UNITED STATES AIR FORCE • MAY 1971

Aerospace SAFETY

COVER PHOTOGRAPH BY S. J. TANNHEIMER, AEROSPACE AUDIO VISUAL SERVICE.

UNITED STATES AIR FORCE

Aerospace SAFETY

MAY 1971

FOR AIRCREWS, MAINTENANCE & SUPPORT TECHNICIANS

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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MAY 1971 AFRP 127-2 VOLUME 27 NUMBER 5

the family tree

Lt Col George D. Akins
Hq Alaskan Air Command

After a few months riding the circuits, an inspector becomes aware of looking forward with pleasure to returning to certain stations—and looking forward with some displeasure about returning to others.

Since they are all "remote," and since a different set of people is there each time he arrives, what makes one station consistently "good," and another consistently "not so good"?

We are convinced the answer is good "character," built over the years by people who care about what they leave behind.

Sitting in the mess hall at one of the remote stations, and gazing around at the milling, munching crowd, a new inspector remarked that one year from then (when he got back to this station) all those faces would be gone and a new generation would have taken their place—still milling and munching.

The remark provoked thoughts and dialogue through several beers that night: "A new generation born, matured and gone each 12 months;" "a whole life span packaged in a 365-day capsule;" "the continuity of character on a family tree, or in the history of a remote station."

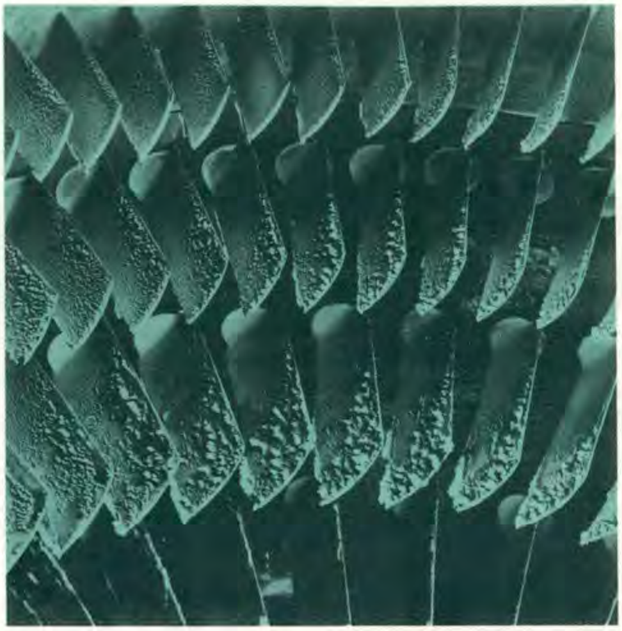
Without getting too far out about the whole thing, try comparing a station to an old, established family in your home town. Each generation had a part in molding the special quality of that family's reputation and character.

As a member of a family (and as a member of a station), whether he wishes to or not, a man contributes something to the next "generation." A marginal Civil Engineer or Supply function can almost inevitably be traced back on the family tree to a bad apple who begat the bad seed—or to the one who "copped out" for a year, or the one who sat still and "cried" for 12 months.

The special environment of a "good station" is felt almost at once by the visitor; little things that add up to a very tangible character. Their receptions are sincere and friendly—not phony and suspicious; their clubs are warm, comfortable and alive—not cold, awkward and dismal; the mess halls somehow manage to produce a few "goodies" above the standard fare for their troops; conduct of business is confident and easy, not desperate and confused.

There's one thing about good, solid character—if there are enough people who have it, it gets rubbed off and passed on, and it grows and permeates: somewhere down the line the "good" families and stations had enough character in one generation to get the ball rolling.

How's your family's character today? What are you doing about it? What are you going to leave for the next generation to build on? ★



Smart operating procedures and good engine maintenance are the best anti-perspirants for the salt encrustation problem.

A SALTY SITUATION

L. E. GOODDING
General Electric Co., Lynn, Mass.

Salt air may invigorate the mind, clear the sinuses—even cure arthritis. But, to a turbojet or turboshaft engine the same exposure can hardly be classified as therapeutic. The relationship of salt air to metal corrosion is well known and caution notes abound in tech data.

Less well understood, and sometimes ignored, is the tendency for salt build-up on engine compressor vanes and blades to rob the engine of its normal power potential and its compressor stall margin. To the helicopter pilot hovering just above the ocean, the subject should be of more than academic interest—reading and responding to engine operating symptoms can avoid possible engine malfunction and keep the powder dry.

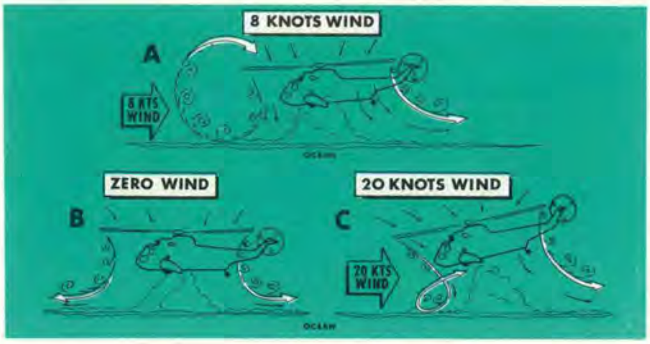
The following material was drawn from T-58 engine testing and field experience. Although certain characteristics may be unique to this engine, most of the information is pertinent to all gas turbine engines and is worthy of review by other than just the H-1 and H-3 operators.

Salt moisture particles or droplets entering a turboshaft engine are typically measured in parts-per-million by ratio with the incoming air. However, an air-breathing engine consumes very large quantities of air while doing its thing; as an example, the relatively small T-58 engine ingests 12-14 pounds of air per second, the T-64 devours 28 pounds per second. Under the right conditions, this big appetite results in a rapid build-up of salt crystals on compressor components.

In the forward stages, the high air velocities quickly evaporate the water from the salt. In the aft stages, the heat of compression is sufficient to boil away any remaining liquid water particles. Heaviest concentrations appear in the early stages, as evidenced by the photo above, but deposits need not be that severe to have operational repercussions. The salt deposits play havoc with compressor airflow and efficiency. The smooth and shiny blade/vane surfaces are now coated with rough deposits—the engine runs hotter. Power and stall margin decrease at a substantial rate.

Extensive helicopter testing has provided important background regarding the many variables that contribute to the salt encrustation rate and the corresponding "safe" time that can be expected at a given hover height. The downwash from the helicopter rotor system creates a frothy ring or *torus* of agitated sea water around the entire aircraft. This air velocity causes salt particles to become airborne. With conditions at the worst, this salt spray is swept forward and upward, directly into the engine inlet. To the Rescue/ASW pilot the explanation should pose no surprise; windshield wipers must often be used to improve visibility in this machine-made mist. Conditions are comparable up to the mezzanine where the engines are operating.

At first blush it would appear simple to develop hover time limits at various altitudes based on some acceptable power degradation level. Unfortunately, too many contributing variables are involved, among them salinity content, wind velocity/direction, sea state and



aircraft attitude. As the figure above illustrates, wind conditions are particularly significant. At zero wind, most of the spray is blown away from the aircraft. At 20 knots the spray blows aft, beneath the aircraft. With an 8-10 knot headwind (and a low hover height), conditions approach the intolerable—the engine inlet is engulfed in salt spray.

Hover height is particularly critical in determining the salt deposit rate. Figure 1 defines power deterioration rate versus hover height under adverse wind and sea state conditions. Below ten feet, a very tall chart is required to contain the data points on the paper. For T-58 powered helicopters the rotor downwash ceases to be a major factor above 40 feet. With larger rotor systems such as exist on the H-53, the equivalent level might occur at approximately 70 feet.

The loss of power potential during over-ocean hover can be better appreciated by monitoring engine instruments as the hover continues. As salt build-up progresses, the engine must steadily increase gas generator speed (N_g) and power turbine inlet temperature (T_5) to maintain the constant power demands. Less obvious to the experienced helo pedal pusher is the corresponding decrease in compressor stall margin which accompanies the salt encrustation process. On the adjacent chart the stall area is depicted as a large black cloud. Continued salt air ingestion causes the stall region to move closer to the engine operating line. If the stall area actually intersects the operating line there may be a series of pops and/or an immediate loss of power unless, in the popping process, the compressor sheds some of the salt

POWER DETERIORATION RATES VS HOVER HEIGHT ABOVE SALT WATER*

RATES STRONGLY INFLUENCED BY PREVAILING WIND AND SEA STATE CONDITIONS.

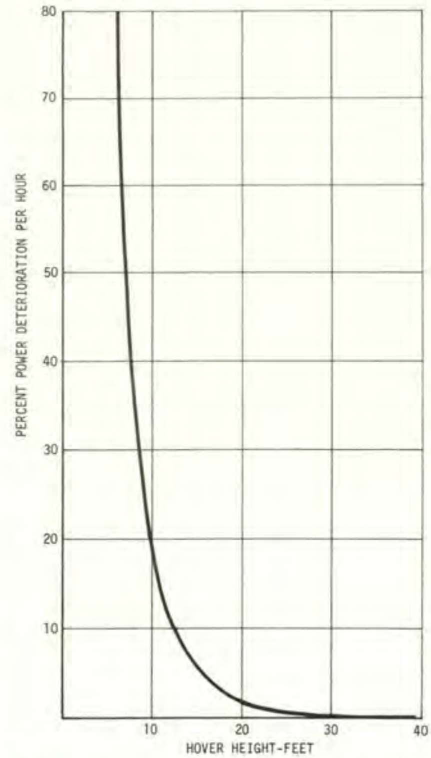
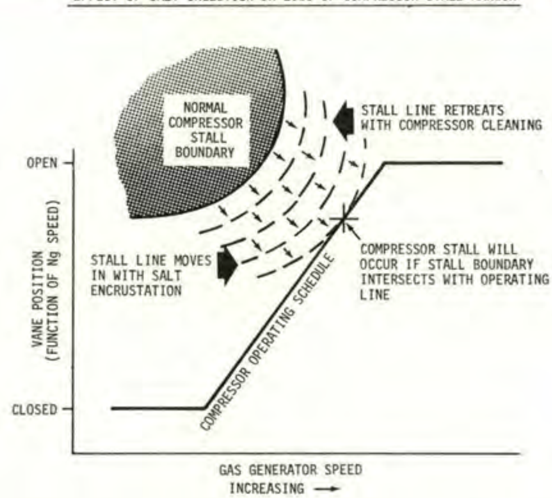


FIGURE 1

*DATA FOR COMPARATIVE PURPOSES ONLY - NOT TO BE USED AS LIMITS FOR DETERMINING SAFE TIME IN HOVER CONDITION.

EFFECT OF SALT INGESTION ON LOSS OF COMPRESSOR STALL MARGIN



deposits and regains a portion of lost stall margin. A sudden deceleration or down collective can further aggravate stall possibilities. Where substantial power deterioration has already occurred, the best operating policy is to leave the hover area using slow, even changes of power.

A SALTY SITUATION

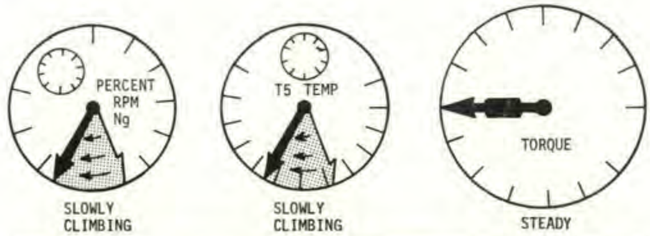
In the case of multi-engine aircraft, stall could conceivably occur almost simultaneously on all engines. Therefore, monitoring for power degradation is particularly important to mission reliability. Even where stall may not be a factor, the reduction in overall engine power potential downgrades capability in the event of an engine-out emergency.

OPERATING TIPS

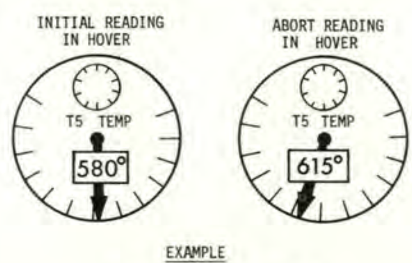
The pilot is equipped with adequate instrumentation and the engine provides sufficient symptoms to allow recognition of excessive power degradation. At a fixed torque, N_g and T_5 will continue to rise as the salt build-up process continues. Armed with this information, the pilot can exercise effective precautions.

1. For T-58 engines with adequate stall margin, an increase of 35°C can be tolerated at a fixed torque before a hover abort need be considered. The compressor should be washed prior to the next flight.
2. Preferably, the T_5 and torque (Q) should be recorded upon entering the hover. If for any reason, speed selectors are manipulated or load changes applied, periodic checks should be made by re-establishing the original torque on each engine and determining the T_5 rise.
3. When the stall margin of a T-58 is not known by periodic maintenance check or the compressor is partially fouled with exhaust products, a T_5 temperature rise at 20°C (at constant torque) should be selected as the hover abort limit.
4. Flying through rain showers may regain a portion of lost power and stall margin. This approach is *not* an adequate substitute for the prescribed compressor cleaning procedure, however.
5. Rapid deterioration can be expected whenever heavy deposits of spray strike the windshield.
6. Installation of an EAPS or FOD deflector system reduces salt build-up rate and allows longer periods of hover near the ocean surface.
7. In instances of substantial power degradation, the speed selectors and the collective stick should be moved with discretion. Quick movements of either system increases the chance of stall.
8. Unless the mission demands continuous proximity to the water, increasing hover height will noticeably decrease salt build-up.

ENGINE CHARACTERISTICS IN A SUSTAINED HOVER OVER SALT WATER



MONITORING CHECK FOR EXCESSIVE T_5 RISE DURING HOVER - EXAMPLE



EXAMPLE

INITIAL READING	580°C
READING AFTER 'X' MINUTES IN HOVER	615°C
RISE IN T_5 AT SAME TORQUE	35°C

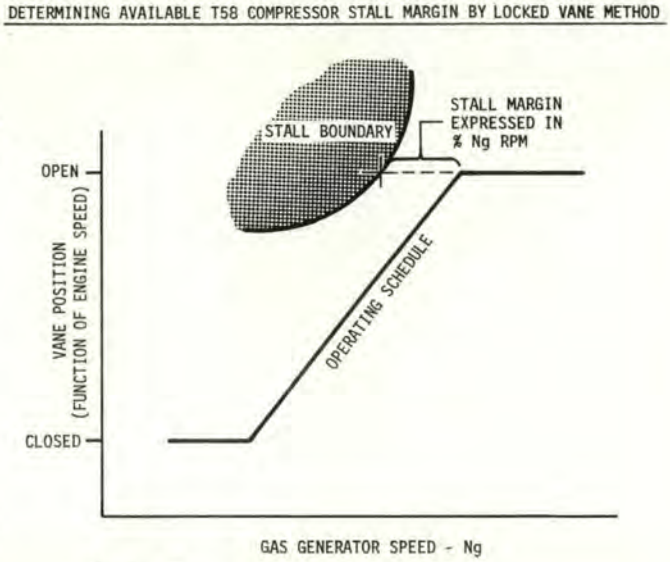


FIGURE 2

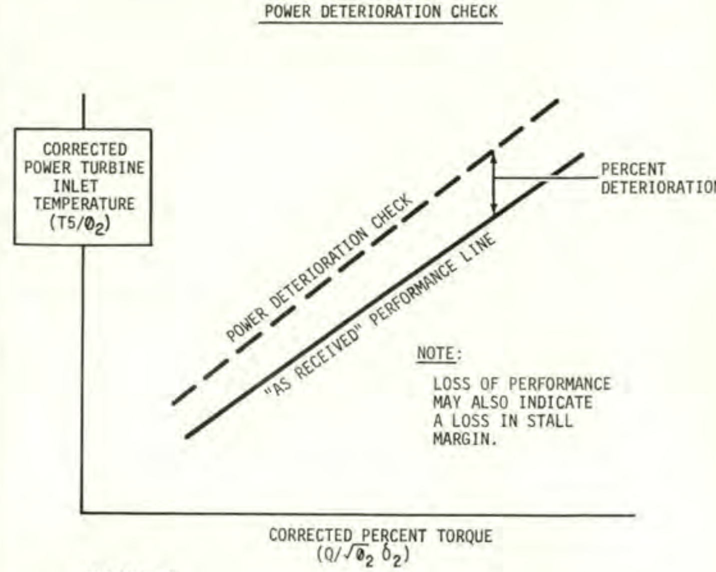


FIGURE 3

MAINTENANCE TIPS

For pilot precautions and monitoring procedures to be effective, maintenance personnel must issue a "good" engine from the JEIM shop and keep the compressor clean of all contaminants. Technical Orders define these various procedures. Certain USAF units will be equipped with AGE and instructions for conducting periodic T-58 compressor stall checks. Important steps include the following:

1. Conduct stall margin checks on all T-58 engines after JEIM repair. This check is performed by locking the variable stator vanes at a specified position and decreasing N_g speed slowly until the authorized limit is met or a stall occurs. See Figure 2.
2. Perform periodic stall checks in the aircraft (Mechanical Stall Checker) or power deterioration checks to detect possible compressor damage or fouling. Power deterioration checks compare actual performance to previous "as installed" values. As loss of stall margin normally accompanies a drop in performance, power checks can define serviceability in the same manner as a stall check. See Figure 3.
3. Wash compressors after each flight where a noticeable T_5 rise has occurred during hover.
4. Swear off stator vane tinkering to correct deficiencies elsewhere in the engine. A reduction in stall margin always results when vanes are adjusted in the open direction. When such adjustments are made, a stall margin check should follow.

The limits and procedures described above apply only to the T-58 engine. Other engines may display somewhat different characteristics with salt water ingestion. Generally, such information is included in the applicable operating and maintenance instructions.

It would be delightful if every helicopter were equipped with a console light or an audible warning system for crew alert when salt deposits exceed tolerable levels. Such a device may be available in the future. However, if the prescribed maintenance and T_5 monitoring practices are conscientiously followed, the device need not be a requirement.

In the words of the not-so-famous Eskimo poet and philosopher:

"He who fails to heed this primer,
Had better be an excellent swimmer." ★

AN

Aerospace SAFETY

INTERVIEW

with **COL ALBERT P. LOVELADY**
Systems Program Director
Life Support Systems Program Office

life support for aircrews

During the past several years, marked improvements have been made in Air Force life support equipment. Technical advances undoubtedly have been a factor but two other developments exerted considerable influence. These were the war in Southeast Asia, which intensified the need for better life support gear and the creation in 1965 of the Life Support System Program Office (SPO) in System Command's Aeronautical Systems Division.

Since their lives depend upon the availability and quality of life support equipment, aircrews have always been extremely interested in this subject. Hence, the following interview with Colonel Albert P. Lovelady, director of the Life Support SPO, in which he discusses some of the goals and accomplishments of the SPO, describes improvements in current hardware and gives us a glimpse into the future.

AEROSPACE SAFETY: Col Lovelady, what have been the major accomplishments of the Life Support SPO (LSSPO) to date?

COLONEL LOVELADY: Probably the most significant thing—and the purpose for establishing the Life Support SPO—has been to establish a single agency responsible for all life support equipment. This is important because we finally have established a single manager, a focal point, for all life support development. As an example, several years ago, SAC needed a lap belt fix on some of its aircraft. In order to get it, they were forced to deal with five or six different agencies in both the Logistics Command and Systems Command. Today they need only to identify the requirement to the SPO, whose job it is then to coordinate whatever efforts are required to get the job done.

AEROSPACE SAFETY: Does this mean a different approach from the way we did things in the past? For example, in the development of new aircraft?

COLONEL LOVELADY: Yes it certainly does. Although we are really just emerging in this area, we have actively participated in the F-15, the B-1 and the AX development programs and have even modified and tailored many of our research and development efforts in their support. We are currently developing a new ejection seat intended for the F-15 as well as a new self-contained oxygen system for the B-1. We see our role as a consultant in Life Support, available to assist the major Weapons System Program Offices.

AEROSPACE SAFETY: What other new developments are there?

COLONEL LOVELADY: Many. New things keep coming along and of course we keep trying to improve present equipment. These are the more obvious and most publicized of our efforts. But, before we pass on to these, let me touch briefly on a very important but less noted accomplishment. As the Air Force focal point for all life support developments, we have been able to establish a close working relationship with the other services as well as NASA. As Air Force spokesman in the area of life support, we have been able to establish areas of common requirements and undertake joint programs to the mutual benefit of all services. It has permitted us to make maximum use of our research and development dollars. This is a very bright and promising development which is often overlooked.

AEROSPACE SAFETY: Now that there is better organization of the life support effort, what lies ahead? What are your major goals?

COLONEL LOVELADY: Well as you know, we have been kept busy putting out fires. But now we're ready to move ahead to a real systems approach. Something that is absolutely necessary and we're working on it now. Our first major goal is that of documenting for both the "user" as well as the designer, those requirements which describe a true system for life support. When this is accomplished, it will be in the form of a designers' handbook, available to all and in a format which can serve as a common basis for all.

This will enable us to determine in the initial design stage how much comfort we must provide the crew for best performance—how much space, the size of the seat. In other words, we think eventually that aircraft will be designed around the man and his requirements. We must continually keep the man uppermost in our minds.

AEROSPACE SAFETY: Colonel, we have a lot of survival training. How good is it in your estimation?

COLONEL LOVELADY: Survival training is not a responsibility of the Life Support SPO but we are very much dependent upon its success if the equipment we develop is to do its job. From this viewpoint, then I would answer: It is good and is continually improving. Major schools like the TAC SEA Survival School and the PACAF Jungle Survival School, I believe, are the best in the world. Certainly, we have frequently trained men in the wrong school or given them training they didn't need or that wasn't totally pertinent to their combat environment. But this area, like life support, is learning from past mistakes and I believe we will see a new philosophy emerge with the recent consolidation of all survival training within the Air Training Command. I think we're going to see some drastic changes where training will be better tailored to the needs of the individual commands to fit their mission.

AEROSPACE SAFETY: I wonder if we could get into some specific items that aircrews can look forward to?

COLONEL LOVELADY: Surely and there are a lot of them. Some they'll see very soon, some will take time. Let's start with flight clothing.

First, there's the Nomex family of fire resistant fabrics. The Nomex flight suit is in the field. Its life saving ability has already been graphically demonstrated in recent aircraft mishaps and although we've received a few complaints regarding its comfort in warm climates, it appears to be well accepted. We are working on the CWU-17/P jacket with Nomex shell and batting which is planned to replace the N-2B heavy and intermediate weight jackets. A new CWU-36 is planned to replace the present lightweight flight jacket. It will not have the orange liner but will carry an orange panel stowed within the inside pocket.

We have a new quick-don boot coming and we're also testing (in SEA) a Nomex sock and Nomex-leather jungle boot. The boot is an Army development and if our tests are successful, we will standardize on this item for hot climates. We are also testing a Nomex trouser and an intermediate weight coverall in anticipation of a possible command requirement.

AEROSPACE SAFETY: We've heard a lot about a material called polybenizimidazole (PBI) which is supposed to be more fire resistant than Nomex. How is it coming along?

COLONEL LOVELADY: That's farther off but it has a lot of promise. It can withstand higher temperatures than Nomex and appears to be more comfortable in warm climates. We have some coveralls out in OT&E

and the preliminary reports have been very good. The final test results should be in during May. We're looking forward to using PBI but there are some problems to be solved if we go to it exclusively. First, we're having some trouble with color. The suits we have are light brown, and sage green dye hasn't taken well, so far. However, that'll be solved soon. The biggest problems are cost and availability. The only source at present is a small government plant and it can't produce sufficient quantities for Air Force needs. When, and if we get a civilian source, it will be another two years before we have sufficient material to meet the requirement. Then, the end items have to be made. The total time looks like about three years from now. Incidentally, the moisture regain of PBI is better than cotton and almost as good as wool. So, it promises to be a comfortable flight suit.

AEROSPACE SAFETY: How is the custom fit helmet project doing?

COLONEL LOVELADY: There are currently three ways of producing the custom fit helmet. In one, a mold is made of an individual's head by base technicians and sent to the manufacturer for final production. Another method provides a standard liner that can be shaved and cut to fit a person's head. This method will require a sufficient number of trained people at unit level to meet the demand. The third method, now in operational testing, involves pouring foamed plastic into a mold on the person's head and shaping it to fit that individual. This could possibly be done in the unit. The results of this latest test should permit a decision regarding the best approach to solving the custom fit helmet problem. We expect such a decision very shortly.

AEROSPACE SAFETY: While we're on helmets, don't we have some new visors coming along?

COLONEL LOVELADY: We have a new visor system in OT&E right now. The testing should be completed some time in May and, if it looks as good then as it does now, we should get it into the inventory by September.

The system consists of two visors, a clear inner visor of polycarbonate with the actuating knob on the right side and a dark outer visor of acrylic with the knob on the left. As you know, the old visor size varied with the size of the helmet. The new visor mechanism fits all helmets. Incidentally, while the new clear visor is very strong, it scratches easily. We currently are testing an improved coating and if it proves out we will incorporate it on the first units for issue.

Other items associated with the helmet are the new high-G offset bayonet and MBU-7/P oxygen mask. The new bayonet has incorporated an improved retention geometry which significantly betters the high-G retention of the oxygen mask. The MBU-7/P mask offers greatly increased wearer comfort over the MBU-5/P by improving face mask fit and incorporating an improved inhale/exhale valve for easier breathing. Preliminary data from our current OT&E is very favorable.

AEROSPACE SAFETY: You mentioned a new oxygen system earlier.

COLONEL LOVELADY: Yes, and this is very important. Our goal is to eliminate both high and low pressure liquid oxygen from all aircraft. We believe we can do this by one or more techniques of extracting oxygen from ambient air, utilizing available aircraft power. Such a self-contained oxygen system will have a tremendous impact on the operational mobility both in terms of cost and logistics. We are currently working with an electrochemical system which can absorb oxygen from ambient air and desorb that same oxygen in a cyclic process by simply controlling temperatures and pressure while applying a DC voltage. It is our intent to develop such a system for the B-1 aircraft.

Engineer demonstrates chlorate candle oxygen system now in use on the C-141. System eliminates pressurized walk-around bottles.

AEROSPACE SAFETY: Colonel, we've heard a lot about an advanced ejection system. Would you describe it, please?

COLONEL LOVELADY: You're talking about the Advanced Concept Ejection System (ACES). It is the departure

Mockup of ACES now under development by the contractor and Life Support SPO.

point for the development of future systems and gives us the opportunity to consolidate the knowledge of the last 15-20 years of technology into a standard Air Force ejection seat with the systems needed for the success we think we must achieve.

ACES is designed to provide a full chute in three seconds or less over the entire ejection envelope, which is 0-600K and 0-50,000 feet. The heart of the system is electronic timing that can sequence the subsystem functions with milisecond accuracy. The seat is stabilized by a gyro vernier rocket pack (stapak) in the seat pan, which assures a good platform for parachute deployment.

This seat incorporates many new concepts including a mortar deployed parachute which can be more quickly deployed and inflated and an integrated parachute harness with a single point release for faster ground egress. Our major goal has been to improve total performance with maximum comfort and we believe we have made significant progress in both areas. The ACES is undergoing testing right now and should be available to the operational F-15 as well as adaptable to our current aircraft.

AEROSPACE SAFETY: That's the kind of stuff the crews like to hear. There is also a lot of interest in survival gear that will help the man on the ground. What's new in survival avionic-radios?

COLONEL LOVELADY: Our developments in survival avionics fall broadly into two areas. The first is a continuing attempt to improve our batteries, which incidentally have proven to be a major problem. The compactness achieved in our current survival radios has severely challenged battery technology in demanding a small power source of sufficient power but still able to perform over a broad range of temperature. We see no sure cure for this problem at the moment but we are working hard for a breakthrough.

Our second front is in the conceptual stages of development and is a joint service endeavor under Air Force management. We are formulating the de-

Col Albert P. Lovelady, Director of the Life Support System Program Office, and Lt Col Fred Ewing, Program Control Division Chief, examine latest survival radio, the PRC-90.

velopment of an Advanced Avionics System which will incorporate (1) a distress incident locator, (2) a survivor locator device and (3) a transceiver.

We envisioned the distress incident locator as a means of employing a satellite relay system to fix a distress location to within a 25 mile radius anywhere in the world. This will then be complemented by the survivor locator device which will be capable of guiding a rescue aircraft through bearing and DME signals directly to the survivor. Then an ultra-miniature transceiver requiring only short range performance will complete this system capability, assuring us of timely reliable survival avionic package.

As I stated, this is a conceptual effort toward developing a tri-service, avionics system for worldwide application in the 1975 time frame.

AEROSPACE SAFETY: Colonel Lovelady, you make this aspect of life support sound exciting, a real R&D challenge.

COLONEL LOVELADY: It is exciting and promising and it is typical of the things that are beginning to happen in Life Support, a direct result of the formation of the SPO and the central management it offers. We are a relatively new organization and we have been learning and growing, but we see a challenging future with real opportunities to make meaningful gains. I am confident that we can contribute significantly to the Air Force mission. ★

IT'S YOUR  MOVE

The word went out, "It's Your Move—Make It Safely!" So the Air Force Communications Service (AFCS) and the Ground Electronics Engineering Installation Agency (GEEIA) packed themselves up and moved bag and baggage—and didn't even sprain a back.

It all began last spring when the Air Force announced the merger of GEEIA into AFCS and relocation of their combined headquarters at Richards-Gebaur Air Force Base, Mo.* Some moves of lower echelon units were involved too.

Affected were to be about 2000 military personnel and civilians moving their families, household goods and government equipment between five major points in the United States. AFCS headquarters was at Scott AFB, Ill., 270 miles from its new home near Kansas City, Mo., and GEEIA headquarters was at Rome, N.Y., about 1200 miles away.

Changes were also to be made by personnel from the command's regional headquarters at Novato, Calif., Chicopee Falls, Mass., and Oklahoma City, Okla., to new sites at Griffiss AFB, N.Y., and Oklahoma City AFS, Okla.

As plans for the big move unfolded, AFCS Safety personnel went into action. Major General Paul R. Stoney, commander of AFCS, had named the overall program, "It's Your Move—Make It Safely." No one doubted the need for a well organized and specialized accident prevention effort to compensate for the numerous built-in hazards associated with an operation of such magnitude. The enormity of the task began to appear as safety men visualized the driving, pushing, pulling, packing, lifting, tugging and carrying that was about to take place.

The big move was to commence during the summer and continue through the fall months. This meant sharing the highway with the throngs of vacationers, Sunday drivers and boat and trailer haulers. It meant added exposure for the men of AFCS and their families during the time of year when highway injuries and fatalities are on the increase.

The safety campaign, "It's Your Move—Make It Safely," was a coordinated effort between the Safety personnel of AFCS organizations at Scott, Richards-Gebaur, Hamilton, Tinker, Westover and Griffiss Air Force Bases. Educational aids, covering all known or suspected hazards, road maps and brochures, outlining the traffic laws of the various states, were distributed. Lectures and briefings were given to all personnel outlining the hazards involved in the move and explaining correct and safe methods of packing, lifting, driving, etc.

Letters and directives reminded officers and first line supervisors of the hidden pitfalls which would cause injuries. Families were provided with helpful hints and the entire campaign was geared to inform and motivate AFCS personnel, to guard against complacency and warn them of the dangers of emotional stress and fatigue.

Following the announcement in March and the first moves that began April 1, the move really gained impetus in July and was due to be completed by the end of September 1970.

More than one and one-quarter million pounds of government equipment was transported to new locations by 68 moving vans shuttling back and forth over the highways. More than ten million pounds of personal effects were moved during a 90-day period. More than 100 van lines participated. In all, 6537 people, including dependents, were moved as a direct result of the reorganization. About three and one-quarter million miles of highway travel were involved.

When the big move was completed, the record showed that not one person had been injured or killed during the entire relocation. Not even a back-strain had been reported.

***GEEIA's responsibilities had been the engineering and installation of ground communications electronics and meteorlogical equipment for all Air Force commands and for foreign nations under the military assistance program.**

AFCS provided operation and maintenance of that equipment and the Air Force's on-base and off-base communications, air traffic control and air navigational aids and facilities; also flight inspections and evaluations of the air traffic control and navigational aids. ★

THE I.P.I.S. APPROACH

By the USAF Instrument Pilot Instructor School, (ATC) Randolph AFB, Texas

PROCEDURE TURNS

Recently we've had several questions on outbound course guidance for a procedure turn. Specifically, just what constitutes outbound course guidance? Outbound course guidance is defined as, "bearing guidance from the procedure fix, i.e., VOR, ADF." When you have bearing information from the procedure turn *fix,* you may descend to the FAF altitude when you are within 20° of the *inbound* course and are headed *toward* the inbound course. (See Aug '70 "IPIS Approach" article, Point to Ponder.) This means that you are within and will *remain* within ± 20 radials of the inbound course and the aircraft heading is within 90° of the inbound course. Without bearing guidance from the procedure turn fix, i.e., DME, OM, crossing radials, you must maintain the *procedure* turn altitude until on course inbound. (See AFM 51-37 for entry procedures.)

AIRSPACE

Have you noticed in FLIP II that the Airport Traffic Area (US) has been raised to, but not to include, 3,000'.

AFM 60-16

Q Do I have to have both ceiling and visibility weather before I can file to a destination?

A AFM 60-16 allows you to file to a base using visibility—only criteria. If you do use visibility—only, be sure to figure your fuel properly. (See Nov '70 "IPIS Approach" article.)

HEY, GUYS!!

Your response to our offer to provide a copy of all "IPIS" Approach" articles (Jan '71) has been overwhelming! As a matter of fact, one gentleman wanted a thousand sets. Unfortunately, we cannot fulfill a request for more than one or two sets. If you need additional copies, your base publications may be able to reproduce them.

CLEARANCES

Q Are there times when I can neither receive nor accept an abbreviated clearance?

A Yes; an abbreviated clearance can neither be issued nor accepted if the route of flight originally filed with ATC has been changed by the pilot. In this case, the *pilot* will request a detailed clearance. (Section II, FLIP Planning.)

Q Do I have to read back an ATC clearance?

A We know of no directive which requires you to read back clearances, either received on the ground or in the air. However, FAA Manual 7110.8A states, "Either controllers or pilots *may initiate* readback of a clearance when it is considered necessary." Additionally, your MAJCOM directives may require readback of specific clearances. Readback of clearances that are complex or doubtful is recommended.

IFF IDENTIFICATION

Q When ATC directs "IDENT," are we required to acknowledge by a "Roger" or "Wilco," etc.?

A Most controllers consider the act of "IDENTING" as sufficient acknowledgment of the IDENT request by ATC.

PILOT REPORT VS WEATHER REPORT

Q I took off when the visibility was reported to be two and one-half miles. The visibility was actually five miles and I reported it as such. I requested a VFR pattern. The tower controller would not allow it because the visibility was still being reported by the weather observer as two and one-half miles. Which takes precedence, a weather observation or a pilot report?

A The visibility reported by the weather observer is a prevailing visibility value. You may have been in an area of five miles visibility; however, visibility in other quadrants may have been sufficiently lower to justify the prevailing two and one-half miles value. Visibility is normally measured and would not be subject to change based on a pilot report. If the *ceiling* is *estimated,* then a pilot report within 15 minutes of the time of the observation would take precedence and the weather observer would change his observation in accordance with the pilot report. However, if the *ceiling* was *measured,* then the weather observer is not required to change his observation. ★

RAMP RECKS

MAJ EDWIN L. MARSH
Directorate of Aerospace Safety

Gentlemen, we must reduce the number of flight line incidents and accidents. Simple as it may seem, this is one problem area we haven't been able to lick.

Flight line marshallers continue to direct aircraft too close to hangars, other aircraft, vehicles, fences.

Maintenance men pre-position AGE too close to aircraft parking spots or signal pilots to taxi before properly clearing the area.

Pilots taxi too close to vehicles, obstructions and other aircraft, or grossly misjudge clearances.

Drivers of flight line vehicles park in the wrong spots, or drive into aircraft, and civil engineers fail to maintain ramps and taxiways to acceptable standards.

Here are some prime examples of what we mean:

• A C-124 had followed a long line of departing aircraft and was preceded by a commercial 707, which stopped on the runup pad headed toward the active runway. The pilot of the C-124 maneuvered his aircraft to the extreme left side of the taxiway and intended to taxi behind the 707 to get into position for an engine runup. Both the copilot and scanner told the pilot that clearance would be minimal but believed the wingtip would clear the 707. They were both wrong, and the right wing struck the 707's elevator, damaging it beyond economical repair. (What do you say to the airline captain at this point—oops?)

• At the opposite end of the size spectrum, a U-10 pilot recently landed at night at a large international airport and proceeded to taxi toward the parking area. He did not request transient services from the contract facility. The ramp area was not lit nor did it have yellow taxi lines; however, the pilot was aware of a white line denoting the parking area limits and believed that if he followed this line, adequate wingtip clearance would be assured. He was also aware of a fence to the right of the ramp entrance, which he could see lit by red obstruction lights. The pilot picked out a familiar looking white line and began to follow it. Unfortunately, it was not the line denoting the parking area, but one that marked a vehicular road. The copilot saw an unlighted post too late to avoid crunching the right wing. (The false sense of security due to the relatively familiar environment led to relaxed vigilance on the part of the pilot.)

• The pilot of a C-130 knocked off two feet of the right wing, damaged the wing spar, and caused $2500 in damage to a hangar while attempting to taxi between two hangars, unaided by wing walkers or marshallers. He was relying entirely on a Follow Me vehicle to lead him. (Didn't *anyone look* at wingtip clearance?)

• A C-7A was damaged at an overseas location by a forklift. The driver engaged the wrong gear and instead of backing up after loading the last pallet he rammed forward into the aircraft. (The driver possessed a valid [?] operator's permit.)

• Following dearming, an OV-10 was maneuvering toward the ramp and struck a dearming vehicle. The vehicle was too close to the taxiway and no wing walkers or marshallers were used.

• Two B-52s assigned to the same wing were damaged within a few days of each other when they each struck a snow bank while taxiing. In both cases, snow was banked too close to the parking stubs and taxiways.

• Another B-52 sustained damage to the fuselage and radome when it jumped the chocks and ran into a parked metro van crushing it into a nose dock. An engine run was being performed by a qualified engine technician; however, he was not familiar with hydraulic system operation, nor had he been required to receive such training.

• Seven aircraft, ranging in size from an OV-10 to a C-141, struck parked trucks on the ramp; 15 others struck trees, fire bottles, water pipes, blast deflectors and buildings, while taxiing.

The examples cited above are a random sample of the numerous avoidable ramp mishaps reported in the past year. What can be done to avoid these needless, expensive and unwarranted mishaps? Let's take a look at how some problems have been remedied at one base.

One FSO we know drove down to the ramp at night to search out the most hazardous areas. His first impression was that many work areas where vehicle traffic was heavy were inadequately lighted. To him the answer was obvious—more lighting in these selected areas, or, where this was impractical, move the work areas to the existing lights. The same FSO attached reflective tape to aircraft pin streamers, engine covers, etc. At night the aircraft stood out in reflected silhouette.

Perhaps these measures won't work or would be impractical at your base, but they did reduce the number of flight line incidents at his. Here are some other suggestions that should be at least minimum standards at all bases:

Vehicle operators should be thoroughly trained for all flight line operations, and recognize the increased hazards involved while operating around aircraft.

Emphasize proper training and supervision of ground marshallers. They must be able to demonstrate all of the commonly used ground signals in a manner that pilots will recognize. Above all, they should be constantly alert to insure that aircraft are taxied safely in congested areas.

Maintenance men serving as wing walkers should be familiar with lead times required for rendering ground-to-cockpit signals. Pilots should not assume that every man on the flight line is qualified to marshall an airplane. (However, it wouldn't be a bad idea for every man working on the flight line to know at least the emergency signals.)

Regardless of whether or not wing walkers are used, aircrews must be reminded constantly to remain alert when taxiing near objects on the ramps or taxiways. If doubt exists regarding proper clearances—**STOP** and wait for wing walkers.

Transient alert personnel must be aware of airfield capabilities, i.e., the type and size of aircraft that can use every area of the ramp, which aircraft can use existing taxi lines with adequate wingtip clearance, etc.

Civil engineers should insure that airfield markings, lighting, obstruction clearances and snow removal are up to acceptable standards at all times; that obsolete taxi lines are completely obliterated; and current taxi lanes are readily discernible. (What about reflectors spaced on taxi lanes similar to those used to denote driving lanes on many highways?)

Never pre-position AGE if there is any chance that a parking or taxiing aircraft might hit it. The few moments saved will never make up for the time and expense required to repair the aircraft and to report and investigate an accident.

Vehicle operators must insure that their equipment is properly lighted, parked, chocked, and kept in good operating condition.

All AGE and ground vehicles operating on the ramps should be prominently marked with reflective tape as required by AFM 127-101 and appropriate tech data.

Establish procedures for handling stalled vehicles on the ramp or taxiways. Radios should be used to summon help if possible so the driver won't have to abandon his vehicle.

For every suggestion above, a dozen others could probably be presented. Enterprising safety, maintenance, operations and civil engineering personnel should be able to come up with many good ideas tailored to their specific base. A little extra time, money, training, and use of just good common sense can save thousands, perhaps millions, of hard-to-come-by defense dollars and manhours. ★

NUCLEAR SAFETY AID STATION

BUDD WHEELS, STUDS AND NUTS

A recent evaluation made by personnel of the Directorate of Materiel Management, Hill AFB, regarding wheel stud failure in a reentry vehicle/guidance and control (RV/G&C) van has been completed. The exhibits included wheels, hub, drum, wheel studs, and inner and outer lug nuts. The investigation revealed that one of the outer wheels had a wider flange than the wheel normally used. Three of five studs were not Budd studs, and none of the five inner and five outer lug nuts were Budd nuts. TO 21M-LGM30F-4-4 should be used to obtain proper part numbers for these studs and nuts. In addition, the lug nuts (inner and outer) were loose for some period of time prior to the stud failure. Commercial trucking industry personnel informed Ogden Air Materiel Area (OOAMA) that broken wheel studs are experienced when nuts are not kept tight. The exhibits indicate that the inner lug nut is the one that is not being kept to proper torque. OOAMA strongly recommends that you comply strictly with step-by-step torquing procedures and insure that proper wheels, studs and nuts are used when replacements are required. Emphasis is placed on the requirements in TO 3629-8-40-1, 30 May 1969, page 3-21, para. 3-46, changed 21 Aug 1970, for keeping the lug nuts torqued.

THE CASE OF THE INVISIBLE MISSILE CONTROLLER

During a normal strategic alert at a missile site, the "ENABLE" indication illuminated at the crew commander's panel. This indicated that the missile was prearmed and ready to accept a launch command. Needless to say, this condition resulted in an immediate response to the affected launch complex. Investigation by maintenance personnel revealed that a loose wire was responsible for the inadvertent ENABLE. The wire was reconnected and the ENABLE indication extinguished. It is believed that the wire was accidentally loosened during the accomplishment of a time compliance technical order (TCTO). The lesson to be learned is don't foul up the rest of the system when performing maintenance on a part of the system. Always follow TO procedures to the letter and don't try shortcuts, especially when performing maintenance on sensitive Command and Control equipment.

AID REPORTING

In the day-to-day business of analyzing accident/incident/deficiency (AID) reports, it is refreshing to come across a report which is clear, concise and contains all relevent facts required to determine the nuclear safety impact. Recently such a report (71-6) was received from the 90th Strategic Missile Wing at F. E. Warren AFB. The Dull Sword report described the specifics of the malfunction (how the system behaved), the nature of the maintenance action and their findings (what was done), the nuclear safety implications and actions taken to reduce the hazard, and a statement relating to compliance with applicable procedures and policies.

The importance of careful and meticulous preparation of AFR 127-4 reports cannot be overstressed. It is important that all relevent information pertaining to a nuclear accident, incident or deficiency be included in the report in order that higher headquarters can take expeditious and effective corrective action when necessary. Too often valuable time has been lost by having to obtain additional information from the field. Our hat is off to the nuclear safety officer of the 90th SMWg for a job well done.

DO NOT USE WEAPONS AS TESTERS

Exactly 60 days ago we reported a case via the AID Station where a nuclear weapon had been used to troubleshoot a faulty Aircraft Monitor and Control (AMAC) system. The title of that article was "Disconnect—Then Test." Well, it's hard to believe, but it has happened again. This time the weapon was disconnected and downloaded; however, required AMAC tests were not performed and the weapon was loaded and downloaded three times before the faults were corrected. Specifically, an AMAC postload electrical check indicated a fault in the system. The weapon was downloaded but the required GWM-4 check on the aircraft system was not performed. A preliminary inspection of the weapon indicated no malfunction. The weapon was loaded again and sure enough, the same fault indication was present. The weapon was again downloaded and the required tests performed. It was determined that the aircraft weapons control unit was at fault. The unit was replaced, the weapon loaded, and for the third time the fault indication was present. Another download and tests indicated that the break pin on the weapon was broken. **Repeat lesson**—you don't load a nuclear weapon on an aircraft if there is an indication of a fault in the AMAC system. Isolate the fault using approved procedures. **Correct** the fault, then load the weapon. ★

ORVILLE STINSON, PHOENIX TOWER
Reprinted from Journal of Air Traffic Control

THE EVILS OF TECHNOLOGY

You may not believe this, but there is a fellow who claims to have perfected a voice retriever gadget. Based upon the theory that the spoken word goes on and on endlessly (wifelike) through space, it follows that, with proper instrumentation, all vocal utterances from the beginning of time can be replayed.

We will agree that possibly there is some historical or dramatic value in hearing, for example, one named Noah as he implores *"Which one of you cats is rocking the boat?"*; or to be more recent, to hear Brigadier General George Armstrong Custer as he exclaims, *"Whereinell did all these (_____) Indians come from?"*

But we definitely approach all other possibilities with visible trepidation. For in many years of shattering the airwaves with command decisions, we and our cohorts have managed, with considerable aplomb, to give birth to a few statements which should forevermore be permitted to rest in peace.

We recall a local controller of no little repute, who acquired instant immortality with the simple expression *"Straight out approach approved!"* This, and *"For further touch and gos you'll have to make a full stop landing or leave the pattern!"* are considered by all the down-the-tube-goers as the epitome of concise traffic control instructions.

Also, we would certainly be remiss if we overlooked another notable transmission of urgent words of wisdom, to wit: *"Go around, your gear is not UP!"* And we must not overlook the poor maligned trainee who suffered severe bodily bruises as the result of *"No-radio Cessna, contact ground control on one two one point niner."*

But ATC communication is a two-way affair, and pilots are no exception when it comes to decimating the decorum of an orderly traffic pattern. Advised to call the freeway on final, one sterling chap complied explicitly with *"Hello Freeway," "Hello Freeway!"*

Even the jumbo jets are getting into the act. As the result of a rather heated disagreement within the tower, the following query was offered, *"How many wheels are you supposed to have on that aircraft?"* Well, as all of you should know, when you really want to know something about an airplane, you naturally ask the pilot. This held true in this case, for the information received in reply was *"Why, are some of them missing?"*

For such reasons, we cannot in good faith drum up a modicum of enthusiasm for the aforementioned fink machine. This is not necessarily because we have attained the status of lasting remembrance for a dubious decision or two.

Rather, it is because we suspect that our one personal vocal claim to fame, most likely to reverberate through the years to come, is the anguished wail of a too-well-skewered controller, making his urgently bidden appearance on a Blue Monday, in the Inner Sanctum:

"But, Chief—But, Chief—!" ★

ON THINKING AHEAD

One of the more interesting magazines we've encountered lately is the US Naval Institute's *Proceedings*. In a recent issue we found a fine article by Captain E. F. Oliver, USCG, on the gargantuan oil tankers developed since World War II.

There are some mammoth problems associated with the operation of these mammoth ships, but one—the problem of stopping in an emergency—is of particular relevance to anyone interested in safety.

The World War II T-2 tanker weighed 17,000 tons. It could come to a "crash stop" within one-half mile—but it took five minutes of engines "full astern," during which time the ship's captain could neither steer nor regulate speed. For the 200,000-ton *Idemitsu Maru*, a screeching halt takes approximately two and one-half miles and 21 minutes. By extrapolation, "crash stop" for the 400,000-ton tanker now being built will take four or five miles and 30 minutes, and plans for a one million-ton tanker are on the drawing boards!

Working within the limited maneuverability of ships of this size is tricky business—an error in planning, or lack of planning at all, can easily result in disaster.

Despite the differences in speeds, distances and times, the tanker captain and the airplane pilot have pretty much the same problems and, oddly enough, the same solutions. If emergency action is needed, it's needed *now*, and there's precious little time to talk it over, whether airborne or at sea. We depend on our training, knowledge and professional skill to cope with an emergency, and we depend on competent pre-planning to avoid self-induced emergencies. At least, we should . . .

• The crew of a C-124 requested an enroute altitude 4000 feet blow the MEA for the route, several hundred feet below actual terrain within a few miles of course —and below the published minimum altitude for reliable NAV radio reception. Disaster occurred—as programmed.

• On a navigation training mission (!), a T-37 IP and student diverted into a large civilian airport when destination weather deteriorated. After casting about for help and calling the flying supervisor at home station, the IP decided to RON and make the short hop to his military stopping point the next day, under VFR conditions. They took off the next day, planning for five minutes of flight with 17 minutes of fuel on board (even though a little deeper research would have disclosed a suitable alternate fuel available where they were). The only nav-aid on board was inoperative on taxiing, but the IP elected to continue, confident that pilotage would get them where they wanted to go (the only maps on board were ONC charts and the final report asserts that no more suitable maps were available—but it's hard to imagine a large civilian flying facility with no sectional charts for sale). They took off as scheduled, climbing out on course. Approximately five minutes later the destination airfield passed under their right wing, but neither crewmember saw it. After 11 minutes of flight they recognized their bind and started asking for help. The help they got was something less than we might hope for, but it's doubtful that anything would have extracted them from their self-built box by then. The airplane flamed out after 17 minutes of flight and both crewmembers ejected successfully.

Airplanes being what they are, there is often precious little time to think out a problem in flight. The only time we can really count on having is that time *prior* to flight, and conscientious use of that time can—and does—pay handsome dividends.

To the ocean-pilot's advantage, adequate pre-planning is sufficient to avoid sailing up a box canyon, and even if he did, a ship is capable of stopping and backing out. Unfortunately, an airplane can't do that.

• A T-33 pilot and his non-rated passenger were killed in a "box-canyon" episode. Starting at something less than 2000 feet, above open water, the pilot turned inland, climbing above a 12-degree slope, intending to go through a gap at the 8200-foot level. Near the 5000-foot level the impossibility of clearing the mountain became painfully apparent, and the pilot made a right turn to get out of the trap. Airspeed, thrust and deep desire were inadequate to sustain flight in a climbing turn, and the airplane crashed near the 5400-foot level.

Planning goes a long way toward assuring the success of any endeavor; but when it comes to flying airplanes, planning goes a long way toward assuring survival as well. ★

REVERSE THRUST

In considering just how marginal an abort near V_1 really is on a heavy weight takeoff under critical runway conditions and how dependent successful accomplishment is on the correct handling technique, a large international airline decided to carry out an analysis of its flight crew capabilities under such circumstances.

Using a B-707 type simulator and fully qualified B-707 Captains and First Officers, they tested more than 150 cases of rejected takeoffs. No special briefings were given by the instructor nor were the pilots prewarned that engine failure before V_1 would occur. Engine failures were not simulated, for the most part, by retarding thrust levers. Many think that closing the thrust lever to simulate engine failure in an airplane gives the crew too great a clue; hence, the training is less than realistic. But the simulator provides a way by which this important clue can be eliminated. Finally, no pilots' names were logged; and there was no "fail-pass" association; and only the first scheduled rejected takeoff by each pilot was analyzed.

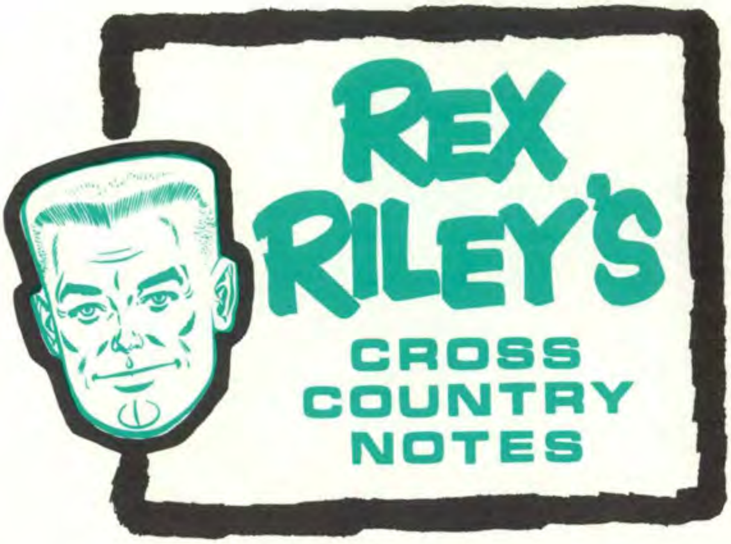
The airline came up with some very interesting data. Most of the pilots, 99 percent, in fact, correctly identified the failed engine, but 12 percent took from two to four seconds to do so and two percent took more than four seconds. After correct identification and call, 18 percent of the pilots took another two to four seconds to react properly and another 17 percent took more than four seconds. These results should be compared with the certification of the B707-300C which considers brake application, thrust reduction and speed brakes up to be completed in three and one-half seconds. Any delay in throttle closure can result in serious speed overrun. Also, certification tests assume a hard, dry pavement with no degradation of the coefficient of friction.

Now comes the interesting part. While just about everyone, i.e. 99 percent, used reverse thrust, *23 percent did not use symmetric reverse thrust!* This was about the most goofed-up aspect of the whole thing. The difficulty pilots have in reaching over the throttle quadrant and reversing two symmetric engines is noteworthy. Time and time again the wrong two are cracked and the concentration required for correct selection seems to force the pilot into lowering his eyes into the cockpit for an excessive length of time to the detriment of aircraft directional stability. During this period, more important matters, e.g. FULL BRAKING, are overlooked.

Pilots should continue to discipline themselves into remembering that certification established the ability to stop *without reverse thrust,* and that if everything else is done right it is a fringe benefit only and should be categorized as relatively low priority.

Reverse thrust contributes from 200-400 feet of stopping ability to the aborted takeoff. Although this may appear a minor increment, it certainly should not be ignored. The nature of the deceleration curve is such that if the runway proves too short, the speed off the end will be substantial, e.g., if it is too short by 300 feet, you would expect to leave the end of the runway at 50-60 knots. And consider—the 200 feet you save by using effective reverse may be the 200 feet you threw away in lining up for takeoff, a maneuver which is not accountable in the calculation. ★

(Flight Safety Foundation Bulletin)



THE

REX RILEY
Transient Services Award

LORING AFB	Limestone, Me.
McCLELLAN AFB	Sacramento, Calif.
MAXWELL AFB	Montgomery, Ala.
HAMILTON AFB	Ignacio, Calif.
SCOTT AFB	Belleville, Ill.
RAMEY AFB	Puerto Rico
McCHORD AFB	Tacoma, Wash.
MYRTLE BEACH AFB	Myrtle Beach, S.C.
EGLIN AFB	Valparaiso, Fla.
FORBES AFB	Topeka, Kans.
MATHER AFB	Sacramento, Calif.
LAJES FIELD	Azores
SHEPPARD AFB	Wichita Falls, Tex.
MARCH AFB	Riverside, Calif.
GRISSOM AFB	Peru, Ind.
PERRIN AFB	Sherman, Tex.
CANNON AFB	Clovis, N.M.
LUKE AFB	Phoenix, Ariz.
RANDOLPH AFB	San Antonio, Tex.
ROBINS AFB	Warner Robins, Ga.
TINKER AFB	Oklahoma City, Okla.
HILL AFB	Ogden, Utah
YOKOTA AB	Japan
SEYMOUR JOHNSON AFB	Goldsboro, N.C.
ENGLAND AFB	Alexandria, La.
MISAWA AB	Japan
KADENA AB	Okinawa
ELMENDORF AFB	Alaska
PETERSON FIELD	Colorado Springs, Colo.
RAMSTEIN AB	Germany
SHAW AFB	Sumter, S.C.
LITTLE ROCK AFB	Jacksonville, Ark.
TORREJON AB	Spain
TYNDALL AFB	Panama City, Fla.
OFFUTT AFB	Omaha, Nebr.
ITAZUKE AB	Japan
McCONNELL AFB	Wichita, Kans.
NORTON AFB	San Bernardino, Calif.
BARKSDALE AFB	Shreveport, La.
CHANUTE AFB	Rantoul, Ill.
KIRTLAND AFB	Albuquerque, N.M.

Since we started breathing life into the Rex program some months ago, we have been gratified at the response from the field. Our traveling Air Force has begun to let us know when they are pleased or displeased about transient services. On the other side of the coin, most commanders are quick to respond when valid deficiencies in their transient facilities are identified. We think from what we hear and see, transient services have improved Air Force-wide. On the theory that if a little effort does a little good, a lot of effort can move mountains, we're going to put more emphasis on the entire program. For example, transient facilities will become a special interest item of the UEI teams. They will submit their in-depth evaluation of a base's transient capability to Rex upon completion of an inspection. Since this is still limited in scope, we again ask that you troops on the move let us know where service can be improved. As an additional aid, Base Ops should provide you with a critique sheet which can be evaluated by the particular base or if the transient feels it necessary, the questionnaire can be sent directly to Rex Riley, Directorate of Aeroscape Safety (IGDSEA), Norton AFB, California, 92409.

These evaluation sheets should be readily available to transients. Without them, it is unlikely that the individual responsible for transient services will ever know that he has a problem area. The locally reproduced forms used and distributed by this directorate have Rex's address on the back along with the "Postage and Fees Paid" statement so all that is necessary is scotch tape, staple, or whatever is handy and the US Mail does the rest. (AFM 10-5, Ch. 6)

Rex is always looking for ways to improve the program so let's hear from you! ★

what happened to the T-38

TRAINER AIRCRAFT ACCIDENTS IN 1970

LT COL LARRY T. COOPER
Directorate of Aerospace Safety

The Air Force pilot trainer fleet, which includes the T-28, T-33, T-37, T-38, and T-41, contributed significantly to the great reduction in USAF aircraft accidents last year. These five aircraft experienced a total of 29 major accidents during 1970 compared with 39 in 1969, for a reduction of 26 percent. By type, T-28 accidents were reduced from four to none, T-33 from 15 to seven, T-37 from nine to five, and T-41 from two to none. Only the T-38 experienced an increase, from nine to 17.

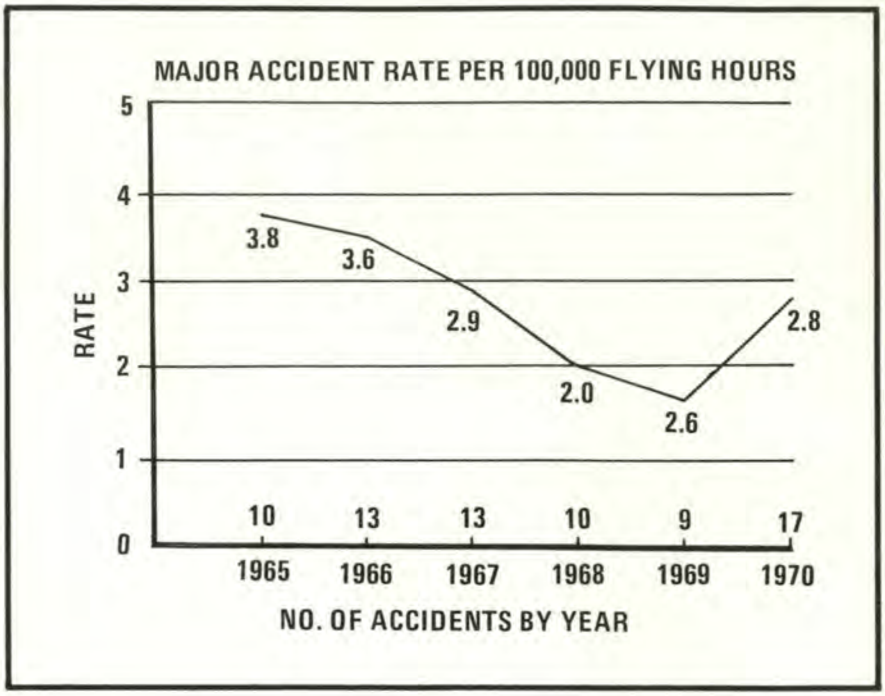
Obviously, a variety of factors and circumstances combined to achieve this marked reduction in trainer accidents. However, the most significant factors appear to be improved engine reliability and correction of structural problems in the T-28; improved pilot discipline in the T-33, especially during the weather approach phase; structural modifications, improved maintenance, and increased supervision of pilot training in the T-37; and tighter operational restrictions regarding surface winds in the T-41.

Although the T-38 major accident rate for 1970 of 2.8 major accidents per 100,000 flying hours was still slightly below the overall USAF rate of 3.0, this was the first annual increase since 1965 and the highest rate since 1967. The 17 accidents in 1970 were four more than the previous high of 13 in 1966 and 1967.

These statistics are more significant when considered in light of all other USAF aircraft and the overall improvements accomplished, both individually and collectively. Of all 16 USAF fighter and trainer type aircraft, the T-38 was one of only three showing an increase in the major accident rate during 1970, and the other two increases were slight. The T-38 rate increase of 1.6 to 2.8 represents a 75 percent jump, which is significant regardless of which statistical yardstick is employed to measure accident experience and trends.

Although the 1970 T-38 accidents were attributed to a wide variety of cause factors, the major increases occurred in pilot factor and instructor pilot supervisory areas, which increased from four to eight and from none to two respectively. In addition to the two IP supervisory factor accidents, instructor pilots were the primary cause of three pilot factor accidents and were directly involved in three others. This is a reflection of reduced instructor pilot experience levels and indicates the continuing need for close supervision of all aspects of the Undergraduate Pilot Training Program.

This graph illustrates the favorable trend enjoyed by the T-38 since 1965 and the sudden reversal in 1970.



While these statistics reveal that the T-38 had a relatively poor safety year, they do not imply that there are any inherent problems in T-38 operations nor that pilots and supervisors have failed to do their jobs.

In 1970, the T-38 fleet of slightly over 1000 aircraft flew approximately 610,000 hours, which is second highest of all USAF aircraft. When this is equated to almost 600,000 sorties and more than 1.1 million landings, it becomes clear that most students, instructors, and supervisors were obviously doing the right thing, at the right time, all of the time. And this is what is required to fly that many hours, on that many sorties, and accomplish that many landings without having any accidents.

But let's look at it this way; if each and every T-38 student pilot and instructor pilot had done the right thing, at the right time, all of the time during 1970, 12 major accidents would not have happened; 11 T-38s would still be flying; and eight pilots would still be alive. All you T-38 drivers think about it, and maybe 1971 will be a reversal of 1970 with a return to the downward accident trend previously enjoyed. The first three months of 1971 indicate that this is being accomplished.

The T-38 is a good, safe, reliable bird, but like all aircraft, especially high performance jet types, it is extremely unforgiving of complacency, poor judgment and errors, particularly in the traffic pattern, and let's face it; that's where you guys spend a great deal of your time. ★

TECH
briefs for maintenance techs
TOPICS

free wheeling

The C-118 pilot discovered after takeoff that his left gear did not retract fully. The engineer looked the situation over but was unable to determine the problem. The gear handle was then placed in the down position and the gear promptly went down and locked. It was left down while the aircraft returned to home station. After about 3000 feet of the landing roll, violent bumping occurred. The brakes had been operating normally, but they ceased to operate after the violent bumping. The aircraft was stopped by using the emergency air brakes.

Maintenance found that the nut on the left main gear scissors bolt had been forced off the bolt. The nut was found on the runway where the last touch and go landing had been made. So it was decided that the nut came off during the landing. With the scissors disconnected, the gear was allowed to castor freely. It was determined that the nut was oversized and had been pressed off the bolt, shearing the cotter pin. It is believed that the scissors bolt and nut had not been worked on since the last IRAN in May of 1968.

How is it possible for a knowledgeable maintenance man to install an oversized nut on such a critical component? Or, how could such an installation go undetected for nearly two years? However you answer those two questions, you have to admit that landing with one of your main gears castoring in the breeze is a sport in which nobody wants to participate.

"where's the hole?"

As the aircraft pulled into the parking space and stopped, the assistant crew chief ducked into the wheel well area with the speed brake collar and the main gear pin in his hand. He installed the speed brake collar on the actuator, but in the dark was unable to find the hole for the gear pin. As he left the wheel well, gear pin still in hand, he walked under the intake area and the pin and streamer were pulled from his hand and ingested by the engine.

Local procedure has been changed to install the pin and collar after engine shutdown. Even so, it needs to be emphasized again and again that we can't be too careful around jet intakes. And what was the assistant crew chief doing without a flashlight?

taxi tangles

Once again it's time to highlight those terrible taxi tangles. Usually the airplane driver is blamed for taxi accidents even though someone on the ground is waving him on. To give you an idea of what's been going on, here's a review of some of the tangles that have taken place in recent months.

• Due to limited parking space,

two helicopters were attempting to park in the same revetment. As soon as the first one was spotted, the second one began to maneuver into position. However, one of his rotor blades struck the rotor blade of the one already in position. The reasons were (1) misinterpretation of hand signals from one maintenance man to another and also by the pilot, (2) no guide lines for parking two helicopters in one revetment, (3) the ground crewmember was using a grounding point in the ramp as a reference point for parking the chopper; however, he was using the wrong grounding point. Looks like it would have been a lot easier for all concerned had the revetment been marked beforehand to accommodate the two choppers.

• C-7—the report reads, "While the aircraft was being maneuvered into a designated C-7 parking spot in a revetted, U-shaped ramp which accommodates several C-7 aircraft, the right outboard flap hinge bracket struck the top of a revetment wall." The report further reads, "After heading into the revetment at a slow speed the pilot began a 180 degree left turn away from an adjacent C-7. As the aircraft was moving left to parallel the rear revetment wall, a maintenance man between the aircraft and the revetment wall, gave the pilot a thumbs' up signal. Based on this signal, both the copilot and the flight mechanic reported 'clear right' to the pilot. As the aircraft continued to turn toward the intended parking spot, the right wing passed over the maintenance man's head, and the hinge bracket hit the revetment wall." Again maintenance gave, and the flight crew accepted, *unauthorized* hand signals.

• A B-52 struck a parked step van and pushed the step van into the nose of another parked B-52. The step van had been left unattended 15 feet inside the taxi clear zone. Who got tagged for it? The aircraft driver, of course. But who left an unattended step van in the taxiway?

Getting back to the hand signal department, there is a strong indication that AFR 60-11 should be reviewed by both maintenance and flight crews.

three for one

While preflighting a B-57, following checklist procedures, the aircrew connected the battery to the aircraft. A short time later fumes were detected and smoke was observed coming from the battery compartment. The crew immediately extinguished the fire and disconnected the battery.

Investigation revealed that the cover used on this battery had been modified with vent holes in accordance with TO 1C-135(K) A-2-10. Since both aircraft (B-57 and C-135) use identical batteries, the covers are interchangeable. In this case a cover modified for a C-135 had been installed on a B-57. After the vent holes had been drilled, they had not been reamed out or the burrs removed. These burrs had made contact with the battery terminals causing a short that ignited the battery. After checking a little further, maintenance discovered that, although the battery had been through the shop on two occasions for cleaning and repair, the socket head screws in the cells and receptable risers were still installed. TO 8D2-3-1 requires replacing these socket head screws with hex head bolts. This would have increased the clearance between the battery cover and the terminals and possibly may have prevented the burrs from shorting out on the terminals.

It took three different acts to set the stage for this incident. Elimination of any one—burrs on the cover, installation of the wrong cover, or modification per TO 8D2-3-1—would have prevented the incident. Our ultimate goal, of course, is to eliminate all steps that could lead to an incident or accident.

wrong way doesn't pay

The seat kit and parachute had been removed from the A-7 aircraft. A personal equipment man, while trying to free the arming lanyard, exerted enough pressure to cause the cartridge actuator device to fire. The reason for the incident was given as follows: A split rubber hose had been used to protect the arming lanyard and the hose was taped in two places to secure the arming lanyard within the hose. So when the P.E. man tried to pull the arming lanyard free—BANG! True, the P.E. man should have been more

TECH

briefs for maintenance techs

TOPICS

cautious when handling an arming lanyard; but protecting the arming lanyard with a rubber hose was an unauthorized procedure. The results show why.

how to ruin a prop

A C-7 was marshalled into a parking spot, but before the engines were shut down, the crew received a frag change. When the aircraft came to a stop, the flight mechanic climbed down from the overhead hatch and went to the rear of the aircraft to prepare for chocking. Meanwhile a maintenance man moved a 50 pound CB fire extinguisher from the edge of the ramp and placed it in front of the number two engine, then jumped in his vehicle and departed.

Along with the frag change, the pilot also was given instructions to move the aircraft to a new parking spot. As the flight mechanic was climbing back to his position in the roof hatch, the pilot released his brakes and started to taxi. After moving approximately 13 feet forward and slightly to the left, the number two prop struck the fire extinguisher.

There were several contributing factors in this incident, but one provides an obvious lesson: maintenance should never park a fire extinguisher or any other equipment in front of an aircraft that is running, especially one that has just taxied in and does not have chocks installed.

fire warnings

If you were to analyze the one thing most feared by everyone who ventures skyward, the answer would no doubt be fire.

Because of the dangers of inflight fires, fire warning systems have been installed on most aircraft. However, these warning systems are only as good as the people who maintain them. Pilots would have more faith in the system if they knew that every time the light flashed they either had a fire or an overheat condition. Some of you maintenance types are no doubt reacting to that last statement with such thoughts as, it's not our fault, it's the fault of the fire warning circuits, they are no good. Granted, all the fire warning circuits are not one hundred per cent reliable, but many a pilot has received a faulty indication due to improper maintenance. (Like the boy calling wolf once too often. Pretty soon the pilot just doesn't know if he should believe the light or not.) To give you some idea, here are a few of the incidents reported in the last six months.

The O-2 pilot shut down his rear engine because the fire warning light came on. After landing, maintenance found the fire detection wiring improperly routed.

After an F-4 made a single engine landing because of a fire warning light, maintenance found a pinched loop in the fire warning flex cable.

A T-37 returned with one running and one shut down—fire warning light again. This time maintenance found a fire warning connector saturated with dirt and oil.

These are only three of the many incidents that have been reported. The causes vary from a piece of safety wire shorting out the terminals to loose connections. They all reported that there was no other indication of a malfunction other than the warning light. However, once that light starts flashing, the pilot has no choice but to believe. But how long would you believe if you were to frequently get a faulty indication?

high cost item

An engine run team plus two supervisors were in the process of clearing two maintenance discrepancies on a C-5 aircraft: (1) fluctuation of number one and number four brake pressure gages, (2) operation of four newly installed generator control panels. All four engines were operated at idle for approximately ten minutes. As the throttles were advanced to 75 percent, the airplane moved forward over the chocks and traveled approximately 100 feet before being stopped with the emergency brake system.

Damage to the aircraft was approximately $8,000. After reading something like this we must ask ourselves questions like, was the brake operator qualified in accordance with AFR 60-11? Is it possible that someone might believe that chocks alone will keep an aircraft from rolling forward during power checks? *They will not.* In this incident (so reads the report) someone inadvertently released the parking brakes prior to advancing power. ★

CAM INTACT BROKEN CAM

GOOD CAM BAD CAMS DISTORTED

WOULD YOU USE THIS NOZZLE?

W. J. Haynes, SAAMA, Kelly AFB, Texas

During a hot pit refueling a single point refueling nozzle became disconnected from an F-4 aircraft. Considerable fuel spilled and ignited, causing extensive damage to the aircraft.

The investigation report stated that the primary cause of the accident was failure of the nozzle crank handle locking cam which permitted the single point refueling nozzle to become disconnected from the aircraft.

This cannot be denied. The handle was broken and it did fail. Would you have used this nozzle with the broken handle? Someone did. All of the broken handles in the above picture were removed from nozzles at one base. Good maintenance practices would have replaced all of the broken handles.

No EUMRs had been received by the AMA prior to the accident. The report also stated that technical data on operation of the nozzle was inadequate. No AFTO Forms 22 had been received by the AMA prior to the accident advising that technical data was inadequate. Would either of these actions have prevented the accident? We will never know because nothing was submitted.

As a result of the accident and follow-on EUMRs, action was taken by the prime AMA to issue a TCTO requiring the collar handles be indexed in a straight aft position rather than the 53 degree position. This provides protection to the cam on the crank handle when dropped or dragged on the concrete. The technical order for the nozzle was rewritten to include detailed operating and inspection instructions; it also explains the locking mechanism for the nozzle.

The point we want to make here is, do not wait until an accident occurs before you submit EUMRs or AFTO Forms 22. If you have unsatisfactory material or inadequate technical data, report it or someone else may make the report for you. ★

FUEL SERVICING CONTROLS

MAJOR DWIGHT BROWN, JR., SAAMA, Kelly AFB, Texas

Last year a cargo plane took off from an enroute stop for a flight to its home base. It never made it. The aircraft could only manage 400 feet of altitude before the aircraft commander gave the order to prepare for a crash landing. The plane crashed and burned. Fortunately, the crew escaped without injury.

What caused this accident? Would you believe the aircraft had been serviced with the wrong grade of fuel? Murphy's Law had been successfully applied again.

Something needed to be done. Positive steps had to be taken to insure that the proper grade of fuel is issued to aircraft. The command owning the destroyed aircraft recommended that SAAMA host a meeting of major command fuels personnel with a view toward improving current control procedures. The Quality Division of SAAMA hosted the Fuel Servicing Control Meeting 3-4 December 1970 at Kelly AFB, Texas.

Realizing that the human factor is the cause of most accidents, the conferees focused on mechanical improvements to refueling hardware that would lessen the chance of personnel error. During the two-day conference, every aspect of fuels operations was covered, from the time fuel is received on base until it is issued to the aircraft.

In many functional areas the idea of supplementing human judgment by the use of various mechanical devices has resulted in reduced errors. This principle was applied to refueling operations. The first step in approaching the goal was to provide standardization in all refueling operations. This led to the decision to fill all refueling units from the bottom or "bottom loading"— the term used by fuels people.

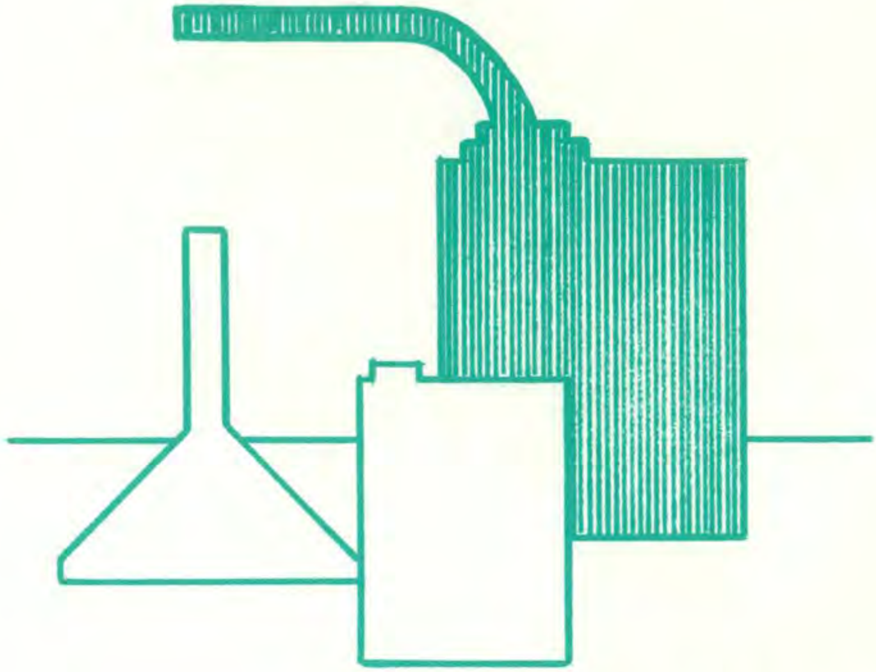
Bottom loading not only provides a means of preventing the commingling of fuel, but also results in improved safety of operations, and aids in maintaining the quality of aviation fuels. To achieve the desired reliability, it was necessary to make botton loading connections on vehicles and fixed facilities distinctively different. This was accomplished by adopting the standard single point nozzle and receptacle for JP-4 and a dry break type coupling valve with adapter for avgas. *With these two different systems it will be virtually impossible to bottom load the wrong grade of fuel into a refueling unit.*

WRAMA, the Vehicle Item Manager, is in the process of publishing TCTOs for all types of aviation re-

Note the standard single point nozzle will not fit the dry break type coupling.

Bottom load hook-up for JP-4.

Bottom load hook-up for avgas.



fueling units with a compliance date of 90 days from date of issue or 30 days from receipt of parts, whichever is later. You should see these soon.

Pending conversion of all units to bottom loading, a lock control system will be required for avgas vehicles. Padlocks will be on truck domes with keys suspended from the fillstands. This locking system will be mandatory at those few bases that have a need to retain a top loading capability. TO 42B-1-1 is being revised to eliminate the lock control system for *fillstand* operations once bottom loading modifications of refueling units and fillstands are complete. Any deviation from bottom loading will require a waiver from HQ USAF.

A further safeguard is the use of the paper chromatography test outlined in TO 42B-1-1SS-2, issued last October. The test, which will be applied to storage operations, will detect the slightest degree of avgas contamination by jet fuel. This testing procedure will be used to verify that a bulk storage tank has not been contaminated by subsequent receipts of fuel. Tanks that have received fuel will be checked against a reference fuel before the storage tank can be released for issue to fillstands or hydrant systems.

Two additional administrative procedures were implemented to complement the changes in the mechanical portion of the systems. Instructions in AFLC CMAL (Control Multiple Address Letter) No. 71-5 require verification that the right grade of fuel was issued to the refueling unit, and refueling unit markings identify the correct grade of fuel for the aircraft being serviced.

In addition, the lock control system for refueling units presently outlined in TO 42B-1-1 will be retained. This system requires locking of refueling unit access doors or primary control valves which must be opened to permit fuel servicing. The conference went one step further and recommended that the location of the lock be standardized for each type of refueling unit.

The servicing controls adopted by the conference were the optimum methods available to insure that aircraft are serviced with the proper grade of fuel. With these procedures and sound management practices, Murphy's Law will be a thing of the past in refueling operations. ★

FLIGHT LINE SAFETY

EXPLOSIVES SAFETY

JOHN H. KAWKA
Directorate of Aerospace Safety

Accident reports show that most explosives mishaps occur on the flightline, and that half of these are caused by personnel error. This is why flightline activities must be included in unit explosives safety programs.

The danger comes from errors made not only by munitions people but by others involved with munition-carrying aircraft containing munitions. A communication specialist can blow a canopy, a mechanic can salvo bombs, and just about anyone can inadvertently expend one of the many electroexplosive devices used on our aircraft—to name but a few of the possibilities. This is one reason why TO 11A-1-41 (Explosives Safety Surveys) requires the surveying officer to report the effectiveness of command support for explosives safety in the organization, including the method of communication between him and the commander.

Since the commander cannot delegate his responsibilities for explosives safety, yet cannot be present in all areas, he takes the next best step and delegates his authority for explosives safety to his explosives safety officer. His explosives safety officer must identify operations having an accident potential in handling, storage, loading, transporting and use of explosives in order to keep his commander informed on the action taken and recommended to minimize these potential hazards.

When the explosives safety officer finds a deficiency, he should bring it to the attention of the supervisor involved, recommend corrective action, follow up to see that corrective action has been taken, and keep the commander informed. However, surveys and Unit Effectiveness Inspections indicate that while many explosives safety officers are surveying their munitions storage areas and insuring proper safety measures there, they don't always survey their flightlines and egress shops. How, then, can they be effective in applying the commander's delegated authority? Further, how can they keep their commander informed of the actions he needs to take to preclude explosives accidents?

To make his commander's position of responsibility more tenable and his own position of authority more effective, the explosives safety officer should make regular checks and monthly surveys of the entire flightline (including checks of the loading and handling of aircraft containing explosives) to insure that:

- Munitions loading crews are certified and thoroughly familiar with the aircraft, its load, requirements and the proper conditions or equipment required during loading.
- All flightline personnel are briefed that only qualified and certified munitions load crews are authorized and permitted to handle munitions and that they must thoroughly understand their duties.
- Munitions load crews adhere to prescribed procedures during all operations involving explosives.
- Munitions are returned to the storage area immediately when no longer needed.
- Positive control of munitions is maintained at all times—especially on the flightline.
- Preflight loading and unloading are conducted as prescribed in the applicable Dash-1, Dash-2, and checklists for the aircraft and munitions to be loaded.
- Competent personnel inspect the aircraft to make sure that no munitions are aboard prior to maintenance and that armament circuits are deenergized prior to preflight.

In addition to the checks made on the flightline itself, the explosives safety officer should make regular checks of the egress shop to insure that:

- Approved standing operating procedures are on hand and being followed.
- Propellant actuated devices are within their time-change limits.
- Mockup trainers are available and being used.
- Behind-the-line supervisors and other involved personnel are briefed on the hazards of the various ejection systems for all assigned aircraft.
- Propellant actuated devices are not being stored within the egress shop, except for the minimum necessary to support each operation.
- Flight status safety pins and streamers are being used and are serviceable.
- Ejection systems on all aircraft in hangars have been safetied by egress specialists.

These safety precautions should be supplemented locally as necessary to assure safe on-the-line operations.

Explosives flightline mishaps can be greatly reduced if the explosives safety officer assists all flightline managers to develop and maintain a well directed explosives safety effort actively supported by the commander. To protect the flightline and other resources from explosives mishaps, the commander should make sure he has an active, effective explosives safety education and promotion program backed up by frequent observations, followup and supervisory enforcement. ★

Toots

is interested in your problems. She spends her time researching questions about Tech Orders and directives. Write her c/o Editor (IGDSEA), Dep IG for Insp & Safety, Norton AFB CA 92409

Dear Toots

Your question and answer article in the December issue stimulated quite a bit of discussion about the Exceptional Release. Since you have managed to keep us out of trouble in the past with your excellent guidance, we return to you for advice.

Para 2-62c of TO 00-20-5 states in part, "When an exceptional release is signed by a maintenance officer, it will not require another signature for that calendar day unless additional *uncleared* red symbol discrepancies are encountered." Para 2-62c(3) of the same tech order states, "to indicate what outstanding items are to be covered by the exceptional release, the crew chief will draw a red line under the *last* entry on the AFTO Form 781A. When the release is signed, the releaser will place his initials at the left hand margin on the AFTO Form 781A beside the red line entry."

Here is our question: An aircraft is released for flight by a maintenance officer, the status today in block 11, box 3 indicates the status is a red diagonal. The maintenance officer signs on line 1 for the red diagonal in box 3. The aircraft flies a mission and lands with a minor discrepancy. The crew chief puts a red diagonal on this discrepancy. Maintenance personnel clear the defect and the aircraft is ready to fly again (same calendar day). Is another release required and is it necessary to draw another red line on the AFTO Form 781A? If so, who initials it?

In another case, the same aircraft lands with a major defect, a red X. The status today is changed to a red X in block 11, maintenance again clears the defect and the aircraft is ready to fly (same calendar day). The status today in block 11 is changed back to a red daigonal. The status of the aircraft is now the same as when the maintenance officer first released it, there are no additional uncleared red symbol discrepancies. Again is another release required and another red line on the AFTO Form 781A?

CMSgt George H. Westerfelhaus
376 Strategic Wing
APO San Francisco 96239

Dear Chief

I presented your question to the OPR for TO 00-20-5. They feel it is a valid question and request you submit an AFTO 22 with your suggestions as to how to change the TO. They interpret the TO, as it is presently written, as follows: As long as the status today, block 11, 781H, does not change, a new release will not be necessary. If the discrepancy was a red X, then the status today, block 11, would have to change, which, in turn, would require a new exceptional release.

Toots

Ops topics

MICKEY MOUSE FOD

The ground crewman was performing a "last chance" inspection on a T-38 waiting to take the active runway. He finished his check in the right wheel well area and headed for the nosewheel area, leaving the underside of the aircraft just forward of the right wing. A gust of wind caught him and threw him off balance, and the hood of his parka was drawn into the engine intake. The crewman pulled free, but in so doing his "Mickey Mouse Muff" ear protectors were dislodged and ingested. The engine was shut down, but too late to prevent compressor damage.

Wind at the time was 23 knots, gusting to 30, and the engines were at idle RPM.

We can't over-emphasize that these giant vacuum cleaners we deal with can be dangerous. If your job takes you near an operating jet engine, give a little thought to maintaining safe clearance from the intakes —it might save your life, and a heck of a lot of money.

RUFFLED T-BIRD

The mission was transition training, with an IP in the back of the T-33 and a pilot undergoing initial qualification in the front. After some work in the transition area, they brought the bird back to the field for some practice SFO landings. The first two approaches and landings were normal, and the third approach was broken off for conflicting traffic. The IP wasn't satisfied with his student's airspeed control and use of flaps, and demonstrated the fourth approach and landing, stressing those items, then gave the airplane back to the pilot for another approach. Gear and speed brakes were extended at high key (7000 feet), and flaps set at 20 degrees. Full flaps were set at the 270 degree point, as the aircraft was a bit high, but the pilot didn't lower the nose enough to compensate for the additional drag of the flaps. On final the airspeed decayed to 125 knots and the bird developed a rapid sink rate. The IP reminded the pilot to monitor airspeed, then took control of the bird when the airspeed went through 120, and applied full power—just before the airplane touched down in the overrun, in a right crab, right-wing low. Inspection disclosed more than two kilobucks worth of damage to the left gear door, strut and wheel rim.

Anybody who's been an IP for a while knows the value of letting a student learn from his own mistakes —but it's all too easy to get behind. Stay Alert!

TWO GOOD SAVES

We do a lot of jawing about the way we dumb old pilots bend up our machinery. It's a real pleasure to break a trend and report on a couple of steely-eyed jocks who wouldn't let the gremlins get to them.

• The F-4 was in the soup on GCA final when the pitot-static instruments started disagreeing with the ADI presentation. The pilot immediately made a partial panel recovery to "on top." Once in the clear, the ADI appeared to be working normally. The pilot suspected a bad case of vertigo and declared an emergency. Another F-4 in the area joined up with him and brought him in for an uneventful wing landing. When the ADI was bench checked it was found to be sticking in pitch and roll.

In another part of the world, crew coordination saved the day.

• The attitude indicator in the front seat of the F-4 froze at 30 degrees of bank, although pitch and azimuth indications appeared normal. Standby was selected and the ADI recovered. Rear seat indications were normal. Shortly thereafter another turn was entered and the ADI froze straight and level. This time switching from standby to primary righted the ADI and, again, no malfunction occurred in the rear cockpit. The mission was completed with the back seater relaying all his attitude indications to the front seat. If any deviations were noticed, the reference selector was switched from primary to standby (or vice versa). In all cases this freed the ADI and righted it.

In each case, superior skill and cunning paid off and what might have ended as a tragedy became an incident. These pilots, and the thousands like them all over the world, deserve a pat on the back for taking up where the machine left off.

FLIP CHANGES

Daylight Saving Time: As you know Daylight Saving Time is in effect until 0200, local daylight time, 31 October 1971, in the conterminous United States, except Arizona and Michigan. To avoid confusion, a new method of depicting times which reflects the minus one hour change in zulu time caused by the implementation of Daylight Saving Time has been included in the United States IFR and VFR Supplements.

All times will continue to be referenced to Greenwich Mean Time (GMT) corresponding to local standard time. However, for those airdromes/facilities located in areas where Daylight Saving Time is in effect, the zulu time corresponding to local Daylight Saving Time follows in parenthesis, e.g., Field Attended 1100-1500 Z (DT 1000-1400 Z)

Taipei Blow-Up: Effective with the 29 April 1971 Pacific and S.E. Asia FLIP Enroute Charts, a new terminal area chart of Taipei has been added to Chart T-2 which will improve the depiction of the Taipei area. ★

PALLET ERROR

The C-123 was scheduled for a high-speed taxi check to resolve a discrepancy between static and inflight engine performance. When the pilot and copilot arrived at the aircraft, flight line personnel informed them that the aircraft was ready to go and that a flight engineer would not be going with them. The pilot instructed the copilot to perform the exterior walkaround inspection while he made the interior inspection. The pilot stated that he noticed a loaded cargo pallet in the rear of the aircraft, but assumed it was secured.

The crew started engines and taxied to the active for their full power taxi check. Shortly after releasing brakes they heard a slight noise in the cargo compartment, but neither pilot thought it was significant. The crew accelerated the aircraft to 90 knots, then retarded throttles and reversed engines. Immediately after reversing, the crew heard a loud bang in the aft compartment, and the copilot reported that the pallet was resting against the forward bulkhead. (Good thing the bulkhead was there—the pallet weighed two and one-half tons!)

The primary cause was assessed as operator factor, in that the pilot ignored his checklist and left the pallet unsecured. Supervisory error contributed, in that local instructions require that cargo be downloaded and fuel reduced to minimum for high-speed taxi tests.

In addition to the more obvious corrective actions, this unit now requires that high-speed taxi tests be monitored by quality control personnel.

F-4 SWITCH MOD

The OOAMA Configuration Control Board has approved a modification to F/RF-4C/D/E aircraft to relocate the primary/standby switch from the compass controller in the right console (aft) to the pilot's main instrument. Purpose is to eliminate the possibility of the pilot experiencing vertigo or spatial disorientation when switching from the primary to standby system for aircraft attitude reference presentation on the ADI. Installation is expected to begin 1 August.

STARVED T-BIRD

After a delay of approximately 20 minutes in the number 1 position, the T-Bird pilot was cleared for takeoff. When the throttle was advanced for engine check, the ol' J-33 protested, coughed and quit. As the RPM went through 26 percent the pilot stopcocked. T-33 drivers can guess this one—there was no fuel in the fuselage tank.

This is not the first time a T-33 has been starved for fuel at this point, but hopefully it will be the last. Check your gages after a prolonged wait on the ground. We wonder if the low level fuel light was on. ★

MAIL CALL

Well done, AFRES

We at Headquarters Air Force Reserve were proud to see an aircrew in one of our units, the 992nd Tactical Airlift Group, Kelly AFB, Texas, singled out for recognition for their "professionalism and excellent aircrew coordination" in a hazardous situation.

The USAF Well Done Award which they received is a measure of their outstanding airmanship and performance in the critical situation described in the citation, appearing in the February 1971 issue of *Aerospace Safety*.

It's ironic, though, that the Reserve unit they were airdropping from their C-119s, the Texas Army National Guard was correctly identified, but no mention was made in the account that the safety-conscious crewmembers are Air Force Reservists. This fact makes their achievement all the more noteworthy, since these Citizen-Airmen are not normally full-time flyers and fly older aircraft.

Lt Col Ernest L. Burney, Jr
AFRES (SE)
Robins AFB, Georgia

Failure to communicate

In reading your February 1971 issue of *Aerospace Safety,* I came across a mistake on page 20 concerning a movie personality. The article concerned the pulse plug break pins on the F-104G aircraft.

The statement, "What we have here is a failure to communicate," was not said by Steve McQueen but by Paul Newman, in *Cool Hand Luke.*

Unfortunately, since I am an aeromedical technician A90150, I am sometimes lost when I read some of your more technical articles. However, being in such close contact with flying personnel, I enjoy reading *Aerospace Safety.* I find your articles very interesting and very helpful, especially when it comes to discussions with flying personnel concerning their functions as aircrew members.

May I also add that, in my opinion, your articles are written and edited for both easy reading and enjoyability.

Sgt Frank B. Chavez, Jr
USAF Hospital
Vandenberg AFB, Calif.

Our apologies to Mr. Newman—or Cool Hand Luke.

A thousand combat missions??

I read General King's fine farewell message to his fellow pilots in your equally fine February '71 issue, and wondered about his opening phrase: "About thirty years and a thousand combat missions ago. . . ." I learned long ago not to bet into another man's raise, unless I had at least three Aces—but I'd be tempted to call and wait for the last card on this one.

I flew combat in the old, slow conventional types, back when fifty missions were good for a ticket back home—and some of those who got their fifty arrived home alive.

My question is, did the General use that phrase, ". . . a thousand combat missions. . . ," as a jesting way to denote a helluva lot of missions, or did he actually survive a thousand? If so, he should live to be at least 100; somebody "up there" must love that guy!

Also, I'd like to pass on my congrats to the General for having flown all types of kites for 30 years without being tagged for a personal-error accident. Every jock should tack a copy of his sage advice: "Know your machine and its capabilities, **and** know your capabilities —exceed neither," upon the wall and read it each morning. General King's retirement is the Air Force's loss. They should re-hire him as a flying instructor.

Worried Old Timer (Retired)

General Ben King did indeed have a thousand combat missions (and probably more), flown during three combat tours in WWII, Korea and a couple of tours in SEA. We agree, when General King retired, we lost not only a fine combat pilot but a great leader as well.

☆ U.S. GOVERNMENT PRINTING OFFICE 1971 431-464/9

UNITED STATES AIR FORCE **WELL DONE AWARD**

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

MAJOR
Ronald G. Standerfer

108 Tactical Fighter Wing, ANG, Atlantic City, N. J.

During TDY in student status to the 419 Tactical Fighter Training Squadron, McConnell AFB, Kansas, Major Standerfer's rapid evaluation of an emergency and calm, decisive action saved a valuable F-105D. While flying number two on a formation GCA missed approach at 200 feet, his engine flamed out. Major Standerfer immediately zoomed his aircraft and attempted a restart by selecting the emergency fuel control. As he approached decision altitude and airspeed for ejection, the engine compressor stalled violently several times, then began to accelerate. By matching throttle position with actual RPM, he brought the engine under control and accelerated to military power. Major Standerfer then notified the instructor pilot of his difficulty and turned downwind for a landing. On downwind he restored his airspeed and, using a precautionary landing pattern, touched down without further incident. Maintenance investigation revealed that the main fuel control had failed internally, causing the flameout.

Although Major Standerfer had less than six total hours in the F-105, his precise assessment of this serious inflight emergency and prompt corrective actions averted a major accident. WELL DONE! ★


OPERATION
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SUMMER ATTACK
1 APR–30 SEP