JUNE 1955

FLYING SAFETY

UNITED STATES AIR FORCE

• Page 4 . . . USAF's New Light Bomber

FLYING SAFETY

VOLUME ELEVEN NUMBER FIVE

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REX SAYS: See page 16.

SUBSCRIPTIONS

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USAF PERIODICAL 62-1

HOW WELL CAN YOU REMEMBER?

The questions in this quiz are based on the last three issues of FLYING SAFETY (April, May and this issue). The answers are in the box at the bottom of this page; but no fudging, take the test and *then* check your answers. Watch it though, if you miss more than five, you don't pass!

APRIL

1. What is the average jet engine acceleration time?
   - *a. 5 - 10 seconds.*
   - *b. 10 - 15 seconds.*
   - *c. 15 - 20 seconds.*

2. The ventilated portion of the pressure suit will keep a man in thermal balance with cockpit temperatures of:
   - *a. 90 degrees F.*
   - *b. 140 degrees F.*
   - *c. 190 degrees F.*

3. Records indicate that 80 per cent of all tornadoes occur between:
   - *a. noon and midnight.*
   - *b. sunset to sunrise.*
   - *c. during daylight hours.*

4. The C-11B is a trainer rather than a simulator because its cockpit configuration and flight performance do not duplicate any specific aircraft.
   - *a. True.*
   - *b. False.*

5. Visibility minimums are being published in the current revisions of the instrument approved charts.
   - *a. True.*
   - *b. False.*

6. When you reduce engine RPM from 100 per cent to 90 per cent the engine thrust is reduced to:
   - *a. 90 per cent.*
   - *b. 85 per cent.*
   - *c. 75 per cent.*

7. When planning a flight in the vicinity of a prohibited restricted or warning area, check the:
   - *a. Radio Facility Chart.*
   - *b. AFR 60-9.*
   - *c. Supplemental Flight Information Book.*

MAY

8. The C-123 is equipped with fully reversible props.
   - *a. True.*
   - *b. False.*

9. In all cases when landing a B-47 aircraft, the outrigger will prevent dragging a wingtip or outboard engine.
   - *a. True.*
   - *b. False.*

10. Fewer compressor stalls occur in centrifugal jet engines because they operate at a much higher pressure ratio.
    - *a. True.*
    - *b. False.*

11. It is possible to make a VFR arrival or departure at a base where local IFR weather conditions exist.
    - *a. True.*
    - *b. False.*

12. The Bendix Carburetor installation on a B-25N can be identified by:
    - *a. Location of the airscoops in the nacelles.*
    - *b. Checking the engine access door.*
    - *c. Reading placard on engine nacelle.*

13. The F-89D is restricted from spinning because of the excess weight of the wingtip rocket fuel pods.
    - *a. True.*
    - *b. False.*

JUNE

14. Partial flaps are used for normal takeoff in B-57B aircraft.
    - *a. True.*
    - *b. False.*

15. An advantage to liquid oxygen is that its combustion potential is low.
    - *a. True.*
    - *b. False.*

16. The region west of the Continental Divide is the predominant thunderstorm area.
    - *a. True.*
    - *b. False.*

17. A running pick-up can be used if hovering or landing are impossible during a helicopter rescue.
    - *a. True.*
    - *b. False.*

18. "Useful consciousness" at between 30,000 and 35,000 feet is about:
    - *a. 10 seconds.*
    - *b. 30 seconds.*
    - *c. 60 seconds.*

	APRIL	7. a.	13. b.
	1. b.	MAY	JUNE
	2. b.	8. a.	14. b.
ANSWERS	3. a.	9. b.	15. b.
	4. a.	10. b.	16. b.
	5. a.	11. a.	17. a.
	6. c.	12. a.	18. b.

LETTERS TO THE EDITOR

Jet Special Studies

When, if ever, are you coming out with another up-to-date jet special study? Your last one was very well received here and my copy is getting a little dog-eared from so much use.

If for some reason you are not planning to prepare and distribute another special issue of all jet operations, I would like to know so that I can dig through the old mags and make up my own list for future reference.

If you are planning a special study, when will it hit the field?

In closing, I would like to congratulate you on the good job you are doing on the magazine.

Major Thomas J. Williams
U.S. Air Force

Thanks for your letter. A selected study on jet operations and flying techniques is at the printers now and should be ready in about three weeks. They will be available upon request through your base Flying Safety Officer.

Experimental Jet Logs

I am submitting the attached exhibit on behalf of the Jet Flight Log problem, especially from the standpoint of the single seat type aircraft.

Over a period of 12 months much cross-country flight experience was obtained (T-33 type aircraft) and many local type Flight Progress Charts or Logs of varying nature and design were used. This afforded ample opportunity to develop a flight chart to one's particular standards.

The following provisions were adhered to completely . . . pertinent data — included . . . irrelevant data — excluded . . . space—alloted as seemed necessary . . . order or system—placed so the data progress naturally.

The front side contained:

Letdown: Make certain that destination has a Jet Letdown and that same is in possession of pilot.

Service: Assure that the aircraft was fully serviced and entry made to that effect in Form 1.

EGT: Max. and actual, very important for some type of jets.

Oil: Pressure at takeoff, a necessary figure for some aircraft.

Cruise: Insert as seen fit: climb-tips full — tips out — pylons full — pylons out — etc.

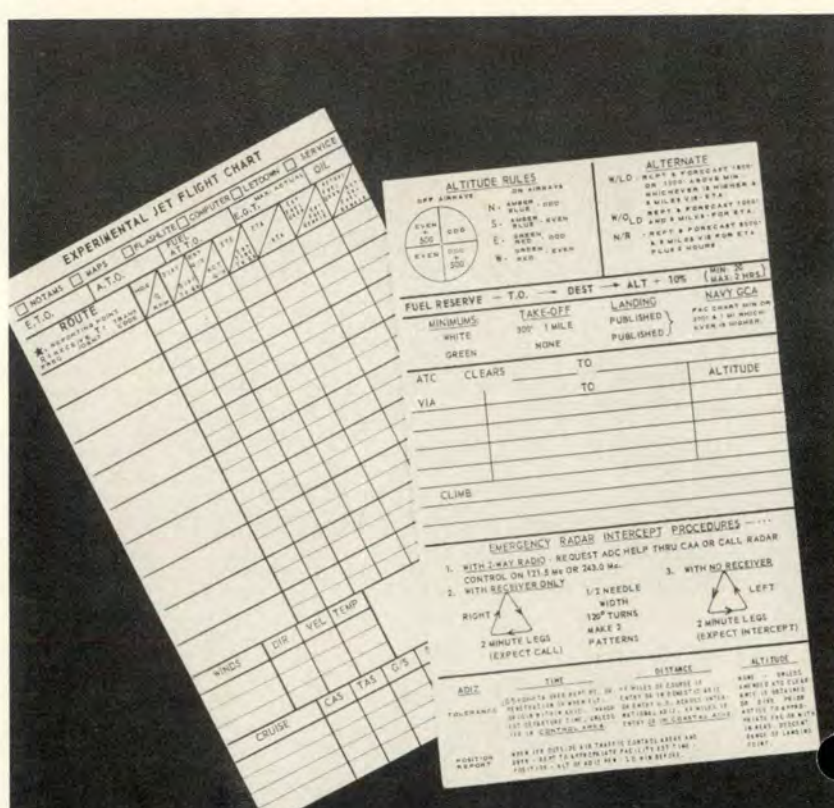
R.F.: Here the range factor is inserted. Under *Range* or *Endure* is inserted distance for range and/or time for endurance.

Comments from other pilots in the squadron were favorable concerning this experimental jet flight chart.

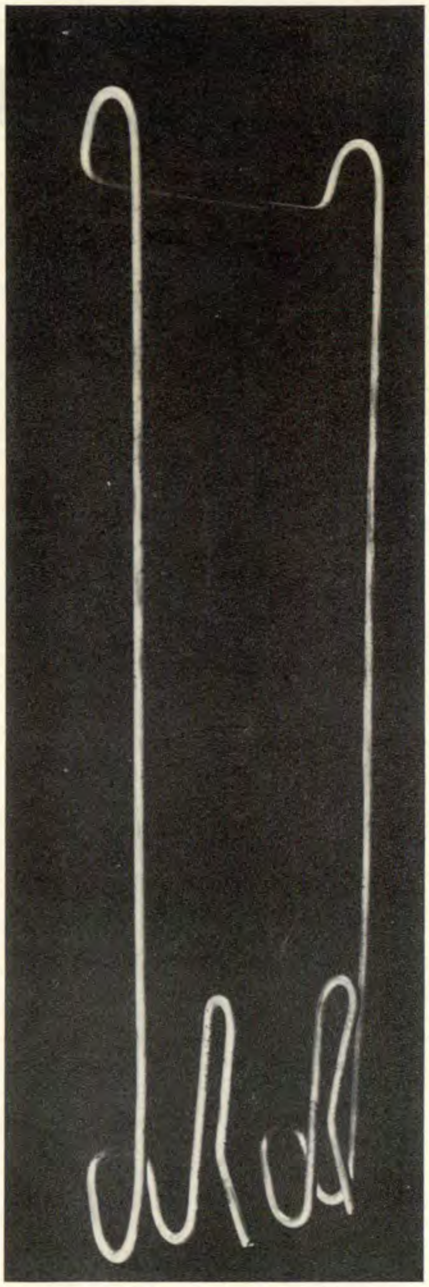
With the aim of offering this type of jet chart to as many pilots as possible, six copies are being sent to the USAF Aeronautical Chart and Information Center (Research & Liaison), Washington, D. C., for whatever use they may think necessary or practicable.

Should these charts be approved for widespread use, reference may be made to the form number in the

In the constant quest for simplification, these experimental jet logs are another step forward.



A holder for the jet letdown chart, improvised from a coat hanger, fitted on the panel of a T-33.



lower right hand side of the chart, viz., Air Force LAFB — L — 4 — 850. The 2200th Field Printing Unit at Langley AFB, Va., has the plates on file. Thus duplication in reproduction costs would be eliminated.

Capt. Robert A. McCauley
509th F-B Sq
Langley AFB, Va.

We're passing along to our readers another good idea from the field. Don't forget to send us yours!

His Best Uniform

The pilot and instructor pilot carefully prepared for their flight to a destination 1 + 30 away by T-Bird. Maps were prepared properly, flight log made out and flight plan given a lot of thought. The form 175 was signed and telephoned to flight service. Clearance was received and the pilots proceeded to their T-Bird with their luggage and flight gear.

The luggage consisted of the pilots' clothing contained in a thin plastic bag. This was draped over the radio equipment in the left nose section of the '33 and the gun bay door secured.

Proper walk-around check was completed, everything okay. A start was made and taxi-out accomplished. Takeoff was normal and the aircraft bored up through the overcast.

Everything was beautiful for the first 100 miles. Then the No. 1 inverter failed, but the pilot switched to the No. 2 inverter and continued on course. At the end of the second hundred miles the No. 2 inverter failed; however, with VFR conditions there was no sweat, and they landed okay.

A good landing was made at the destination: taxi-in, parking and shut-down were accomplished okay. The pilot wrote up the failed inverters on the Form 1.

The luggage was taken out of the nose and then the swearing started. Both the blouse and trousers belonging to the instructor pilot had been burned completely through. The only clothes he had along were ruined and he had to stay all night. To top it off it was his newest blues — purchased just a month ago. Bye, bye $85.00.

The pilots had hung their clothing over the air intake side of the inverters; without air the inverters burned out. Heat from the inverters burned the radio cable and destroyed the pilots' clothing. Two inverters and one coaxial cable to the ARC-27 also were listed as casualties, along with the uniform.

Capt. George M. Hall
Hqs 4th AF (IG)
Hamilton AFB Calif.

A Holder for your Chart

1st Lt. Donald Robison, one of the jet fly boys here at Tyndall, got tired of dropping his jet letdown chart or trying to squint over his oxygen mask to get his inbound heading. He decided to do something about it. The attached photos show the results of his labor. This is a very simple device made of coat hanger wire and takes about five minutes time.

As you can readily see, the holder puts the letdown chart right in the middle of the normal instrument cross-check used while flying on the gages. The booklet that is being held is the local production made by the instrument section of the F-86D course here.

I feel that this gadget is of a general interest nature and could be used in almost every outfit that is flying the T-Bird.

Lt. Col. Albert N. McCreight
FSO, 3625th CCT Wg (Int.)
Tyndall AFB, Florida

The Lieutenant's American ingenuity is showing. This is about as sound a gimmick as we've ever seen, inexpensive, too.

Swift BLACK

During starting operations, black smoke from the cartridge escapes from the engine exhaust port.

Originally designed by the British in 1944, the Canberra, so named after the Australian city, made its first flight on Friday, 13 March 1949. To date it holds 10 official World Class performance records.

Upon request from the United States Air Force, the Glenn B. Martin Company purchased the design. The adaptable Canberra airframe was taken, existing electronic equipment was added to this airframe and engineering improvements were undertaken and accomplished. The two Wright Aero J-65 turbo-jet engines rounded out the changes that have resulted in the light bomber designated the B-57B.

IT WAS A BALMY afternoon as the Base Operations Officer silently shuffled through the stack of papers that filled his IN basket. It was serene and quiet; quiet, that is, until the Ops Officer jumped to his feet, screamed, "Fire on the flight line" and made for the front door. Black smoke poured from the engine nacelle of a sleek, black, multi-jet bomber, but as everybody was soon to discover, where there's smoke there's not necessarily fire.

The black smoke originated from the cartridge type starter unit of this airplane and is just one of the unique innovations that has arrived on the Air Force scene along with the light bomber, jet (B-57B).

The B-57B, readily distinguished by the large chord of the wings, is a streamlined, all-metal monoplane, powered by two Wright Aero J-65 engines. It is highly maneuverable, even at extreme altitudes, and is capable of performing acrobatics such as rolls, loops and Immelmans.

The aircraft has a pressurized, air-conditioned cockpit that provides tandem seating for a pilot and an observer and is equipped with two jettison-type seats.

Gone are the close, cramped working quarters so often associated with the cockpits of jet aircraft. The office of the B-57B, for both pilot and observer, can be called roomy.

Both crewmembers are covered by a single, bubble-type canopy that is hinged at the rear and raised or lowered by means of a hydraulic actuator. In an emergency it can be jettisoned by explosive canopy remover.

As previously noted, one of the most outstanding features of the B-57B is the cartridge type starter system. The aircraft has no electric inertia starter, consequently no external electrical power source is needed for starting. Instead, the power is obtained from a cartridge of slow-burning powder that is inserted into a removable breech housed in the bullet-nose of each engine. The power from this burning cartridge is transmitted to a small turbine wheel then through a series of gears to the engine drive-shaft. This one-shot cartridge will accelerate the engine to a speed sufficient to support combustion in 10 seconds.

Another interesting feature is the rotary type bomb-bay door. The door is unique both in design and in op-

Starting cartridge is inserted in removable breech in the bullet nose of each engine.

eration. It is constructed in such a manner that the bombs are attached to the door instead of to the structures inside the bomb bay. Prior to starting the bomb run, the door is rotated 180 degrees about its longitudinal axis. This places the bombs outside the airplane and the outer surface of the bomb door inside the aircraft fuselage, completely sealing the bomb bay. The door is electrically controlled and hydraulically rotated with hydraulic pressure holding the door open or closed.

Welcome news to pilots of the Tactical Air Command is that it is not necessary to slow the aircraft down to open the door and there is little or no noticeable effect on trim when the door is full open.

Still another added attraction to the B-57B is the liquid oxygen system. The LOX system can supply more oxygen per pound of equipment weight than either the low or high pressure gaseous systems.

The B-57B oxygen system holds 4.5 litres (liquid) and a rough working approximation is the assumption that one litre of liquid oxygen will supply about three manhours of gaseous oxygen. (Of course, the actual duration is dependent upon altitude, cabin pressure and so on.) Before taking off on an extended cross-country flight the current Radio Facility Chart should be consulted to be certain the point of intended landing has LOX available.

Aircrew training in the B-57B centers around the 3515th Squadron of the 3510th Combat Crew Training Group at Randolph AFB. They have the dual responsibility of training both pilots and observers, the vast majority of whom come from the Tactical Air Command.

The 3515th, as well as the trainees, feels strongly about developing and maintaining the pilot-observer team concept and the students are formed into teams prior to arriving in the squadron for training. With the exception of specialized phases of training for each crewmember, the teams study, fly and are returned to operational units as a team.

The majority of the student pilots are past masters in the B-26, but are totally unfamiliar with the idiosyncrasies of jet aircraft. Not only must they be instructed in the operation of a new, tactical bomber, but they must also be taught the procedures required to meet the more critical demands of jet operation.

While attending the school, pilots receive a total of 50 hours of actual flying, of which the first 25 are in T-33s. Each pilot must qualify for the standard jet instrument certificate before beginning transition in the B-57. In addition to the 50 hours of flight time, the student pilots are given 84 hours of instruction under the flying training phase of the school. This includes mission preparation and briefing, postflight debriefing, critique and grading and instruction in the C-11 and C-8 synthetic trainers. In the future, additional time will be spent in the new B-57B procedures trainer now being built at Randolph.

Flight time in the T-Birds covers day and night transition, instrument instruction and practice, solo navigation and cruise control. The flying time in the B-57B is devoted to day and night transition, instrument instruction, navigation, Shoran indoctrination and practice tactical missions.

Student pilots also receive 229 hours of academic instruction including aviation physiology, aircraft systems and procedures, instrument flying techniques, high altitude weather,

A ground school training aid shows fuel-flow control panel arranged in a schematic flow pattern so that overall operation can be seen at a glance.

bombing and gunnery equipment, special weapons and survival training.

Student observers receive a total of 56 hours of flying training, with 21 hours of actual flight in the B-57B. Their academic course runs 230 hours and covers much the same subjects as the student pilots', with more emphasis being placed on navigation and equipment procedures and less on aircraft systems and instrument procedures. Observers are graduated from the school as specialists in the operation of the Shoran equipment as well as in navigation.

Instructors impress on the observers and pilots alike, that in order to utilize the B-57B effectively, each crewmember has a definite function. If either the pilot or the observer falls down on his job the aircraft might as well have stayed on the ground. There is little need for the pilot to take off if the observer miscalculates and cannot find the target. Likewise, there is no need for the observer to be proficient in the Shoran equipment if the pilot can not provide him with a desirable platform. They must work as a team, from takeoff to landing.

The best way to find out about any airplane is to ask the man who flies it. Without exception, pilots of the 3515th feel that the B-57B is so easy to fly that the only real danger is complacency. True, like any other airplane it has design limits that can not be ignored. However, fly it right and you will be pleasantly surprised with its handling characteristics.

Starting

The actual starting procedure for the B-57B is probably as simple as you have ever seen. First, of course, the interior, pre-start checklist is accomplished. Then when the starter switch is placed in the START position, ignition is provided for about 15 seconds during which time a primer valve is opened, providing fuel automatically. All the pilot need do is sit there as the tailpipe temperature rises and the RPM begins to build up. As the instruments stabilize at normal readings, the throttles may be advanced to full power, as no warm-up is necessary.

It will take about 75 per cent rpm to get the airplane moving for taxiing. The nose gear is of the full swivel type and steering is accomplished through the use of the brakes. Jockeying the throttles to make small turns will be ineffective because of the low acceleration rate of the jet engines.

Takeoff

After running through the pretakeoff checklist you are ready to leap off. As you apply 100 per cent rpm and release the brakes for the takeoff roll, you notice a definite nose-up tendency. You have a sensation of the airplane's attempting to leap off the ground, which, in a sense, is true. You have a tremendous amount of power pushing you forward. A considerable amount of forward pressure on the control column becomes necessary to counteract this initial nose-up tendency but this decreases as the airspeed increases until back pressure is required to bring the nose wheel off the runway.

Upon breaking ground the aircraft accelerates rapidly. Therefore it is necessary to get the landing gear up as soon as possible to keep from exceeding the structural limitations of the landing gear doors. After gear retraction you may notice an initial

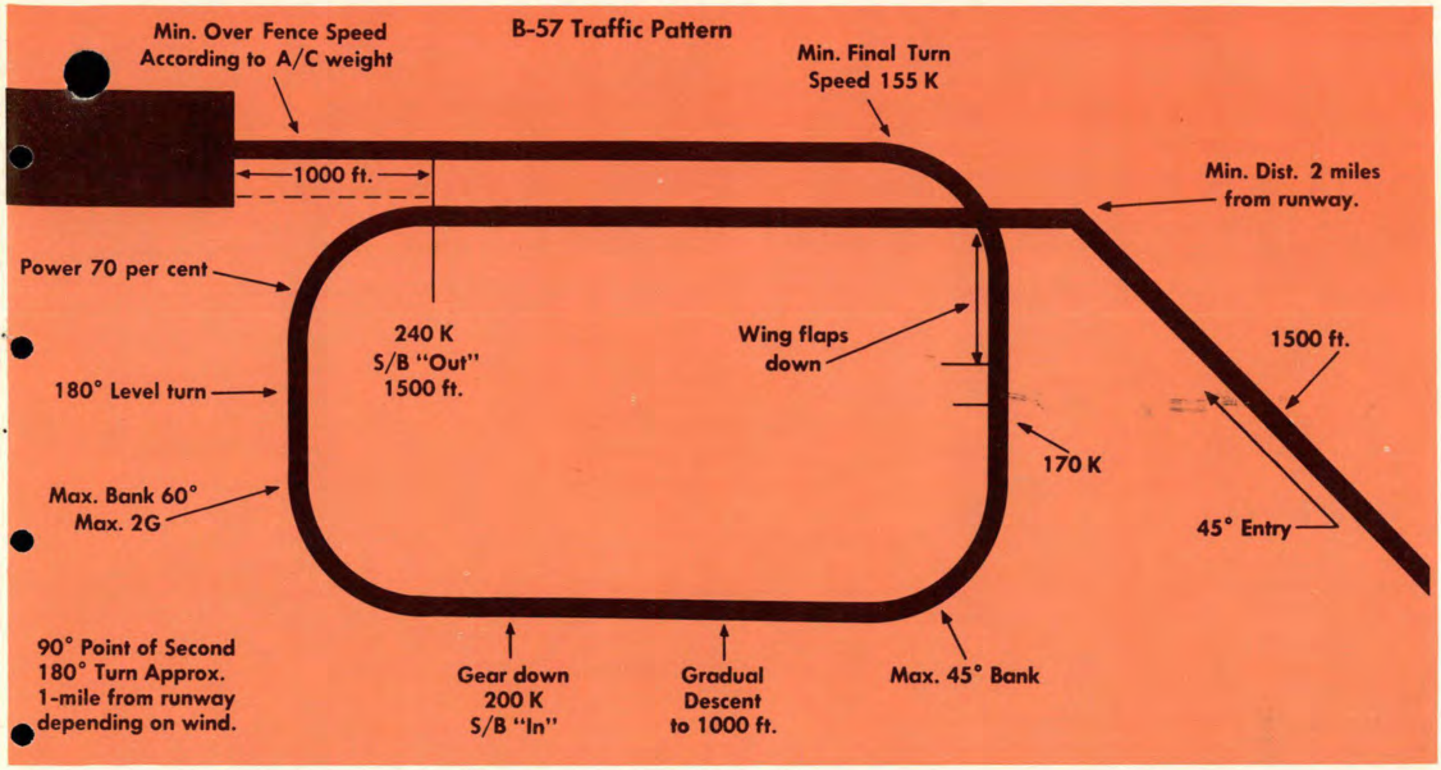


Figure 1. Recommended landing pattern shows speeds and configurations.

pitching down movement, but this is very slight and can be controlled easily with additional stick-back pressure.

Currently, the TAKEOFF position on the emergency fuel system will not be used. Operation of the emergency fuel system while the switch is in the TAKEOFF position is unsatisfactory because under certain conditions the emergency system will cut in unexpectedly at engine speeds as high as 95 per cent rpm.

In Flight

Fuel management in any jet aircraft is an all-important crew duty. Fuel is stored in four internal tanks, two of which are located in the fuselage and one in the leading edge of each wing. Also, droppable wing tiptanks may be installed.

The fuel flow control panel is arranged in a schematic flow pattern and overall operation can be seen at a glance.

All fuel normally flows into the No. 1 fuselage tank, thence to the engines. However, fuel can be fed directly to the engines from any of the fuel cells by use of a by-pass control.

L/Col R. C. "Pappy" Craddock, 3515th Squadron Commander, states, "The B-57 is so easy to fly that the only real danger is complacency."

An instructor discusses procedures, using simulated instrument panel.

On the trim tab mock-up, tab can be actuated to demonstrate operation.

Booster pumps in the No. 1 fuselage tanks are controlled by a switch on the flow panel, and this switch is safetied in the ON position. The booster pumps on the other internal tanks are operated automatically when the respective tank is selected on the panel.

The recommended procedure for routing fuel is to takeoff with the wing tanks feeding into the No. 1 fuselage tank. After approximately five minutes of flight, switch to the No. 2 fuselage tank and run it dry. The majority of the pilots in the 3515th make this switch when passing through 5000 feet and incorporate it into their normal 5000-foot checklist, i.e., oxygen, fuel flow and so on. After the No. 2 fuselage tank is dry, the tips are then used and finally the wing tanks.

A word of caution. It is important to burn the No. 2 fuselage tank out first to prevent creating an unfavorable aft center of gravity load factor. The initial five minutes of flight on the wing tanks is performed to reduce the possibility of siphoning.

The tiptanks on the B-57B have a tendency to feed unevenly, creating a one-wing heavy condition. This can be corrected by using aileron trim; however, this is not recommended. The fuel system is designed so that each tip can be used individually and it is recommended that the aircraft be kept in trim by evening out the tip-tank fuel rather than by using the aileron trim tab.

There is a gage indicating fuel quantity in pounds in each internal tank so that the pilot should be able to tell at a glance just how much fuel is remaining.

The B-57B is extremely clean aerodynamically, and with the tremendous amount of power available through the J-65 engines, care must be taken to prevent exceeding the structural design.

The aircraft is equipped with speed brakes located in the aft portion of the fuselage and dive brakes which, when actuated, protrude vertically out of the wings. The speed brakes, appropriately nicknamed "the barn doors," are controlled by a switch on the control panel, and the degree of extent is controlled by the length of switch actuation. The dive brakes consist of drag channels that are located in the upper and lower surfaces of the wings and extend when the speed brakes are opened. There is a total of 21 channels in each wing, 12 on the underside and 9 on the top. They are one and one-half inches square and extend about four inches from the wing skin.

The speed and dive brakes are extremely effective and when extended it is not difficult to descend and remain within the speed limitations of the aircraft. The normal descent procedure is to extend the brakes and place the throttles in IDLE.

Landing

The landing flaps are of the full drag, no-lift type, and are in either one of two positions: Full up or full down. The flaps consist of four panels, two in each wing, and each panel has its own actuating cylinder. An interesting note concerning the aircraft's stability is that with one panel inoperative the aircraft is completely controllable at all speeds. In fact the aircraft has been landed in this configuration without the pilot even realizing it. Although the aircraft is controllable with two panels on one side inoperative, under these conditions a no-flap landing should be accomplished.

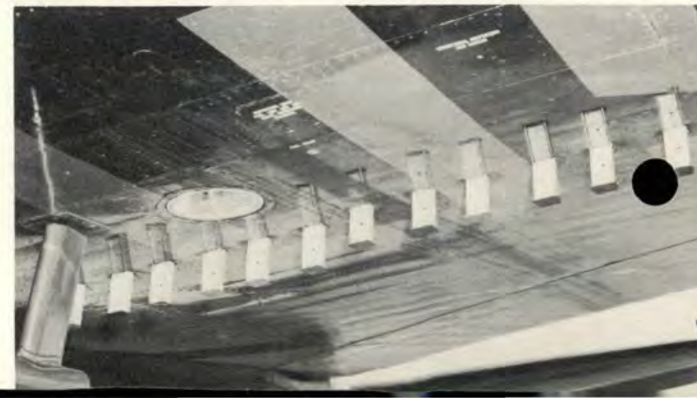
As the flaps offer no lift they are not used for takeoff and should be retracted immediately in the event of a go-around or single engine.

The flaps normally are extended just prior to turning onto final and remain full down for the remainder of the landing pattern. (See Figure I)

The B-57B has been described as a pilot's dream to land. Not that the pilot can fill out the Form 1 while

Wing flaps can be used in only two positions: Full Up or Full Down.

Dive brakes protrude from the wings when the speed brakes are opened.



A B-57B cockpit procedures trainer is used for student orientation.

Speed brakes, aptly nicknamed "barn doors," operate hydraulically

on final, but the aircraft has a natural tendency to flareout when the power is reduced to IDLE.

Following the "break" and entry into the landing pattern, a small amount of forward trim is needed as the landing gear is extended. And an additional amount will be required as the flaps come down. Forward pressure on the control column must be used during the final approach, and a normal round-out and main-gear-first landing is made. The distance covered during the landing roll is amazingly short. It is comparable to that distance required by today's reciprocating engined, light bomber.

Except at critically low airspeeds, the loss of one engine on the B-57B should pose no serious control difficulties. Once speed has been attained the aircraft will climb, maneuver and land in a very satisfactory manner. It will maintain level flight with one engine operating at 80 per cent rpm.

If an engine becomes inoperative at critically low airspeeds, a terrific yaw effect takes place. Since there is no boost assist on the rudder, the pilot must apply foot pressure plus trim, in order to maintain directional control. A figure of 155 knots is listed as the minimum controllable speed. The minimum controllable airspeed is definitely dependent upon how much physical force the pilot is able to exert on the rudder pedal, as there is more than enough power available for acceleration.

The airstart procedure is almost as simple as a normal ground start. Merely stop-cock the throttle, drain the tailpipe, adjust the airspeed to attain 14 to 20 per cent rpm and move the starter switch to CRANK ONLY. Then open the throttle slightly above IDLE and as soon as the tailpipe temperature rises retard the throttle to IDLE. When the RPM stabilizes, advance the throttle to cruise, and you're off.

Landing with one engine inoperative is basically the same as a normal landing. The main difference is in maintaining airspeed and making a go-around decision sooner, so that sufficient speed and altitude will be available to perform the go-around.

If an engine-out landing becomes necessary, the extremely effective drag qualities of the wing flaps and speed brakes must be considered carefully. It should be noted that with the speed brakes out, and the wing flaps and landing gear extended, the aircraft cannot maintain altitude with one engine inoperative.

A normal entry on initial approach should be made at 1500 feet with an IAS of 240 knots. During the entire engine-out landing pattern, the angle of bank should never exceed 45 degrees. The pitch out should be made approximately 1000 feet short of the runway with a minimum IAS of 200 knots and a definite downwind leg should be established. The airspeed should be reduced to no lower than 190 knots and a descending turn made onto the base to an altitude of 1000 feet. At this time the gear should be extended and the turn onto final completed at not less than 500 feet. As soon as it is definitely assured that the runway can be reached, a minimum of 160 knots and maximum of 170 knots should be maintained until the flaps are lowered. After the flaps are down the airspeed should be reduced to the best approach speed for the weight involved. At this point the aircraft is committed to land and a go-around is then out of the question.

Well, here's hoping you now have a little better picture of the aircraft that you are bound to be seeing a lot of, real soon. The BRAVO FIFTY SEVEN is a straight-forward airplane and actually a pleasure to fly. Its flashing acceleration, performance and simplicity of operation, make it a rarity among twin-engine aircraft. In a word, IT'S A HONEY! Mute evidence of how pilots feel about it is reflected in the large backlog of applicants requesting B-57B transition training at Randolph. ●

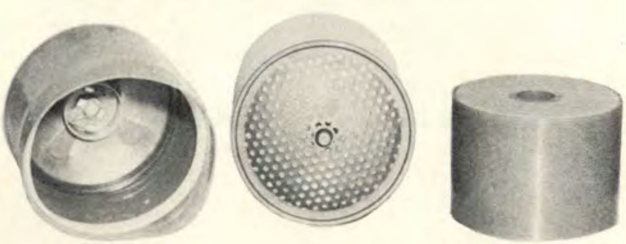
The single, bubble canopy is hinged at the rear to afford easy entry.

The rotating bomb bay door makes a high speed bombing run possible.

Left, on the RB-57, the observer enters through the access door on the right side. Below, the B-57B, designed as a night intruder, is used also in close ground support.

LONG LEAN and *Lethal*

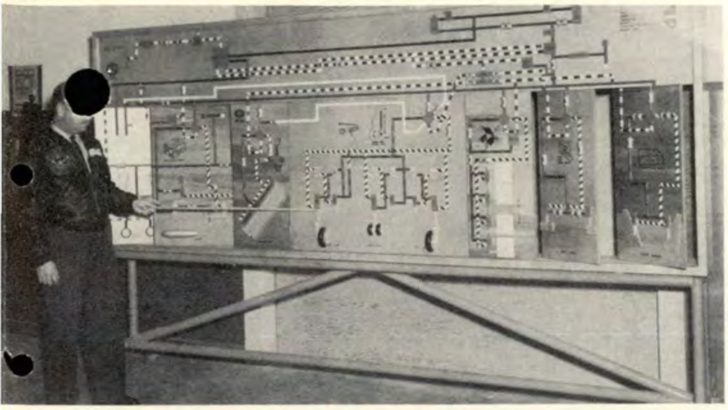
Slow-burning powder and a metal casing comprise the starting unit.



We believe the story on the preceding pages describing the B-57B and what it can do is of special interest to our readers. The aircraft is one of the latest in the U. S. Air Force's stable of combat planes, and while its progenitor, the Canberra, is fairly well known, the B-57B has so many modifications that it is, for all practical purposes, completely different. FLYING SAFETY, both through the article and the extensive picture coverage, is publishing for the first time the full story on this aircraft and how it is being phased into the Tactical Air Command.

A written checklist is followed during the walk-around inspection.

Lightweight screens protect the engines from foreign object damage.



B-57 hydraulic system is illustrated through a training aids panel.

The RB-57 has a smaller canopy that covers the pilot's cockpit only.

The underslung design of the aircraft creates an illusion of taxiing in a nose-low attitude.

A careful check of the liquid oxygen system must be made during walk-around inspection.

Students learn proper procedures in a T-33 cockpit trainer before starting transition.

Each pilot must qualify in a T-33 for the standard Air Force instrument certificate.

Keep Current

NEWS AND VIEWS

It Listens — Speaking of tow-targets, have you ever thought of *listening* to how far you miss the target? Sounds crazy but one of the latest tow-target systems now undergoing tests does just that. It is known as the Accoustical Firing Error Indicator. This system "listens" for near misses, measures the distance and angle, and passes this information to the ground by means of a telemetering link, thus allowing engineers to make necessary modifications and adjustments to the fire control system undergoing tests.

That's right, in this case it's the fire control systems that are out for high scores instead of you. Tow-targets of today must not only be stable and able to withstand high speeds but must also be capable of carrying any one of a number of "miss" distance indicators. The old targets only indicated the "hits," whereas the new targets not only indicate the "hits," but also show how far the target was "missed" on firing runs.

In earlier air-to-air combat training, a slow, cumbersome canvas "sock" was towed behind the tow aircraft. The fighter pilots would make passes at the "sock" and their accuracy was determined simply by counting the holes in the towed target. While this improved the fighter pilot's marksmanship, it did not aid in improving the fire control systems. The old canvas and cheesecloth tow-targets are being replaced by tow-targets capable of speeds of more than 600 miles per hour. High-speed targets of this type are essential in the engineering and testing of the complex fire control systems of modern aircraft.

Engineering testing of the tow-target development program is carried out at ARDC's Air Force Armament Center, Eglin Air Force Base, so that the expensive and highly complex fire-control systems can be given the final controlled tests before becoming operational.

★ ★ ★

Navarho—Far ranging jet aircraft will receive extremely long range navigation aid from an experimental radio station currently being tested. The station is the first of its kind and the long range system is called Navarho. The station will beam information 2500 to 3000 miles in all directions.

Navarho is designed to supplement the short-range airways stations that criss-cross the country. A single Navarho station can cover an area bordered by the West Coast of the United States, the Azores in the mid-Atlantic on the east, the Artic Ocean on the north and the Gulf of Mexico on the south. An aircraft flying at high altitudes, above that normally used, can fly from the West Coast to the Azores without retuning the radio equipment. For an aircraft travelling 600 mph, this would be guidance for a flight of five hours.

The Navarho station feeds continuous information to the pilot, telling him whether he is east, north, south or west of the station and how far he is from the station. A

This newly designed high-speed tow target is required to test the fire control systems of present day complex, supersonic interceptors.

The new C-119 cargo door can be opened to meet a variety of inflight situations and is a marked departure from standard design.

plane 1000 miles away will receive information accurate to within 10 miles in any direction. Navarho will direct a plane to a point 100 miles from its destination, where it can pick up a short-range station for normal letdown and landing purposes.

★ ★ ★

Three Drones—Three unmanned QF-80 drones were exposed recently to close-in effects of a major atomic blast at the Nevada Test Site. These were F-80 jet fighters, fitted with robot command guidance systems.

During the tests, one drone was lost on takeoff but was replaced immediately by a stand-by. Three separate formations were flown. Each consisted of one drone with two DT-33 director aircraft and two chase planes. One of the chase planes had the function of photographing the drones to record damage or other effects which occurred during the operation. The director aircraft controlled the drones during the takeoff and flight to and from the orbit area. Each DT-33 carries a remote control pilot to control the drone and a pilot to fly the director aircraft. Only one director craft controls the drone, with the other for emergency stand-by.

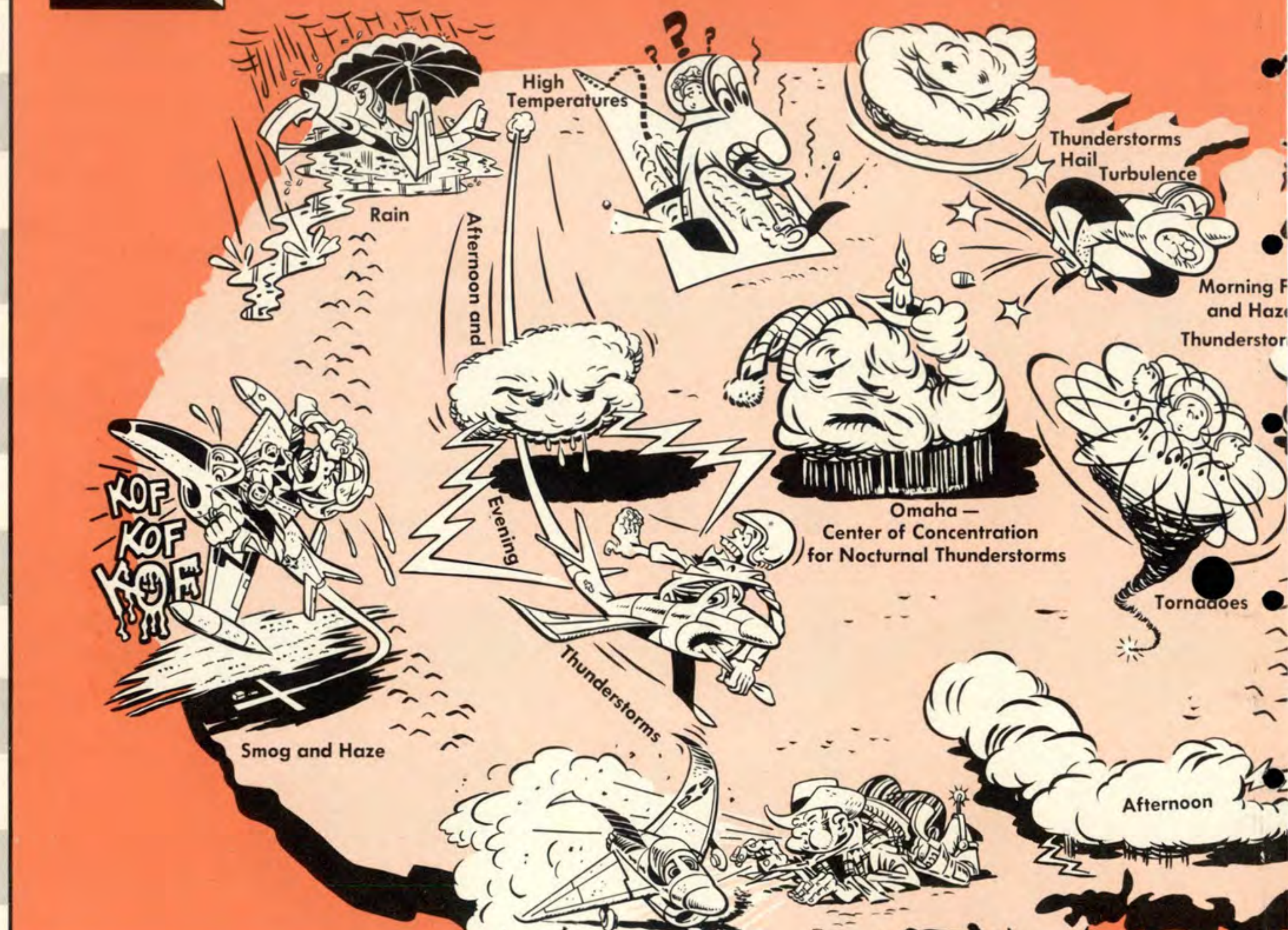
When the formation reached the orbit area, three ground radar operators assumed control so that the unmanned jets could be properly spaced before arriving at assigned air positions. After transfer of control the director aircraft proceeded to a holding point several miles from the blast to pick up any of the surviving drones. If a drone is destroyed, special data-collecting equipment is jettisoned by radio command from the director and helicopters spot and recover the equipment.

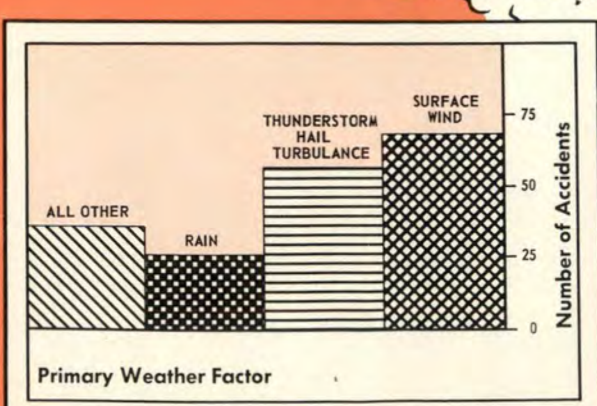
All three drone aircraft survived the immediate blast effects; however, two of them were severely damaged. One was crash-landed on a dry lake bed by its director aircraft. The other damaged drone crashed in the mountains. The third was landed successfully.

Four production models of the B-47 are shown in a "family portrait." Newest of the series is the RB-47E photo recon, shown at far left.

A runway controller flies the QF-80 off the runway, then a DT-33 director aircraft controls it to the orbit area, and a ground radar controller directs the pilotless aircraft through the atomic cloud.

Summer Flying Haza





THE GOOD OLE SUMMER TIME is just around the corner and everybody knows that's the time for blue skies and balmy breezes. SURE it is! But lest you forget, you're still in the flying business and woe to the birdman who sells short the many summer flying hazards.

Weather elements that are most often cited as contributing causes to summer aircraft accidents are thunderstorms, hail, rain, surface winds and turbulence. A by-product of one or a combination of these phenomena that has caused its share of grief to the unsuspecting, is blowing dust.

Thunderstorms will be found over the states bordering the Gulf of Mexico and over the Ohio, Missouri and Mississippi River Valleys. They are also prevalent along the eastern edge of the Rockies with gusty surface winds in Texas.

We must also consider low ceilings and visibilities. The New England and Mid-Atlantic coasts, the Seattle area and the coastal region of Southern California around Los Angeles will have lots of that type of weather. The hours from midnight to 0900 will be the time of most frequent occurrence. Certain industrial regions in the Ohio River Valley are also susceptible to these foggy conditions.

Just for the record, it seems that the Great Plains States from Texas to Canada have the most "weather" accidents during June, July and August. Fifty-six per cent to be exact. The region west of the Continental Divide reported only nine per cent and the balance of the nation reported the remaining 35 per cent.

The accidents discussed in this article are those in which weather was a contributing factor. In only 27 of the 194 cases was weather the primary cause and 25 of those cases involved thunderstorms or their offspring.

Most pilots believe that the old thunderstorm is the greatest contributing factor in summer accidents. 'Taint so. The seemingly inoffensive surface wind was the villain in 68 of the 194 summertime weather factor accidents. Sixty per cent of those were in the Great Plains States, with Texas alone reporting more than 25 per cent of the "wind" mishaps. An interesting, though distressing, offspring of gusty wind conditions is undershooting. Heretofore, gusty winds accounted for the wing drags and groundloops and only recently have we been confronted with this undershoot problem.

The majority of accidents caused by thunderstorms and associated weather occurred in the Great Plains States. About 60 per cent of the accidents attributable to thunderstorms have happened in that area. This figure probably reflects the fact that almost all pilots are familiar with the frequent occurrence of thunderstorms over the southeastern part of the country. However, most drivers are relatively ignorant of the fact that these storms occur with equal frequency over the prairies and along the eastern edge of the Rocky Mountains. Knowledge makes them reluctant to fly into the southeast during thunderstorms season. Lack of knowledge results in having no qualms about flying over the Plains States. It is simply a case of not foreseeing the true picture and therefore not being prepared to meet it.

Rain is another hazard, accounting for 33 of the 194 weather accidents. Wet runways, rain-blurred windshields and other obstructions to visibility were the direct causes most often cited. More than half of these accidents occurred east of the Appalachian Mountains.

Always a problem in summer, particularly to jet pilots, is the effect of high temperature on air density, which in turn greatly affects the takeoff roll of jet aircraft. A condition of high temperature and low air density can exist anywhere in the nation. So, check that takeoff roll carefully because the combination of heat and high field elevation can really be hairy to the unsuspecting pilot.

And now a word of warning. The facts and figures presented are based on past occurrences and averages. We have outlined the areas of maximum occurrence of certain weather elements. However, under certain conditions, any element could be encountered over any portion of the country. To plan your individual flights, check with the forecaster at your local station. He has the latest information available and will do his best to help you. ●

> "I am really interested in helping you get the word around concerning your latest near-miss. It helps everybody when we share our experiences. So, send me those near-accident reports. Remember, they will all be treated anonymously."

REX SAYS:

Major Rex Riley, the well-known aircraft accident investigator, switches his attention to the accident prevention phase of flying safety. He is interested in pointing out that as a direct result of operational hazard or near-accident reports the Air Force has taken a big step toward preventing avoidable aircraft mishaps.

This reporting system is in effect within several major commands and many base Flying Safety Officers have started their own programs too. The value of reporting a situation that ALMOST resulted in an accident is quite obvious.

The problem is to encourage personnel to submit near-accident reports thus assuring proper action. Rex feels that one way to round-out the appropriate action phase is to send the reports to him. He will review them and you can read about the pertinent trends and information in his special REX SAYS feature.

I HAD AN experience recently that points up what can happen when an instructor loses his temper with a student and attempts drastic corrective action.

We had been unable to fly for nearly a week because of the weather and this ride was to be a pre-solo transition mission in a T-28. It was the student's fourth ride, and all pre-solo requirements had been fulfilled.

His last flight had been unsatisfactory because of poor preflight planning and poor traffic patterns. The student's difficulty had been a slightly diving final turn, although his general pattern and airwork were considered satisfactory.

After takeoff, we stayed in the pattern and shot six landings. The student seemed to be doing well, so we flew to the acrobatic area and spent 20 minutes on acrobatics. We then returned to the field and the student entered the traffic pattern again.

I noticed that the student was delaying his pitch slightly and was flying too long on the downwind leg. After talking him through several more patterns, during which he failed consistently to shorten the length of the downwind leg, I took the controls and demonstrated another pattern.

On the student's next pattern, he delayed his pitch slightly and rolled out on downwind at 1500 feet. He dropped the gear and then the flaps; at this point I became overly irritated at his failure to turn onto base and kicked hard right rudder and fed in aileron and back pressure to start the turn. The airspeed was approximately 105 to 110 knots.

The aircraft immediately snap-rolled to the right, went inverted in a full stall and continued to rotate. I told the student that I had the plane, added power and released some of the back pressure, attempting to get the aircraft flying again.

After the first roll, I still didn't have enough control to stop rotation, and the plane remained in a stalled condition. During the second roll, the aircraft started to come out of the stall. I finally got enough aileron control to stop the roll at the bottom, but the plane didn't stop shuddering until I released still more back pressure.

It appeared at this time that I would touch down, but we cleared the ground and slowly climbed out. I don't remember just when I pulled up the gear, but it was up after I had recovered from the rolls.

It goes without saying that I intend to play it cool in the future; I'll be the sweetest-tempered instructor in the Air Force, bar none.

— — —

REX SAYS: *This lad learned a lesson the hard way, but all in all he came off remarkably well — and has the good grace to pass his learning on. His mistakes are obvious; no student can learn when his instructor loses his temper, and today's big birds aren't designed for manhandling close to the ground by any pilot in a fit of pique.*

★ ★ ★

RECENTLY, I HAD several experiences that I believe will be of value to your readers. In the first instance I was taking off an F-84D when the entire cockpit became flooded with such a dense accumulation of vapor that it was almost impossible to see the instruments. The weather at the time was restricted visibility with a 250-foot ceiling.

The vapor was caused by very high outside humidity, and formed suddenly, without warning, just as the wheels left the ground. My first reaction was to try brushing the stuff away from the flight indicator and airspeed indicator. This was strictly a losing battle and I then flipped the cockpit pressure switch from PRESSURE to RAM. This dispelled the fog immediately and I was able to see my instruments satisfactorily.

Hereafter, on takeoff in this aircraft under such conditions, my own solution is to place the cockpit pressure switch in RAM position before takeoff and leave it there until I reach a comfortable altitude.

The second incident happened several days later while I was giving an instrument check in a T-33. I believe this could have been very serious under actual weather conditions.

The student was making a standard jet penetration and low frequency range approach on an Air Force base. He had completed his penetration over the homer and had taken up the correct outbound heading of 035 degrees on the slave gyro, going to the low cone of the range. However, instead of being on a heading of 035 degrees he actually was on a heading of 080 degrees. Sometime during the penetration the slave gyro, with no warning or indication, had gone out of phase by 45 degrees.

REX SAYS

I found that once this situation is known, it is a simple matter to make the appropriate corrections. In this case, the student made two more penetrations and low approaches with the instrument 45 degrees off. The danger lies in not knowing the instrument is out of phase, and in which direction it is off. I feel that it is very advisable, when flying under instrument conditions, and particularly during the letdown and landing phase, to cross check the slave gyro against the standby magnetic compass whenever the aircraft is in a level flight attitude.

— — —

REX SAYS: *The recommendations and comments on these two incidents make a lot of sense.*

One thing in the F-84D incident does occur to me. Wonder why the fog didn't show up in the pre-takeoff check at 100 per cent?

Cross-checking, while on instruments, is always important, and checking the slave gyro against the standby magnetic compass in level flight sounds like one of those kind of tips that pays dividends.

"...brushing the fog off was a losing battle."

REX SAYS

I WAS FLYING a night 60-2 mission in the front seat of a T-33 with another pilot in the rear. We has just completed a practice GCA final approach with the pilot in the rear seat flying under the hood. Both GCA controllers at this time sounded very clear and capable except for having told us at two different points to descend to 1500 feet. After adding power to go out for another approach the final controller told us to take up a heading 050 degrees, 2000 feet and contact search control. We did this and search control said that he had us on his scope and told us to maintain a heading of 050 degrees and hold 2000 feet. Approximately one minute later the controller instructed us to turn left to 260 degrees and maintain 2000 feet.

During this interval we clearly heard the controller directing at least two other aircraft. We turned to 260 degrees holding 2000 feet. We were intermittently in the clouds. While flying in the clouds, approximately a minute later, my oxygen mask became completely plugged. I told the pilot in the rear seat that I was loosening the mask to unplug it. As I was looking down into my mask, movement below the left side of my canopy caught my eye. It was very dark and poor visibility downward, but I suddenly realized that there were bushes about 300 feet below us and that the ground was rising very rapidly. I jerked my head forward and saw only black, but at 11 o'clock high through the haze I could make out some sort of building or towers, which I suddenly realized were on top of a mountain ridge or crest. I grabbed the stick and pulled back. We were making about 250 knots and as I pulled 5G, putting the aircraft in a shudder, I saw the face of the mountain in front of us. I clenched up, waiting for the crash and from what I could determine from the side of the cockpit, the aircraft passed upward parallel to and within a few feet of the face of the mountain. As we headed skyward, we passed below and to the side of the buildings on the hill which means that we were apparently in some sort of draw. We recovered partially in the clouds and headed back to the base and landed.

We informed GCA immediately that we almost hit a mountain, and the controller said that he believed that our receiver must have been out and to turn left to 230 degrees. Considering our position, I am sure that the controller did not have us on his scope and that the unit was trying to handle more aircraft than it was capable of handling. At no time was our receiver quiet for more than a very few seconds and transmissions to all aircraft were clear and distinct. At no time was there any indication of radio failure. On the ground it was determined that we were heading toward an 8000-foot mountain.

I am convinced that no accident was ever more certain or close without actually occurring and that only through the Grace of God was it averted. Amen!

"... I saw the face of the mountain in front of us and clenched up, waiting for the inevitable crash."

REX SAYS: *There are two things to be considered here. The first involves the GCA controller. That the controller should have directed the aircraft to another heading, provided he had radio contact, is obvious. If GCA had so much traffic that they could not adequately handle it, the fix here is also obvious. Granted, the facts available indicate that GCA goofed, but let's hit on the second point. The pilot flew in a GCA pattern for more than one minute without receiving any transmission from GCA. It must be remembered that, regardless of the reason, if you do not receive transmissions for any 30-second period (or as specified in the GCA emergency instructions) while in the GCA pattern or for any five seconds while on final, execute that missed approach procedure.*

This is probably the hairiest near-miss I have ever read. The pilot's comment about it being so close is the understatement of the year, and I'm with him when he says AMEN!

Nothin' ever happens to me!

Col. Harry G. Moseley, USAF (MC), Chief, Medical Safety Div, D/FSR

IF YOU ARE A member of the "It-can't-happen-to-me" school, listen to this. What happened to the particular pilot we are about to describe could happen to anyone and, except for the fact that he had taken a few fortuitous precautions, this announcement might have appeared as a statistic rather than a story.

The episode was relatively simple and completely unexpected. He was cruising along in his fighter at 33,000 feet, with a cabin altitude of 14,000, at 280 knots indicated. The morning was bright, fuel was no problem, destination was clear and all was well with the world. Then suddenly something happened.

There was a resounding crash. The cozy cockpit changed to a howling environment of terrific and icy wind. The pilot's vision was blotted out. It was upsetting.

After a moment some semblance of composure was regained and he found he was still in level flight and that the merciless pummeling he was receiving from the cold air was the result of the unanticipated and unannounced departure of his canopy. Further, he discovered that his loss of vision was due to the fact that the windblast had pushed his oxygen mask up over his eyes. So here we are at 33,000 feet, cruising at 280 knots indicated, pulling our oxygen mask down over our nose, being blasted by an 80-degree-below-zero slipstream, and studiously announcing "MAY DAY!"

It is appropriate to observe that he was able to make such an announcement because he was still equipped with microphone, mask and protective helmet. This is of more than casual interest. The same windblast that raised his mask over his eyes did its turbulent best to snatch his mask, helmet and all and remove them permanently from his possession. Had he not had his chin strap well fastened, he would also have been dependent on near oxygen-less air for his continued survival. How long is useful consciousness at 33,000 feet? A little over 30 seconds!

However, being still connected to the ship's oxygen supply, he was able to think, so he quickly decided to leave this high, frigid and inhospitable environment and seek some more friendly territory, say around 10,000 feet or thereabouts, until a landing field could be found. The latter point, too, was a matter of slight concern since a quick inventory revealed that all maps, charts and similar aids had chased out after the canopy, to assist we presume in celestial navigation.

Here entered another surprise. As soon as the nose was lowered, the speed picked up, and noise, air blast and buffeting became so insultingly painful that higher cerebral authority immediately issued a cease and desist order. The pilot found that the maximum descent he could maintain was a few thousand feet per minute and the maximum speed 250 knots.

Even this descent had to be periodically interrupted with a bit of level flight to keep matters within the limitations of his tolerance, and to give him time to place a near frozen hand or toe briefly in front of the heater duct. Of course, if he had dumped his dive brakes and chopped his throttle, he undoubtedly could have come down much quicker. Yet, it is only fair, in view of the circumstances, to allow him a bit of confusion.

Here enters another observation of some importance. The cold of the upper atmosphere is a nasty character with little or no regard for the fraility of human flesh. Thus during the entire descent there ensued a running battle between the thrusts and parries of frostbite and the defense and evasion of the pilot. As luck or destiny (or foresight?) would have it, the pilot was wearing, in addition to his regular clothing, a B-15 flying jacket, a scarf, gloves with liners and two pairs of heavy socks under his flying shoes. This undoubtedly won the battle for him. The only wound that frostbite inflicted was one small nip on the heel.

Eventually reaching an altitude of approximately 10,000 feet and relatively warm air of approximately zero, the pilot was able to orient himself, find a suitable air base and make "an uneventful landing."

It might be concluded that a fastened chin strap and sufficient clothing are handy antidotes in combating the celestial alchemy which would lure us to hypoxic oblivion or reduce us to popsicles. And for the benefit of the "It-can't-happen-to-me" boys, it might be added that the loss of the canopy was due to a small error in maintenance. ●

For Loss of a Bolt . . .

Capt. Richard F. Miller
Flying Safety Officer, 3575th Pilot Training Wing
Vance Air Force Base, Okla.

Here is an outstanding example of what can be accomplished through an efficient, highly organized flying safety program.

In this particular incident, Capt. Miller's effective "near-accident" reporting system, his close liaison and personal knowledge of the pilots in his organization and his aggressiveness and determination to "get the job done right," enabled him to discover the true cause of a major accident. His efforts uncovered a hitherto unsuspected defect which could affect the control system of B-26 aircraft.

In recognition of his fine work, Brigadier General Joseph D. Caldara, Director of Flight Safety Research, Deputy Inspector General, presented Capt. Miller with a letter of commendation. The following excerpts from that letter speak for themselves:

". . . Captain Miller, Wing Flying Safety Officer . . . by his aggressiveness and initiative, brought a B-26 design deficiency to light that will, in all probability, save the Air Force valuable lives and equipment resoures.

". . . persistent individual interest and desire to improve the Air Force situation is extremely laudatory.

"Captain Miller is commended for his demonstration of the outstanding qualities desired in a Flying Safety Officer. Only by such searching analysis and investigation can we achieve our goal."

SOMETIMES I FIND the role of Flying Safety Officer to be much more than just an interesting assignment. There are times when I wish that I had a bit of second sight. Sure, I know that the FSO is a guy well versed in all phases of accident investigation and has most of the answers on the prevention end of the business, too. Once in a while, however, you run up against a blank wall.

Recently I did a lot of head-banging on that proverbial wall, and for a while all I got for my troubles was lumps. Ever have that happen to you?

We lost one of our B-26s one day. The aircraft was scheduled for a round-robin navigational proficiency flight but the IP scrubbed the mission after receiving severe weather warnings and decided to fly local for several hours. The crew shot a normal landing at an auxiliary field late in the afternoon; this was the last radio contact with the B-26.

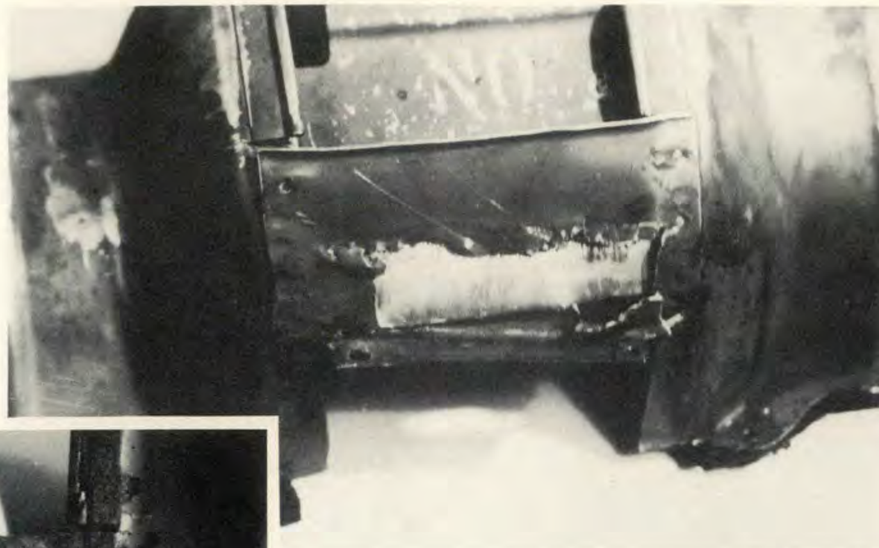
Upon being notified of the crash, a convoy proceeded from the base to the scene of the accident. The plane had crashed at a high rate of speed in a rough pasture. Witnesses stated that the B-26 was flying about 2000 feet above the ground, entered a fairly steep bank, lowered the nose in the turn and rolled out in a diving attitude, with the wings level. They agreed that the plane had almost leveled out prior to impact.

Investigation confirmed the witnesses' statements. The aircraft had hit in an almost level attitude at 300 mph, with normal power on both engines. An obstruction on one end of the field enabled us to determine that the minimum glide angle of the aircraft must have been at least 17 degrees. Exhaustive examination of the wreckage failed to turn up any evidence of materiel failure or mechanical malfunction. After reviewing all the evidence compiled, the accident investigation board determined that the aircraft had been engaged in a simulated gunnery pass and that the pilot had misjudged his elevation and initiated his pull-out too late.

For all of our digging and recon-

The combined strength of the two pilots was necessary to move the jammed control from neutral and force its cover through the tough metal torque tube assembly cover.

Right, external view of how the cover of lower end of control column came through the casing.



Torque tube assembly, shows the damage inflicted when lower cover was forced through.

structing and analyzing we still arrived at but one solution — "Pilot Error." Believe me, I hate to use those words. In this case especially, they just didn't ring true. Yet, we were faced with almost irrefutable evidence that an experienced instructor had violated some of the basic principles of recognized flight procedures.

With the board findings completed and the accident report forwarded to higher headquarters, I suppose the logical thing to do would have been to forget the whole affair. Possibly I'm not logical. I couldn't forget it and in spite of my common sense, I couldn't reconcile the board findings.

Understand, when I say that, I'm not implying that the board didn't do a good job. They did as well as any group of experienced personnel with the information available.

Approximately one month after the accident, we had an incident occur that involved a thoroughly qualified instructor pilot and student. When I use the word incident, I do not mean the reportable kind as spelled out in AFR 62-14 but rather a near-accident. Another B-26 was mixed up in this one and we nearly lost it.

Briefly, this is what happened: Early one afternoon an IP and a student took off on a routine training flight. As the aircraft was climbing out, the instructor noticed that the right engine oil temperature was running high so he canceled the mission and re-entered traffic.

The surface wind was beginning to kick up quite a bit at this time, with gusts up to 35 knots, so the IP decided to land the plane himself. He turned on final with the airspeed pegged at 150 mph and flaps down 38 degrees.

Nearly down on the deck, the pilot eased off on power and started to apply back pressure for the flareout, and at this moment he knew that he was in trouble. The controls felt jammed. He couldn't move the yoke back and the runway was coming up at an alarming rate.

He immediately let go of the throttles and got both hands on the control wheel. A quick glance assured him that the student was not touching the controls, and then with all of his strength he heaved back on the column. At the same instant, the student realized the instructor was having trouble, and he added his strength to the tug-of-war. This was fortunate, for their combined tugging gradually deflected the elevators enough to get the nose up just a bit, and with a spine-jarring slam the B-26 hit. The nosewheel contacted the runway first but luckily was not sheared. As the main wheels touched down, the pilot got on the brakes and brought the plane to a successful stop.

Inasmuch as this could hardly be classed as a normal approach and landing procedure, both pilots were, to coin a phrase, "just a bit shook" and immediately taxied the plane to the ramp and shut it down. Then they came directly to my office to report the incident.

I went back down to the line with them and we checked over the B-26. What had happened really was fairly simple. One of the screws which holds the cover on the lower end of the pilot's control column had come out at some time or other. The cover had worn a groove in the rear chaffing plate of the control torque tube cover. When the instructor pilot had attempted to flareout on the landing, the control column cover had jammed into the groove, causing the controls to bind in a nearly neutral position. The two pilots, both big men, had overcome the binding by application of a lot of muscle. The fact that the aircraft was in a shallow angle descent, using only 38 degrees of flaps, was another big reason why there was no major accident.

Anyway, that's how we had it figured then. Further analysis proved we were right.

Well, right away bells began ringing in my head about that "pilot error" accident that had been on my mind for the past few weeks. Maybe this incident was an identical case, but with a happier ending. I was anxious to find out.

The pilot who had just reported the incident had been assigned another B-26, and I suggested that he put his fingers on the control cover and move the controls to see if he could feel any grating or grinding in the metal. Sure enough, he found that the same situation existed on this aircraft as on the one he had just landed.

I went to look for the maintenance officer and brought him back out to the flight line with me. Then I reported our findings to the chief of maintenance and recommended that we conduct an immediate, one-time inspection of all of our aircraft and that an emergency UR be submitted.

The up-shot of our one-time inspection was that we found three *additional* aircraft with exactly the same discrepancy—the screws at the bottom of the control cover plate for the lower end of the pilot's control column were loose, so that the cover plate was wearing against the torque tube cover.

By this time I was convinced that the cause of this incident was also the cause of the accident that had happened a few weeks before.

All of this occurred on a Friday afternoon. Early Monday morning we began sifting the wreckage of the crashed B-26. We found only about 40 per cent of the control column assembly and torque tube covers, but we did find the bottom of the pilot's control assembly. And the screw which was missing on the B-26 involved in the incident on Friday also was missing from this cover.

There was no one at our base with enough specialized knowledge to tell if the screw had been out at the time of the crash, and we were not even certain that the missing screw could have caused the accident. Our Wing Commander decided that I should visit the San Bernardino Air Materiel Area and possibly the Directorate of Flight Safety Research with my evidence in order to obtain a qualified opinion as to whether we had uncovered the cause of the accident.

Left, shows how the bolt backed off of lock nut. Below, cover plate removed exposes the critical area where loose bolt caused the jammed control.

The conclusion was that the accident had been caused by the screw backing partially out. Our opinion that the loose screw had permitted the cover plate to come away from the edge of the casting was confirmed. The freeing of the cover plate then permitted the control column cover to enter this space and jam up against the screw, restricting elevator travel. It was further concluded that the screw had finally pulled out all the way during the disintegration of the aircraft on impact.

And so the original "pilot error" label on the accident has been changed.

The San Bernardino Air Materiel Area has issued a Tech Order requiring a one-time inspection similar to the one we pulled at our base, and there is also a fix requiring that bolts with self-locking nuts be installed on that control column cover.

To my mind, this whole business shows how vital near-accident reports can be. If the pilot who experienced the control trouble that Friday afternoon had not bothered to report the incident to me, that aircraft could have been repaired and returned to service without anyone knowing about the problem except the maintenance man who did the repair work.

In that case, the investigation which we conducted would never have been made, and we would never have known the real cause of that B-26 accident. And, carrying the thought a little further, those other aircraft which had the same discrepancy might have ended up as "pilot error" statistics, too.

Intuition or sixth sense or whatever you want to call it had told me there was more to that first accident than we had uncovered. But I would never have found the real answer if that IP and student hadn't taken the trouble to report their near-accident that day.

This incident clearly shows the value of a written near-accident report. Most commands now have a standardized form for such reporting procedures. And, only by complete dissemination to all agencies concerned can we hope to prevent recurrences of incidents of this sort.

The old saw about forewarned is forearmed certainly applies in our business. The near-accident report form and emergency UR are the tools to fight and lick almost any aviation problem. ●

WELL DONE

Captain
L. S. Thompson, Jr.

6614th Air Transport Sq.
Ernest Harmon AFB, NEAC.

". . . Number One engine exploded suddenly."

". . . h one burning, a straight-in was made."

CAPTAIN LESLIE S. THOMPSON was flying a C-119 from Torbay Airport, Newfoundland, to Goose Bay, Labrador. Shortly after takeoff the oil pressure of the right engine dropped to 15 psi. The aircraft was leveled off at 3000 feet and power on No. 2 was reduced. The cylinder head temperature moved toward the red and as the engine started to backfire, Captain Thompson shut down and feathered the propeller.

The aircraft was immediately turned back toward Torbay and GCA was notified of the emergency. The weather at takeoff had been 300 feet and one mile and GCA had been tracking the aircraft during the takeoff and climb.

As soon as the 180-degree turn had been completed the top cylinder on No. 1 engine suddenly exploded and the torque dropped approximately 50 per cent. With 19 passengers and a load of cargo, the aircraft began losing altitude immediately. Captain Thompson quickly unfeathered the right engine and put it into operation with only partial power available.

GCA brought the aircraft on to a long straight-in approach and with the left engine on fire the aircraft broke out of the overcast.

Captain Thompson managed to complete the approach and skillfully landed the aircraft without further damage.

The outstanding flying ability and excellent judgment displayed by Captain Thompson are a credit to himself and to the United States Air Force. WELL DONE!

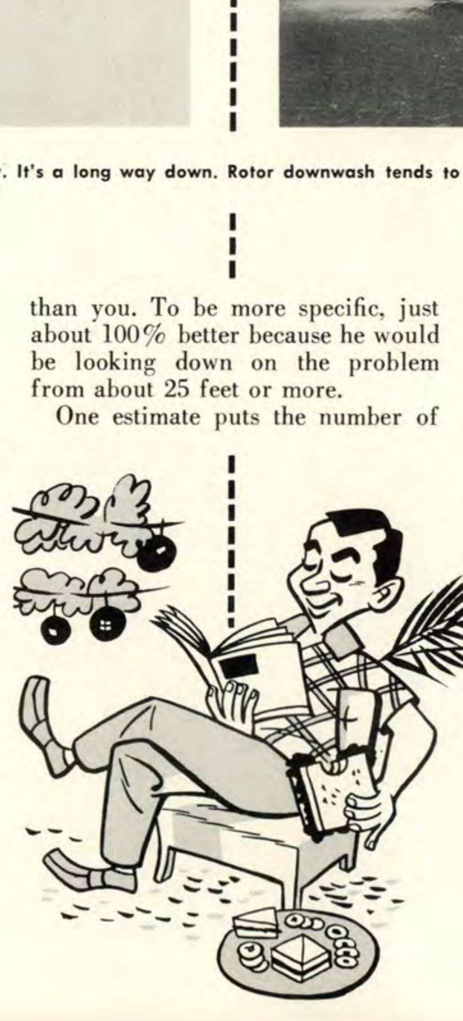
It's better when you help—

It is important to get in that sling correctly. It's a long way down. Rotor downwash tends to hold life raft under chopper. Stay with it.

IN CONCENTRATING on his own machine and all that goes with flying it, the average "fixed wing" pilot has given little if any thought to his plane's cousin, the rotor bird. This breech of family etiquette may go unnoticed for an indefinite period. On the other hand, it could be brought into sudden focus at a time when formal get-togethers would be about as appropriate as a pair of water wings at a roller derby. Or, don't you think that the moment of rescue would be a rather late date to be finding out about the tricks of the trade?

Of course in this event, cousin whirly would do all that he could to make up for your past indiscretions. The success of these overtures of goodwill would depend entirely upon him, for you see, he would have a much better view of the situation than you. To be more specific, just about 100% better because he would be looking down on the problem from about 25 feet or more.

One estimate puts the number of lives saved by helicopters in the Korean fighting at more than 7000. Some of the rescues were routine, some exciting, some were accomplished in a matter of minutes and others took days of thought and planning. However, for the helicopter rescue pilots, business—the life-saving business—has been good. The stump jumpers have been hard at work.



Regardless of their work and countless successful saves, too many downed pilots did not know how to help save themselves. They didn't understand how to attract attention. They threw away useful equipment. They did not take proper care of themselves. And most important of all, they did not know enough about helicopter limitations to put themselves in the best rescue position.

This is particularly true of the fellow down there alone, with nothing between him and big trouble but a pararaft and a survival kit. Survivors in groups not only can spell one another, but collectively, they can better figure out the smartest ways to proceed, and thereby help each other out. But the solitary soul, strictly on his own, is more likely to make the kind of mistakes that will preclude a successful rescue.

Having qualified the necessity for a survivor to have a more practical knowledge of his rescuer and his problems, four simple principles are offered which if applied, make for easier rescues.

The four principles are: *anticipate, communicate, prepare for a wait* and *cooperate*. They are as simple as that. To know and practice them will give every pilot and crewmember a much greater chance for survival if the need ever arises.

In survival and rescue, the percentage always favors the man who has figured out some of the answers beforehand. That is, *anticipate*. And, like most preplanning it begins with a book session. A thoughtful look at the many publications on survival will show you what some of the problems are and will help you prepare for them.

Another part of the anticipation principle is knowing the survival gear you carry around with you. The Aero-Med people are old hands in the business of staying alive during emergencies and have included in the pararaft kit as many helpful items as you can conveniently carry around. Break down the kit and take a look. Then learn how you can use it.

While all this may have very little to do with being hauled out of trouble by a helicopter, you can be on hand, ready and waiting for rescue when the whirlybird pilot wheels over the horizon.

Have you been through your bailout routine lately? How about your procedures for an overwater bailout? It's still a good idea to have a set pattern in your mind about when to inflate your life jacket for example, because once you've done it you may not be able to slip out of your harness. The trick is to release your harness before inflating your vest. Old stuff, you say? Sure it is, but some people have forgotten.

The Mark III and IV anti-exposure suits, good as they are, have added a few more complications to ditching. Recently a pilot was forced to ditch and then jumped into the water with his chute still on. The tight leg straps trapped a lot of air inside the suit and he soon found himself floating like a high diver who couldn't recover from a jack-knife—head under and rear end riding high. He had to paddle like mad to keep his head up and consequently could not use his hands to loosen the leg straps. Fortunately, a helicopter was on the spot. After much furious swimming, the ditcher was able to get an arm through the sling, but half way out of the water he lost his grip and fell back in. The second pickup was successful. All this happened in less than five minutes. It didn't help matters either that the rescued man was pulled aboard the helicopter with the parachute and pararaft still strapped to his posterior.

It is recommended that when wearing one of the buoyant anti-exposure suits one should try to squeeze all of the air out of the pants before fastening the leg straps of his harness.

Another thing. Each time you fly, you may suddenly have to become a spotter. If one of your buddies bails out do you know how to keep him in sight? Nothing is easier than to miss practically any object down below. By the time you've turned around your survivor is gone. This can happen on land as well as over water. That is why some squadrons in Korea made a specific effort to train their pilots to keep people on the ground under close observation. They practiced on farmers working in the fields or with their own people posted down there in training exercises. Emphasis was placed on sighting a downed pilot immediately and not looking away until he had been accurately located with reference to landmarks.

What has this got to do with bettering the chances of rescue? Just this; nobody can make up a set of rules as he goes along. The unexpected always happens fast, so prepare for emergencies that may happen to you or your friends. Be ready to help when it happens. Practice sighting objects on land or on the sea. Remember that the helicopter pilots are too visually limited in range to do much wide searching. For them to reach a downed man requires aid. Either through radio contact with the CAP, by mirror or some other signals from the ground.

Next thing on the agenda is to *communicate*. There are many ways for the downed airman to communicate. If you find yourself in the spotter's role, a good position report is a must. You'll see why if you take a look in the cockpit of a helicopter. Navigation instruments are few and far between. Understand also that the pilot is necessarily so busy with his hand and feet that he cannot possibly do much fancy navigating. In combat over enemy territory a helicopter, relatively slow and limited in range, is a hovering duck for small-arms and AA fire, so the whirlybird starts out on its rescue mission with a specific objective. The pilot must know where he is going, and whether

Give the pilot all possible aid to help him determine the direction of the surface wind.

he can make it back home. Of necessity a good position report is a must for him.

Naturally communication procedures vary from area to area, but one thing never changes: The necessity for full information about the intended pickup.

In a plane equipped with VHF or UHF radios, you know that your range of communication is limited. At the same time, knowing how difficult it is to keep sight of an object as small as a man, you won't want to go upstairs where your message has a better chance of getting through. You may not be able to locate the survivor again if you do. The best bet is to keep the man in sight, taking a chance on the radio signal. Later, if you are forced to leave without being relieved, gain altitude and send out your signal again.

When several aircraft are flying cover, one pilot can go up high for effective transmission. Just be sure that someone is keeping the survivor in sight.

And when the helicopter appears, give it plenty of air room. Prop wash or disturbed air in the wake of a jet can be very troublesome indeed when the stump jumper is trying to concentrate on his rescue.

One of the most important aspects of getting rescued is making up your mind that a little time may elapse. Hence, the third of the four easy rules: *Prepare for a wait.* Regardless of how good the rescue chances may seem, settle down as if you have to be there for days. Help may be in plain sight, your friends may be orbiting and waggling all kinds of encouragement, you may see a helicopter winging its way toward you—but prepare for a wait, anyway. The situation can change in the twinkling of an eye. A sudden squall hides you from view. Your friends upstairs are forced to leave. The helicopter develops mechanical trouble and must turn back. Improbable? All these things have happened.

Where are you if you've dumped your survival kit and jettisoned your smoke flares? Up the creek and not a paddle in sight. This is what the specialists emphasize again and again; never count on a quick rescue. Never. Not when you're down at sea, not when you're down on land. The rescue detail will do everything in its power to bring you home as soon as possible. Count on that. But prepare for the wait, anyway.

This illustrates how difficult it is to spot survivors from the air. How many can you see?

Unless ground-fire or other enemy action dictates otherwise, it is better to stay in the vicinity of a crashed plane because that is what the rescuers are most likely to spot from the air. And keep a close eye on your physical condition. If you find it desirable to make tracks away from the airplane, your best bet is to make haste slowly, taking care not to wear yourself out in frantic flight over rough terrain. If for any reason you have to walk to a more accessible area, take it easy. A mile a day made by a fellow who takes reasonable precautions is better than 20 miles made by the man who moves so fast that he exhausts his strength too soon. In general, the best formula for moving through the wilds is to bring along as much survival gear as you can carry comfortably.

Of course you will want to *cooperate* with those people who are risking their necks to save yours. If cooperation were merely a matter of good intentions, it would be pointless to mention it at all. The fact is, cooperation with the rescue people is based on knowledge. You must know enough of the procedures they follow to be able to lend them a hand. As far as a helicopter is concerned, this is mostly a matter of knowing the capabilities and limitations of the machine itself.

One of the best ways to get the word is through talking with the chopper drivers themselves. You'll find these earnest, hard-working men just as interested in doing their jobs as any of the "fixed wing" crowd. The difference is that usually several lives are at stake whenever one of the whirlies sets out on an errand.

If you're stationed near a 'copter outfit, go and visit them. The lads will tell you that they make their rescues in three ways, depending on the circumstances:

• Hovering — The survivor gets into the sling and is hoisted into the hovering helicopter. This is the usual method. When needed, a crewmember may be lowered to help out.

• Running — The survivor grabs the sling hanging below the 'copter as it flies by. This method has its risks, but may be necessary at times.

• Landing — Quite often the choppers are not equipped with a hoist or the density altitude is such that a hovering pickup is impossible. In that case, it is up to the survivor to make a clearing or move to a suitable landing spot for the 'copter.

As a survivor you must decide where to be and what to do on the basis of the above methods.

There are a few small gimmicks that you should know about in water rescues. Upon reaching your position, the chopper pilot will make a steep, near vertical approach to the raft and will hover directly over you. The downwash from the rotors will encircle the raft and hold it under the helicopter. The sling will be lowered to hoist you aboard. Consequently, only as a last resort should you abandon the protection of your raft. Just throw out the sea anchor and hold your position.

Get rid of your parachute if you've been using it for shelter. It can blow from the downwash created by the main rotor. The chute may billow and foul the tail rotor of the helicopter. When that happens maybe nobody gets rescued.

So there are the musts for cooperation at sea. Make yourself as stationary a target as possible. See that your opened chute is out of the way and will not foul the 'copter rotors.

Now, how do you get in the sling? There's only one approved method. Place the sling over your head, behind your back and under your armpits. Keep your elbows close to the body and hold on. Your own weight holds you in the sling. If there is a chest strap, fasten that, too.

If the sling seems too small, the chances are there's too much air in your Mae West. Deflate Mae until you fit. Note also that during the winter months the added bulk of heavy flight gear may force you to squirm a little to get into the sling, but you can do it.

Sea rescues are not too complicated. It's on land that your finest cooperative efforts are called for.

In spite of the cheery articles in the slick magazines, helicopters do have limitations. They can't hover over a gnat's back on a mountain peak or beat their way down a mine shaft looking for you. Not that most whirly-bird pilots wouldn't try to do those things if a life were at stake, but the chances of success would be dim. When you know what the machine can do the mission is more likely to succeed.

To get you over the land, a good pilot always bears in mind several special factors in addition to his normal problem of flying with head, hands and feet. They are:

- Wind direction and velocity.
- Contour of the terrain and the number and kinds of obstructions in the area.
- Altitude of the survivor (you).

Whatever help you can give him in determining or overcoming any of these makes his job simpler.

Indicate wind direction for the pilot by lighting your smoke flare when you see the 'copter approaching. This has the added benefit of helping to spot you. Remember that with the helicopter's limited fuel supply, time is important. Work fast, but use your judgment, too. If you light the smoke flare when the helicopter is too far off it may dissipate too soon.

Without a smoke flare, you must improvise. Throw dirt, dried leaves or anything else into the air and continue to do so until the whirlybird pilot spots you. If the wind is strong enough, hold up your scarf or some other piece of cloth. When the ground is frozen and you have no other means of making like a human wind sock, turn your back to whatever wind there is and swing your arms vertically along the sides of your body to indicate the wind line. The idea is to help the pilot as much as you can.

Most people think of helicopter rescues only in the terms of "hover and hoist." But a man in need must also consider where the 'copter can hover and how far it can hoist. Normally helicopter pilots prefer to hover in ground effect which is about the radius of the rotor disk.

The cable on the helicopter is only 75 feet long. If you are surrounded by trees, buildings, telephone poles or other objects, the cable may not reach you. With your added weight the pilot needs forward as well as upward motion to get going. Always make for an open area. Try to get clear of all obstructions. In mountainous country where a running pickup is usually necessary, find an open area and try to allow enough "up wind" clear space to avoid obstructions while being hoisted on the run. Don't be at the bottom of a ravine waiting for a 'copter to come. It can't.

At high altitudes, the helicopter cannot hover and hoist. It must have forward speed to stay aloft. The 'copter pilot knows this; he hopes you know it too. You must be poised in

Emergency signal cards should be a must with every unit and carried by all flight crews.

an open area like a sprinter, ready to grab as you go. Hanging on under these circumstances is not the easiest stunt in the world, but many people have done it. If you can hang on long enough to be hoisted or even for the pilot to descend to a safer place at a lower altitude, you've got it made.

Many organizations have prepared emergency signal cards that pilots carry with them. This card graphically displays standard rescue signals used by the potential survivor to communicate with the circling airplane or chopper driver.

The main idea is to be prepared to aid the man who spots you, every way possible. So — read over the helpful books and pamphlets on survival. Be sure you know the proper way to tell the world about your troubles. Always be prepared to wait. Hang onto the emergency equipment you know you'll need. Talk with the helicopter pilots about their ways of operating. Be set to help the fellow who is helping you.

Rescue techniques and devices are being developed daily. But no matter how good they get, their effectiveness always will depend in part on your anticipation, communication, preparation and cooperation. ●

LOX

IT'S ONE OF THE many things that make high-altitude flight possible. The fighter pilot uses it from the ground up, and the bomber crews have it within easy reach at all times. It's the only antidote for those bluish fingernails and that slap-happy feeling that leads to oblivion at altitude. It's your friend and mine, OXYGEN.

By now every airman should be fully aware of the necessity of oxygen in connection with high-altitude flight. This then is not to expound further upon its use, but rather to introduce a new development in its packaging.

An excellent place to start would be with the first recorded flight into high altitude. Man's first representatives in this venture were three European scientists: Sivel, Croce-Spinelli and Tissandier. In the year 1875 they set forth and ascended to an altitude of 28,820 feet in a balloon. These men had anticipated the adverse effects of the rarified air at high altitude and carried with them several small balloons filled with oxygen. Because the supply was so small, the men hesitated to use the oxygen. They hesitated too long. The men were unconscious from lack of oxygen before the balloon reached 26,000 feet, and only Tissandier lived to relate his experience.

Since that time, efficient gaseous oxygen systems have been developed. Aircrews need no longer hesitate to take full advantage of their oxygen supply. With the advent of aerial refueling, the range of airplanes such as high-altitude bombers and fighters was extended almost indefinitely. The time limits of human endurance came to be more and more the factors governing flight duration at high altitude.

The answer to the problem of oxygen supply was to produce pure liquid oxygen by the fractional distillation of purified, liquid air and carry the liquid oxygen in containers which could also serve as units to convert the liquid into the gaseous form again.

A 25-liter liquid oxygen converter occupies only one-eighth of the space required for a gaseous type oxygen system of the same capacity. The liquid converter when filled weighs approximately 132 pounds, while the weight of a comparable gaseous system is approximately 459 pounds.

In addition to conserving space and weight, the 25-liter converter permits easier installation. For example, each converter requires only seven connections on the manifold panel, as contrasted with more than 100 connections for a comparable gaseous system.

The oxygen-production qualities of the converters have almost tripled the comparable capacity of the gaseous system on the B-47. The early series have a conventional low-pressure oxygen system which provides either 143 or 198 cubic feet of oxygen for the crewmembers. This is sufficient for approximately 15 hours of normal high-altitude operation. B-47s coming from production now are equipped with a liquid oxygen system which will supply 392 cubic feet, and the aircraft will have provisions for the installation of additional facilities which will boost this total of 588 cubic feet.

Now let's look into some of the peculiar properties of liquid oxygen. First, high-purity liquid oxygen is a bright blue, transparent liquid which flows like water. At normal atmospheric pressure the liquid is at a temperature of minus 297.4°F. Because of the extremely low temperature of the liquid, the physical properties of materials it comes in contact with can be altered greatly. Rubber hoses used to transfer liquid oxygen must be handled with care because the hoses freeze and become brittle. Carelessness in handling liquid oxygen will result in severe skin burns and damage to valuable equipment.

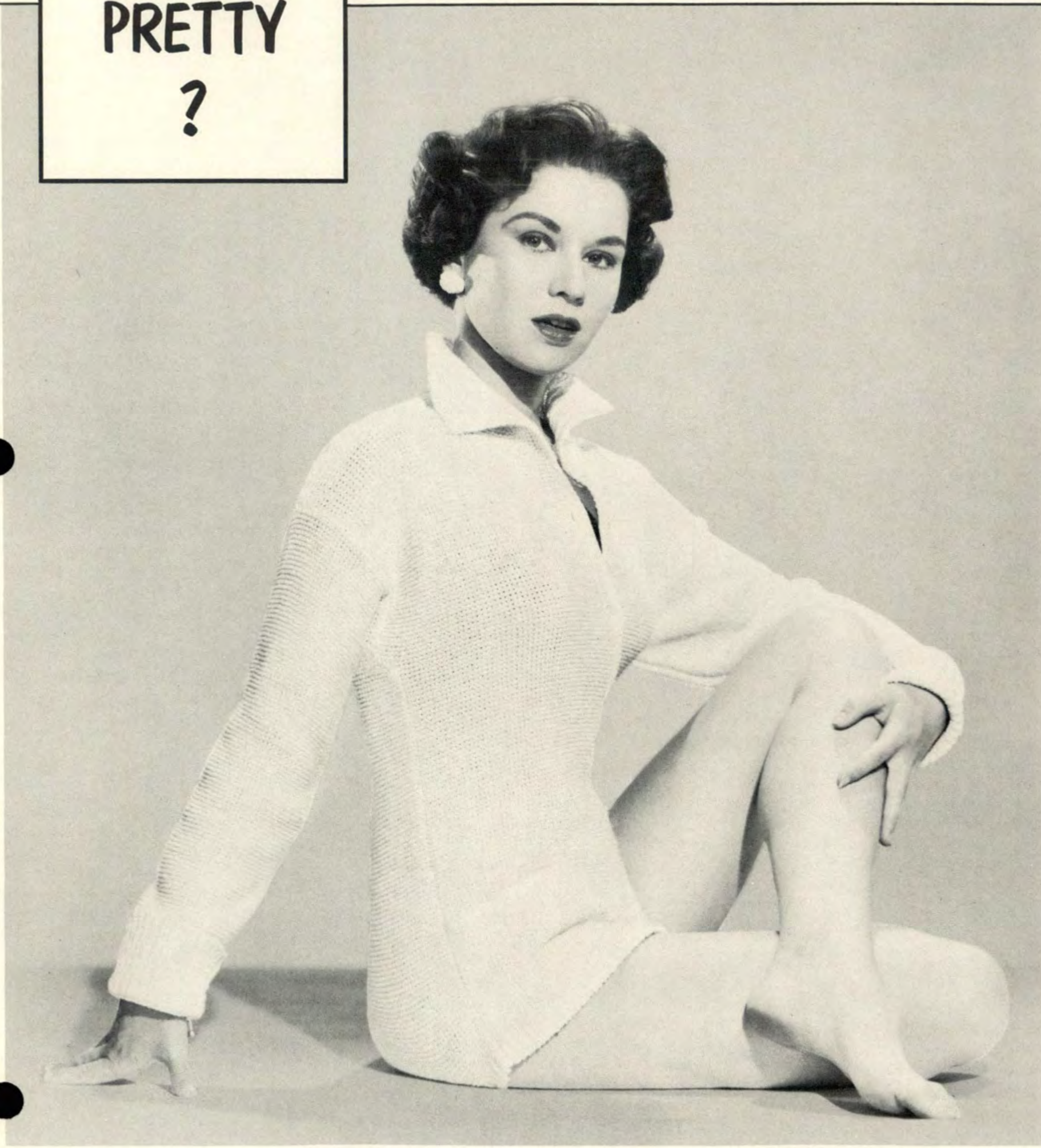
Oxygen in the concentrated liquid form has a greatly increased potential capacity for supporting combustion. If the vapor from liquid oxygen mixes with gaseous fuel and is ignited, a violent explosion may occur. Normal precautions, such as those required on the gaseous type oxygen systems, will eliminate the possibility of combustion or any other undue occurrence.

As far as flight crewmembers are concerned, the operation of the liquid system will be the same as the operation of the gaseous system. But like any other component or system of your aircraft, it is always well to be completely familiar with a new adaptation and to assure that all crewmembers have a working knowledge of its functions.

The "ungarbled" word for all types of oxygen systems may be found in current Technical Orders. If you have not done so already, it would pay you well to read and heed. Oxygen, like altitude, can work for ya' or agin' ya'. It depends on you. ●

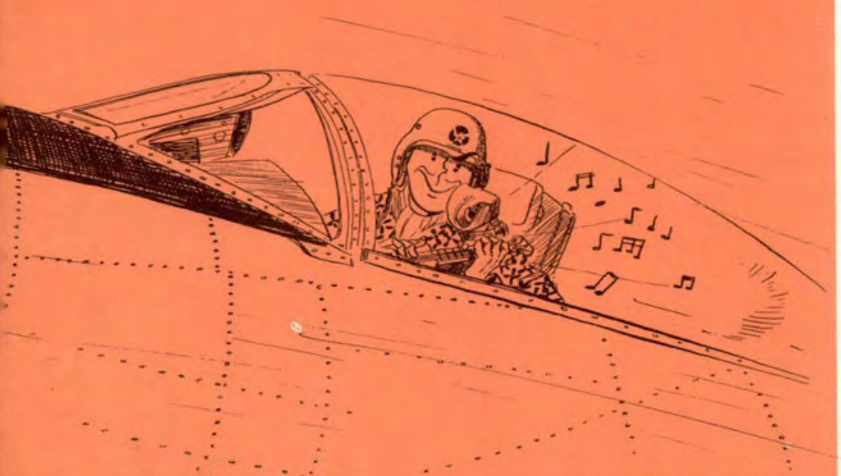
ARE YOU SITTING PRETTY ?

Just sitting around looking pretty is okay for this little gal. She undoubtedly isn't waiting for rescue following a bailout (No GI shoes). If she did fall into this category, she could do something better than just sit there. There are many ways to help your chances of rescue. Look at page 24 and see for yourself.



Mal Function

Dressed for summer, Mal flies high,
Temperatures here like Eskimo pie.



Canopy fails, and leaves Mal's craft,
Hero is faced with cold, cold draft.

He's finally down, but way too late
'Cause round-out arm is frozen straight.