flying SAFETY

Maintaining the F-22
The Long and Short of It
New AGE
PROP-er Care

AUGUST 1991

Maintenance Flight Safety

THERE I WAS

■ Following the uneventful taxi-back landing of a B-52H, I climbed aboard to update my touch-and-go currency. We took off and completed a low approach to let the wheel brakes cool. Sitting in the IP seat, I watched the pilot set up for a touch-and-go landing.

As we touched down on the rear landing gear, the pilot eased the front trucks onto the runway and raised the airbrakes as the copilot reset the stabilizer trim to the take-off setting. The throttles were advanced. Suddenly, the aircraft shuddered and started veering to the left as the pilot fought to control it. He started to apply power to complete the touch and go when the aircraft shuddered violently again. The pilot, fighting to maintain control of the aircraft, quickly discussed the situation with the co-pilot, as we were headed toward the left side of the runway and possibly into grassy infield. I wanted to yell out "ABORT!!!" But I kept quiet, hoping they would make the correct decision and knowing the value of a back seat driver when their hands were already full. We were now about half-way down the runway and quickly running out of pavement.

Finally, the pilot elected to abort and called for the abort check list. As he pressed further on the brakes, the mighty beast shook terribly as we began slowing down.

Finally stopped, we all got out to examine the aircraft damage . . . a blown main gear tire was shredded, a 10-inch hole was in the right flap section, and a very nervous, but relieved, flight crew was beginning to calm down.

The problem . . . a main gear wheel brake had locked up which did not allow the tire to rotate and was not caught as we taxied out for takeoff — a B-52H at light gross weight has plenty of extra power for taxiing.

I learned to be very careful when checking those tires to make sure they are all rotating following a taxi-back landing. Remember, most checklist items are a result of problems someone else experienced on a previous flight. ■

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CONTRIBUTIONS

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Maintaining the F-22

CMSGT ROBERT T. HOLRITZ
Technical Editor

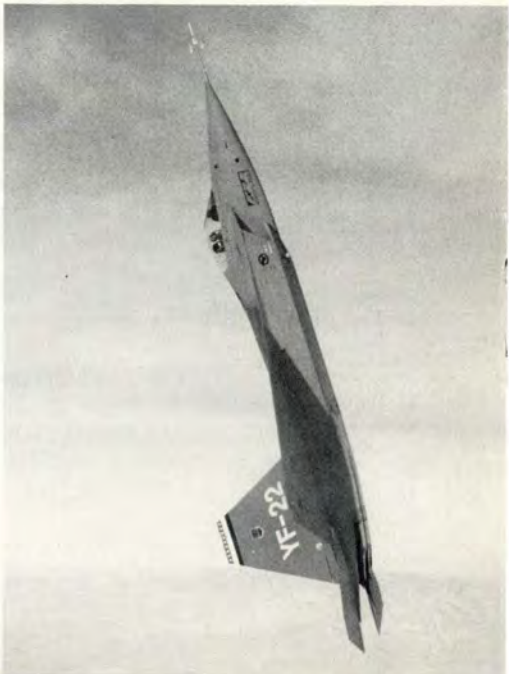
■ Fast, agile, stealthy, and high tech are terms most often used to describe the F-22. But the Lockheed-led F-22 team balances the new aircraft's reliability and ease of maintenance. "Reliability and maintainability were foremost in our design. From the very beginning, we drove a stake in the ground and stuck to it," said Bob Humphrey, Lockheed Director of Logistics and Reliability. During a recent interview, Mr. Humphrey discussed some of the highlights of how the Air Force will maintain the world's most sophisticated fighter.

Austere Operations

Desert Storm re-emphasized the need for highly deployable air power. The F-22 will be an extremely mobile weapon system capable of operating under austere field conditions with minimum support personnel and equipment. It has an on-board gas generating system which provides the pilot with oxygen and also provides inert gases, such as dry nitrogen, for the aircraft systems. This system will eliminate the hazards and logistical problems associated with liquid oxygen.

A built-in auxiliary power unit supplies all the electrical power needed to service the aircraft. It also provides in-flight engine start capability and, unlike the F-16 EPU, oper-

The F-22 combines speed and agility with stealth technology.



The F-22 will carry a full complement of air-to-air armament. Below, an AIM 7 missile is fired from one of the hydraulic launchers.

ates on standard jet fuel, not hydrazine. All that is needed to combat-turn the F-22 is fuel and weapons.

Armament

The F-22 will carry a full complement of air-to-air armament, including the AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM) and the AIM-9 Sidewinder. The F-22 has three missile bays — two outboard of the engines and one centerline. The good news for armorers is the racks are hydraulically actuated, making impulse cartridges a thing of the past. The gun system will consist of the time-proven M61 used in the F-15 and F-16 with an improved feed system for reliability.

Engines

Maintainability was prime consideration in the design of the F-22 engines. Although these will be the first production engines to have thrust vectoring capability, the Pratt and Whitney F119 engine will have 40 percent fewer parts and require 60 percent fewer tools. The designers located most of the engine components where they are easily accessible, requiring fewer engine removals due to maintenance. According to Bob Humphrey, an experienced crew can change an engine in about 90 minutes.

Avionics

The modular avionics concept is by far the most revolutionary feature of the F-22. Nearly 85 percent of the LRUs have been replaced by electronic modules, housed in easily accessible racks located just forward of each intake. The racks are liquid-cooled and maintain the modules at a crisp 60 degrees, allowing four times the reliability of current avionics systems. The modular system is about one-fortieth the size of that of the F-15, and it has six times the processing power.

Test pilot Dave Ferguson, center, talks to the press after the first F-22 flight. "I am confident we could just refuel it and fly it again this afternoon."

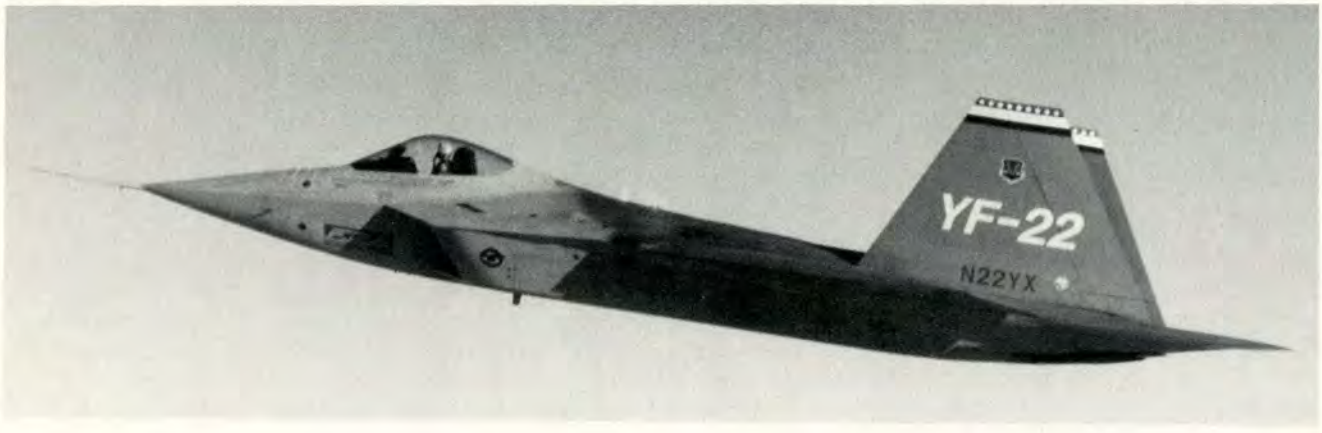
An "On Board" central integrated diagnostics capability increases the maintainer's ability to isolate faults tenfold. Each module performs its own BIT check down to the chip level. The health of the module is monitored at the next higher level, and a time stress measurement system is incorporated in the system to provide maintainers and depot information about the kind of environment in which the malfunction occurred.

The avionics are "fault tolerant." This means they are designed to operate in a degraded condition rather than failing completely, allowing continued sortie generation with minimum impact on system capability. The use of common modules which can be used interchangeably to perform a variety of functions has virtually eliminated the need for intermediate avionics maintenance. "Two level" avionics maintenance eliminates the need to deploy intermediate test stations and intermediate test personnel.

The Bottom Line

The F-22 will provide our tactical air forces with air superiority well into the 21st century. Its advanced technology will make it twice as reliable and require only one-third the man-hours per flying hour as current fighters. This reliability, coupled with the ease and speed with which it can be serviced under austere combat conditions, will allow the F-22 to fly a sortie rate nearly twice that of today's fighters. The F-22 is also "logistics friendly." Because it is practically self-sufficient, it requires only about one-third of the airlift necessary to deploy a 24-aircraft F-15 squadron.

The value of high tech, maintenance friendly weapons systems was proven during Desert Storm. The F-22 has the technology, reliability, and maintainability needed to guarantee our air superiority well into the 21st century. ■



THE LONG AND SHORT OF IT

CMSGT AUGUST W. HARTUNG
Flying Safety, June 1988

■ Soon after takeoff during the initial climb to flap retraction altitude, the KC-135 pitched down from its normal climb attitude. The pilot had to use excessive back pressure to regain the required attitude. Later, even with the yoke full forward, he was unable to level the tanker.

The aircrew declared an emergency and used the stabilizer trim to control the aircraft's pitch. Two T-37 chase aircraft confirmed the horizontal stabilizer was near the full nose down position (leading edge up), and the elevators were split.

Through some skillful flying, the crew was finally able to land their tanker uneventfully.

Looking Back

A review of aircraft maintenance records showed a left elevator control push rod had been changed 3 days prior to this mishap flight. When the investigators checked the left elevator control rod, they were surprised to see the rod installed was actually a right-hand control rod. Although both rods look the same, the left side rod is 2½ inches shorter than the right side rod.

Setting the Stage

Going back a little further, a 5-level aero repair (AR) technician had found a broken grease seal on the left elevator control push rod while the aircraft was undergoing a phase inspection. The technician went to the applicable -4 aircraft parts book and attempted to order a left-hand elevator control rod, but because of a confusing group assembly parts list (unclear differentiation as to left or right control rod), he inadvertently requested a right-hand control rod. When told the part was not on hand in supply, he back ordered what he thought was a left control rod "BQ" status.

A few months later, supply delivered a right-hand control rod to the AR shop. (If you recall, the technician thought he ordered a left-hand control rod.) Ironically, on this same day, a different AR technician troubleshot another KC-135 aircraft and, finding a defective left-hand control rod on this second aircraft, removed and brought it to his shop.

There the AR technician and his shop chief compared this rod to the new one just received for the other aircraft. When the two determined the supply-issued control rod was not the one required because it was too long, they placed the new control rod in the parts holding area within their shop.

The Deed is Done

Now a shift change occurred in the AR shop. When the swing shift came in and started checking for things to do, someone noticed the back ordered "BQ" elevator control rod in the parts holding area. So the swing shift AR supervisor dis-

patched three of his technicians to remove and replace the control rod with the worn grease seal on the aircraft which had been through the previous phase inspection.

Since the trio had several jobs to work on the flight line, they took the new control rod with them. What they didn't know was this part was a right-hand elevator control rod which is 2½ inches longer than the one they needed for the left side.

Their procedure this time of taking the part with them was contrary to their established procedure of removing an old part and bringing it to their shop. There they would compare the new part to match the old, and then take the new one to the aircraft for installation.

When the AR team arrived at the aircraft and found the control rod access panels still installed, their team leader directed his two associates to remove the panels while he returned to the shop to get the supervisor to work another job. When the team leader and supervisor returned to check on the workers, they found the panels and control rod nuts removed, so they assisted with removing the old control rod. The weather conditions at this time consisted of winds at 19, gusting to 28 knots.

The supervisor grasped the two rods about ⅓ of the way down from the threaded ends, held them a foot apart, and saw they looked alike. To make sure the rods were adjusted the same, he counted the threads on both ends and installed the new rod. With assistance from his team members, the supervisor performed an elevator travel check.

During the check, he found no binding. So he pulled the elevator down to check for the fairing of the elevator to the stabilizer and, considering the wind velocity, thought it seemed pretty good. After the two team members returned from the cockpit, the area was cleaned up and the 781 forms signed off.

Lessons Learned

This incident is a reminder even routine tasks which have been carried out successfully many times in the past, can result in a high mishap potential situation when there is any change to the expected conditions.

Probably the most obvious change to expected conditions in this incident was the inexperienced 5-level technician, with less than 5 months in the AR shop, attempting to order a part for the first time from a confusing parts listing.

Another contribution: The unit was undergoing a major command inspection. This may have added to the confusion at shift change.

With an incomplete shift turnover of tasks, the swing shift saw a new flight control rod to be installed and pressed on. But they changed their normal procedures by dispatching to several jobs and taking the control rod with them, instead of removing the old part, bringing it to the shop to compare and adjust the new one, and then returning to the job.

The team leader changed his established procedures when he left the job site to return to his shop, get the supervisor, and work still another job.

And then there was the change in weather. The gusty wind may have added additional pressure for the technicians to complete the task.

Only through vigilance and by learning from incidents such as this can we avoid repeating situations with such high mishap potential. After all, that's what flight safety is all about. ■

NEW AGE

CMSGT ROBERT T. HOLRITZ
Technical Editor

■ Along with the F-22 and B-2, the folks at Wright-Patterson's Aeronautical Systems Division (ASD) have been busy developing a new generation of aircraft ground equipment (AGE) to replace the equipment now in use.

-60 Replacement

The Ground Power Generator System represents one of the most significant updates in flight line support equipment in more than 30 years. The new system will eventually replace the A/M 32-A-60 generator and A/M 32-C-10 air-conditioning cart familiar to all TAF maintainers. The new power system has many advantages over the older units. It is powered by a highly efficient gas turbine engine which

Along with the new generation of aircraft comes a series of new support equipment designed to be more reliable, quieter, and user friendly.

has an average fuel consumption rate of only 15 gallons per hour compared to 46 gallons for the -60.

The new system was also designed with the maintainer in mind. It features a lower noise level and is more reliable and much easier to maintain than the -60. In addition, it is easier to deploy since it can operate at temperatures ranging from -50 degrees F to +128 degrees F and uses just about any type of jet fuel compatible with military aircraft. By next year, the first 104 ground power generator units will be in the field. The remaining 1,100 units will be delivered over the next 3 years.

Nitrogen Generator

The portable nitrogen generator is another important development in the new generation ground support equipment. Providing dry nitrogen for aircraft servicing and maintenance has been expensive and a logistical problem for the Air Force. Now, a new system has been developed and is being evaluated by ASD to generate nitrogen as it is needed in the field, eliminating the need to contract the gas from outside sources or supplying it to deployed locations.

The idea of generating nitrogen in the field is not new. It was made possible by a gas separator system called PERMEA® which was developed by the Monsanto company back in 1979. These separators have no moving parts. They are simply a bundle of hollow fibers contained within a lightweight shell.

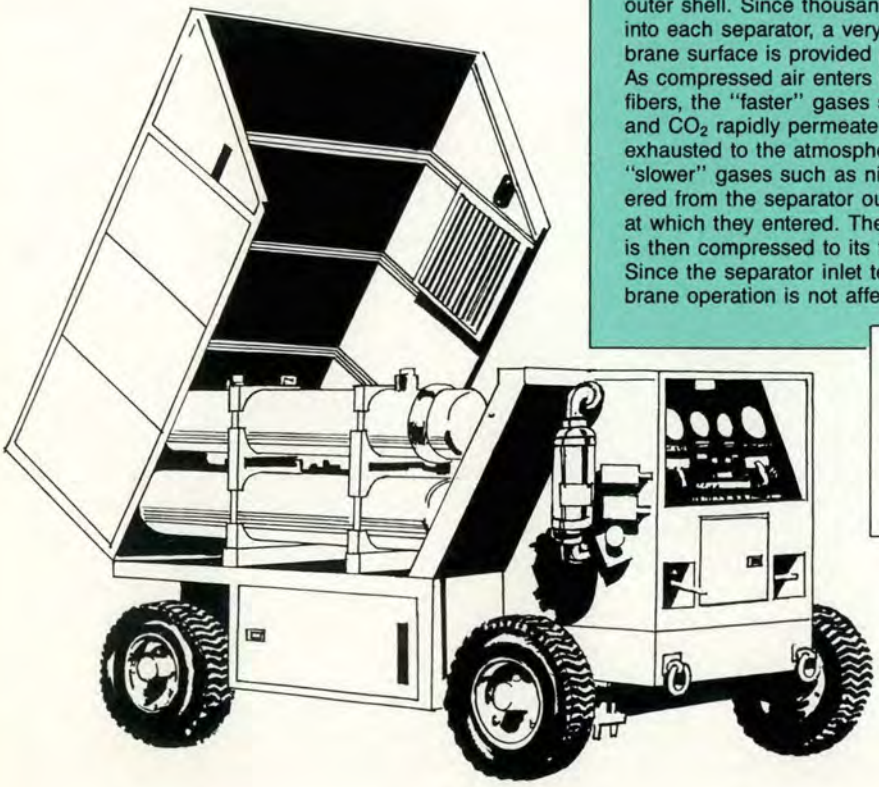
As the compressed air passes through the tubes of the many fibers, the faster gases, such as oxygen, CO_2, and water vapor, pass through the fiber walls and are vented into the atmosphere, leaving the inert gases such as nitrogen and argon. These gases, which are better than 90 percent pure, are then compressed and stored at high pressure for use.

Units using the PERMEA® system, made by several manufacturers, are also being tested by ASD. There is also a proposal to modify existing air compressors with gas separators. The first units should be in the field within the next 18 months. The system is already being used by commercial aviation companies, and by the 89 MAW to service the tires of Air Force One.

"It All Starts With AGE"

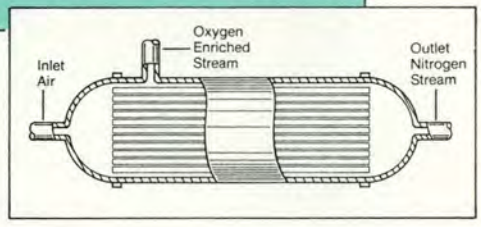
The slogan "It all starts with AGE" still holds true. And, with the new generation of aircraft entering the Air Force inventory, the folks at Wright-Patterson's Aeronautical Systems Division are working hard to keep aircraft ground support equipment up to date. ■

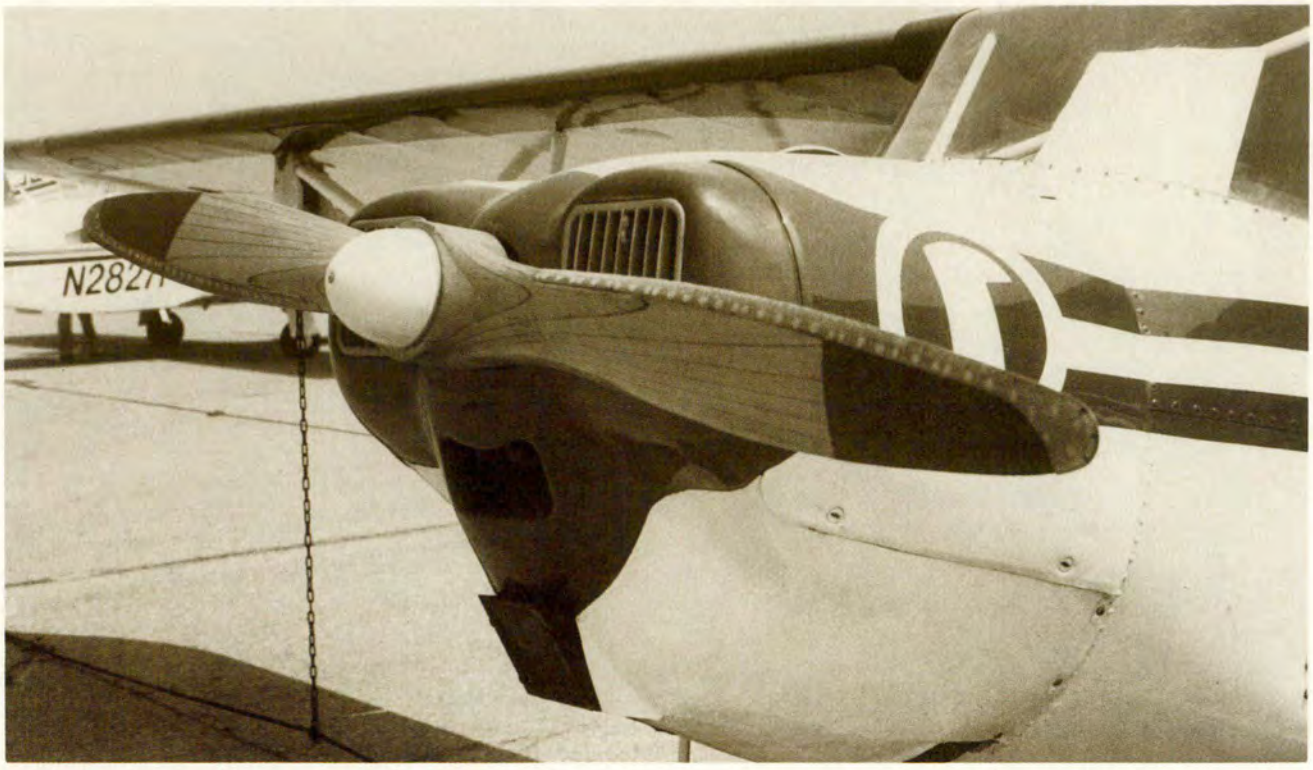
One model of the portable nitrogen generator which is being tested. It will eliminate the need to deploy heavy nitrogen bottles.



HOW PERMEA (a Monsanto Company) *Prism*® Alpha AIR SEPARATORS WORK

The separators have no moving parts. They are simply bundles of hollow fibers contained within a light weight outer shell. Since thousands of these fibers are packed into each separator, a very large air separating membrane surface is provided per unit of separator volume. As compressed air enters the hollow core of the many fibers, the "faster" gases such as oxygen, water vapor and CO_2 rapidly permeate through the fiber walls and are exhausted to the atmosphere . . . leaving the inert, "slower" gases such as nitrogen and argon to be recovered from the separator outlet at nearly the same pressure at which they entered. The very dry, nitrogen-rich product is then compressed to its final high pressure and stored. Since the separator inlet temperature is controlled, membrane operation is not affected by environmental extremes.





PROP-er CARE

MAJOR ROY A. POOLE
Editor

■ If there's one difference between the military aircraft we fly as professionals and the civilian aircraft we fly for recreation, it must be the propeller. For those of you flying the T-41s or the TG-7s, don't get mad, you've probably already heard this story.

While a total failure of a prop is rare, it *can* happen. But perhaps more annoying is the constant vibration and noise which accompanies a poorly maintained prop. These vibrations can eventually cause the premature wearing of your engine with a significant loss of performance. Let it go long enough, and a complete engine overhaul, costing over $10,000, may be required.

The two most common types of props you are likely to encounter are the fixed pitch and constant speed props. The fixed pitch is made from a single piece of aluminum, and the angle of the blades is set at the factory to maximize performance in your particular aircraft. The constant speed prop uses a governor to automatically maintain constant RPM by the pilot.

The most common material for props is still aluminum, although research is beginning to expand the use of composite fibers like graphite. The main factor determining the use of materials is its ability to withstand the stresses incurred near the prop's tips. At the tips, the speed of the prop may approach supersonic ranges. Some designers change the shape of the tips to eliptical, square, or even bent backward (called "Q" tips) to solve the stress problems.

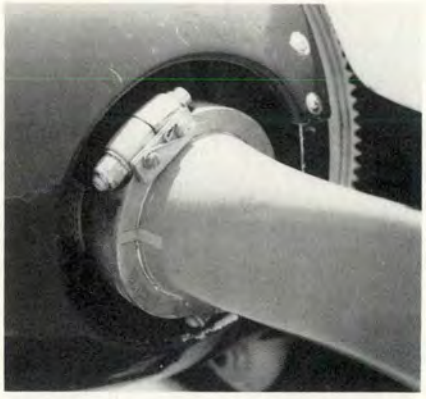
Before the correct prop is installed on the aircraft, it is painted black on the back side so the pilot does not see it as a shiny, hypnotic disc. On the front side, the tips are frequently painted contrasting colors so people on the ground can see the prop in motion.

After all this effort to design an efficient prop, why do props vibrate so much when installed? There are many reasons, from a faulty mounting, to improper balancing, to looseness, to damage to the prop itself. The best way to avoid the vibration and potential damage is to always perform a thorough inspection of the propeller before each flight. ■

Despite advances in composite materials for propellers, it is not uncommon to find wood still in use.

Fifty percent more trouble? No, but you will spend a little more time preflighting these.

Part of every preflight inspection should include a close examination of the prop hub and safety wire.



Propeller repair stations aren't located at every airfield. The time to look for a reputable station is *before* you have a major problem with your prop. Talk to them about the proper care of your propeller.

Vibration, and the engine damage it causes, can often be corrected by a good prop overhaul which includes precise balancing of all prop components.

10 Steps to Proper Prop Care

1. Read your owner's manual, and in preparation for future maintenance, locate an authorized repair station for your prop.

2. Visually check the prop before each flight, looking for dents, nicks, scratches, or corrosion.

3. Don't use high RPM when parked or taxiing over loose gravel.

4. Don't use prop blades as handles for pushing or pulling — that's what tow bars are for.

5. Use a lightly oiled rag to clean the prop, because water is often the first step to corrosion.

6. Clean and wax the prop blades often, and repaint them as required.

7. Admit the prop needs to be reconditioned and take it to an authorized repair station . . . NOW.

8. Check for "blade track" in accordance with the manufacturer's recommendations.

9. Perform a "fine-tooth comb" inspection once a year. Have an A&P remove the spinner and check the attaching bolts are tight.

10. Maintain a propeller logbook to ensure periodic overhauls are accomplished on time.

CROSS-COUNTRY NOTES

The Prime

■ We are coming to the end of a busy summer, and I wanted to take this opportunity to review what has happened in the Rex Riley Program over the past year.

One of the most significant changes was the addition of volunteer pilots from the major commands who have been individually trained to conduct Rex Riley transient services surveys at bases they transit during their normal flying duties. I have 20 pilots already out conducting surveys and hope to have a total of 30 by the end of the year. These pilots, flying tankers, fighters, trainers, and transports all over the world, will give me much greater opportunity to survey bases which up to now have been almost inaccessible.

In the past year, over 50 Rex Riley surveys were completed. Eight bases qualified for the award for the first time. Five bases had some problems and either did not qualify or were removed from the list. The other bases were recertified and retained the award they had previously received.

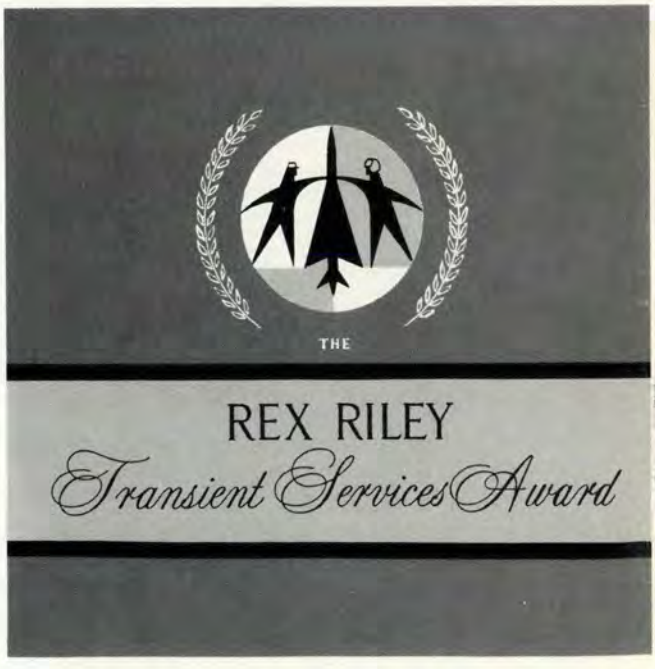
Overall, I am extremely pleased with the services transient aircrews are receiving at Air Force bases worldwide. It demonstrates a continuing commitment by individuals and organizations at every level to provide quality service. The Prime Knight Program, implemented Air Force-wide last year to improve billeting, crew transportation, and meal availability, has received rave reviews by crewmembers.

Providing quality services to transient crewmembers **can** prevent mishaps by minimizing hassles and distractions during a crewmember's ground time. It takes a team effort by many individuals in different organizations on a base to win the Rex Riley Award. Each base on my list can take pride in their achievement.

New Award Recipients

Selfridge ANGB, Michigan. Both Weather and Transient Alert were rated outstanding during this survey. Transient Alert was specifically commended because they took time out on the 4th of July to assist in bringing 14 civilians (friends and relatives of the crew) out on the flight line to look at the airplane on display, even though it was past quitting time.

Nellis AFB, Nevada. Nellis provided excellent service to Rex. Sgt Freddy Scott, Duty Forecaster, was highlighted for providing an outstanding weather briefing. The Prime Knight Program is well run and goes out of its way to meet the needs of the transient crewmember.



Knight Program

Retained the Award

Dyess AFB, Texas. Weather personnel continually updated Rex on deteriorating weather conditions in the local area and along his route of flight. They even sought him in the crew lounge to deliver pertinent weather information just prior to takeoff. Transient Alert dealt quickly and efficiently with many aircraft arriving simultaneously because of weather diverts into Dyess.

Eglin AFB, Florida. A jewel in the Southeast with a reputation for outstanding service! On this particular flight, Rex called Eglin "a first-class operation all around."

Reese AFB, Texas. Base Ops and crew transportation were rated outstanding. A U-Drive vehicle is available for transient crews if needed. Other transportation was prompt and helpful. Sgt Mitsuhiro Munoz, Airfield Management Specialist in Base Ops provided exceptionally courteous and professional service.

Congratulations also to **Kirtland AFB, NM; Williams AFB, AZ; Barksdale AFB, LA; Carswell AFB, TX;** and **Bergstrom AFB, TX,** for retaining the Rex Riley Award. ■

FEEDBACK

In the past year, I have received some feedback and questions from the field that relate to the Rex Riley Program. Since some of this information might be of interest to others, I would like to devote an upcoming column to publishing questions and feedback I receive. If you have a question or an opinion on something relating to transient aircrew services, a complaint, constructive criticism, ways to improve, a gripe against aircrews or services received, or anything else that comes to mind, I would like to hear from you. Send all correspondence to AFSA/SEFB, Norton AFB CA 92409-7001, Attn: Rex Riley, or call Rex at DSN 876-2226. Any feedback would be published anonymously and considered confidential. However, if you want a reply from Rex, please include your name, rank, job title, organizational address, and DSN.

Loring AFB	ME	Wright-Patterson AFB	OH	Holloman AFB	NM	Wake Island	WQ
McClellan AFB	CA	Pope AFB	NC	Dyess AFB	TX	Sembach AB	GE
Maxwell AFB	AL	Dover AFB	DE	Aviano AB	IT	RAF Alconbury	UK
Scott AFB	IL	Griffiss AFB	NY	Bitburg AB	GE	Hurlburt Field	FL
McChord AFB	WA	KI Sawyer AFB	MI	Keesler AFB	MS	Carswell AFB	TX
Myrtle Beach AFB	SC	Reese AFB	TX	Howard AFB	PM	Altus AFB	OK
Mather AFB	CA	Vance AFB	OK	George AFB	CA	Grand Forks AFB	ND
Lajes Field	PO	Laughlin AFB	TX	Peterson AFB	CO	Fairchild AFB	WA
Sheppard AFB	TX	Minot AFB	ND	Clark AB	RP	Mountain Home AFB	ID
March AFB	CA	Vandenberg AFB	CA	Moody AFB	GA	Barksdale AFB	LA
Grissom AFB	IN	Andrews AFB	MD	RAF Lakenheath	UK	Hickam AFB	HI
Cannon AFB	NM	Plattsburgh AFB	NY	Zaragoza AB	SP	Kelly AFB	TX
Randolph AFB	TX	MacDill AFB	FL	Torrejon AB	SP	Travis AFB	CA
Robins AFB	GA	Columbus AFB	MS	Luke AFB	AZ	Norton AFB	CA
Seymour Johnson AFB	NC	Patrick AFB	FL	Eaker AFB	AR	Tinker AFB	OK
Elmendorf AFB	AK	Wurtsmith AFB	MI	Bergstrom AFB	TX	Charleston AFB	SC
Shaw AFB	SC	Williams AFB	AZ	Davis-Monthan AFB	AZ	McGuire AFB	NJ
Little Rock AFB	AR	Westover AFB	MA	Zweibrucken AB	GE	Incirlik AB	TK
Offutt AFB	NE	Eglin AFB	FL	Hahn AB	GE	Selfridge ANGB	MI
Kirtland AFB	NM	RAF Bentwaters	UK	Kunsan AB	KOR	Nellis AFB	NV
Buckley ANGB	CO	RAF Upper Heyford	UK	Ramstein AB	GE		
RAF Mildenhall	UK	Andersen AB	GU	Johnston Atoll	JQ		

Once Again, Thanks For Your Support!

AND THE WINNER
FOR THE APRIL 1991
DUMB CAPTION CONTEST
IS . . .

Detachment 8, 1 ECRG
Richmond, Kentucky

Little did Lt Col Schultz realize, the chameleon-like KGB was hot on his trail, filming his every move.

Whew! That was close! You won't see it, but the 7th-place entry for listing as an honorable mention contestant in last month's contest was Mr. Gascon P. Martinet, of the UODCWA. It's a good thing we don't have to actually *publish* one of those AWFUL entries from the United Organization of Dumb Caption Writers of America . . . this time. We want to thank this month's winner, Detachment 8, 1 ECRG, and all of the honorable mention entrants for their help. The brilliance of these dumb caption geniuses can be enjoyed below. Had there been just a little less effort on your part, we just might have been forced to print a caption from the . . . I can't say it!

Please! Only an avalanche of our readers' outstanding dumb captions can keep those certified members of the UODCWA from getting this close again. Send in your dumb captions to the contest picture on page 13 right away. (Yes, we mean more than one caption.) Remember, any caption from our readers is enough to put the UODCWA in their place.

Honorable Mentions

1. **(No. 2) Okay, sir . . . in this scene, you just smile. (No. 4) Scene 190 . . . take one. (No. 6) Take the lens cap off, dummy!! (No. 7) Where'd he go? I can't see him! (Gentleman kneeling) I *am* smiling!!**
   Yvonne LaGrange, AMARC/IM, Davis-Monthan AFB AZ

2. **(No. 3 thinking) I sure hope this is an ordnance movie 'cause it's gonna bomb . . .**
   Jim Burt, Academic Training, NAS Corpus Christi TX

3. **(All thinking except no. 2) (No. 1) I wonder, do these guys know the meaning of "budget." (No. 2) "Let's see um . . . your next line is um . . . oh yeah! . . . *And There I Was* . . . (No. 3) If this guy can't remember his lines . . . how is he ever going to remember the dance steps I taught him! (No. 4) I don't even have room to think here. (No. 5) I wish I had a space ranger belt like his! (No. 6) "Aw, Harv, you said I could look *next!*" (No. 8) Geez, this guy has nose hair longer than my little finger! (Gentleman sitting) Do I kiss the plane in the closing scene or did he say the blonde?**
   SSgt Margaret Gatlin, ANG

4. **(All thinking) (No. 1) Maybe if I back up real slow I can get away before everyone remembers I recommended this guy for the audition. (No. 2) Scratch Major Schultz off the Christmas party entertainment list. (No. 3) Pitiful, just pitiful. (No. 4) My stomach can't take another verse. (Three men behind camera) And they thought our impression of the Three Stooges stunk . . . He could make Freddy Kruger have nightmares. (No. 8) That was the worst Al Jolson I've ever seen.**
   MSgt David L. Jernigan, Chief, Air Traffic Control Training, 2101 CS, Eaker AFB AR

5. **(No. 2 thinking) Darn! I've got spaghetti sauce on my jacket! (Gentleman kneeling thinking) What is the meaning of life? (No. 3 thinking) I told him to watch where he was walking. (No. 4) "I'm sorry . . . I didn't mean to . . . honest! (No. 5 thinking) What a klutz! (No. 6 thinking) Ouch! I'll bet that was expensive! (No. 7 thinking) I wonder if it can be fixed? (No. 8) "Great . . . now I can't see a thing."**
   SSgt Keith A. Haydon, 317 CS/SCLMQ, Pope AFB NC

6. **(Gentleman kneeling) "With the boss watching, camera, lights, I kneel down in a pile of manure."**
   TSgt Kirkpatrick, 3380 CS/SCLMQ, Keesler AFB MS

WRITE A DUMB CAPTION CONTEST THING

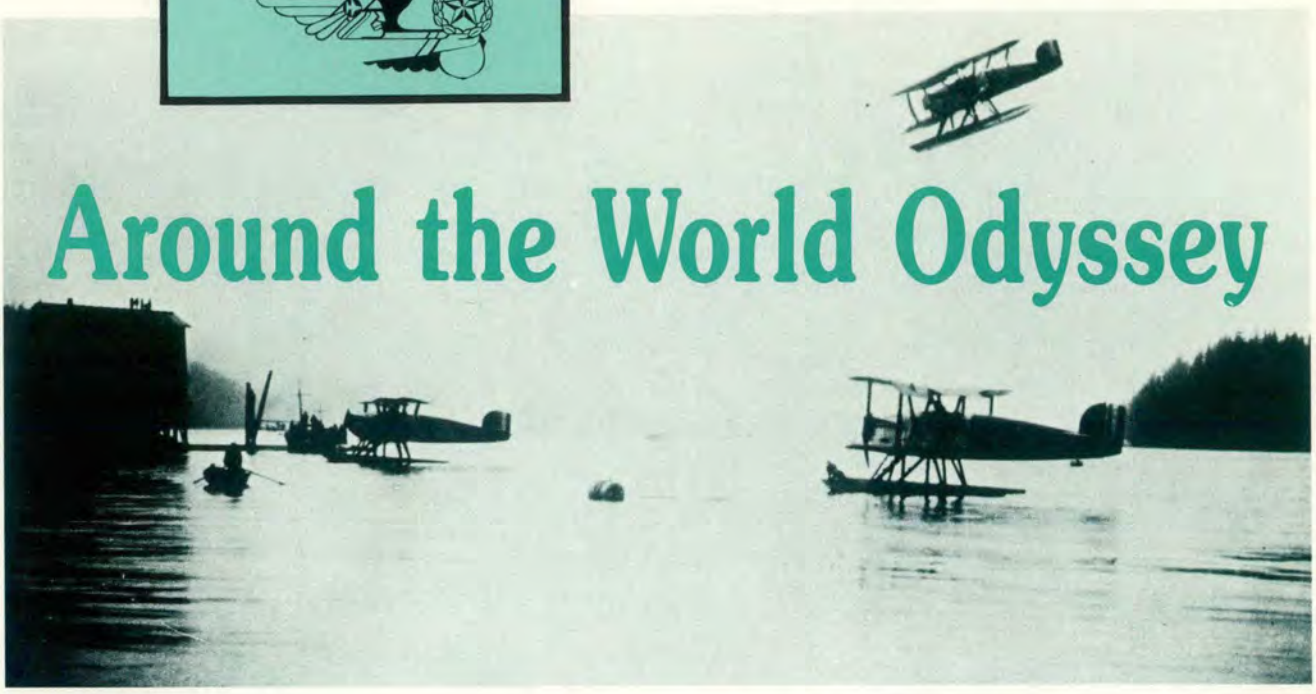
Just when we think we've finally caught Byron Q. Lackluster, President and Chief Legal Counsel of the United Organization of Dumb Caption Writers of America (UODCWA), he slips away like warm Jello® on a Del Rio sidewalk. In an effort to get a match on his fingerprints with tape found on your entries, we baited the office with fresh, glazed donuts and free coffee. Sure enough, he showed up like a brother-in-law on Super Bowl Sunday. But he had bandages on all his fingers! He claimed he burnt them while barbecuing steaks yesterday. Ha! The only way he's ever eaten a steak is if somebody else paid for it.

Byron's oiliness knows no boundaries. We can't prove it, but we're convinced he's trying to sabotage your entries to this month's contest. Don't let him get away with it, though. Send in as many good captions as possible, 'cause we know the good ones can't be from Byron.

Give this picture to the fifth-grade class at the nearest elementary school and tell them they need to reproduce it in charcoal for a class art project. (Unless you want to share the fabulous prize with them, make sure they don't put their names on the copies.) Or, you could copy the page and tape your caption to the copy. But, DO NOT SEND US THE MAGAZINE PAGE. Entries will be humorously judged by a panel of expert dumb caption officials. Some of the judges have indicated they can't be bribed, but some fresh coffee (no beans please) would sure go well with the chocolate chip cookies you sent last month.

Send your entries to **"Dumb Caption Contest Thing"** • *Flying Safety* Magazine • HQ AFSA/SEDP • Norton AFB CA 92409-7001

Safety Warrior



Around the World Odyssey

Here is the story of the men and the planes and the flight that shrank the world forever.

CMSGT ROBERT T. HOLRITZ
Technical Editor

■ The armistice of 1918 left air power largely untested. In the years that followed WW I, the proponents of air power campaigned heavily for an independent air corps and took every opportunity to demonstrate the value of the airplane as a vital weapon of war. In 1921, one of the staunchest supporters of air power, Billy Mitchell, demonstrated its capability against a simulated invading naval force by bombing and sinking several ex-German warships in a series of tests. The tests concluded by the sinking of the ex-German battleship, *Ostfriesland*, to the amazement of the Navy, War Department, and Congress. As a result, the *Navy* was convinced the airplane could be an extremely effective offensive weapon, but the War Department and Congress held to their traditional military views and were still not persuaded of the need for an independent air arm.

Still, determined to prove the viability of an independent air corps, in April 1924, the Air Service set out to demonstrate the long range and speed of their aircraft by attempting the first around-the-world flight. The idea was not new. The British had attempted to circumnavigate the globe by air in 1922 and again in 1924. The Italians and French also tried. All failed.

Photos courtesy of US Air Force Museum, Wright-Patterson AFB, Ohio, and Office of History, Maxwell AFB, Alabama

Pictured from left to right: Lt Leigh Wade, Lt Lowell Smith, Maj Frederick Martin, and Sgt Alva L. Harvey. Of these four, only Lt Smith would complete the journey.

Douglas World Cruisers

But the Americans had a trump card — a plane appropriately called the *"Douglas World Cruiser"* (DWC), designed by a bright engineer named Donald Douglas. Years later, Douglas would also design the DC series of transport aircraft, includ-

ing the DC-3. Its military version, the C-47, would be the workhorse of WW II and the Berlin Airlift. The DWC was a two-place open cockpit biplane. It was powered by a single water-cooled 400 hp Liberty engine which gave it a maximum speed of 103 mph and allowed it to cruise at 80 mph.

These engines were not specially built for the world circling mission but were supplied from stock at the Air Service's Engineering Division at McCook Field, Ohio. The Liberty engine was chosen because of its reliability and also because it was much lighter than the aircooled 600-hp alternative and provided a net fuel economy with a significant increase in speed.

Since about half of the landings were planned to be on water, the cruisers were modified to be easily configured with either pontoons or wheels. Except for the landing gear, the DWC was not technologically different from other aircraft of the time. The wings were fabric, and the struts, frame, and even the prop were fabricated from wood.

In order to provide the crew some flexibility and to give the pilot a rest on long flights, the DWC was configured with dual controls. This would prove to be of value during some of the many emergencies which these crews would encounter during the mission. The plan called for four cruisers to make the historical flight. Each was dedicated to a great American city. They were named *Seattle, Chicago, Boston,* and *New Orleans*.

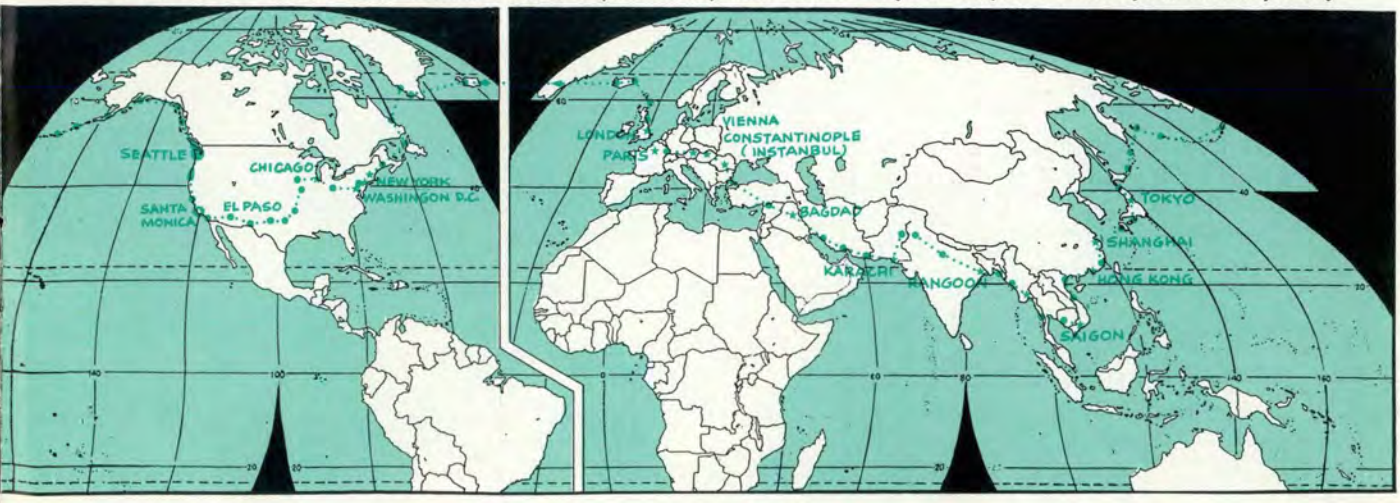
Three World Cruisers moored in Resurrection Bay, Seward, Alaska.

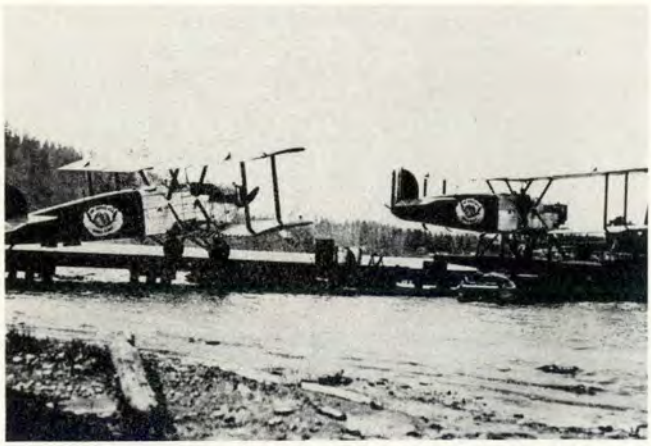
Logistics

Circling the globe by air required an enormous amount of planning. Failure to provide adequate supply and support contributed to the failure of earlier attempts to circumnavigate by air. Spare parts, engines, pontoons, wheels, propellers (oak for pontoons, walnut for wheel-configured aircraft), tools, and equipment were procured and dispersed along the route, and arrangements were made for fuel at each stop.

Although the Navy was against a separate air arm, it was a strong backer of air power and agreed to provide ships for both logistical and rescue support in the Air Service's endeavor. Each of these ships carried at least two spare engines, spare propellers, and clean clothes for the fliers. Fortunately, the world was at peace, and the State Department had little difficulty making diplomatic arrangements for landing clearances in the more than 30 countries along the route. To validate the route, Air Service pilots traveled over parts of the routes to evaluate landing sites and provide valuable information. Major General Mason M. Patrick, the head of the Air Service, wanted nothing left to chance! continued

The route of the Douglas world cruisers. It would require 72 stops and take 175 days to complete the nearly 27,000-mile journey.





On 1 April, the world cruisers were towed to a barge, fitted with pontoons, then lowered into Lake Washington.

Around the World Odyssey

continued

The Aviators

Gen Patrick was not an experienced pilot. In fact, he earned his wings only a year earlier at the age of 59. But his ability to lead and plan more than made up for his lack of aviation skill. He knew, even with meticulous planning, the success of the globe-circling flight depended on the skill of the flight crews. For this reason, he wanted his best pilots for this highly visible mission.

To command the mission and pilot the *Seattle,* Patrick chose the commander of Chanute Field, Maj Frederick L. Martin. As his copilot and mechanic, Martin chose Sgt Alva L. Harvey. An excellent mechanic, Sgt Harvey was one of a few enlisted men certified to pilot Air Service aircraft.

With Gen Patrick's approval, Maj Martin picked the pilots who were to fly the other three cruisers. To pilot the *Chicago,* he chose Lt Lowell H. Smith, a seasoned pilot who, less than a year earlier, broke the flight endurance record by flying a T-2, single-engine biplane, for 37 hours and 15 minutes. This flight also demonstrated the viability of in-flight refueling.

Lt Leslie P. Arnold was chosen as the *Chicago's* copilot. Unlike Martin's backseater, Arnold was an experienced pilot with many hours at the controls of the Martin bomber. Several years earlier, Arnold escaped with only minor injuries when his Martin bomber was blown off course and crashed. In addition to being skilled pilots like many of the Air Service's aviators, both Smith and Arnold were excellent mechanics.

The *Boston's* pilot, Lt Leigh Wade, was young and eager. He was a natural flier, and both Patrick and Martin were impressed with his prowess in the air. As with the *Seattle, Boston's* gib was a certified enlisted pilot. Sgt Henry H. Ogden was a master mechanic whose skills complemented Wade's.

Lt Erik H. Nelson was picked to fly the *New Orleans.* Lt Nelson won the Curtis Marine Flying Trophy in 1922 flying a Martin transport, out-

Lt Wade tries to get the overweight *Boston* airborne. A gun and ammunition, weighing 125 pounds, had to be removed before it would fly.

The cruisers in Nazan Bay near the Aleutian village of Atka. A Navy ship in the background provided logistics support.

pacing four Martin bombers. In 1920, he was selected by Gen Billy Mitchell to fly a DH-4B (a large, single-engine biplane) from New York City to Nome, Alaska, to map part of a route to move aircraft directly to Asia. Nelson's copilot, Lt Jack Harding, was not only a seasoned pilot but also a master signal electrician. In July 1919, he flew with Capt Roy Francis around the US continental "rim" to test the endurance of the Martin bomber and the Liberty engine. His knowledge of the Liberty power plant would come in handy on the world flight.

The Route

While it would require longer than 80 days, the journey of the World Cruisers would easily rival the odyssey of Jules Verne's travelers. Beginning and ending in Seattle, the westward route was more than 26,000 miles and would take the aviators to 29 countries. In all, there were 73 stops planned with flights averaging just under 500 miles.

The decision to fly to the west at this time was made on the advice of Signal Corps meteorologists to avoid adverse weather systems such as Alaska's spring fog, Pacific typhoons, the monsoons of Asia, and above all, the violent north Atlantic winter storms.

Prelude

The aircraft were assembled at the Douglas plant in Santa Monica, California. Altogether, five aircraft were built — a prototype and the four which were to make the flight. The cruisers were rolled out in mid-March. The *Seattle* and *Boston* were put on display at Clover Field — a dirt strip which is now Santa Monica Municipal Airport. Hundreds of local people came to see these magnificent machines and the brave aviators who were to make this historic journey.

A few days later, the crews flew the cruisers to Seattle where they were officially christened. The *Seattle* was splashed with water from Lake Washington, the *Boston* with water from Boston Harbor (YUCK!), water from Lake Michigan was poured on the *Chicago*, and the *New Orleans* was sprinkled with water from the Mississippi.

The Journey

The pomp and ceremony at least temporarily over, the World Cruisers were fitted with pontoons and oak propellers, then slipped into the chilly waters of Lake Washington. The flight was scheduled to begin on 4 April but was canceled due to fog. The next day, the fog had lifted, and the crews climbed into their aircraft, but the flight was aborted when the *Seattle* broke its propeller.

The third day, 6 April 1924, three of the cruisers took to the air without difficulty, but Lt Wade could not get the *Boston* airborne. He followed several hours later and joined the others in Prince Rupert in Western Canada. The World Cruisers had begun one of the greatest adventures in aviation history!

The route across the Pacific would take them along the west coast of Canada to the southern coast of Alaska along the Aleutian chain to Japan. Although it was well into April, the weather in Canada and Alaska was bitterly cold. The fliers often encountered blinding snow and freezing rain. At times, the pilot and mechanic had to alternate flying the aircraft while the other cleaned the ice from his goggles. Since they had no radios, the poor visibility made communications difficult, often impossible. Several times, the weather forced them to land and take shelter.

But weather was not the only problem the crew of the *Seattle* experienced. Several hours after takeoff from Seward, Alaska on the way to their first planned stop in the Aleutian Islands chain, Maj Martin noticed a rapid drop in the Liberty's oil pressure. He made an emergency landing in a sheltered cove. A quick check by Sgt Harvey revealed a hole in the oil tank. The engine was ruined!

The other cruisers continued and notified the Navy of the *Seattle's* problem when they reached Dutch Harbor. The next morning, a Navy ship found the *Seattle* and towed it to a sheltered beach. Another Navy vessel delivered a replacement engine. The next morning, with the new engine installed, Martin and Harvey flew the *Seattle* to the small Aleutian village of Chignik.

After refueling and a quick check

continued

Maj Martin and Sgt Harvey in front of the *Seattle* at the Aleutian village of Chignik.

Shortly after takeoff from Chignik, the *Seattle* encountered light fog and crashed into a mountain ridge. Fortunately, Martin and Harvey sustained only minor injuries.

Around the World Odyssey

continued

of the new engine, the *Seattle* took off. Martin was anxious to rejoin the others so he decided to fly over land instead of following the meandering coastline. Minutes after takeoff, they encountered light fog. As they broke out of the mist, Martin saw he was headed directly for a mountain ridge. Even Martin's skillful piloting could not prevent the collision. The *Seattle* was destroyed.

Fortunately, neither of the aviators was seriously injured, and after nearly 11 days enduring cold, hunger, and snow blindness, they made their way to a fish cannery along the coast. With the loss of the *Seattle*, Lt Smith assumed command of the mission.

The three remaining cruisers continued to experience severe weather. During WW II, the severe weather in the Aleutian chain would account for more American casualties than the Japanese. Hopping from island to island, the fliers often waited days for favorable weather taking shelter in abandoned cabins and line shacks. Their rations consisted mainly of flour and condensed milk. Occasionally, they could talk an Aleut out of some fish or poultry.

The three aircraft finally reached Japan on 23 May, and although the weather in Japan was chilly, they were warmly greeted. On 2 June, they landed at Kagoshima where their arrival was announced by an armada of boats blasting steam whistles. A crowd of 50,000 enthusiastic Japanese lined the shore waving Japanese and American flags. Lt Arnold recalled: "The shore was black with people. It was an inspiring scene."

Wearing fresh uniforms delivered by a US Navy warship, the aviators were honored at ceremonies and dined with the Japanese elite. But their stay in Japan was not all play. The warship also delivered new engines and pontoons which had to be installed before proceeding to South Asia.

Crossing Asia

From southern Japan, the route was along the coast of China with stops at Shanghai, Amoy, and Hong Kong. For more than 1,000 miles, the aircraft performed flawlessly. But over the Gulf of Tonkin, the *Chicago's* engine began to overheat forcing Smith and Arnold to land in a sheltered jungle cove along the coast of Vietnam. Arnold quickly determined the liberty had lost oil pressure and was ruined. No telephone — no radio. They were stranded.

The three remaining World Cruisers wait for a break in the Aleutian weather.

In Japan, the world fliers were wined and dined by the Japanese elite. Lt Smith shakes hands with Japanese General Ugaki as US Ambassador Cyrus Wood looks on.

Fortunately, their landing was observed by some villagers. Before long, a party of natives in war sampans came out for a closer look at the strange flying machine. The fliers quickly won the admiration of the villagers, and their leader arranged for three war sampans to tow the *Chicago* to Hue, some 26 miles away.

The 10-man crews rowed all night and made the trip in just over 11 hours. Smith made arrangements to have the Navy bring a new engine from Saigon. The *Chicago* was moored under a bridge and, using a makeshift boom, the old engine was removed, and the new Liberty was lowered in place. The next day, *Chicago* joined the other aircraft in Saigon.

Inland Trek

The flight over the South China Sea was without mechanical problems. Stopping in Bangkok and Rangoon, they arrived in Calcutta on June 26. In Calcutta, the aircraft traded their pontoons for wheels in preparation for the flight across the middle east and Europe. Associated Press correspondent Linton Wells was assigned to cover the story of the World Cruisers in India. Since Lt Smith was weakened from a severe case of dysentery, Wells offered to help with maintenance. Crammed into the rear cockpit of the *Boston*, he flew with the cruisers for four flights. But when the Army found out about the stowaway journalist, Smith was ordered to leave Wells in Karachi, Pakistan. Temperatures in the Middle East in July can easily climb over the century mark. Over the Arabian desert, the heat strained both men and flying machines. They were glad to leave the desert behind and welcomed the rainy skies of Europe. The cruisers arrived in Paris on 14 July. It was Bastille Day in France, and the aviators were met by a crowd of eager Frenchmen and government dignitaries. On July 16, they landed in London but remained only long enough to service the aircraft and accept an invitation to a formal dinner.

Atlantic Peril

The next day, they flew to Brough, a small British hamlet on the Humber River. Here, preparation was made for the most critical flight of the entire mission, the flight over the North Atlantic. At Brough, the aircraft were once again fitted with pontoons. Each aircraft also received a fresh Liberty engine. Every inch of the cruisers was inspected. A crash in the Atlantic would almost surely be fatal. Even if the crew survived the impact in these icy waters, they would succumb to hypothermia within minutes.

Freshly overhauled, the cruisers flew to the Orkney Islands north of Scotland. Landing in Houton Bay, American sailors serviced the cruisers with gas pumped from drums delivered to their moorings via a longboat. One last check of the aircraft was made. Any hint of a problem was double checked.

The distance from the islands to Iceland was 830 miles — exactly the tested range of the cruisers. Since

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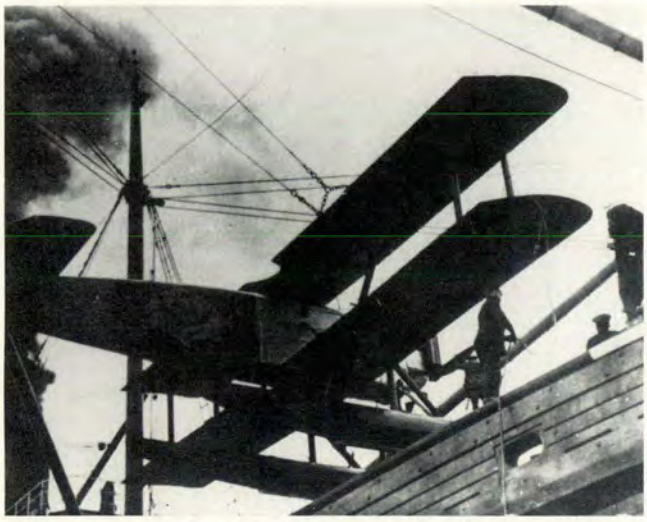
The *Chicago* being refueled from drums by a Navy support team in a Japanese harbor.



At Brough, England, the fliers were given a new liberty engine, and the wheels were again replaced with pontoons for the most demanding flight of the journey.

Lt Wade was forced to set the *Boston* down in the Atlantic after it developed engine trouble. During the rescue attempt, the *Boston* flipped on its back and quickly sank after a hoist cable broke.

Around the World Odyssey

continued

any anticipated weather or mechanical problems could force the aircraft to run out of fuel and make a forced landing in the ocean, all ships at sea were radioed to keep a watch for the three cruisers.

Shortly before sunrise, the three aircraft took off from Orkney and set a course for Iceland. In spite of the precautions, trouble came several hours into the flight when the *Boston* developed engine trouble, and Lt Wade was forced to set the aircraft down in moderate seas. Ogden determined a failed oil pump caused the engine to seize. They sat in the cockpit for several hours, helplessly riding the waves until they were discovered by a fishing boat. The trawler tried to tow the *Boston*, but they feared the aircraft would capsize.

After several hours, a U.S. Navy destroyer arrived. As the sailors tried to hoist the aircraft onto the ship's deck, the cable broke. The *Boston* flipped on its back and, within a few minutes, sank to the bottom of the Atlantic. After nearly 19,000 miles, the second World Cruiser was lost.

The remaining aircraft made it to Greenland and on to Newfoundland without incident. They landed in Indian Harbor on the coast of a village aptly named Icy Tickle. Gen Patrick had the prototype World Cruiser christened the *Boston II* and had it flown to Nova Scotia where Wade and Ogden joined the other fliers on a tour across the United States.

At every stop, they were greeted by enthusiastic crowds. On 9 September, the cruisers landed at Washington DC's Bolling Field. There

Lt Wade and Sgt Ogden rejoined the other cruisers in the prototype cruiser which was christened *Boston II*. The three aircraft flew across the United States on a whirlwind tour.

The world fliers in formation over New York City, September 8, 1924. This view of Manhattan was quite different in this Army Air Service photo than today. The Chrysler Building and the Empire State Building were yet to be built.

they met President Calvin Coolidge. The President waited more than 3 hours in the rain to shake the hands of the daring aviators. In Los Angeles, the crowd was so enthusiastic they nearly trampled the fliers. One fan, a young lady, actually cut a piece out of Lt Smith's pants with a pair of scissors.

Welcome Home

On 28 September, a crowd of more than 50,000 gathered at Seattle to welcome the circumnavigators on their final landing. To ensure no one aircraft could claim to be first to fly around the world, the cruisers flew wingtip to wingtip over Sandy Point Field. The American aviators flew nearly 27,000 miles on their 175-day odyssey. The total flight time logged by the cruisers was 15 days, 11 hours, and 7 minutes. Remarkably, although they used up 17 Liberty engines, they experienced only 5 forced landings. In addition to being the first to girdle the globe by air, the World Cruisers also made the first trans-Pacific flight and also claimed the first east-west flight across the Atlantic.

Epilogue

The flight of the cruisers had great political and military significance. Countries could no longer depend on vast oceans and mountain ranges to protect them from their enemies. It also demonstrated the airplane could greatly expand a nation's military sphere of influence. One can only imagine the thoughts of Japanese military planners as they watched the DWCs land in Japan after skirting the Pacific.

While the trek of the cruisers had shrunk the world, it still didn't convince the War Department or President Coolidge there should be an independent air corps. That would require another world war. ■

The around-the-world odyssey ended in Seattle on September 28, 1924. The fliers were met by a crowd of more than 50,000. Enjoying their hour of conquest, the circumnavigators pose for the press in front of the *Chicago*. From left to right: 1Lt Leigh Wade of *Boston*, 1Lt Leslie Arnold, copilot of *Chicago*, 1Lt Lowell Smith, pilot of *Chicago*, Sgt Henry Ogden, copilot of *Boston*, 1Lt Eric Nelson, pilot of *New Orleans*, and 1Lt Jack Harding, copilot of *New Orleans*.

IFC APPROACH

My Instrument Question Is:

THE INSTRUMENT FLIGHT CENTER STAFF
Randolph AFB, Texas

■ As the focal point for Air Force instrument flight procedures, the Instrument Flight Center has received numerous inquiries on instrument-related topics. We have published the most frequently asked questions in hopes this information will increase your understanding of instrument procedures and techniques.

QUESTION: *What approach book does the controller use when you are in the radar pattern?*

ANSWER: Unless you specifically request a high altitude approach or a portion of a high altitude approach, the approach provided you will be out of the low altitude IAPs.

The majority of low altitude IAPs are only designed with A-D minimums published. In certain cases, users request E category minima be included on the low altitude IAP.

High altitude IAPs are designed at the request of the military and do include E category minima. Often the routings and altitudes between the high and low altitude approach will be different. Flying the high IAP when cleared for the low IAP may put you somewhere the controller does not expect you to be.

QUESTION: *If the weather goes below minimums when you are established on an en route descent, are you legal to continue the en route descent? Are you legal to start an approach IAW AFR 60-16,* General Flight Rules?

ANSWER: AFR 60-16, para 8-14, says you may start a published straight-in, side-step, or en route descent only if the visibility is at or above published minimums. Even if the weather goes below minimums during an en route descent, you can continue. However, after the en route descent, you can't start the approach if the weather is below minimums.

Radar approaches (ASR, PAR) start when the aircraft is established on final. As a reminder, straight-in and side-step approaches require visibility only, and circling approaches require both ceiling and visibility.

QUESTION: *When a controller gives me a speed to maintain, is this a minimum or maximum speed?*

ANSWER: The answer to this question is found in the TERMS section of FLIP GP under "speed adjustments." ATC requests pilots to adjust aircraft speed to a specific value for the purpose of providing desired spacing. Pilots are expected to maintain a speed of plus or minus 10 knots or 0.02 mach number of the specified speed.

QUESTION: *In reference to a procedure turn: I have proceeded outbound and made my turn back inbound. Do I have to intercept the inbound course, or can I proceed direct to the FAF?*

ANSWER: While no procedure prevents you from proceeding direct to the FAF, it is not a technique recommended by the IFC. We feel it is better to be established on centerline with the drift "killed" by the time you cross the FAF, rather than cross the FAF at an angle and then work to establish yourself on centerline inside the FAF. The only time it would be advisable to proceed direct is when you are unable to intercept the published course.

QUESTION: *On a low altitude IAP, what is the difference between an en route facility and a feeder facility?*

ANSWER: Both are considered published routing.

The outer, en route facilities ring indicates NAVAIDS, fixes, and intersections that are along the low altitude airway structure. From this point, terminal routing giving bearing, distance, and MEA direct to or via feeder facilities to the IAF are shown. The fixes and intersections on the en route facilities ring are not defined by radials or bearings since they are found on the low altitude chart along the low altitude airway structure.

The middle, feeder facilities ring has NAVAIDS used by ATC to direct aircraft to intervening facilities/fixes between the en route structure and the IAF. These NAVAIDS normally are not part of the en route structure. Intersections shown on the feeder facilities ring are shown by the intersection of the radials or bearings from the NAVAIDS defining them.

QUESTION: *On a civil SID, if the depicted climb gradient does not say it is for obstacles, can it be deleted?*

ANSWER: No! Civil SIDs only depict obstacle climb gradients, and they depict see-and-avoid weather minima to be used in lieu of the gradient USAF aircraft must fly by AFR 60-16, which does not allow the use of see-and-avoid minima. ATC climb gradients are not depicted on a civil SID. You must calculate these on your own using the depicted altitudes and distances. Simply assuming the absence of a climb gradient means you must maintain 200 feet per nm could get you into trouble.

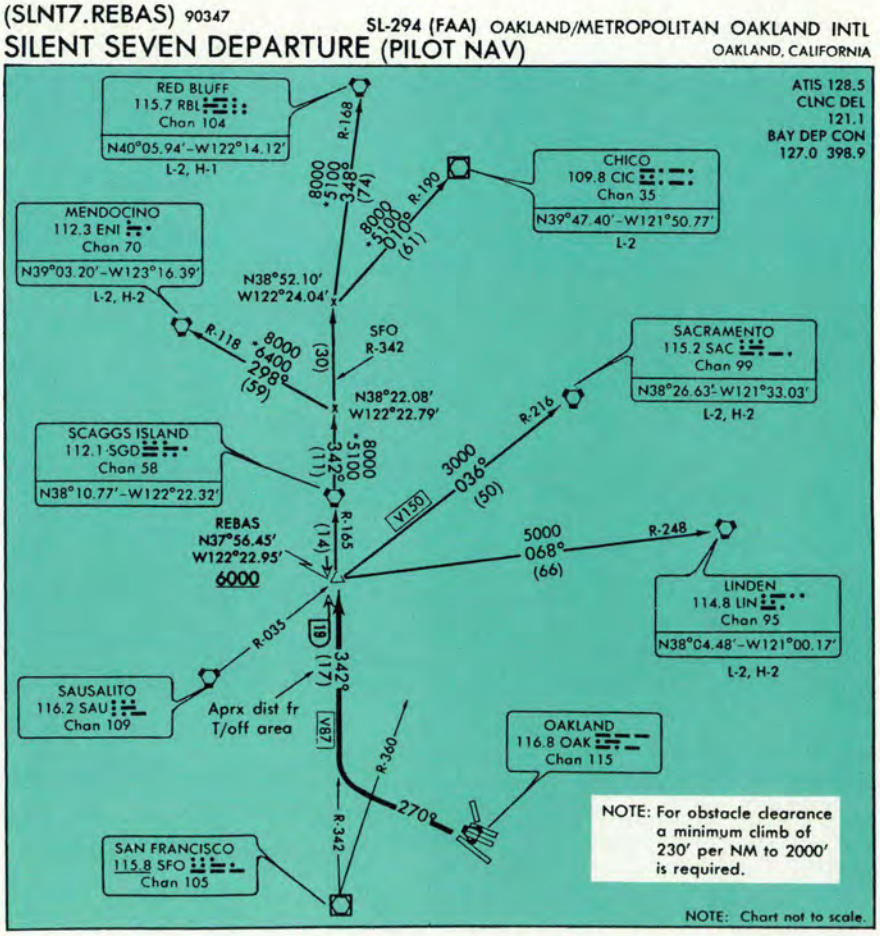
For an example, take a look at the Silent Seven Departure out of Oakland, California (figure 1). The depicted obstacle climb gradient is 230 feet per nm to 2,000 feet. However, the climb gradient to 6,000 feet is 352 feet per nm (based on 6,000 feet in 17 nm).

QUESTION: *Do I have to call departing the IAF altitude?*

ANSWER: No, you are not required to unless specifically requested to by the controller. Also, when being radar vectored in the pattern and the controller tells you to maintain "X" altitude until established on a segment of the approach, you do

continued

Figure 1.



THE IFC APPROACH

My Instrument Question Is:

continued

not have to call departing this altitude for an altitude depicted on the approach. The controller is expecting you to comply with altitudes depicted on the approach plate. Making these calls would unnecessarily tie up the radio frequency.

QUESTION: *Reference the ILS RWY 13 approach into Corpus Christi Intl. The controller tells me to "hold northwest as published at ATHIS." The IAP (figure 2) does not show a holding pattern at ATHIS. What am I supposed to do?*

ANSWER: If the holding pattern is charted and the controller doesn't issue complete holding instructions, the pilot is expected to hold as depicted on the appropriate chart (figure 3). Holding instructions that contain only the holding direction (hold EAST) inform pilots the pattern is charted. Only those patterns depicted on U.S. Government Low/High Altitude En route and Area or STAR charts should be used. In the case mentioned, you should not be looking at the IAP to find the holding pattern, but should be looking at the Low Altitude chart for that area.

QUESTION: *I fly the T-38 and was told that while operating in the PCA, I can plan to file outside of the Service Volumes (signal coverage) of the NAVAIDS because ARTCC will give me radar vectors. Is this true?*

ANSWER: It is most definitely false! All USAF aircraft must file their fixes inside the appropriate Service Volume of the NAVAIDS they use to define their fixes. Aircraft which are not capable of degree/distance or RNAV navigation must file so they will remain within the Service Volume of the selected NAVAIDS. Once airborne, you may be cleared routing that will take you outside of the NAVAID Service Volume. However, you must ***file*** your flight plan so you can fly your routing in case of ATC radar failure, communications failure, etc. ■

Figure 2

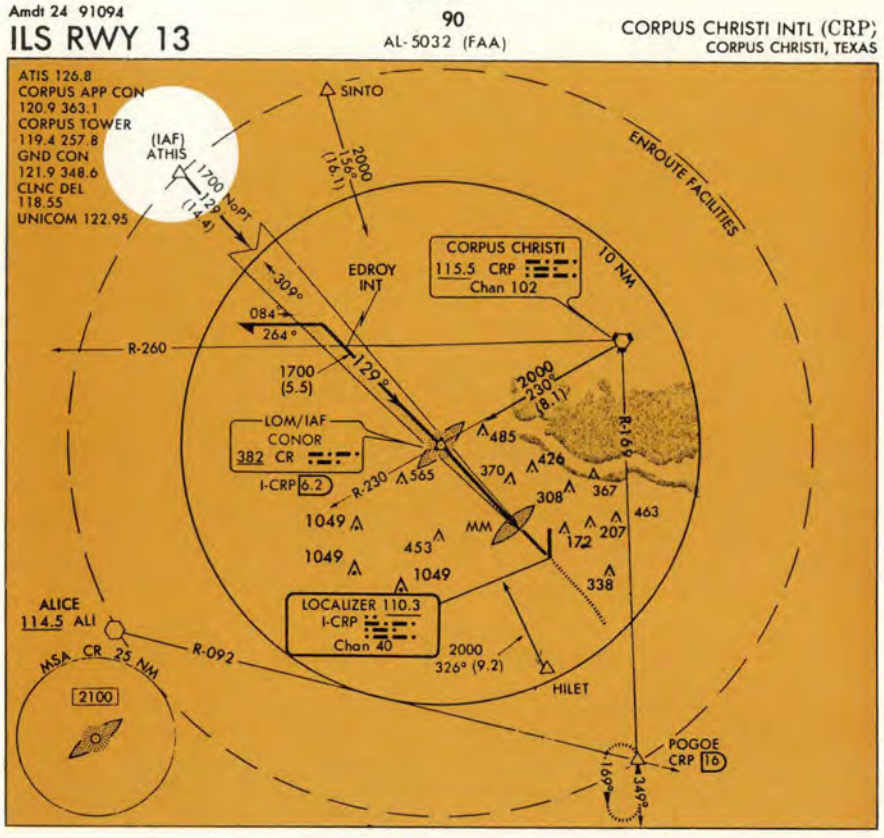
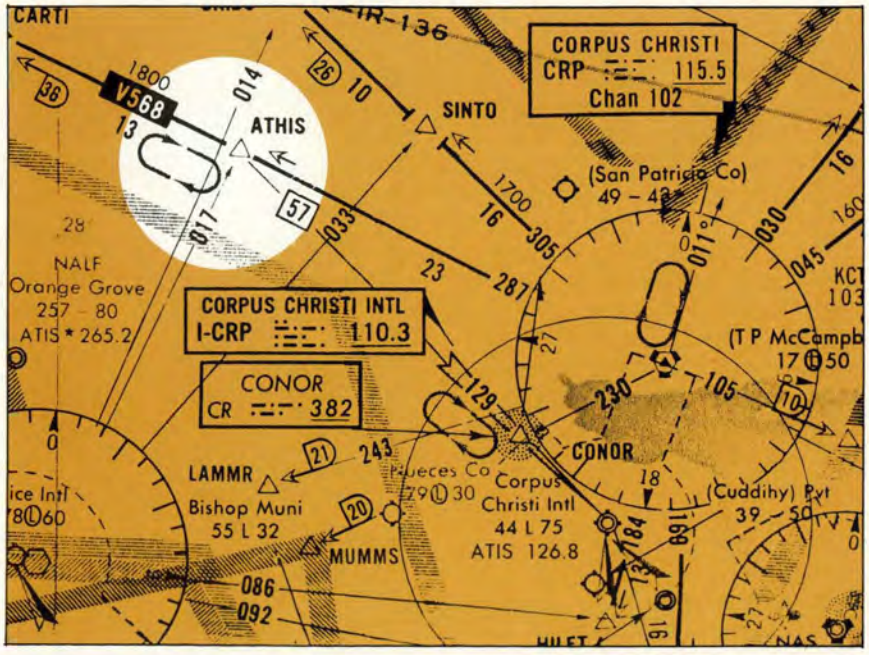


Figure 3



MY INSTRUMENT QUESTION IS:

Fold

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Fold

THEY LOST ONE OF THEIR OWN

MAJOR RUSS NAPPER
ATC Flight Safety
Randolph AFB, Texas

■ The line of "38s" was solemn. The once-proud pointed noses were imperceptibly lower. This day they had absorbed the insults of new students and weathered the last of the rushing air from a thunderstorm, and now the flight line was quiet and empty. All the bright-eyed young pilots had departed for the club long ago, and the oldtimer crew chief had taken one last glance at the line before he closed the door to his car and drove away.

The young security policeman, detailed to the mundane job of patrolling the ramp, thought he heard the whispering but disregarded it as being the wind. His attention turned to the local jackrabbit nibbling on new grass.

The planes had lost one of their own today. It had happened too quickly for any one of them to absorb the reality. One minute he was a streak of white in the final turn, the next a burned hulk of inanimate metal.

What had happened? The same question raced up and down the blue section and was passed dutifully to the jets over in the white section. The answer was the same . . .

Everyone knew him. He was a safe, sound individual. He was known by the flight crews, linemen, and his fellow associates as a well-behaved, physically sound bird. Not one of them had heard of any problems. No fuel problems — his diet was excellent. Only the best JP-4 crossed his strainers. Hydraulic fluid, the life blood of the ship, was bright red and pure. Although he had over 10,000 hours of flight time and was 22 years old, he was not fatigued. Some said he was feeling particularly good at the time of the mishap.

The whispers grew louder as neighbors explored the possibilities. How could it happen? No answer was forthcoming. Remarks were made, and to some it seemed the speculation was getting out of hand. A wary eye was cast toward the patrolman, but he was still enthralled with the rabbit.

"If you're not quiet, he'll hear," cautioned the line leader, the oldest jet on the ramp. "Now, please, hold it down."

The conversation continued in a subdued tone until the young, brash plane on the end spoke. She had just transferred in from the west coast and was still going through maintenance checkout — in other words, she was an outsider. The words she uttered sent a gasp through the entire line as surely as if a bullet had broken the silence.

All eyes went directly to the patrolman and then to the rabbit. Was that a twitch in the rabbit's ear? Why did he stop eating? Had he heard the gasp? Why did the patrolman pick that moment to look up?

After all were once more assured no one was listening, the attention was again turned to the new plane. "How can you insinuate such a thing? Of course, it couldn't be our pilots' fault! We train the best — right here. No question about it! If you knew anything about it, you wouldn't even think about such a thing."

Everyone knew the same question had been asked in each mind, but they had always accepted the responsibility of mishaps as part of their duty. They did so for the protection of the pilots, the ones who put life into them each day, the ones who were their reason for being. So it seemed impossible to conceive anyone could ask such a question out loud.

The line grew quiet once again, as each one drew inward to reflect on the day's events and what had been said. The wind continued to blow its endless stream of dust, as heat from the ramp made steam rise from where the rain had pooled. The rabbit had found a nice bunch of grass and was settling down for the night.

The security policeman looked over the line of T-38s and noticed how the raindrops on the canopies looked just like tears. ■

MAINTENANCE MATTERS

In-Flight Fuel Leak

■ The F-15 took off on a routine ferry flight with 10,000 pounds of fuel. At 18,000 feet, the pilot noticed an abnormally high fuel flow reading of 25,000 pounds per hour on the no. 1 engine while the fuel flow to the right engine seemed to be normal. About 30 miles from the departure base, the fuel quantity read 9,000 pounds. Suspecting a severe fuel leak, the pilot turned the Eagle back to the base and declared an emergency. During the turn, the pilot noticed fuel trailing the aircraft confirming a major fuel leak. Suspecting the leak was coming from no. 1 engine, he retarded the engine, and the fuel flow indication dropped to 12,000 pounds per hour. By the time the aircraft was on final, the fuel indication was down to 6,000 pounds. The pilot made an uneventful landing and shut down the left engine during rollout.

Apparently, the aircraft leaked about 3,400 pounds of fuel during the short flight. The cause of the leak was a fuel line elbow which connects the main fuel pump to the no. 1 engine augmentor fuel pump. Furthermore, three ¼-inch bolts which connect the line to the fuel pump were not reinstalled after the main fuel pump was replaced. A check of the aircraft records revealed the removal and replacement of the fuel pump was never documented and, therefore, a 7-level inspection was not performed to ensure proper installation.

Three factors contributed to this mishap.

- Failure to use and follow tech data. If they had followed the book, the bolts would have been properly installed.
- Lack of documentation. Had the maintenance been properly documented in the aircraft forms, a 7-level inspection would have caught the missing bolts.
- And poor supervision. Had the maintenance been properly supervised, the entire mishap could have been prevented.

Phantom Phixers' Alert

As a result of several recent F-4 mishaps, the engineers from AFLC are spreading the word to remind Phantom Phixers of the critical need to service landing gear shock struts with nitrogen or dry air AND hydraulic fluid.

The AND is emphasized to point out this: When a shock is being serviced, both fluid and nitrogen levels must be checked. Servicing with nitrogen only imposes excessive loads on the shock and strut components and allows severe landing loads to be transferred to the aircraft structure. This can cause a catastrophic failure of the strut and result in the potential loss of an aircraft and crew.

In one recent mishap, improper servicing led to catastrophic failure of a Phantom's nose gear strut, causing it to fall off the aircraft during takeoff. Parts of the failed strut also FODded one of the engines. The conclusion of this emergency was a controlled bailout and crash of the Phantom — a high price to pay for improper performance of a routine maintenance task.

Following the step-by-step procedures contained in TOs lF-4 -( )-2- 2, 1F-4-( )-2-2CL-1, and 1F-4C-2-5 will ensure struts are able to do their job of absorbing the shock during landing. ■

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THEY DO CARE

We received this "Dear Chief" letter from a pilot who just had a crew chief find one of those "soon to be catastrophic" hydraulic leaks. The pilot went through a fast aircraft swap, launched and flew a successful mission. By the time the aircraft recovered, the crew chief had gone off shift, and the pilot realized he hadn't thanked him. The pilot did find the chief the next day and thanked him, but also wrote us a letter. We're passing it on because we think some maintenance folks lose sight of their part in the mission and feel "unappreciated" by the flight crews. ***They do care!***

Dear Chief

Thanks for saving my tail! In these days of personnel turnovers, detached organizations, and quick turns, I may never get to meet you and thank you personally, but I want you to know I appreciate what you're doing. I'm talking about all the folks from the ''in-view'' crew chief or his assistant, to the ''behind-the-scenes'' shop technician or POL truck driver. You are responsible, as much or more than I, for the bombs on target, the missile up the opponent's tailpipe, the completed air refueling, or the on-time critical resupply cargo mission. Unfortunately, in most cases, you are like the doctor after the patient's recovery — you never get to see the product of your labors — the mission accomplished.

Anyway, I want to again tell you I appreciate your efforts. I will probably show up at the airplane in a rush and seem totally preoccupied with getting off the ground. Nevertheless, when you tell me about the aircraft or put something in the 781, I do pay attention and care, because you know more about the condition of the patient than I. Don't be intimidated by mission ''pressitis,'' or ''on-time'' fever, or rank, or anything. Write it up or tell me what I need to know before ''your machine'' becomes my life! I like to talk about nothing more than flying your aircraft.

Let me tell you a little about myself. I may fly four times a week or only once a month. I may have 8,000 hours of flying time or only a few hundred. I can be a full-time flier or maybe the staff type who can only get out of the office occasionally to keep my hand in. Like you, I come in all ages, sizes, shapes, colors, sexes, educational backgrounds, and experience levels. I am married, single, divorced, or separated and have most of the same problems you do. I may not be exactly where I want to be or doing exactly what I want to be doing.

We are not that different, and we share the desire to put the safest possible aircraft in the air to accomplish the mission. I guess ''mission responsibility'' is what keeps most of us on board.

I ranted and raved a bit, but my bottom line is ''thanks.'' Despite all of the above, you do good work, and I wanted to let you know I care. Hang in there! We need you to keep 'em flying. ■

Appreciative Crewmember

Adapted from *Maintenance* magazine, Summer, 1980


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