeds in accordance with definite laws. There are combustion ferments (enzymes, yeast and the like) whose function it is to bring about the union of oxygen and fuel thus providing an orderly, regulated oxidation of fuel (food). The oxidation ferment can be compared to oxygen atoms being hurled at food molecules in order to split them. [Oxidation: C+O(2)=CO(2).]


NATIONAL ARCHIVES

BRUTES IN REVIEW

As these mow familiar brutes pass in review we're taken by the shear magnitude of moving and storing of them. As here, special trolleys are fabricated for them. It apparently turns out to be a three-man job just to move them from here to there. In this situation the weather has a bearing on this exercise: if the ship pitches forward the job is made easier but if the ship pitches bow up the job is more tenuous (ship-roll doesn't play much of a role here). These are little things until you try to do them yourself. In that light I don't recall if these trolley's front wheels swivel or not. If not, how do they direct them to the right or left? Even if they do swivel, turning the wheels is not at all a simple matter what with 1,000 of the 2,000 pounds bearing down on the front wheels. We look at this and say, "No problem". If we reconsider we'll come to a different conclusion. We haven't even considered the handling of these brutes down in the storage-compartment. Chains and pulleys are the answer as well as overhead runways to which the pulleys are attached is the answer. Note that the gun-barrels are almost perfectly lined up as one. Be assured that this is in fact a duel-mount, forward of the superstructure. War is hell and these bombs will prove it somewhere out there. // We probably don't appreciate the work requited to move and deploy these bombs just as we don't appreciate the problems of others. It's the classic case of not having "walked in the others' moccasins for a mile". That's the first step (no pun intended) to understanding others and gaining an insight into the plight of others. The better we understand one's plight the better we are dealing with it (id so inclined).

Biology: the comparison to inanimate combustion is that in animate combustion the item is split without destroying the edifice. Thus the energy for metabolism is available and the body is still intact. The chemical mechanism for fat metabolism follows: the fatty acids form chains of hydrogen atoms connecting a CH(3) molecule at one end and a COOH molecule at the other end. The complexity of the fatty acid depends on the number of links in the chain. The oxidation process breaks each link in turn. Then the two large molecules are broken up into carbonic acid and water. The oxygen does the breaking with the aid of the ferment (catalysts). The ferments determine the speed of this process. Sugar metabolism is the fuel for the body. All the carbohydrates in our food (bread, rice, potatoes, fruits, etc.) are converted in the intestines to form grape sugar which is stored as glycogen in the liver. This conversion of grape sugar to glycogen is accomplished by the insulin found in the pancreas. Gland products that are secreted into the blood-stream are known as hormones and insulin is the hormone of the pancreas. The muscles are the chief consumers of the sugars derived from the carbohydrates.


NATIONAL ARCHIVES

HELLDIVER DELIVERY SYSTEM

This 1,000-lb. bomb apparently only requires a smaller trolley than the 2,000-lb. bomb. It can be tipped slightly to allow it to change directions without excessive trouble (so say I). It 's unusual that the bomb is being pushed around with the fuse in place (at the nose of the bomb). Usually the red-shirts affix the fuse just before or just after it's been installed in the aircraft. However, I only presume this from my observations. (I'm wondering what it takes to man-handle this load around and about on the flight deck because it's such a load.) Sometimes the officer in charge, as here, pitches in to help with the physical efforts, but certainly with the technical aspects of loading the bombs properly. Note the area right above the star on the fuselage. This after canopy can be lowered such that the machine-gun has freedom of motion to train on targets anywhere in an 180`degree arc behind the aircraft. I'm guessing that there's also a cut-out in the firing-mechanism when the gun sweeps past the tail-section of the Helldiver (no point in shooting down your own aircraft). I count five 1,000-lb bombs in this picture (don't forget the one under the Helldiver with bomb-bay doors open). Previously I said I presumed that the fuse was set when loading the bomb. We all do too much presuming, especially concerning others and their motives. This is not only unfair but also unwise both in a personal way and in a societal way. After all, our justice system requires that someone is presumed innocent unless and until proven otherwise. This is not only good public policy but also interpersonal policy. You know perfectly well that you don't like to be prejudged so why do it to others? "Do unto others as you would have them do unto you". Giving someone the benefit of the doubt until shown otherwise is only reasonable and sensible and honorable. [What kind of a world would this be if everyone were honorable? We can dream, can't we? We can also have the expectation that the human condition will improve with time, right?]

Biology: the metabolic processes are regulated by substances secreted by certain glands into the blood-stream and are carried by the blood throughout the body. These substances can be considered chemical messengers and are called hormones. In general the process follows: a gland receives its raw materials by way of the arterial blood. The gland then manufactures the particular hormone after which it secretes the hormone into the circulating blood system. The endocrine system of glands include the pineal, the pituitary, the thyroid, the parathyroid, the thymus, the island tissue, the adrenal and the sex glands. The pineal gland is a rudimentary gland thought to affect the rhythms of activity. The pituitary gland is situated in the center of the brain, in two parts: 1) the posterior lobe is connected to the hypothalamus and stores two hormones made by the hypothalamus (to be cont.).

WHAT CAN BE SAID?

What can be said? What can be done? What can any rational being imagine of those poor lost souls, those who survived, wandering in the utter darkness of despair.? What is the way out from that damnable darkness? There's naught but water whichever way one turns (who can find the paths to the points of egress?) It's a small world when there's no place to turn. Front to back, back to front, all is the darkness of death. Some few will survive, but who? And how? And when? And why? What miracle will say that "me and thee" will survive and he will not? What can be said? What can be done? Even, no, especially in this small world war is hell. And we here in the safety of our attending ship can only conjure what transpires at this moment. Where are the chaplains, where are the padres? Let it be done. Let it be over.

Biology: the pituitary lobe connected to the hypothalamus stores two hormones synthesized in the hypothalamus: ADH and oxytocin. AND is a hormone that maintains the balance between the water and salt in the body and stimulates the birth process. The anterior lobes secrete six hormones some of which control the activities of the other glands (thyroid, gonads and adrenal cortex). The pituitary gland acts on the brain, the bones, the thyroid gland, the heart, the liver, the adrenals and the sex glands. The thyroid gland controls the production of the iodine content of the body. Iodine stimulates the sympathetic nervous system which controls the metabolic process. Also it's of interest that iodine is stimulated by agitation such as loud talking which stimulation increases the output of iodine. This circular process leads to further agitation and thence sometimes anger. The parathyroids regulate the blood calcium level, determining the transport of calcium from the bones into the blood-stream and the tissues. The ingested calcium first goes to the bones and then to the blood as required. A deficient parathyroid means a deficiency of calcium. Calcium inhibits the neuromuscular irritability of the tissues. The thymus and pineal glands are concerned with youthful growth. The "isles of Langerhans" are connected with the pancreas. The hormone secreted by these tissues is called insulin and aids in the digestion of primarily sugars. It also generates glucagon which regulates the level of sugar in the blood. The adrenal gland secretes several hormones. Some regulate salt and water metabolism while others regulate the use of carbohydrates, fats and protein. It also secretes hormones that in times of stress cause the heart to beat faster and harder (raise the blood pressure), increase the blood flow to the heart and muscles, dilate the arteries in the lungs, mobilizes the sugar from the liver and it initiates the physiological "fight or flight" syndrome. As seen, the adrenal gland generates the most hormones.


NATIONAL ARCHIVES

STOPPED AT THE THIRD BARRIER

This Helldiver probably took a hard landing (was too high), bounded over the arresting-wires and the first two barriers, hit the deck hard breaking its right wheel-strut, was caught by the third barrier which swung it around and deposited it as seen here. The flaps are down and the forward slot in the wing is extended (to add additional curvature to the top of the wing) so those can not be blamed for this situation. What perplexes me here are those open bomb-bay doors. Perhaps this had something to do with this result but if so I can give no valid explanation. The yellow-shirt in the foreground is luging a fire-extinguisher for the non-fire. Everyone else appears to be unperturbed by it all. Actually, If there's no fire there's no need to be excited. However, it's to be expected that they'd be animated because there are things to do, RIGHT NOW: there are others overhead who want to come aboard after a long and fatiguing flight (fatigue to the point of making many of the landings not a sure thing). However , a great deal of the blame for a bad landing is placed on the LSO (Landing Signal Officer) because it is he who makes the determination as to whether or not the aircraft is too high, low, askew, fast, too slow, etc. Leadership means "getting it right" almost all of the time. If the leader is amiss so go the followers. If you aspire to the leadership rope keep in mind that with it goes acumen sufficient to warrant the trust of the followers. It's an implied responsibility that doesn't come cheaply. It must be EARNED (there's a good deal of satisfaction in that).

Medical Imaging: sound and electromagnetic radiation are used to create visual images of th interior of the body without the need for surgery. This medical imaging is a diagnostic tool used to determine the effects of treatments as well as the need for treatments. With the increasingly capable digital computers and their software, technology has made enormous strides in a relatively short time-span. Various different techniques have been developed in the process. In ultrasound scanning high frequency sound waves transmitted through the body are absorbed and reflected to different degrees by different body tissues. This is considered safe imaging because it doesn't use radiation of X-rays (although X-rays are still the most common form of clinical imaging). Here short-wave electromagnetic radiation is passed through the body and then detected, making a photographic-type of image. This image may be of limited use and exposure to radiation could damage the cells. Computerized tomography (CT) scanning combines the use of multiple X-ray beams and detectors with a computer that can create more detailed cross-sectional or three-dimensional images. There are special devices for special locations of the body. We'll next consider one of them, echocardiography The field of imaging is growing very nicely.


FLY
2
35
NATIONAL ARCHIVES

STRANGE PROPORTIONS

If this were the only picture one had of an Essex-class carrier one would think that mist of the ship was back aft of the superstructure. Not so. A true perspective would show that the distance is equidistant fore and aft from the superstructure (as much flight deck space in front of the superstructure as back of the superstructure). Another seeming aberration is that most carriers had only 20 Helldivers instead of the 30 seen here (recall, 30 Corsairs, 30 Hellcats, 20 Helldivers and 20 Avengers). The deckedge elevator is almost exactly amidship but one couldn't ascertain that from this picture. Here we see the two pair of towers, fore and aft, that string the high frequency radio aerials between them. As has been said, these towers are lowered to the horizontal position during flight operations. Speaking of that, the Airdales have a busy time ahead of them in preparing the deck for a launch. Among other things, all aircraft must be moved back of the forward elevator to allow the use of the catapults (which start at about one quarter of the flight deck length back from the front of it). This means shuffling aircraft between flight deck and hanger deck. Yes, they have their "work cut out for them". Such a pronounced example of perspective should be a lesson to all of us. By appearance alone things are not necessarily what they appear to be. Never forget that different people will always have different perspectives from yours. This realization will go a long way towards assuaging misconceptions and its attendant frictions, the bane of a civil society.

Medical Imaging: electrocardiography has become an important diagnostic tool. It uses ultrasound to visualize the internal structure of the heart and its movements. The emitter in th transducer produces pulses of ultrasound waves which are beamed painlessly into the body. Different densities of organs or tissue absorb the waves or reflect them as echoes. These echoes are picked up by the transducer's receiver. The transducer's emissions are moved over the body and the strength and tine delays are recorded by a computer which evaluates the meaning of these returned echoes. In this way an image of the organ scanned is pictured in black and white. These results are in real time but they can be recorded for further analysis. This technology has been used extensively to monitor pregnancies which are much safer for the fetus than are X-rays. The transducer contains both the transmitter and the receiver making for ease of use. In CT scans a low-power X-ray is directed at the body as the source rotates around the body. There are receivers distributed around the body so that a large set of two-dimensional pictures are taken. After each rotation the transducer moves down for another set of pictures, covering the entire body. Unlike standard X-rays, Ct scans provide detailed images of internal organs and tissues.

A PICTURE TOO MANY

I believe I went too far by including another picture of these 2,000-lb. bombs because, gosh, aren't they ugly?! Only a red-shirt could love them. I wonder if red-shirts developed personalities different from the rest of us after associating with these monstrosities over a period of time? However, what of the personalities of the brown-shirts and their possessiveness of "their" aircraft? Or the take-charge attitude of the yellow-shirts? And the trepidation that the blue-shirts felt among the raging aircraft? Or the dominance that the green-shirts adopt when catapulting and trapping aircraft? And the meticulousness that the red-shirt fuel-men exhibited? But hold on. Everyone of those "colors" was meticulous to the nth degree, especially the "yellows" and the "blues". Looking now at the bombs we can note that I was wrong when I said, a few pages back, that the bombs were fused only at the aircraft. These bombs here certainly are fused, with but a thin wire holding the fuses' propeller immobile (if I'm not mistaken the propeller will not turn with the wire in place——it's pulled just before the bomb-bay doors are closed). Yes, we all make mistakes as I did about the fuses some pages back. Instead of making things worse by trying to protect your fragile self-assurance, just admit your mistake and carry on. The initial pain is there but it quickly dissipates. It not only shores up your character but it also makes you feel better in a short order. Besides, a little humility never hurt anyone who is basically well-adjusted. [What is it to be well-adjusted? (Balanced)].

Medical Imaging: magnetic resonance imaging (MRI) uses radio waves in a powerful magnetic field. This method produces highly detailed images of the tissues in the body, especially of tissues with high fat or water content (such as the brain). It can be used to diagnose a range of disorders as well as allow doctors to monitor degenerative disorders of the central nervous system. In radionuclide scanning a radioactive substance is introduced into the body and then the radiation given off is detected by a special camera. Positron emission tomography (PET) is a form of radionuclide scanning that uses computer software to produce images that reflect the function of the tissues as well as their structure. One of the main uses of PET has been to study the brain, as it can provide valuable data about brain function in dysfunctional brains. The MRI works thus: within the body's water molecules, hydrogen nuclei usually spin randomly around magnetic axes that point in all directions. The intense magnetic field produced by the electromagnet in the MRI scanner causes these nuclei to line up in the same direction as the polarity of the electromagnet waves emitted by the MRI. A pulse of radio frequency then knocks them out of alignment and causes them to wobble. To be continued.

TOWERING INFERNO

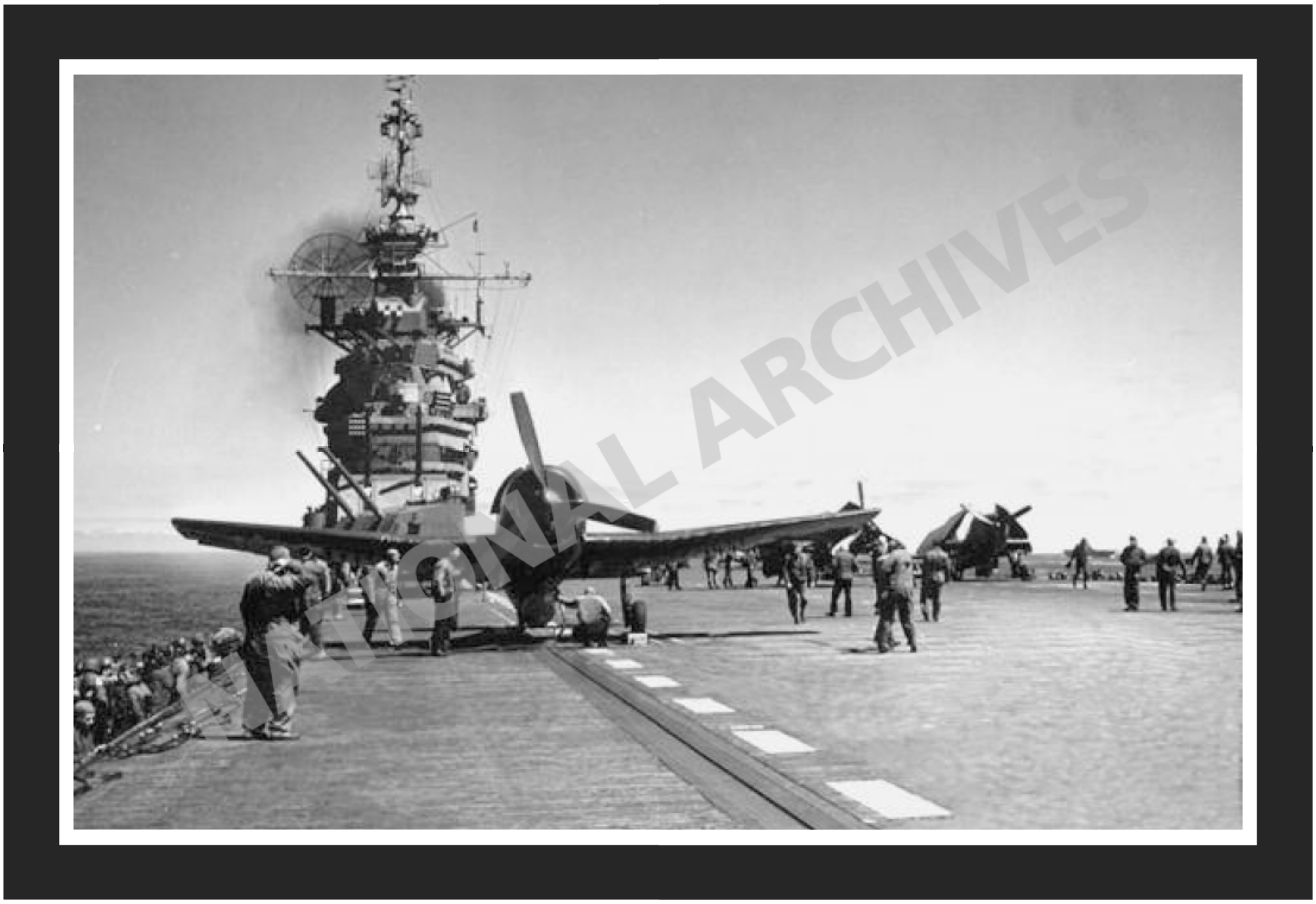
Somewhere, there at the bottom of that towering inferno, is a ship, a once proud and mighty ship. And now it's but a charred "battlefield" whose deck is now all strewn with unspeakable desolation. Is there any life whatsoever left after the gods of war have done their damnable worst? Those topside are gone, yes, while those below can only wonder what has befallen this ship, this their home, out there on the vast and trackless sea. Let it be said here and now that no Essex-class carrier was ever lost during the war. They've been egregiously hurt, but never lost. Shipmates are lost but the ship carries on even if under extreme duress. To gaze on this scene it seems but a miracle that such could be so. And yet, for those who are intrepid and will not be bowed the remaining crew found a way to save their ship and so limp back to sanctuary to be refurbished to fight another day. These then are the true veterans to whom homage will be paid on their day of recognition. Those of us others who also wore the uniform yet were unscathed are, in my most humble opinion, but "secondary" veterans. I'll take some "flak" for this and when I get that "flak" my mind will return to this image of a ship put out to sea and terribly exposed to those who want you, specifically, to be dead. Setting that aside, "thy will be done" (God willing).

Medical Imaging: as the wobbling nuclei realign themselves to their normal condition after the applied electromagnetic field is stopped they then emit their own weak radio waves which are picked up by detectors and analyzed by the computer software (recall that it is the axes of the hydrogen nuclei of the body's tissue's water content that line up when a strong electromagnetic field is applied to the body). It is the image obtained from the realignment that is analyzed by the computer software. Since MRI can probe the tissues within dense bone it is very effective in studying the brain. It is also useful for showing small details of soft tissues such as nerves and blood vessels. The images of the tissues are different according to the density of the hydrogen atoms. Since hydrogen is a part of water [H(2)O] and water is present throughout the body, MRI is very versatile. Tissues with a high water content such as fat show up more prominently. A PET scan is accomplished by injecting a low dose of a radioactively tagged chemical. This substance concentrates in the more metabolically active tissues of the body. A ring of detectors surrounding the body measures the amount of radiation emitted by the tissues at a given position of the body that provides a cross-section at that position. Computer software then analyzes these images to present them on the monitor. The low dosage of radioactive material makes for a safe procedure. These devices provide a marvelous synergy of medicine and technology that makes us truly benefactors with them.

EN GARDE

On guard, the ship seems to be saying with a Hellcat poised on the catapult and the upturned 5-inch dual gun-mounts showing their defiance to any foe who dares approach. Even the helmeted gunners down on the catwalk to the left take their stance, with 20-mm guns at the ready. Meanwhile the flight deck personnel are going about various and sundry duties even if not with urgency. The situation appears to be that the squadrons are airborne on a mission while a few fighters remain on board for additional protection that can't be handled by the CAP (Carrier Air Patrol). As an Airdale, for some reason I always felt just a little bit more secure on seeing the fulsome and lofty superstructure. It was in a way a compatriot to those of us on the open expanse of the broad flight deck. Having been on an Essex-class carrier I believe I would have felt "unsheltered" on the smaller Independence and "baby" flat-tops with their "no-count" superstructures. This feeling probably is made of "thin stuff" yet it has substance to me. Navy ships are not made with any excess appurtenances whatsoever. Thus everything about the superstructure was vital to the best operation of the ship. I believe these sentiments of mine can only be understood by other flight deck personnel, if at all. Thus what's important to me is unimportant to thee, and visa versa. This is so throughout life and the better we realize this the better we'll all be. Being purposely critical of others' tastes is counterproductive and upsetting (presuming the differences are not illegal or unethical). Besides, differences can be a fillip to life. (As they say, "vive la difference!". (Obscenity, crudity and violence are not on the table nor even in the room.) [Obscenity, smut, destroys the beauty of something that is beautiful if it's respected..]

The Brain: let it be said first off that the human brain is the residence of both the mind and the soul. One without the other reveals its speciousness. The brain interrelates the messages it receives, originates responses, stores impressions both visual and mental for future use and eventually becomes the seat of intelligence (capacity to reason and understand). The brain can be divided into three parts: the cerebrum and thalamus, the midbrain, and the cerebellum, medulla oblongata ad pons. In a functional anatomical description of the brain it can be divided into the following segments: the brain stem (medulla oblongata, pons, midbrain and thalamus), the cerebrum, the cerebellum and the ventricles. The brain stem is divided into four segments: the medulla oblongata, the pons, the midbrain and the thalamus including the corpus striatum. All parts of the brain are interconnected to form the central nervous system that controls the incoming messages from the sensory organs and the outgoing fibers that control the muscles. The brain truly is "fearfully and wonderfully made". TBC



JAVA TIME

Yes, it's cold outside on the deck where the wind almost never takes a holiday. Those in the woolen watch-caps are probably red-shirts (note the 5.25-inch rocket on the trolley) and those with the cloth helmets are the blue-shirts (Airdales). Coffee wasn't on my needs-list so I never imbibed even with the cold and the wind. That foul weather gear was fine for protection from the elements but disastrous if one had to go into the water should the ship be sunk from underneath you. It was so heavy you'd go down with the ship. When it became wet you'd be water-logged and you'd go down with the ship, and if you became water-logged you'd become so cold that you'd be unable to move your extremities and you'd go down with the ship (even before hyperthermia killed you . What I'm alluding to is that if the ship was sunk and there were no rescue vessels in the area you were a dead man. Even if the ships could reach you, you had about five minutes of life left to you. After that it was Davy Jones' Locker for you and a "missing in action" notice sent to your home. I forever wonder at the mentality of those intrepid merchant mariners who plied the North Atlantic and were then sunk by German submarines. If they survived the explosion of the torpedo and the ship then went down, they had but five minutes to ponder their fate. My hat's off to them in spades. We back home in 1943 hadn't the slightest idea of how brave they were, these "mere civilians". Where were their medals? That's a characteristic of most people: they don't appreciate their situation and their fortune. Why isn't there a memorial to them on the National Mall? Lest we forget, lest we forget.

The Brain: at the base of the brain stem the medulla oblongata contains centers for the control of respiration, heartbeat rate and strength, blood pressure and control of body temperature. Overlying this can be found the cerebellum which is concerned with controlling complex muscular processes such as maintaining posture, controlling the movement of one's limbs and maintaining balance. The cerebrum (cerebral hemispheres) are paired outgrowths of the front end of the forebrain which is involve d in all sensory input and motor output. This area also processes thoughts, emotions, memory and behavior. Sensory info arrives in the cerebrum in the form of nerve impulses that come from sensory receptors of the sense organs such as the eyes, the nose, the ears, the skin, The cerebrum processes these impulses and generates other pulses to be sent out to the body's muscles. These are called voluntary responses. The body also generates involuntary pulses that maintain the integrity of the body, such as monitoring and controlling the pulse, the blood pressure, etc. In effect, we have no control over the involuntary nerve system and in that we are fortunate. To be continued.

NOW AWAY ALL HELLDIVERS

The tranquility of these "birds" belies their mission of dropping those 500-lb. bombs attached to their wings (in addition to probably 2,000-lbs. of bombs in their bomb-bay). Remember, two 500-lb. bombs were responsible for wreaking serious havoc on the U.S.S. Franklin. So, though small-looking, those bombs could be lethal. The Helldiver had a higher cruising speed than the Avenger and only somewhat less than the Hellcat fighter. Its top speed was significantly higher than the Avenger's (295vs. 267). While the Corsair could carry the same bomb-load as the Helldiver, its range at that load was considerably shorter than the Helldiver's. The Helldiver had an autopilot capability for use on log-range missions. This was beneficial in cutting down the pilot's fatigue, thus making them more efficient over the target. The bomber pilots had to get to the target, drop their bombs and race back home while the accompanying fighter pilots certainly had more to do if the enemy engaged them anywhere along the way. We all are endowed with "auto-pilots". First, we have the autonomous nerve system previously mentioned by which our breathing, pulse, blood pressure and the like are automatically controlled. Beyond that we also do many of our tasks and think many of our thoughts on "auto-pilot. This is good and necessary if we're to make it through the day. However, this capability also makes it more likely that we do things that we shouldn't, at least not if we don't want to upset the peace and tranquility of normal relationships. To wit, we're thoughtless to the point of "rubbing people the wrong way" when we meant no offense. Thoughtfulness is definitely one of the pillars of a felicitous society, and the cost-effectiveness of thoughtfulness is about 5-95. Thoughtfulness is gold.

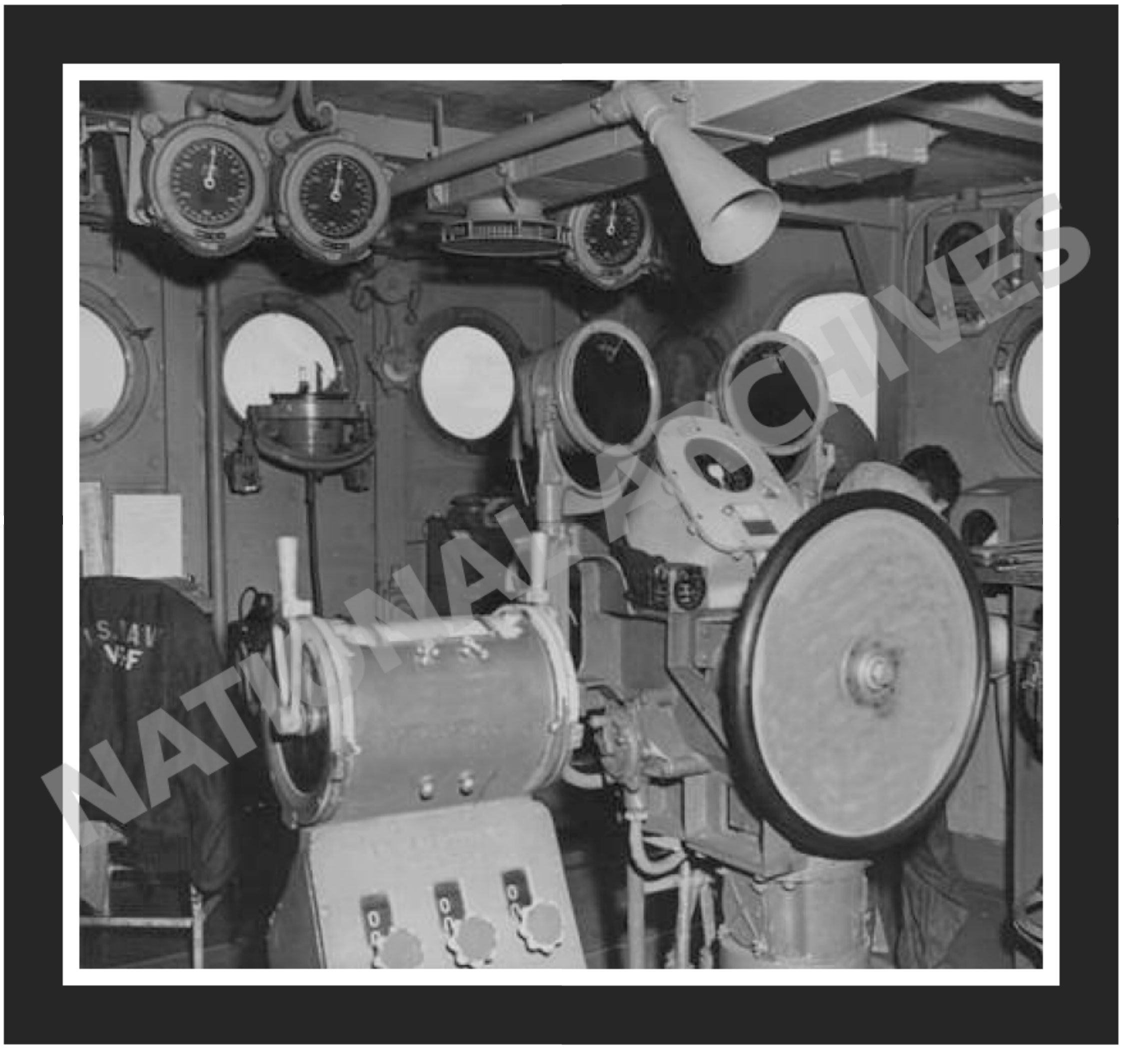
The Brain: the brainstem is the location where the spinal cord merges with the undersurface of the brain proper and contains the previously mentioned medulla oblongata and midbrain. This is the oldest region of the nervous system from whence the modern brain evolved and which will be discussed in the following pages. As said, the brainstem is the body's life-support system containing regulatory mechanisms for vital functions such a breathing, heart rate, blood pressure and the like. It's our "autopilot". The brainstem acts as a relay station between the peripheral nerves and their sensors and the central nervous system consisting of the "new brain" above the brain stem. The upper part of the brain primarily consists of the cerebrum consisting of the cerebral cortex and the cerebellum. This area will receive extensive attention in the pages to follow. Before that though, it is my understanding that we are what we are as determined by what is found in that upper , new brain. We are not what we look like nor even what we can do, such as run very fast. That is not what we "are".


26
12
22

PILOTHOUSE

We'll take a quick, short detour to visit the site of my pre-Airdake days: from January 1945 to April 1945 I was a quartermaster striker (a striker's an enlisted man who is working toward gaining a rating in some category such as radioman; my category was in the Navigation Division where we learned about all aspects of navigation and the like).This is the pilothouse, surrounded by the bridge and just forward of the PRI FLY. I stood watch on the bridge, four hours on, eight hours off. As a striker my position was at the annunciator, that device to the left of the helm ("steering wheel"). When the OOD (Officer of the Dat) ordered a change of speed the striker at the annunciator would pull the handles all the way down to ring a bell in the engine room and then set the handles at that position that indicated the ordered speed (of which there were four, if I remember correctly). At times I'd be given a chance to man at the helm to steer the ship according to the ordered heading and as indicated by the duplicate compasses above the helm (that other indicator, just in front of the helm, is the rudder-angle indicator (of whatever is the angle of the rudder with the ship's centerline). If the OOD said, "right full rudder", I'd spin the helm swiftly three times and the rudder-angle indicator would take a position of 30 degrees in about five seconds. The compass needle would swing smartly and then I'd reverse the helm about once depending on the ordered course to which I was to bring the ship. It was all great fun, much more so than on the flight deck. Fun is fine, within limits. Too much of a good thing can be deleterious to a well-balanced life that has, or should have, its more sober moments (which are usually our most pleasurable ones). Ponder this. You'll be glad you did.

The Brain: what follows will be a fairly extensive portrayal of the subject of the brain with fulsome references to the book on said subject entitled "Mysteries Of The Mind" by Richard Restak (published by the National Geographic). The brain contains abut 100 billion neurons, or nerve cells, EACH connected, directly or indirectly, to 100,000 other neurons. Establishing and maintaining these connections is the basis of human learning and mental growth. The brain of most all vertebrates is composed in two parts: the right and left hemispheres. The outer portion is thin and is the location of all "thinking" and sensations. It's called the cerebral cortex and can be likened to the shell of a walnut. The cerebral cortex is divided into four parts: the frontal lobe (behind the forehead), the parietal lobe (back of the frontal lobe), the temporal lobe on each side of the head) and the occipital lobe (the back of the head). The cerebellum resides under the above lobes and the brain stem is the "structural support" for all of the lobes. Let's reconsider the cerebrum and the four lobes. To be continued.



THE HELLDIVER

The Helldiver was a "friendly" aircraft to an Airdale because of its wide stance. The wheels were far enough outboard so that we didn't have to worry too much about the propeller as we did with the other aircraft. This angle of view exaggerates the distance between the prop and the wheel but it was still ample for our purposes. The bomb-bay doors were always open when in the quiescent state because they had to be opened with the power provided by the engine. To my knowledge all the mechanical motions such as spreading the wings, retracting the wheels, opening the bomb-bay doors were operated by the engine driving an hydraulic system. Note that each wing is individually operated. That wing wont come down until the engine is fired up. Also note the wheelchock, the Airdales tool-in-trade. The part closest to us slides on the wooden bar to be adjustable to the diameter of each wheel (Helldiver, Avenger, Hellcat and Corsair). The Helldiver was a large aircraft but as I said, it was a "friendly" one to the Airdale. No one else would care about this except maybe the yellow-shirts who had the responsibility of wedging the Helldiver into a small parking space. Speaking of the wheelchocks being adjustable to the wheels, we too could and should be adjustable to the various and sundry exigencies of our lives. Perhaps a better word would be "adaptable" (while not giving up our standards). [A simpleminded example is if someone wants to go to X and you want to got to Y, don't be hardheaded about it, be amenable (adaptable) by going to X (and who knows, you might even enjoy it). Adapt: to modify your thoughts and actions fittingly and responsibly.

The Brain: the Frontal Lobe: it contains almost 50% the volume of each cerebral hemisphere. In addition to its importance concerning the personality, emotions and conscious control, the frontal lobe is important to language capability, movement, planning and consciousness (as witness the song, "Yesterday When I Was Young"). Parietal Lobe: it processes every sensation except that of smell, which connects directly to a more interior part of the brain, the limbic system. The parietal lobe is a sensory integrator for our sense of body position. It's separated from the frontal lobe by the a narrow band called the motor cortex, the locale of the neurons that control the body's motor nerves and thus our body's physical motions. Temporal Lobe: this lobe contains areas involved in hearing and understanding speech. It is also connected to the hippocampus and amygdala, two segments that figure importantly in the process of LEARNING, memory and emotion (it's interesting that they are involved in both intelligence and emotions). Additionally, the temporal lobe integrates our inner experiences and gives us a sense of our identity (who and are what are we?). [We are what we think, what we feel and not what we do.]


17
17

"NEW BOY ON THE BLOCK"

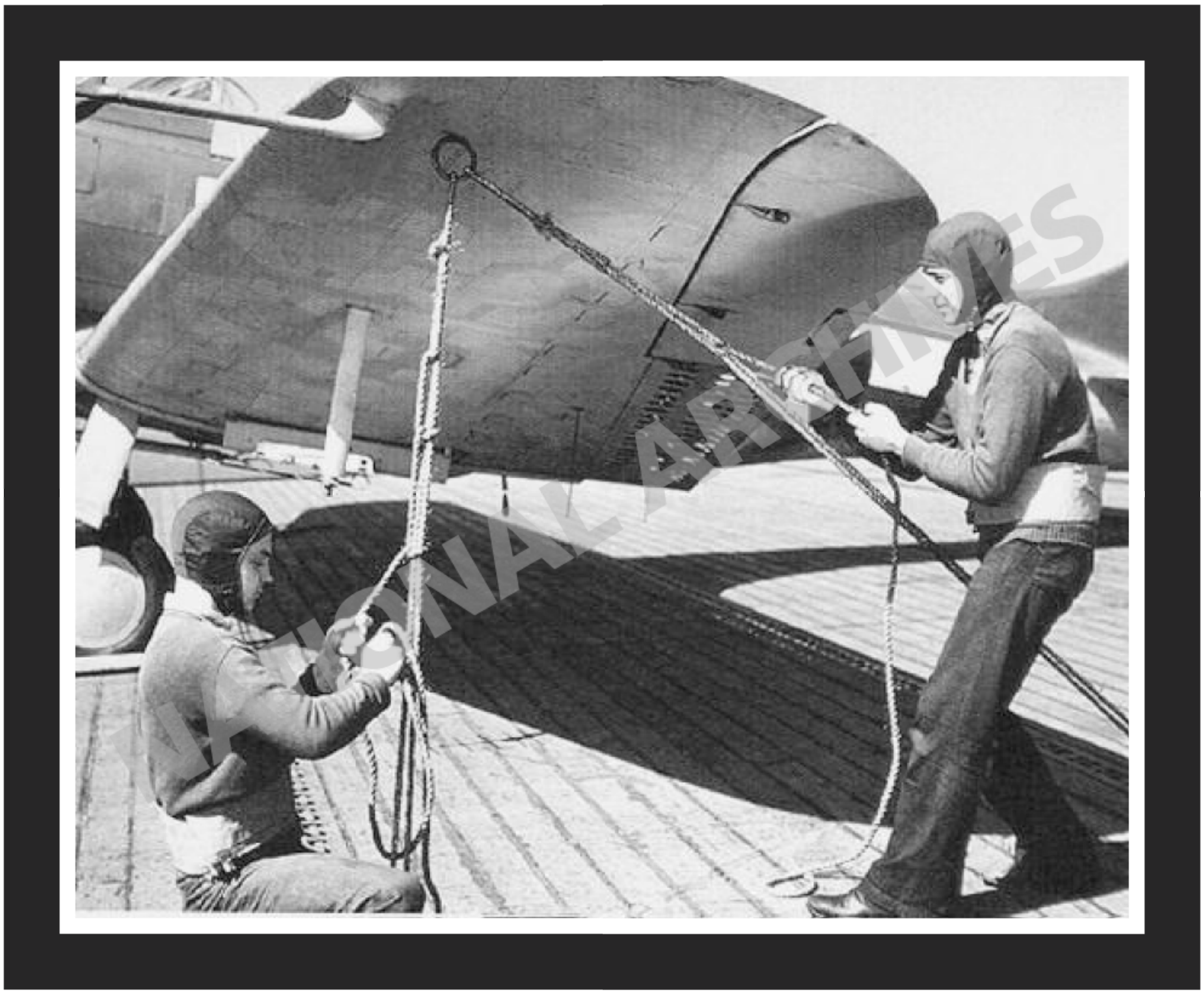
Though I can't vouch for it, I "could swear" that that hatless Airdale, the one in the middle, is none other than "yours truly" on my first day on the job as am Airdale. In fact I remember precisely this same moment in time: I was just that day assigned to flight deck duties as an Airdale. I had a decent idea of what transpired down on the flight deck because, as a quartermaster striker, I spent a fair amount of time watching the flight operations from the superstructure. However, when I reported to the chief to begin my duties he had nothing to say; no directions, no advisements, no cautions, nothing. So my only recourse was to emulate the other Airdales. Thus then I would closely follow Airdales around on the flight deck get the feeling of being "one of them". This is precisely what I'm doing here. This Helldiver has just landed and frankly I don't know what our destination was but follow them I did, with a "vengeance". It was a week before I was given a helmet and a pair of goggles. So it was. So it was "sink or swim" and I chose to swim. In fact I swam for another thirteen months on the Antietam, growing into the job that was there to be mastered as if my life depended on it (I still have my dungarees that give evidence of this by their having been thoroughly worn at the knees). The above is a more stringent example of the requirement that sometimes we need to adapt (as referred to on the previous page). Here adaption can be called a learning process which indicates that we are all always adapting as we learn. This entire book is about learning, the need for learning, nay, the necessity of learning, the joy of learning. [Perhaps the most difficult adaption of all is that of adapting to a love lost (but books are written about this. Mine can be epitomized in the son "If I Loved You")].

The Brain: Occipital Lobe: it contains regions necessary to visual perception and processing. Each lobe of the brain is anatomically and functionally specialized. The density and arrangement of nerve cells in the optical cortex (the outer wall) differs from what is in the auditory cortex, which differs from the cortical areas that concentrate on the more evolved expressions of mind, such as thinking and remembering and LEARNING. Of all the lobes only the occipital lobe is dedicated to straightforward processing of a single sensation (vision). The other three each dedicate a small portion, about 25% to simple sensory or motor activities. The remaining 75% makes up what's called the association cortex. – a vast network of communicating fibers that unifies our diverse perceptual and behavioral experiences. As a result of this network we don't see the world in terms of separate sights, sounds and sensations. Instead, our brain is a unifier: all our experiences are combined into a whole by being associated., [thus allowing some to create songs such as "Somewhere Beyond The Sea", "Shenandoah" and "Smile"].

THE STANDARD

This is what an Airdale is supposed to be: cloth helmet, blue jersey (in cold weather), life-belt around the waist and missing are the flight deck shoes that have soles that "grip" the deck. Actually those of us on the Antietam were similar to this, if scruffy from spending some time "flaked out" on the deck when our duties were temporarily done (I'll admit that this is a posed picture and that these Airdales are "pristine" and serve primarily as a model of what it should be under optimum circumstances (which never existed). When you work and crawl about and sprawl out on the deck you'll never be as shown here, for sure. The aircraft being tied down is an SBD Dauntless dive bomber, the hero of the Battle of Midway (June 4-5, 1942). In the military conformity is most often the rule; how could it be otherwise with everyone going off in their own individualist directions? In civilian life, on the other hand, society is made up of numberless individuals each expressing their own "message". This is as it should be in a free society AS LONG AS thy remain within recognized, standard bounds. Our laws help us establish the minimal level of proper conduct even while there are those who act on the level of a smart-aleck, trying to "push the envelope" to the point of ripping it asunder. It's not cute, it's not clever, and it's not intelligent to do so. Being rude, crude and socially unacceptable only burdens others as does trash disfiguring the environment. Individualism within a basic conformity would seem to be the ideal. [Diversity isn't the issue.]

The Brain: the entire surface of both hemispheres , the cerebral cortex, consists of a thin shell covering the material below. It is thinner than an eighth of an inch. Yet the cortex is full of neurons and the supportive glial cells that distinguish us from all other creatures. This thin layer is responsible for all of our mental activity and is known as the gray matter. Traveling to and from the gray matter are extensions of the neurons which are referred to as nerve fibers. These fibers connect to others of the brain. A fatty insulating substance, mylin, surrounds the nerve fibers which have a whitish appearance and so is the white matter. Interspersed within the white matter are subcortical nuclei. The human cerebral cortex is the most densely and most organized expanse of biological material in the world. A piece of it about the size of a course piece of sand contains about 100,000 nerve cells. Since it's estimated that the average nerve cell (neuron) receives inputs, directly and indirectly, from about 100,000 others, the nerve cells contain within that single grain of sand about 10 billion connections. It's this interconnectedness that gives us our ability to think thoughts and be able to retrieve those thoughts. In this season of Christmas , our minds are able to appreciate a magnificent hymn such as the unsurpassed "Oh Holy Night".


NATIONAL ARCHIVES

THE "PLAYING-FIELD"

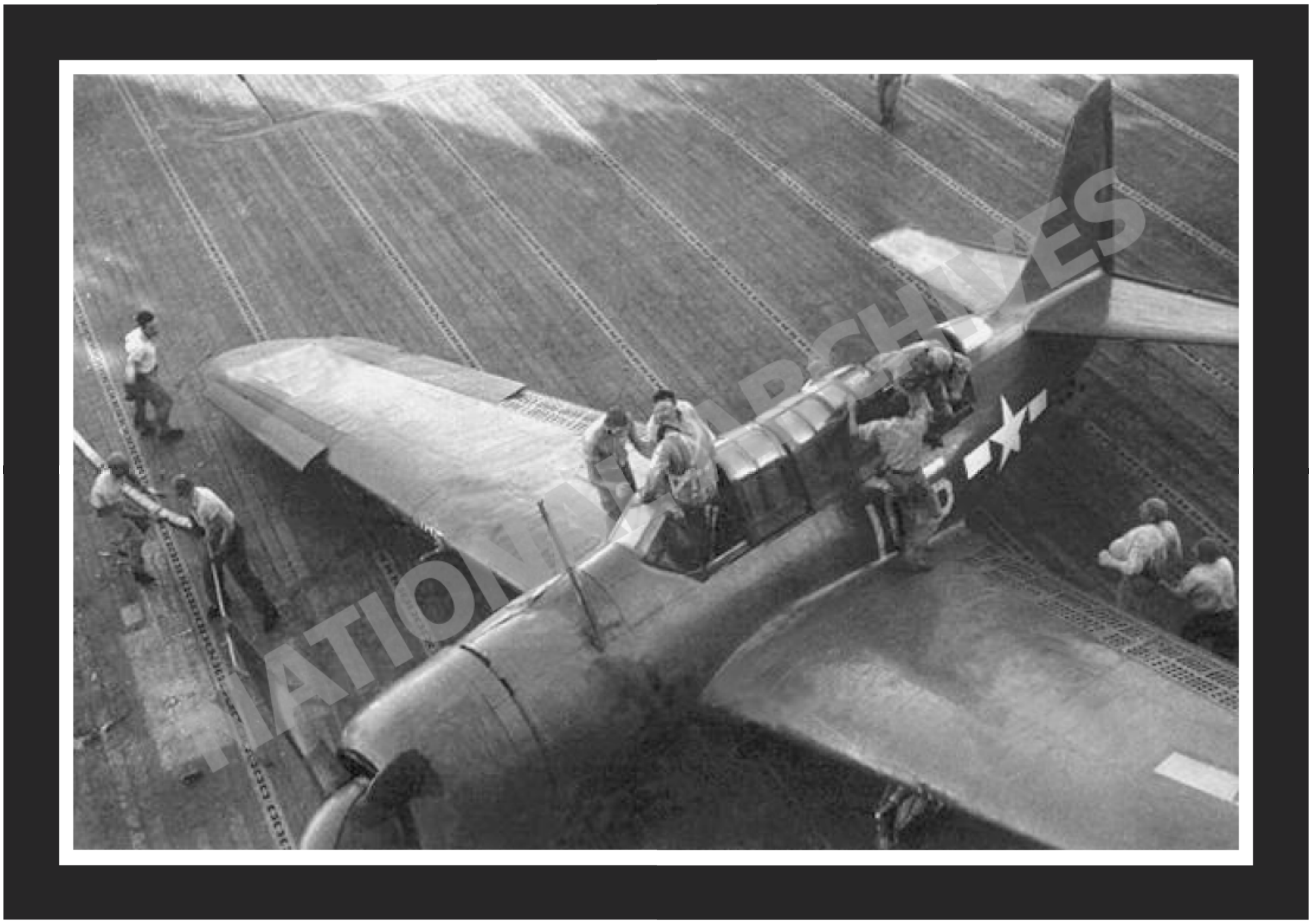
We're back to the "playing-field" where the action is winding down. To approach the action more closely I zoomed in and in the process lost some of the resolution. No matter, this is the type picture whose resolution would be a distraction. The usual cast of characters are in place assembled: the yellow-shirt bringing the Avenger forward as it spreads its wings, the launch officer awaiting its approach, the other yellow-shirts taking control of the aircraft one by one and the Airdales throughout, ensconced next to the wheels. What is not normal, at least not on the Antietam, is the intermixing of Avengers and Hellcats as here. Perhaps this is a function of our missions where they sent aircraft to bomb and strafe targets while our mission was to train pilots in all aspects of carrier operations, including launches and landings. This ship's presumably in an enemy zone of influence while we could have been anywhere. However, for all we knew the enemy was just out of sight over the horizon ready, willing and able to pounce on us. It never happened, but then why did we have General Quarters drills? They were purposeful exercises: preparation for what might and could be (a viscous attack by a determined foe). It would have been a dereliction of duty by our captain if we didn't have those drills (duties). We all have duties even if we don't call them that. For us civilians a better word would be "responsibilities". In a very serious way we are honor-bound to fulfill those responsibilities (in the military they're called "duties" and in our civilian life they're called "responsibilities"). Either way, we're the lesser person for shirking them and self-respect then becomes but a will-of-the-wisp. [If you don't, you should know your responsibilities; consider this and list them NOW.]

The Brain: to explore the brain's interior regions, imagine splitting the two hemispheres and viewing one of them from the inside side. From here we can see the brain's three main divisions: the forebrain or cerebrum, the brain stem and the cerebellum. Within the forebrain's structures are the corpus callosum, the cingulate gyrus, the thalamus, the hypothalamus and the pineal gland. Each of these elements will be very briefly described in turn. The corpus callosum is an 8 million nerve-fiber bridge that connects the two hemispheres and coordinates their activities. The cingulate gyrus along with adjacent cortical matter is known as the limbic lobe. "Limbic" means "a border" and the limbic lobe borders the corpus callosum. It and other subcortical areas connected to it form the limbic system which is involved in our experiencing and expressing emotion. [There are many books (I have six of them) including the National Geographic book which provide ample pictures and diagrams of all the elements and their interrelationships. It would greatly simplify your comprehension of this most fascinating subject.]

ONE CRIPPLED HELLDIVER

What probably happened here, and was recorded from atop the derrick standing aft of the after 5-inch gun-mount opposite which start the barriers, was the result of a hard landing: the left wheel pivoted around the skidding right crumpled wheel-strut causing the Helldiver to make almost a 180 degree turn. Since the bounce was high it caught no arresting-wires and the right, dragging strut prevented the Helldiver from reaching the barriers just out of sight to the right (the bow of the ship is to the right). A shaken pilot is helped by the brown-shirt while the tail-gunner is assisted by another brown-shirt. Airdales converge from all sides and a pair of them bring out a hose with an applicator attachment. The Airdales are the first-responders as well as the second and third ones. They're it. There is no designated crew who just sit there awaiting an accident. Furthermore, when accidents do occur, no one tells the Airdales to respond; they do it automatically and promptly. Because I was not initially assigned to the flight deck crew (Airdales) I don't know how much and what kind of training they were given. However, how much training is required to haul out the hose and douse the flames? One glitch here is indicated by the Airdale manning the hose: he's looking back to the one manning the water-valve at the catwalk and wondering, "Where's the water?" Seldom can we do it alone. We need the cooperation of others to accomplish our tasks. This is, or should be, a normal and natural quality: cooperating with and helping others who actually need that help (pseudo help and pseudo needs need not apply). In addition, it improves the quality of life for us all. Altruism enhances life.

The Brain: the thalamus is a way-station for nerve impulses on their way from the periphery to th cerebral cortex and the other parts of the brain. The thalamus can be found just outside the main entrance to the cerebral hemispheres. The hypothalamus and the pituitary are two small but crucial structures immediately beneath the thalamus. They're devoted to the maintenance and control of bodily processes such as temperature regulation, reproduction and hormone production. Finally, the pineal gland is an important regulator of sleep and wakefulness. The side view of the brain also reveals the brain stem, the second of the three main parts of the brain. From the top down, it's composed of the midbrain, the pons and the and the medulla. The midbrain, the point of origin of the third and fourth cranial nerves, moves the eyes and controls the size of the eyes' pupils. Together the pons and the medulla contain the origins for the fifth through the twelfth cranial nerves which are responsible for sensations and movements of the face, outward movements of the eyes, taste, hearing, swallowing, tongue movements and other functions. [Take a few breathes and stay with it! This learning by wrote is necessary.]



"IN EXTREMIS"

A hard landing (from a height) caused the auxiliary fuel-tank from under the fuselage to detach and then rupture with a spark from scrapping metal igniting the spilled gasoline (note the tank in front of the aircraft). The flames quickly spread to the aircraft's main fuel tank and this tragic spectacle was the result, a conflagration that looks as if the ship were hit by a sizeable enemy bomb. This picture was probably taken about 20 seconds ago with about 10 of those seconds available for the pilot to make his way to safety. Those twenty seconds were not enough to allow more Airdales to man fire-hoses because we never stayed next to a fire-hose during landings in anticipation that each and every landing might possibly require a response to such as this. We were geared for accompanying and parking aircraft in the most expeditious manner possible. There are the LSO and his assistants back aft as well as the green-shirts who disengage the tail-hook and some few Airdales who helped the Hellcats fold their wings (this is a Hellcat sitting in the flames of its own making). To those back aft it is not the flames that are the problem; it's the smoke that robs them of a sense of security. At the same time it would be my expectation that the area down there on the deck will soon be filled with Airdales and others to forge a strategy to subdue the fire, a ship's potentially primal nemesis. There are some things which we consider to be unbeatable, things we can "never achieve". Yet perseverance and a dedication are rewards in and of themselves, especially if your cause is just (such as fairness and freedom and fidelity). [It's the intrepid ones who overcome disappointments and carry on.]

The Brain: deep within the pons and stretched around its length resides a major portion of the recticular activating system. This complex and loosely arranged collection of cells extends the length of the brain stem which helps keep us alert and awake. The medulla, the lowermost portion of the brain stem merges with the spinal cord and can be thought of as an extension of it. Within the medulla are nuclei , These are clusters of nerve cells responsible for hearing, balance, and head and back movements. The medulla also contributes to such basic functions as blood pressure, heart rate and breathing. Finally, arched over the pons and the medulla and resting beneath the cerebrum's occipital lobes is the cerebellum. This cerebellum, adjacent to the medulla, is responsible for the coordination of motion and balance and posture. The cerebellum also has a large influence in cognition and the processing of received data. If one were to slice through the cerebral hemisphere cross-wise one would see the following structures: the lateral ventricles, the basal ganglia composed of three structures: the caudate, part of the striatum and the globus pallidus. [Just as above, it's the intrepid ones who overcome adversity and carry on.]


NATIONAL ARCHIVES

THE MAGNIFICENT ESSEX

For just a few moments imagine, if you will, a small floating village of 3,000 officers and men serving a small airfield that can go to about 70% of the world carrying 100 large aircraft wherever it went. Now imagine a ruthless antagonist who would have this airfield at the bottom of the sea. To counter that hostile intent we now festoon this airfield with a wealth of detection equipment and a largess of armaments (12 guns of 5-inch caliber, 72 guns of 40-mm caliber and 60 guns of 20-mm caliber, not to mention 60 aircraft carrying four 20-mm guns). In fact we can see 20 (4x5) of those 40-mm guns clinging to the side of the ship (five 40-mm gun-quad sponsons). It's all there below us, this airfield cutting through the water at 30 knots (32 mph). Angular views of the ship tend to make it look squat and bulky but here we have a true, full view of its long and slender lines, a marvel of man's ingenuity. The superstructure gives it just the right balance of authority without being overbearing. What a wondrous example of what man hath wrought! There are those who think this ship to be "funny looking" with its flat top but for those of us who rode it, it's sheer beauty. Even the parking pattern is perfect. The only deficit of this picture is the lack of another aircraft back aft taxiing forward. This, ladies and gentlemen, is the ESSEX! The fact of the matter is that this is not imagination. This was a real ship with real attributes that really inspired me. However, the power of imagination is to be commended and encouraged. What would life be without the positive imagination of the good that could be? Some of our greatest advances are the direct result of well-honed minds contemplating the great and grand things that could be. Besides, it's a beneficial intellectual exercise. Speaking of the intellect, we carry on (as does a carrier at sea – even though we carried those two evils, death and destruction).

The Brain: the basal ganglia organize and coordinate movements that do not require conscious processing. Often they take over after the conscious aspect of learning is completed. (We can't allocate our conscious thought to ever little thing we do. How could we "look forward " if we couldn't operate to some extent on autopilot?) Specifically, when learning you concentrate on the motions you must make to master a skill. At this stage the motor centers of the cerebral hemispheres play the dominate role while you consciously attend to your movements. After a period of this conscious learning the actions become essentially automatic. You are now free to do this activity while intellectually doing other things. That is, the basal ganglia now take over the control of the learned activity. Immediately below the basal ganglia are the forebrain nuclei. Physically small, these nuclei have an inordinate influence on our mental functioning. To be continued. Hold fast, it will become clear.

TRAPPED BY THE SECOND BARRIER

This Hellcat was trapped by the second barrier (the first barrier is just this side of the after elevator, seen where an arresting-wire has been pulled around it). The Airdales, in their foul- weather gear, are trying to pull the tail of the Hellcat down to the deck. My question here is, "How'd they loop the ropes around the tai-wheel?" I could fathom some thoughts about this but why deal in speculation with only limited space available? There were no standard responses to crashes. Each one was unique in its own way but the one thing that was not unique was that the situation had to be cleared up (and cleaned up) poste hast so as to bring on the other aircraft circling the ship. There are no alternative landing fields out there on the broad expanse of the ocean (unless perhaps there was a little space on a nearby carrier–but don't count on it). If the crash was a serious one that dug up the wood deck, there were steel plates to cover the jagged holes thus making for safe landings without punctured tires.[Returning to the ropes, it seems to me that a larger force-vector would be had by pulling down from directly under the tail-section rather than being off at a large angle as here. The only advantage of the method used here is that more strong backs can be applied to the task. Maybe it's six of one and a half dozen of the other.] In any case, hurry up, time's awasting and time is precious; to waste it is truly a sin. Our pilots didn't depend on the availability of an alternate landing place and you shouldn't depend on others either to extract you from a sticky situation. You should learn how to "stand on your own two feet" (if at all possible). Dependency is a miserable condition in which to find yourself. Keep repeating, "God helps those who help themselves".) [Don't be a burden to others.]

The Brain: another small but powerful structure buried deep in the hemispheres is the amygdala. It lies in front of the hippocampus toward the front of the temporal lobe (follow this by opening to the named diagrams of the brain). It is part of the limbic system and is an important participant in the experience and expression of emotion. It helps evaluate an event's emotional significance. An unknown situation may activate the amygdala so that you feel anxiety (even known situations such as occur on the flight deck can activate the amygdala). The amygdala also figures importantly in the operation of the memory and works in tandem with the nearby hippocampus which forms the entry point for composition of memories. Sights, sounds and other sensory data enter the hippocampus where they're incorporated into a memory for that specific moment. The hippocampus is central to memory creation. The main brain areas and structures have now been identified except the ventricular system which is a series of fluid-filled and interconnected passageways throughout the brain. [The "good stuff" is coming.]

A BEARCAT UPSET

This is a post-war Bearcat, the replacement for the Hellcat. Though 20% lighter than the Hellcat it was fitted with underwing attachments that would allow two 1,000-lb. bombs to be carried. It also carried four 20-mm cannons in its wings and four 5-inch rockets. Its rate of climb was 30% faster than the Hellcat's and its speed was 420 mph. while its range was comparable to the Hellcat's (1500 miles). It was a neat "little" aircraft which I say because one day it just appeared out of the blue on our deck. This was a one-day visit; we never saw them again. (We also had a one-day visit of a F7F Tigercat, a two-engine fighter significantly larger than the Hellcat. Here this Bearcat was tripped up by the No. Two barrier in the process of which it lost its right landing gear (wheel-strut). The errant wheel and wheel-strut can be seen to the right just beneath the 40-mm guns to the right. Parenthetically, do you notice that the 40-mm guns do not have the protective steel shields installed. This is a post-war ship. Another indication that things are slim is the dearth of anyone on deck. The base of the island superstructure normally has clusters of Airdales and brown-shirts there awaiting the landing aircraft. (Yes, some of them scattered when this Bearcat looked as if it would have a barrier crash but there's only so much space inside the island and no one said it would be a picnic out there on the flight deck during the landings of many high-powered aircraft. Accidents do happen even in the best of circumstances.) This does NOT imply that someone should think he's impervious to danger* when being reckless: foolhardiness is the antithesis of intelligence (I believe there's an inverse relationship between intelligence and fast driving, and my advice is to please consult the physics book. Don't be a dumbbell. Amen.) *("Danger-freaks" are beyond the pale.) [Initiative is good, unrestrained enthusiasm is not.]

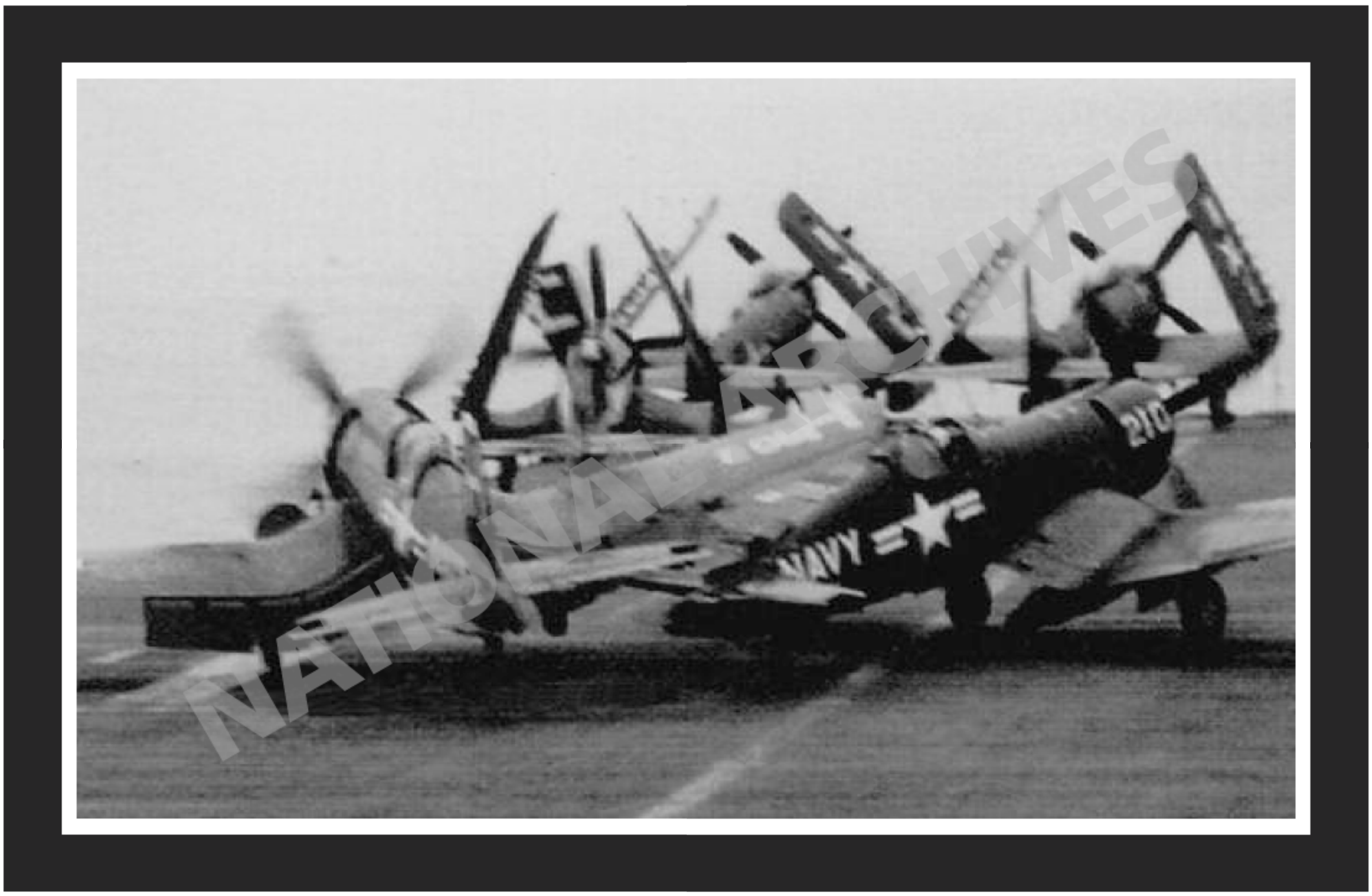
The Brain: resting within the ventricles choroid plexis which contain clusters of specialized secretory cells that produce the cerebrospinal fluid that bathes the brain and provides a soft protective cushion. Additional protection is provided by three membrane layers found just beneath the skull. Certain areas of the brain are specialized for specific purposes but the brain can only be understood as a highly complex and integrated functional unit. A great majority of its neuronal connections involve "cross-talk" among neurons rather than the transfer of data to and from the rest of the body. The large association cortex is responsible for this data flow from one part of the brain to another part. Despite the brain's billions of neurons and their trillions of interconnections, no nerve cell is remote from another. Size and location are not primary in the determining the importance of a brain structure: the heart depends on the fingertip-sized medulla. [Is the brain a "machine" or is soul-based?]


NATIONAL ARCHIVES

RUNAWAY CORSAIR

This Corsair hit the deck so hard that it hurdled all five barriers and then became an uncontrollable runaway. The brakes were of no use because the wheels were on the deck for only a fraction of a second. Even now they appear to be off the deck. There's only one thing that'll stop this renegade aircraft: another aircraft. Those further back down the deck are alert to the situation but the yellow-shirts and Airdales up forward are concentrating on parking aircraft and so are vulnerable since all their attention is forward. In addition, things happen fast in these situations This Corsair is traveling at least 40 mph over the deck and has to cover only about 150 yards before impact (in this case with that Corsair to the right which is still in the parking process. Usually there are more, many more, personnel up in this area (none are seen here because, as witness those two Douglas AD Skyraiders up forward, this is a post-war period and the crew was greatly slimmed down.). We in the parking area were concentrating so much on the advancement of an aircraft "wedging itself" into a parking spot that we weren't concerned with what was happening behind us. The first you know of a problem is when that Corsair smashes into an aircraft (but then it's too late to get out of the way, presuming there was a safe place). This situation requires that you be fully conscious of what's in front of you (the closure of propeller- blades and tail-section) as well as fully alert to what's transpiring behind you (it'd be nice to have an extra pair of eyes at the back of our head). Just so in life: be fully conscious of what's happening explicitly in reality in real-time) at the same time as you're alert to what's transpiring implicitly (the veracity of what's presented in movies and TV and books and magazines and radio and newspapers and you name it. These all invite insidiousness for those who are not alert. It's important.

The Brain: the hypothalamus constitutes less than 1% of the total volume of the brain despite its role in regulating temperature, food and water intake, and other bodily processes. The brain exhibits hierarchical organization. High-level, complex, predominately symbolic activities such as thinking and consciousness evolved more recently than the lower level, more automatic functions. The primitive cerebral cortex preceded frontal lobes. The brain exhibits what is called plasticity: each and every experience over a lifetime changes the brain in some way. These changes may be undetectable yet they take place. We now turn to the brain's electrochemical activity that occurs at the cellular level. In most ways the neuron resembles the rest of the body's cells. There 's a great variety of shapes of neuronal cells but each neuron engages in transmitting data within and without the brain. Before proceeding, let's put to rest the erroneous idea that there are "grandmother cells": one cell per memory.


210
NAVY

TWO SECONDS LATER

Here's the result of the previous page about two seconds later. The renegade Corsair has done its worst and is now on its way to a water landing fifty feet below. Actually the damage turned out to be minimal because of the diverted path of the Corsair. It could have been much worse if he drilled straight down the flight deck knocking aircraft about as if they were ten-pins. It's even clearer here that there are no personnel in the area to feel the brunt of the blows meted out by this errant Corsair. I must confess that, post-war or not, it looks very peculiar that there seems to be no one in the picture except for that one soul up forward to the left. In fact, he's probably a yellow-shirt directing that AD Skyraider just to the right of the errant Corsair. If this were the Antietam there would be about ten yellow and blue-shirts in the area beyond the upturned Corsair in the process of or just finishing the parking process. The Corsairs were known to be high-bouncers when landing but to completely hurdle all five barriers was not a common occurrence and thus no one was particularly prepared for such. However, preparation should be the watch-word on the flight deck of a carrier bringing aboard "hot" aircraft. Preparation should be the watch-word of students approaching their various tests. They say you learn from your exams, yes, but better yet, learn BEFORE your exams. It'll save untold grief that could have been prevented by being prepared. It wasn't the Boy Scout's motto for nothing and it helped me attain th e Eagle Scout Badge with Bronze Palm. This is not a feather in my cap; this is just an example of a good sound work-ethic of being prepared (which anyone with gumption can acquire). [The work-ethic certainly is a learned trait which becomes easier as it's acquired.]

The Brain: the neuron has a cell body that contains the nucleus and protoplasm found in all cells. Neurons are similar to a vast tree whose branches and twigs are the dendrites that all fed INTO the cell body. Each branch and twig receives electric impulses from other neurons. Some cells have few branches while others are as a densely branched tree. The more dendrites a neuron has the more connections it has. A densely branched neuron can communicate with as many as 100,000 other neurons. (I've read that the learning process physically increases the number of inter-neuron connections.) Each neuron keeps a close tally of the impulse its dendrites receive. In response to these received impulses it may send a signal to other neurons via its axon: a neuron has but ONE axon that is outgoing only, may be very long and may connect with many other neurons. Thus dendrites enter the neuron while axons leave the neuron. Axons may also have branches so that it interfaces with more than one other neuron (either its cell body or more normally to a neuron's dendrite. This transfer of pulses will follow.


NAVY

WHERE ARE THE AIRDALES?

I can't answer that question nor can I explain the odd placement of the Hellcats. Sometimes you just have to take what's served you and do the best you're able with that (even though it was I who chose these pictures). The reason I chose this picture was the clarity of the process of unfolding a Hellcat's wing. Yes, though it appears that they're in the process of folding the wing they're in fact bracing themselves to unfold the wing: the moment the pilot activates the release-mechanism they will quickly back-pedal until they're directly under the wing, at which time they'll push upward, with gusto, underneath the wing to lock it in place. The entire process takes about 2 ½ seconds. That part is clear; what is not clear is why the yellow-shirts are doing it, and where are the Airdales? This is a very non-typical scene before us but it does show what's required. Who knows what's going on at the other wing? This procedure was so routine that what we have here is an anomaly: it was seldom seen. There are those who take advantage of seldom seen situations or ideas. They will present their arguments based on the fact that you are ignorant of certain things. They will use your ignorance to make specious statements requiring those who are gullible to be on guard so as not to allow others to take advantage of them and their ignorance. Guess what will thwart these ills pervaded by others? That's right. LEARNING. Though it's not the panacea for all things, it will definitely stand you in good stead as the years pass by and you have to confront those who mean harm.

The Brain: the conduction of an impulse along an axon is entirely electrical (we computer users realize that we're now approaching the "sister" domain of the digital computer what with its myriad circuits of electrical pulses; however, a digital computer has no real semblance to the human nervous system as will become clear as we proceed). Where the axon touches a dendrite it is called a synapse, a tiny gap between the axon and dendrite. (Incidentally, lowering the temperature of a nerve will slow the speed of the electrical impulses. Have you noticed that your physical reflexes are slower when you're very cold? This is due to the slowing of the chemical processes in the synapse and not the slowing of the electrical impulses.) There are neuron called the "basket cells" that connect to dendrites and whose purpose is to inhibit a neuron's activity to prevent overload. The axons of the neurons are sheathed in a substance called myelin which protects the axon and speeds up the electrical transmission: the axon's outer membrane is selectively permeable to different ions, principally sodium, potassium, chloride and calcium. The membrane's permeability is due to ionic channels that allow passage of ions both ways.

ISN'T IT A BEAUTY?

Isn't it a beauty? There are (were) many who say (said) that the F4U Corsair was the preeminent aircraft of WWII (in spite of its "beauty"). Here the pilot has started to unfold its wings as he prepares to take it aloft for testing at the factory. Let's consider its attributes as best I could garner from various sources. At war's end the following statistics apply to the last variant of the Corsair (F4U-4 with variants of this model): speed, 450 mph; range (with added fuel tanks (1,500 miles; cruising speed,215 mph; ceiling, 41,500 feet; rate of climb, 3879 fpm; power-plant, 2100hp (also 2450 hp with water injection); 4-bladed, 13'3" propeller; two 1,000-lb. bombs; four 20-mm cannons in the wings; eight 5.25-inch rockets; two 11.75-inch rockets (the aforementioned armaments were not all available at one time; however, bombs could be carried at the same time as were the eight 5.25-inch rockets under the wings). Thus we see an aircraft that was not only a superb fighter but also a formidable bomb-carrying aircraft. It was used to both bomb and strafe targets and then take on the role of a fighter, all with the aplomb (assurance) of a top-notch dual-purpose aircraft. Added to that, it just plain looked like a "lean mean fighting machine" (for a noble cause). I believe my data is correct in all details. We must be ever vigilant in seeking the facts because there are those who would not have you know the facts. One of the tools we must always carry with us is that of a responsible circumspection to make us whole and as invulnerable as possible: get and verify the facts!

The Brain: because of variations in the permeability at different stages of the nerve impulse, the concentrations of sodium, potassium and chloride ions vary within and without the nerve cell. At rest the nerve cell contains little sodium; most sodium remains outside the cell, The distribution of potassium is just the opposite; most of it resides within the cell. Such concentration differences (gradients) are responsible for the electrical potential that exists across the nerve-cell membrane. Changes in this membrane potential result in the propagation of an action potential. It is one of two methods of conveying data from one place to another, both within the brain and throughout the nervous system. The second method begins after the action potential has sped along the entire length of the axon to its termination at a dendrite. Here at the "presynaptic" membrane are gathered thousands of spherical structures , the synaptic vesicles, which contain one or more of the chemical messengers called neurotransmitters. When the action potential reaches the end of the axon it causes the calcium channels in the nearby membrane to open resulting in a massive rush of calcium into the nerve cell, which is significant. Th next page will begin the important and intriguing description of the actual transfer of data to a nerve cell.


254

DECKEDGE ELEVATOR

The deckedge elevator is on the port side directly across from the PRI FLY (aft of the bridge) of the island superstructure. It's 60 feet along the length of the flight deck and 34 feet outboard. One half of the outboard dimension is within the area of the flight deck (which extends out about as far as is the cockpit of the Hellcat.). Here, at the hanger deck level, it's about 20 feet above the water and I quickly noticed the lack of the safety netting at the edge of the elevator adjacent to the ship. This is not a problem if you're careful and the ship doesn't pitch forward. While the centerline elevators are operated by hydraulic pistons the deckedge elevator is operated by means of an hydraulically energized cylinder and set of pulleys/cables (note the vertical cable just to the left of the side of the ship). When the elevator went down to the hanger deck level a railing at the flight deck level automatically rose up (to protect against a 30 foot fall to the hanger deck level. This elevator could be folded next to the ship to allow passage through the Panama Canal locks (which we did since we were built at the Philadelphia Naval Shipyard). The time to travel from one deck to the other was, to my recollection, no more than six seconds. My recollection of the ship and the shipboard activities is still good. There are some memories you keep (by recirculation and reinforcement) and some that are not worth the keeping. However, whish to keep and which to discard? Does it make any sense whatsoever to hold a grudge? No. Does it make any sense to hold onto anger? No. Does it make any sense to remember a slight? No. How many other "nos" are there? Disabuse yourself them.

The Brain: first, the synaptic vesicles fuse with the plasma membrane, dumping their contents (the neuro- transmitters) into the synapse. These chemicals then wend their way across the synapse, traveling from the presynaptic nerve to the postsynaptic one and attach to specific receptors on the membrane of the postsynaptic neuron. The binding of neurotransmitters to these receptors opens or closes certain ion channels on the membrane, creating a flow of ions that in turn generates a small electric current thus transforming the message back from chemical signals to electrical ones (ions). This current changes the membrane potential of the postsynaptic neuron, making it more likely to fire an action potential down its axon and by this means forwarding data to the next in line. Communication within the brain involves multiple neurotransmitters (acetylcholine, norepinephrine, serotonin and perhaps many hundreds more) operating via multiple variations of receptors. Serotonin, for instance, has more than 16 subtypes of receptors. Thus, a single drug can be used to influence a single receptor subtype. Let's return to the synapse , to the binding of a neurotransmitter to its receptor and the resultant opening (cont.)

A LAUNCH ? A LANDING? WHAT?

If a launch, where are the yellow-shirt and launch officer? If a landing, why is the radio-aerial tower still upright back aft? If either a launch or a landing, where are the Airdales and plane-captains milling about next to the superstructure (rather than those sailors with their white caps)? No, it's neither a launch nor a landing. I'm guessing, I'm wondering if this is not rather a "field day" for the personnel of a visiting destroyer that has the duty of always preceding or following the carrier wherever it goes.? Firstly, there are a large number of spectators filling every vacant spot. Secondly, this does not appear to be either a launch or a landing. Thirdly, notice that sailor in "whites" over there to the left, he with the non-regulation bell-bottom trousers (as is the wont of a salty destroyer-man, with his arms crossed and cap pushed forward in a defiant stance, the very epitome, the very model of the sea-going "swabby" who's "been there and done that"). Yes, I'm guessing this is an extracurricular exhibition for the for the benefit of those who experience a carrier's operations from afar month after long and tedious months. To wit, the Hellcat and the accompanying Airdale probably are merely running up and down the deck as if it were putting on a show to "titillate the troops" (if I may be so condescending). The first supposition was that it was either a launch or a landing, but not both. How can it be both? Yet life is full of things that are "both". One can be both tough and gentle, both outgoing and reticent, both intellectual and athletic, both both glad and sad, both stern and easygoing, both energetic and quiet and so on. On the other hand, fie on us if we temporize our standards and especially shame on us if we unwisely tamper with the time-tested and established moral and ethical precepts. That is, be smart, don't allow anything to interfere with the sound basis of your cogent life.

The Brain: returning to the synapse and to the binding of a neuro-transmitter to its receptor and the resultant opening or closing of ionic channels: this process can occur in one of two ways. Either the channel opens immediately due to ionic action or the channel opens after a delay because metabolic activity must occur before there is movement of the ions. Before proceeding, a review: as an impulse travels down a nerve to a synaptic bulb, thousands of vesicles spill their neurotransmitters into the synaptic gap which is only a billionth of an inch wide. Each molecule of neurotransmitter binds with a suitable receptor on the target neuron, an act which prompts sodium ions to rush in and potassium ions leave. This flow of ions excites the target nerve, thus generating an electric impulse in that cell. Returning to the discourse, ionotropic receptors, built for speed, respond within a millisecond or two while G-protein counterparts are designed for prolonged responses which allow memories.


NATIONAL ARCHIVES

ANOTHER MESS

The day's damp, the air's cold and we have another mess to clean up. This certainly spoiled the pilot's day as outstretched arms reach up to break his slide down the wing to "terra firma". Only one hose-applicator has been brought out (to the right) but no fire developed which would have made the day even worse. The derrick will have to be trundled out to pull the tail-section down to the deck but this is all in a day's work (not that we had that many barrier-crashes). If urgency were not a factor this would be nothing of significance. However, there are schedules to keep so it's incumbent on the yellow-shirts and Airdales to minimize the disruption of that schedule as much as possible. It's not just the crash that made an impact but it's the impact on others that's of more importance. The damage to the Hellcat is minimal, the pilot is not injured and the barrier can be replaced. Aircraft making water-landings can also be replaced however it will be at a significantly higher cost. So it's, "Hurry up you Airdales, turn to; move this Hellcat out of the way to clear the deck for those to follow". More things that we do have more effects than we realize. We don't live in isolation; we are not hermits. What we do affects others often without our realizing it. The ill effects of our actions are most often unbeknownst to us so we are beholden to be responsible enough to realize that a little thoughtfulness would prevent bad repercussions due to our actions. [Thoughtful and thoughtfulness are cut from the same cloth: the former concerns abstract thinking while the latter refers to our concern for others. We must realize that thoughtfulness is one of our most valuable attributes. Treat it as such and treat others as you would be treated (presuming you're a normal, rational and upstanding person).]

The Brain: thus we see that the brain, like the nerves of the body, is an electrochemical organ that is modified by the environment in which it finds itself. Functionally it's composed of networks of neurons that are unique for every person in the world. Even the brains of identical twins are not the same because they do not undergo the same experiences. These different experiences are embodied within the brain over time in the form of distinct neuronal networks. Operationally, the brain employs these networks to transmit data via a two-step process involving the action potential (nerve impulse) and the chemical processes that occur among neurotransmitters and their receptors. Some neurotransmitters are excitatory; they activate additional neurons and thus increase the spread of activation potentials throughout the brain. Other neurotransmitters are inhibitory; attachment to their receptors decreases the likelihood of further neuronal stimulation. The progress of brain research has profited greatly from physics, chemistry and the computer sciences (imaging techniques).

FLAPS DOWN

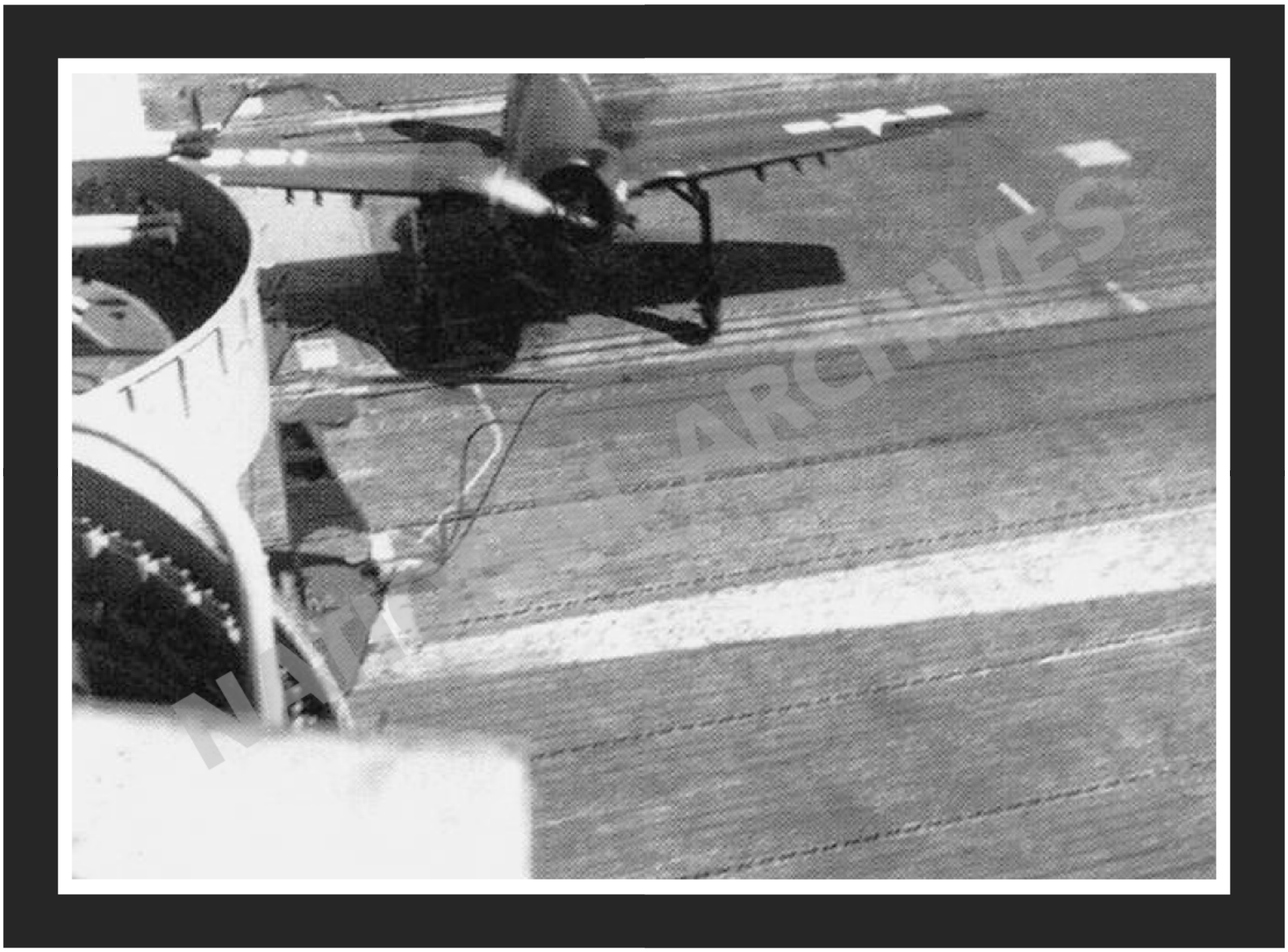
The wing-flaps are clearly seen as this Hellcat revs up its engine to taxi smartly up the deck to be parked (which process was a "gut-wrenching" time of unmitigated anxiety for the Airdale standing next to the wheel: would he get a face-full of shrapnel as the propeller "chewed up" the tail-section of the aircraft in front of him?). On the Antietam we would fold the wings as the tail-hook was being disengaged. In addition usually an Airdale would approach the aircraft from both sides with a wheekchock in hand and then accompany it up the deck to the parking area. This picture puts me in mind of an occasion when, after having parked an aircraft, I started to walk back aft for the next job when I stopped in the middle of the deck to have a head-on view of a Corsair in the landing-slot (about 300 yards astern, at the ship's centerline). I was adjacent to the middle of the superstructure and right in the middle of the deck as the Corsair approached at what seemed to me to be too high. Sure enough, it hit the deck hard at the after elevator and hurdled the first four barriers. The Corsair was airborne 5 feet above the deck before being brought to a halt by the fifth and final barrier, rolling forward to not 4 yards from where I was standing 2 seconds before (my having run to the side at the moment the Corsair hit the deck). No one injured (except for the pilot's feelings; they're a proud lot, as well they should be; pride that's earned and subdued and warranted is a good thing; further, it promotes the sense of excellence that is necessary and at the core of a good society that thrives on merit, the well-spring of useful progress). ["Pride goeth before a fall" but only if it's a groundless price]

HNet: the next several pages will address the computer software program that mimics the biological brain, Of course when I say mimic I tamper with the meaning of words for there is absolutely nothing whatsoever in this world of ours that should even be alluded to as brain-like. For instance HNet can do marvelous things with but a few (mathematical) cells whereas the biological brain has billions of interconnections among millions of cells. Therefore we will make no further comparisons except as the HNet has borrowed the verbal morphology of a biological brain. Firstly, the HNet is an acronym for Holographic Neural Technology. The HNet model supports a framework in which stimulus-response learning and recall is performed within a single cortical cell (this "cell" performs a similar function as a biological cell by means of a mathematical algorithm). HNet cells can also be combined into cell assembles. These cells follow the morphology and inter-connectivity of specific types of neuron cells. Of 8 cell types 4 are modeled after the cerebellum and neo-cortex: They are the granule, the stellate, the pyramidal and the Purkinje cells. [We'll briefly discuss the software and then return to the biological basis.]

BRACE YOURSELF

The reason there weren't any personnel in the previous picture can be explained by this picture (which is a completion of the previous picture). The Hellcat didn't appear to be any kind of threat at that previous stage. However, this picture is an object lesson in that what appears to be normal is not always so. Never, ever "take your eyes off the ball" because untoward things happen with uncommon swiftness on the flight deck during landing operations: 40-50 mph in that limited space. In addition to that, there are not that many places of safe refuge from an out-of-control high-powered aircraft with "a mind of its own". Some things can be anticipated while other things are very crafty (if a person, you could say "devious"). By and large you could say that the flight deck was not a dangerous place on which to work (the launch and parking processes excepted) as long as you were alert and understood the situation. That is, where danger lurks there also should go caution for it's here that "wisdom is the better part of valor". When there are at least two wheels on the deck you can measure the possible problems and act accordingly but when the aircraft are airborne above the deck, all bets are not only off but also foolish. We all do foolish things one time or another and usually "get away with it". However there are some things that are too foolhardy to allow that attitude even a minute of your time: driving too fast. I would say that 95% of accidents are due to excessive speed in a car, and a large part of that is due to being in a hurry. Excessive haste when in charge of a vehicle is tantamount to utter stupidity and disregard of common sense besides being a dereliction of duty (hey, "haste makes waste"). Punctuality is fine but NOT at the expense of life and limb. We were careful on the flight deck. Can you be any less so? [Let's be frank: speed is for the idiots of the world!!]

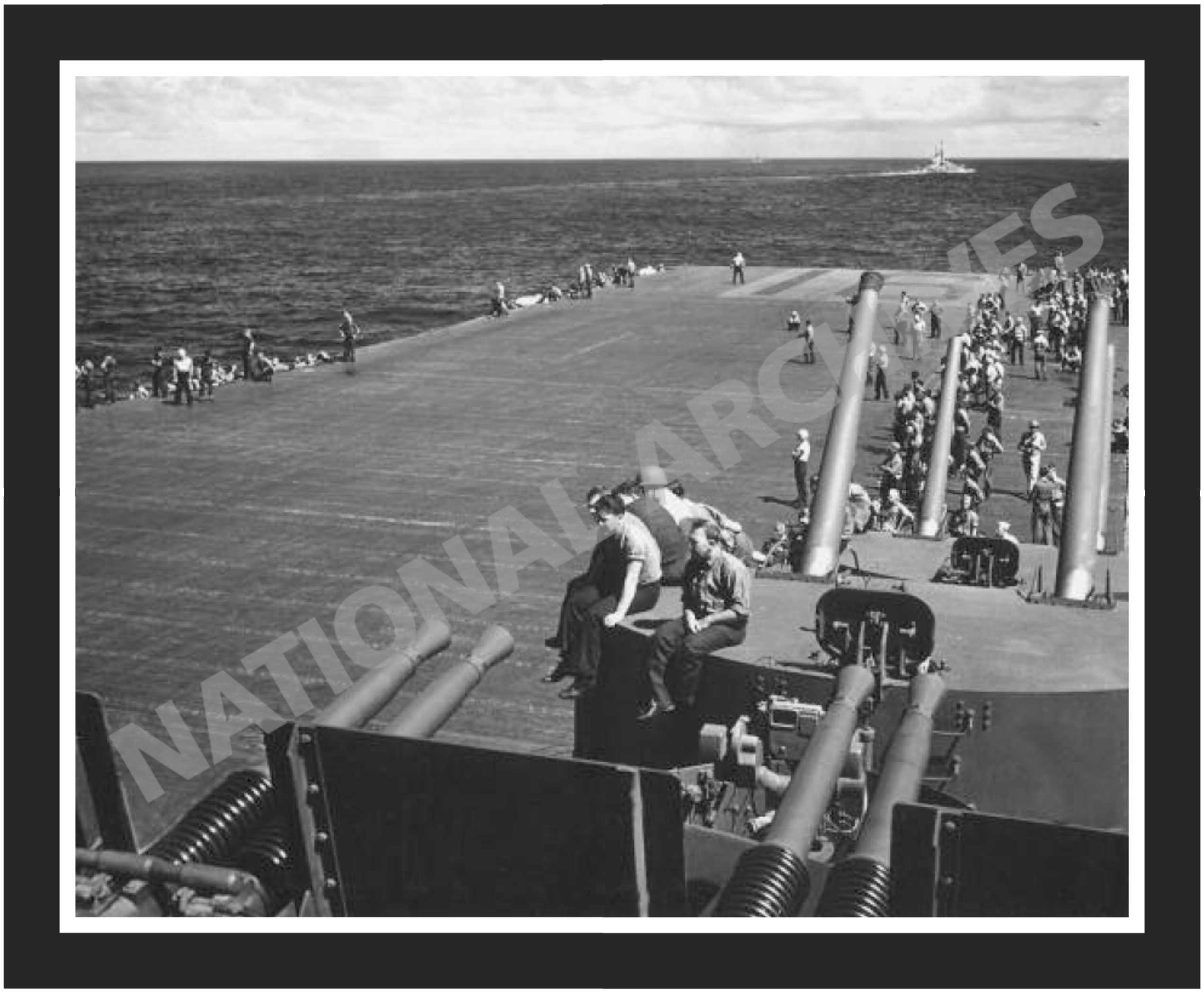
HNet: a stimulus is represented by a set of analog values such that IF A and B and C THEN response X. This is an IF-THEN statement where for instance A= temperature, B=humidity and C=wind direction. The response X might equal "start construction". A specific set of values for A, B and C is a pattern, and life is full of patterns. Above, for a given pattern of weather conditions, a certain response is specified. This is the stimulus-response that applies to a neuron cell with the stimulus being applied to a set of dendrites inputs to a neuron cell and the response emitted on the outgoing axon of the neuron cell. We are in effect "mapping" a set of stimulus values to a corresponding response. What has been described is the so-called "Grandmother Cell" where one cell represents the entire stimulus-response relationship. This is completely at odds with the biological systems we just considered which involve many thousands of neurons per stimulus-response. {to be continued.]



NOW LET THE SHOW BEGIN

All is ready, all are in place, now let the show begin. In mere moments the squadrons will return, one by one, in all their clamorous presence. Those gunners' mates sitting atop the 5-inch gun-mount have good seats for the parade of those deep blue, man-made marvels called the Corsairs, the Hellcats, the Helldivers and the Avengers, each one of which is a mighty force with which one must reckon "up close and personal". It's the gunners' mates back aft on their 5-inch gun-mounts who have the front-row seats as each aircraft in turn touches down, some with grace, some with a jolt on a deck that's not always as stable as here. That crowd up forward, which seems somewhat excessive, are for the most part the brown-shirt plane-captains, one for each aircraft. Their purpose probably is to contact "their" pilot after a raid to ascertain if there were any problems with the aircraft after the mission over the target. [They certainly don't go into "officers country" seeking out a pilot; this was territory was the officers' quarters that was off limits to enlisted personnel). There are no doubt those who consider this to be "undemocratic" and elitist. The military has operated thusly since time immemorial. It's purpose is to maintain the idea of authority (and discipline) without which a military would only be a gaggle of warriors each going his own way (which is no way to run a war). Properly accomplished authority is not only proper but essential to the properly run society. It's when the authority becomes improper that trouble arises. Now, what's "proper"? Among other ways, look to the Christian-Judeo precepts proved over time (they write books about freedom vs. authority, and both are required for a properly functioning society; balance is key. We of course refer to benevolent authority while cursing malevolent authority). [Authority's prime purpose is to protect us from the evil-doers of the world.]

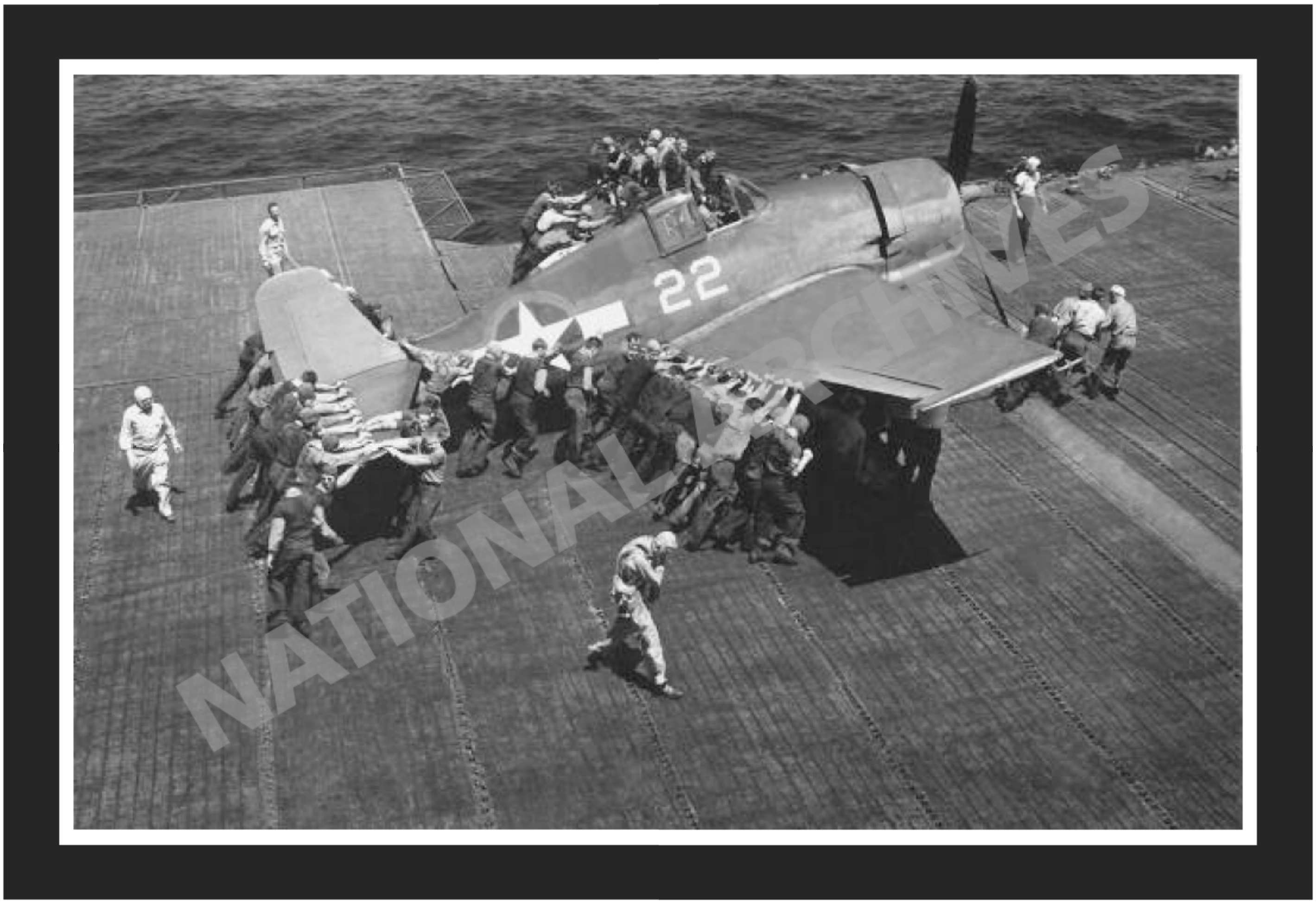
HNet: we'll now discuss the macro biological functions in terms of the Hnet perspective that very broadly emulates portions of the biological brain. Computer neural networks, a generic term, attempt to construct data processing systems based on known features within neurobiology. Little is currently understood regarding the mechanism of data processing within the neuron cells. General aspects with respect to the morphology of various neurological cells types (their structure), inter-connectivity, as well as aspects concerning signal transmissions, are known (see pages on "The Brain"). The following provides a brief overview of the field of neuroanatomy with particular emphasis on the section of the brain referred to as the neo-cortex (the gray matter or the outer layer, the most recent part of the brain. A more primitive part of the brain, the cerebellum at the base of the brain, will also come into the discussion (but excluding the primitive parts of the brain such as the hippocampus, amygdala, etc,.


NATIONAL ARCHIVES

ALL TOGETHER NOW

No, this isn't a typical situation. Normally we never had more than ten people pushing an aircraft. The pilot here seems to have injured his left shoulder after his aircraft blew out its right tire when touching down too hard on landing. All the Airdales, a lot of the brown-shirts and probably some green and red-shirts are assembled to remove the damaged Hellcat from the area. (Why they don't take it to the deckedge elevator and the hanger deck I don't know.) They're moving it forward with the use of a sturdy dolly under the right wheel. Notice the group under the right wing lifting upward so as to take part of the load off the dolly: the dolly's wheels are small and made of cast iron thus causing an excessive amount of friction (making the forward motion that much more difficult: a large pneumatic tire offers much less friction that the dolly's small iron wheels). Trying to further take the load off the dolly are a bunch of Airdales getting a free ride on the left wing so as to lift the right wing upward. Even those pulling on the tow-bar are having a hard time steering the Hellcat (because of the dolly). No need to be embarrassed". There are no slackers here. Everyone joins in the effort because that's the Airdales' mode as well as their code of conduct. Though I wasn't looking for it, I never was aware of any shirking of duty or any barking of orders. We knew what had to be done and we did it, plain and simple, mundane job notwithstanding. Frankly, I believe there was that understood principle of pride in a job well done. There's a real satisfaction in that that mere words do not convey (so everybody, all together now, push!).

HNet: this computer software bears many close analogies to the morphological, inter-connectivity and signal processing features of actual neuron cells. Some HNet cells have been given biological names due to their similarity to certain classes of neurons cells such as granule, stellate, pyramidal and Purkinje cells. The following will provide the biology upon which HNet is modeled. It's been estimated that the human brain contains about 25 billion neuron cells. The basic structure has multiple dendrites entering the neuron cell, either directly or indirectly, and one output axon leaving the neuron (with that axon accessing multiple dendrites of other neurons). Each neuron has an enclosing membrane within which are found the controlling nucleus and the cytoplasm in which float the elements that nourish and maintain the cell. The size and shape of the various types of neurons varies widely but structurally they all have multiple dendrite inputs and an axon output. Neurons are believed to be nonhomogeneous in function. The interconnection pathways of the various neurons cells are very complex and form a very complex structure. However, consistent patterns are found in the interconnection pathways.


22
NATIONAL ARCHIVES

THE MIGHTY HAS ARRIVED

The mighty has arrived, yet it remains " tethered" (due to its being unable to retract its tail-hook). No, even the mighty can not do it alone. Even the mighty need help from those of us less well situated even as there are those who thrive on being needed (and without whom we would all be the lesser). Who in life can make their way without the help of those who care about us? That one has yet to be born. // "Reading" this tableau from right to left, there is the yellow-shirt "holding" the mighty one with arms upraised. Next is an Airdale awaiting the following aircraft while two other Airdales decide which of them will go, wheelchock in hand, to the wheel-strut to accompany the Corsair up forward. Now we consider those two green-shirts huddled under the tai trying to retract the tail-hook. To their left is the flight deck officer observing the ministrations of the green-shirts and ready to signal the yellow-shirt when the deed is done. To his left is a stand-by green-shirt and behind him we see an Airdale approaching the left wheel-strut. Finally, there's another Airdale peering at the activity, prepared to help. One final note is the presence of that biggest help of all, the fire-hose at the ready at the edge of the deck. To help others is to be a friend (but strangers give help). Can we call them friends? In a way, yes. However, when we are weary of heart whom do we turn to? Is it the stranger? No, it is the friend , someone in whom we can deeply confide with the utmost of trust (where "trust" is the defining concept). At your peril, don't ever forget that a true friend is a precious gift. We tend not to realize what a gift we have until we lose it. So cherish it NOW.

HNet: recall that the junction of an axon with a dendrite, or a neuron, is called a synapse and that there is only one outgoing axon from a neuron (which axon can connect to many, many separate dendrites or neurons. Therefore a neuron has many in but one out. These synaptic connections are in an organized and reasonably well defined manner. The basic computer artificial neural network (ANN) systems form a very crude similarity to the biological neural structures. Most of the present ANN systems form layers of interconnected cells each of which performs real-value multiply and accumulate operations over their input field. (An ANN cell is an artifice that defines a mathematical operation). Diagrammatically, an ANN has a single column of input cells, a single column of "hidden" cells and a single column of output cells. A multivalued set of inputs (temperature=21, humidity=1000.2, wind velocity=16) is applied to the input cells, then the computations are performed and finally the output is obtained that specifies that a certain pattern has been identified. Very crudely this describes the operation of an ANN. However, it's the HNet that is our concern and interest so set aside the ANN.

THE EARLY YEARS

This is a time from the early years in the war as indicated by the SBD Dauntless dive-bombers back aft (with wings that can not be folded). Now it's early in the morning, the ship's heading into the wind giving us a nice fresh salt-air breeze. Yes, there are hazards up here topside on the flight deck but those relegated to the below decks aren't able to enjoy this delightful morning air. Perhaps things do even out after all if only we'd be alert to what's right in front of us. The lack of aircraft in view implies that the squadrons are airborne doing what squadrons do. We back here at the ship can only wonder at what transpires "out there". We don't even know if we're close or far from the exigencies of war so we just take in what's offered us here such as this fine day. In the meantime we move big machines from here to there as meets the requirements of some higher intelligence than ours. Note that some of the railing that rises up when the elevator goes down is missing. This doesn't seem to bother some Airdales while other more prudent ones stay behind the railing as they all show their curiosity in what's happening below. This is normal, or should be, to most all of us. Is it possible no to have a (healthy) curiosity? Are you really alive bereft of a healthy curiosity? In fact, can there be learning without that catalyst of curiosity? It's such a big wide world out there that to go through it without curiosity would seem to be well nigh impossible. Curiosity, and its satisfaction, is one of life's true pleasures (while morbid curiosity is not defective).

HNet: before continuing with the biological aspects of the brain I'll feature some of the aspects of HNet that make it unique: Biometric Intelligence is the science of understanding and replicating the processing structure and mechanism of the brain. Traditional NN have little or no resemblance to actual neurological structures, and more importantly, have proven to have very limited capability. The HNet technology however applies the power of digital holography within synthetic neuron cells. Assemblies comprised of such cells have one-to-one correspondence with the primary cell structures of the brain. These biometric structures provide the capability for truly real-time learning and present a vast increase in (stimulus-response) memory storage capability. To provide a practical example, a cell assembly can locate and track human faces in real-time. A cell assembly can learn facial images in real-time, building within its memory all observed forms of an individual, and subsequently identify that individual smiling or frowning, etc. This application's at the upper limit of technological capability when employing traditional methods. Application of the basic HNet two-cell "cerebellar" model reduces the above task to a rather straight-forward procedure. This scheme is effective in micine, process control, automation and etc.

NATIONAL ARCHIVES

A SOLID CITIZEN

Solid. Stolid. Sturdy. That's what one thinks when looking at the SB2C Helldiver dive-bomber. It replaced the famed SBD Dauntless dive-bomber of Midway lore on June 4-5, 1942 when they sank four enemy carriers. The Helldiver didn't join the fleet until 1943, not until some 880 design changes and delays but when finally available it proved to be an outstanding aircraft . There were 6,000 of them built for service in not just the U.S. Navy but also many other services. One of its functions was to accurately drop depth-charges on marauding submarines. This precision was possible because the Helldiver would aim itself directly at the target as opposed to aircraft that dropped their bombs from level flight. It carried bombs, rockets and 20-mm guns for strafing in addition to the depth charges. A small item of interest only to an Airdale was the placement of the wheel-strut side-panels on the outside. This required the Airdale to position himself inboard of the wheel putting him that much closer to the prop. This was not that much of a problem because of the Helldiver's wide stance. This stance, this air of stability, was part of the reason it looked like such a "solid citizen"; but what's a "solid citizen"? Among other things the first word that jumps out is the word "integrity". Solid implies integrity. When one speaks of the "integrity of a ship" one refers to its lack of faults or imperfections. Integrity is "soundness of and adherence to moral principles". That is, a person of integrity is a person of uprightness (honesty), a person of fidelity (dependability), a person of veracity (trustworthiness), a person who's looked upon with utmost respect, a person who's solid.

HNet: pulse modulation through electrochemical transmission is the manner by which biological neurons transmit signals between cells and at the synaptic connections. In the digital implementation of holographic/quantum (HNet) neural cells these signals are discrete in time. [A stimulus field at one time-step may be represented by a complex numbers where the stimulus input to a neuron is stimulus S=the sum of the complex numbers where the frequency of the complex number is represented by the vector angle (a stimulus variable such as temperature=72) and the scalar of the complex number is represented by the magnitude of the vector.] The neurological system may be separated into four principle areas: the cerebral cortex, the cerebellum, the brain stem (the primitive part of the brain) and the spinal chord. Each area's comprised of indigenous cell types and has many varied substructures and their neural pathways. Thus for instance the cerebellum is connected to the cerebral cortex, the thalamus and the brain stem. The spinal chord serves to send signals to the muscles and organs and receive signals from the sensory organs of touch, taste, and kinematic orientation of the body.


2

"TAKE YOUR MARK. GET SET, GOOO!"

A moment ago the pilot had his eyes fixed on the launch officer. Now they're fixed on his instruments that tell him of the engine's rpm. I suppose he keeps the oil pressure gage in his view and finally the air speed indicator. All of these determine whether he rises or falls, all of them are a source of relief or dismay. If this were the Antietam, then that was the U.S.S. Boxer or Bon Homme Richard in the distance. We traveled as a pair, sometimes having "war games" with each other where their aircraft would swoop down on us. W`hat "damage" was assessed against us I don't know. I often wondered, when I was in among the aircraft during a launch, the foolish notion that one day one of those propeller-blades would work its way loose from the hub and then slash all in its destructive path (such as this air officer here directly in line with the propeller). It never happened, naturally (but what if.......?) Another thing I wondered was the fact that as much as I recoiled from the engine noise those pilot had to follow it wherever it went. No thanks! However, all the pilots were volunteers for the flying service (flight pay didn't hurt). They made the conscious choice to do so, so our sympathies must be tempered. Just so, we too all make choices (or should). We make big choices and small ones, but regardless, we must be accountable for those choices. Equally, one of the paramount reasons for studying and subsequent learning is that those choices will be the best they can be for our purposes and circumstances. I don't subscribe to the manta that "you can be or do anything you set your mind to" because of inherent limitations, but it does have a point to a certain degree. Chose wisely and well for you'll have to live with the choice and its consequences. Furthermore, we should definitely appreciate the fact that our's is a society that allows us the availability of many choices.

HNet: it's believed that volitional movement originates from specific cell types within the cortex, these cells directly enervating more neurons, and thus movement or contraction of muscle tissue. These controlling output signals originate from the large pyramidal cells of the neo-cortex as well as the Purkinje cells of the cerebellum. These cell types have axonal processes which travel down corticospinal tracts terminating upon motor or gamma neurons in the spinal column. The gamma neurons subsequently induce muscle activity. The cerebellum also is believed to perform a substantive role in postural control and integration of movement. These signals are modified in part by feedback mechanisms via indirect pathways within the cerebellum, thalamus, brain stem and hippocampus. [It is this capability that the feedback systems of computer control try and do emulate and what makes automatic control systems so interesting. This is why I went back to college to earn my BSEE degree.]


NATIONAL ARCHIVES

WHAT TO DO?

What's an Airdale to do if he's on the far side of this rampaging Hellcat? Not much except hope for the best (and the best doesn't look all that good). The event's not over yet: that debris has to return to the "ground" before anyone can survey the damage. In fact the pilot in the Hellcat appears susceptible to that debris and that large piece far to the right will leave its mark. Normally there are a fair number of personnel mulling about up there among those aircraft already parked. They're probably hurting right now. Why that person to the left didn't jump down onto the catwalk is strange, the catwalk being only about 3 ½ feet down. However, in a sudden emergency we don't always do the rational thing. Even so, there's little to do to prepare for such an event. The flight deck during launch and landing operations is not conducive to prearranged courses of action. Even though it appears to be done by rote, what happens on the flight deck is usually unique. It's more similar to reflexive reaction to a sudden, unexpected occurrence. At least I never thought out ahead of time what I'd do in such and such a situation. However, in "civilian life" this is not an unnatural concept. One obvious example is the preparation for school-work. I personally could never understand those who put off their studying until the last moment. I figured it had something to do with conceit: "I'm so smart I can pick this subject up in no time at all". Even granting that, why short-change yourself by not going that extra mile and so be that much smarter? Is there a bizarre notion that to be smart is to be pedestrian (not "cool")? Maybe they don't deserve to be smart (by wasting their talent) and let's nip useless conceit in the bud. Too often the conceit stifles ant further improvement, leaving one overtaken.

HNet: principal cell structures within the various regions are significant in determining the effective memory storage capacity. One assembly structure of the HNet structure that may be constructed from the cell types (granule, stellate, pyramidal and Purkonje) is based on the neo-cortex which has a three-layer composition: granule–>stallate–>pyramidal cells. The second assembly structure is based on the more primitive cerebellum (or "reptilian brain") having a two-layer structure: granule–>Purkinje cell. The neo-cortical model has the potential for significantly greater learning capacity than the cerebellum model due to its three-layer structure which realizes the commutative property. An overview of the general cell types and structures within the neurological system is presented with the following. The Cerebral Cortex (Neo-Cortex): this is a layer of gray matter covering a white core over both cerebral hemispheres. This gray matter is principally neuron cell bodies and areas of synaptic connections. In spite of the large number of neurons it is about 1/8 inch thick. To be continued.

WELCOME ABOARD

Apparently someone of note has just come aboard. Who knows, it might be Admiral Halsey the famed admiral whose feistiness against the enemy was legendary (follow his wartime career and you learn much of the war in the Pacific). Those in the foreground and up in the superstructure are from below decks, such as radiomen, machinists, radar operators, cooks, engine-room men, etc. (those who seldom saw the light of day). Then, since this was their domain, the blue and green and red and brown-shirts had a "front-row seat" behind a line to watch the deplaning of the "brass". I left out the yellow-shirts because, as noticed to the right, they've already "seen it all". The only unusual things that happened on the Antietam was the one-day appearance (on separate days) of the twin-engine F7F Tigercat and the diminutive, but nifty, F8F Bearcat. (I should also mention that the Antietam was used in the 1949 must-see movie "Task Force" which in a narrative way chronicled the development of the aircraft carrier and naval aviation through the end of WWII.) I should add for the present-day generation that this movie is realistic, not surrealistic or even "over the top" type movie that seems to be the only genre that appeals to present-day movie-goers: in their effort to out-do what preceded them, the movies have become a caricature of real life. Is this frenzied fantasy of real life so appealing? Is normal life that dull? If so, that's sad, very sad. While I'm at it, as concerns the above "welcome", why is it that notability and recognition, past and present, is so important? (It can be, maybe, perhaps pleasant to give and receive, but important? Step back and try a little serious reevaluation. You'll be glad you did because often we do things will-nilly without giving them a deserved serious thought.

HNet: again, the cerebral cortex is a layer of gray matter covering a white core over both cerebral hemispheres. This gray matter is principally neuron cell bodies and areas of synaptic connections. The sub-cortical white matter is comprised predominately of axons from cells directing neural pathways between various regions of the cortex and pathways between the thalamus, hippocampus, brain stem and spinal chord. The cortex (gray matter) varies in thickness between 1.5 and 4,5 millimeters and microscopically can be divided into six layers. Each layer possesses a particular arrangement of cell-types and structural interconnection pathways. The neurons of the neo-cortex fall predominately into four types: pyramidal, stellate, Martinotti and granule cells. The structure and interconnection patterns typical of these cells will be discussed in turn. While the structure of the different cells is important it is the interconnections of the cells that provide a brain with its uniqueness. From the time we're born these pathways are being developed and serve as our "markers" (who we really are, less disguises).

CAREFUL, THAT'S "MY AIRCRAFT"

Yes, I know, I've said it before but I'll say it again, "This Avenger was the biggest single-engine aircraft of WWII (and it had to find its way onto the carriers)". Though I don't know it, it certainly appears as if this aircraft "belongs" to this pilot. Some of the more proficient pilots even had their names stenciled just beneath the cockpit to make sure everyone knew it was "his". There doesn't appear to be much urgency displayed here and that's probably due to the fact that most all of the aircraft are now airborne. Usually, when an aircraft didn't launch it was because it had a mechanical problem (at least that was the case on the Antietam, a training ship). Here these Airdales up front are merely going through the motions for how much force can you generate with your arms stretched overhead? Only the one at the right wheel is making a contribution. The ones who are providing the muscle-power to this job are the ones whose legs-only are in view: the trailing edge of the wing provided satisfactory pushing-surface (and of course the Airdale with the wheelchock at the left wheel has only one arm to offer). Often it was only necessary for one Airdale to take up a job for the rest to follow suit. This is called leadership (and if you must, a positive form of peer-pressure). However, it's my strong recollection that peer-pressure was never a factor on the flight deck: a job needed to be done and the nearest Airdales did it without the least hesitation. I believed then, and I believe now, that it was a natural (and normal) desire to do a job that was expected of you, and to do it well, no matter how mundane. That was my clear and unadulterated opinion.

HNet: Pyramidal Cell: these cells are normally in layers IV to VI of the cortex. These cells have relatively few dendrites (incoming) over the extent of their cell walls. However, they contain a large number of dendritic spines situated above the extent of these cells connections. The apex of the dendritic arrangement is directed upward toward the cortical surface with basal structures (deep within the cerebrum responsible for coordinating motion) whose dendrites course through the gray matter horizontal to the cortex. These are found in layers V to I. Axons from these cell types course down through white matter via the corticospinal tract and spinal column to directly enervate the motor neurons. These axons also make connections with the neurons of the brain stem. Each pyramidal neuron may receive up to 200,000 synaptic inputs from dendrites. The Stellate Cell: this cell consists of smaller star-shaped neurons which are found in all but the Layer I. These neurons have short, extensively branched, spiny dendritic processes. The axons of these cells may be long in length and project to deeper layers of the cortex forming connections primarily with the dendrites of nearby cells. Axons of these neurons may (TBC).


57
57

NEXT IN LINE

This Corsair, at about 525 feet from the bow, is taxiing up to the take-off point at 400 feet from the bow (note the after elevator in the upper left corner with the arresting cable pulled aside to allow the use of the elevator). Our modus of operation was to accompany the aircraft next to its wheel, wheelchock in hand, right up to the take-off point (where there's probably a Corsair right at this moment revving up its engine for a launch (its prop-wash was added to this Corsair's prop-wash making for a wind that was hard to resist). Note the optical illusion of the "bent" propeller even at taxiing rpm; the real diameter is the white circular outline with a diameter of 13' 4". The camera can detect this but we seldom could (but assuredly we knew where it was). With eight 5.25-inch rockets under its wings, and four 20-mm machine-guns in the wing, this was a tidy package. Now assemble 20 of these aircraft and there is a force with which to reckon. Consider it a bombardment made by a 5-inch gun shooting 8x29=160 rounds at a target. That's a message that'll register. Each squadron had its own unique markings such as this Corsair with a white cowling, a vertical arrow and even a unique size and placement of the identifying number. The earlier aircraft had 3-tone coloring (medium blue on top, light blue in the middle and cream color on the bottom. However, later in the war all aircraft went to the dark blue color throughout: one color fit all. In life we are all properly of "all colors". We might have our favorites but we should never look down on those who happen to have different ("colors" in the form of styles and customs and even personalities——"character" is an entirely different category where differences matter. Regardless of culture, integrity is integrity, and so on and on.

HNet: the axons of the stellate cells (neurons) may be varied in length and project to deeper layers of the cortex forming synaptic connections with neurons both nearby and far distant in the cortex. These cells are estimated to have in the range of 10,000 to 50,000 synapses along the extent of the dendritic processes. Martinotti Cell: This cell resembles the stellate cell discussed above although the axonal process is oriented toward the cortical surface projecting to and terminating on synapses located in more superficial layers. This cell has short, extensively branching dendrites. However, these processes extend to the same or deeper cortical layers. This cell's located primarily in the lower cortical layers and would seem to provide a feedback or recurrent structure for signal flow within the neo-cortex (upper cortex). Granule Cell: These cells are very small compared to the stellate and pyranidal cells, receiving relatively few (typically <5) synaptic inputs. The granule cell also is the most numerous within the cortical system with an estimated 10 billion cells. It has few dendrites and one axon.


183
83
183
183

IS THIS HELLCAT ASKEW?

If this Hellcat is in the "slot" (dead astern the ship) then yes, it is askew and it will be waved off. If it's not waved off there will be consternation down there on the deck. Better to have a peeved pilot rather than a likely crash. However, if this be a telephoto picture of an aircraft making his turn into the slot then all is well, so far. Methinks it's the latter. With tail-hook down and flaps down (look closely) the pilot is at the reduced speed required for a safe landing (note that the blades are visible). That external fuel-tank is always a source of concern either because it detaches at touchdown or the landing gear collapses and the fuselage crushes it with resultant potential and/or likely fire. That would spoil anyone's day even as does an automobile accident (your fault or no). [We are responsible for not causing an accident which jeopardizes innocent others.] A 40 to 50 mph speed over the deck plus instability is a formula for mischief. Sometimes we ourselves are askew and others know it. If you believe that those you most admire think you worthless then it's hard not to think yourself worthless. (To deliberately ignore someone is to say he's worthless, hardly a charitable gesture. However, the freedom to ignore is a basic freedom).This is a time for serious self-examination (and also a time to be your own best friend even while being circumspect). The idea should be to right yourself before someone else tries to do so. If the above seems to meander it's because I'm hurting today and, as on the flight deck where I didn't miss a day, 'the show must go on"

HNet: these stellate cells are located primarily in the somatosensory region of the cortex (parietal lobe near the top of the head). This region of the cortex receives sensory input signals from the thalamus and hippocampus. Granule cells are generally believed to be a kind of preprocessing stage for the cortex. The axon of the granule cell to the same or more superficial layers of the cortex branch extensively and eventually form synaptic connections with upwards of 10,000 separate stellate and Martinotti cells. // Cell Assembly Structure Of The Cerebral Cortex: Gross topography and interconnectedness of certain principal structures within the neo-cortex is descriptively as follows: Dendrites in the cortical surface feed down to pyramidal neurons. These in turn feed downward and also to stellate and Martinotti cells (neurons). The stellate cells in turn receive from below the axon outputs from the granule cells and which receive signals from the thalamus. The Martinotti cells feed to both the stellate and pyramid cells. This rendition gives the proper description of the interconnectedness of the different cells in the different layers. To unravel these pathways and their purpose are beyond these pages and even those of the researchers (I believe). This will be reviewed briefly on the next page.

DEFECTIVE FLAPS?

This Helldiver caught its left wheel on the top wire of a barrier while the right wheel continued on until the it flipped over, swinging it across the deck. A fuel-line broke and the hot metal ignited the gasoline. Two Airdales to the right can be seen running to the aid of the pilot and probably a group of Airdales will have to get under the right wing, lifting it up to extricate the pilot. Momentarily another group of Airdales will be there to douse the flames. Presuming the flaps were inoperative, the pilot would have to increase the power to increase the speed to increase the lift of the Helldiver to compensate for the diminished lift without flaps extended. This in turn was overcompensation which caused the wheel to catch the barrier instead of the arresting-wire, causing the trip up. The arresting-wires are lifted by brackets about 4-5 inches from the deck so therefore the wheels would not be impeded by the arresting -wires (the wheel's radius is a good deal greater than 4-5 inches). However, after each "trap" (landing stopped by an arresting-wire) the brackets are lowered to lower the wires so that the small tail-wheel won't be caught when the aircraft taxies forward. (and so personnel won't trip over them). This system of retractable arresting and barrier wires worked well. Would that the non-mechanical systems worked as well. The "lubricant" of an easygoing demeanor works wonders in the social fabric of our everyday lives. The military can have their drill-sergeants but we civilians do better by giving others the benefit of the doubt before the facts are ascertained. What is it? "One's presumed innocent until proven guilty" (and be darn sure that you get the facts STRAIGHT). [No democracy could long function properly without a populace well versed in the correct facts.]

HNet: the foregoing illustrates the afferent (incoming) signals relayed via thalamic and hippocampal pathways to granule cells of the parietal lobe (sensory inputs) located in the cortical layers III to V. The thalamus is believed to function in part as a rely station and processing center for signals received over most parts of the central nervous system. The hippocampus is believed to function as a time-delay storage register that facilitates learning of spatio-temporal patterns. Within the cortical layer of the sensory receptive region (parietal lobe) the granule cells synapse upon (make connections to) stellate cells. Cell assemblies comprised of stellate and pyramidal cells are predominant over all regions of the cortex. Specificity of location for the granule cells (located predominately in the sensory region) indicates a preprocess mechanism for input sensory fields. The granule cell possesses a connectivity pattern and structure that suggests expansion of the afferent (input) stimulus signals to higher order combinations prior to input to the principle learning/recall structures (stellate/pyramidal cell assemblies).

AWAY ALL AIRCRAFT

This Hellcat either has a lot of zip or it started its run down the deck from about 500 feet instead of the normal 400 feet from the front of the flight deck. Also normal, right now there would be an aircraft at a spot one inch form the top and right border. It would appear to us at about half the size of this Hellcat and it would represent an interval of about 20 seconds between launches. The sea looks to have a 10 mph wind over it and so we can expect that the ship is making 20 knots (22 mph). This is the U.S.S. Leyte (CV-32) named after the battle of Leyte Gulf off the Philippines on October 25, 1944 as part of the largest naval battle in history (The Battle Of The Philippines Sea). Here at Leyte Gulf two super battleships and three other battleships plus 12 cruisers, many more destroyers and the inimical (hostile) kamikazes were brought to bear on a very small U.S. force of several escort carriers and a handful of destroyers. The enemy wanted to destroy the U.S. troop ships landing an invading army on the Philippines. This small U.S. Navy flotilla fought the enemy to a stand-still in a miraculous display of fortitude punctuated by everlasting bravery which they would not avoid. It was a classic David and Goliath confrontation (of course the U.S. had a very large contingent of naval forces in the general area. Sometimes bravery is sought, sometimes it is thrust upon us. Here in this battle the U.S. Forces were in the latter category but when presented with the challenge, they stayed the course. Bravery can come naturally to some and with effort by others. Perhaps it's the latter that are the more brave. Bravery implies jeopardy and usually is met by a rush of adrenaline that blots out the intellect (when one sometimes thus becomes foolishly brave). We must all at times measure our bravery-quotient that very often does not involve the threat of physical danger. This type of bravery might require more courage than the physical type. [If you are self-assured, based on your having shown diligence in learning, would you not also tend to be brave? Yet the ignorant, being ignorant, jump into danger and thus appear brave(?)].

HNet: the pyramidal cell operating in conjunction with stellate and granule cells establish a three-stage processing structure, this forming the neo-cortical model within the HNet system. Subcortical regions display principal fiber traces in which afferent (incoming) signals are received by stellate, Martinotti and pyramidal cells. The short axons of stellate cells project onto the dendritic synapses of nearby pyramidal neurons. Axons from the pyramidal cells course down the cerebrospinal tract to enervate motor neurons, completing the control loop from input stage (senses) to output (muscle activity). Pyramidal cells also establish feedback loops from their axonal processes which generally terminate at superficial layers within the cortex.

THE NEXT TO LAST TO LEAVE

I've found that the longer I look at these pictures the more I appreciate them. For instance, scrutinizing this picture one can detect that these are very probably new recruits as indicated by their new dungarees but more importantly their hesitant "body language". A veteran Airdale would have time-worn dungarees and an almost impervious attitude in the presence of a fired-up aircraft (but mind you, certainly not a careless attitude). This Avenger is held up until the preceding one could be taken to the hanger deck due to something being amiss with its engine. This after-elevator has just about returned to the flight deck (as witness that the guard-railing around the elevator has recessed into the deck). This elevator's somewhat to the starboard of the centerline. This was done so as to allow greater space on the hanger deck when the elevator was topside: when the elevator rose topside an auxiliary elevator, half the area of the main elevator, also rose up to the level of the hanger deck thus filling one-half of the elevator pit. These centerline elevators were operated by hydraulic pistons allowing a trip to be made in about 5 seconds. Looking at a picture such as this provides a good object lesson about how we look at others: we most often only see the veneer of people and things. In our sometimes frenetic life it's the superficial that catches our attention and interest and not the fundamentals of a person or situation. We're only concerned with the fabric and not the contents of the fabric (what's inside? what's relevant?). At the risk of seeming unduly excessive and pedantic, what's the deeper meaning? Yet at the same time it would be irresponsible to consider one's thoughts as authoritative: the only admonition is, "look beyond the veneer" (and seek out the good, not the bad).

HNet: we're almost to the end of this HNet discussion vis-a-vis the biological, cursory review of the brain. Cell assemblies form cylindrical sections over the extent of the cerebral cortex oriented perpendicular to the surface of the cortex. The composition of these cylindrical sections are as follows: input signals from the body's sense organs (touch, etc.) are applied to the dendrites of a granule cell layer (a given signal can go to more than one granule cell). The axonal outputs from the granule cells then lead to the dendrites, in "random fashion", of sets of stellate cells assembled into the sections described above (vertical columns of cylindrical sections). The axonal outputs of these stellate cells in turn go to the dendrites of pyramidal neurons found in the above vertical sections. The axonal outputs of the pyramidal neurons now go to the bodies muscles. In addition, these pyramidal outputs are returned to the dendritic inputs of the stellate cells at any of the vertical columns (the signals, in addition to going to the muscles are also fed back to form a closed-loop of the excitations).


NATIONAL ARCHIVES

STILL WATERS

Still waters greet the now subdued warrior back from a strenuous tour of duty. Everything is now still, everything is now quiet as the mighty ship slowly, smoothly slips into port when not long ago all was sound and fury. Topside there are about 70 aircraft, Hellcats mixed with Avengers and Helldivers back aft while down below on the hanger deck are the 30 Corsairs as a group. Consider the power available from this mighty ship with 150,000-hp at its command. Then consider the aggregate power of those 70 aircraft on the flight deck: 70 times about on average of 1,900-hp per aircraft equals 133,000-hp (not forgetting the 60,000-hp of the 30 Corsairs below). Yes, there now idles along a gentle giant. We can clearly see the origin of the graceful clipper bow of the newer Essexes due to the placement of two 40-mm quad gun-tubs on the bow of the ship. Before going further I must explain that Avenger jutting out over the water next to the radio-aerial tower: on the older ships this was a catapult device that to my understanding was never used. So much for that. The Navy names its ships "battleships, cruisers, destroyers, etc." but none is more aptly named than an "aircraft carrier" as illustrated here. What's in a name? Here it's is obvious but elsewhere a name can be deceiving. Just so can appearances and deportment be deceiving. Here all's serene and mild but do a dastardly deed and you'll awaken a wrathful giant. Don't mistake gentleness for weakness. In fact only the strong can dare to be gentle. It's the weak who resort to irascibility (testiness) in an effort to intimidate. Be a "gentle giant" as is this ship (that is, a giant in quality).

HNet: stimulus-response relationships can be both learned and expressed on signal transits through the three-stage configuration of granule to stellate to pyramid and around again (and again). [In extrapolating this operation to the HNet configuration to represent the biological model, one pass through the HNet defines the mechanism in real time (one pass) of learning several 10's or 100's of millions of stimulus-response patterns. No other computer neural network comes even remotely close to this capability. However, technical discussion of HNet is not the topic here.] Cerebellum: The cerebellum is concerned primarily with motor coordination and is believed to perform a fundamental role in posture control and integration of movement. It's a more primitive part of the brain than the neo- cortex and its structure and function is basically different from the neo- cortex. The signals received and produced are highly integrated with signals received from various regions within the central nervous system. Integration of signals is done primarily within the adjacent brain stem structures and the thalamus. The cerebellum is 10% by weight of the brain and a cortical surface which is 40% of the surface of the cerebral cortex.


NATIONAL ARCHIVES

A ONCE PROUD SHIP LAID WASTE

What devastation where once was habitation! Those not there now were not warriors bold but merely sailors simple, just as you and me. This, or what's left of it, is the starboard side aft of a once mighty ship, now ravaged by death and destruction. We can see two 40-mm gun-tubs eerily "hanging onto" the side of the ship, bereft of all humanity. Just this side of the forward gun-tub is an overflowing gasoline-saturated waterfall all afire. The ship tilts from the excess water pouring down onto the hanger deck from above (or can it be that the captain ordered left full rudder to initiate the evacuation of this build-up of water?). Here, as elsewhere, if the fire doesn't get you the smoke will. This, the U.S.S. Franklin, was an inferno over the after-half of the flight deck. It was hit by bombs while carrying a deckload of aircraft all fueled and armed with bombs and rockets which made it a "tinder-box" for this conflagration. The aircraft were reduced to melted metal, the people to the indescribable. Airdales, pilots, yellow-shirts, whoever happened to be in the area perished with not an iota of a chance for salvation. What with all this havoc wreaked on this proud ship, it yet did not go down: it limped back all the way home to NYC, a true testament to the indomitable spirit of those who would not give in to the worst that could be meted out. Can we, with our relatively pedestrian and prosaic lives, with apologies to those more substantial, do any less? (standing tall in the face of adversity). Not if we care about ourselves. Recall the book, "The Power of Positive Thinking".

HNet: the cerebellum is similar to the cerebral cortex in that it has a cortical (overlaying) region of neurons and synaptic connections, the gray matter, overlaying the inner region consisting of fibers going into and out of the cerebellum (the white matter). Similar to the cerebral cortex the cerebellum can be separated into distinct layers. There is the Purkinje layer and the granule layer. In this cortical region there are distinct assemblies of cells (neurons). The cerebellum has a two-layer arrangement (as opposed to the three-layer mode in the cerebral cortex, previously described). That is, the granule cells' axons feed into the Purkinje cells' dendrites. The granule cell has few branches while the Pirkinje cell has a great many branches (dendrites). Purkinje Cell: This is the principle cell of the cerebellum and is located between the molecular layer and the granule layer in the cortical (outer) region of the cerebellum. The extensive number of dendrites of the Purkinje cell course through the full extent of the molecular layer to synapse with the axons of the granule cells. The dendrites of the Purkinje cells have many spines so that axons of the granule connect not just with the Purkinje cell body but mostly with the spines on the Purkinje cells' dendrites (there are 150,000 synnaptic spines on one Purkinje cell's set of dendrites).

ALMOST FINISHED

This is another one of those "paintings" that appeals to me, with just enough detail to make it realistic. It's all there: the air officer sending this Avenger down the deck, the yellow-shirt behind him awaiting the next Avenger, the aircraft in an orderly line, the blue-shirts and the brown0shirts lining the "runway" because there are no more aircraft to send aloft. The only thing missing is the wearing, tremendous roar of these giants as they rev up their engines for that critical run down the deck. Once these aircraft are all airborne the Airdales will turn to to clear up any aircraft still on board by taking them either up forward or more likely by taking them down below to the hanger deck for whatever attention they require. This is an active "airport", always aflutter after a launch in preparation for a return of the wayfarers. Yes, when the work of a launch is done comes the time, the opportunity, to "flake out" to recoup the energy lost in the previous launch when one's emotional energy is imperceptibly drained, not being noticeable until all is again relatively quiet. Fighting the wind, assaulted by the noise does not particularly sap one's reservoir of physical energy but when it's not needed the emotional energy lost becomes dominate and tangible fatigue sets in. How we handle emotional fatigue is important to how we interact with others. Fatigue eats away at the felicitous (happy) interrelationships we have with others. Just as it's dangerous to drive when emotionally drained so too is it detrimental to the important sociability-quotient , not a trivial consideration. Furthermore, emotional fatigue plays havoc with one's positive outlook where difficult situations can appear as welcome challenges. Lack of emotional energy promotes a negative attitude, a bAD thing, I know.

HNet: each Purkinje cell possesses one axon (as do all neurons) which courses down through the whit matter to deep cerebellar nuclei. These nuclei are believed to operate as relay stations propagating signals to cell structures within the brain stem and thalamus. An estimate has approximately 15 million Purkinje cells in the cerebellum. Granule Cell: as are the granule cells of the cerebral cortex these cells are very small compared to the Purkinje cell but they are far more numerous. It has been estimated that about 2x10^9 granule cells exist in the cerebellum (ten to the ninth power). Granule cells predominate in the lowest cortical layer ("cortical" is the "cloth helmet that the Airdale wears"). Granule cells have only 3 to 5 dendrites, forming connections with the climbing (input) fibers and relaying these signals from the brain stem and cerebral cortex. The axon from the granule cell courses vertically through the Purkinje layer and then branches, forming many collateral connections within the more superficial molecular layer which run parallel to the cerebellar surface. Closing, the cerebellum is presented.


NATIONAL ARCHIVES

TO CATCH A CORSAIR

Engine at idle, flaps down and tail-hook reaching for one of the 16 arresting-wires this Corsair seems to be poised to make a nice landing, coming to a stop within about 60 feet once a cable is caught. Then the same drill that's enacted over and over and over is begun: yellow-shirt "holds" the Corsair, green-shirts disengage the cable, Airdales go to the wheels with wheelchocks in hand and then the yellow-shirt motions the pilot to rev up and proceed up the deck to the next yellow-shirt about 60 feet forward. Most often all is well and the four squadrons come aboard without incident, but as is said, "You never know": each and every landing is a problematic proposition. There are many variables involved in that process: the LSO's proficiency at that particular time, the pilot's proficiency at that particular time, the ship's motion at the last few seconds, the wind direction and gusts at that particular time, the constancy of the aircraft at that particular time and the "attitude of the gods" at that particular time. Remember, this is not a heavy, ponderous and stable aircraft with which we're dealing. No, rather these are "hot" aircraft that sometimes seem to have a mind of their own, to the consternation of all on the flight deck (not to mention the pilot). The reliability of the process is always called into question on the flight deck but after all, this is war and things can go maddeningly wrong. Back home, on the home-front though, one would like to feel there's security in the reliability of those we trust. This means saving those "Dear John" letters until after the war (I was given that courtesy but others weren't so fortunate). To feel reliability in others is pure gold. Give others that gift. Then who knows, thy in turn will offer others that gift, starting a trend that bodes well.

HNet: the granule cells' collaterals that run parallel to the cerebellar surface establish contact with up to 500 Purkinje cells. The collaterals come in contact with the Purkinje cells only once. However, as said previously, a single Purkinje cell can receive up to 150,000 synaptic inputs from the granule layer. The Cerebellum: incoming signals are received from the climbing fiber system relaying signals from the mid-brain, thalamus and cortex. These climbing fibers establish synaptic contact with the granule cells, synapsing with about 20 to 40 granule cells. The granule cells integrate these input signals, propagating their output via axonal processes to Purkinje cells. Signals from the granule layer establish synaptic connections on the Purkinje cells' dendrites located within the molecular layer. The Purkinje cells themselves have axonal processes which form the only outgoing signals from the cerebellum. The HNet program uses the cerebellum process to create the generation of and recall of 100's of thousands of patterns (a pattern can be a scene, a large set of values, even a thought). And now let's move on.


WR
5
NATIONAL ARCHIVES

FOAM A LA MODE

The only redeeming reason for presenting this picture is the copious use of foam to fight a fire that's gasoline-fed. It's not as available as water but it's more effective. I was also hesitant to use this image (not very "pretty") since the aircraft is not one of "ours". Instead, it's probably a Douglas AD Skyraider of post-war vintage. How much of the white area is foam and how much is flame is also not clear. What is clear is that it was an effective way to subdue aircraft fires. If someone were to ask what's that round object under the cowling I'd have to plead ignorance. Note the foam on the deck; this will have to be cleaned up before the next landing. It won't be a trivial job in the light of the limited time available (remember those aircraft circling overhead). I presume water-hoses will be used to wash down the deck. This brings up the question of the foam's consistency: is it sticky? Does it adhere to the wood-deck? Again, this is a busy "landing-field". Questions, questions. Never be embarrassed to ask questions because of (false) pride. That's how one learns because one question leads to another and another and before you know it, you're much smarter than you were a short while before. One of the biggest impediments to acquiring knowledge is the fear of appearing ignorant when in fact it's ignorant to be afraid of appearing so. Look at it this way: you're acknowledging the intelligence of the one you interrogate and there are many who relish being thought the "authority". It's a "win-win" situation (and who can criticize that? Instead, applaud it.)

U.S. Constitution: the next group of pages will discuss the document under which we all live (and thrive). It's a document whose purpose it is to serve the general public's welfare (needless to say we're in no way talking about "public policy welfare"). The pages will be seamless with no single concept allocated to one page. That is, read from page to page as one complete essay. With that, let's begin this fascinating subject: in 1763 the leaders of the separate colonies of the land called America assembled to consider forming a confederation of colonies to establish a grouping of colonies with a central government for the purpose of defending themselves from the French and Indian incursions and British policies. In 1776 the Declaration of Independence was proclaimed as well as a proposed Articles of Confederation of the colonies. However it wasn't until 1781 that they were ratified by all the colonies. Then, in 1787, as the Preamble states, "... in order to form a mor perfect union ...", the Constitutional Convention was convened. In the last quarter of the 18th Century there was no country in the world that governed with separated and divided powers providing checks and balances on the exercise of authority by those who governed. (This thread will continued on the next pages as one continuous presentation.)

FUEL-TANK FIRE

Let me apologize yet another portrayal of a conflagration, but they did happen and I would be remiss if I didn't include a certain number of them. Being random in selection they have appeared in a bunch, but sometimes that's how accidents happen on the flight deck. The auxiliary fuel-tank can be seen in front of the aircraft, detached when the wheels impacted the deck. From the appearance of the resulting fire it would be suspected that the main fuel-tank contributed to this blaze. It's not to be assumed that the pilot was not able to get clear of the aircraft before the fire raged in earnest, but there's no sign of him. In the foreground are the yellow-shirt manning the hose and an Airdale providing backup. Since this is a solitary landing the fire will of its own accord burn out relatively quickly when other Airdales bring to bear their hoses. Whether it was a defect in the fuel-tank attaching device or an extra hard touch down or both is unknown. It's the unknowns, either on the flight deck or in our lives, that are disturbing. To live in a world of unknowns is to live in limbo. Believe me, this is no place to be, where artifice can run roughshod. Run, don't walk, from such a world: I've spent a lifetime doing so by making books of nonfiction my staff and my comfort. You too should seek out knowledge to put yourself far on the correct side of limbo. The sooner you learn that learning is your salvation the sooner you'll reach that happy condition we all want.

U.S. Constitution: a first step toward such a result was taken with the presentation of the Declaration of Independence in 1776, which was followed by the Constitutional Convention which was drafted in Philadelphia in 1787. In 1791 the Bill of Rights was added. Both of these documents had antecedents back to the Magna Carta presented to the King of England by the nobility. This work of 55 men at Philadelphia in 1787 marked the beginning of the end of the concept of the so-called divine rights of the kings in Europe. In place of the absolutism of monarchies the freedoms flowing from this document created a land of opportunities for all who would avail themselves of them. Ever since then discouraged and oppressed peoples from every part of the world have looked to this country for hope and even sustenance of the spirit. The PREAMBLE: "We the People of the United States in Order to form a more perfect UNION, establish Justice, insure domestic Tranquility, provide for the common defense, promote the general Welfare and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America". This was a bold action since it's said that only 1/3/ of the country supported this action while 1/3 opposed it, favoring the powerful British Empire. Those people were called royalists and felt more secure under the king's tutelage.1/3 were noncommitted.

THE CLASSIC POSE

If there was one impression I've retained over the years of the yellow-shirts it's this one: arms raised overhead beckoning the pilot to advance up the deck (to the parking area, that realm of the sometimes excruciatingly anxiety-wrought parking process that made me feel as if I was slowly, but slowly, approaching that point of no return). Note the pilot's eyes, firmly affixed on the yellow-shirt because he must, but also because he is completely denied any idea of what's directly in front of him. He is, quite simply, dependent on the presence and competence of that man in the yellow-shirt. The yellow-shirt then passes the pilot on to the next yellow-shirt at which time I can vividly remember watching the pilot's head jerk forward in an instant as he sought out the next yellow-shirt, knowing full well that he depended almost entirely on those men in the yellow-shirts. The pilot was, after all, operating a large, powerful machine that was making its way up a deck crowded with personnel not to mention other large machines (aircraft), some of which were also on the move. The flight deck was a dangerous place at these times and men had gross responsibilities. Just so do we all have responsibilities, probably not so critical, yet responsibilities nevertheless (even when some events seem to conspire against us). We also find ourselves sometimes dependent on others, as were the pilots, in the most difficult of arrangements which can often be an odious situation (including such as giving up some of our freedoms, like driving, in deference to others' well-being). Fortunately this dependence on others can be alleviated by, yes, by arming ourselves with knowledge (that we acquire from learning our "P's and Q's"). The key to learning is to make it an enjoyable process: have fun!

U.S. Constitution: this is the Christmas season and I feel the joy and comfort of the incomparable beauty of the Christmas hymns and the pleasure of the Christmas carols. Music doth have the power to soothe the minds of even the most discouraged (take heart, you of distraught sensibilities). In truth, is there a more inspiring set of music than the Christmas music? (for all, sectarians and nonsectarians alike). Is there one not moved by the magnificent hymn "Oh Holy Night"? But I digress, even properly, yet to the subject at hand, our government, in a non-political manner. Our government takes the course of federalism in which there are two distinct bodies: national and state governments in which the national laws overarch (precede) the state laws. In addition, we have a representative type government, both national and state, where we vote for those who will, in turn, represent us. In addition, states have the power to have referendums in which a given topic is approved or disapproved by a majority vote. Democracy is the right to vote with minority rights accommodated. Unmitigated control one over another is XX!


26
NATIONAL ARCHIVES

TOO CLOSE

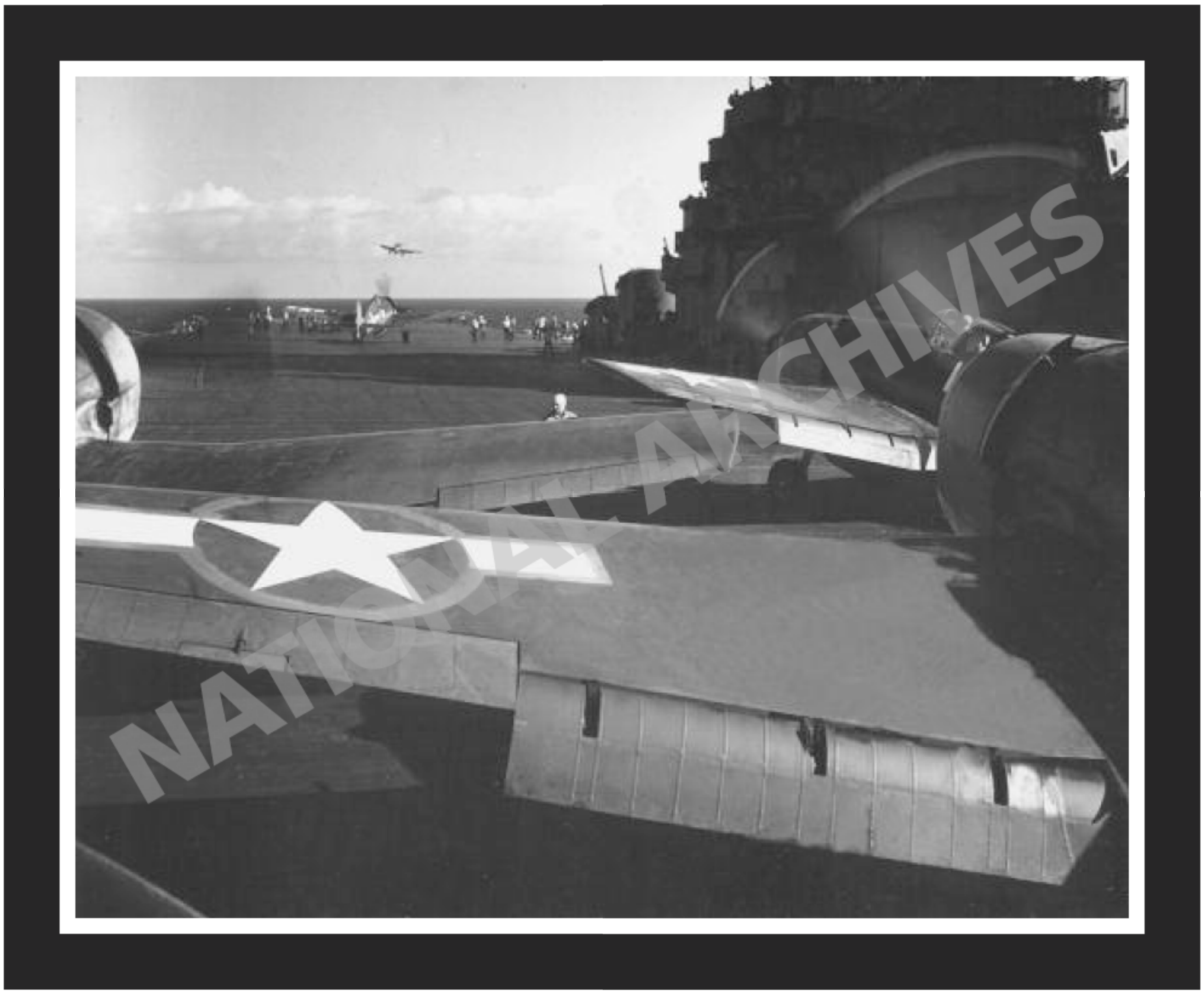
Following about 10 to 15 seconds behind the just landed aircraft was too close, resulting in a "go-around" without even being waved off. This picture can not be perused if one is interested in what's available from it. Firstly, this Avenger has been caught by the No. 3 arresting-wire (note that the wire is still attached to the hook(in a diagonal direction). Right now there's a pair of green-shirts disengaging the wire (the head of one of them is just perceptible back of the stabilizer). A yellow-shirt stands ready to beckon the Avenger forward to the next yellow-shirt opposite the aft 40-mm gun-tub (whose guns are directed outboard). Just in front of that yellow-shirt are two "men-in-white" wearing asbestos suits should it be necessary to extract a pilot from a burning aircraft. Those three are standing next to Nos. 1 and 2 barriers (now flat). Noticeable too is the No.12 arresting-wire strung across the after elevator: usually this wire is pulled back from the elevator so that it can be used during the landings (but presumably it's not needed at this time). Also note that the two radio-aerial towers are lowered to the horizontal position as is always done during a landing operation. This picture can be an object lesson in being observant. This quality ranks high on the scale of intelligent learning and is essential if we are to have an intelligent citizenry knowledgeable about their government. The more that one knows the less apt he is to be beguiled and even controlled. No democracy will long survive bereft of hard and fast facts (which come more easily by being informed and knowledgeable). Becoming truly interested in the world around us is the first step to learnedness.

U.S. Constitution: let's first run through the very basic outline of what our Constitution prescribes, Articles 1 through 7 as follows: 1) the legislature and its powers; 2) the executive office and its powers; 3) the judiciary and its powers; 4) the federal relationship between the national and state governments; 5) the amending power to the Constitution; 6) the Constitution as the supreme power; and 7) the ratification process. There have been 22 amendments to the Constitution of which the first eight are called the "Bill of Rights",ratified in 1791. Amendments 13 to 15 are called the Civil War Amendments, one of which, No.13, abolished slavery. Amendment No. 1 assured the freedom of worship, press and assembly. [Speech is not entirely free: the courts have riled that one is not allowed to shout "Fire!" in a crowded theater; there are also slander laws properly in effect (and I personally believe other forms of "free speech" should be limited, such as incitement to lawlessness and I stand with those who oppose the use of "raunch" and crudity, but admittedly this is less clear: a beautiful nude vs. a gross depiction. Here again, perhaps education of what is quality would resolve this problem about good taste..]

BY THE NUMBERS, COUNT

By the numbers, one after the everlasting other, the aircraft "step up to the line", race their engines and then release the brakes to launch themselves into the air to do their assigned duty. Duty is the prevailing mind-set that permeates the flight deck, the watch-word, at each and every launch. The pulse runs higher, the adrenaline rises, the senses perk up and the routine takes over. Yet, is it a routine when the unexpected can happen at any time and at any place? No, not routine, but routinely disagreeable possibilities. The Hellcat up forward has started its run down the deck from a start at a point within the shadow across the deck. This represents a firm 20 second interval between aircraft, enough to avoid the preceding aircraft's prop-wash. In the foreground are the following aircraft, with flaps down. To the right of each aircraft is a yellow-shirt, holding and guiding the pilot. What is unusual here is the space between these aircraft and the launch-point. This is too large a gap that doesn't follow the "routine". Imagine, an "air-field" in the middle of the ocean. What will they think of next? (Do yourself a favor: use your imagination to facilitate your learning-process.) It's very clear from this picture that everyone on the flight deck depends on the others. It could not be otherwise because dependability is the glue that holds a society together. On the flight deck life and limb are at stake but here at home the general welfare depends on dependability. Do unto others as you would depend on them. Remember, we are only as good as is our word ("our word is our bond" and without which there would be no such thing as that golden word, "honor"). Without it all else falls. Do your part.

U.S. Constitution: we call the framers of our Constitution the "Founding Fathers". There were recognized primarily six extraordinary men who were true patriots for among other things having a bounty on their heads by the British King. History recounts their lives so I'll only recount their names: George Washington, the "Father" of our country for assuring that all stay the course as well as having led the army to victory over the British and having been our first president; James Madison who was the primary author of the Constitution and the fourth president of the U.S.; Thomas Jefferson, the author of the Declaration of Independence and the third president of the U.S.; John Adams, a sometimes close associate of Thomas Jefferson and the second president of the U.S.; Benjamin Franklin the elder statesman ; Alexander Hamilton, along with Madison and John Jay, wrote the influential "Federalist Papers". All of these men were integral to the creation of the Constitution. Washington presided over the Constitutional Convention in Philadelphia which fashioned the most famous of all constitutions which was based on Madison's version written for the state of Virginia. There were 25 signers from all the states.


NATIONAL ARCHIVES

THE INDOMITABLE AIRDALE

As a pair of aircraft circle the ship in the landing-pattern the Airdales quick-time the wheelchocks up forward, passing the deckedge elevator (note the safety netting). Multiple times I've said that we on the Antietam usually picked up the aircraft at the area where they came to a stop after touch down and trap. This meant that the wheelchocks were assembled back aft as opposed to up forward near the parking area as these Airdales are doing. It's apparent that each ship had its own procedure for handling their landing operation. For my part, having been a late comer by a few months, I merely followed suit as befits the sensible course of action. I must confess that I don't understand why these Airdale are running. However, I like this because it indicates the right attitude: due diligence to their duties that reflects well on their sense of responsibility. I'll also be willing to warrant that they did not have to be told to do so. We, the Airdales, were the "low man on the totem pole" doing a mundane job but we were proud of the work we were doing. We were part of a small cadre that made a difference in the scheme of things which were a part of the larger scheme of things. Pride can be built on the smallest of things. A good grade in a school-subject may be a small thing but it's part of the important larger scheme of things: your future. The first sign of growing up is when one starts to take charge of one's future because if not you then who? Taking responsibility for one's own actions is the mark of a grown up that should be ardently desired by one and all. [A caveat: the early teens need not be in that much of a hurry: once grown up there's no turning back (but that's my own personal view). Change of course implies for the better which in turn means based on INTELLIGENCE.]

U.S. Constitution: the Constitution has 4,440 words in it . It's the oldest and shortest written constitution of any government in the world. The framers made a point of establishing three branches of the government (legislative (Congress), executive (President) and judicial (Supreme Court)) as essentially equal by constructing checks and balances one on the other. The Congress contrives the laws which are administered by the president both of whom are adjudicated by the Supreme Court. Each of these powers must operate within the framework of the Constitution thus restraining one branch's domain over another branch. What is allowed the other is denied even as each branch has limitations within its own domain. For instance, if the President embarks on actions seen as not conforming to the wishes of the Congress, it can withhold monies from the executive branch. If the executive administers a law in a manner deemed unlawful by a group, that group can solicit sanctions against that action by appealing to the courts for adjudication. The courts "can not" legislate from the bench (by court order).

THE AUDIENCE

The checkered flag goes down as the pilot releases his brakes and studies his gauges. The "gallery" of spectators on the deck are brown-shirt plane-captains, up front to watch "their" aircraft as it revs up and takes off. Each plane-captain has a personal interest in "his" aircraft, thus he's there at the starting line to evaluate the sound of the engine, how fast it accelerates and the like. Of course the pilot, with the instruments in front of him, has a better reading of the condition of the engine. The pilots are not only concerned about their mission but also they're vitally interested in the reliability of the engine because there just aren't any landing spots out there over the endless ocean. The marines took woeful casualties to secure the tiny island called Iwo Jima in order to provide a way-station for damaged B-29 bombers after their raids over Japan. It was their place of refuge out there over the vast Pacific Ocean. The carrier's pilots had the carrier as their point of refuge, if they could reach it. In the distance is another carrier, another place of refuge. This side of it, on the catwalk, are the below-deck types "catching some of the action". These spectators, and the brown-shirts, are a good indication of a healthy curiosity which in turn feeds their interest even further. Many of these personnel probably never saw an aircraft in person and they're taking advantage of their opportunities. This is natural but also commendable in that they'll be stimulated to delve even further into the world around them. In effect they're doing themselves a big favor, for they're learning new things (even if it's only a Hellcat rumbling down the flight deck). Stay interested!

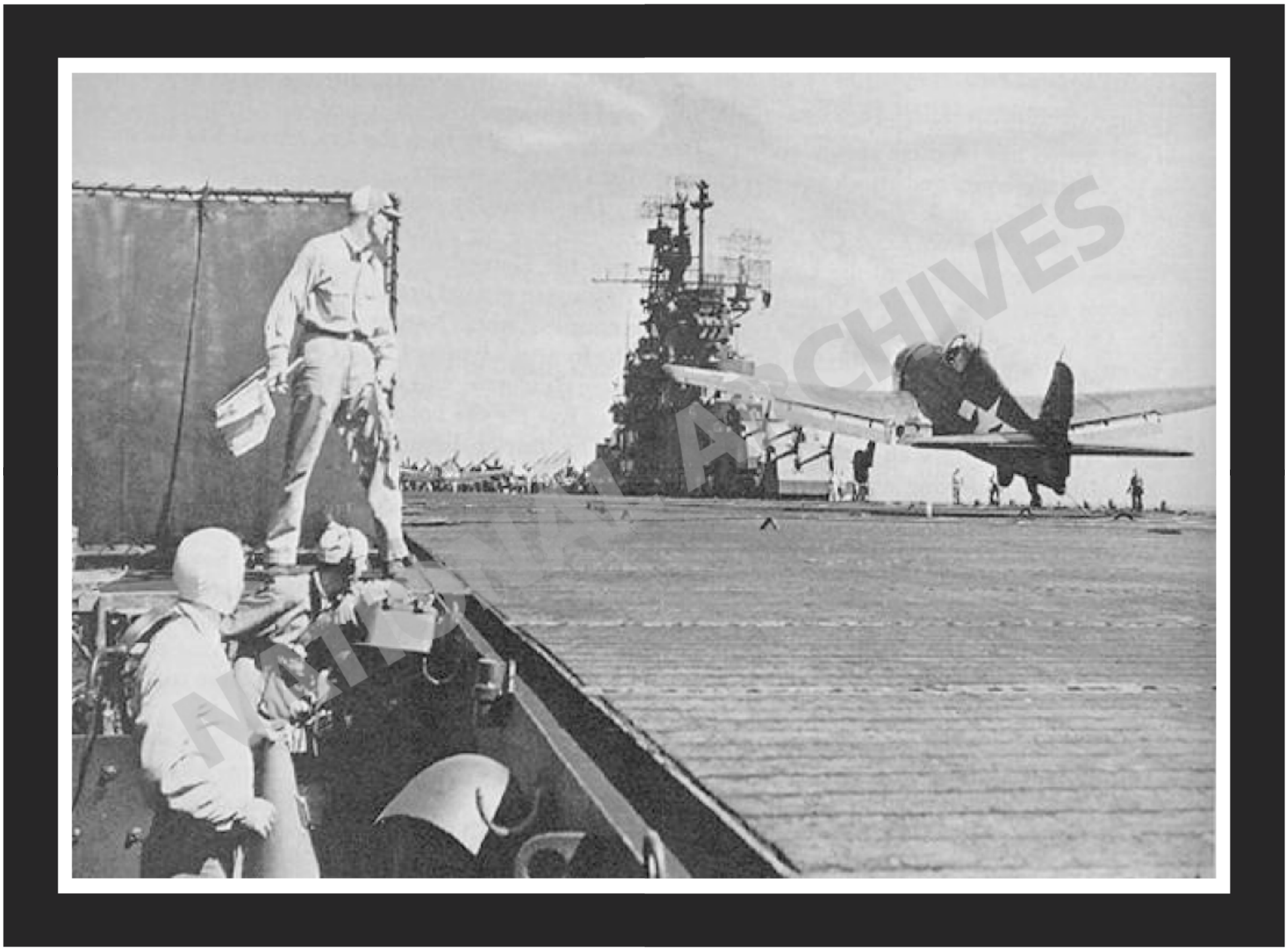
U.S. Constitution: the Congress is divided into two chambers (Houses): the Senate and the House of Representatives. Each state elects two senators and each state elects the number of representatives as determined by their population (the larger states having a greater representation). All legislative acts as voted on by the Congress shall be subsumed by the Constitution. That is, all legislative statutes must conform to the provisions of the Constitution with the courts deciding the disposition of any dispute between the Constitutionality of a legislative statute. There is, however, concern that in adjudicating these disputes the courts may in effect be the source of new laws. This is proscribed (forbidden) by those who consider themselves the defenders of the strict separation of powers between the legislature and the courts. At the same times there are those equally fervent in advocating that the Constitution evolve with the times to represent those changing times. [This would seem to take one on the slippery slope of court-originated laws, a far cry from the separation of powers. Remember, the courts members are selected for life and are immune from the plebiscite (referendum) or even representative review.]


NATIONAL ARCHIVES

ANOTHER PAINTING

And another Hellcat puts down inside the prescribed 200 by 8o foot area, threatening neither man nor machine. The LSO (Landing Signal Officer) gives a concerned look to verify a satisfactory landing. He has little time though to tarry because the next aircraft is fast approaching the "slot" at which time the pilot will require the assistance—-no, the complete guidance——of the LSO to assure a good landing. It appears that this Hellcat is catching wire No.1 which will pay out about 60 feet. The green-shirt controlling the barriers has to be very alert to lower the barriers the moment a good trap has been made lest the aircraft entangle itself in a barrier (should it catch one of the wires further up the deck). Note how the Hellcat has flared up slightly (nosed upward). This tends to slow the aircraft but it also makes for a harder touch down since the wheels have further to go to reach the deck. It's for this reason that Navy carrier aircraft are ruggedly built (which means that they're therefore somewhat heavier. When the Hellcat taxis forward an Airdale from each side will go to each wheel with wheelchock in hand to accompany it to the parking area where a group of Airdales will assist its folding its wings. It's now that commences that most harrowing of experiences on the flight deck: the parking process The inanimate aircraft can be very threatening and intimidating at times such as these but what's equally as emotionally painful is the cowardly, deliberate needling done to others who have no way of avoiding or countering such (nonphysical) bullying. Good-natured banter (and teasing) are fine; in fact they show a certain affection. The other , however, is outright maliciousness and detrimental in terms of its possible outcome. It's especially reprehensible if the recipient of the needling is denied any relief or understanding or protection from the subtle taunts. This type of bullying is sharply antithetical to one's general welfare. No, the Constitution doesn't forbid it but that's no reason to overlook or condone it. Good fellowship absolutely forbids it. Don't demean yourself by being a bully.

U.S. Constitution: this will close the issue of the Constitution until a more complete addendum after the final page. Here we'll close with a few comments about the Presidency. Basically, the President administers the business of the government by presiding over all the departments of the government. He's responsible for appointing the top-level managers of all the departments as headed by the Cabinet-level officers who are his direct contact with those departments. One of his most important functions is presiding over the conduct of the country's relations with foreign governments. This includes responsibility for the U.S. Embassies throughout the world which in turn represent our interests, including those of our citizens, world-wide. The President also sets policies.



HELL ON BOARD

I prefer not to comment on this catastrophe except to say that this is what can and did happen, anywhere on the flight deck, when a high-powered aircraft has to land on and stop within an area about 200x 60 feet (correcting my having previously said “80” feet). Yes, accidents do happen as did this one when very probably it was again a matter of the auxiliary fuel-tank breaking loose, bursting and spilling the high-octane gasoline onto the deck to be ignited by a spark caused by the metal fuel-tank scrapping over the metal hold-down cleats that run across the deck every six feet. We can only gaze at this picture, bow our collective heads and murmur “Farewell, gallant airman. ‘Tis war that claims you. Rest in peace”.[Do we understand how the living morn in pain at the loss?]

Muscle Function: to begin at the beginning we'll consider the fabric of muscle: protein. A protein consists of amino acids which combine to form peptones which combine to form albumen which combines to form protein. Protein is a a polymer (chain) that contains carbon, hydrogen, oxygen and nitrogen (some also contain sulfur). Amino acids are made of a carboxyl group (COOH), an amino group (NH(2)) plus hydrogen, oxygen and an organic group. The protein is made up of these amino acids joined together by peptide bonds (CO(2)) to form large molecules. There can be many hundreds of amino acids in a molecule of protein, of which there are 20 different kinds (of amino acids) due to different sequences of peptide linkages. The muscle protein is just one of many proteins (such as enzyme proteins, skin protein, etc.). Thus protein molecules are long chains of amino acids linked by peptide bonds. The properties of a protein are determined by the sequence of the amino acids in the molecule and by the three-dimensional structure of the molecular chain. Protein synthesis occurs in the body's cells. The data determining the order (sequence) in which the different amino acids are joined is found in the DNA (deoxyribonucleic acid) in the form of a code. The part of the DNA that carries the code for a protein is called a gene. A protein of average size contains about 200 amino acid molecules. With 20 different amino acids that can be put together in various configurations and sequences assures the possibility of “unlimited” number of different kinds of proteins even while having the same content. Recall that the cerebellum controls much of the overt physical activity (muscle responses) as specified by the cerebral cortex. Muscle are long in structure and can contract to one-half to one-third its at rest length. Muscles form antagonistic pairs where the contraction of one of the pair causes the extension of the other pair. The voluntary muscles are attached to the bones via tendons with motor-nerves directly affixed to the muscle. These are called striped (or striated) muscles. [To be continued.]

THE PLAYING-FIELD

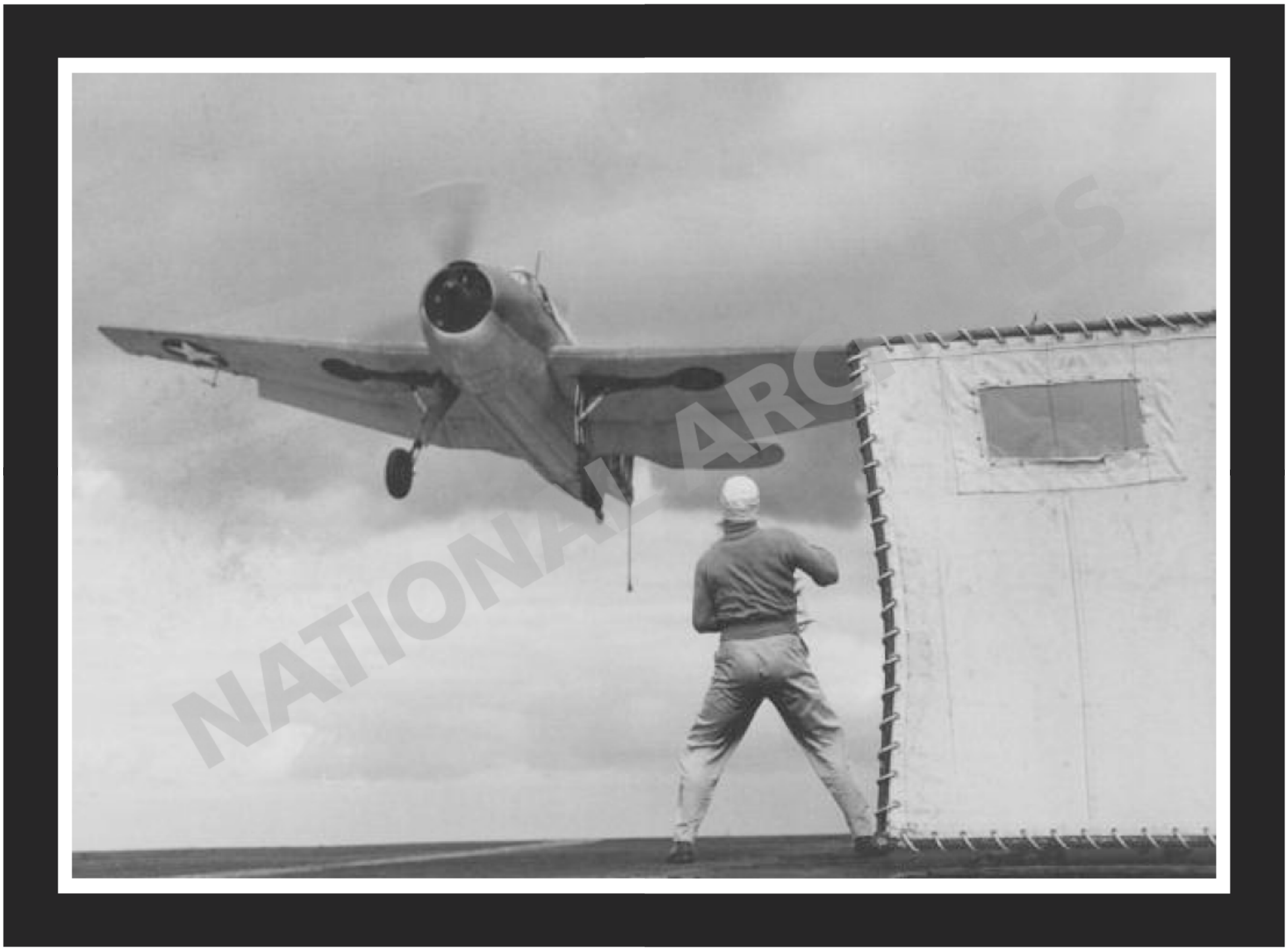
There, down there, that's the clamorous playing-field and this Airdale, the one struggling next to the Hellcat below us, this is what I did as my contribution to the war-effort. My only comment about this scene relates to the dearth of aircraft on the deck. With almost 100 aircraft to launch there needs be a line of aircraft ready to "toe the line" just to the right 400 feet from the front of the flight deck. From front to back are the captain's marine guard standing at the aft part of the navigation bridge, a sailor standing on the ladder (stairs) leading to the PRI FLY filled with officers and of course the yellow-shirts on the deck directing traffic. Those vertical lines are the halyards used to raise the multi-colored signal flags. (The open space on the flight deck disturbs my sense of propriety; in all deference, this definitely is not the Antietam.) For the uninitiated this view seems to imply the privileged (the spectators on high) and those in possible jeopardy on the flight deck. Not so. This is war and privilege is not a consideration. Period. However, it does suggest the generic concept of fairness (outside of war). Justice implies fairness. But what's fairness? Those endowed with the quality of empathy will understand what fairness means. Kindness can be said to be a direct relative of fairness. Fairness comes with legitimate maturity and is a mark of strength. Only the strong can be truly fairminded and kind. Have you ever meet someone who has low self-esteem who's fairminded? Fairness breeds fairness and so is felicitous for society. Consider: would most laws be required if there was universal fairness? If one follows the rules representing proper standards of conduct made by consensus, fairness shall usually prevail. Impartiality and equality of opportunity would seem to cover most cases. If all else fails, try this: "how would you like it? " (the vernacular for the Golden Rule—do unto others as you would have them do unto you [just make sure that what you like is not antithetical to them].)

Muscles: there is the smooth muscle and the striated muscle. The former deals with the involuntary processes and the latter with the voluntary. We'll consider only the latter. They say that we have 639 muscles. They also say that these muscles contain 6 billion muscle fibers, each of which contains 1,000 fibrils. This is what they say. In the performance of work the fibril "motor" of the muscle fiber exhibit a process similar to the car engine in ten steps: 1) Both are combustion engines that consume high-grade fuel. The muscle cell converts its fuel to carbon dioxide and water. 2) The "fuel tank" is the gastro-intestinal process and the lungs. 3) The heart can be considered the fuel-pump. 4) Oxygen is required for combustion of th fuel. The "carburetor" for this biological engine is the lungs. (To be continued.)

MAKING YOUR PRESENCE KNOWN

Twenty feet high, forty-five mph relative to the deck, forty yards yards from touchdown, and all's well though the LSO (Landing Signal Officer) is not yet convinced. He and the Avenger's pilot lost eye-contact about sixty yards further back so ever since then, when the engine was shut down to idle, all is left to Mother Nature. Consider the impact this aircraft will make in the matter of moments: falling 20 feet at 45 mph horizontal within 40 yards. After touchdown there'll be about a 35 foot pay-out of the arresting-wire. Such is a landing on a moving deck (which alleviates the situation) within a 200 by 70 foot area. Certainly doable (because it was done over and over and over again, but not all with such felicitous results). After all, setting a 12,000 pound aircraft (this one is 16,000-lbs.) this way is not a normal way of setting down am aircraft (unless you happen to be on an aircraft carrier). Note the tail-hook "reaching" down to clutch at a wire. Unless their was an excessive bounce at touchdown and the aircraft was unable to grabbed any of the wires, there would be another one of these "traps" in about 20 seconds (and another and another, etc.). The canvas screen to the right was to protect the LSO against the wind. Are we as an organized society oriented toward and to protecting those who are unable to protect themselves against the adverse vicissitudes and hardships of life? As I sit at my window I notice a squirrel rummaging in the leaves for sustenance on this cold winter day. I can't help but wonder at his tenuous existence at this time of year as compared to me in my warm home adequately provisioned. How many "squirrels" are there out there.? How can one not help but commiserate with that little squirrel in the cold elements (and admire his indomitable spirit)? [Note my use of the word "organized" above, without implying a political persuasion. Further, the above is not about "feeling good" (though such helps). That is, the idea is to make others feel good, not necessarily yourself.]

Muscles: 5) The artery is the line by which the fuel-air mixture is sent to the "motor" (fubrils). 6) The functioning elements of the muscle "motor" are within the parallel fibrils comparable to the auto's row of cylinders. 7) In both types of motors the fuel-air mixture is ignited by a spark. The auto has an ignition system while the body has the nervous system supplying the "spark". 8) The auto makes use of spark-plugs while the body is provided with fibril end-plates. 9) The combustion products consisting of carbon dioxide and water are carried off by the "exhaust" system, or the veins. 10) In both auto and body, the energy of the combustion has to physically move something: the auto has a crankshaft and gears for this purpose while the body uses its limbs as the output of its combustion. Both systems make abundant use of lubricants to maintain a smoothly run machine.



UP IN THE AIR

Up in the air but soon to join his brethren down here on the restless flight deck under the watchful eye of the LSO and his trainee. When a 16,000-lb. machine drops in like this it's an event, even if it occurs time and time again, day after day. The heavier bombers (the Avengers and the Helldivers) tended not to bounce as much as the "hot" fighters (Corsair and Hellcat). With time we came to know the landing idiosyncracies of each of the aircraft. The more ponderous Avengers were more apt to set down with less energy than did the active Corsair that might land in the most incongruous positions, such as upside down. The Corsair joined the fleet last because of its marginal landing capabilities. With modifications it was finally allowed to "come aboard" in spite of its inconsistencies. It was such a superior aircraft once in the air that it could not be denied. Here, this Avenger is probably well situated, if a little high. Sometimes the LSO had to make an "instantaneous" decision as to wave off or not. Some wave-offs were clearly indicated but others were marginal. Once the "cut" signal was given by the LSO there was no "turning back". It was thus incumbent on all hands to stay alert to any untoward landings. Landings could be problematical but it was the launch and parking processes that could "raise the hair on the back of your neck". Prudence dictated that you show respect for all landings regardless of height, speed, attitude and alignment. Just so when we meet someone for the first (and second and on) time. This is one of the easiest things one can do which also has such a salutary effect. It goes without saying that this respect be evenhanded regardless of the newcomer's apparent or obvious station in life. That is, until known, everyone is equally due respect equally. In fact, the lesser the station the greater the respect that's in order. At the same time exhibit due diligence to not impose yourself on others. An imposition is an imposition and I for one will not impose myself on others..

Muscles: where the auto's engine produces repetitive explosions the body's muscles have protoplasmic filled "boxes" that are energized by electric impulses from the brain such that the semifluid protoplasm freezes for a fraction of a second and then returns to a semifluid again. This process is accompanied by a chemical reaction. During this process the glycogen molecule is broken down into glucose which combines with phosphoric acid. This compound is then divided into three lactic-acid molecules of which only one is used for fuel. The other two are resynthesized into glucose. A Nobel Prize was awarded for this discovery but the actual nature of the protoplasmic motor is still diffuse. The muscle action is complicated but in general the muscle-motor is activated by the fibrils of the muscle fibers contracting. This is but an outline. Consult the texts for amplification.

PICTURE-PERFECT

From all appearances this is a picture-perfect landing. However, the picture is completely bereft of all personnel except for those two green-shirts at the right edge of the flight deck. Where is everybody? Why aren't there several yellows-shirts down there ready to immediately hold and then send up the deck the Hellcat whose wings have first been folded by a group of Airdales? The dearth of personnel is somewhat "spooky". No aircraft moves on the flight deck without a cadre of yellow-shirts guiding it along its path up to the parking area. What would have been a perfect picture is marred by this lack of a flight deck crew's presence. Furthermore, we most always folded the Hellcats' wings right there where it was unhooked. It wasn't good form for an aircraft to go rumbling up the deck with wings spread. Thus the procedure here is significantly different than that of the Antietam but rest assured that there are personnel down there ready to do their duties. A carrier is the domicile of strict adherence to responsibility. We here at home should be so strict about our responsibilities. Some responsibilities are very important, as here, and some not so much so. Yet big or small, being responsible is the sinew of a prosperous society. What is responsibility if not following accepted rules and regulations where one can not necessarily do what he wants when he wants. Our freedoms are inextricably entwined with our responsibilities. Freedom is hollow less the attendant, well developed sense of responsibility: rules, standards, ethical conduct, a moral stance, even the concept of honor—look up these words, that is if you're responsible. Ultimately, responsibility is the earnest seeking of the meaning of the word "responsibility". You take it from here, remembering its importance.

Muscles: muscle fatigue can be assigned to the generation of the lactic-acid with the use of the muscles. If lactic-acid is removed from a tired muscle the muscle is "revived". These lactic-acid toxins are always being generated as well as other fatigue-producing substances produced by the destruction of muscle protoplasm. These fatigue substances are carried throughout the body by the blood to cause general fatigue, including fatigue of the brain. Recuperation occurs when these lactic-acids and toxins are removed from the body. Muscle cell damage must be repaired and the nerve cells must be recharged. Fatigue engendered by sitting at a desk for a long time is countered by walking which activates the rested part of the body. This stimulates the recuperation of the fatigued parts, such as your brain. The human body has 500 pistons going in all directions, several 100 's of driving belts driving more than 36 transmission systems and moving over 100 joints. The mechanics of all this has left the experts bewildered. Such is the introduction to the complex subject of the muscle-system (check it out).

THE BUSINESS AT HAND

Down below, down there on the flight deck, serious and dour business is being conducted with the appropriate attention it deserves as an appalling 1,000-lb. bomb to the left and a cataclysmic 2,000-lb. bomb to the right are being wheeled to their respective delivery systems. Below us we see a mix of red-shirts and blue-shirts all seemingly in motion with a given purpose in mind. The purpose of those with the bombs is clear while the purpose of the others is somewhat less so. Even the tractor driver is leaning forward in a purposeful mode. Evidently the aircraft are being respotted back aft in preparation for the next launch with the red-shirts at work even before the deck is set (as is the dinner-table). The life of the flight deck crew is purposely prescribed in all aspects: place these aircraft back aft, in order and in close proximity to each other. Should we consider that our lives are so well defined? There's a certain comfort in having an orderly purpose to one's life (just like the one I used to know on the flight deck), but what is that purpose? Perhaps, like the flight deck crew and as should be ours, it's to do our very best in what it is we are properly doing, big or small. Perhaps our purpose is to benefit ourselves in such manner and force as to bring benefits to those around us as a result of our self-serving efforts. We should do this regardless of the impediments thrown our way, the frustrations created on our behalf, the thwarting barriers erected in our desired paths. Our purposes should be those that instill a pride in our accomplishments that benefit not just ourselves but coincidentally our world around us, minimal though they may be. Our purpose could be the satisfaction of leaving this world a better place than when we entered it. Our purpose might even be found when we step back and view the world as does an innocent child, thus feeling a uniquely rejuvenating fillip. Perhaps our purpose is to do, to be, such that at the end of the year when reckonings are made and reminiscences well up we know that we had even a modicum of salutary effects on the world around us, even while not grand. Finally, our purpose is to be true to our responsibilities. If nothing else, our purpose is to think responsibly.

Algebra: is the branch of mathematics in which numbers are represented by symbols for variables and unknown quantities. For instance, the algebraic statement (equation) (x+y)^2=x^2+2xy+y^2 is true for all values of x and y [the symbol "^" refers to a quantity raised to a power such as 2, 3, etc. To be continued.

THE AIRDALES PLACE

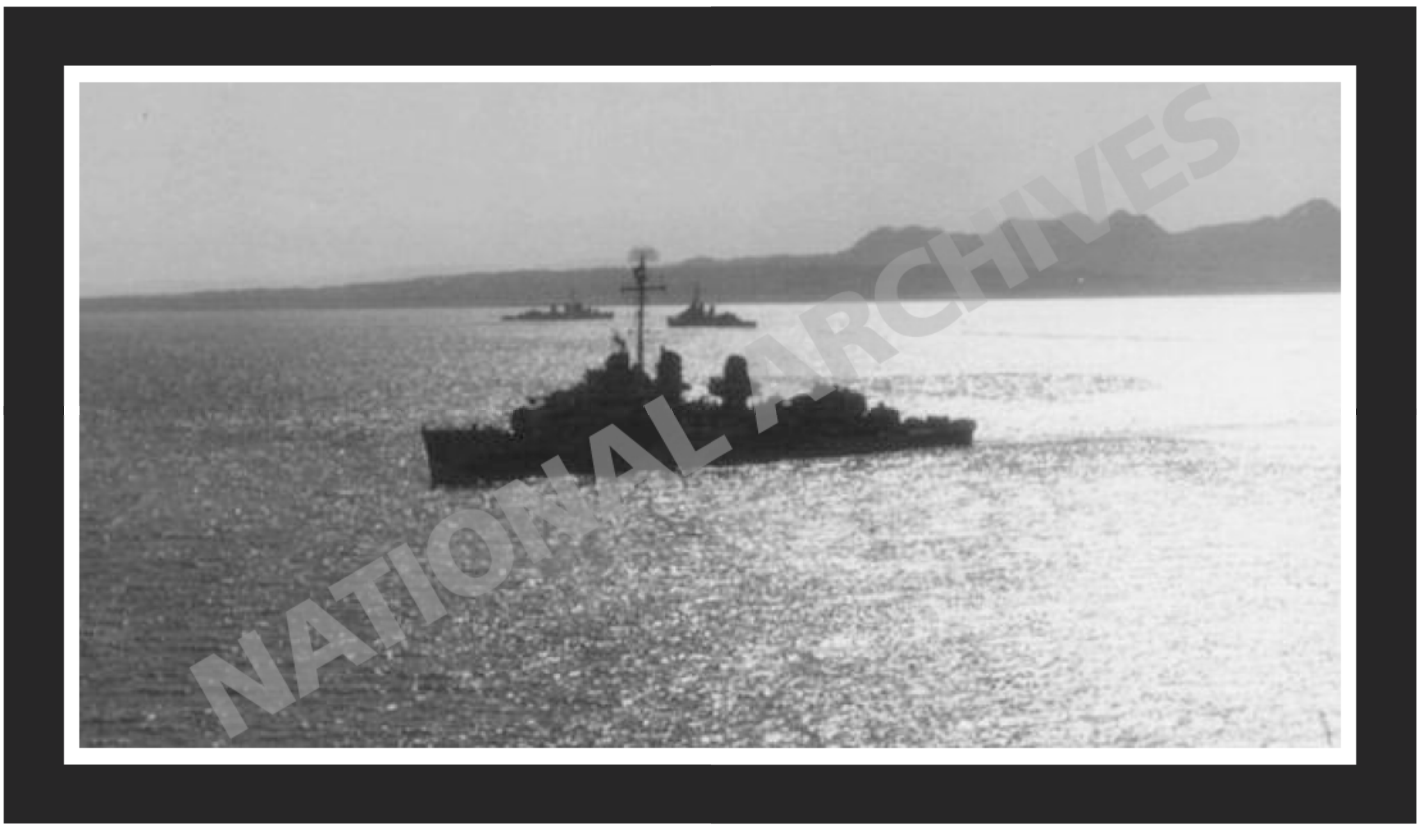
Come visit the Airdale's place, for it's here that he spends much of his time. Crouch down low under the cover of the spread Hellcat wing so as to mitigate the thrashing blow of the punishing prop-wash as this Hellcat chomps at the bit to fly off the deck and into "the wild blue yonder". The admonition "Airdale, stay alert" is mot necessary even for them who have felt many an occasion just like this. Close at hand is this Hellcat armed with two 5.25-inch rockets while the Hellcat beyond has none. A yellow-shirt, arms in the proverbial upraised position, is beckoning forward that Hellcat as the Airdale with wheelchock in hand, stays with it until its been passed to the air officer up the deck at the 400 foot take-off point. He stays low to avoid additional wind-blast since the tip of the propeller is directly in front of his face. Not all of the Airdales would stay with the aircraft to the take-off point as was my mode of operation. When I first joined the Airdales I saw others do so, so I followed suit thereafter till the end of my tour of duty thirteen months later. Standards are set by those who have experienced the process over time. We who follow take advantage of those who have had the experience of a task or a situation. WE learn that such standards are our guide-posts to a proper conduct as we make out way through life. We should be grateful for them since it reliefs us of the effort and necessity of "reinvent the wheel". It's somewhat as if someone blazed a trail in the woods and we who follow are thus properly guided. Yes, it's a long way between the flight deck and the woods but it all falls into place. Don't forget, standards include all our ethical and moral time-honored values.

Algebra: an algebraic statement (equation) such as (x+y)^2=x^2+2xy+y^2 is true for all values of x and y [the symbol "^" refers to a quantity raised to a power such as 2, 3, etc.]. The basic purpose of algebra is to allow the solution of mathematical equations in which one of the variables is unknown. The unknown variable is represented by a symbol such that an equation containing that variable can be manipulated to arrive at its value; variable x=9. In the complications of the real world algebraic equations are invaluable for reducing difficult problems to manageable terms: the management wrestles with an equation when it decides how long to keep a machine that depreciates at so many dollars per year before replacing it with a new equipment that costs a certain amount. Closer to th e ship, algebra is used to determine how a timer should be set so that a bomb dropped from 10,000 feet will explode 500 feet above the target (war would not occur without algebra, but we do need algebra). Scientists would be tongue-tied without the "language" of algebra. In a way, algebra (and math) is shorthand for their thoughts and the results of their experiments. To make it useful, algebra makes use of symbolic arithmetic.

"PEACE BE WITH YOU"

Even in a time of war there are those moments of tranquility and serenity without which one would be but a rudderless ship in a sea that besets us with naught but an underlying angst. We need those moments of contemplation to refresh us and resolve our own "Gordian knot" (admittedly this is somewhat "steep"). Becoming more prosaic, an artist would possibly rearrange this tableau something such as moving the ship in the foreground somewhat down and to the right, the upper right ship down and to the left and the upper left ship to the left and a little less down (so that the two small ships balance the larger ship and thus the picture). In any event, is this not a restful scene in that world engulfed in the madness of war? Yet, it is a war and in that war these destroyers were seemingly innumerable. We always had at least two of them either following us (during landings) or preceding us (during launches). They were the epitome of the sea-blue Navy, the conveyers of the true "sea-dogs", the "tin cans" (thin skin), the "little boys" that did a man's work. As a boy of ten or so I was given a little wooden destroyer about nine inches long. It was one of my fantasies: captaining this sleek little ship over the bounding main while wearing my Navy captain's garrison hat. At bottom, this picture is the embodiment of the world of reflection and musing and as such, if you will, thoughtfulness (which means both a thought-provoking mood and a concern for those around us). Is not this word "thoughtfulness" one of our most preeminent? (Yes, it is, and even now I'm listening to the soothing as well as stirring music entitled "Meditation" which I believe embodies the word "thoughtfulness"). It's a word that on one hand is inward- looking and on the other hand outward-looking. It does double-duty and as such it's doubly important. At the same time there are those who seek to shut out the unpleasant with a semi-controlled frenzy. I've met "frenzy", I've known "frenzy" and "frenzy" is no friend of mine. [I don't mean to put down (legitimate) enthusiasm but sometimes it becomes mindless (even destructive).]

Algebra: in 825 A.D. al-Knowarizmi, the sage from Baghdad who had publicized the 10-positional system of numbers, wrote the first clear textbook on algebra. The title of the work "al-jabr w'al-muqabalah", which means "the art of bringing together unknowns to match a known quantity" (is that a compact for a social policy?). The key-word in the title, "al-jabr" means "bringing together" and so the word "algebra" was derived. That in essence is what algebra does: form an equation that contains both knowns and unknowns which are then manipulated until all the knowns are on one side and the unknowns on the other side. The concept involves assigning symbols to both knowns and unknowns to represent the equality of both sides of the equation.


NATIONAL ARCHIVES

NOW THE DAY IS OVER

As we approach the final pages of this book the pictures become more oriented to the quietude symbolic of reaching the end of a journey, an adventure never to be experienced again, ever. This picture is the end of a day whose activities were heightened by the visceral effects of the sound and fury felt on this flight deck, this "playing-field" of one-hundred large "combatants". Here the shadows lengthen as the sun back-lights those magnificent mountains of cumulus clouds just barely defined. The sea's settling down to its eventide calm as it shimmers in the sun's brilliant light. Up close are two of the Hellcats, wings spread, ready for an early launch come tomorrow. All are now below deck emotionally unwinding after a full day's work amid and among the raging aircraft. Meanwhile I'm sitting topside in a lookout's chair watching the drama of the largest free-moving objects in the world: the giant cloud formulations there in the distance. Do we ever really comprehend and fully appreciate the glory and grandeur of Mother Nature? Do we have an inkling of how much these things can enrich our lives? Yes, they're there for all to see (but where are we?). One good reason for being interested in many things is that by so doing we come to learn many new things, one of which is the realization that when denied enjoyment in one area we know of other areas in which to fill the void. Learn that happiness, even pleasure, is there waiting to be found. "Seize the day". [Encourage your interest in things to stimulate your desire to learn.]

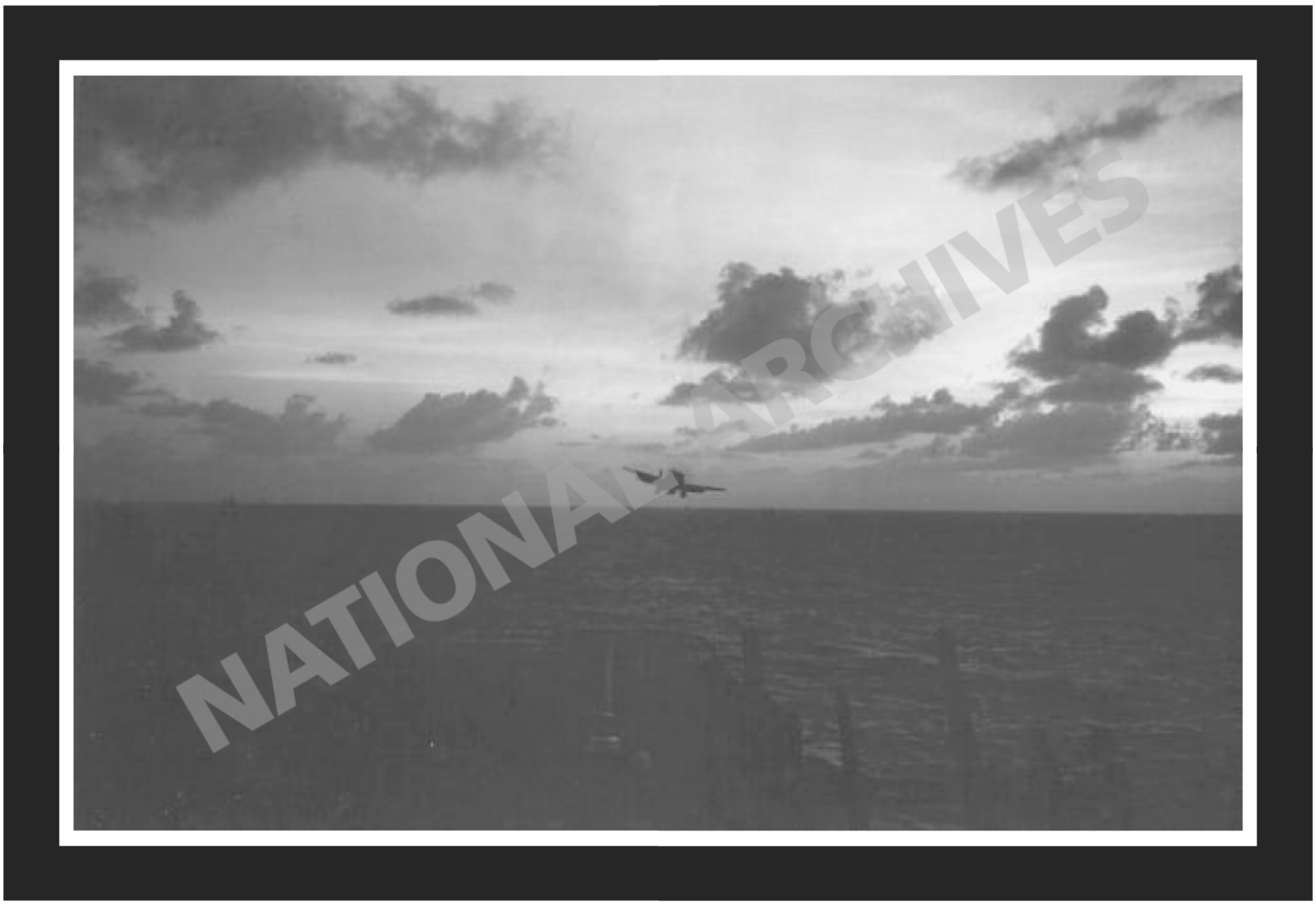
Algebra: the power of algebra is its capability to construct unwieldy word problems to more manageable symbolic equations. For instance we can determine a man's age by converting a set of statements into an equation: a man's youth lasted 1/6 of his life (letting x represent his life we have x/6); he grew a beard after 1/12 more (x/12); after 1/7 more of his life he married (x/7); 5 years after his marriage he had a son (5); after his son was born he had a job that lasted exactly 1/2 of his life (x/2); he then died 10 years later. How old was he? Solving for x, his life span, we obtain $x=x/6+x/12+x/7+5+x/2+10$ and $x=94$. The creative part of algebra is setting up the equation: denoting the unknown quantity by x and from the conditions given in the problem, find the expressions which are equal or which form an equality (equation). One expression may equal another if an amount is added or subtracted or if the expression is multiplied or divided by a number. By arranging these conditions to make the expression equal, an equation is formed. Numerous laws of mathematics or mechanics or physics often establish the foundation on which to build the equality such as length x width=area, or rate of speed x time=distance traveled or number of articles x price each=total cost or number of people x $received from each=# of $ received.


40

COMING HOME

"Now the day is over, night is drawing nigh, shadows of the evening steal across the sky", a sky that's amber with clouds a luminous gray over a dark, foreboding sea as the air takes on that freshness impelled by the slight evening breeze. All is well. But no, the war is still with us where there are those who straggle back from their mortal combat up there high in the enveloping sky. Now then, which is it, a glorious evening sky or a "battleground" of victory and survival or defeat and death? For now, the war will not let go. Besides, a lone Hellcat is yet to come home as the pilot strains his eyes to mark those small lighted paddles that the LSO is diligently manipulating. The moment of truth fast approaches when the moving deck is but an apparition in the lowering light. The flight deck personnel fix their collective eyes on this lone wayfarer as they imperceptibly clench their fists in anticipation of the impact and then the possible worst. One could even say that each time an aircraft makes a landing it's "a moment of truth". Hold on, just what is this thing we call "the truth"? Truth is not in the eye of the beholder: the immutable truth is that the sun will rise every day (if it does not, everything is moot). That's a fact, a truth that's provable. Then there are those truths that are intangible, yet truths nonetheless: as Thomas Jefferson wrote in our Declaration of Independence. "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain inalienable Rights, that among these are Life, Liberty and the pursuit of Happiness". However, how does "truth" differ from "honesty"? Honesty is the opposite of lying where you know the truth but not only withhold it but also knowingly distort it. To tell th truth straight-on is to be honest which is to be honorable. [To tell a lie about a thing is reprehensible; to tell a lie about a person is sinful to the fullest extent of the moral code (without which we would all be cultural paupers).]

Algebra: continuing our listing of examples of equalities, principle x percentage rate= interest; the square of the hypotenuse=the sum of the squares of the two sides. The problem may state the equality directly. One then arranges the conditions of the problem to conform to this equality. For example, consider this problem: In 15 years Mary will be three times as old as she was 5 years ago. What's her present age? First look for an equality. If we multiply her age 5 years ago by 3, the product equals her age 15 years hence. This is our equality (equation): age 15 years hence=3(age 5 years ago). Now let x=present age (which we will determine). Then $x+15$=her age 15 years from now, and $x-5$=her age 5 years ago. Form the equation $x+15=3\ (x-5)=3x-15$. Therefore $2x=30$ and $x=15$. Next we'll consider problems with two unknowns in which two conditions or statements are necessary.


NATIONAL ARCHIVES

WATCHING AND WAITING

A glassy sea presents itself to the solitary Airdales who, along with the gunners manning their 20-mm guns, watch and await any possible terrors from the sky in the form of determined, single-minded kamikazes. The still, placid sea disguises the thoughts of an implacable enemy screaming down in all their fury. The sailors, being a superstitious lot in these circumstances, might be wondering whether that sliver of light on the horizon is an omen for good or evil. What they wonder is what is just beyond that nearly indistinguishable horizon. Their vigil brings nothing new as this study juxtaposes the serenity of the sea against the anticipation of a possible fire-storm sweeping the deck. They might be wondering if this is the proverbial "quiet before the storm". Who knows? [Note how a picture can be even more effective by not being "busy": you're able to read into it what you will.] In that mode, I'm able to surmise that these sailors are by now, in their Navy careers, able to have a confidence in their ship to weather any storm (served up by the enemy). This self-assurance not only makes their life simpler and more effective but also assures the efficacy of the ship under any and all conditions. Just so too in our civilian lives: we become more efficient in all we do by dent of the self-confidence we bring to a job or activity. In no way whatsoever does this imply even a whiff of arrogance. In fact, earned self-esteem causes one to be apparently more self-effacing because one has no need for recognition. In addition, another plus is that the quietly self-assured person is the complete antithesis of the arrogant and bullying shell of a man. Have you ever seen a self-assured person be an overbearing person? No, never. What a felicitous society this would be if the world were full of people with honest self-esteem! Think on that because to do so will stand you in good stead.

Algebra: to solve problems with two unknowns two statements or conditions are necessary. One unknown is usually denoted by x and the other by y, but it isn't always necessary to use two symbols for the unknowns because the second unknown can often be expressed in terms of the first unknown. In the following example only one unknown will be used: one number exceeds the other by 8 and the sun of the two numbers is 14. Find the numbers. The condition of equality is stated directly in the problem; the sum of the numbers=14. This is also a statement of a condition. The other statement is that one number exceeds the other by 8. Let x=the smaller number. Then $x+8$=the larger number. Forming the equality from above: $x+(x+8)=14$ so $2x+8=14$ and $x=3$, the smaller number. Thus $x+8=11$, the larger number. Easy, right? If a problem contains three unknowns three statements of conditions must be given in order to solve the problem. To be continued.

RELATIVE BEARING, 280 DEGREES

This is neither the navigation bridge nor the signal bridge but no matter. If its's the former they're taking a bearing on another ship and if it's the latter they're reading signal flags being run up the halyard (the signal flags, about six of them to a halyard, each represented short phrases such as "running low on fuel"). This type of communication was necessary because even the short-wave radio of the TBS (Talk Between Ship) type could be detected by overhead enemy aircraft. When I was in the Navigation Division on board ship for about a month I don't recall such a telescope placed here, but each ship had its own idiosyncracies. Of all warfare, none seems to elicit the concept of a chessboard so much as naval warfare. In addition to the surface ships there were the aircraft overhead and the submarines below, all involved simultaneously in a great confrontation spread over the expanse of the sea (the chessboard). On this chessboard there is the carrier fronting that ominous-looking storm that will affect "the game" one way or another. Beyond the Helldiver one can just make out, on the shimmering sea, a large battleship, another "piece" on the board. The drama unfolds as we wonder what lays "out there" or "up there" or "down there" and the hackneyed phrase, "time will tell", comes to mind. The chessboard, the relative bearing, they connote one's own essential quest to understand oneself. Without this understanding one is rudderless and adrift. My admonition in this is to be ABSOLUTELY honest with yourself. If you aren't, who will? You desperately need a known, ACCURATE starting point. That, mon ami, is critical and the beginning of something good: your salutary development.

Algebra: a problem with three unknowns follows: a contractor spent \$1185in buying additional switch-cars, switches and portable track-sections, which cost \$90, \$35 and \$15, each respectively. The number of switches exceeded the number of cars by 4 and the number of track-sections was twice as many as the number of cars and switches together. How many did he buy of each? First, establish the equality from the statement : cost of cars+cost of switches+cost of track=\$1185, which is one of the conditions. Let x=the number of cars. Then x+4=the number of switches (second condition) and 2[x+(x+4)]=number of track sections (third condition). Cost of cars=90x, cost of switches=35(x+4) and cost of track-sections=15(4x+8).Thus, 90x+35(x+4)+15(4x+8)=1185. Solving, x=5 cars, x+4=9 switches and 4x+8=28 track-sections.


NATIONAL
ARCHIVES

GRAY ON GRAY

Even now I can hear the increasing crescendo of the roaring engine as the pilot applies full power to escape the pull of gravity during his wave-off by the LSO. At the same time he retracts the wheels to reduce the drag that they present to the struggling Hellcat. (That large object underneath the fuselage is the auxiliary fuel-tank). He must now rejoin the landing-pattern and try the landing again. We have no way of knowing whether his approach was bad or whether the deck was fouled up by a crashed aircraft. There can be seen another aircraft way off in the distance with an inexplicable space between him and what's in front of him. Unless there's a good reason (which I can't fathom) this is poor management of the landing process. Time is of the essence during these operations and time awaits no one. In the meantime the green-shirts have erected two of the barriers and are raising the other one (including the two to the right out of sight). Gray on gray in spite of the fact that there's a brilliant sun illuminating everything below while casting the sea in a shimmering glow, even while it's gray on gray. If this pilot made a bad approach he must try again. This is not only necessary but appropriate because "practice makes perfect". This applies to all of us: most all of us are not able to apprehend something the first time, so we must review the material until we do. As they said in the military, "I'm going to tell them what I'm going to tell them, then I'll tell them and next I'll tell them what I told them". Repetition gives one a feeling of confidence because each time we know a little more. This is satisfying, as you already know, and besides it makes further learning that much easier. What could be better? [The object here is to experience the satisfaction gained when we learn.]

Algebra: the tabular method is a systematic arrangement of problems to assist in establishing the equality. For example the length of a rectangular field is twice its width. If the length is increased by 30 yards and the width decreased by 10 yards, the area would be 100 yards less. Find the dimensions of the field. Length x width = area. The first field's length=2x, its width=x and its area=2(x^2). The second field's length=(2x+30), its width=(x-10) and its area=(2x+30)(x-10). The condition of equality is if the area of the first field is decreased by100 square yards, it equals the area of the second field. Therefore, 2(x^2)-100=(2x=30)(x-10) and x=20. Next, a certain sum invested at 5% yields the same amount as a sum $200 larger at 4%. What is the amount invested? Principle x rate=interest, so 0.05x=0.05x $ and (x+200)0.04 equals 0.04(x+200). The condition of equality is 0.05X=0.04(x+200) and x=$800. These examples are meant to show the importance of stating the problem in precise (and concise) terms to simplify the solution of the problem. They are simple but explanatory.

WHY IS THERE NO ONE THERE?

Those Airdales, where are they? Why aren't they there at the catapult to adjust the Hellcat on the catapult? Normally there would be about 12 Airdales and two green-shirts and a one yellow-shirt and a launch officer all assembled there next to the Hellcat on the catapult. Where are all of them? Automation had not replaced man on the flight deck, at least not during 1942-1945. We'll just leave it at that so as to consider why the pilot has not yet raised his landing-gear (to reduce drag). The observant ones, the ones who are "on top of" the knowledge-game, will notice that this ship has only one catapult (because it's one of the older Essexes). Also note the elevator next to it. To the left is a battleship "making tracks", meaning that this carrier has to make about 27 knots to have a 30 knot wind over the front of the flight deck. Up overhead, the discernable ones will detect a flight of five aircraft to the upper left and three aircraft in the middle among those fair-weather cumulus clouds. Being about five miles away, if they were headed our way at 200 mph they'd be on us in about a minute and a half: radar was indispensable for protection. For those who have read these books they will remember that off and on I've been puzzled by pictures such as this. No doubt at times we all have been "Bewitched, Bothered and Bewildered" by what transpires (it's been the "story of my life"). So then, how do we confront such things? In a fundamental and backhanded way such "puzzlements" are a gift simply because they make us put on our "thinking hats" (it doesn't hurt to be corny once in a while). My suggestion is to use your (precious) time only on useful puzzles (that would have useful results). ["useful puzzles" enhance your knowledge or mitigate your undesirable situation (or both).]

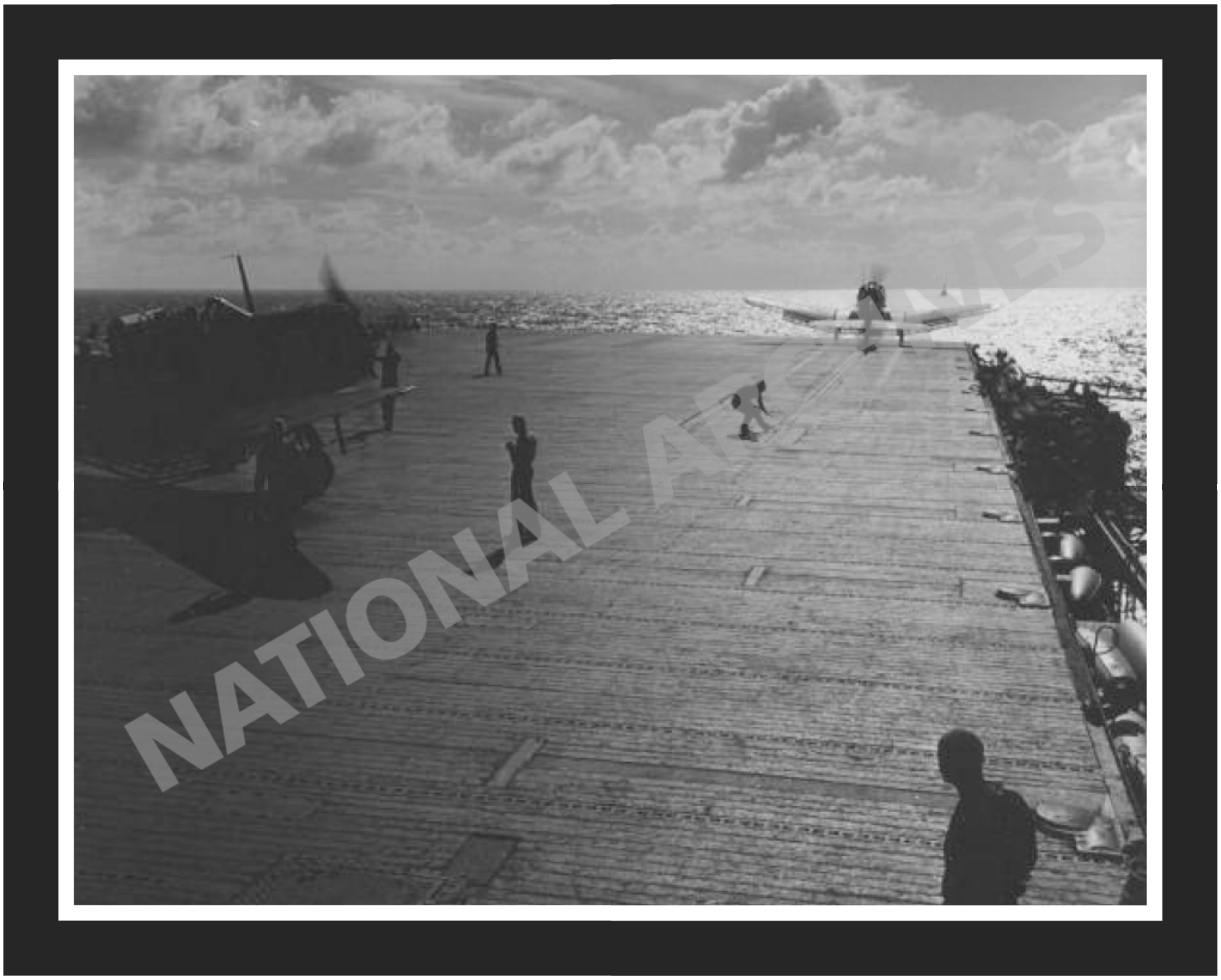
Image Processing: I have modified every photograph in all of these books in the following ways: contrast (very important, brightness (important) and "glitches" (necessary). A device is used to scan the photograph to generate a file that represents the photo by a unique number for each pixel (picture element). That is, each pixel's density is defined by a digitized number. A computer algorithm is then used to adjust the contrast, brightness and other modifications to the picture as prescribed by the computer operator. The modifications are then restored in the file. This technique is also used in the medical industry to enhance images taken of the body. The sciences also find uses for these techniques not to mention the cinematographers. One of the fields supported by image processing is that of image analysis or pattern recognition: the construction of algorithms capable of processing the range of input patterns of interest to yield a set of output patterns such that the occurrence of each input causes a uniquely identifiable output pattern to occur. Computer neural networks do the same: identify patterns.


NATIONAL ARCHIVES

SAME TIME, SAME PLACE

We could and we will surmise that this is the same time, the same place, as the previous page. We also note that these aircraft are SBD Dauntless dive-bombers, corroborating my remark that it was an older Essex-class carrier. I'll also retract my comment that it was a Hellcat on the previous page thus accounting for the fact that the landing gear was still down (the SBD's did not have retractable landing gears). To "seal the deal" the ship is also heading into the sun as was the ship on the previous page. With all that settled let's look more closely at the activity on the flight deck. Missing is the sling that threw the SBD into the air: a green-shirt should right now be retrieving it from the front of the deck (note that the shuttle has been returned to its starting point (note the green-shirt reaching down to it, for some reason). This is certainly a "laid back" operation with few in sight and those who are show no urgency whatsoever (as I believe they should and we did). Actually, this isn't a very good representation of the flight deck activity typical of the flight operations that I knew (and "loved"). However, it's very photogenic and I'm a soft touch for that, so we'll leave it at that. I was wrong about the previous page. I admit it. It's my contention that life is a great deal simpler if one admits one's mistake, learns from it and then moves on. The "air is cleared", lessons are learned and now new lessons can be learned. What could be better?. And for heaven's sake, DO NOT have an inferiority complex. Of all the non-physical problems, that is probably the worst. Tighten your belt and move on. Time is too precious to waste on useless self-pity. You're better than that. End of homily.

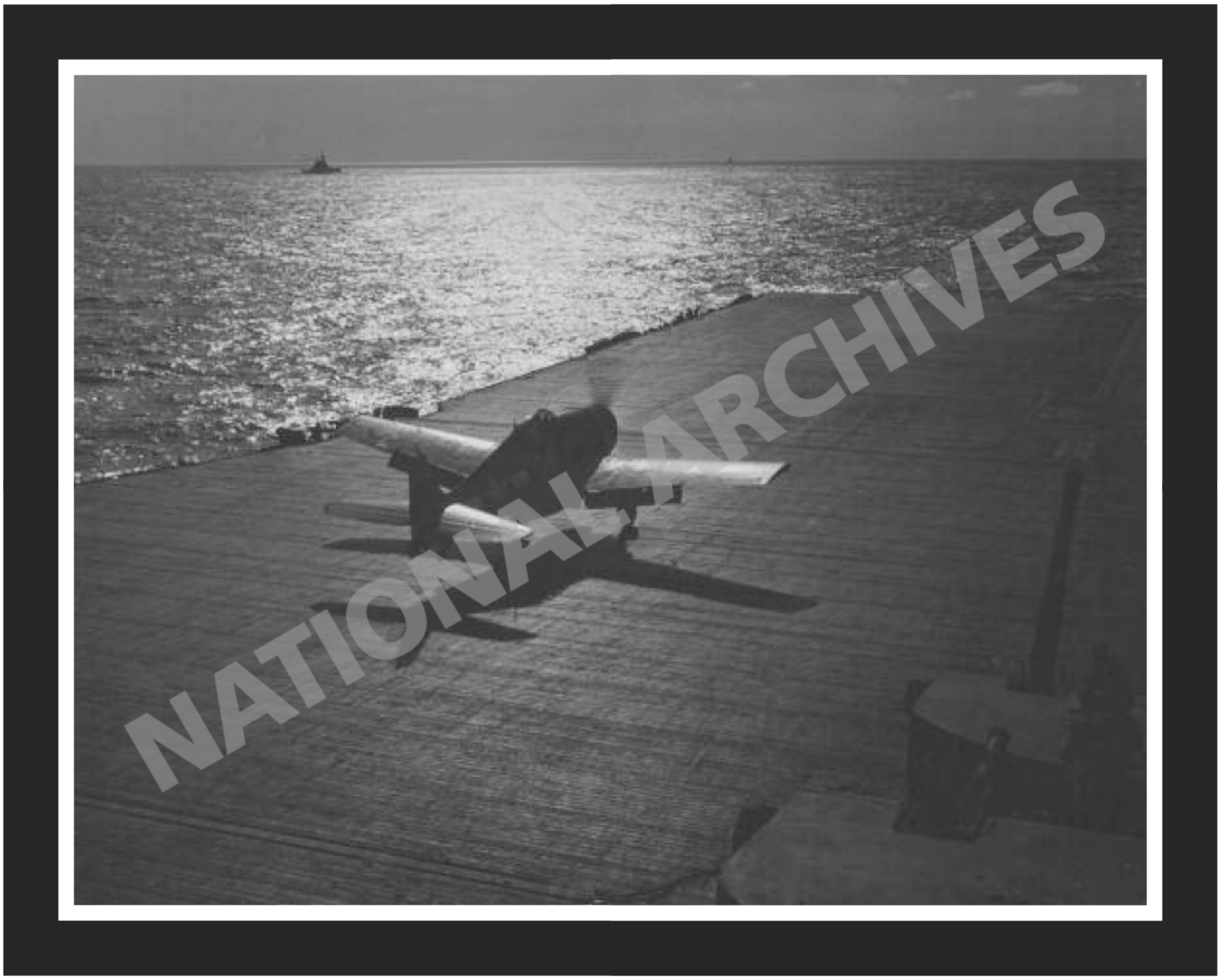
Algorithm: is a precise formulation of a method for doing something, usually of a certain amount of complexity. Algorithms are found predominately in the usage of digital computers where it is a collection of procedural steps or instructions organized and designed to enable the computer to accomplish useful tasks. Some have suggested that science could be defined as knowledge which is understood well enough to be taught to a computer. It has also been said that going from an art to a science is facilitated by the bridge of an algorithm. An algorithm is converted into a specific set of instructions which a computer, using its logical capabilities, converts to useful results (from medical solutions to manufacturing processes on the production floor where robotics is a prime example). Non-mathematical, heuristic problems are also represented by algorithmic solutions. An algorithm can be either computational or of a data-handling nature. One could say that when you plan your day you are creating an algorithm, albeit a simple one. Many algorithms involve the methods of sensing the conditions of a system and then controlling that system: the immensely fascinating and useful field of automation.


NATIONAL

THIS DAY AND AGE

In this day and age of automatic controls, electronic devices and computerized decision-making this "homely" yet sturdy aircraft is guided by "mere" Man with but a panel of dials to indicate his condition. In truth he has but his nerves and sinews to guide him and determine his path to success or failure. The glistening sea is not nearly so hospitable to his intentions as it is beautiful. Every little thing in this picture, from the broad expanse of the deck to the distant ship harken back to the time when I was young and wondered at the audacity of these knights of the air. I can still hear the engine straining itself as it seeks to gain that precious speed needed to lift off. Though everything looks so calm and peaceful, it is not so: the pilot sits atop a thunderous engine that throbs as it strains to take wing. At times like these it's hard to sympathize with those who took umbrage at the idea of "officers' country" where we were not allowed to tread. Too often we're critical of others' their privileges that are earned. In like manner we're also too ready to criticize and be critical of others. If criticism is in order, there are ways of expressing such without being demeaning. Many criticize, only to antagonize, surely a counterproductive result. Does it not make much more sense to be instructive rather than destructive? Instead of striking out against another, mentally step back to understand the others' reasons for their ideas. I hesitate to use the word but I will: use the method of "nurturing" rebuke (at least initially). Admittedly, there comes a time when this soft approach itself becomes counterproductive and an iron-hand is the only recourse and is in order. At the very least, think before you "leap" . (Hot-heads need not apply to the conversation). [Don't scoff at the valuable word "nurture".]

Vitamins: an organic compound essential for the normal functioning of the body, and usually obtained from foods. Natural and synthetic vitamins usually have the same biologic value. Vitamins function as coenzymes which are an active part of the enzyme system. This system catalyzes many of the anabolic and catabolic reactions of living organisms necessary for the production of energy, the synthesis of tissue components, hormones and chemical regulators as well as the processes of detoxification. (Anabolism is the process of burning up body tissue, promoted by the influence of certain hormones (a chemical secretion of the ductless endocrine glands). It's the constructive side of metabolism as opposed to catabolism.) A prime example of the requirement of vitamins was the situation in the British Navy during the 18th century when ships stayed out to sea for long periods of time. The sailors would contract the disease scurvy due to a deficiency in their diet. It was found that if they were fed limes (ascorbic acid) they would be cured. To this day English sailors are called "limeys". [Goof food is life.]



16,000-LB. ON WINGS OF SILVER

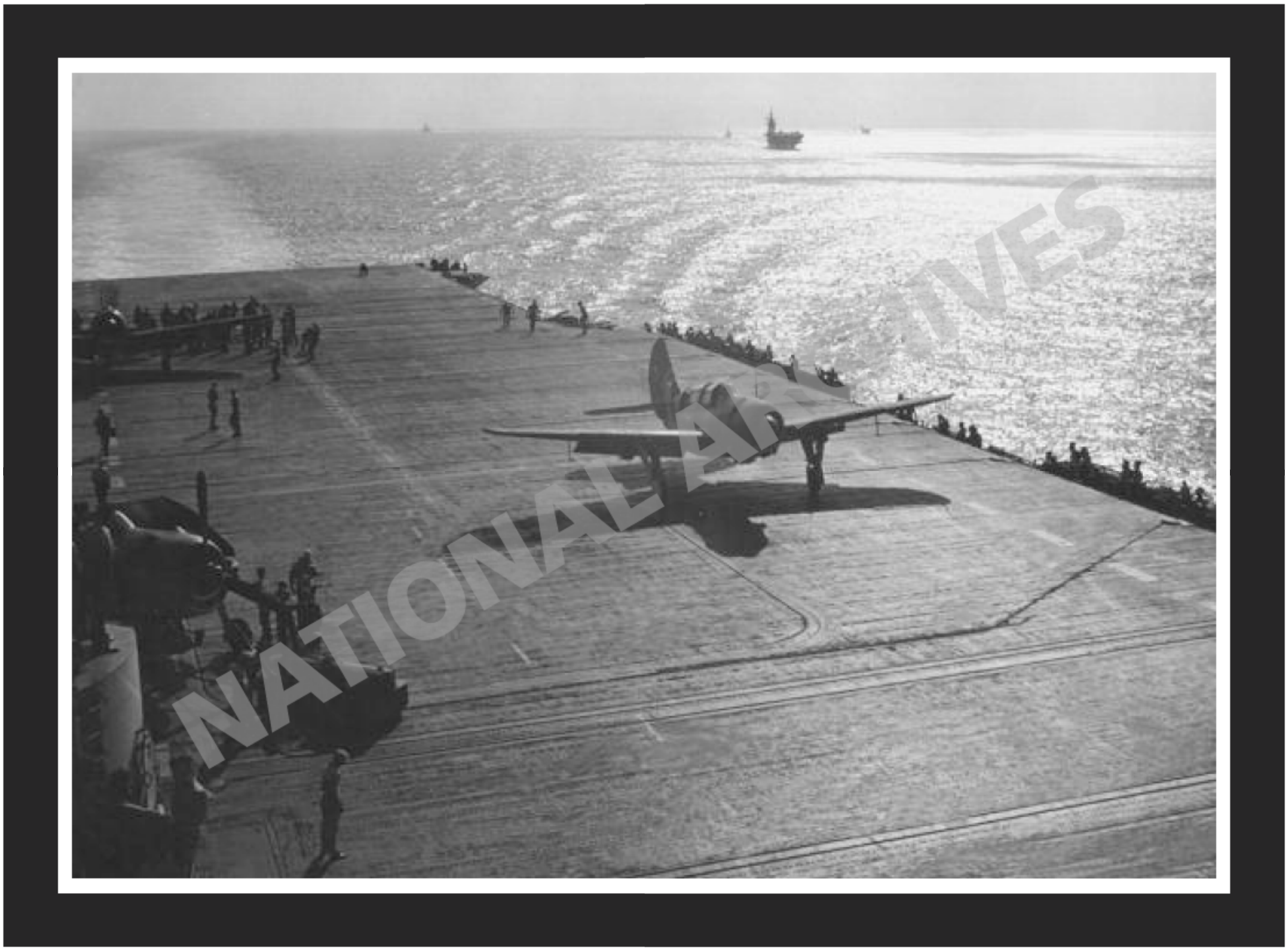
Note how with these last several pictures the photographer has awaited the time when he could point the camera directly in the direction of the bright sun to assure the effective creation of a silhouetted tableau with the attendant glistening sea. Now consider that 16,000-lbs. of weight that's lifted, as if by magic, off the deck within a distance of about 55 yards. At the time it was just another aircraft on its way. However, when able to quietly reflect on it, it's a testament to man's ingenuity par excellence. Everyone has their favorites, and mine are those who create the wherewithal that allows us to lead our lives with little thought to those things we just take for granted: the engineers who design, build and maintain our infrastructures, our material essentials, our conveniences, they are the "heroes " of our society, to my way of thinking. Consider the superb capabilities of those who created and assembled the hardware and software of my keyboard, my monitor and my computer right here at my beck and call that give me a capability beyond imagination when I was a boy. We use them without the slightest thought as to their derivation. It's not just those who create these things but also those who maintain them (such as the power-people, the water-people, the grocery store-people and on and on). Here on the flight deck we merely do what's necessary to send them on their way with little or no thought to the underlying effort to make all this possible: the day is long, the contingencies unknown, so lets keep 'em moving. We have a ways to go yet.

Complex Numbers: 2nd order equations give rise to complex numbers which have a real part and an imaginary part: a+/-jb. The real part is "a" and the imaginary part is "b" as signified by the letter"j". When this number is plotted on an x-y graph the x-axis is the real part and the y-axis is the imaginary part. These numbers arise when the roots of the equation are determined by the quadratic equation for the 2nd order equation which might be: [a(x^2)+bx+c=0]. Using the quadratic equation: x={-b+/-[b^2-4ac]^(1/2}/2a. Read this, "x equals -b plus or minus the square root of the quantity b squared-4ac all of which is divided by 2a. [All algebra books have this basic formula]. Reiterating, complex numbers are the result of solving for the roots of a 2nd order equation, taking the form of (a+/-jb). Since science and engineering are replete with 2nd order equations all scientists and engineers deal with them all the time. This is especially true of the electrical engineering field where currents and voltages are affected by the laws of inductance and capacitance. These numbers are also found in the area of automatic controls which use electric motors. It turns out that an electric motor's derived equation is a 2nd order one. Thus all control systems are by definition at least of the 2nd order. Application of complex numbers to be continued.

THE RECALCITRANT HELLDIVER

As one Helldiver sets off on a launch another one back aft resists the opportunity. A strange situation, this. While all attention is being directed to the balking aircraft, no one seems concerned with the Helldiver to the right. It's a firm flight deck maxim that moving aircraft receive the primary attention at all times while all else has secondary consideration. By rights that Helldiver on the move should be "under the control" of at least one yellow-shirt up to that final position of launch 400 feet from the bow at which point the launch officer sends it on its way. Instead, this appears to be a "do it yourself" project which is contrary to all that is held dear on the flight deck. Presumably the recalcitrant Helldiver has engine troubles and is being administered to by a large part of the Airdale crew. Beyond that I can not say except that the Hellcat to the left is connected to the tractor for a trip to the bow to clear the area for the ensuing landing operation. Note the arresting-wire pulled back to make the elevator available for bringing aircraft topside for the launch. While the Helldiver was unable to take advantage of its opportunity (to launch) we dare not miss the opportunities presented to us. The hard part in this is recognizing them, but our acquired (learned) knowledge simplifies this. Right? Also, the flight deck maxim, though not a proverb, does lend credence to the idea that our lives are directed by the stated, as well as unstated, maxims of right and wrong which we have LEARNED since our childhood . We even learn them as adults, such as the fact that eliminating stress obviates (prevents) anger (the bane of our lives, the bane of society and a gross waste energy and precious time).

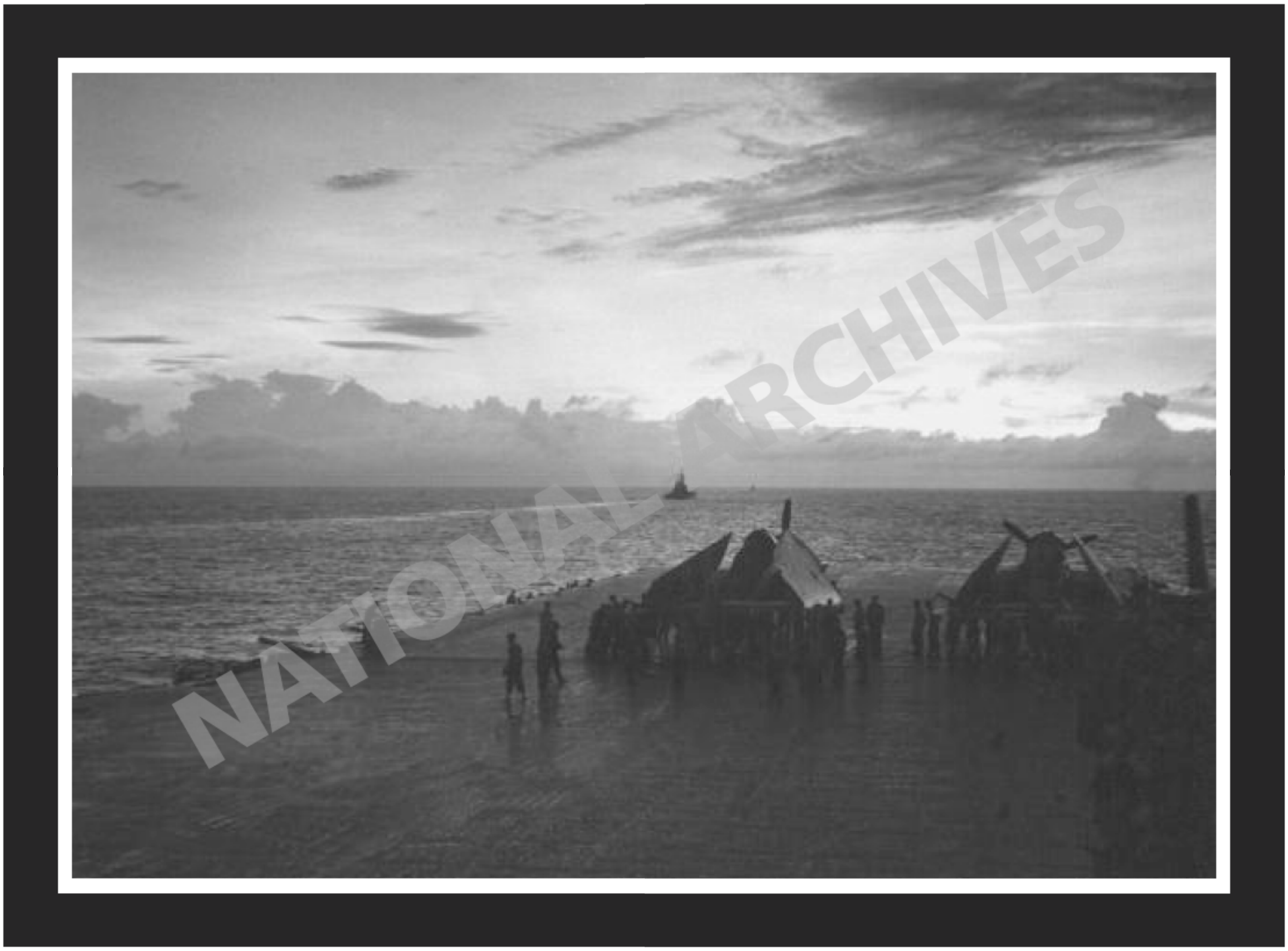
Complex Numbers: as said, complex numbers are essential to designing and analyzing automatic control systems: consider the simple control system consisting of an amplifier and a motor with the actual output fed back to be compared with the desired input, the resultant being the control signal. The closed-loop transfer function is output/input which equals C/R=K/[(s^2)+2s+K]. It's the characteristic equation (the denominator) that is used to evaluate the system. We do this by evaluating the roots of the characteristic equation. The quadratic equation provides the following roots which turn out to be complex numbers: For various values of the constant K the roots are for K=0, 0.5, 0,75, 1.0, 2.0 3.0 and 50.0, s1= -0+j0, -0.293+j0, -0.5 +j0, -1.0+j0, -1.0+j1.0, -1.0+j1.414, -1.0+j7.0 and S2=-2.0-j0, -1.707-j0, -1.5-j0, -1.0-j0, -1.0-j1.0, -1.0-j1.414, -1.0-j7.0. To unscramble the above computations if the above roots are plotted on an x-y graph the locus of the roots would form a horizontal line between x=0 and -2 and also a vertical line going through the x=-1 point and reaching +/- 7.0.Thus visualize a horizontal/vertical cross through the -1 point on the x-axis. Next we'll consider the importance of this diagram.



DAY IS DONE, NIGHT IS COME

We follow that massive battleship into the fading glow of evening: day is done, night is come and the closing bell is rung on another month at sea of uninterrupted flight operations, day after long emotional day. We're finally heading back to that port of quietude where our wherewithal can be assuaged after serving one hundred aircraft day in, day out, twice daily. Now we'll have but a couple of days of redress to recharge and restore and renew our depleted and worn sensibilities after the endless onslaught of the stress of wind and noise and slashing blades about our head and shoulders. The squadrons have since departed for the beach (land airfields) leaving behind these two ailing Hellcats that are now being taken to the hanger deck below. Whether we liked it or not, we were a band of brothers who had experienced the same trying days that engendered an unstated cohesion (even though a loner) as we fulfilled our obligations that I believe merited a "well done". There are no flight operations now; nevertheless the pace is swift for a safe haven yet far away: our enemy does not favor our coming sense of security, prompting "Full speed ahead". A sense of security is a normal aspiration and is aided and abetted by being surrounded by those who espouse the benefits of a righteous life. Again we are confronted with that term, righteousness. At the very least, righteousness implies doing no one harm, emotionally, mentally or physically. Often this requires the capabilities of intelligence, and where do we obtain intelligence? Yes, by LEARNING, and what a joy that is (even if it takes a little more effort for some of us than others. Fine, we're stronger for it.)

Complex Numbers: with the locus of the roots (complex numbers) plotted on a graph we can derive some of the characteristics of the closed-loop control system as well as adjust the setting of the amplifier gain K to obtain the desired mode of operation. As the value of K varies the point on the locus of the roots varies: when K=3 the roots= -1.0+/-1.414 (note previous page). It happens that a line drawn from the origin to the root locus (at K=3) will provide an angle whose cosine is called z (the damping ratio of the output; the greater the damping the less the overshoot of the output action). Thus by adjusting the value of K we can adjust the stability of the system: if the angle is cos 45 degrees (=0.707) then the overshoot is 5%. Furthermore, the settling time of the output T(s) [output varies no more than +/- 2%] is 4 divided by the real part of the complex number. Again, the value to which we set the amplifier gain K enables us to make adjustments to the performance of the system. These are extremely important specifications of a control system that are made possible by the use of the complex number system to be found in the study of algebra. Algebra's basic to science and engineering disciplines (note the word "discipline").



GRAY SKY, BRIGHT SEA

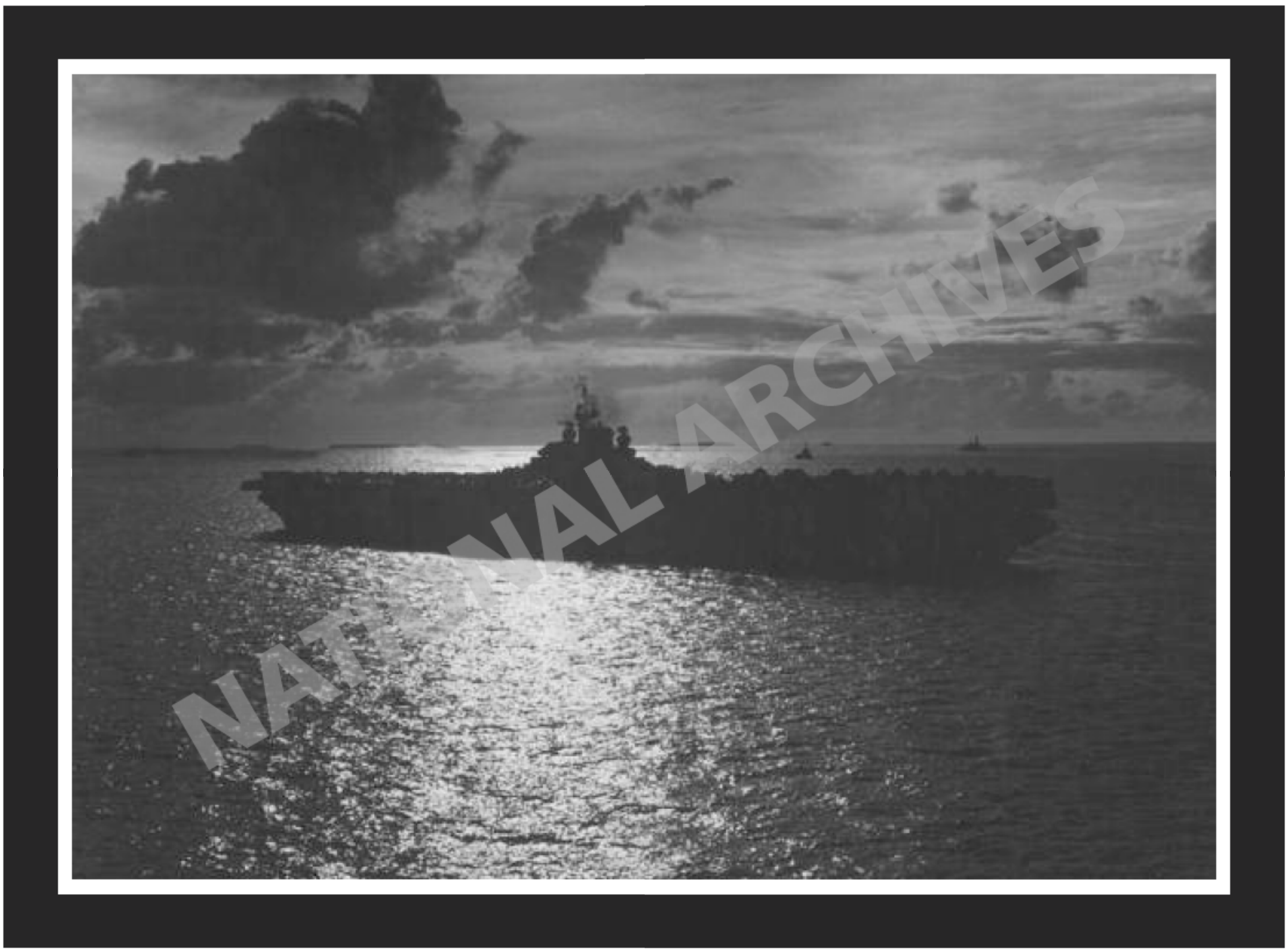
This smoothly dramatic scene of sky and water shows us a near perfect rendition of the landing operation as the following aircraft trails at just the correct interval. The lack of perfection is found in the omission of the next aircraft making its appearance just this side of the right-hand margin which would represent the optimal 20 seconds between aircraft. Such an interval assures the proper spacing of aircraft to allow expediting aircraft landings while at the same time providing enough time to disengage the tail-hook and move the aircraft up the deck. Overhead can be seen some of the aircraft circling the ship as they await their turn to land. Looking down, we see the very location of the U.S.S. Bunker Hill (CV-17), that ill-fated ship which, on May 11, 1945 off the island of Okinawa not far from Japan, took two kamikaze hits within 30 seconds. The entire aft third of the flight deck, part of which we see here, was packed with aircraft during a launch operation. They were thoroughly devastated, leaving little that was recognizable. The dense, black smoke billowed far up into the sky as it also engulfed half the flight deck (a scene the exact opposite of this one here). Every life back aft was snuffed out, including probably those down there now. While they are gone do we, the living, appreciate life as we should? Just what does make life worthwhile? Do we know what is truly enjoyable? Do we know how to enjoy it? Do we give it any thoughtful consideration? Does our egocentric nature prevent such? Do we believe that in improving life around us we improve ours? Are we fortunate enough to have tried and true trusted friends? Again, what makes life worthwhile? In the final analysis perhaps it's our efforts to make it so. [Give it some close thought.]

Machine Tools: no industrial country could long survive without the capabilities of the machine tool industry, that industry that fabricates the tools that are used to fabricate the products that we take so much for granted (and which I consider to be a woeful lack of appreciation of those who, unheralded, provide us with the wherewithal of our very comfortable lives; appreciation is such an easy thing to feel and extend, and it requires such little effort). All of our major products make use of the production tools found on the production lines of our factories. Many of them perform multiple functions that are in and of themselves a tribute to the ingenuity of our production engineers. Their number are relatively few but their contribution to society is enormous. To paraphrase, "Never have so many owed so much to so few". Machine tools create the parts of which our refrigerators and cars and ships and on and on are made. These tools cut, bend, shape, press, impact, grind, etc. these metal parts. Many of these machine tools are operated automatically as programmed by a digital computer=automatic controls.

THE STATELY ANTIETAM

And now it's time to take leave of that stately ship, the U.S.S. Antietam (CV-36) as it slowly glides across the silver sea in front of a sky painted with the lofty and splendid clouds of the wide Pacific. Its long deck is covered from stem to stern with its 100 bulky aircraft, row on row, column on column. Soon, in a couple of days, it'll be on its way to places of unknown destination and problematical assignation as its world is encompassed by the limitless sky that supports the ever-changing cloud display. We're placid this day of respite off the Mariana Islands only to go chaotic on the high seas in the next two . This was one of our "ports of call" that allowed the starboard and port watches to have one afternoon of liberty on the beach. When you spend about 500 consecutive days on a ship you form an unconscious bond with it, especially if those days are filled with the clamor of a flight deck that conducts seemingly continuous activity that can present danger much of that time. Yet how can such a serene scene be a source such anxiety? Part of it lies in considering that which is important. So what's important in life? In view of the previous page, this metaphor comes to mind: there are those who sit in the wagon and tell us what's important, and then there are those who made the wagon or who push the wagon. Now, what's important? Personally, I'm partial to the latter group who either make or push the wagon. In addition, for starters, who can say what's important without the absolute banishment of things artful and surreptitious, of devious paths around the truth (because unless your premises are correct and accurate, all that follows is specious and counter- productive. [Besides, to be devious and artful is to be very, very unfriendly, the antithesis of friendliness.]

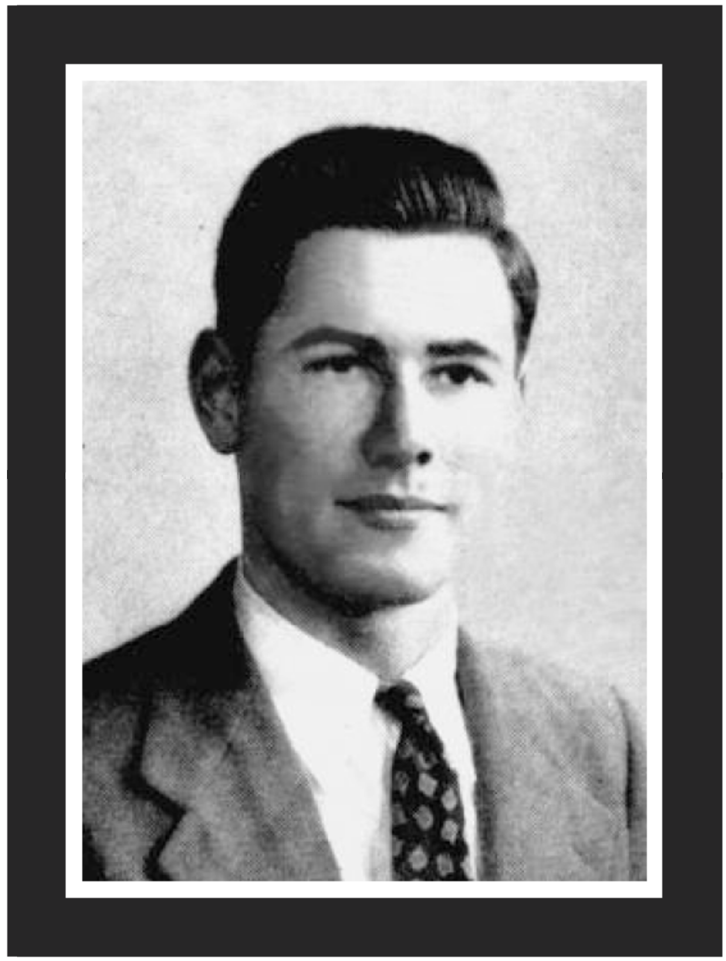
Machine Tools: consider that virtually every product requires the use of a machine tool somewhere along its path to completion (manufacture), either directly or indirectly to make the machine that makes the product. Mass production is not possible without the machine tools to turn out precision, interchangeable parts . Machine tools are so important to the national economy that their sale is used as an indicator of the economic health of the country. Not only are machine tools operated automatically in sequential steps but also many of them are automatically loaded and unloaded. These tools increase labor productivity such that per unit costs are lowered and as such act as a buffer to inflation (where the cost of your purchases increase). During WWII the U.S. machine tool industry shipped to U.S. and overseas manufacturers more than one million machine tools, more than the post-war period from 1946 to 1961. Beyond these tools the production manufacturers had to assemble these machines into production lines that are the basis of a county's economic strength. Kudos to all of them!




.S.S. ANTIETAM (CV-36)
CHRISTMAS 1945

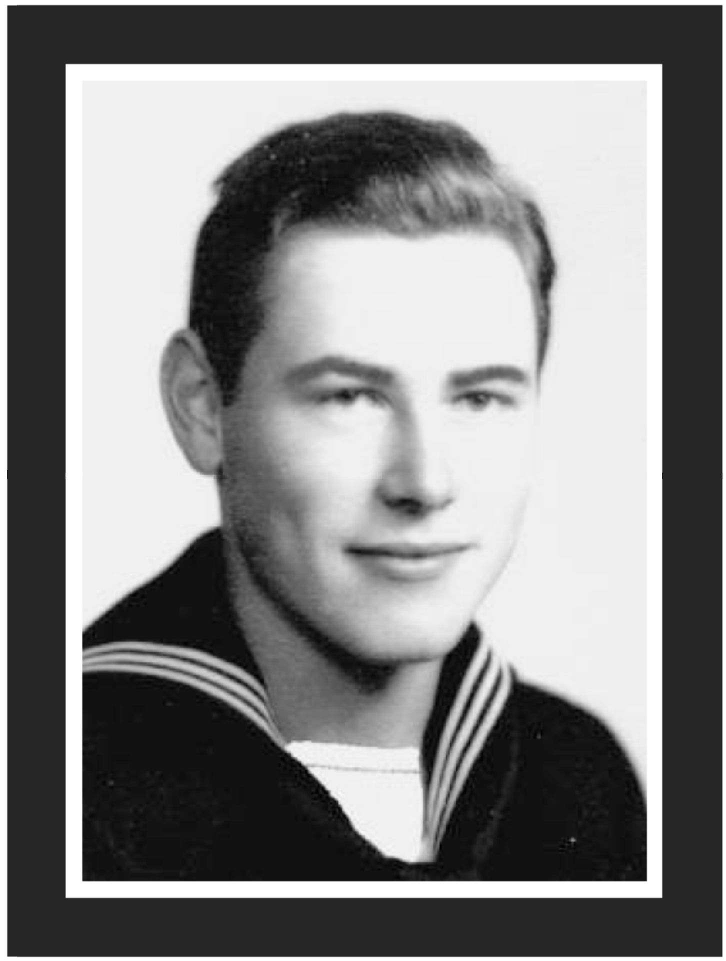
1944

The author attended Newark Academy in September 1939, the start of WWII, and he graduated from Newark Academy in June 1944, the start of the invasion of Europe. These were five years of international tumult of a scale unknown to mankind, and were amply chronicled in newspapers, magazines, and newsreels. Besides college preparatory courses, the author participated in varsity football, basketball, and elsewhere in baseball and tennis and swimming activities. He was a member of the student council, and by the time he was a Freshman at Newark Academy, he had earned the Eagle Scout Badge with Bronze Palm (having had the advantage of having gone to a scout-oriented summer camp since he was seven years old).



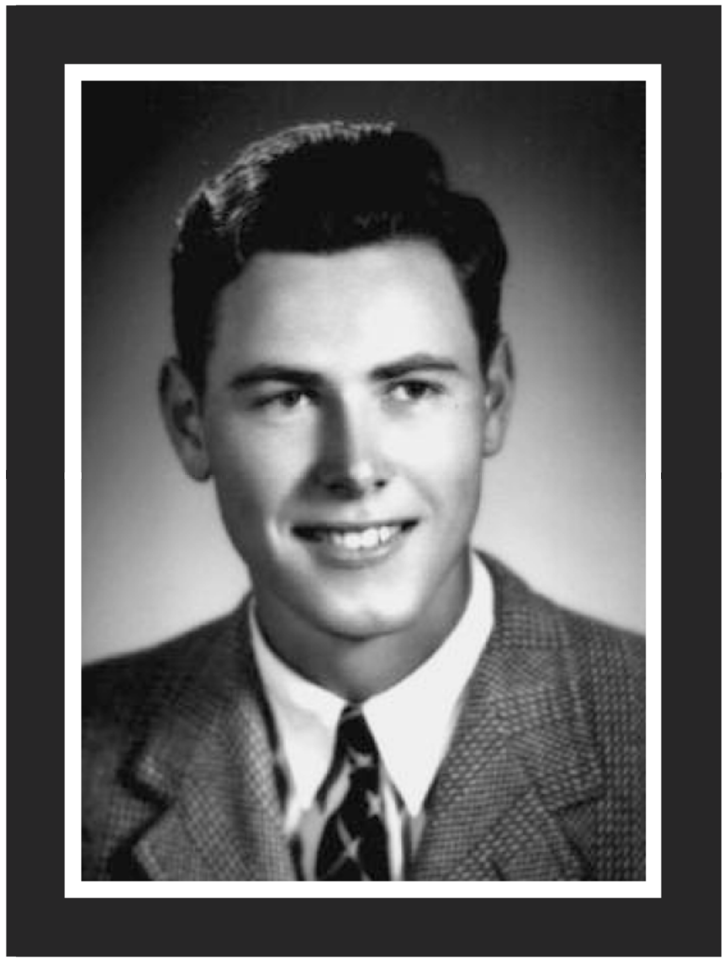
1945

Just out of boot camp and still "wet behind the ears". And just ahead would be the Receiving Station at Newport, RI, where I, the author, was assigned to the Quartermaster (Navigation) Division of the U.S.S. Antietam, nearing completion at the Philadelphia Naval Shipyard. The prospect of being on the bridge of a large carrier was exciting, and for about a month's duration, I did stand watch there and spent some time at the helm (steering such a ship was definitely a memorable experience, and with nary a blush, "I did so without a hitch".) So, how explain the subsequent transfer to the flight deck? "Pick a number". (I've made every effort to be as honest and precise as possible, about both the events and my thoughts throughout this book).



1946

The author in the 1946 Yale Freshman Yearbook, two years after my enlistment in the U.S. Navy (from fledgling to "old salt" in two short years. Wiser, if not smarter.) This somewhat melancholy picture captures well my state of mind upon returning home to learn the fate that was to be mine, so well described in the song "What Now My Love?" That which was feared the most had happened. It took two years to find it out, and then a new journey was mandated. Foolish now, but devastating then. The war, having been over since August 1945, had completely subsided in the consciousness of the civilian population by the time I returned home in May 1946. The attitude I received was "Well where have you been?" as if I had been playing hooky. This was a very difficult time and I can only apologize to one and all for my constantly somber mood then, then when my only recourse should have been found in the WWI song "Smile". But I was derelict in my conduct, shamefully so. I can only say, "I'm sorry".



1996

Newark Academy, 1939-1944

U.S. Navy—U.S.S. Antietam, 1944-1946

Yale University, 1946-1950
(B.S. Business Administration)

New York City banks, 1950-1952

Electronics companies, 1952-1959

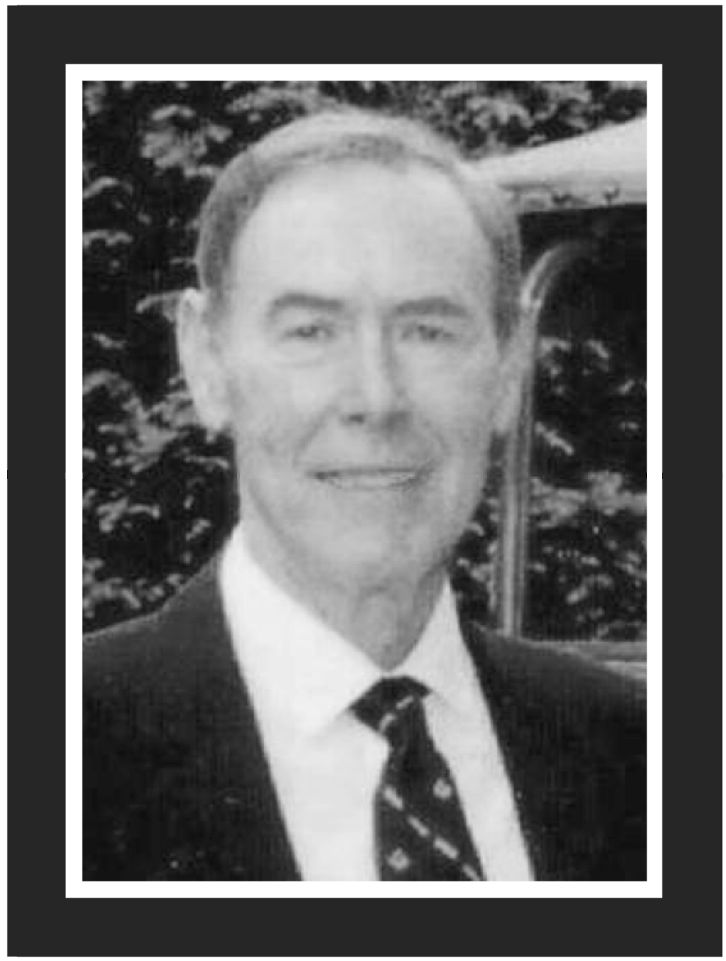
Fairleigh Dickinson Un., 1959-1961
(B.S. Electrical Engineering)

Western Electric Co., 1961-1962
(Bell Labs)

Vitro Labs, 1962-1964
(Management Engineering)

Navy Department, 1964-1991
(Management Engineering)

Retired, 1991 (1st book incorrectly stated
"1989" instead of "1991".



U.S. CONSTITUTION COMMENTS

[I made extensive use of the Collier's Encyclopedia, 1963, when assembling this.]

1. Basic Structure of the Constitution
2. Judicial Review
    A. State Actions
    B. Restraints
3. Separation of Powers
    A. Commingling
    B. Legislative Investigations
4. The President
5. Federalism
    A. National Authority
    B. Cooperative Federalism
6. Regulation of the Economy
7. National Taxing and Spending
8. Rights of Individuals
9. Toward Positive Responsibility
    A. Erosion of Constitutional Limitations
10. Preferred Freedoms and Judicial Self-Restraint

1. Basic Structure of the Constitution

In 1796 Justice William Paterson stated that, "It is the form of government delimited by the mighty hand of the people, in which certain first principles of fundamental laws are established". In 1875 Justice Samuel Miller said, "The theory of our government, national and state, is opposed to the deposit of unlimited power anywhere". We now would take issue with the word "unlimited", it now being absolutely banned even from our conversations. In the Federalist Paper No.51 James Madison, the "originator" of the U.S. Constitution, said that, " In framing a government which is to be administered by men over men, the great difficulty lies in this: you must first enable the government to control the governed; and in the next place oblige it to control itself". The Constitution both grants and limits power (power being the force of law backed by enforcement capability). Articles I, II and III of the Constitution entrust powers in the agencies of the Congress, the President and the Judiciary respectively. Sections 9 and 10 of the First Article restrain national powers and state powers respectively. However the Constitution provides no definition of either powers or limitations. Therein lies a fertile field for "endless" controversy. The Constitution expressly forbids Congress from passing "ex post facto" laws (retroactively making what was legal now illegal: if I legally built a house on a given tract of land the government could not later say that that house was illegally built) and "bills of attainder" (denying convicted felons of certain civil rights such as the donation of inheritance). The Congress may not tax exports from states and, except in serious emergencies, suspend the "writ of habeas corpus" (being held illegally by the government). The Bill of Rights contains a list of things the national government is prohibited from doing. The state governments are similarly proscribed from acts as defined in Article I, Section 10. They may not enact "ex post facto" laws, coin money, emit bills of credit, or enter into any alliances or treaties with foreign states. To put restraints on the government the Constitution set in place the separation of powers between the Congress, the President and the Judiciary as well as the concept of federalism (separation of national and state governments where the national overarched state governments. The Constitution contains the "due process" clause (the Fifth (part of the Bill of Rights) and Fourteenth Amendments provide in part that no person shall "ne deprived of life, liberty, or property without the due process of law" (including trial by jury)). The framers included the process of judicial review in implementing the separation of powers of the three branches of government and to imbue the concept of restraint. These provisions are not explicitly spelled out thus ensuring a great deal of "conversation". There is a certain blending and mingling of powers of the three branches that at times becomes highly technical but in general Congress makes laws, the President administers them and the judiciary adjudicates the actions of both. The president can thwart the Congress by his veto of bills but this in turn can be overridden by a majority of Congress. [It should be said that the above is not "cut and dried" but rather has technical "addendums".] While the President can make high level appointments the Congress must give its "advice and consent". Federalism, the other concept of the separation of powers, is a system whereby there are two independent governments that govern the same peoples but in which the national government has the higher authority and where what is not delegated to the national government is left to the state governments. That is, the national government has certain enumerated powers, all else being reserved to the state governments. Thus Federalism, like separation of powers and checks and balances of the three branches are devised to require the government to control itself. [This is a marvelous concept for us as individuals: control ourselves.] The Judiciary stands as a bulwark in defense of individual rights. Alexander Hamilton wrote in the Federalist Papers No. 22 that "The want of a a judiciary power was the circumstance which crowned the defects of the Articles of Confederation" (the precursor to the Constitution). The Founding Fathers, being mindful of the power of the majority to trammel individual rights, established "free government" in which all were open to participate in the governmental process (this was not specifically specified but was implied——how I'm not clear).

2. Judicial Review

Alexander Hamilton said in the Federalist Papers No.78, that "it is the duty of the Court to declare all acts contrary to the manifest tenor of the Constitution void". Continuing, specific limitations on legislative power could be perceived in no other way "than through the medium of courts of justice". The courts must ascertain the meaning of the law, whether contained in the Constitution or in a legislative act. Hamilton said that if there were a difference between the meaning of the Constitution and the meaning of a legislative act, the former should always take precedence. He further stipulated that judicial review does not imply the superiority of the Court over the Congress. He presumed that the Constitution represented the will of the people and that therefore the Constitution was supreme over the legislative statutes (the prevailing attitude of this day also). Hamilton considered that the Constitution was the will of the people while statutes were the will of their agents, the legislators, and that the former always held precedence over the latter. This the Courts were bound to acknowledge and to which they were to defer. He did profess that the conflict between the Constitution and the statute must be clearly in favor of the Constitution's specific clause and thus the conflict of the powers of the Court and Congress. Chief Justice Marshall, perhaps the preeminent judge, spelled out Hamilton's thoughts by saying, " It is emphatically the province and duty of the judicial department to say what the law is". Marshall inaugurated , as Oliver Wendell Holmes put it, "a new body of jurisprudence by which guiding principles are raised above the reach of statute and state, a nd judges are entrusted with a solemn and hitherto unheard of authority and duty". We study the Constitution but do so only as it is read by the Supreme Court.

2A. Hudicial Review of State Actions

The Supreme Court has spent much more of its efforts and time adjudicating state laws as they concern the Constitution as opposed to those as enacted by the Congress. Only sixty-nine acts of Congress fell under judicial review between 1889 and 1937, thirteen of these occurring within the crucial period of June 1934-1936. Since 1937 then the Court's review of actions by Congress have been minimal.

2B. Restraints On Judicial Review

Justice Frankfurter stated that "holding democracy in judicial tutelage is not the most promising way to foster disciplined responsibility in a people". From time to time the Court has invoked certain cautionary considerations to keep the power of judicial review bounds: one who relies on the invalidity of a statute has the burden of proving its invalidity; if this burden is not sustained the Court will presume the statute is constitutional. The Court does not, should not, pass on the expediency or efficacy or wisdom of legislation. The Court can not question the Congress' motives nor will it involve itself in political issues except in so far as it relates to the content of the Constitution. In all of this the Constitution, in its desire to maintain the separation of powers of the three branches of the government, strongly implies that the Court shall not delve into the prerogatives of Congress by legislating in the name of interpreting the relationship of statute to Constitution. While the judges are not enveloped in a "Constitutional wrapper" and they do have political thoughts as would anyone whose life is concerned with government, the true merit of a judge is found, among other things, in how well that judge eschews the political scene no matter how devoted to the natural interest in social issues. They, after all, are selected for the rest of their lives. Their purpose in life is to interpret the statutes in terms of conforming to the letter of the Constitution (not an easy job). Without ignoring the social issues, their strictures are to "ring" the legislative statutes against the Constitution, and not, by their interpretations, 'legislate from the bench". The recourse of those who would change the social fabric is through our elected representatives (in conformance with the representative form of government of this country). True, there are changes in the social, political and economic scene but modifications in there areas are not the domain of the Court except in a tangential way (as reflected in their decisions). [This brings to the fore the function of the President and how the President can effect change in the Constitutional environment.] The Court's domain is the legality of the statutes, not their possible "stupidity" (which is under the aegis of the legislature——— AND the people who elect them as their representatives).

In sum, the Court should have no agenda except that of justice under the rule of law (as it rests in the first instance under the aegis of the Constitution).

3. Separation of Powers

3A. Commingling of Powers

The system of checks and balances between the three branches of government not only permits but requires the commingling of powers. The legislature may exercise the executive power of pardon and also provide minute detail to the rules of procedure to be followed by by the Courts. Congress has the power to control the issuance of injunctions by federal courts and to restrict the courts' power to punish for disobedience. While the courts may not legislate, their decisions may in fact have that effect (but again, courts may not rule in a legislative way). Within limits, the courts may exercise the legislative power of appointments. Congress may confer on courts the authority to suspend sentences. The Presidents control over foreign relations is such that the advising and consenting to treaties and the declaration of war has recently come under more control by the President. Congress in turn does control the allocation of funds as a counter to this power of the President. The administration has the power of adjudication in disputes of the rights of patent holders. The Tax Court of the administrative branch makes judicial decisions about the tax code. Within the executive branch the Federal Trade Commission and the Interstate Commerce Commission make both legislative and judicial decisions. The courts have recognized that the details of administering laws of Congress require that the executive branch must make decisions when administering those laws in such a way that they undertake judicial functions. The legislature allows the executive to fill in the details of a statute by enumerating regulations to carry out that law of Congress. During war, the Congress has delegated aspects of power not condoned during peacetime. Of necessity in this increasingly complex society there are and will be conflicts between competing interests in all three branches. Politics is a profession that has no easy or well-defined answers.

3B. Legislative Investigations

The Power of Congress to conduct investigations ferives immediate;y from "necessary and proper" clause (Article I, Section 8). It is sustainable solely on the basis of the inherent powers of legislature to inform itself for purposes of legislation. This power pf Congress was adjudicated saying that Congress did not possess the "general powers of making of making inquiries into the private affairs of citizens", that this power was solely related to some legislative purpose. The Congress has the power to investigate corruption of government though there are certain restrictions of procedure. There must be a legislative purpose for the investigation and not merely for the purpose of exposing. The questioning must be pertinent to the inquiry. These above mentioned items come under the purview of the courts as a restraint on Congress. Investigations can not be made foe personal aggrandizement or for personal punishment.

4. The President

Our government tends to place a substantial amount of power in the hands of the President and his administration (the executive branch). He derives much of this by being the head of his political party, being extra-constitutional. He exercises the power of pardon, the veto power of statutes, extensive war powers as commander-in-chief of the armed forces and as administrator of a huge body of departments, and has an almost absolute control of foreign relations. The Congress, with certain limitations, can confer on the President its own powers to be used when swift and coordinated action is requited. Finally, the efficient conduct of government, increasingly in the hands of administrative authority, has given rise to the expression "big government" and "government by executive order". While the President has certain leeway as to his executive prerogatives, his administrative officers have no such authority except by legislative grant. Under Article IV, Section 4 the President has the power to furnish military assistance to repress domestic violence upon the call of a state governor or legislature. This also applies if the domestic disorder results in the violation of federal laws. The Constitution provides that the President "shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, ... Judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law: but the Congress may by law vest the appointment of such inferior officers, as they think proper in the President alone, in the courts of law, or in the heads of departments" (Article II, Section 2, Clause 2). Those not appointed according to the provisions of the Constitution are not "officers of the United States". The power of the federal government over the armed forces of the nation is divided between the President and the Congress. The legislature (Congress) has been given the important powers of raising armies and providing a navy (Article I, Section 8, Clause 14); the President, as commander-in-chief of the armed forces (Article II, Section 2, Clause 1), may issue regulations of his own and may take charge of all military operations in times of both peace and war. Article I, Section 9 limits Congress' power to suspend "writ of habeas corpus" to "cases of rebellion or invasion". In foreign affairs the President is limited by Congress only with great difficulty and on rare occasions. The control of the public purse provides a theoretical check on the President's foreign policy endeavors but in practice it has had limited effect. Treaties must receive two-thirds vote of support by the Senate to be valid. A treaty has two aspects: an engagement with a foreign entity and as federal law. The former may be changed or modified only by the President while the latter may be altered or negated by an act of Congress. Executive agreements by the President with foreign entities has tended to circumvent the treaty process. These agreements have obviated the imposition of Congressional action as concerns these agreements which have the weight of law. Finally, the President is the "manager" of the federal bureaucracy and as such determines its efficiency and efficacy.

5. Federalism

The United States is governed by a federal system in which governmental powers are distributed between central (national) and local (state) authorities. In the nascent confederation of the colonies it was seem that as individual entities they lacked the necessary ability to fend for themselves in a world more developed than they were. Local patriotism gave way to the exigencies of the times and they sought the strength of banding together even as independent sovereignties. Local patriotism necessarily yielded before the proved inability of the confederation (of Colonies) to cope with the problems confronting it. In the Constitutional Convention compromise was achieved between the advocates of a strong central government and supporters of states rights. Federalism also fit into Madison's basic requirement of free government. It reflected his purpose to so contrive "the interior structure of the government as that its several constituent parts may, by their mutual relations, be the means of keeping each other in their proper place". The Ninth and Tenth Amendments sought to clarify this distribution of powers between national and state authority but it still is the cause of contentions, to be resolved by the Supreme Court.

5A. Scope of National Authority

Theoretically, the powers of the national government are limited to those delegated to it by the Constitution, expressly or by implication; the powers "not delegated .... nor prohibited by it to the states" are "reserved to the states respectively, or to the people". The national government may choose the means of carrying specifically granted power into effect. Implied powers find verbal basis in Article I, Section 8, Clause 18: the "necessary and proper" clause merely enables the federal (national) government to maintain its supremacy in the limited sphere of its activity. Article VI, Section 2, the keystone of the federal system, stipulates a third dimension of national power. It indicates that if the legitimate powers of the state and nation conflict, that of the national government shall prevail. There are exclusive powers and concurrent powers of national and state governments. An example of an exclusive power is that of the federal government being exclusively the coiner of money (Article I, Section 8, Clause 5).

5B. Cooperative Federalism

Under Article IV, Section 4, the United States is under obligation to guarantee to every state a republican form of government. Amendments may be proposed and ratified by the state legislatures; state court judges are bound to observe and apply federal law. Through the years the national and state governments have de facto increased their cooperation as being to their mutual benefit. They are less amenable and amicable when a state's purposes did not coincide with the larger national purpose. Conflict has arisen from two sources: 1) when the states in the pursuit of normal objectives, under their police power, encroached on Congress' power to regulate interstate commerce,; 2) when the federal government pursued a national policy normally thought to lie within the province of the states. While recognizing the states' right to handle their own internal affairs unhindered, according to their local precepts, the Supreme Court made decisions that also recognized that the country's peoples were inextricably entwined such that the concept of "one for all, all for one" was in the best interests of both national and state welfare (where "welfare" is not a political word). States' rights advocates and a strong national government adherents over the years have worked out amenable compromises that essentially accommodate both sides. As in life, things are not all white or all black, even though people can legitimately stand firm in their core beliefs, giving a little here, taking a little there. The prevailing view would seem to be that things should not change precipitously but rather that they should evolve over time, seeking the most beneficial level. With a diverse content of peoples such as is our country, it of necessity must be so. [However, our heritage from our Founding Fathers is important and even crucial to the our identity. Diverse cultures are fine but can only be salutary within our national heritage (China is China, the U.S. is the U.S.) Pardon my personal interjection.]

6. Regulation of the Economy

The Commerce Clause (Article I, Section 8, Clause 3) was inserted in the Constitution primarily to prevent the several states from impeding and interfering with the freedom of national commerce. Over time this clause has increased in importance in terms of national authority. Since the beginning with Chief Justice Marshall the Courts have ruled in favor of those policies that implement the Federalism construct: those things of a national nature come under the purview of the Congress with the states being granted authority over the rest of the field of commerce, including those areas strictly within the state and not in conflict with the national interests. This is a very fertile area due to the fact that commerce is so heavily involved in national activity and thus of a national concern. Interstate commerce trumps intrastate commerce every time and influences the Court in such conflicts. The purpose of this is to facilitate interstate commerce and prevent one state from dominating another state. There is no "balance of interests" where the national and state interests collide. However, the judiciary takes cognizance of the states' rights to regulate such things as local taxes, inspections, safety rules, weight restrictions and such other local concerns. Of prime importance to the federal aspect of our government is the prevention of local barriers to national commerce. 7.

7. National Taxing and Spending

Under Article I, Section 8 the Congress shall have the power to "lay and collect taxes, duties, imposts and excises, to pay the debts and provide for the common defense and general welfare of the United States.....". [This Clause "providing for the general welfare" strikes a chord in many but must be taken as an overarching rather than a specific stipulation.] It would be difficult to fashion more sweeping language. In the exercise of its taxing power, the national government reaches individual citizens and their property and acts directly as though there were no states. Except for the limitations of the voters at the ballot box, Congress is free to set any amount it desires through taxation. [Recall the cry during the Boston Tea Party, pre-Revolution, " no taxation without representation". No democracy could function otherwise.] The only specific limitations on the taxing authority is found in Article I, Section 9 which expressly prohibits the national government from granting a preference to one state's ports over another's, and it forbids a tax on exports (a concession to the southern states). In addition to these expressed limitations the Supreme Court has developed two others through interpretations. The first one is found in the doctrine of reciprocal immunity: the national and state governments cannot tax each other. A second Court decision prohibited the federal (national) government from certain taxing and spending powers as a way to regulate certain activities traditionally within the states' purview (such as the agricultural production). In short, the general-welfare clause was a grant of power to use public money for any purpose that concerns the general welfare. In 1913 the Sixteenth Amendment was passed: "Congress shall have the power to lay and collect taxes on income, from whatever source derived, without apportionment among the several States and without any regard to census or enumeration". The "due process" clauses of the Fifth and Fourteenth Amendments were not now (since 1949) considered impediments to the national and state governments in dealing with private business and commerce in cases considered to be offensive to the public welfare (labor disputes). [More on "due process" in next section.]

8. Rights of Individuals

"Due process", found in the Constitution including the Fifth and Fourteenth Amendments, stipulates that certain things cannot be done by the governments without the due process of the law, such as trial by jury. [The problem with the law is, how can a law be written which is both succinct and "all-inclusive " at the same time? There are so many iterations of "unique" situations that one law does in no way fit them all. Yet this shall be the challenge of the legislators and the imperative of the courts. One of the beauties of science is that one law fits a multitude of situations: Newton's Law of "force equals mass times acceleration" can be applied with equal force (pardon the pun) to any number of applications. Not so the legislative law: the courts are assigned the task of unraveling the meaning of a law in the context of the unique details of the conflict. In fact, unlike science, there is no one right answer to satisfy all parties. Who among us has the wisdom to fairly and rightly adjudicate all our conflicts with their multitudes of ramifications ? These are points to ponder.] The decisions of the courts over the years have molded and remolded our personal, individual rights in an ever increasing complex society. To follow this history is beyond the ken of this Constitutional summary. It will be said that there are references to "due process" (redress of wrongs by jury consideration) and "equal protection under the law" (everyone has their day in court). These two clauses refer to the individual in relation to the government, national and state. The individual rights in such cases have evolved over time and have relied in large measure on the interpretation of the historic set of rights enumerated in the Bill of Rights, that set of amendments ratified shortly after the ratification of the Constitution. Besides statutory enactments, judicial decisions and custom, the first ten amendments of which the first eight are the Bill of Rights, were proposed by Congress in 1789 in order to assure both the people and the states that their rights would be protected against encroachment by the federal government. Several of the amendments follow: I. (Freedom of Religion, of Speech and of the Press) Congress shall make no law respecting an establishment of religion or prohibiting the free exercise thereof; or abridging the freedom of speech or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances. IV. (Security, Unwarrantable Search and Seizure) The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated and no Warrants shall issue, but upon probable cause supported by Oath or affirmation, and particularly describing the place to be searched, and the person or things to be seized. V. (Rights of Accused in Criminal Proceedings) No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment or of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in service in time of war or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy lide or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty or property without due process of law; nor shall private property nor shall private property be taken for public use without just compensation. VI. (Right to Speedy Trial, Witnesses, etc.) In all criminal prosecutions, the accused shall enjoy the right to a speedy trial, by an impartial jury of the State and district wherein the crime shall have been committed; which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defense, VII. (Trial by Jury in Civil Cases) In suits at civil law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall otherwise be re-examined in any Court of the United States, that according to the rules of the common law. VIII. (Bails, Fines, Punishments) Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishment inflicted. IX. (Reservation of the Rights of the People) The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people. X. (Power Reserved to States or People) The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people. The preceding are rights provided to the people, and states, by the reading of the Constitution. These rights are being interpreted and reinterpreted by both the Courts and the Congress and so is a "work-in-progress". Presumably and hopefully these rights will be accommodated to the changing times even in light of the "strict constructionists". However, it's nevertheless necessary to "stay tuned".

9. Toward Positive Responsibility

Americans have become so accustomed to judicial review that they take it for granted. Whenever the government enters a new domain there are questions as to the constitutionality of this action. Since the 1930's many have wondered wether a government so contrived can survive in an age that calls for power to deal with domestic problems of an ever-increasingly complex society and the power to cope with ever more complex international issues. These pressures may help explain why, during the 1930's, the principle of constitutional limitations has been under siege. Nevertheless, Americans are still accustomed to think in terms of the constitutionality of governmental actions rather than of its wisdom. Again, it's a contest between those who feel the Constitution should be liberally defined to reflect the changing times and those who feel that the strict letter of the Constitution should be followed even as society becomes more complex. The former group is not uncomfortable with the counts de facto legislating from the bench while the latter group vigorously rejects this concept. One thing should be clear: the spirit of the Constitution rejects the concept of a "legislative" court: the laws must conform to the Constitution, not the other way around. In addition, keep firmly in mind that the Court is elected for life while legislators can be voted out periodically. [The Second Amendment ("A well regulated Militia, being necessary to the security of the State, the right of the people to keep and bear Arms, shall not be infringed") has been the epicenter of a controversy over the right to bear machine-guns. There were no machine-guns on December 15, 1791. The concept in 1791 was that every man should be a part of the State militia. Are our citizens now expected to do the same? No. Do they now need hand-guns for protection? Possibly. However, do they need machine-guns for protection? No, because we have the service of the police, and we have a National Guard. Is there then a justification to bear machine-guns? Only in one's wildest day-dreams. However, is there danger of monstrous mischief (hellish behavior)? Unfortunately even civilized countries have monsters. So then, the Constitution says we may bear "arms" (single-loading flint-locks). To be a smart-aleck, would we say an atomic "device" is an "arm"? Would we then stick to the letter of the law? Hardly. I have yet to hear even a glimmer of a sensible, valid justification for allowing machine-guns (except the vapid one that "if they take away my machine-gun they'll next take away my hand-gun". No, we're not that ignorant. Personally, I'd like to have every "arm" in civilian hands banished, but that will not happen because even in an affluent society such as ours there are the "bad guys" out there. (When I was about 10 years old I looked in my father's bureau and saw a hand-gun. I never gave it another thought.) In sum, let's use our God-given

intelligence when considering things of such importance. I would warrant that the police have strong views about the proliferation of "arms" and they are our "thin blue line" between us and the "bad guys". There can be some "bad apples" but gosh, let's give them a break in a world where there are those with absolutely mo conscience. So, how does a judge interpret the word "arms"? Is he legislating from the bench if he defines it as hand-gun? I think not, and I'm partial to looking to the Constitution as an essentially immutable standard of conduct. Tamper with it only at the very edges and then with trepidation. Machines have to have strict standards and I'm partial to machines. The question is, "does the law conform to the Constitution, our standard, and if not, why not"?]

9A. Erosion of Constitutional Limitations

There are three prime delimiting principles provided by the Constitution: separation of powers between the three branches of government, the federal system (national and state) and the due process of law. Since 1937 these three delimiters have been slowly eroded. In addition, there is no specific elements in the Constitution that proclaiming the separation of powers of the three branches. Those separate powers are only implied by the structure and organization of the Constitution. Hoever, it does not preclude blending of powers. However, in the modern are the executive , by virtue of its size, tends to be the dominate branch of the government (in addition to which must be added the state governments). In its daily operations the executive branch reaches into the daily lives of everyone in a manner that leaves even the legislative branch of secondary (but important) significance. [There are those who are pleased when the legislators do nothing, at all. There are also those who would have the legislators rescind many laws that no longer pertain.] When the government seized the steel mills (during a strike) in 1952 without statutory authorization Justice Black stated, "In the framework of our Constitution the President's power to see that the laws are faithfully executed refutes the idea that he is to be a law-maker". Justice Black's rejection of the claim of inherent power in the President to deal with this emergency as he pleases was rooted in the doctrine of the separation of powers. The public perception probably is that the President "runs" the country, and in large measure this is true in his capacity as the head of a very large executive organization, i.e., all the large governmental departments that seem to pervade our lives. However, the Constitution endeavors, by its structure, to maintain the balance of powers through the court system and the legislative bodies. [We are a large and complex society that necessarily requires a large and complex government. The Framers of our Constitution did so in a largely agricultural and small - sized country. That they could derive a form of government that could "grow" with the increasing weight of an increasing population of increasing complexity is remarkable. That that Constitution also respects the inalienable rights of the individual members of that society at the same time is what makes the Constitution so remarkable. Without those (responsible) rights the word "democracy" would be a sham. To support these rights it's absolutely essential that a citizen have accessibility to the courts, that the courts rely on the merits of a case , and that the courts impose complete impartiality, the "sine qua non" of jurisprudence. As stated on the frieze over the entrance of the Supreme Court, "Equal Justice Under Law".] Against an impressive background of unprecedented executive aggrandizement in the last half of the 20th Century, and with the concept of self-restraint still fresh, the Court interposed its authority, making it quite clear that presidential action is not immune to judicial review (to enforce the separation of powers). This was exemplified when Justice Douglas said about Truman's 1952 seizure of the steel mills, "the most important one in our history concerning separation of powers between the President and Congress, and the role of the Court in enforcing the separation". The separation of powers is also found in the relationship between the national and state governments, particularly in the area of interstate commerce: anything transported between states comes under the purview of the federal government: the Congress has the power to regulate interstate commerce not only of tangible goods but also of those intangibles such as services or intellectual property, etc. Even the minimum wage law was held to be in the domain of the federal government because of the commerce clause. [As time progressed and the society became more complex and economically interrelated, the federal part of federalism has ascended while the states bring up the rear (which does not mean that they do not have substantial powers. It only means that the citizen has more and more government with which to contend. There's a constant push and pull between the "nanny" government and the laissez-faire proponents. The common wisdom seems to be that both will be with us in the foreseeable future, with the hope that conditions improve to the point of favoring the latter.]

10. Preferred Freedoms And Judicial Self-Restraint

Starting in 1937 the Supreme Court justices were faced with the necessity of probing the philosophy of the limits of judicial self-restraint. Having adopted self-restraint as to commercial regulations, in the face of audacious presidential assault (such as the President Truman's seizure of the steel mills), would the same narrow concept of judicial power apply to enactments that infringe upon free speech, thought and religion? [In recent times the power of the president to wage war has come under scrutiny. The Constitutional power of the Congress to withhold monies from the executive branch is a blunt method when the military action is essentially localized: what ability does Congress have to withhold funds for a specific military action? This dual power of the President and Congress concerning the initiation of military action is a difficult one when the concept of an immediate emergency is considered. The area of resolution could perhaps be delimited by separating defensive military as opposed to offensive, preemptive actions. It would seem clear that a preemptive military action would require a sound Congressional participation in accordance with the Constitution (which debate might in effect cause the action to be unnecessary: the adversary rethinks its position——-but "saber-rattling" is akin to gamesmanship, a repugnant form of international diplomacy that is not useful in the 21st Century. This is a most important issue about which books have been written and is mentioned here only because it is so important: this book documents an aspect of one of those most important results of such deliberations.] The fact of the matter is that all three branches are responsible for restraining themselves even as they undertake to fulfill their duties under the Constitution. "Power-grabs" most often come off as an example of a "holier than thou" attitude (if not outright self-aggrandizement). [We dislike the phrase "power corrupts and absolute power corrupts absolutely.] In 1937 the Courts tended to take a hands-off attitude when the Executive was involved in the administration of the economic and commercial success of the economy. This did not apply when things such as civil rights as found in the Bill of Rights Amendments were under consideration.. The Courts were not prone to tolerate infringement of these elements of the Constitution. This was spotlighted when the Warren Court in 1954 unanimously ruled against segregation in public schools. The Warren Court took the liberal view in cases concerning the Bill of Rights, saying that all such cases should be examined with special diligence and that "the Judiciary has the duty of implementing the constitutional safeguards that protect individual rights". The Courts purpose is to "ring" the legislative statutes (federal and state) against the precepts of the Constitution, without at the same time writing their own "legislation" by their interpretations. This is a fundamental complaint of those who rightly desire a well-established separation of powers. It is said that the Warren Court has achieved libertarian objectives largely by statutory interpretation. In its repudiation of the "separate but equal" doctrine it stirred up strong feeling both pro and con. While now a settled issue it was once a very divisive and contentious one in which the Court was accused of legislating fro the bench. Wartime brings about all kinds of controversies as to the legitimate powers of the executive as concerns the privacy of the citizens due to executive imperatives to prosecute the war or their legislative proposals to accommodate the executive. Integral to this is whether the condition of war could be established. War can be considered an emergency and in conditions of an emergency the government can impose itself on civil liberties and rights. Thus war makes itself felt in this region also. The condition of war is far too serious to be dealt with as a political gambit. That would be a "federal offense of gigantic proportions. It's that age-old conundrum of balancing the security of the nation as against the civil liberties of the populace. It would seem that the Constitution was written in such a way as to cry out for interpretation which in turn assures a steady dependence on the courts. In this way the admirable simplicity of the wording of the Constitution presents opportunities for responsible disagreements in this modern day and age. The function of the concept of checks and balances assures that if the "ship of state" heels over too much one way it will be self-righting by virtue of one of the three branches. The problem seems to be to protect individuals and minorities without thereby destroying capacity in the majority from governing. One of the qualities of a democracy is that the majority is not always so; the majority and minority may alternate periodically and the minority never loses its standing as legitimate and deserving of proper consideration. Defense of the rights of the minorities becomes not the antithesis of majority rule but its very foundation. It thus becomes necessary to preserve equal access in the political process to both majority as well as the minority. This is the essence of a democracy. An act of judgement in a court based on intellectual reason can have a moral force far exceeding that of the purse or the sword. Thus the Court's worth consists not only in its restraining power but also in its making available ideals and values that might not otherwise be made available. These standards must not be silenced lest we as a people sink into an abyss difficult from which to extricate ourselves. In the final analysis, it would seem that what all branches of the government require for a felicitous (apt and well-run) outcome is an impeccable sense of conscience (with the admonition, "Let your conscience be your guide"). How could one ask for more? (besides knowledge and intelligence, obtained from the thrill of learning).

EPILOGUE

As may be found in the Declaration of Independence ("We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain inalienable Rights, that among these are Life, Liberty and the pursuit of Happiness") and further in the Preamble of the Constitution of the United States ("We the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defense, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish the Constitution of the United States of America") it is clear that liberty (freedom) is the preeminent Right. To be sure, Rights of all stripes abound in our present-day society. However, it would be foolhardy to keep piling them one upon another, thus diluting those that we hold paramount. Of more importance would be the refusal to balance legitimate Rights with commensurate applications of Responsibilities (and Accountabilities). The former, without the latter, represents a marked diminution of the heritage of our forefathers and their moral commitment to contribute to the general welfare of society (not to be confused with a welfare state). A to-the-point homily clarifies this: "Get off the wagon and help push that wagon". It is such that has made this country strong and good. Woe be unto us if this state of mind wans. "Rights", yes, but only with equal amounts of "Responsibility" and "Accountability". The extent to which we lose this balance is the extent to which we diminish ourselves as a Nation (where "Nation" is a cohesive group of people and "Country" is just a place). This balanced mindset is the only rational way to proceed if we are to be successful as a Nation. To be sure, with that proper balance there comes a prevailing sense of satisfaction.

I can not close this Trilogy of "Flight Deck" without first saying a few words about whom I believe to be the unsung "heroes" of our nation. [A true hero is one who puts one's physical life in jeopardy while in service to others. Do not diminish them by carelessly attributing this honor.] My "heroes" are they who devote their talents to the design and then the manufacture of tangible products or "goods" ("goods and services" equals GDP) . I have a special admiration for those who manufacture (produce) products. Strange though it sounds I feel emotionally stimulated when I watch an automatic production-line in operation. It's why I left the "service" industry (which is now taking on more and more of our economic endeavors) and applied myself to the field of automatic controls, a crucial subset of manufacturing (even though my actual jobs were never directly so related due to the exigencies of "earning a living").

In any event the study of the engineering aspects of automatic controls has been my “passion” and has occupied most of my attention ever since I turned to it fifty years ago.

As an important aside to the above I am pleased to be in the knowledge that one of my ancestors (Paul Moody) has been cited as the Father of the American Industrial Revolution and that my grandfather (Edward Atkins) was an entrepreneur who started an electric car company. My name, Edward Moody Atkins, encompasses both as does my father (Paul Moody Atkins, born in Boston and who was savvy enough to have received one “B” and all the rest “A’s” at Yale University and who subsequently met my mother in France during WWI, she from Charmonix and Paris, with an MBA from Syracuse University.

I will close now with what is to me an obligatory recital of Paul Moody’s pertinent “resume” as culled from the City of Lowell, MA historical files. Paul Moody was born in Newberry, MA in 1779 with descendants from England, starting in 1634. While his six brothers went to colleges (Harvard and Dartmouth) he went to work at a cotton mill at the age of 12 where he learned the trade. About thirty years later he teamed with Francis Cabot Lowell, the entrepreneur, to develop the world’s first vertically integrated production system, a cotton-mill factory, in 1814 (complete production-line from start to finish under one process and roof) . There Paul Moody was in charge of developing all the machinery of this plant as well as modifying, maintaining and supervising the operation of the factory. He also had the responsibility to develop, maintain and operate the water-works necessary to generate the power used by the cotton-mill. While Francis Lowell provided the mathematical skills and financial requirements it was Paul Moody who designed and developed and maintained the machines and improved upon existing machines, and then integrated them into the cohesive production-line that was to become the model for all future manufacturing plants. Thus he was claimed to be the Father of the American Industrial Revolution with many patents to his name.

Paul Moody applied himself with special effect to the education and well-being of the employees and citizens of the community. He supported temperance even if only by example. He strongly supported the Episcopal church he regularly attended. As superintendent of the mills, the following is transcribed: “The part which he sustained in the origin and early development of Lowell (MA) greatly enlisted his interests in the welfare and prosperity of the community, and he gave the strength of his judgment and the weight of his influence to whatever might contribute to its beauty by the best use of its physical advantages, or might conduce to its beautifulness, or might secure an elevated moral tone of sentiment and conduct [the prime purpose of my books is to promote proper conduct.] He was especially efficient in promoting the cause of temperance.

........His measures were quietly but effectively taken and sustained by his own example (and) were successful. [I still wonder at the inability of the many who are unable to comprehend the meaning of moderation and the one-way toll taken on the body and the mind.] In reference to his influence , both at Waltham and lowell, no one would demur to the statement of Edward Evertt that "to the efforts of his self-taught mind the early prosperity of the great manufacturing establishments in Waltham and Lowell was in no small degree owing".......He was a warm friend of education and favored the most liberal expenditures for this purpose [remember that this is the 1810 period, 200 years ago.] An Episcopalian in sentiment and church membership he gave to the cause of religion the influence of his personal example, his careful observation of the Sabbath, his regular attendance at church and liberal [i.e.,fulsome] contributions for its current and occasional expenses [our nation was founded by those of deep religious convictions that have become moderated with time.] Habitually cheerful, strong in his attachments, faithful in friendships, tender in his conjugal and parental relations, he was greatly respected and beloved by all...... From the earliest active measures he has sustained a conspicuous part of this enterprise; and it should be remembered , the place which he has held in this concern he has sustained by the uncommon strength and acuteness of his practical talents. He was kind to the poor. He was not wont to turn away from actual [not feigned] suffering without an effort to relieve it. No person more fully appreciated the superiority of that charity which provides for the destitute by encouraging their own laudable exertions and industry [Would that we could tack these words on every lamp-post throughout the land, for this is, this needs be, our nation's indelible heritage.] What he was as a friend, a brother, a father, a husband has been involuntarily attested to by the deep, unaffected and irrepressible emotion which this truly emotional event has occasioned........The habitual cheerfulness of his disposition, the stability of his friendship, the fidelity and constancy of his attachment, the affectionate tenderness of his parental character are known—-and written on the heart.......The use of few of his inventions has been susperseded by more modern discoveries, and they were so numerous and important that to no one are we more indebted for the advanced and successful state of the cotton manufacture among us."

There are tributes and there are tributes but the above are there to warm the heart. Yes, I am proud to be a part of his name in spite of the fact that I used to be "joshed" for having the moniker of "moody" in school (come to think on it I was no stranger to moodiness———-but since divested of such). I will end this little dissertation by saying to all those others who are or have been beset by moodiness: In the final analysis we are all as happy as we make up our minds to be so (such as learning the art of appreciation of such as nature and human nature).

INDEX

Accountability, 52

Acids and Bases, 152

Aerodynamics, 110, 112

Aeronautics, 108

Algebra, 34, 780, 782, 784, 786, 788, 790, 792, 794

Algorithm, 798

Alkali Metals, 168

Alkaline Earth Metals, 170

Analog Computers, 534, 536

Analog vs. Digital, 530, 532

Antenna, 16

Automatic Controls, 72

Basic Physics, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226

Biblical passage 132

Biology, 652, 654, 656, 658, 660, 662, 664

Black-and-White Monitor, 14

The Brain, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712

Carbon, Silicon and Tin, 174

Catalysts, 156

Chemical Activity Series, 162

Chemical Analysis, 188

Chemical Engineering, 378

Chemical Heat, 158

Chemical Reactions, 146, 148

Chemistry, 60, 62, 64, 66

Chemistry (Salts), 154

Chemistry and Water, 160

Circuits, Integrated, 50

Color Monitor, 14

Communication, 6

Complex Numbers, 802, 804, 806

Computer Machine Code, 372

Computer Software, 8

Control Systems, 70, 74, 76

CPU, 10

Digital Computers, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588

DNA, 120, 122, 124, 126

Drink and Drugs, 282

Electric Circuits, 430, 432, 434, 436

Electric Motor, 116

Electrical Circuits, 438

Electrical Engineering, 376

Electrochemistry, 164

Electromagnetic Induction, 128

Energy, 32, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646

Engineering, 106, 346

Engineering Design, 348, 350

Flatbed Scanner, 28

Fuzzy Logic, 78, 80, 82, 84, 86

Gasoline Engine, 44, 46

GPS (Global Positioning System), 336, 338, 340, 342, 344

Grammar, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480

Halogens, 180

HNet, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752

Holography, 230

Human Cell, 228

Hydrogen, 370

Image Processing, 796

Industrial Engineering, 380

Integrated Circuit, 48

Jet Engines, 114, 406

Jobs, 42

Laser Printer, 20, 22, 24, 26

Machine Tools, 808, 810

Manufacturing Engineering, 382, 384

Manufacturing Technology, 68

Math Modeling, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428

Mathematics, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528

Mechanical Engineering, 374

Medical Imaging, 666, 668, 670, 672

Metals and Nonmetals, 144

Muscle Function, 770

Muscles, 772, 774, 776, 778

Networks, 56

Neural Networks, 88, 90, 92, 94, 96, 100, 102, 104

Nitrogen and Phosphorus, 176

Nuclear Power Plant, 40

Operations Research, 362, 364, 366, 368

Organic Chemistry, 182, 184, 186

Oxidation and Reduction, 150

Oxygen and Sulfur, 178

Packet Switching, 648, 650

Petroleum, 130

Photosynthesis, 118

Photovoltaics, 136, 138, 140, 142

Physics, 38

Probability and Statistics, 30

Radio Transmissions, 16

Robotics, 440, 442, 444, 446, 448, 450

Servomechanisms, 452, 454, 456

Ship Speed, 36

Simulation, 356, 358, 360

Stem Cells, 134

The Sun, 290

Systems Analysis, 352, 354

Technician, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280

Telephone, 6

Television, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506

Thunderstorm, 284

Transistor, 18

Transition Metals, 172

U.S. Constitution, 754, 756, 758, 760, 762, 764, 766, 768, 818–828

Vitamins, 800

Voltaic Cell, 166

Water-power, 32

Weather, 286, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404

Welcome Home, 54

This book has taken a fair amount of time since it was completely a one-man effort. The pictures were chosen from literally thousands of photographs as taken by U.S. Navy photographers. It was a huge job to pick out the ones that would be right for this book, given a certain balance that I thought would best portray "a day in the life of an Airdale" on the flight deck. Being a novice at this sort of thing, there are no doubt flaws in the final product. But it's really the pictures that tell the story, and I'll rest on that.