Interceptor

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FOR THE MEN RESPONSIBLE FOR AEROSPACE DEFENSE

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Hq ADC Field Printing Plant
Ent AFB, Colorado

spotlight

Someone has figured out we have made approximately 35 million laws trying to enforce the Ten Commandments.

departments

special features

OUR COVER

An extremely potent member of our Aerospace Defense team stands cocked and ready if needed for the defense of our country. ADC's CIM-10B, or Bomarc B, a Mach 2.6 Ground to Air Interceptor with a 30-second reaction time to launch.

memo

from the CHIEF OF SAFETY

THE "TORTOISES" AND THE "HARES"

Col H. C. Gibson

In our May issue we mentioned the Los Angeles experiment where an expert driver drove a test car over an inbound freeway during peak morning traffic. He switched lanes 57 times, followed too closely 48 times, and exceeded the speed limit 17 times. He reached his destination *exactly 25 seconds* ahead of a driver who drove lawfully. He also spent the rest of the day taking ulcer pills.

A recent article in a local newspaper outlined two such tests conducted in Europe, but over much longer distances — results after 1,000 miles, the "Hare" (or "nut" in this case) finished the course only 31 minutes ahead of the "Turtle" after taking every advantage. He braked 1,339 times with 4 panic stops, passed 2,004 cars, and was passed by only 13. The safe, relaxed "Turtle" enjoyed his trip. He braked 654 times with *no* panic stops, was passed 142 times, and passed other "Turtles" 654 times. Consideration of the time saved by "Hare" driving emphasizes the foolishness of such an action. Consideration of the risks involved underscores its absurdity. The spoils of the sport are a case of nerves, ulcers, and a worn-out car, at best, with the high possibility of early funerals for you and yours; and you're not really saving any time.

This type of driving also points up some other things about a lack of self-control, of maturity maybe, of judgment, and a lack of real knowledge of the proper handling of an automobile.

Playing the "Hare" on the highway spoils the pleasure of automobiling for you and your passengers, not to mention the "Turtles" you anger. So *slow down* and enjoy the sport, the scenery, and the contentment of relaxing. Wave at the other "Turtles" and pity the poor "Hares" in their race to destiny.

COL. H. C. GIBSON

HOT LINE

PARACHUTE HANG-UP

After landing from a cross-country flight, a pilot in the rear seat of a T-33 discovered that he could not get up with his seat style (SA-20) parachute attached. He unbuckled his harness and found that the loose end of the diagonal back strap (adjustment strap) had become lodged between the seat and the arm of the ejection seat. It is highly possible that in the event he had to eject, man/seat separation would not have occurred. The situation would have been more critical if the pilot in the front seat had been forced to eject the man in the rear seat before his armrest could be raised to ejection position. Emergency Ground egress would have been delayed until he could free himself from the chute harness. Until a "fix" is accomplished, all pilots flying with this type of equipment should make sure that loose straps are stowed in the keepers provided.

FUEL FOR THOUGHT

One of our units flying T-birds sent in a message which contains some interesting information. We thought we would pass it on with the comment that this is one of those nasty situations where, if Lady Luck hadn't stepped in, the pilot would have been hard pressed to keep from buying the cause factor.

"When one of our T-33s recovered recently, his fuselage tank fuel quantity went to zero as the aircraft touched down. (The gauge was accurate.) It is our best guess that he suffered fuel icing of a number of components — principally the main wing and leading edge transfer pumps or their float valves, and the tank quantity float. Fuel samples taken here showed nothing. The takeoff base was notified and asked to check out the servicing vehicle (no reply at this time). A possible source of moisture is through condensation in the fuselage cell. This aircraft recovered at another base following a night target mission. However, due to the fact that transient services for refueling were not available until 0800, the aircraft was not refueled as recommended by T. O. 42B1-1-9, para 4-2. If condensation caused the problem, then a hazardous situation exists at bases where immediate refueling services are not available. The pilot noted that he did not get a drop in his fuselage tank quantity following the tip tank out light (about 340 gallons) plus a reasonable length of time. The main wing was selected, followed shortly by descent for landing when the fuel switches were gang-loaded. The fuselage tank showed full until touchdown. The pilot stated that he porpoised the aircraft to see if the tank quantity float might be stuck, but he got no drop so decided that the tips were still feeding some fuel and went to the main wing anyway. This was a near miss of a different variety. We are emphasizing fuel management and surveillance in flight, but we may need some help when it comes to getting refueled on the ground."

THE ORANGEMEN ARE BACK!

Air Force has approved our Required Operational Requirement of a high visibility flying suit. Initially, the suits will be purchased from the old specification for the orange K2-B suit with first deliveries expected in the fall of 1968.

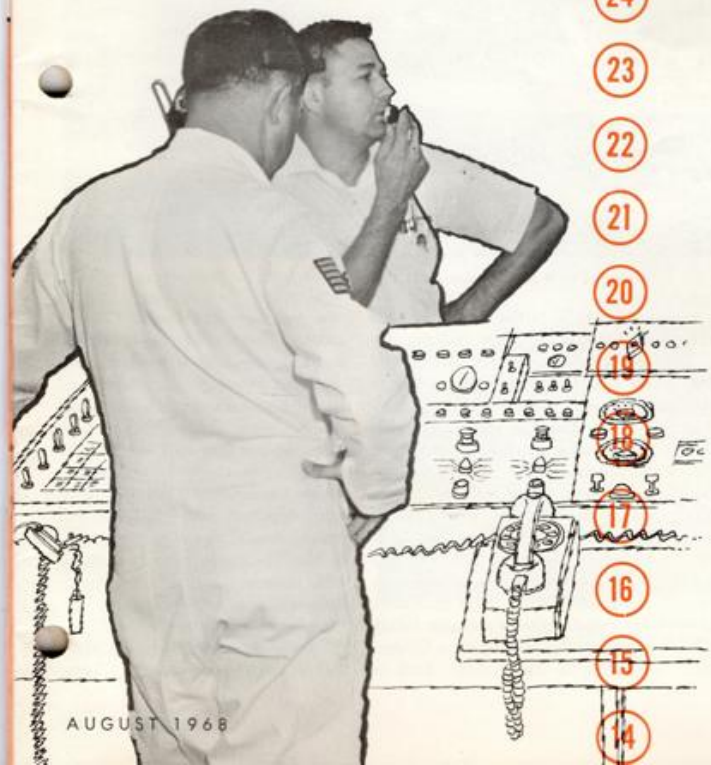
In the way of future developments we can expect to see both green and orange suits made of a fire retardent synthetic material such as NOMEX. Two prototype of NOMEX suits have been tested. Poor aircrew acceptance resulted in both being turned down. The Life Support Systems Program Office (SPO) is redesigning the suit using a safer weave NOMEX with the hope that it can be standardized. NOMEX gives far better fire protection than our present suits.

SONIC BOOM LOG

A reminder to all "faster than the speed of sound" pilots: AFR 55-34 dated 6 October 1967 outlines pilot responsibility in recording supersonic flights. It's an easy entry to overlook during all the square-filling that takes place after a mission. However, it suddenly takes on great importance when the search is begun for the clod who shattered a local resident's bird bath. Protect yourself at all times. It only takes a minute.

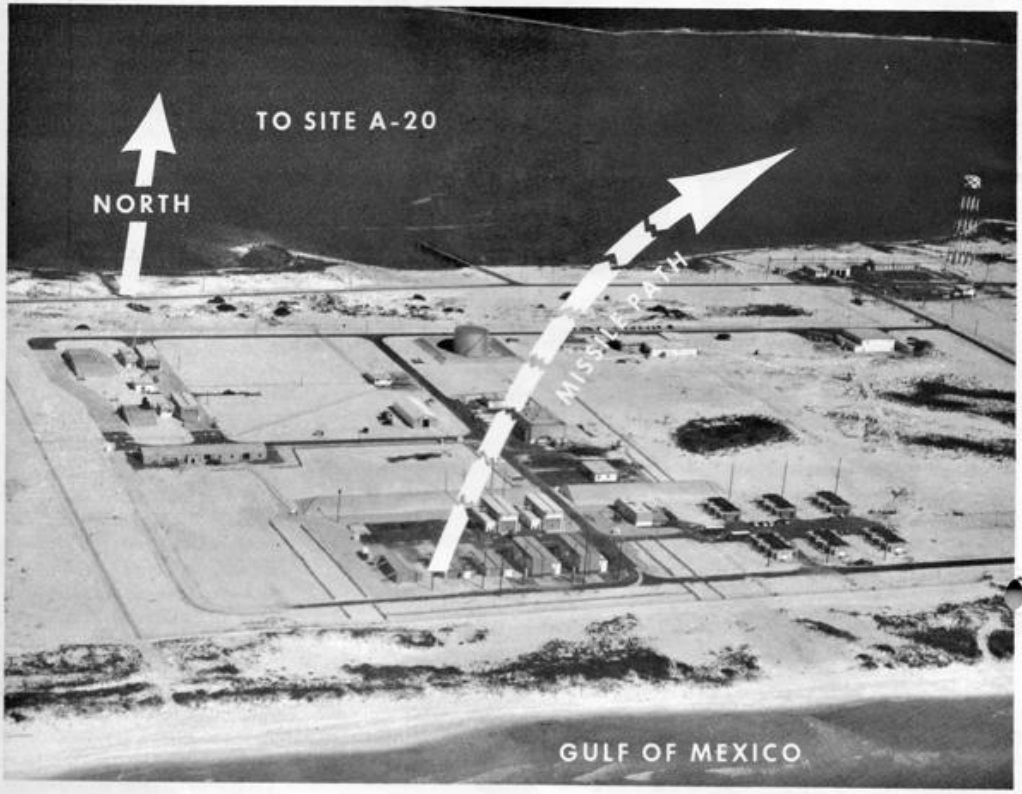
T-30 minus & COUNTING

Part of the mission of the 4751 Defense Squadron is the evaluation launch program of ADC's Bomarc missiles that provide an important part in the defense of the North American Continent.



"T minus thirty and counting!" . . . and thus begins another launch of the CQM-10A, fifteen thousand pounds of supersonic sophistication booming out over the Eglin Test Range. Within 25 minutes or less, the Tyndall fighters will be attempting intercepts against this "target" which will be travelling in excess of mach two above 50,000 feet. This is ADC's supersonic drone, CQM-10A, or Bomarc-A. It's slightly obsolete by today's standards of Aerospace Defense, but has served its role well in the defense of our country since January 15, 1959 when the first big bird scored a direct hit on a QF-80 jet drone some 87 miles out over the Gulf of Mexico. The "A" is outmoded now by the newer, faster, and fantastically more capable Bomarc-B. We are using the "A" models for training, both for interceptors and launch personnel. They serve as part of the four-fold mission of ADC's 4751st Aerospace Defense Squadron located at Hurlburt Field (Eglin Aux #9), Florida.

Another interesting part of their mission is, as we said, the evaluation launch program of the CIM-10B, or Bomarc-B. This beauty is similar in weight, size, and exterior appearance — but there the similarity ends. With speeds in excess of 2.5 above 75,000 feet and a range of over 400 miles, the "B" boost rocket motor contains solid propellant fuel as opposed to the liquid red fuming nitric acid of the "A" (ugh!) and with a reaction time of less than 30 seconds! Aerospace Defense Squadrons equipped with "B"s and located strategically throughout our country and Canada are at this very moment "cocked" and ready, if needed, to provide their part in the Aerospace Defense of the North American Continent, just like our fighter squadrons, both ANG and regular,



Bomarc testing facilities, Santa Rosa Island, Florida

24 hours per day, seven days a week—forever! (Just ask an alert troop.)

The 4751st provides two of the supersonic "A" drones per month for Tyndall fighters and training launch personnel and they additionally operate a Ground/Air transmitter site 24 hours per day in support of the 32nd Air Division. They also conduct SAGE/Bomarc school at Gunter AFB, Alabama. They're busy people, proud people, and successful people, as two recent concurrent Outstanding Unit Awards and a Missile Safety Plaque will bear testimony.

But, back to the launch . . . the countdown continues and the various activities and launch control areas at Hurlburt begin to tick in time with their clocks and computers. About a mile across the inlet from Santa Rosa Island is the launch control site which relays the information to the missile. On the island the "Drone" stands ready, having been prepared and processed by the Santa Rosa (or Site A-15) maintenance personnel. Approximately 80 of these dedicated, sun-tanned experts are now taking refuge in the Maintenance Control Building for the blast-off. Back on the mainland at Mission Control, another area adjacent to launch control Site A-20 is located. This building houses the computers and the civilian contract technicians and the Squadron Operating personnel. The Squadron's Mission Launch Director, his technician assistant, range coordinator, and the Veriplot monitors (for altitude and track) begin to get a little more tense. The clocks keep ticking and the launch time gets ominously nearer—all systems and safety precautions check out — it's still go. SSgt Ronald I. Langston, the NCOIC of the Bomarc Control Center

monitors his crew of two, SSgt Nebit and Sgt Howard. They wait now for the last six minutes of countdown, and the final directions from the Computer Building Launch Control.

To date, over 160 Bomarc missiles have been launched against targets flown over the Eglin Gulf Test Range. The excitement and tension here may not quite reach the level prior to and during a space shot, but is exciting, nevertheless.

The countdown reaches within two minutes and personnel whose duties do not require them to stay at their posts, step outside to watch for the missile as it rises one mile away on the island. Time's up, and so is the missile. You can see it, of course, before the sound of the liquid fueled rocket boosters boom —the Bomarc "A" is away within seconds and accelerates to above mach 2 where the ram jets kick in and accelerate to about mach 2.4. It levels as commanded at 56,000 feet and is then directed into a slight left turn down the Test Range Corridor where the fighters have a go at it. Within minutes the missile is approaching the down range point and in this case was given the "self destruct" command at approximately 175 miles from launch point.

So ends another supersonic target and in its wake are more and better trained missile launch people, and more and better interceptor crews, more experience, more know how, and more defense.

The 4751st Air Defense Squadron initiated the Bomarc Combat Evaluation Launch Program in November of 1963. Under this program, each of the Bomarc Tactical Squadrons, including those in Canada, annually send a tactical Bomarc to Hurlburt Field and deploy a firing team to process and launch this missile. During the period of

Personnel responsible for maintaining CQM-10A Launch and Control facility, SSgt Dennis A. Neish (L), Sgt Harry S. Howard (C), SSgt Ronald L. Langston (R)

Sgt Steven H. Beckman, Missile Maintenance technician, accomplishing a little "brain surgery" on CIM-10B missile

CIM-10B Bomarc shelters at Site A-15, Santa Rosa Island

Canadian Air Force low cost visual tracking computer at work on Santa Rosa Island

deployment, these personnel are assisted by members of the 4751st Air Defense Squadron and each missile launched is fully instrumented to provide in-flight data on the various subsystems of the missile. This program provides the Aerospace Defense Command the means of constantly evaluating the men and equipment composing one of the most effective weapons available for defense of our Continent. The men who man the Tactical Units look back on Hurlburt as their "Alma Mater."

HISTORY

The idea of a Surface-to-Air missile is not new. German scientists developed their famous V-2 rockets early in the 1940s. Although the V-2 was surface - to - surface, they were beginning an era, taking the first faltering steps toward the Missile Age. The United States, impressed by V-2 capabilities, began its own accelerated research in the missile field shortly after World War II. It was then that the Bomarc, now a vital element in our command and our defense, began to take form.

The Boeing Company of Seattle, Washington, launched Project GAPA with the goal of developing a surface-to-air guided missile with a range of 25 NM; their research in the field of missile technology was soon joined by the Michigan Aeronautical Research Center, producing from this union the first experimental models of the CIM-10A, hence, Boeing-Michigan Aero Research Center, BOMARC, and with capabilities of intercepting enemy aircraft not at the initially planned 25 miles, but at a range of over 200. Bomarc testing continued at Cape Canaveral, beginning in 1951, until the quest for bigger and better space shots began to dwarf the Bomarc program there. Envisioning the need for a

Assembly and maintenance hangar at Hurlburt

more fully developed area defense weapon, the Bomarc planners sought a location for a multi-million dollar missile complex to include facilities for training crews to man Bomarc squadrons throughout the nation. Such a site would require a climate permitting year round tests and space for a 200-mile corridor through which the missiles would fly. They found such a site on the Gulf Coast of Northwest Florida — Hurlburt Field.

By 1958, the 4751st Air Defense Wing was organized and on 10 July that year, the first Bomarc was delivered to Hurlburt from the Boeing plant at Seattle, Washington.

Since that time, a few other wars have occurred with the most recent highlighting the Surface-to-Air missiles, or "SAMs" as our newsprint says, utilized by the Viet Cong. The SAM is similar in mission to Bomarc and designed, developed, and produced in the Communist corner of the world. All too many American pilots have had recent personal knowledge of the Russian-built SAMs or "Flying Telephone Poles" as they're sometimes called in the skies around Hanoi and Haiphong — they've accounted for a "few" of our airplanes although much inferior in performance and capabilities than our Surface-to-Air missiles. Our fighter pilots seek out and destroy the VC SAM sites wherever possible.

The 4751st Aerospace Defense Squadron Commander is Colonel "Nat" King. His people are dedicated people and work long hours to provide their part in Aerospace Defense. We're happy to know that they are a proud and growing member of our team.

Sleep well tonight, because ADC is awake! ★

B model on the rise

TO GO OR NOT TO GO

A cross-country flight can be a pleasant experience, provided things go just right. Smooth air, bright sunshine, and favorable winds are a few of the "no sweat" factors. A good bird doesn't hurt, either. But when you've been on the road for a while and the master plan begins to come apart at the seams, big trouble lies ahead if you don't play your cards right. Once you start losing, if you double up to catch up, you can suddenly find yourself busted, maybe permanently. What you have to do is back out of the game, count up what you have left, and then make it stretch. The stakes are getting too high for the luxury of using bad judgment every now and then.

The point was brought up not so long ago when we were finishing up a tiring haul around the west coast in a T-bird. Except for running into some lousy weather here and there (usually on final approach), the trip had been uneventful. Our schedule called for a night flight into a favorite RON spot, with a mid-morning departure for home plate the next day. More than halfway down the road on the night hop, the gyros went ape. Needles and rotating cards went into high rpm. The weather wasn't bad (we could see where we were going) so we decided our best bet was to press on. Instead of fighting the CDI and mag compass, it seemed like a good opportunity to work with traffic control radar on some gyro-out navigation. Everything went pretty well until we switched over to another Center. Playing it to the hilt, we flew the last assigned heading until we were notified that we were drifting off course. It confirmed our suspicions that we hadn't been handed over as a "gyro out" aircraft. (A good bit of info to store in the memory bank for future reference.) After some thrashing around on the radio, the confusion cleared and we

got excellent service to touchdown at destination. Since it was getting pretty late, we wrote it up, promised to be on the line bright and early, and headed for the "Q".

Next morning, after going through the motions that pilots have gone through countless times, we headed directly for the sea gull to see how bad it was broke. The Form 781 didn't tell us anything we didn't already know. No "red X," no diagonal, no nothing. Over to Transient Alert, followed by the inevitable question, "What's the trouble and when's it going to be ready?" The reply, "We're real busy but we think the instrument specialist said the gyro compass was out." A pause was followed by thirty or forty questions, five phone calls, and two pilots with high blood pressure. Conditions were perfect for setting up an accident.

The situation was simply this. As far as anyone knew, the replacement part was not on base. Maybe it could be procured from a nearby base, but that would take most of the day. If the other base didn't have the part, it might take up to a week to get it through normal supply channels, since this situation only carried routine priority. Or, there was the possibility that the home base could fly in the part. The discrepancy was a safety of flight hazard, but the "red X" wasn't entered because this gave the pilot an option to fly the airplane if he wanted to, considering the potential delays involved.

With your blood at the boiling point, the temptation to double up and catch up is tremendous. We decided to back out of the game and see what we had going for us. Maybe the reason is that in the safety business you become familiar with all the exposure possibilities as messages and reports pour across your desk day after day. It's enough to make you think twice before going through with a rash decision.

Somehow, we were left with the impression that someone was trying to give us the heave-ho. Out of curiosity, we checked the weather and found that a VFR flight could be made to another base, but it wouldn't bring us any closer to the home drome. Then, mental gymnastics began. Would an impatient or less experienced pilot get so fed up that he would jump into his bird and go anywhere, just to get out of here? Would he waste any time if the weather was reported good all the way to his destination? Would he give a second thought to taking off with unreliable navigation equipment in violation of good sense and regulations?

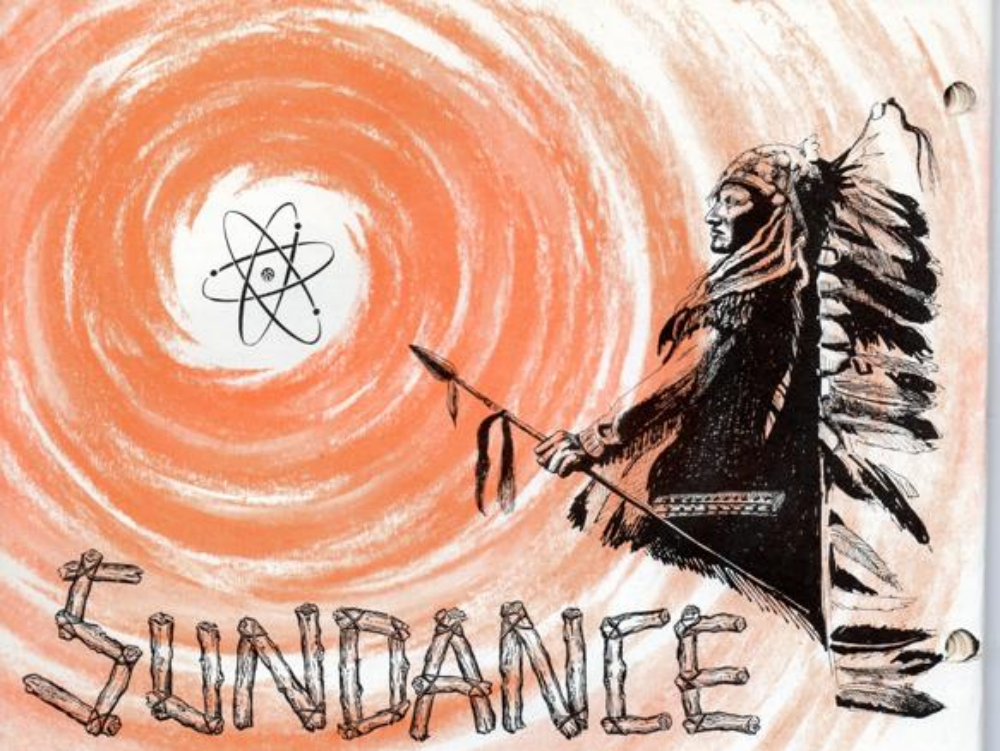
We knew with certainty that the opportunity and temptation were there, and that they shouldn't be, from a safety point of view. It wasn't too unreasonable to assume that there might be one or more pilots around who would take the chance. The big questions are — what risks were involved, and could they be justified if something went wrong?

Everybody knows that small malfunctions have a way of building into large scale emergencies. Whether it's "gyros out" or any other "no real sweat" situation while airborne, there are plenty of accident files to prove the unexpected can and does happen. The best advice always is to get it on the ground ASAP. That's why it seemed to us that a particularly dangerous situation exists when forces are at work urging departure as a solution to inconvenience. Although a subsequent accident may not have resulted from, or had anything to do with the uncorrected discrepancy, poor judgment would be a sound basis for a pilot error finding. Everyone would remember the pilots in a hurry who took off without gyros, etc., but not the reasons behind it. You are on your own when it comes to explaining why you dug a hole in the ground with a million dollar shovel.

We were puzzled as to why a pilot can be faced with a situation in which he must decide to go or not to go. There should be no doubt in anyone's mind that an airplane is grounded with a "red X" condition. No option to the pilot. Wheels ought to start in motion to get the bird fixed, automatically and expeditiously, even if it means going as far as contacting the base of ownership for support. A pilot shouldn't have to run around begging and pleading with everyone under the sun to locate a part for his sick aircraft. Personal or professional reasons may encourage a speedy departure. Unless he has a lot of will power, he'll be sorely tempted to take what appears to be the easy way out, a well-travelled path to the boneyard.

Thinking the situation over a little more, it occurred to us that if a pilot lost one more piece of his flexibility, he might choose not to enter a grounding discrepancy in the form. That kind of daredevil flexibility costs lives and airplanes, and doesn't belong in the vocabulary of a professional. One way or another, his services will eventually come to an abrupt end. It's not worth it.

With the brain session over, we finally latched on to the man with a golden touch. After explaining the predicament, he located a replacement part in record time. Found it in another unit's supply bin, no more than a couple of hundred yards down the ramp. Maybe, according to the books, there's a right way and a wrong way to go about doing things; but on occasions there is a more important way, the safe way. ★



Sundance, Wyoming, is historically significant in our American heritage and specifically to the Aerospace Defense Command. It was here in the Bear Lodge Mountains atop 6,650 foot Warren Peak that for the past six years just 30 pounds of enriched uranium ore has provided the energy of ADC's nuclear-powered Radar Surveillance Unit, the 731st Radar Squadron, which is part of the air defense ground environment operated by ADC's Tenth Air Force. Approximately twenty pounds of the original sixty-five pounds of uranium in the reactor core provided enough electrical power and steam heat for the radar site for over two full years. In 1967 the Sundance PM-1 unit established the continuous power output record (4,101 hours) for *all land-based nuclear-powered plants in the free world!*

When one considers that this unit is portable, so named PM-1 for Portable, Medium power, the first of its type, flown in by Air Force C-130 aircraft in 16 sections or packages, and then trucked to the mountain top for assembly—it has become a reality that man has indeed harnessed the power of the atom to provide continuous heat and power in a remote spot on earth — and that he has accomplished this feat in just a short span of years where once the Plains Indians roamed, and man's transportation was by horseback.

Further consider that just 84 years before the arrival of the first PM-1 packages at Sundance, Wild Bill Hickok was shot in Number 10 saloon of the fabulous old mining town of Deadwood, South Dakota, just 35 miles to the southeast. On June 25th of the same year, General George Armstrong Custer and 225 troopers of the famed 7th Cavalry were wiped out to a man by the Sioux and Cheyenne at the confluence of the Little Big Horn and Rose Bud rivers, 180 mi northwest.

Why Sundance? As the name implies, probably derived from the century-old religious ritual of most on the American Plains Indian Tribes. A dance or ceremony, not in worship of the sun as it sometimes erroneously believed — it involved little if any sun worship,

but usually sponsored by someone in the tribe who had made a vow to do so in return for supernatural help. It was a means of having powerful visions and of bringing good to the whole tribe. It's ironic, or sequential if you may, that in this very geographical place, man's early vision of power and supernatural help for the whole of mankind has been realized. Not a weapon of war or destruction, but a tool of peace in furtherance of man's progress in the universe. The ultimate, practical implications of peaceful nuclear power can only be imagined in this span of time. The past here is recorded. What the Aerospace Defense Command has achieved with the Sundance PM-1 unit has been a powerful vision of supernatural help for the good of the tribes, and a vision come true.

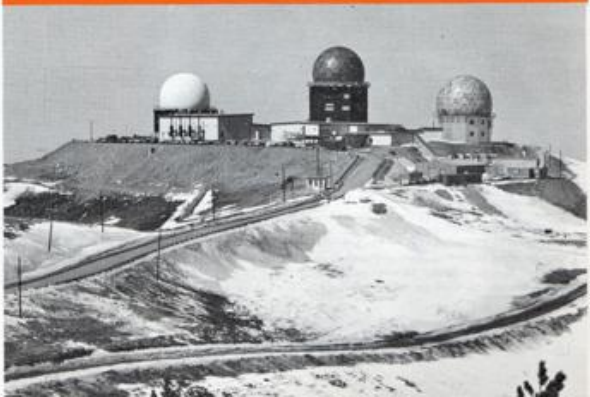
Whether a "vision" from an ancient of the High Plains horse-and-buffalo culture had anything to do with the Sundance of today can only be interesting speculation. What is certain is the farsighted vision of the men who made the Sundance PM-1 unit a reality. Built by the Nuclear Division of Martin-Marietta Corporation, under contract to the U. S. Atomic Energy Commission, the Sundance PM-1 unit has operated for as long as 24 consecutive months above 94.3% design availability with an all-military crew. It supplied the site with up to 1250 kilowatts of steady electric power and 7 million BTUs of heating steam per hour. It achieved these feats on the top of a lonely Wyoming mountain through the 45° below zero winters and the plus 102° F blazing summer sun. The chill factors involved in the winter winds have been something to behold. It required more than men of vision here, it required the dedication and selflessness that place some men above others.

In the past, diesel generators

One of the 16 portable "skids" used in transporting the PM-1 to Sundance.

The Sundance site under construction — the Forestry Service Tower in the background is also powered by the nuclear reactor, turbine-generator combination.

The winter winds of Wyoming howl across lonely Warren Peak.



The "Order of the Nervous Neutron" presented to those persons who were fortunate to visit the working plant. It states in part, "having been exposed to neurotic neutrons, galloping gamma rays and scrutinous shift supervisors, has been given a glimpse of the nasty tank, and has been bathed in the blue light from the reactor core . . ." The holder of this particular certificate just happens to be ADC's SMSgt William N. Patton who was the Operations Chief of PM-1 during its record run.

supplied power for the squadron's giant radars and other facilities. Over a two-year period, these generators consumed 40,000 drums (2,200,000 gallons) of fuel, a quantity very costly to move to a remote location such as Sundance.

Overall operation of the PM-1 has been the responsibility of two Air Force officers and a crew of thirty-three men. Qualified servicemen from the Air Force, Army, and Navy have worked together as a dedicated team. Each crew member is a certified nuclear reactor operator, and together they have a total of over 100 years operating experience. The nucleus of the original group gained its initial nuclear know-how as part of the team operating the Army's power plants at Camp Century, Greenland and Fort Belvoir, Virginia. Some served aboard the Navy's atomic submarines. New crews must be graduates of the 52-week nuclear power plant operator course at Fort Belvoir. All men have received intensive schooling and on-the-job training under either Martin Company, Atomic Energy Commission, or Air Force engineers. Each operator must also be highly qualified in either mechanical, electrical, instrumentation, or process control specialties.

Protection of personnel from over-exposure to nuclear radiation was a primary consideration in the design of the PM-1. Shielding is provided by water surrounding the reactor, by earth barriers and by lead. Areas within and around the plant are constantly checked by a highly reliable radiation monitoring system.

This system records the radiation levels at each of the monitoring points and presents visual and audible indications in the master control center whenever safe limits are exceeded.

One senior enlisted shift supervisor, one operator, and one trainee are on around-the-clock duty at the control console to insure the proper functioning of the reactor and associated equipment and to keep the electrical power output constant. Although the operator may initiate the action, he is backed up by a reactor safety system which will automatically shut down the reactor should any significant plant condition exceed pre-set limits.

A chemical analysis and health

Lt Col Stanley P. Gross, Commander, 731st Radar Squadron, explains some of the past squadron achievements to 1Lt John P. Schmitt. Awards directly attributed to PM-1 operation include ADC "A" Award, Outstanding Unit, Best Power Plant in ADC, Outstanding Sector Plant, several Commendation Letters from ADC, 10 AF, and 30 Air Div Commanders as well as many awards to individual PM-1 members.

Sgt First Class (U. S. Army) Elmer D. Duhn, a recently current member of the tri-service team, points out particulars of the skid-mounted radioactive waste disposal system.

The size of PM-1 Core 2 compared with the size of an average man.

Top view of Core 2. One fuel bundle removed so that the tubular fuel elements are visible.

physics laboratory has been an integral part of the PM-1 plant. The health physicist, as a member of the operating team, insures that safe practices are observed by all personnel, checks the effectiveness of shielding the water quality, and supervises all decontamination procedures.

The plant's current superintendent, SMSgt Felix D. Willaford, explained some of the intricacies of the plant's development and operation. An interesting point mentioned, that every man at PM-1 who operates the equipment no matter what his past experience, level of degrees or title, must be "certified" at PM-1. A part of this certification program is that each man must be able to draw on paper *from memory* every major electrical and pipeline diagram in the PM-1 plant. A glance into some of the working parts of the plant would convince one of the enormity of this particular requirement. You have the impression that you might be looking into the interior of a submarine.

And, speaking of submarines, the U. S. Navy personnel trained at the PM-1 are prepared for their future duties at PM-3A, sister plant of PM-1, located at McMurdo Sound, Antarctica. Personnel completing operator and supervisor training are required to meet further rigid written and oral examinations given by the USAF Directorate of Nuclear Safety team. This team includes selected nuclear-trained officers and a qualified PhD in the nuclear sciences.

The PM-1 has been described as not only a nuclear "first" for the Air Force, but also as an "outstanding example of the peacetime application of atomic energy." Since its inception by the Air Force's men of vision, the PM-1 has achieved and surpassed all of its objectives, accident free! A further significance of this accident free record is that during the period, the nuclear reactor core was changed—another first for the unit and the Air Force, and that over 95% availability using one reactor and one turbine generator was sustained for over two consecutive years.

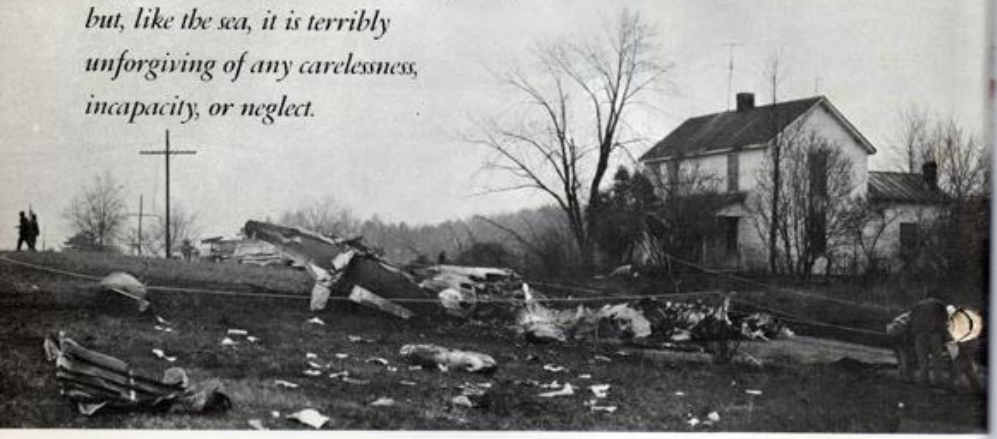
And now, soon, Sundance will be closing down. The nuclear reactor is being dismantled. The core will be transported to the Navy, and other selected equipment to the Nuclear Engineering Center at Wright-Patterson AFB, Dayton, Ohio and to the U. S. Army Engineers' Reactors Group. With their mission accomplished, our people at Sundance, the 731 Radar Squadron, and their PM-1 nuclear power personnel will soon depart for other challenging jobs in other phases of the nuclear program in other geographical locations. Behind them is Warren Peak and Sundance, Wyoming.

Very rarely have we an opportunity to see how the introduction of a new element or two can cause a cultural revolution. In the case of Sundance, the first principal element for man was the horse, aided by the trade articles such as metal and woven goods which were traded by the High Plains Indians from tribe to tribe, well ahead of the advancing white men. Some eighty years later in the same area, a new element called nuclear power has been introduced that is also creating a new culture for mankind. Based on this history, if we can conjure a vision from a modern "Sundance" of our own, the cultural revolution of the nuclear age should include aerospace defense in the magnitude of the galaxies of outer space. ★

NAAIS

NATIONAL AIRCRAFT ACCIDENT INVESTIGATION SCHOOL

Aviation in itself is not inherently dangerous, but, like the sea, it is terribly unforgiving of any carelessness, incapacity, or neglect.



The aviation world is swiftly approaching an era wherein advanced technology will allow supersophisticated aircraft to carry gargantuan loads of cargo and astounding numbers of precious human lives across vast distances at scorching speeds. Combat and combat support aircraft will be not only fast and sophisticated, but extremely costly as well. The field of safety, both civil and military, is making a thorough reappraisal of its responsibilities towards the enormous challenges of the present and future. In essence, we are entering a phase where we cannot afford even *one* accident — cannot afford one financially, equipment-wise, and in the case of transports, the high number of priceless lives. Aircraft accident *rates* are now at an all-time low, but the challenge of the future is a near zero fatality rate.

One of the most important facets in the development of a Safety Officer's background is his education. The Ad Hoc Committee on Safety Career objectives is in being for the purpose of studying the safety career field and taking necessary action to develop an effective safety career program within the Air Force. One of the schools recommended by the Committee for the training of a Flying Safety Officer in his career progression is the National Aircraft Accident Investigation School.

The National Aircraft Accident Investigation School was established in 1963 at the FAA Aeronautical Center, Will Rogers World Airport, Oklahoma City, Oklahoma. The school is administered jointly by the Federal Aviation Administration and the National Transportation Safety Board.

The nucleus of the school is the four week course in Aircraft Accident Investigation Procedures and Techniques with a systematic and practical approach as its theme. The full-time instructors are highly qualified pilots, engineers, and accident investigators, with priceless

years of varied experience in aviation. They graciously and enthusiastically impart this knowledge during the course in a profound and palatable manner. That their presentations are well received is commendable as most of their students are no newcomers to the flying business themselves. Air Force officers in the grade of Lieutenant through full Colonel have attended. The Army, Navy, Coast Guard, and Civil Service safety type avail themselves of the school as well. The course covers a wide spectrum of things aeronautical and serves to jog the memories of many and opens new doors for others. One swiftly realizes how much can be forgotten in ten or fifteen years in this flying game. Much of the information is actually fresh and new if you are not an aeronautical engineer with an extensive safety background.

While civil and air carrier accidents are used as examples, the principles and procedures, for the most part, apply towards the military as well. Theory is held to a minimum and proven experience is used very effectively.

The subject matter is treated under seven general functional categories:

I. Organizing the Investigation
II. Conducting the Investigation
  A. Operations and special areas
  B. Structures
  C. Powerplants
  D. Systems — electrical, hydraulic, instruments, pneumatic
  E. Aircraft and engine records
  F. Witnesses
  G. Human factors
III. Processing Recommendations for Corrective Action
IV. Analyzing the Investigation Data
V. Reporting the Investigation
VI. Participating in Public Hear- and Depositions
VII. Releasing Information and Materials

The school was originally intended as a training center for Bureau of Aviation Safety and Federal Aviation Administration investigators. The investigation of civil aircraft accidents, however, was so interrelated with the military that following an evaluation of the school by the Air Force, a quota was approved for military personnel. A typical class at the NAAIS could include personnel from the Bureau of Aviation Safety, the FAA, several branches of the military, aviation industry personnel, and foreign nationals. The Dean of the school is Mr. Rudolph Doering of the National Transportation Safety Board. The Assistant Dean is Mr. Jim Maupin of the FAA, a former USAF fighter pilot and a veteran of 100 F-80 missions in the Korean conflict. The resident instructors have a varied and colorful background.

Mr. Bill Allen (FAA), a dynamic proponent of the common sense approach to safety and accident investigation is a fighter ace of World

One of the schools training aids . . . . mock up of fuselage of SST.

War II, a graduate of the Flight Safety Course, USC, and a veteran of 16 years as an Air Force Flight Safety Officer, and two and a half years as a civil accident investigator. He holds a Commercial single multi-engine land and rotorcraft, helicopter rating, as well as an ATR with a DC-3 type rating. He was current in the F-102 when he retired from the Air Force. Mr. Allen frequently reminds his student to "stay off the pilot's back . . . criticism is free and liberal and often unjustified after an incident or accident . . . give the pilot's judgment, integrity, and reputation the benefit of the doubt until pilot error is definitely proven to be a cause factor." Some of the subject matter he covers is Weight and Balance, Air Traffic Control, Cockpit Voice Recorders, Weather, Hydroplaning, CAT, and a very useful and practical block of instruction on the many uses of photography in the safety business, in particular accident investigation. Students are issued cameras and film to practice with and they soon learn that taking sharp closeups of a piece of aircraft wreckage is no simple task.

Mr. Cliff Sheker (NTSB) is the Aeronautical Engineering expert, and when he relates to the class how accurate analysis of aircraft wreckage can determine, in most cases, what caused an in-flight aircraft breakup, there is no doubt that he is an expert. He emphasizes the aerodynamic down load on the horizontal stabilizer in his practical aerodynamics pitch, and it helps to clear up some hazy thinking on several aspects of aerodynamics. He holds a B.S. degree in Aero-Engineering, is a graduate of U.S.C., pilot duty in World War II and Korea, instructor USAF Contract Primary School, civil accident investigator, and holds a Commercial Pilot's Certificate with a Single and Multi-engine rating, and Flight and Instrument Instructor's Certificate.

Mr. Roger Fancey (FAA) teaches aircraft systems including electrical, hydraulic, instruments, and pneumatic. From him the class learns how to determine which of the aircraft systems were inoperative, partially operative, or operating at the moment of crash impact. Terms like rotational scoring (instrument gyros), and filament stretch will come out in his lectures. He has an extensive maintenance and inspection background, as well as a Commercial Pilots Certificate, A.S. & M.E.L. Flight Instructors Certificate, and Flight Engineers Certificate.

Mr. Ralph Stokes (NTSB) holds a Master's degree and is an ex-high school teacher. He was a Naval aviator in World War II and Korea,

"All the King's horses and all the King's men, couldn't put Humpty Dumpty back together again," . . . especially after he went straight in at 450 kts. But these experts can find out from the pieces why.

d taught navigation and meteorology at Pensacola for three years. The titles of some of his presentations are The Investigation Process, Regulations, Report Writing, Witnesses, and Human Factors. According to Mr. Stokes, when involved in an aircraft accident investigation, "Facts are: stronger than argument, more impressive than reasoning, and more dependable than opinion."

From FAA, Mr. Jay Hickenlooper takes the class through powerplants investigation. What were the engines doing on impact, and why? Jet engine unstacking, log jamming, compressor shift, and high power overtemp are some of the items covered by this expert on engine maintenance repair and investigation. He also covers conventional engines and turbo-props as well. "When looking for FOD in a jet engine, check the trailing edges of the IGV." Mr. Hickenlooper has a college degree, taught college for eleven years, holds a Commercial Pilots license, A.S. & M.E.L., and Flight Instructors Certificate.

Some of the highly qualified guest lecturers on the agenda are impressive, effective, and are indeed an asset to the school. Mr. Hagedone, an FAA lawyer, presents the legal entanglements that an accident can precipitate in easy to follow layman's language. He advises the accident investigation board, both civil and military, to take painstaking care, and spare no effort in making a complete and accurate investigation. Legal proceedings can become very costly and time-consuming if an investigation is executed in a casual or questionable manner.

Dr. Reals flies in from Wichita to give his pitch on pathology in the investigation process. He is an Air Force Reserve pathologist and is associated with the Armed Forces Institute of Pathology in Washington. He emphasizes the importance of autopsies in human factor investigation by pointing out how much information an autopsy can divulge if performed as soon as possible after a fatal accident. His advice to the professional pilot is to run regularly, keep weight within limits, and avoid smoking cigarettes.

Path of flight in relation to the terrain becomes part of the detailed investigation.

Professor William Hartman presents two valuable thought-provoking hours on Management Principles, which actually apply to any situation where several people have a common goal.

The location of the school at the Aero Center is an ideal site. The FAA Academy, the Civil Aero Medical Research Institute, and Airman and Aircraft Records are also located there. A mockup of an SST is used, as are laboratories with well documented actual aircraft accident wreckage. An informative field trip to an aircraft factory is also squeezed in the course so that aircraft in the making may be observed.

There are thirteen additional short courses and seminars offered by the school. The prerequisite for attendance at the school is to be in a position where you can be assigned duties on an aircraft accident investigation board. Quotas are allocated to the major commands by the Deputy Inspector General for Inspection and Safety (AFIAS-E3), Norton AFB, California 92409, based on an annual survey of requirements. The TDY is funded by AFIT.

To date there have been 697 civilians, 180 military, and 48 foreign students trained at this school. The fact that Ops and Maintenance types as well as safety personnel attend is a tribute to its effectiveness.

Accident prevention begins with thorough accident investigation. The school motto, written by the first Dean, Mr. Marion F. Roscoe, is quite appropriate: "There is no pattern to aircraft accidents, but there must be a pattern to accident investigation." ★

water procurement

by MSGT GLENDON B. DUSTIN / 4600 Operations Sq ● Peterson Field, Colorado

Hopefully, this is the start of a continuing series of articles which will attempt to give the aircrew a nutshell refresher on the many individual aspects of survival. The objective is to present basic, minimum knowledge in a concise way.

It has been proven that water is our most important survival need. Man can live for only a few days on food alone. With approximately two quarts of water available per day, he can survive for weeks. The purpose of this article is to re-emphasize the problem of water procurement during a survival situation as it pertains to each of the global environments.

A. THE ARCTIC

During *summertime* in the arctic regions, water is generally abundant in lakes, streams, and marsh areas on the tundra. Melting snow and ice are main sources of this water. The pools and marshes usually found in the tundra areas will normally be discolored and probably insect infested. The discoloration comes from vegetation and does not spoil the water. However, purification methods should always be used regardless of the source or apparent condition of the water. Insect nests can easily be removed by filtering water through a piece of parachute material.

During *wintertime* in the arctic, water will be abundant in the frozen state. The main problem will be in melting it to drinkable form. Snow, picked up and eaten, can increase thirst. A large amount of snow, consumed in a short period of time, can cause lowering of the body temperature (hypothermia). When snow touches the lips, they will become chapped and add to discomfort. If snow must be consumed, allow it to melt in the mouth before it is swallowed. As a general rule, always try to reduce snow and ice to warm fluids before drinking.

Selection of Ice and Snow. The ice found on lakes and streams is drinkable. The ice found at sea (sea ice) can be put into two categories:

1. Old Sea Ice. This ice has been formed for some time and all of the salt and minerals have passed out of it through a settling process. It can be identified by its bluish color and crystal-like texture and may be used for drinking purposes.

2. New Sea Ice. This is recently formed ice and still contains large amounts of salt and minerals. It has a milky color and normally a taste will tell the difference. Like sea water, it should not be consumed.

Melting Techniques. Where there is a choice between ice and snow for melting purposes, the best selection will be ice. There is more water content in a certain volume of ice than there would be in snow. Also, it takes less fuel to melt it.

If snow must be used, always try to add a little water to the container first so as to prevent burning the container while the snow is melting. Crush the snow in snowball fashion and add it to the water in the container. It will melt faster this way and increase the volume.

The methods for melting snow and ice are as numerous as the imagination will allow. Some ideas are:

1. Over an open fire in any type of container. A survival student at Thule melted snow in a paper bag, using a candle.

2. An LPU and/or One-Man Raft bladder can be filled with ice or snow and suspended above and away from a fire. The LPU inflation hose makes a good spout for drinking or pouring water. In the case of fuel absence, the LPU bladder can be filled with snow and placed under the clothing to allow body heat to melt it.

3. A dark waterproof cloth, such as the shield on the liferaft, may be placed on the ground and sprinkled with small amounts of snow. Sunshine will do the rest.

B. THE DESERT

Finding water in the desert is difficult because it requires time, patience, and sometimes physical exertion. The following are a few general rules which should be observed:

1. *Don't* ration water. If it is available, drink it as desired. Sipping water does not satisfy body needs. It only moistens the mouth which can be done by placing a pebble in the mouth. Many people have died in the process of rationing their water.

2. *Don't* walk or be overly active during the heat of the day. Digging for water may lose more through sweat than might be found. Wait until the cool of the evening or morning.

3. *Do* ration sweat. This can be done by keeping out of the sun. Cover all parts of the body in the manner of the natives of the desert.

When looking for a source of water, here are some likely places to find it:

1. Dig around green vegetation. Water will sometimes form in pockets under the plants.

2. Dry stream beds are another potential water source. Dig into the outside bends. Water from a flash flood may have seeped into these banks. Pools or moist dirt can sometimes be found. If moist dirt is found, wrap it in parachute material and squeeze it to collect the water.

3. Small amounts of water can be obtained by sucking on cactus, plants, and the roots of plants.

4. If parts of an aircraft are available, dew will form overnight on the wings, etc. It should be sponged off before the sun rises or it will evaporate. A waterproof material can be placed on the ground and will collect dew in the same way.

5. Flights of birds can direct you to water sources. Watch for them, especially during early morning and early evening hours.

6. The Land Solar Still has been known to be very effective and a valuable device to fly with. Check with personal equipment people for particulars or the November 1965 issue of INTERCEPTOR.

C. THE TROPICS

The main problem in the tropic regions is contaminated, brackish, insect-infested water. The best procedure to follow is to filter all water first through a piece of parachute material and then purify it. In the absence of parachute material or cloth, a container may be devised in which sand, grass, charcoal, and pebbles can be placed in layers for filtering. Another method is to dig a small hole next to the water source in such a way as to allow filtering to occur as the water drains into the hole.

In tropical areas, water is normally placed in three categories:

1. Emergency water — rivers, streams, ponds, lakes, etc.

2. Substitute water—plant juices, such as coconut.

3. Trapped water — water in vines, bamboo, or in cracks in rocks.

Water along the seacoast can be used if treated with the desalter item found in survival kits.

D. AT SEA

Water procurement at sea requires patience, skill, and a strong desire to survive. Although completely surrounded by water, not a drop of it is consumable. Many people have tried to drink salt water, but not without having ill effects. Mixing salt water with fresh water is not recommended.

Water can be procured through the use of the Solar Distillation Kit, MK-2 Desalter Kit, and by collecting rain and condensation.

1. Solar Distillation Kit. This kit is found in all multiplace raft kits. It is a self-cleaning kit which will distill salt water and produce pure drinking water. No further purifying is required. Although output will depend on the heat of the sun, it can produce as much as three pints a day.

2. MK-2 Desalter Kit. These are found in all multiplace raft kits as well as individual seat type kits. This is not a self-cleaning device and must be cleaned prior to each usage. It contains seven bars of chemical which looks like charcoal. This chemical is designed to leave a small amount of salt in processed water to replace body loss due to perspiration. Each bar desalts one pint of water.

3. Rain. Rainwater can be trapped by using the tarps packed with all kits or the spray shield on the one-man raft. These should be rinsed off with the first amount of rain collected so as to remove any salt spray that may be present.

4. Condensation. This will collect on tarps that are spread out during the night. Again, attempt to remove salt spray first.

E. WATER CONTAINERS

When suitable water containers are not available, many types can be made using personal equipment. For instance:

- LPU bladder — with the top cut off makes a useful container with built-in spout.
- G-suit bladders.
- Pieces of wood—hollowed out.
- Helmet.

Remember that all plastic or rubber devices are normally treated with talcum or other substances to prevent adhesion when packed. It is advisable to rinse them out before using. Shock and nausea may be present and a taste of talcum treated water could result in vomiting. After purification, if water tastes bad for any reason, add a small amount of candy or sugar from the survival kit to give it a more flavorful taste.

F. WATER PURIFICATION

For protection, all water should be purified. There is no way of knowing what is floating upstream a hundred feet from your collection point. The best methods for purifying water are:

1. *Boiling.* Allow water to boil for at least one minute *plus* one minute for each 1,000 feet above sea level. After boiling water, it will have a flat taste. To improve the taste, pour the water from one container to another (aerating) or add sugar or candy.

2. *Iodine tablets.* Normally, add one tablet to each pint of water.

G. GENERAL TIPS

1. Conserve sweat, not water.

2. Diet — when water is scarce, eat only those foods which do not bring on thirst, or better yet, don't eat at all.

3. Never drink blood, urine, salt water, or fish and animal juices as water substitutes.

4. Last but not least: PURIFY ALL WATER. ★

OPERATIONAL READINESS INSPECTION TEAM

HQ, ADC

Who the Heck is Responsible for the Interceptor Reliability Phase?

When your friendly ORI team visits your unit, one of the inevitable tests is the Interceptor Reliability Phase. It is important, significant, misunderstood, and extremely exhausting. Contrary to popular belief, it is *not just a fighter show.* Granted, the fighter unit has the most riding on it—Weapon System Evaluation Missiles, Mission Simulator Rockets, Operational Readiness rate, hack rate, and abort rate. The old SAGE Direction Center has only Intercept Reliability Positioning Success Rate to worry about. This would be the whole story if ORIs were merely statistics-gathering expeditions, which they are not. The term "Aerospace Team" is not just propaganda. We know that air defense won't work without teamwork. We inspect teamwork and one of the best sources of information about GCI-fighter teamwork is the reliability phase of the ORI.

Consider this: the fighter unit's problem is to get as many birds as possible off the ground expeditiously, fire primary and secondary successfully, and get the birds back on the ground in an orderly and expeditious manner. This means good planning and good control. A beeline down the Line of Position (LOP), the pilot yawns, and then fires. This makes a poor pilot or a marginal Fire Control System (FCS) look good. "Two in the can" 30 minutes after takeoff makes it much easier to tickle the turnaround troops with a controlled recovery flow. So the fighter guys need two things from "Good Ol' Gumdrop," the local SAGE DC: *Good Control* and *Good Planning.* Good control does not mean a team full of Masters of Air Defense (although who would object?). We have yet to see a division that didn't have the talent to do the job well. We *have* seen divisions that didn't plan well, and herein lies the reason for our tale. Poor planning in the reliability phase makes control look bad, makes fighter squadrons look bad, wastes faker travel, and makes us wonder about teamwork. The sad part of it all is there is no real reason for poor planning. There is plenty of time, nothing new, and nothing difficult. Our team arranges for the faker aircraft to IP in the most convenient training airspace. We also specify when to start, stop, and how many intercepts to get per sortie. At this point, "Good Ol' Gumdrop" must jump in and complete the plan. They must coordinate airspace, set up racetracks, and plan fighter flow. Let's examine these tasks and see what can be done to smooth out the operation.

Coordinating Fighter Airspace. The division trusted agent, Air Traffic Coordinator (ATCOR), and FAA centers involved, all receive copies of the strike schedule for the reliability phase well before the fly date. The strike schedule gives each faker's type, call sign, takeoff base, takeoff time, IP time, area and delay time. Early coordination at this time is helpful. The trusted agent should give FAA a rough idea of anticipated fighter flow. Usually the centers won't commit the airspace until the day of the activity but the earlier they know the requirements, the better the chance of a completely happy customer.

Setting Up A Racetrack. Usually we provide continuous high, low, and medium fakers, each in the

NO NOT LAUNCH YOU IDIOT!.. I SAID IT'S TIME FOR LUNCH!

airspace you normally use for training. We assume that you have run max efforts or "turkey shoots" for each fighter unit and have established faker routes that are convenient. If you haven't, you should.

Planning Fighter Flow. To show what foggy planning will get you, we saw one unit that had one medium faker track and one low faker track in the reliability phase. They planned one front quarter pass on the medium and two sterns on the low for each interceptor. It averaged five minutes to run the front and 25 minutes to run the two sterns. The fighters came off the ground at five-minute intervals and it wasn't long before most of the squadron was airborne and milling around, waiting to get on the low faker. Some had to go home without a pass. As you might be able to guess by now we didn't force this on them. They were victims of their own "planning." Hindsight is 20/20 but if they had spread out fighter takeoff intervals, planned the fighter flow better and run a front-stern on the medium and stern on the low they would have never had all the "mill around" time. The key is to anticipate these situations while planning.

Every fighter unit periodically schedules a max hack or "turkey shoot" day. These are identical to the reliability phase of the ORI if:

a. At least 25% of the intercepts are against low fakers, and 25% against high fakers.

b. Each interceptor simulates expenditures of primary and secondary armament only (two passes for F-102 and F-106, three passes for F-101).

c. Proper tactics are used.

So, if your "turkey shoot" days are planned and conducted based on the criteria mentioned above, many interceptor reliability planning problems can be ironed out while nobody's watching. Over a period of time and through experimentation the best methods and techniques to suit your particular situation can be developed so as to meet the criteria quickly and effectively with each interceptor. As a result of this plan, you get maximum "goods" for your money and when the reliability phase of the ORI is upon you, it merely becomes another "turkey shoot."

TOM WILLE, Colonel, USAF
Team Captain, ADC ORI Team

DOWN and out

F-102 FLAMEOUT

The mission was scheduled as a routine radar training flight. The aircraft configuration consisted of a chaff tank on the left wing station and a 230 gallon drop tank on the right wing station. During mission briefing, the pilot was given special instruction on fuel balancing procedures pertaining to his aircraft configuration. Preflight, post engine checks, taxi, engine run-up, and takeoff phases were all conducted properly. No discrepancies were noted during "last chance" inspection just prior to takeoff.

The radar training mission consisted of three intercepts. The aircraft was then handed over to Approach Control for RTB. Fuel state at hand-off was 3,300 lbs. Subsequently, while enroute to the terminal TACAN station, the pilot was cleared to descend to 12,000 feet, and later to 5,000 feet. Three 360° turns were given for aircraft spacing. The pilot was then cleared to descend to 3,200 feet for an ILS approach. He was cleared to tower for an ILS landing. The pilot opened the speedbrakes and lowered the landing gear—descending through 3,000 feet awaiting the outer marker signal. Airspeed was 185 KIAS.

Without warning, the engine flamed out. Initial airstart was attempted on normal fuel system (throttle retarded, ignition button depressed) with no results. Emergency fuel was selected, and ignition depressed again, with no start. At this time speed brakes were closed for better glide and the ram air turbine extended to maintain flight control operation. Aircraft speed was 165 KIAS, altitude about 1,500 feet MSL. The pilot closed the throttle and made a successful airstart, using the normal ground-start procedure. Airspeed was still 165 KIAS, but in the attempt to accelerate the engine, its compressor stalled at about 55% RPM. The pilot then transmitted "flameout" to the tower, pulled up to miss a small group of people, and ejected successfully at approximately 300 feet and 150 KIAS. As the aircraft impacted the ground, explosion and disintegration took place.

Investigation and analysis of the flight began with fuel management, since the aircraft was carrying a chaff tank. Procedures covered in the briefing were followed except that the pilot was not absolutely certain he turned on the forward left boost pump after fuel equalization since he was in an intercept phase at the time. The switch was off when found in the wreckage. The fuel cutoff switches were also off, but the valves were open which reduces the credibility of the boost pump switch position. Neither boost pump warning light was illuminated at impact, indicating that either the lights malfunctioned or that engine RPM was high enough prior to impact to maintain AC power.

Fuel quantity in the number 3 tanks was not checked during the penetration, but both sides were checked equal about one minute prior to flameout. Examination of the wreckage showed that the left wing near the number 3 tank was burned extensively, while the number 2 tank contained only a small amount of black soot. The right wing burned extensively in the area of both number 2 and 3 tanks. The burning was sufficient to indicate that adequate fuel for landing was on board at the time of crash, and that a significant amount of the right wing fuel was possibly in the number 2 tank. Fuel quantity gauge indicated 1600 lbs.

The fuel flow equalizer valve was found positioned full right and investigation indicated this was the position at impact. This valve would not normally shut off the fuel completely from one wing unless the spring-operated portion was not functioning, which was a possibility in this accident.

Inspection of the engine and accessories, including fuel control, indicated no major discrepancies. The first two attempts at airstarts on both normal and emergency systems were unsuccessful. The engine had flamed out abruptly without any warning, such as surges, etc. If the fuel control had caused flameout, it is believed that there would have been some warning, and that the second airstart attempt on the emergency system would have been successful. The fact that a start was obtained on the third attempt indicated that the emergency fuel control was operational, and that flameout was due to fuel interruption. It is believed that the third and successful air-

start would have recovered the aircraft had altitude and time permitted.

All engine instruments recovered and examined basically confirm the pilot's testimony. The pilot reacted properly except that he attempted the first start in the normal system. Since he almost immediately selected emergency fuel and attempted an airstart which proved unsuccessful, it was concluded that his initial reaction did not have any influence on the outcome. The fact that the pilot closed the speed brakes and extended the RAT indicated that he was in control of the situation and reacting properly under the circumstances.

The ejection sequence was normal with all equipment functioning as designed. At the time of ejection, the aircraft was at an estimated 300 feet terrain clearance, wings level, approximately 10 degrees nose down, and 150 KIAS. The pilot raised both armrests, jettisoning the canopy, then squeezed both triggers. The seat departed the aircraft with a slight backward tumbling motion. After activation of the lap belt and seat separator, the BA22 parachute was automatically deployed utilizing the one second delay of the F-1A timer (the zero delay lanyard is not used with the high impulse rocket catapult to avoid seat-chute entanglement). The opening shock was considered moderate and occurred approximately ten seconds before ground contact. During this time, the pilot deployed his survival kit and removed both safety covers of his J1 canopy release. Immediately after a normal parachute landing fall, the right J1 release was pulled, separating the right riser. All survival equipment was retained, although the top half of the pilot's clipboard separated at ejection due to the failure of the three centerline rivets.

The investigation board concluded that the flameout was caused by malfunction of the aircraft fuel system. The cause of aircraft fuel system malfunction could not be positively identified. However, the most probable cause was fuel starvation caused by deceleration forces uncovering the rear bell mouths of the left number 3 tank with forward left boost pump inoperative or not turned on, and right side fuel not available due to malfunction of fuel flow equalizer. A possible cause of fuel starvation is created by failure of both forward boost pumps or failure of right forward boost pump, and pilot failing to turn on left forward boost pump. Upon opening the speed brakes and placing the gear handle down, the aircraft decelerated sufficiently to uncover rear bell mouths in the number 3 tanks. Therefore, with forward boost pumps inoperative, the engine could have received a gulp of air which flamed it out. ★

V POINTS

This section of the magazine has been designed for you. Be you a headquarters type at any level, a commander, safety officer, pilot - interceptor, transport, light aircraft - radar intercept officer, mechanic, a civilian in industry, weatherman, doctor, designer, or Indian Chief. This is your corner.

We solicit your ideas, items, notes, photographs, sketches, and pictures. The writing should be less than a paragraph - preferably a sentence or two.

We would sincerely appreciate your inputs mailed directly to: The Editor, INTERCEPTOR, Box 46, Ent AFB, Colorado 80912.

V Gasoline will chew up low-density plastic at temperatures of 140 to 150 degrees F. The heat in a car trunk or the closed areas of boats can reach this temperature easily. Use only approved container for storage of fuels.

(FAA/NAAIS)

V Recent comments from pilots on the road a lot indicate that Perrin AFB, Texas, and Richards-Gebaur AFB, Missouri, are two of the fastest, smoothest, and safest turnarounds going, with Last Chance inspections included. A look at the Tinker AFB, Oklahoma, Base Ops is to see what is perhaps the ultimate in a modern model Base Ops facility. (ADCSA)

V July 1937. The U. S. Air Corps submitted its first list of military characteristics for an aircraft detection radar. This resulted in production of the SCR-270 and SCR-271 radars. (ADC-PS)

V A perennial and justifiable complaint from maintenance troops is the all too brief, vague, or incomplete aircraft discrepancy write-up. This can result in the crew chief or specialist having to contact the pilot for clarification, or worse yet, guessing at the omitted details. T. O. 00-20-5, Change 1, page 2-12, paragraph 2-84, clearly spells out that the pilot may use as much of the left half of the MAINTENANCE DISCREPANCY WORK RECORD sheet in the AFTO Form 781A as is necessary to **completely** describe a discrepancy.

(ADCSA)

V 10 June 1955. The General Operational Requirement (GOR) 96, "A Ballistic Missile Detection Report System," was published, outlining the requirement for three northern radar sites capable of detecting and tracking ICBMs launched from within the Soviet Union.

(ADC-PS)

Autokinesis. Staring at an isolated light at night can readily produce the false sensation that the light is moving, usually slowly, in no particular direction. This can occur after nine seconds of staring. Many actual and near mid-air collisions, in formation flight, have occurred due to this. This illusion is avoided by increasing the number of lights in the visual field and by avoiding the tendency to stare. (FAA/NAAIS)

A message from the Chief of Staff to all major commands recently advised of the potential fire hazard that is characteristic of the disposable sleeping bag, FSN 8465-338-5415, listed in the General Services Administration (GSA) catalog October 1967. GSA reports that this item is manufactured in accordance with a U. S. Forest Service specification which intentionally includes a requirement that the disposable sleeping bag be flammable. Wide dissemination is requested so that users will become aware of the combustible nature of the item and potential fire hazard is used without proper precautions. (ADCSA)

According to studies of bird strike reports received by the FAA in 1966 aircraft damage was estimated to have been in excess of 10 million dollars. Most strikes occurred below 3,000 feet on or near airports. (FAA/NAAIS)

21 July 1943. The U. S. Army Air Force began accepting delivery of the P-61 "Black Widow" interceptor. The aircraft was equipped with SCR-270 radar and four 20-millimeter cannons. It was replaced in the air defense inventory in 1959. (ADC-PS)

Integrated flight control/fire control system, solid state from the early days. The complete weapons system was a SPAD. (ADCSA)

RED X. Paragraph 2-81, Section II, T. O. 00-20-5 says the proper symbol entry will "normally" be made by the mechanic or flight engineer. However, paragraph 2-70 says the Form 781A is designed so that each individual deficiency reported by a pilot, an aircrew member, or discovered by maintenance personnel can be documented. This is their authority to make an entry . . . and if in his opinion the aircraft discrepancy makes the bird unsafe to fly, a pilot certainly should emphasize it by entering the RED X symbol.

(AMS (AFIAS-E1)

safety officers' FIELD REPORTS

TF-102A, LOW FUEL. TF-102A made an emergency landing due to a low fuel situation which developed during an intercept training mission. Investigation indicated the emergency fuel situation was due to the instructors throttle being in the afterburner range without AB ignition.

F-102A, ERRATIC FUEL INDICATIONS. During a routine fuel remaining check, the pilot received indications of 200 pounds on each side and less than zero in each number 3 tank. No low level lights were on and total fuel remaining indicated properly until the latter part of the flight. At shutdown, 55 minutes after takeoff, total fuel remaining indicated 1600 pounds. Examination of the indicating system revealed a shorted pin in a "T" connector, which had caused the erratic cockpit indications. The connector was replaced and no other discrepancies were noted during an operational check.

F-102A, FUEL FEEDING MALFUNCTION. After 15 minutes of flight, the total fuel remaining indicated 6,000 pounds (left side: 2600, right side: 3300). Boost pumps were turned off on the low side, but fuel continued to indicate 6,000 pounds. The external tank switch was turned on, total fuel went to 6800 pounds and the two sides then indicated even. A precautionary landing was made, after which a defective solenoid (air shutoff) valve in the right drop tank was discovered and replaced. The malfunctioning valve appears to have allowed the right drop to feed without the external tank switch on, causing the uneven fuel condition. No other discrepancies were found.

F-101B ENGINE VIBRATIONS. A precautionary landing was made after the pilot experienced vibrations in the left engine at 35,000', after terminating A/B operation. The EPR was 0.5 lower than the right engine. All other indications were normal. The engine was left in idle until after landing. Inspection revealed four binding A/B actuators which were removed and replaced. The exhaust nozzle control head was cleaned and all accessories were checked for looseness. The idle open nozzle cam was adjusted. The engine was then checked and found to be good.

T-33A OVERHEAT LITE. While climbing through 10,000 feet, the tail section overheat light illuminated. Power was reduced to 80% and the light extinguished. Returned to base and landed without incident. Cause Factor: Hot air leak from the thermocouple assembly located in exhaust unit section blowing on thermoswitch.

F-104A, LOW OIL PRESSURE. FCF was being performed for main fuel control change. During climbout, pilot noted oil pressure reading low with the maximum being 26 psi at military power. Placard oil pressure was 41 psi. Takeoff flap landing was accomplished with 4200 pounds fuel remaining with touchdown in front of mobile control at 180 KIAS. Pilot pulled drag chute handle, but did not feel drag chute deploy. BAK-12 barrier was engaged at approximately 50 knots. Pilot elected to engage barrier rather than risk not being able to stop in the remaining distance (980 feet). Maintenance confirmed low oil pressure readings and removed the engine. Flow check was performed on the transfer gearbox and gearbox was found to be out of limits. Gearbox was removed and replaced and new oil pressure placard of 37.6 psi established. Engine reinstalled and has flown without further difficulties. Reason for no drag chute was that no drag chute had been installed.

F-102, ATTITUDE AND DIRECTIONAL INDICATOR FAILURE. After recovering from a stern snap-up attack, the pilot rolled out of a turn and noticed that the attitude indicator had frozen in a 30 degree banked attitude. The directional indicator had also failed and remained on a single heading during turns. No other indications of an AC power problem were evident, and a check of voltage output showed normal voltage on all phases. A precautionary recovery was initiated by joining a TF-102 to lead him down through the undercast. During the recovery, the pilot was advised to bring the emergency AC generator on the line. When this was done, the OFF flag on the attitude indicator retracted and both instruments began to function properly. A recovery was completed without further difficulty. During the post-landing cockpit check, the pilot returned the AC bus switch to normal (off) position, and the indicators continued to operate on main AC generator power. Operational checks on ground and aircraft power were conducted, with no instrument malfunctions noted. The electrical system was then checked, also without discrepancy. Instrument shop personnel replaced the attitude indicator and J-4 amplifier, all systems were operationally checked and the aircraft was released.

THE WAY THE BALL Bounces

ACCIDENT RATE

1 JAN THRU 30 JUNE 1968

	ADC	ANG
Thru June 1968	3.2	4.7

MAJOR — ALL AIRCRAFT

ON TOP OF THE HEAP

MO	ADC	MO	ADC	MO	ANG
57	62 FIS	48	4600 ABW	78	132 Ftr Gp
53	414 Ftr Gp	39	18 FIS	65	162 Ftr Gp
50	48 FIS	38	408 Ftr Gp	63	112 Ftr Gp
48	87 FIS	38	4677 DSES	53	141 Ftr Gp

ACCIDENT FREE

BOX SCORE

ACCIDENTS FOR June / CUM TOTAL	1st AF	4th AF	10th AF	4600	ANG	ADWC
CONV						
T-33		1				
F-100						
F-101	1	1				
F TF-102	2				3	
F-104						
F-106	1					1 / 1
B-57						
F-89						
EC-121						

MINOR ACCIDENTS THIS PERIOD — 0
MINOR ACCIDENTS CUMULATIVE — 4

CUMULATIVE RATE

1 JAN THRU 30 JUNE 1968

	ADC	ANG
JET	4.5	5.1
CONVENTIONAL	0	0

BY AIRCRAFT	ADC	ANG
T-33	1.8	0
F-89		0
F-100	0	
F-101	5.6	
F TF-102	12.3	6.8
F-104	0	
F-106	7.2	
B-57	0	
EC-121	0	

RATE = MAJOR ACCIDENTS PER 100,000 FLYING HOURS

we point with PRIDE

Captain Lee V. Greer
328 Fighter Wing
Richards-Gebaur AFB, Mo.

Captain Ralph L. Davis, Jr.
328 Fighter Wing
Richards-Gebaur AFB, Mo.

T-33 GENERATOR FAILURE

Captain Greer and Captain Davis took off in a T-33 for the last leg of a cross-country flight. Approximately 20 minutes after level-off at FL 370, a vibration was felt in both cockpits accompanied by unusual surging noises. The vibrations and surging became more frequent. Approximately 10 minutes after the first vibration, the generator failed. A transmission was immediately attempted to Denver Center; however, the radio was inoperative as a result of the generator failure. The emergency position of the IFF was selected, and Code 7700 was set on the SIF.

The two pilots discussed their delicate situation. They were over mountainous terrain, eastbound. The weather forecast for the area immediately below and for approximately 300 miles in all directions was for ceilings and visibilities at or below minimums. Weather was forecast to improve further eastward. They were flying in the clear, approximately 2,000 feet above an undercast. All nonessential equipment was turned off after it was decided that the emergency squawk had probably been received by Denver Center. The flight was continued at FL370 using the standby magnetic compass for headings. Garden City, Kansas was the next check point, approximately 275 miles east. They decided to attempt a penetration and landing at Garden City. After computed time en route to Garden City had expired, a letdown was begun using the turn needle, vertical velocity indicator, and a standby compass. Weather was encountered at FL320. It was decided to continue the descent to VFR conditions or 5,000 feet MSL. At 10,000 feet MSL the main inverter, TACAN, and IFF were turned on momentarily to establish a definite fix and to allow FAA to monitor the emergency squawk. The UHF radio was still inoperative. They determined that they were 35 NM from Garden City. VFR conditions were encountered at 7,000 feet MSL. Full flaps were extended early on the approach because of the relatively short runway (6,000 feet) and the posibility of complete electrical failure occurring at any time. Landing gear was extended on final and the landing was uneventful.

The cause of engine vibration, loss of flight instruments, and UHF radio was internal failure of the generator. A brush arm in the generator had broken and ingested into the commutator.

Through their teamwork, in making timely and sound decisions under adverse conditions, Captain Greer and Captain Davis saved an aircraft and made themselves worthy of the Aerospace Defense Command's "We P with Pride" award.

AFTER BURNING

Address your letters to The Editor, INTERCEPTOR, Hq ADC (ADCSA-E) Ent AFB CO 80912
To be published, your letters must be signed,
but names will be withheld upon request.

"A TIRED AMERICAN GETS ANGRY"

This is to say a sincere "Thank You" for your recent letter and it truly is appreciated more than you know.

Your thoughtful letter was heart warming to receive because we receive some vicious letters concerning "Tired American" . . . but they are only about three out of every fifty letters.

We dislike to answer your letter with a form letter, but we have been flooded with letters, thousands and thousands, since "Tired American" was first published May 13, 1965. Every letter has been read, appreciated, and filed.

You might be interested in how "Tired American" came to be written. As a family we have traveled the world for a number of years. I was becoming choked up on the term "Ugly American" . . . being used by foreigners and even by Americans in an apologetic way. The people who used that term had never read the book and didn't know that "Ugly American" was given by the natives to this man of great heart, but who was physically as homely as Abraham Lincoln. . . that "Ugly American" was a term of affectionate endearment and not derision.

I heard that term used one day in Luverne. It angered me and everything boiled over and I sat down and pounded out the editorial in about 20 minutes. I sent it to the linotypes and then it got laid aside. One day, after it had been lying on the "Bank" for about six weeks I nearly told the foreman to throw the thing away. A couple weeks later we used it and from then on life has been different, inasmuch as we have had to budget extra time for correspondence, etc.

Seemingly it is the editorial that refuses to die. It was page 1 of the Halifax, Nova Scotia, Herald and other Canadian papers, it ran in a Canadian magazine. But—it has also appeared in publications in Australia, Afghanistan, Tokyo, New Delhi, Brussels, Mexico, Rio de Janiero, and others.

A New York newspaper (The Buffalo Courier Express) did a feature on "Tired American" and predicted it would rank as the most widely reprinted editorial in the history of American journalism. Thousands of papers, publications, etc., have used it.

It won a gold medal top award from Freedom Foundation February 22 at Valley Forge. My 17-year-old daughter, Jean Mae, was my stand-in there. I didn't make it—three doctors fought all night to keep me from taking a one way trip across the River Styx. Once again Jean was my stand-in . . . to receive the Americanism award for me from the Minnesota VFW . . . and the air line strike make it impossible for her to get to Boston where the National Newspaper Association was having its convention. In the annual newspaper awards, in which 2600 newspapers participated, "Tired American" won the Herrick award first prize.

Sounds like bragging . . . but let me tell you what made me weep with humility (and we get many letters from Viet Nam) was the youngster in special services at a lonely outpost. He wrote to say "God Bless You, Mr. McIntosh." (I am not accustomed to be God blessed but damned.) And where did he read it? On a handwritten sheet of paper containing "Tired American" which was being "passed along" in the swamps. Then I did weep with humility. It proves that there is true patriotism and love of America burning in millions of hearts . . . a triumphant answer to those who would sell us down the river.

Alan C. McIntosh
Editor and Publisher
The Rock County Star Herald
Luverne Minn 56156

***This is the source of the original "Tired American." We have found after long search the true author of the letter itself with his strong patriotic feelings. We would like to thank Mr. McIntosh for his permission to reprint his "Tired American" and his letter. We think both of them are inspired. Some minor wording changes have been made by being handed down by word of mouth, but the meaning is still the same. We can give Mr. McIntosh the sincere thanks of over 40,000 readers, whose patriotism has been stirred.**

ADVANCE OF TORNADIC TURBULENCE

Many thanks for the copies of your June issue, and the nice job on reproduction of FSF PSEB 68-102. This is one of the best condensations of the ramblings of a Windy Professor I've ever seen, and you chaps certainly handled it well.

Your B-57s with the 4677th DSES at HIF cooperated with us on chaff drops the week of 10 June. We know now that we can see it with a side-looking radar (AVQ-55) in cumuli in a flanking line. I hope we can prove beyond a shadow of a doubt the existence of the tube pattern in the clouds in operations next year. We sure appreciate the help of USAF, ADC, and AWS in that work.

If you have some copies of the June issue left, I think General Caldara, President of FSF, would appreciate a few.

Ferdinand Charles Bates
Associate Professor
St. Louis University
P. O. Box 8020, College Station
Saint Louis, MO 63156

***We try harder. Thank you for your kind comments. Extra June copies are on the way to General Caldara.**

"FIGHTER PILOT" SCROLLS

Would appreciate two Fighter Pilot scrolls, if supply is not exhausted, as we plan to frame them and make presentation to our Wing Commander and Fighter Group Commander, both combat-ready ADC "Fighter pilots."

Lt Col Walter Leonardo
AF California ANG
5425 E. McKinley Avenue
Fresno, CA 93727

***The scrolls are on their way.**

Three score and seven years ago---

our Fathers brought forth upon this continent an automobile, conceived ingenuously and dedicated to the proposition that all men should drive one.

Now we are engaged in a great automobile war testing whether this car or that car so engineered or so constructed can long endure.

We are met on a great battlefield of that war. We come to dedicate a portion of that field as a final resting place for those who have given their lives to prove they could do 120 mph. It is altogether fitting and proper that we should do this. But in a larger sense we should not speed, we should not drive while drunk, or drag across this ground.

The stupid men, living and dead, who drove here have mangled it far above our poor power to add or detract. The world will little know or long remember what we say here, but it can never forget how they drove here.

It is for us, the living, rather to be dedicated here to safety measures which some have thus far so nobly advanced. It is for us, to be dedicated to the great task remaining before us that from these blundering and thoughtless motorists, we take increased precaution to prevent that cause for which they gave their last breath; that on these highways in our nation we will slow down, we will drive slower, and that the careful person shall not perish from the earth!

(Q Point, Feb. '68)