Flying Safety

HEADQUARTERS UNITED STATES AIR FORCE • RESTRICTED

AUGUST 1948

RESTRICTED

THE COVER PICTURE

A C-54 with an instructor pilot, pilot, and crew chief was cleared IFR for a local flight during which the pilot was to receive a base instrument check. When the assigned altitude was reached, the pilot reported his position to approach control. This was the last radio contact. Later, witnesses saw the plane dive through a low overcast into the ground at an angle greater than 80°. The plane exploded upon impact and fire followed. The three persons aboard were killed.

Due to the complete wreckage of the plane, it was impossible to determine the cause of the accident. It was recommended that the following portions of instrument practice or check flight be restricted to VFR conditions: 1. Maneuvers that require the caging of gyro instruments. 2. Simulated emergencies such as engine failure. 3. Turns steeper than standard rate. 4. Usual attitudes, slow flight or approach to stalls.

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FLYING SAFETY

RESTRICTED

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FLYING SAFETY is printed with the approval of the Bureau of the Budget, Executive Office of the President of the United States.

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CONCEPT OF AIRPOWER --- COOPERATION

IT WAS JUST after 2 o'clock on a calm, sunny afternoon when one by one the six great engines of the Consolidated YB-36 roared to life. The huge airplane sat for a time on the ramp before the hangar, its engines ticking over, while the test crew went through the pre-takeoff checks, then it rolled majectically across the field to the north end of the heavy-duty runway.

The test pilot nursed the big plane around in a gentle turn to the right to line up for takeoff. The engines were turning over a little above idling speed and the plane was rolling forward about five miles per hour. As quite commonly occurs with this Leviathan, the turn went a little bit too far to the right and the pilot had to correct slightly back to the left to line up with the center line of the runway.

As the correction to the left was made, personnel in the rear cabin heard two metallic reports come from the left landing gear. The left power-plant observer located in the left upper blister of the rear cabin saw the left wing drop slightly and the left main wheel wobble. Then the end of the main landing gear side brace dropped into view. The left main gear folded and the left wing settled to the ground. The propellers ground to a stop against the concrete and the outboard propeller tore loose from the nacelle. A small fire broke out in the engine, but was extinguished by the aircraft's methyl-bromide system and water and CO_2 from a fire truck.

The fire was hardly out before engineers were under the plane checking for the cause of the failure. Within an hour, both the Air Force and contractor engineers had compared their findings and established the cause of the accident and the sequence of failures that caused the gear to fold.

As a result of the accident, the Air Force recommended that the contractor conduct further investigations into landing gear drag loads.

The dispatch with which these investigations were launched is typical of the cooperation between the Air Force and the aircraft industry, the cooperation which built the greatest wartime air armada in world history and which is today modernizing our air force.

Specimens of the metals that failed were rushed to the metallurgical laboratory for tests of tensile and impact strength. Representatives of sub-contractors who had had any connection with the manufacture of the parts involved, the engineers of the contractor, and the Air Force plant representative held a meeting the third day after the accident to discuss the failure and decide on a plan of prevention to insure against further difficulty from that source.

In a like manner, weak spots and bugs in all new aircraft produced for the Air Force are found, explored and removed by cooperation of all parties involved. When this and all future B-36's roll out on the line, the flaw which caused this failure will no longer exist.

The basic concept of a continuing adequate Air Force is close cooperation between manufacturer and service. This one accident and the measures taken to prevent a similar recurrence mark one example of how this working cooperation functions today to build a greater Air Force tomorrow.

THERE I WAS—

(OR WAS I ?)

By MAJ. CHARLES H. McCONNELL

I HAD JUST been called back on active duty. The "outside" had been kind enough to me, but like many other World War II pilots the little flying I did in the reserve served only to whet my appetite to get back in the big leagues. As I said before the outside world had been kind to me. A good job, a house, a new car and the finest wife in the world. I gave up the job, sold the house, kept the car and the wife and reported as per telegram to Mitchel AFB.

At Mitchel, the men in white gave me everything but a saliva test.

"For an old man (I'll be thirty this month) you're in fair to middlin' shape," they said.

Two weeks later I found a home. My boss, a lieutenant colonel, introduced me to the mahogany bomber which I was to fly eight hours a day five days a week.

"This," I said to myself, "is not for me."

I walked into the colonel's office like a lion for what turned out to be a heart to heart talk. He did the talking and I did the listening. I came out like a sheep—which had been fleeced.

I guess he felt sorry for me because five minutes after our (or should I say his) talk he came out to my desk and told me there was a trip to the west coast and that if I wanted to go as copilot I could.

In less time than it takes to dump the contents of those "in" and "out" baskets into that big double drawer on the lower right side of a mahogany bomber I was gone.

The flight to the coast was just another trip to the pilot. He was bored stiff. But to me it was as thrilling as my first solo in a PT. I even got a big kick out of making position reports. My navigation was, at the start of the trip, a wee bit ragged. By the time we passed the Mississippi I started to get the hang of the E6B and began hitting the ETA's on the head.

The thought passed through my mind that this was a much nicer way to make a living than peddling insurance policies from door to door.

A few minutes later I was to wish that I was back on the ground policy peddling—or for that matter peddling anything—just so long as it was on the ground. We went full bore into the grandaddy of all thunderstorms. Don't ask me why. We had seen this one from about 30 miles back. I guess I figured we would go around it. Still feeling like a kid with a new toy and for some reason a bit reluctant I just sat there and never said a word.

Two minutes through the roll cloud I became a roving commentator.

"Say, maybe it's none of my business, but aren't we on a CFR clearance?" "VFR," was the reply. That made me mad. "VFR or CFR," I retorted, "I'm getting a change in flight plan."

"We'll be out of this in a few minutes, keep your shirt on," he replied. And sure enough, in a few minutes we broke out into the clear again.

This fellow, we'll call him Captain Smith, was reported to be a good pilot. I had checked on that item before we left home. But he was careless. I had felt that all the way along the route. There were the little mistakes he made on the Form 23, the fast taxiing, the hasty pre-takeoff check, the low turn out of traffic, and now the flight through the cumulobumpus on a VFR clearance.

This boy, I thought to myself, will stand some watching.

That night we RON'd at Barksdale. We got a room together in the BOQ and shot the breeze for a while. Smith was really a character. I wanted to get on the subject of flying IFR on a VFR but found myself to be just a good listener. And Smith could really tell a story.

The remainder of the trip to the coast was uneventful.

"Coast to coast in two days sure does beat house to house for life," I mused to myself as we taxied to the ramp at March AFB.

Coming back, we flew direct to Fort Worth. Flight Service recommended that we return to Mitchel via Tulsa, St. Louis, Dayton and Washington because of a terrific squall line lying between Dallas and Shreveport. One look at the pilot reports and we decided that we hadn't lost anything at Shreveport so it was off to Scott via Tulsa.

The trip to Scott was VFR.

The forecaster at Scott was very pessimistic about the weather into Washington. Since we were both tired I recommended a sack in the BOQ.

"No guts?" was Smitty's reply to my recommendation.

"If you want to go all the way to Mitchel," I replied, "it's O.K. with me."

We started down the runway just as the sun was dropping behind the horizon.

I made a position report to Wright-Patterson Airways. They advised scattered thunderstorms with most of the area en route covered with stratocumulus clouds. We changed to IFR. We were given 9,000 feet by ATC. For one hour, after passing Dayton we were in and out of cumulus clouds. The radio compass needle was very erratic. Static made the identification of any station absolutely impossible. We tried to work an aural null but could not identify the station because of static. We flew several different headings which led me to believe that Smitty wasn't too sure of where we were—other than over North America.

Then it happened. Smith had been trying to locate a station on the compass. The needle settled down and held to 45° on the radio compass indicator. I looked at the magnetic compass. It read 180°. I switched my jackbox to compass position and heard nothing but static.

In a very few minutes, the needle swung around indicating that we had passed over the station. Smith picked up the mike and called Pulaski Radio. I began to feel a little easier about the whole thing when I switched to VHF and listened to Smith's position report.

As he hung up the mike and started to descend to 3,000 feet as instructed by ATC, I reached across and switched him over to interphone.

"You've got a good set of ears," I said. "I couldn't make out that station identification to save my hide."

"Neither could I," he replied, "but I think we're over Pulaski."

"You think!" I screamed.

That was all I needed. I picked up the mike and called Pulaski. I told them that we were uncertain of our position and requested permission to remain at 9,000 until we reached Richmond.

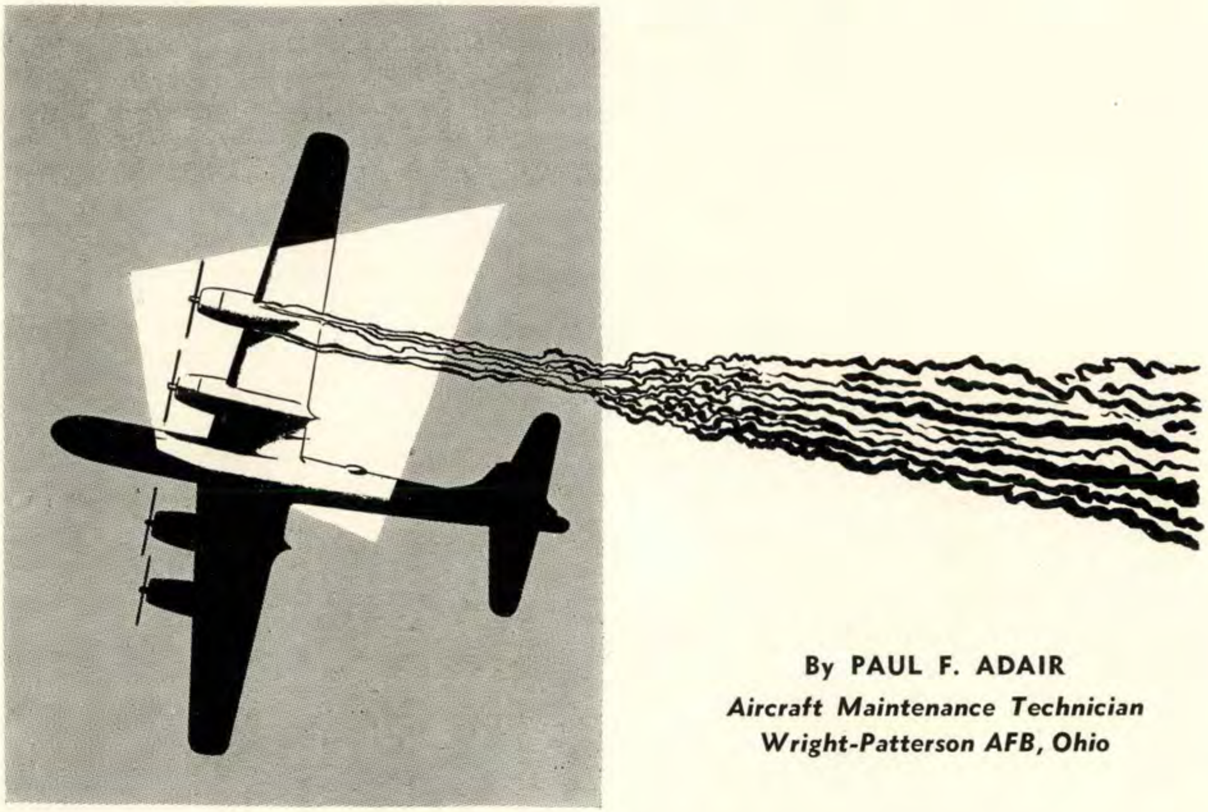
By the time we got back to 9,000, Pulaski informed us that we could stay at 9,000. They had no other aircraft reported in the area.

Smith had given our estimated time en route from Pulaski to Richmond as 1:10. Two hours and five minutes later we reached Richmond. We had been holding a heading of 100° from what Smith had assumed to be Pulaski. From Richmond on into Mitchel the weather was VFR.

When we landed I retraced our flight path from Richmond on the reciprocal of 100° and found that we had been over Huntington, W. Va. at the time Smith started his descent to 3,000 feet. Pulaski is 180 miles from Richmond. Huntington is 300 miles west of Richmond, and Richmond is about 100 miles east of the mountains. If we had descended to 3,000 feet at Huntington, we would have flown most of that 300 miles 2,000 feet under ground.

TORCHY---THE B-29

(ENGINE CONDITIONING—CONTINUED)



By PAUL F. ADAIR
Aircraft Maintenance Technician
Wright-Patterson AFB, Ohio

THE PILOT CRAWLED out of the B-29 and requested that a fire truck be installed permanently on top of the No. 1 outboard engine as it was still torching excessively during takeoff. The engine appeared normal in every respect except for the torching condition at takeoff power.

Maintenance personnel had attempted to correct this difficulty for three weeks. Both fuel injection pumps had been changed, spark plugs had been replaced three times, fuel injection pumps had been tested, ignition timing had been checked, and the valves had been adjusted. The foregoing maintenance action had been done a step at a time with repeated flight tests being made after each change. However, in spite of all the action taken, the engine still persisted in acting up.

ED NOTE: This is another of a series of articles describing the efficient and economical results attained through the performances of AMC-trained engine conditioning teams.

Base maintenance decided to call an engine conditioning team into the game to analyze and correct Torchy's bad manners. It appeared to the engine conditioning team that either the mixture control was too rich or that one or more cylinders were cutting out at takeoff power. The team ran a complete cockpit check to determine the engine condition. The power check indicated the manifold pressure was slightly high, an indication of an inoperative cylinder. The fuel-metering check indicated the system to be operating satisfactorily. In an effort to duplicate the high BMEP encountered during takeoff, a check was made by loading the engine down with the propeller control set at 2,000 rpm to observe the engine operation under this condition. The engine appeared to run very rough, indicating one or more cylinders were inoperative. At the completion of the cockpit check, which consistently pointed to the trouble being one or more dead cylinders, a Magic Wand (ignition testing device) test was made and it was established that the No. 16 cylinder was cold on both right and left switch positions.

Since the fuel injection nozzles supposedly had been tested, it was believed that the ignition system must be the cause of the difficulty. However, it was concluded that due to the short time required to make a fuel injection system test, it would be desirable to re-check the fuel injection pumps and nozzles prior to disturbing the ignition system. Hence, the fuel injection nozzle was removed from the engine and re-connected to the fuel injection line, after which the fuel booster pump was turned on and the carburetor mixture control moved to the automatic rich position. An engine maintenance stand was then removed in front of the propeller in order that the flow from the nozzle could be observed when the starter was engaged with the ignition switch off. This test revealed that fuel ran from the nozzle continually instead of emitting a sharp squirt as is required. The nozzle was then removed from the line and the engine again cranked through with the starter to see if a sharp cut-off of fuel from the line was obtained intermittently as the engine rotated. This test was made to check for proper pump-plunger action and pump check-valve operation. The test indicated that the cause of the difficulty was in the fuel injection nozzle.

A new fuel injection nozzle was installed. The engine was given a complete cockpit check again, including loading the engine down with propeller control to determine the engine operation under high BMEP. The results of this test indicated that the manifold pressure had decreased one inch on the power check, the carburetor mixture was still correct, the rpm drop on the ignition system check was below 50 rpm, and the engine roughness when the engine was loaded down was eliminated. Then the aircraft was test-flown and all traces of the torching were gone.

The time required for the complete checks performed by the team including the installation of the new fuel nozzle and re-checking the engine was approximately one hour. In this case the torching was due to the unburned fuel from No. 16 cylinder being dumped into the exhaust system where it was ignited and burned. This gave an indication of torching or excessive rich fuel metering.

A new name was in order for this B-29.

WHAT DO YOU KNOW ABOUT ENGINE CONDITIONING? INDICATE ANSWER—TRUE OR FALSE

1. Engine conditioning is needed.
   a. To reduce number of man-hours required for maintenance. ______
   b. Reduce number of maintenance parts required. ______
   c. Increase safety of flight. ______
   d. To save brakes. ______
2. The fuel metering system.
   a. Can be adjusted in all ranges by first and second echelon maintenance. ______
   b. Gives the same fuel-air mixture at extreme idle in either auto rich or auto lean on all Bendix injection and CECO carburetors. ______
   c. Can be checked in the cruise range by determining changes in engine speed when moving the mixture control from the auto rich to the auto lean position.
3. If an engine back fires, the fuel metering system is too lean, and the carburetor or master control unit should be replaced. ______
4. The magneto-to-engine timing should be changed by changing the breaker point adjustment. ______
5. If a combustible mixture is present in the cylinder when the spark plug fires, a power impulse will always result. ______
6. Engine valve operation affects fuel-air mixture of the cylinders. ______
7. Excessive valve clearance will cause valve failures. ______
8. Negative valve clearance will cause hard engine starting. ______
9. High RPM drop during the magneto check indicates a faulty magneto only. ______
10. A low RPM drop, when making an ignition system check, is proof that all the spark plugs are satisfactory. ______
11. An accurate ignition system check can be made in the air. ______
12. Advancing ignition timing is the proper method of eliminating excessive RPM drop during the ignition system check. ______
13. When using the cold cylinder indicator, the contact point should be placed on the same location on each cylinder. ______

(1.) a-T, b-T, c-T, d-T. (2.) a-F, b-T, c-T.
(3.) F (4.) F (5.) T (6.) T (7.) T (8.) T.
(9.) F. (10.) F (11.) F (12.) F (13.) T.

Nine came home!

THE FIELD ORDER called for a simulated low-level strike mission against a former Japanese airdrome by 12 A-26's the next day.

It was 1900, and the pilots of the A-26's scheduled for the mission the next day were sitting around the briefing room waiting for the usual pre-briefing which was always held the evening before a mission.

There was no tenseness in the group tonight, a lighter than usual banter was rolling around the room. A slow, quiet rain was falling—had been since before chow that afternoon—and the weather map spread on the table before the weather officer showed a wave development along the eastern China coast. The map was 18 hours old, so the development was probably settling over the islands of Japan now like a protecting gray mantle. Little chance that planes would fly tomorrow.

Nevertheless, the pilots paid their usual strict attention to the pre-briefing on route, target, formation, ETA's, fuel consumption, frontal penetration plans, alternate fields, etc. The meeting broke up in good humor, the men scattering to their quarters secure in their ignorance that three planes would not return and four men would die tomorrow.

At 0630 the next morning, the local weather had improved unexpectedly. Final briefing was held and takeoff time set for 0725. A weather plane had been dispatched at 0600 to check the situation locally and 50 miles on course. The pilot reported a 5,500-foot overcast with six to eight miles visibility.

At 0725 the squadron took off, joined up, and proceeded on course, One by one the check-points slipped behind. The weather alternated between bad and fair until approximately an hour from target time. The squadron was flying beneath a 600 foot ceiling when the lead pilot received a weather report of zero-zero conditions at the target. He turned back toward home.

The weather was worse on the return trip with many rain showers and lower visibilities. The lead pilot observed that two alternates for the home base were closed in by the weather.

Approximately 40 minutes flying time from the home base, the leader received a weather report for the station giving 1,500 feet and three miles. To reach the base, the formation had either to fly across a peninsula through a 20-mile-wide pass between the mountains or take a longer route around the peninsula over the water.

The flight leader could see that the ceiling was very low over the water and that better weather showed ahead over the peninsula. Inasmuch as a plane in the low box was very low on gas and another plane in high box had an engine cutting out intermittently, the decision to cross the peninsula was made.

Except for rain which reduced visibility to one to two miles, weather through the pass was good for a time. Clouds could be seen hiding the mountain tops on either side of the route when the formation broke out of a shower. Then while in the midst of a heavy shower, the formation plunged without warning into a solid overcast.

The leader of the third box saw the first two boxes disappear from sight and turned his flight in a tight "180" and climbed out on top, probably averting greater loss of aircraft and lives than occurred.

The lead box plunged into the overcast so abruptly that the right wingman, caught lagging slightly out of position, lost sight of his leader and started a climb straight ahead. The leader of the high box which had been flying on the right of the lead box turned 10 degrees right to clear the lead flight and also started a climb. His left wingman apparently lost position and started a turn to the left because the slot man in the box saw him missing from position and glanced around to his left just in time to see him collide with the right wingman of the number one flight.

The pilot of the A-26 which was struck from behind, reported later he felt the severe jolt and, realizing what had happened, jettisoned his canopy. The airplane pitched downward and he went out over the left side. The gunner who had unfastened his safety belt when the overcast was entered was thrown through the hole where the rear section of the plane was sheared off. Both men parachuted successfully, striking the ground almost at the instant their chutes opened. The three occupants of the other plane did not get out and were killed in the crash.

All but one of the remaining planes in the formation flew out to sea and let down, coming in under the overcast at 200 to 300 feet and landing safely.

When the formation was ordered to fly out to sea to let down, the pilot of the plane previously mentioned as low on fuel realized he had too little gas to complete that maneuver. He found a hole and let down below the overcast and started around the peninsula to the base. Realizing a ditching was imminent he briefed his engineer and passenger on ditching procedure. When one engine quit from fuel starvation, he made an excellent water landing 100 yards from the beach.

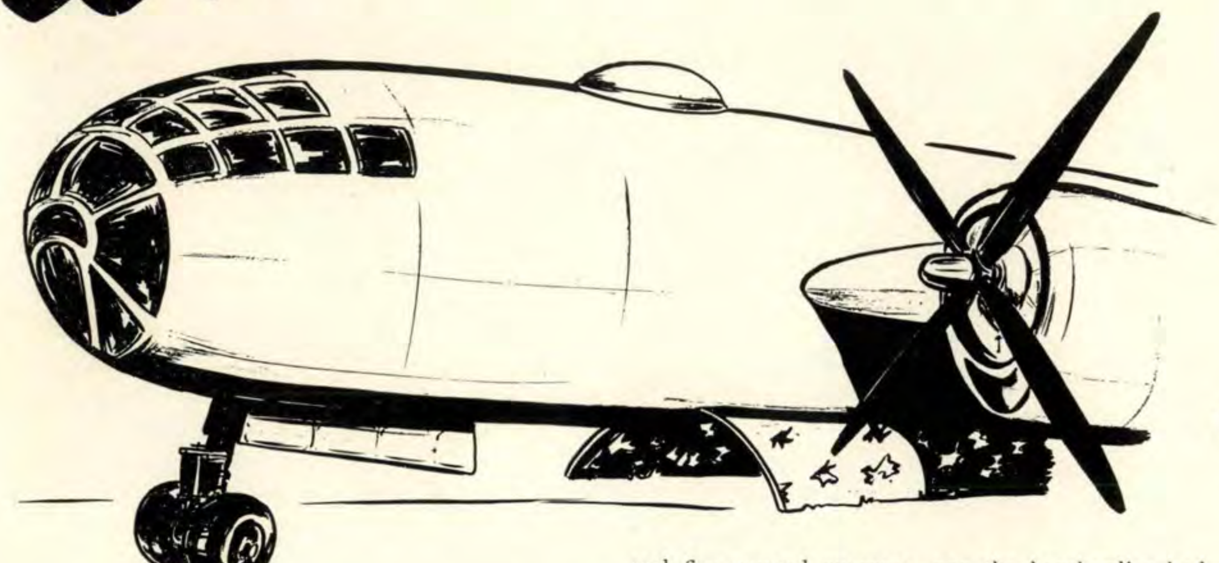
When the plane came to a stop the pilot turned to his passenger, who assured him he was all right. He climbed up on the wing and was inflating his life raft when the passenger called for help from the seat. The gunner who by this time was also up on the wing jumped down in the pilot's seat to assist the passenger. The plane was sinking however and the water was already up around the passengers shoulders when the engineer went into the cockpit to try to help him. He was unable to find what was holding the man in and later reported the passenger was sitting staring straight ahead with glassy eyes, not attempting to help himself. As the plane went under, the pilot and gunner were forced to take to the rafts. The passenger went down with the plane and drowned. A diver found out the next day that the safety belt had not been unfastened and was holding the passenger in the A-26.

The pilot went into emotional shock and the gunner helped him hang onto his raft until they were picked up 20 minutes later by a fishing boat.

The accident investigation board concluded that the accident was a result of the unpredictable weather season existing at the time of the accident and a lack of weather information.

Also, no homing facilities were available to the formation. The board recommended that in-flight emergency weather procedures be put into effect before similar missions are flown and that better weather and radio facilities be provided in the interest of flying safety.

Who HAS CONTROL?



The crew of a B-29 had been on a medium-altitude bombing mission and were descending for low-altitude gunnery. The navigator told the bombardier that the bomb-bay doors had crept open. The doors were closed as the descent continued.

A visual check was the only assurance that the doors were closed. The amber light on the bombardier panel indicated that the bomb-bay doors were still open, but was disregarded since it had been on before and during the entire flight.

Upon reaching the prescribed altitude over the gunnery range, the airplane commander gave the order to fire. No further visual checks were made of the bomb-bay doors.

The left scanner fired the lower forward turret. As he finished firing, the bombardier took control of the turret from his position in the nose and the guns rotated around to the right side of the airplane. In this transfer of control from the left scanner to the bombardier, the guns continued to fire. Before the transfer of control the bomb-bay doors had crept open. The doors and the inboard side of the No. 3 engine cowling were promptly ventilated.

The bombardier, with primary control over both forward turrets, thought he was firing only the upper forward turret. Neither the left scanner, central fire control operator, nor the bombardier had adequate knowledge of the two control systems. They did not know that a flick of the switch at the central fire control position would have prevented the guns from firing as they rotated from one gunner's control to the other.

Using the "B" system, a modification of the original turret control system installed in this airplane, safe transfer of turret control is made by releasing the trigger and action switch on one sight. Then, as the other operator presses the action switch, the turret swings to alignment with his sight. However, if the trigger is also depressed, the guns will fire as the turret rotates. That is what caused the bomb-bay doors and engine cowling to be damaged.

With the "C" system the switch on the CFC operator's panel is the answer. When placed in the "on" position, it overloads the electrical circuit if the turret gets impulses from two sight positions. This overloading prevents the guns from firing while being transferred.

To prevent accidents of this type in the future, it is recommended that gunnery schools and gunnery officers instruct all RCT gunners thoroughly in the different systems of RCT and the teamwork required to operate remotely controlled turrets safely. It would help preclude inadvertent perforations.

good shot

Good photographs serve the same useful purposes in accident investigating as they do in crime detection.

However, gruesome photographs of accidents showing bodies of victims should be avoided unless they serve a specific useful purpose.

It is essential that the accident investigating officer have close supervision of the photographer so as to obtain the best shots showing damage to objects struck, major parts of wreckage, engines and propellers, wheel and landing gear assemblies, detailed views of cockpit instrument panel, engine and propeller settings, valve and radio settings, and all parts involved in or suspected of structural failure or of having contributed directly to the accident.

General views of the scene of the accident from four directions and back along the wreckage pattern to the point of first contact are considered SOP. Always use filters where practical.

(1) This picture of an AT-6 is one of three similar pictures obtained by the investigating officer. It's a good shot but it doesn't show any reason why the AT-6 is in such a ridiculous position. Actually the pilot had to make a forced landing because of a sheared throttle shaft pin of which there are no pictures.

(2) This picture of the pilot's seat indicates the failure of the seat caused by impact of crash landing of the P-47. It wasn't the direct cause of the accident but is related to it and should be included for possible safety study and recommendation.

(3) It looks as though this farmer has a fairly good crop. Also the pilot picked a good forced landing field and landed wheels up with the bent props indicating sudden engine stoppage. But there were no photographs included of the cockpit or engines which would have given the real story on why the AT-11 is in the field.

(4 & 5) Picture No. 4 shows why the pilot ground-looped on landing—note oil covering the fuselage and windshield. Also included is a photograph showing the failure of the dual drive and reduction gear housing in the P-51 engine which resulted in the oil leak.

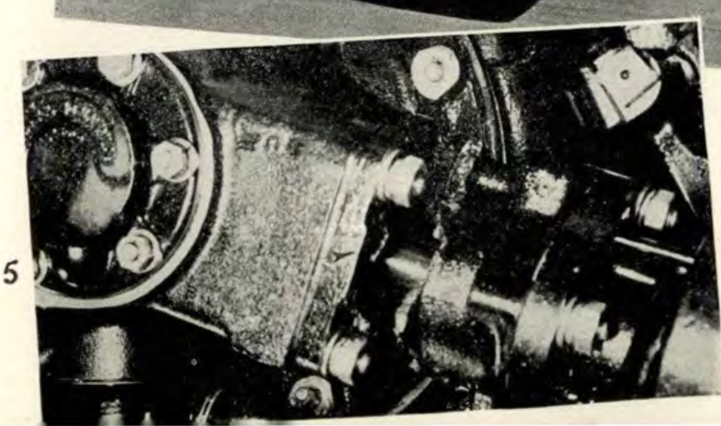
1

2

3

4

5



ICE RESEARCH IN AUGUST

By LT. RODGER W. LITTLE
Flying Safety Staff

AN AIR FORCE with a global aspect cannot be held back by a few hundred miles of icing which in the days of World War II might have scratched a mission.

Soon, thanks to the efforts of the Ice Research Lab at Wold-Chamberlain Air Force Base, Minneapolis, Minnesota, the terrors of icing will be reduced considerably and the Air Force will be a step nearer all-weather airplanes and an all-weather air force.

The Ice Research Lab is flight-testing new aircraft anti-icing systems daily to determine the necessary requirements for future all-weather airplanes.

Capt. Frank W. Horn, Jr., Air Force engineer in charge of the project currently carried on under contract by Smith, Hinchman and Grylls, Inc., says that the days of de-icing boots are about over. In fact, he says that de-icing is on its way out. Instead, it's to be thermal anti-icing. Heated wings, to you.

Captain Horn conducts many test flights in icing conditions. When natural icing is not present, Ice Research makes its own by taking a C-54, affectionately called "Squirtin' Gertie, 4th" aloft. With a system of nozzles on the front of "Gertie," pilots spray water on the engines, windshields, and wings at freezing altitude.

Even Douglas Aircraft Company would not recognize Squirtin' Gertie as one of its products. Gertie is a Rube Goldberg from nose to tail. The

No. 2 engine is an R-2000 with a Curtiss electric prop, unlike the other three engines equipped with Hamilton standards. The props have boots on the leading edges. The plumbers nightmare on the left front side resembling a crew chief stand has caused considerable concern to the people who have seen Gertie fly, but actually it only slows the plane about 10 mph. Hi-intensity lights are mounted in the left side of the fuselage for observing icing at night as well as taking pictures. There are a number of power units inside Gertie to operate all of the extra electrical equipment along with a fire pump which feeds water from two 500-gallon tanks to the spray rig on the front end.

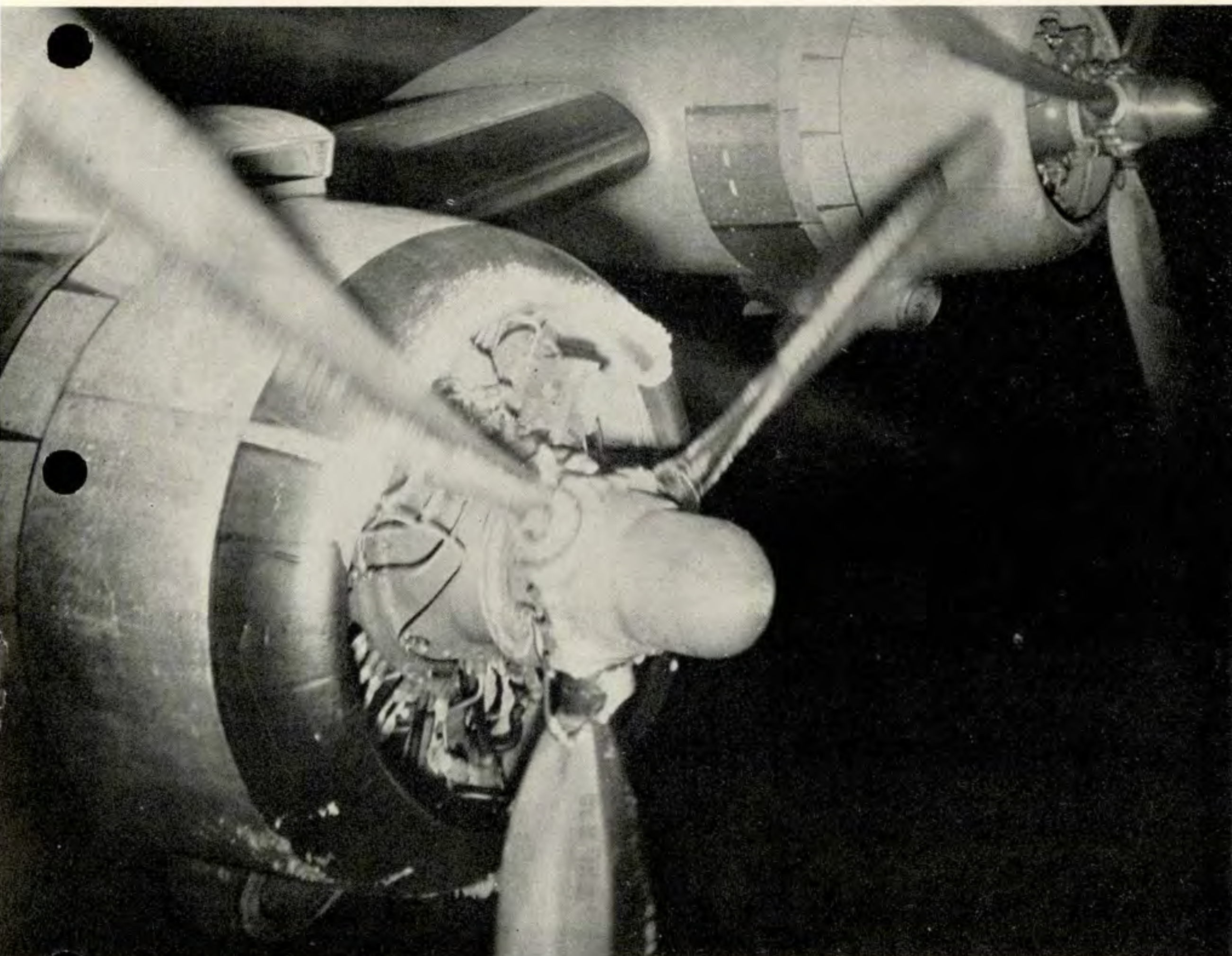
Gertie is also equipped with a nesa glass windshield which has an electrical conductive coating between layers.

There are many other gadgets aboard Gertie such as potentiometers, thrust meters, rate of icing meters, and visibility meters which make her a flying ice research lab.

Rotating cylinders are carried aloft and projected into the air stream to gather ice. The iced-up cylinder is then brought quickly back into the airplane. The ice thus obtained is preserved until an analysis can be made to determine its many and varied chemical qualities.

Ice Research also has a B-24, one of the few still in commission in the Air Force, with an airfoil rig on top of the fuselage. The airfoil rig is being used to measure dynamic heating, heat transfers, velocities and pressure surveys to the airfoil during flight in icing conditions.

At the present time the lab is using isopropyl alcohol, tri-ethyl phosphate, and tri-methyl phosphate with the latter two preferred as anti-icers on



the windshields because they are non-inflammable. Tri-methyl phosphate is considered the best and will keep the windshields clear without using the wipers. Because of its non-inflammability, it can be used on props with a high degree of utility and safety. An infra-red heater is installed on the windshield of the B-24M which is casually called "Leaking Lena."

It is recommended by Ice Research that a pilot exercize the same caution with the thermal anti-icing system that he would with the pitot heater. If approaching a cloud that appears to contain ice, he should anticipate it by turning on the pitot heater and the anti-icing system.

Anticipation of icing brings up another important factor, the free-air-temperature gage. This instrument does not compensate for the effect of dynamic heating of the wing. Thus a pilot could be flying at 300 mph in a cloud with a free air temp of 28° F. and still not be icing up due to the heat of friction on the wing.

In all cases, it is a good idea to play it safe. Here is the statement of one pilot who sweated it out.

"As I hadn't heard of any pilots of P-80's ever experiencing ice, I had more or less formed an opinion that high-speed aircraft were immune to this hazard due to friction of air flowing over the leading edge of the wing. How wrong I was! At 20,000 feet on instruments, indicating 300 mph, clear ice formed and extended approximately one and a half inches forward of the leading edge of the wing. My radio became inoperative and I was considerably concerned. The airplane would not climb above 20,000 feet. As a climb was attempted, the airspeed would drop rapidly with no gain in altitude. I was unable to let down because of the mountainous terrain over which I was flying, and I was unable to climb above the ice level because of the loss in wing efficiency and the load of ice on the airplane. I was reluctant to turn because of lack of confidence in the J-1 attitude indicator and roving pointer turn indicator installed in the P-80B airplane. Fortunately, I flew out of the overcast. This perhaps saved an airplane and precluded a parachute jump."

For the pilots who like to fly in the top of a stratus layer, Captain Horn has a word of warning. The worst place to fly when icing is suspected, is near the top of a stratus overcast as the most severe icing occurs at this level. He defines severe icing as a rate of two and a half inches per five minutes.

The weight of ice that an airplane can support is not too important. What really counts is what the ice does to the airfoils.

There are two methods of heating the wings and leading edges of the tail surfaces. Combustion heaters are considered the most efficient method with exhaust heat exchangers as second best. With two 200,000 BTU combustion heaters installed on the P-82, ice doesn't have a ghost of a chance. Incidentally, these two heaters furnish enough heat to comfortably warm eight to ten houses during a cold, wintry day. There is little danger of failure or fire by combustion heaters as they operate on cycling and overheat switches with warning lights.

To solve the prop icing problem, props are now heated electrically. Hub generators are being tested. They are cast into Aero-prop assemblies to furnish the necessary source of energy to heat the leading edges of the prop.

It was pointed out that with frost or snow on the wings you can't just start your airplane up and take off. Thermal anti-icing is not effective on the ground. You have to have air passing through and over the wing at flying speeds before the thermal anti-icing system operates properly.

Captain Horn also stressed the point that until anti-icing is standard on all AF aircraft, a pilot would be wise to keep de-icer boots operating during letdowns for landings. "Come in faster to compensate for their operation, don't let ice build up and stall out even quicker," he says. While its primary mission is to determine the requirements for anti-icing of Air Force aircraft, work at the Ice Research Lab covers many activities. Its findings and recommendations all point to safer flying now and in the future. When all ice will be confined to highballs.

SINGLE ENGINE PREDICAMENT

LACK of single-engine practice paid off—in the form of a wrecked P-61.

The pilot had taken off on a VFR tactical clearance and after two hours of flight the radar observer noticed large quantities of fuel flowing overboard from the vicinity of the accessory section of the left engine. He excitedly informed the pilot of this over the interphone.

In view of the radar observer's excitement and his long experience in P-61's, the pilot feathered the left engine to eliminate the possibility of fire.

At this time the pilot was flying at 400 feet to maintain VFR under low clouds. He set power on his right engine at 2400 rpm and 40 in, Hg. and headed for the air base about 12 miles away. He did not drop the external gasoline tanks.

The tower was called and clearance was obtained for an emergency landing.

In the meantime, the pilot was having a bad time with his single-engine flight. As power was increased to maintain airspeed and altitude, the rudder pressure became so great that the pilot throttled back to maintain control of the P-61. He did not attempt to use rudder trim to relieve the pressure.

Consequently, he had lost altitude until he was only 30 feet above the water on his approach to the runway. It seemed to him that the P-61 was going to pay off before he reached the runway, so he lowered 15° of flaps and this caused the airplane to balloon up and over an obstruction near the end of the runway.

This gave the pilot time to think of something else—the gear! So he hit the gear handle. But the plane contacted the runway before the landing gear was actuated. That was it.

There was actually no emergency which warranted feathering the left prop.

Prior to this flight the pilot was briefed on the siphoning and return flow characteristics of this particular airplane. He should have realized that sufficient time had elapsed during the flight for the left outboard main tank to have been refilled, resulting in the returned fuel being forced overboard. This is why. The normal rate of fuel return from carburetor to outboard main tanks in the P-61 is 16 to 20 gallons per hour. And fuel had been used out of the outboard main only for takeoff and the first 20 minutes of flight.

After the accident, the left outboard main tank was found to be full and an engineering inspection revealed no loose connections of any sort that would allow fuel leakage.

The single-engine experience of this P-61 pilot had been limited to a flight as copilot aboard a B-25 involved in an actual single-engine landing. Because of inclement weather, he hadn't the opportunity for single-engine practice since being assigned to the outfit. Your guess is as good as ours as to what the minimum checkout requirements were for P-61 pilots at the base concerned.

Pilots at this base are being rechecked and records of simulated single-engine indoctrination are being maintained. All this after the horse was stolen.

HERE'S THAT PLANE AGAIN

THE AT-6, sweet chariot to scores of aviation cadets, is still the nemesis of many experienced rated pilots.

The Air Force is increasing daily its strength of qualified maintenance and line personnel. Mechanics are gaining more and more experience and planes are receiving better care all the time. All reports indicate that pilots are just not *flying* the AT-6. And the AT-6 is a pilot's airplane.

With emphasis in aircraft production placed strongly on bigger and faster airplanes, most of which have a tricycle landing gear, and with most pilots flying a variety of airplane types with tricycle gears, the necessity for actually *flying* an AT-6 from switch-on to switch-off is increasingly important. But if pilots know it, they don't show it.

Take picture number one. That AT-6 is lying unhappily upside down because the pilot didn't know or didn't employ correct crosswind landing technique.

The pilot shot five landings in local traffic then worked radio range procedures for an hour or so. He came in for his final landing and made his pre-landing check correctly. He turned on the final and set up an approach with full flaps at 100 miles per hour.

This pilot knew he had a crosswind at about 30 degrees with gusty wind condition, yet he blandly put down full-flaps. He rounded out and set the plane down in what he thought was a three-point position. The plane swerved sharply to the left and the pilot stomped on the right brake, overcorrecting so severely that the AT-6 started to groundloop to the right. He then applied full left brake and the plane flipped over on its back, striking with such force the crash bar between the cockpits buckled.

The accident was attributed 100 per cent to pilot error for poor technique, use of full flaps in a 30° crosswind, excessive use of brakes early in the landing, and failure to use proper corrective measures.

A little different story explains the pile of scrap metal being looked upon ruefully by the MP in picture number two. The pilot of this plane abandoned ship in a thunderstorm at night.

Clearance was filed from one midwestern airbase to another in weather forecast above marginal VFR except for scattered thundershowers along the route which, the forecaster was careful to point out, could easily be circumnavigated to the north.

Two and one half hours after takeoff, some 50 miles from his destination, the pilot was blinded suddenly by a bolt of lightning which he thought struck the plane. Immediately after the lightning flash, the pilot found himself in heavy rain. He reported he was unable to read his instruments or to fly the plane by outside references and lost control. He went over the side and landed safely about half a mile from where his plane crashed.

The pilot had a flashlight aboard, but failed to use it when cockpit lighting became ineffective immediately following the lightning flash. This pilot apparently violated AF Reg. 60-16 by flying IFR on a VFR flight plan. A simple detour around the thunderstorm would have resulted in a successful flight.

Every pilot should remember this next accident, take it to heart, and nurture it like a tender flower for the rest of his flying days.

The plane in picture number three went aloft one afternoon with a first lieutenant-instructor pilot in the front seat and a student pilot under the hood. After the student had flown hooded instruments for an hour, the instructor pilot took over and returned to the base.

He called the tower and received landing instructions. The pilot flew a normal traffic pattern and came in on a normal approach, flaps down and head up. Roundout was normal and the plane settled in nicely—on its belly.

Part of the pilot's comment on the accident was to the effect that when the plane finally stopped sliding he cut the switches and noticed that he had failed to lower the wheels.

Could happen to anybody? You know it, brother. The payoff is that it happened to this pilot, who had over 2,000 hours with 820 hours in AT-6's. If any pilot in the world is qualified in the AT-6 this pilot was. The student pilot, a lieutenant colonel, was no greenhorn either, as both men were graduates of the P-80 school.

The base CO put it nicely when he said recommendations for preventive action to preclude an accident of this kind are difficult.

When a man with over 800 hours in a particular airplane forgets to put down the gear it can mean only one thing—he has become so sharp in the plane that he no longer needs a checklist. That's the thing to remember, in this Air Force you can do without your checklist like you can do without your head.

THERE IS A PLAN

By CAPTAIN WILLIAM E. SWARTZ
McChord Flight Service Center

A LITTLE MORE than a year ago a C-47 transport from Great Falls, Montana, crashed on the beach near the Sand Point Naval Air Station, Washington. The Air Force plane had lost its radio while making an instrument letdown at McChord AFB during extremely poor flying conditions. A possible contributing factor to the accident in which the pilot lost his life was lack of a concerted plan of guidance by which one agency might have coordinated the well-intended directions of several agencies of control and rescue. The story is different now.

Recognizing the hazardous condition, department heads of the CAA, Coast Guard, Navy, and Air Force units in the Seattle area conferred and discussed the situation. They agreed to interconnect all emergency and rescue agencies in the northwest by a teletypewriter network, owned and installed by the U. S. Coast Guard. Connected by this network that provides simultaneous information to all concerned are Flight Service, McChord Air Force Base, Washington; the Naval HF/DF Station at Bainbridge Island, Washington; the Naval Air Station, Seattle; the Air Rescue Service, McChord Air Force Base; Coast Guard Search and Rescue, Seattle; the Washington State Patrol, Seattle; and a central monitor station. You may judge the success of that plan after reading the following incident which barely made the newspapers and radio news recently.

On April 28, 1948, the McChord Flight Service Center cleared an A-26 out of Boise, Idaho, to Boeing Field, Seattle. The flight plan called for visual flight to Yakima, Washington, then 500 feet on top the clouds to Ellensburg, Washington, on civil airway Blue 12 and from there to Boeing Field on civil airway Green 2.

The flight proceeded according to plan. The pilot made a position report to the McChord Flight Service Center, via Walla Walla Airways air-ground radio station. His report read: "over Yakima at 1250 Pacific Standard Time, altitude 16,500 feet, passing over Ellensburg at 1255 P." (The A-26 was making over 300 miles per hour, not considered unusual for this type plane.) The CAA air route traffic control clearance had been given through Yakima CAA radio range station and the flight proceeded on course, with 90 miles to go across the Cascade Mountain range before reaching Boeing Field.

Above the clouds overhanging the Puget Sound area, the A-26 approached the Seattle CAA radio range station. Letdown clearance was given to the pilot and the A-26 descended into the overcast.

In a few minutes, the on course signal gave way to a sound like eggs frying—precipitation static. The pilot soon advised on VHF (not affected greatly by static) that he could not make his letdown on account of the poor radio range reception.

Immediately, the senior controller at the Seattle Air Route Traffic Control Center issued instructions to the A-26 pilot to climb to 15,500 feet, called Sand Point Naval Air Station to start a search with its high-altitude radar search scope, and advised the McChord Flight Service Center of the action taken. The supervisor on duty at Flight Service alerted the McChord VHF radio direction finding station at McChord to establish contact and take bearings. The Coast Guard air-sea rescue unit at Port Angeles and the Whidbey Island Naval Air Station learned of the situation and the latter put its direction finding unit on the alert.

This unit located the lost plane just east of Port Gamble. A very short time later, the high search antennae of the Sand Point's GCA unit spotted the A-26 25 miles north of Sand Point. From that point on GCA units took over, directed the pilot to a lower altitude, and the GCA final controller brought the plane in for a safe landing 45 minutes after the beginning of the emergency.

The manner in which the various agencies coordinated their operations to bring this plane in safely is a tribute to the commanders whose initiative resulted in establishment of the plan. The incident itself is simple proof that a coordinated plan set up in advance of an emergency will save lives and planes. Absence of such a plan makes effective emergency assistance to aircraft doubtful if not impossible.

To the pilots who fly the Pacific Northwest, there is the reassuring knowledge that the system is standing by to guard their safety.

WELL DONE

TO

1ST LT. ELDON A. KLAPAL
161st Recon Sqdn. Photo, (JP)
Langley Air Force Base

1st Lt. Eldon A. Klapal, AO-811430, 161st Reconnaissance Squadron Photo (JP), Langley AFB, demonstrated superior skill and technique in a P-80 recently when he made an emergency landing with only the right main gear fully extended.

After completing a routine test flight, the P-80 pilot began his letdown from 20,000 feet. At 18,000 feet while at an IAS of 400 mph the generator went out, causing a loss of hydraulic pressure and loss of aileron boost. Simultaneously, the airplane started a fast left roll. Recovery, while stopping the roll at approximately 135°, required 8,000 feet. After recovery, the pilot climbed back to 15,000 feet and discovered that he could fly the fighter in a straight and level attitude at between 100-200 mph. All possible emergency measures were attempted in an effort to lower the gear, resulting in the right gear locking down, the nosewheel extending partially, and the left wheel remaining locked up.

Having ascertained that a landing with only one wheel down and locked was inevitable, the pilot dropped his tip tanks and made a long straight-in approach. The P-80 was landed on the right wheel and the left wing was held up with aileron. As the wing settled, right brake was used to keep the plane straight. After braking became ineffective due to dragging of the skidding wing, the jet veered off the runway and came to a stop 180° from the landing direction and about 75 feet to the left of the runway. Only minor damage resulted.

AIR POLICE

Many states are training police officers in apprehension of violators of flying laws, and 12 states now have special aviation police. While few states write their own regulations governing flight, the majority enforce uniform CAA rules for safe operation of airplanes. In investigating accidents to civil planes, 24 states have their special agents and 26 cooperate actively with federal investigators.

B-29 MODIFICATIONS

To serve as replacements in existing groups and to help fill up new groups, Boeing B-29 Superfortresses are being flown into Wichita for factory modification. The modernization of planes recalled from various depots and bases include: improved electronic equipment, addition of fuel injection systems, installation of pneumatic bomb bay doors and modifications for re-fueling.

HANDS OFF

AF Regulation 60-15 has been published in an effort to reduce the number of inadvertent retractions.

According to this new regulation only pilots and co-pilots may actuate the landing gear controls. This duty can no longer be delegated to the engineer or crew chief.

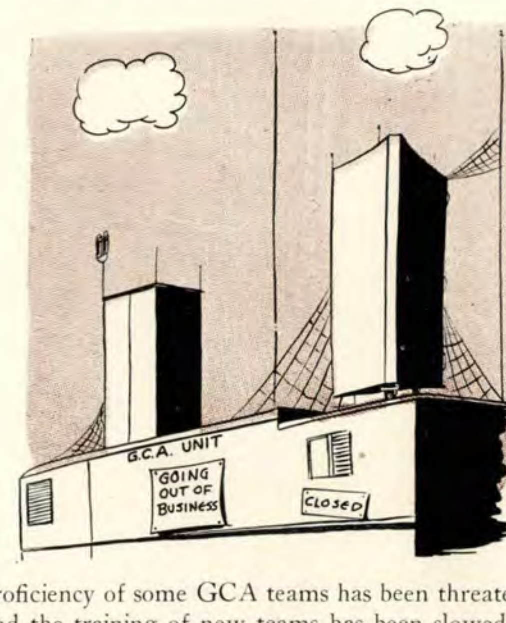
Voice command followed by the approved hand signal, each of which is to be repeated by the co-pilot, is now the only authorized communication procedure between the pilot and co-pilot for ordering the actuation of the landing gear.

USE GCA

The great value of the USAF Ground Controlled Approach (GCA) program is recognized. However, analysis of GCA traffic records throughout the Air Force reveals that many GCA facilities are not receiving sufficient flying support to maintain the proficiency of GCA operating teams or the required number of practice approaches essential to the training of new crews.

A minimum of 200 approaches each month are necessary to maintain the operating skill of a qualified GCA team, while at least 300 approaches per month are required in the training of a new GCA team.

Since actual ground controlled approaches are made only during adverse weather conditions, most GCA facilities must depend upon practice GCA landings to meet training requirements. Thus, the



proficiency of some GCA teams has been threatened and the training of new teams has been slowed.

In view of the necessity for the maintenance of an efficient all-weather Air Force, all pilots should aid in the training of GCA crews by making maximum use of GCA facilities.

PIF NIF BIF

Norfolk, Virginia
March 25, 1948

Adjutant General
U. S. Army
War Department
Sir:

While in the service I was given a book, which is considered to be restricted and secret. In a manual published by the War Department I recall that such books are supposed to be sent to the War Department. I would appreciate information for the proper disposition of this item.

Yours truly,
JOHN J. DOE, JR.

The only thing fictitious about this letter is the signature. It was received by the AG who in turn requested Mr. Doe to forward the "classified" material. Mr. Doe wrote back to the AG questioning

the advisability of using the U. S. Mail for dispatching the book. The Adjutant General contacted Fort Monroe, Va., and arranged for a guard to pick up the book. Meanwhile, Mr. Doe, apparently unable to endure the strain of it all, was hauled off to the hospital with a nervous breakdown. Mr. Doe, Sr., who was holding down the fort while Jr. was in the hospital, took the guard up to Jr.'s room and there, lo and behold, under the mattress was the "restricted and secret" book . . . a Pilot's Information File.

For the information of all Air Force personnel, the PIF, NIF, BIF and several other manuals have been rescinded and declassified. The Air Force has several thousand copies of these books which (one each to a customer) are now available to Air Force personnel for the asking. Drop a line to FLYING SAFETY Magazine and we'll try to fill your request.

NACA AIDS USAF

The military application of aerodynamics has overshadowed the commercial applications for quite some time, particularly since 1940, and there appears to be no change in this trend. Consequently, the USAF has a vital concern in the aerodynamic studies underway at the various NACA laboratories. (The National Advisory Committee for Aeronautics is an independent Government agency whose

funds are appropriated each year by Congress and whose mission is to advance the art of aeronautics.)

In fact, many of the investigations now underway NACA labs have been initiated at the request of the Air Force. While many of the projects have security classifications because they are in the supersonic regime other projects have the end purpose to make the operation of aircraft safer. Meterological and anti-icing studies are of that type. Since so much of what NACA learns is of immediate interest or application to Air Force developments, Air Materiel Command maintains field offices at each of the NACA facilities to monitor specific USAF projects and report on basic research findings having possible military application.

LINK WITH A FLAMEOUT

By T. E. MULFORD
Link Aviation, Inc.

YOU wouldn't recognize the little ground-bound "airplane" now. The Link Trainer which you and 500,000 other pilots used during the war to iron out your instrument flying technique has come a long way.

Links were first utilized by the Air Force in 1934 and, while their maximum use has been in the field of instrument flying, special Links were devised during the war for training in celestial and dead-reckoning navigation, bombing, map reading, night fighting, and auto-pilot operation.

Since V-J Day, however, Link has concentrated its efforts in the field of operational flight trainers. Soon after the war it unveiled the unique C-8 instrument flying trainer which is now being utilized at Air Force bases throughout the country. This was the first Link to incorporate both flight and engine instruments, trim tabs, landing gear and wing-flap controls, and a number of other new developments, each of which augmented the trainer's flight-like realism.

Now, Link has progressed far beyond the C-8 and finds itself in the completely new and untouched field of jet aircraft training. First step in this direction has come with development of a jet trainer for the Equipment Laboratory at Wright-Patterson AFB. When completed, it will be a far-reaching step in the synthetic training field.

Because of the high performance of the airplane itself, pilot training for jet aircraft has become increasingly important. Add this to the critical nature of jet engines and the manifold peculiarities of sub and trans-sonic flight, and the training problem becomes acute. The need for synthesizing accurately the conditions of jet flight so that thorough and proper training—minus cost and hazard—may be achieved is obvious.

For more than a year Link engineers have devoted their efforts to meeting this need. Now, after an exhaustive amount of research, the jet trainer is taking form.

In the Link jet, all controls, valves, switches and indicators of an actual jet aircraft will be included —and they will function exactly as in flight. The trainer will also have a check pilot's or instructor's station located slightly behind the cockpit from which emergency situations may be induced.

Failures which occur in flight due to a pilot's error in controlling the engine, will occur automatically in the trainer, and the reason for the failure will be signaled to the instructor. For example, engine failure due to the pilot permitting an rpm too low for a given altitude will light a window on the instructor's panel. This will show "altitude flameout" in addition to producing the correct effect on trainer "performance." In the event of engine failure because of too rapid throttle movement, "throttle flameout" will be signaled to the instructor. Likewise, in the trainer a sequence control will permit or prevent a successful engine start according to whether a proper sequence was followed. If not, it will tell the instructor what was omitted or done wrong.

The old Link "crab" is being displaced by a new type of recording equipment which provides a tracing of both ground track and altitude profile of the flight.

Also new to the synthetic training field are the radio facilities now being provided. These facilities include automatic accurate simulation of both the low frequency AN type radio ranges and the new high frequency omni-directional ranges of the two or three different types now being installed about the country. Included also is the latest distance-measuring equipment (DME), which is associated with omni-directional ranges to provide a fix from one station as well as a provision for all different landing systems.

The radio facilities not only provide for cross-country navigation, but are sufficiently flexible so that all of the various radio aids at a given location may be set up and utilized in order that the complete approach and landing problem may be carried out exactly as it would be at that particular station.

As aviation continues to advance, so does the demand for up-to-date training devices. Such contributions to flying safety as the jet trainer will help military airmen to keep pace with the future.

LIFE IN A BRASS BOTTLE

By JOHN O. MOORE
Medical Research Analyst Hq USAF

ON A RECENT night cross-country flight two jet fighters were cruising at an altitude around 30,000 feet. After being airborne for almost an hour, the wingman called and stated that the flight leader was flying inverted. After a quick check of his instruments and visual reference to the other plane, the flight leader told his wingman that everything was under control.

Shortly afterwards the wingman called to say that the flight leader was again flying inverted. This time, guessing what was happening, the flight leader told his wingman to check his oxygen supply. This instruction was acknowledged. Two minutes later the wingman called and stated that he could no longer see the lead ship. He was advised to go on 100 percent oxygen and report readings on his oxygen gage. He acknowledged and stated that his oxygen gage indicated 100 pounds, but was falling rapidly. Immediately, a descent was initiated and at 22,000 feet, while in a 20 degree bank, the flight leader felt an impact on his right wing. He was thrown into a spin and recovery was made at 10,000 feet.

The flight leader began calling the wingman. While waiting for an answer, he noticed an explosion on the ground. He contacted the nearest radio facility and reported that he felt sure his wingman had crashed. A nearby base was located and after landing the pilot discovered that the right wingtip of his plane had been struck in the mid-air collision. The disintegrated wreckage of the wingman's fighter was located later that night.

This is a grim illustration of how quickly and inexorably anoxia can grab the controls of an airplane and take command from the best of pilots. The wingman first lost visual and then muscular coordination. He probably lost consciousness and crashed to his death—all this in a period of less than eight minutes. The last radio transmission received gave excellent support to the contention that his oxygen system was not functioning properly and he was suffering from advanced stages of anoxia.

Because the airplane was completely demolished, it will never be known which part of the oxygen system failed—tanks, lines, regulator, or mask. It *is* known that no emergency oxygen cylinder was carried by the pilot as required by Technical Order O1-1-298. No information was available concerning the compliance with Technical Order O1-75FJ-22, which gives information on the type of oxygen masks necessary for pilots who fly jet aircraft. This T.O. states that only the class P mask, type A-13 or A-13-A (Pressure Demand Oxygen Mask), will be used by pilots who fly jets. In addition to this instruction, the T.O. states very clearly that at no time before takeoff should the oxygen pressure read less than 400 psi and that, with each fuel servicing operation, the oxygen system shall be serviced fully.

Flying Safety BRIEFS . . .

WHY THE JET BUGABOO?

The American public as well as a few Air Force personnel still think of the jet as something to be feared—a plane which flies too fast for positive control and one which calls for daredevil pilots and superman crew chiefs.

With such an impression existing one would believe that it stems from discussion and editorial comment of the high accident rates which characterized the F-80 during the first few thousand hours it was flown.

A comparison of accident data on the F-80 and other fighter aircraft during their first 100,000 flying hours will dispel the bugaboo about jets.

Studies made in Flying Safety Division show that it is fallacious to assume that a plane is unusually dangerous because its accident rate during the initial phases of its flying compares unfavorably with that for aircraft with which the USAF has already had considerable experience.

During the first 100,000 hours of flying logged in B-25's in the United States after their acceptance in 1941, these bombers were involved in 133 major accidents. But their accident rate continued steadily downward as airmen grew familiar with them, and in the 100,000 hours before the planes rounded the half-million-hour mark, their major accidents numbered only 39.

A similar clearly defined downward trend in accident rates from their "perilous experiment" stages is observed for all Air Forces planes for which complete accident histories are available.

Compared with the F-51, which it resembles most closely in flying characteristics and in types of missions, and with the F-47, the Shooting Star's early accident performance has been creditable. During its first 100,000 hours of flying in the United States, the F-80 suffered 181 major accidents.

The F-51, during the 100,000 hours following the start of its military career, was involved in 192 major accidents in the United States, while 220 major crashes were charged to F-47's in this country. As Air Force's knowledge of the two conventional fighters increased, their accident rates moved steadily downward, so that the F-51 sustained 80 major accidents and the F-47 was involved in 101 major accidents in the 100,000 hours preceding their half-millionth flying hour. It appears reasonable to anticipate a similar reduction in the Shooting Star's accident rate as experience with the plane accumulates. Meanwhile, on the basis of an appropriate comparison with similar models, the F-80's accident record does not characterize it as a peculiarly hazardous fighter.

The records indicate that for the year 1947 the F-80 had the lowest accident rate of any single-engine operational fighter in use by the USAF.

KEEP THEM AWAKE

By MAJ. WILLIAM P. BENEDICT
Headquarters Air Training Command
Barksdale AFB, La.

Just about the most uncomplimentary thing that can happen in a Flying Safety Meeting is for the lecturer to have to say, "Hey you, wake up!"

To ignore the guy who is sleeping is the easiest way to handle a lecture. But for those who are interested in improving safety meetings to the point where 50 per cent or more of the listeners will get the message and stay awake at the same time, here are a few of the basic fundamentals.

1. Don't apologize for anything you are going to talk about or tell them you're not completely prepared. If you start out by saying you're sorry, but "we all have to stay here an hour anyway, in the name of Flying Safety"—then you might as well take out the dice and start a game.

2. Have a surprise some place in your lecture and follow it up—it helps to start out and end up with a punch. Never just unwind slowly all the way through a lecture in the same tone of voice.

Get enthused, shake 'em, tell 'em, compliment 'em, change moods!

3. Aids—Use any and all aids that you can beg, borrow, or devise. It's like instrument flying—no use making it hard for yourself by caging the gyro's. You use *all* the instruments when flying instruments, so use all the charts, films, mock-ups, blackboards, cartoons and anything else that you can get into the joint that will help make a point. In other words use the full panel system all the time!!

That brings us to *Training* Films. There's one called "Flight Service" (Training Film 1-4004) that is on Plan 62 and narrated by Bob Hope. You can get this film right now from any USAF film library. For general "fill-in" use, there are three new Films called "Flying Follies" I, II, III, (T. F. 14038).

For Flying Safety Joes that are interested in Arctic Air Safety there is a new series being filmed on "High Latitude Survival" that will be ready early in 1949. Other films are being prepared on flying safety, air rescue, weather and communications. Our Air Force is loaded with training aids which can be obtained from Hq AFTRC.

In case you have an idea for a good film or training aid, submit it in accordance with AF Letter 50-6, 13 April 1948 and it may be used.

There are a few fine points on the discussion of aircraft accidents. It is rather boring for pilots to have half a dozen accident reports read to them and then asked the foolish question—"Are there any questions"? Pick your accidents for their specific value in getting across safety points that are related definitely to the flying that your audience is doing this month or this year. Have a list of specific questions to ask your audience that is designed to accomplish one or more of the following: (1) start an argument between two schools of thought that you know to exist within your audience. Then be sure you can steer them to the right answer. (2) Start a discussion that, with your help, will end up with your listeners coming out with the correct solution by virtue of their experience and good judgment. Don't kill audience initiative, however, by posing as the only master of the subject.

Anything you can bring along, such as cartoons, drawings, charts, or actual wrecked parts—are all legitimate tools of the trade—use them!

Another good trick is to keep up with developments of AACS, Flight Service, Flying Safety, the AF Instrument School, the CAA and any one else that can give you timely information.

CHECKLISTS

Pilots assigned to the Air Transport Command's Pacific Division, 2nd Air Transport Group, at Fairfield-Suisun AFB, California, use and rely upon their cockpit checklists.

Termed "Flight Deck Coordinators," by Pacific Division personnel, the devices are small, about 3" by 4", and operate as a scroll, rolling from top to bottom by means of small knurled knobs rotated by the pilots as the checklist is called off. The coordinators are lighted for night operations.

The 2nd Group's 26th Air Transport Squadron is assigned Boeing C-97's for operational use, flying between the mainland and Hickam AFB, Honolulu, Hawaii. By actual count there are 144 separate items on the coordinator that flight crews must check before opening the throttles for takeoff.

In addition to complete checklists for flying, procedures for almost all in-flight emergencies are also printed on the scrolls.

ATC's Pacific Division has flown more than one hundred and twenty million passenger miles in scheduled operations during the past two and one half years, all without fatality on Trans-Pacific operations. To say that checklists alone were responsible for establishing this safety record would be wrong. Excellent and well-qualified crews, superior maintenance and proper supervisory care should also be included. However, the fact remains that not a single accident has been charged to failure to use the checklists.

ONCE IS ENOUGH!

(Editor's Note: These are experiences of pilots who knew better but had to undergo a bit of a shake-up to have the safety lesson sink in. The authors of the following stories remain anonymous at their own requests. If you have had a "Once Is Enough" experience, share it with other airmen by sending it direct to the editor, Flying Safety, First Region Inspector General, Field Office of The Air Inspector, Langley Air Force Base, Hampton, Virginia. We will withhold your name on request.)

Allowing three days for a $100.00 funeral, I should have been planted in the bone orchard on the 19 December 1947. I am an iceman by profession. Not the type who hauls the stuff from truck to ice box, but one of the few who pick up ice on airplanes and haul it around so that it can be photographed and studied by people who photograph and study ice. In short, I fly an ice wagon for the Aeronautical Ice Research Laboratory of the Air Materiel Command.

It was on the night of December 16, 1947 that I taxied out to the runway at Wold-Chamberlain Field. We were about to ferry one of our flying laboratories, the C-54 described in the article "*Ice Research in August*" on page 10 of this magazine, to Wright Field. This airplane was equipped with three Hamilton standard props and one Curtiss electric installed for experimental purposes. The engine runup and check revealed that previous trouble encountered in the Curtiss installation had been remedied by the installation of a new governor that afternoon. After the governor installation, the prop had been painted a bright red. The engine ran smoothly so the possibility of critical unbalance induced by the red paint job was dismissed.

With everyone satisfied that the trip to Wright was in the bag, we started down the runway.

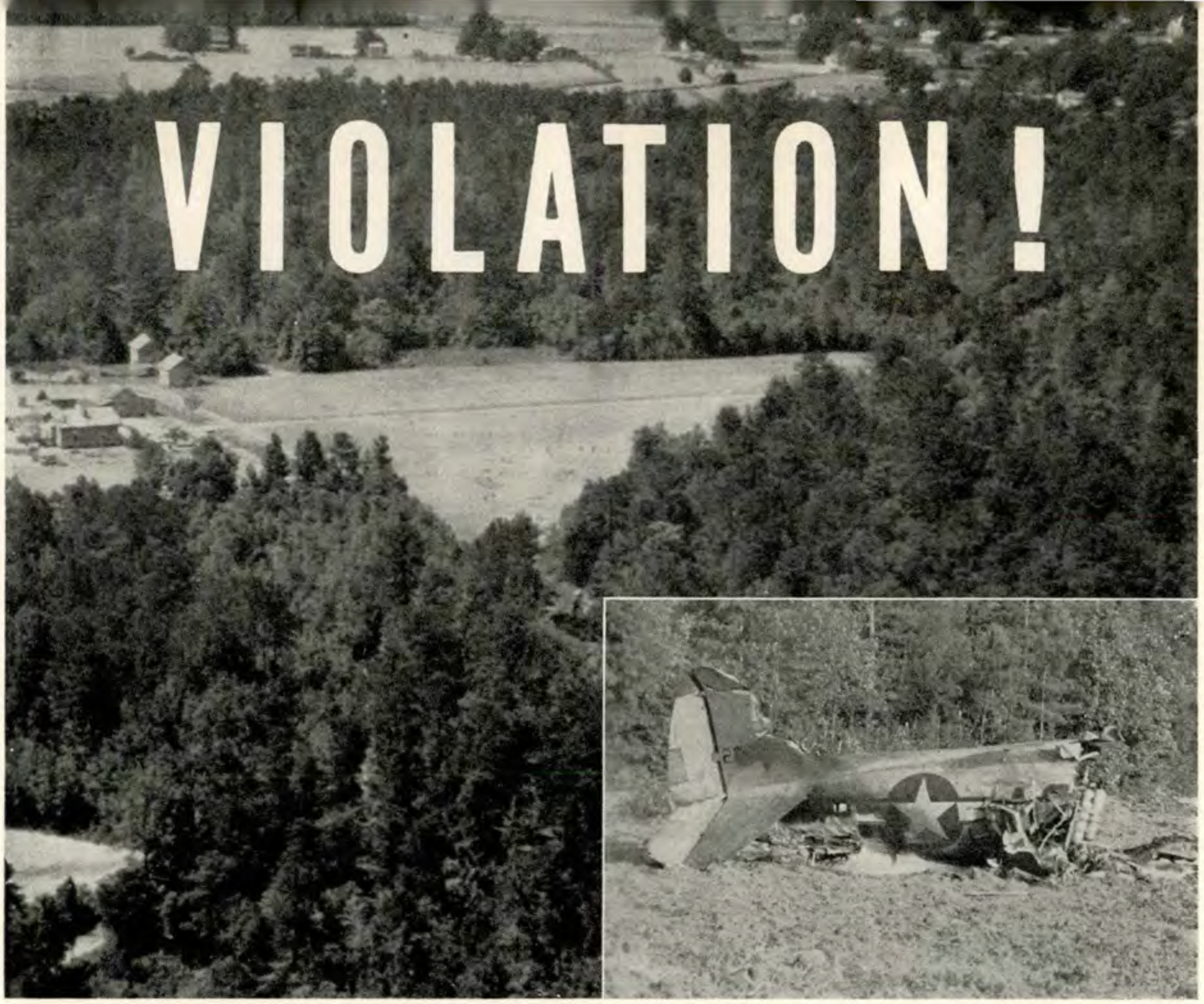
The electric prop surged a little, but was brought back by the copilot's use of the throttle and the governor began controlling properly. As we became airborne, the C-54 developed the palsy. When it appeared that some part of one each C-54 was going to shake loose, the copilot feathered the No. 2 engine on the assumption that all was not well with the electric prop. Smart boy—the vibration ceased. We climbed on up to pattern altitude and turned on a downwind leg for a landing.

Then I made my big mistake. I told the copilot to unfeather the fan and, as he did so, I brought the power up rapidly on No. 2 as the engine temperatures were still in the green. The C-54 seemed to stop in mid-air and back up, associated with left wing heaviness, left yawing and a severe buffeting of the controls. The vertical speed indicator and altimeter told me to have a runway installed in front and about 400 feet below the airplane, but quick. Since time was running out, this plan was discounted, so I called for wheels down and made a steep turn for the nearest strip. As the wheels locked in place we touched down on the runway.

After taxiing back to the ramp, we were even more confused because everything appeared normal. When we unfeathered the electric prop in the pattern, it went into full reverse. We didn't discover this fact until 24 hours later. Since the tachometer and manifold pressure gages had indicated that the engine was operating properly, I had added power to all four engines in an attempt to get a more satisfactory reading on the altimeter and vertical speed and airspeed indicators. Our airspeed actually dropped from 190 to less than 135 mph with a rate of descent of 500 feet per minute. All this with 40 inches Hg. too.

Our trouble was certainly an isolated case caused by faulty installation. However, if this ever happens to you, don't do as I did, do as I say, "Take it out of reverse."

VIOLATION!



An instructor pilot and student officer were assigned to fly an instrument training mission in F-47's.

The instructor who was to be the observer and responsible for the proper supervision of the mission took off first, followed a few seconds later by the pilot scheduled to fly instruments. They climbed in formation to 8,000 feet. The leader told his wingman to pull ahead and fly instruments.

As the wingman pulled ahead, the flight leader assumed the safety observer's position, slightly to the rear and to the left.

Shortly after taking the lead, the pilot scheduled to fly instruments started a series of steep, diving turns which rapidly developed into a rat race with the observer pilot following him closely.

At no time did the student pilot indulge in his scheduled instrument practice. The rat race extended down to within a few hundred feet of the ground and several "buzzing" passes were made over a farm.

They made a low diving pass at approximately 200 feet and pulled up into a steep climbing turn to the left. The observer continued his climbing turn while the student pilot dived down to make another pass.

The observer called his wingman for the first time and told him to join up in formation. He looked down and saw the wingman's plane crash in an open field. It had flown through the tops of some trees. The airplane immediately caught fire and the pilot was killed instantly. His body was thrown clear of the plane upon impact.

Investigation revealed that the observer had been instructed previously to comply with all safety precautions and regulations, although, for this particular mission, he had received practically no briefing.

In turn, the observer had briefed his wingman only on the takeoff and landing times. He admittedly did not use, or intend to use, the instrument training missions and he did not check to see whether his wingman was prepared to use instrument flying aids.

Such gross neglience of duty and responsibility is inexcusable and it was recommended that the flight leader be court-martialed for his violations of flying regulations.

ODR - - - NAVIGATIONAL AID FOR THE FUTURE

By R. L. DANIEL

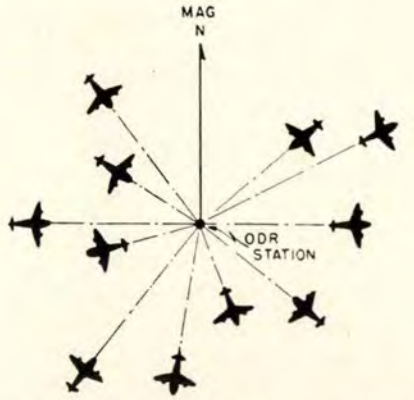
Systems Design Engineer

Bendix Radio Division of Bendix Aviation Corp.

THE NEW VHF Omni-Directional Ranges (ODR) provide facilities never before available in a radio range. The design of the NA-3 Navigational System enables the pilot to navigate with great convenience and reliability through the use of very high frequency bands.

First, the frequency range used is almost completely free from atmospheric static and from the noise interference known as "precipitation static" (rain, snow, or dust static). The navigation facility is thus usable and reliable at the time it is needed most.

Second, more channels are available in the very high frequency band than in the low frequency range band. There is far less interference between channels since the transmissions do not extend beyond "line of sight" distances. This limit of line of sight distance to radio transmission practically eliminates interference between stations on the same frequency if the stations are located so that the aircraft cannot "see" both stations at once. Third, and very important, the Omni-Directional Range is not limited to two or four courses. It will provide accurate course information on any course to the station the pilot may select, hence the name "Omni-Directional Range."

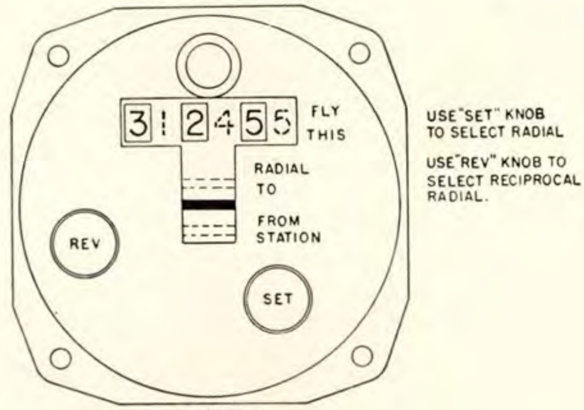


PILOT MAY SELECT ANY COURSE (RADIAL)
HE CHOOSES TO OR FROM THE ODR STATION

An infinite number of courses to the ODR station are available to the pilot of an aircraft equipped with this equipment. Since these courses radiate from the station like spokes from the hub of a wheel they are called RADIALS. The ODR station transmits a different signal over each of the radials. The bearing information is thus generated at the station and transmitted to the aircraft. It is the function of the NA-3 airborne equipment to receive this signal and translate it into an indication which the pilot can use.

Basic information furnished the pilot by the NA-3 Navigational System is the bearing, with reference to magnetic North, from the airplane to the Omni-Directional Range station. This bearing can be flown to the station by reference to the magnetic compass.

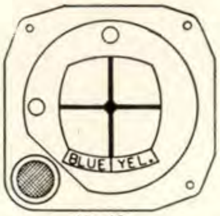
The Radial Selector is the instrument by which the pilot selects the radial desired. It is of standard three-inch aircraft instrument size. A radial is selected by rotation of one of the knobs on the face of the instrument until the desired radial appears in the window. The other knob operates a shutter which exposes the direct radial reading to the ODR station, or, if turned, exposes a second window in which the reciprocal radial, the course away from the ODR station, can be read. A pointer on the face of the Radial Selector indicates whether the radial which can be read in the window is the



MN-82 B
RADIAL SELECTOR

"RADIAL TO" the ODR station or the "RADIAL FROM" the ODR station. Simple, isn't it?

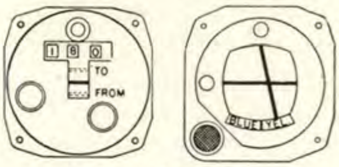
The vertical pointer of the Course Deviation Indicator (Cross Pointer Meter) indicates positional deviation from the selected radial. In order to fly a selected radial to the station, the correct approximate aircraft heading is first established with



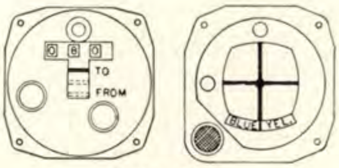
ID-48
COURSE DEVIATION INDICATOR

the aid of a magnetic compass. The Course Deviation Indicator indicates whether the aircraft is exactly on the selected radial or to the right or to the left of it.

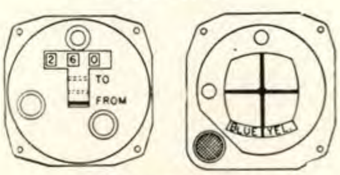
The pilot of an aircraft passing an ODR station may wish to take a bearing on it. To determine a bearing from the aircraft to an ODR station, the radial selector knob can be turned until the Course Deviation Indicator is centered. Then if the pointer indicates "RADIAL TO" the station the bearing which is visible on the indicator is that from the aircraft to the station. If the pointer indicates "RADIAL FROM" the station the radial which is visible is the reciprocal of the radial to the station. In this last case, the second knob on the instrument might be used to operate the shutter to cover the reciprocal radial and expose the radial to the station. At the same time the "RADIAL FROM" pointer will automatically change its indication to "RADIAL TO" the station.



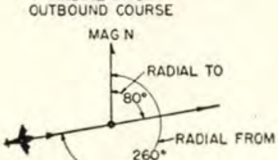
RADIAL NOT SELECTED

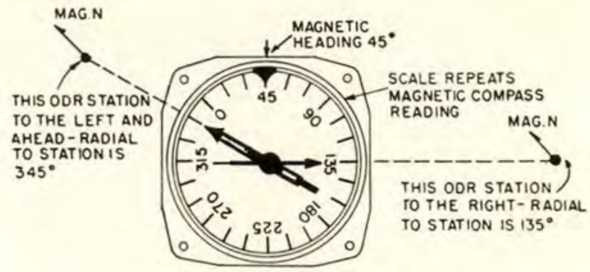


"RADIAL TO"
INBOUND COURSE



"RADIAL FROM"
OUTBOUND COURSE





MN-72A
RADIO MAGNETIC INDICATOR

It is important to note that this indication of the Omni-Directional Range data is not aircraft-heading sensitive. *The instrument indicates magnetic radial directly to or from the range station regardless of aircraft heading.*

By the use of another instrument, the Radio Magnetic Indicator, the aircraft magnetic heading information from a fluxgate compass may be electronically combined with the ODR radial information to provide a fully automatic bearing indication exactly like the present ADF indication, but having all the advantages of VHF operation.

The basic information given by the ODR is direction to the ground radio station. To obtain a "fix" for determining the position of the aircraft, it is necessary to use triangulation from two or more ODR stations.

A new radio aid to navigation, now in the final development stage, is called Distance Measuring Equipment (or DME). It will be available to enable the pilot to obtain a "fix" by using only one VHF Range Station.

The VHF Omni-Directional Navigation System will soon be used in all domestic scheduled transport aircraft and is slated for wide use in military aircraft as well. Development in this new field has highlighted the practicability of the use of VHF for navigation of aircraft. The VHF Omni-Directional Range System is considered to be one of the most important contributions to increased air safety through more accurate navigation since the introduction of the automatic radio compass.

LETTERS TO THE EDITOR

Dear Editor:

I would like to see more articles on the progress being made by the USAF in solving the problems of Uk-Shuk (Eskimo for winter) flying.

While Alaska has extremes in weather, planes are not grounded here as often as people in sunnier climes think. Alaska had a very mild winter this year—the lowest temperature reached was only minus 43 degrees. During previous winters minus 68 degrees F. temperatures have been encountered, and it is under such conditions that conventional equipment is difficult to use. For example, the consistency of engine oil approaches soft putty, synthetic rubber becomes brittle and shatters like glass, fuels will not vaporize, and grease becomes hard and stiff.

Although some of these problems have been overcome as a result of the testing program, most airmen here agree that the most promising development in cold weather flying is the advent of jet propelled airplanes. The jet plane is far more adapted to cold weather operation than were its predecessors with conventional power plants.

Captain, USAF
Alaskan Air Command

★

Dear Editor:

Your magazine gives us a good picture of how to make flying safer. We mechanics particularly liked the story on engine conditioning in the May issue. Give us some more stories on maintenance as it seems that more than two-thirds of your stories are written for pilots. We think maintenance deserves more space.

Master Sergeant, USAF
Scott AFB

See page 4 for part II of Engine Conditioning. The proportion of stories written for pilots is necessarily high because the majority of USAF accidents can be attributed to pilots. We are always pleased to be able to permit good maintenance stories. What do you suggest for future editions?—Ed.

★

Dear Sir:

I hold the MOS. of 552, tower operator. I have read of only one instance where the tower was the subject of an article in Flying Safety, and if you would elaborate only slightly the duty and responsible jbo that tower work is, I am sure that someone would profit by it.

I have met pilots that have never been in a tower before and are completely unfamiliar with the job. We always show them around and compare notes if they show interest. If the pilots aren't familiar with our job, they could at least be informed of some of our problems. How can they rely on us and how can we rely on them if we don't know about each other? Our job isn't glory and we wouldn't know what to do with a pat on the back. We don't want one in the first place. Our thanks and pride is when we see an aircraft safely parked or when we see a pilot safely airborne.

I read thoroughly Colonel Wilson's article on ground accidents due to blind taxiing and we have encountered the same problems here. We have safely parked airplanes a good distance away from the tower but our instructions often were hampered by obstructions that could be removed.

Corporal, USAF
Okinawa

Thanks to the sergeant and corporal for their enthusiastic interest in accident prevention. We're looking for a good tower story, too.—Ed.

SAFETY QUIZ

1. When a line of thunderstorms must be flown through, the pilot should choose the one which has the
   - A. lowest top in relation to adjacent storms.
   - B. highest top in relation to adjacent storms.
   - C. highest base in relation to adjacent storms.
   - D. lowest base in relation to adjacent storms.

2. Sudden intense precipitation from a smooth-appearing deck of clouds indicates that within the deck of clouds there would be
   - A. smooth instrument flying.
   - B. rime icing only.
   - C. turbulent flight conditions.
   - D. stable air.

3. As a general rule, when flying in the vicinity of air-mass thunderstorms, it is best to
   - A. fly over them.
   - B. fly under them.
   - C. fly around them.
   - D. fly through them.

4. Usually a pilot approaching a thunderstorm containing hail would first encounter hail in the
   - A. clear air behind the storm.
   - B. center of the ice crystal zone.
   - C. clear air in front and on sides of the storm.
   - D. ice and water zone.

5. With wind velocity high and dew point spread large, the pilot can expect which of the following airport conditions?
   - A. Drizzle with restricted visibility.
   - B. Fog with restricted visibility.
   - C. Unrestricted visibility.
   - D. Thunderstorms.

6. Frontal fog is usually found
   - A. in the warm air mass.
   - B. in advance of the cold front.
   - C. in advance of the warm front.

7. A cloud cover at night over a land surface tends to
   - A. increase the surface temperature.
   - B. decrease the surface temperature.
   - C. increase the amount of surface cooling.
   - D. decrease the amount of surface cooling.

8. When the free air temperature curve slopes to the right of the adiabat concerned, the pilot should know that the
   - A. layer of air is unstable.
   - B. layer of air is stable.
   - C. freezing level is indicated.
   - D. top of the overcast may be estimated accurately.

9. On the adiabatic chart, absence of clouds is generally indicated by relative humidities less than
   - A. 100%.
   - B. 95%.
   - C. 90%.
   - D. 85%.

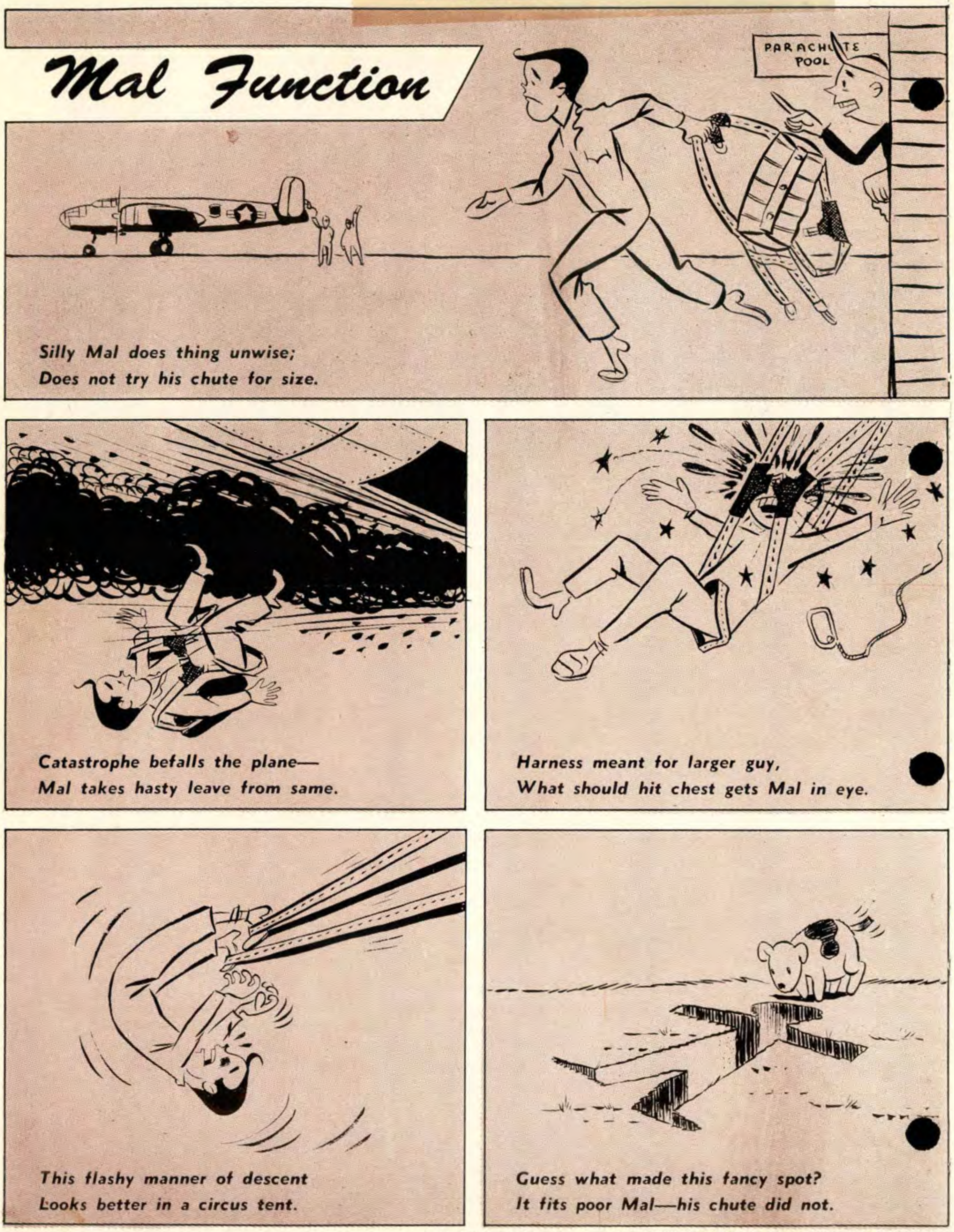
★

1—A, 2—C, 3—C, 4—C, 5—C, 6—C, 7—D, 8—B, 9—D.

WHY?

WHILE TURNING on the final approach, the pilot of this F-51D lowered wheels and full flaps. Airspeed dropped off to 145 mph indicated. Just prior to touchdown, the red landing gear warning light indicated momentarily that the gear was not down and locked. The pilot proceeded to land—wheels up. He stated that he thought his wheels were down and locked since the red warning light had gone out, but later remembered adding throttle just before his roundout. He stated that he didn't remember seeing the green light. Advancing the throttle beyond 20″ HG normally will cause the red light to go out. Subsequent investigation led to the conclusion that the pilot had not placed the gear in the full down position. The P-51 received major damage. WHY?

Mal Function



Silly Mal does thing unwise;
Does not try his chute for size.

Catastrophe befalls the plane—
Mal takes hasty leave from same.

Harness meant for larger guy,
What should hit chest gets Mal in eye.

This flashy manner of descent
Looks better in a circus tent.

Guess what made this fancy spot?
It fits poor Mal—his chute did not.

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