FLYING SAFETY

UNITED STATES AIR FORCE

FEBRUARY 1954

In This Issue

- *A Look at the F-84F*
- *Latest Word on Ditching*

for a long time Captain Hurry
will be losing lots of sleep
fired up and started rolling
bought himself the ramp crew's jeep!

Look around BEFORE you taxi out!

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FLYING SAFETY

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SUBSCRIPTIONS

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USAF PUBLICATION 62-1

VOLUME TEN
NUMBER TWO

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★ ★ ★

Cover—The new F-84F, now being delivered to USAF units, packs lethal wallop.

An article by test pilot George Welch on spinning the F-86 starts on page 14.

Left, first F-84F off the production line. Test pilot Rusty Roth prepares for initial flight.

--AS IN F-A-S-T!

By Russell M. Roth
Flight Test Pilot
Republic Aviation, Inc.

THE best way to learn how to fly an airplane is to fly it. And I believe that the best way to describe a new airplane from a flying safety viewpoint is to detail each step of a flight from walk-around inspection to landing. So, as the pretty gal says on a Saturday night TV program, away we go.

Notice I said new airplane. You jet jockeys who will be flying the Republic F-84F soon will have a completely different bird surrounding you than the old F-84 series aircraft.

The F-84F is a swept-wing fighter designed for flight in the subsonic and sonic speed ranges. It is powered by an axial flow J-65 Curtiss Wright engine, developing 7200 pounds uninstalled thrust. The aircraft lends itself readily to fighter-bomber and long range operations, since it can carry exceptionally heavy external loads.

The cockpit of the "F" was designed with an eye to pilot comfort. It is similar to the 84G, though slightly larger. The pressurization system provides for greater quantities of air at comfortable temperatures and allows cabin pressurization at lower effective altitudes. A double wall canopy, an anti-fogging dry air circulating system and a flat front windshield provide good visibility.

The aircraft is 43 feet long, has a wing span of 33 feet and is 14 feet from the ground to the top of the fin. Gross weight varies from 18,500 pounds for a clean aircraft to over 25,000 pounds for the aircraft with four external tanks installed.

Actually, in discussing the "F," I will refer to two variations of the aircraft. The first planes delivered to the USAF will have two-piece tails. Later, all the planes produced will have flying tails. For simplicity, I will refer to each type as two-piece tails and slab tails.

Special Preflight Check

During the usual walk-around check list inspection, I note the position of the horizontal stabilizer, so that when I get in the cockpit I can see that the stabilizer position corresponds with the cockpit position indicator. Next, I trim the stabilizer to see that the direction of the stabilizer motion corresponds with the position indicator. At this point also, I check the emergency override switch for travel on the longitudinal control to make sure it by-passes the stick grip.

". . . designed for high speeds at all altitudes; flight characteristics are excellent . . ."

"... a swept-wing fighter designed for flight in the subsonic and sonic speed ranges."

This aircraft is equipped with an irreversible control system, and all control surfaces are actuated by hydraulic pressure. No air loads or surface forces are felt by the pilot. An artificial feel device as nearly as possible simulates in-flight air loads. With this control system, forces present on the ground are nearly identical to those encountered in flight. Forces are proportional to stick motion rather than airspeed and loading. Don't rely on stick forces; rely on airspeed for proper aircraft control.

For a preflight check after the engine is started and hydraulic pressure is available, deflect the stick full forward, full back and to the side and apply full rudder. If the entire control system is okay, the stick will re-center itself after each control movement and the rudder will return to neutral. In conjunction with this check the artificial feel devices incorporated in the aircraft give you approximately 38 to 40 pounds for full back stick deflection, 12 to 14 pounds for full forward and 18 pounds laterally for full throw. In addition to the above forces, approximately a 1½ pound force is required for initial movement of the stick from the centering detent.

Just before takeoff I arm my jettisoning switches. The inboard jettisoning switch drops the inboard tanks or stores, the outboard jettisoning switch can be used to jettison the outboard tanks or stores, and the panic (emergency salvo) switch eliminates all four tanks and the pylons in case you have to dump them in a hurry on a takeoff emergency.

Before takeoff I run the engine up to 100 per cent and recheck all the engine instruments, particularly the oil pressure, fuel flow, tailpipe temperature and rpm.

On takeoff, rudder breakout forces may cause a slight tendency to overcontrol at the beginning of the takeoff roll. Care and experience will eliminate this tendency after a few flights.

Watch That Attitude

I would like to emphasize one point concerning takeoff run. I never make any move toward pulling the aircraft off the runway until I have nearly reached takeoff speed for the particular configuration. Naturally I have referenced the dash one for this, prior to starting the flight. When the plane has reached the desired speed range I use a gentle, sustained back pressure to get the nose off and hold a shallow angle of attack. In this attitude, the plane flies itself off the ground as acceleration increases.

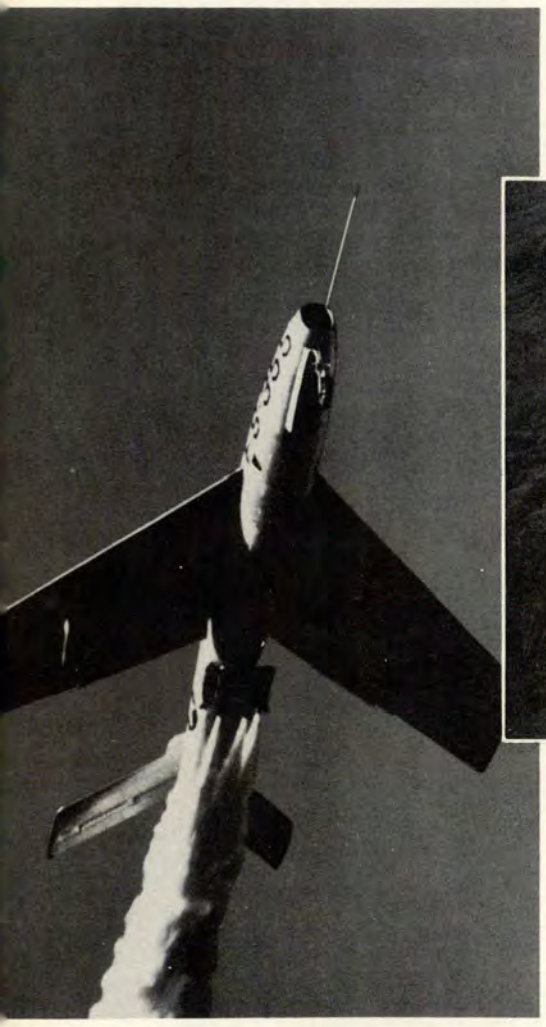
The important things to remember here are airspeed and attitude. If a pilot starts the nose up too soon and holds it off at lower speeds, and he has the elevator power to do this, he stands a good chance of getting on the back side of the power curve, especially with external stores. You all know what happens then. The plane may break ground but it is going to return in a hurry.

Slab tail aircraft have another built-in safety factor. This model has an auxiliary electric hydraulic system which is available to the flight controls. This alternate control system cuts in automatically if the regular system pressure drops below a critical value.

In addition to the normal and the emergency hydraulic systems, an electrical actuator is connected to the longitudinal control system, and the slab tail can be controlled by actuation of the stick trim button. This system by-passes all mechanical linkage and is an excellent battle damage control, as only the electrical wiring from the stick grip to the electric motor in

With the irreversible control system an artificial feel device simulates in-flight airloads.

Below, with jato installed, the aircraft leaps off like a homesick angel. Right, the RF-84F, photo-reconnaissance version of the Thunderstreak on a test flight.



the slab tail is necessary for longitudinal control.

The above control systems actually give the F-84F three separate longitudinal control systems:, regular hydraulic, emergency electrical-hydraulic and direct electrical control.

Rate of Climb

You jet jockeys will be pleased with the way the aircraft accelerates to climb speed; you get to altitude in a hurry.

Okay, the plane is now at altitude, trimmed and ready to go. Let's run through some of the flight characteristics and see how the "F" handles.

This plane was designed for high speeds at all altitudes; flight characteristics are excellent throughout the speed range. The speed is limited only by the thrust available and by total aerodynamic drag. In level flight at high Mach numbers, the few trim changes are made easily using the trim button to readjust the stabilizer.

Aircraft buffet or heavy trim changes are not problems through the trans-sonic speed range. The aircraft remains stable except for a slight tendency to wing heaviness, which is overcome easily with a small amount of aileron.

Stall warning is very good on both the two-piece tail and the slab tail aircraft. First warning is light buffeting, followed by heavy buffeting, and finally by a softening of the controls immediately before the complete stall. Upon stalling, some nose-up tendency is noticeable, but there is sufficient longitudinal control to stop it. In fact, in the slab tail models there is far more control available than ever could possibly be needed.

When the aircraft is stalled there is a pronounced yaw, usually to the left. This gives an additional stall warning. This tendency is no cause for sweat on a landing, as plenty of rudder control is available to correct the yaw before touching down. When the aircraft yaws, just remember the plane is ready to pay off.

On any stall, accelerated or unaccelerated, the 84F comes out flying, with no tendency to spin. This is equally true for aerobatic maneuvers. In fact, to spin this plane, a pilot would have to make a deliberate entry and then hold the plane in the spin. To date, spin tests haven't been run and the F-84F is restricted from spins. Wind tunnel tests with a scale model F-84F have been accomplished and the "F" displayed normal aircraft spin characteristics.

After going through the usual aerobatic maneuvers and observing how well the plane handles, let's go downstairs and see how it handles at low altitudes and on a landing.

Low Altitude Dives

A word of caution for you boys who like to play downstairs at high speeds. This aircraft accelerates rapidly and can really wind up. A word of explanation from our engineering people as to what can happen if you get too gay might help at this point.

A high speed aircraft loses some of its control effectiveness in the vicinity of and above .9 Mach number so be

careful. The point is, don't get in the wrong attitude *at any altitude* where control effectiveness is essential.

In an emergency some help can be obtained by judicious use of the stabilizer trim. However, be extremely careful about overloading the airplane. As airspeed decreases, control effectiveness returns, and if excessive trim has been applied, high accelerations may be experienced. Use full elevator travel before applying stabilizer trim, so that full opposite surface travel will be available in case you pull excessive G.

I'd like to stick my neck out a little bit in discussing landings. I think it is almost impossible to make a bad landing in this airplane. Okay, I know some joker will make a liar out of me, but he is going to have to try real hard. I just don't believe that today's high performance jet aircraft, and I mean all of them and not just the F-84F, can be flown safely in the landing pattern if the pilot insists on wracking around in steep, tight turns. I don't mean that you have to fly a "goonie bird" pattern to be safe; just a modified pattern with normal turns and power.

Although I could quote some figures relative to pattern speeds that generally apply, I believe you should reference the dash one and thoroughly memorize them all. Inasmuch as a definite pattern is a must on my books, I make my break and bring the plane around smoothly for the downwind. Then the gear and flaps are lowered while holding the recommended speed. I prefer to maintain a good margin above stalling until on final and then begin slowing down as I cross the end of the runway, using a shallow approach. I retain power until I have it made, as this aircraft has a high rate of sink.

Airspeed and Power

I still say that you really have to try to make a bad landing. The point is, control your rate of sink with power and sufficient airspeed and there's no sweat. True, the rate of sink may be deceiving to an inexperienced man, as the plane feels good and solid until he looks out and sees the ground coming up real fast. Then when he comes back on the stick, there is no round out left. Remember airspeed and power, and the problem is non-existent.

Russell M. "Rusty" Roth, Republic Aviation test pilot, has made many of the test flights on the F-84F prototype and production aircraft. He has over 1000 hours in jets included in his 2500 hours fighter time, with 400 hours in the F-84F alone.

Roth became a test pilot at Republic in 1951 after eight years as an Air Force pilot. Six years of his service in USAF were spent as a pilot in the Flight Test Center at Edwards, after a combat tour of the SWPA in P-38s.

After touchdown a pilot has plenty of braking action to bring the plane to a stop. In fact, it is easy to slide a wheel with the power assisted brakes and not even know it. I try to get the nose down fairly early in the roll and start light brake application immediately, rather than wait too long and then be forced to use too much.

In case a landing is made deadstick, engine frozen or with hydraulic pressure not available, the brakes are on a hydraulic-mechanical system. Brake forces are high, but full action can be obtained, even to sliding the wheels.

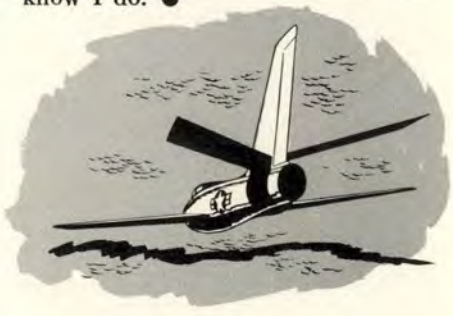
The F-84F can carry a tremendous load of external stores and still get off well. I think both takeoff and landing run compare favorably with other aircraft, especially considering the weight that can be carried.

I have made flights with the airplane in an asymmetrical configuration, with the equivalent weight of a full 230-gallon inboard pylon tank on one side. Landing in this configuration presents no problem; at slightly above normal approach speed with gear down and full flaps there is still enough aileron for lateral control. However, in case an outboard tank is lost, I recommend dumping the other before landing.

As an added safety factor on the two-piece tail aircraft a factory test is flown on each plane with boost off. This test is made to determine at what maximum speed the aircraft can be controlled safely with boost off. This precludes the possibility of getting an aircraft so out of rig that it can't be controlled at higher speeds. Ordinarily, when flying with boost off in the upper speed ranges, the aircraft has good rudder control and fair elevator and aileron control. All flight control in the lower speed ranges is very good.

I suggest that, as a flying safety measure, all new F-84F pilots practice flying the two-piece tail model with the boost off. This will enable them to find out just what the aircraft will do under this condition and to familiarize themselves with the changed control characteristics. To practice booster-off flight, trim the plane for straight and level flight in the mid-speed range and turn the system off. When ready to turn the boost system on, re-trim aircraft to reduce high stick forces. Incidentally, on the slab-tail model this is not a problem as it has an auxiliary control system.

In writing this article I tried to mention some of the F-84's features and some of the things about the aircraft that deserve your respect when flying it. To sum it all up I would say this is a fine aircraft; big, fast and rugged. It will do the job for which it was designed, and do it safely and well. I think you'll like to fly it; I know I do. ●



Captain Burdon L. Davidson, the Wing Flying Safety Officer from Ladd AFB, dropped in to see me the other day. We had quite a chat after he parked his snowshoes and divested himself of his parka and mukluks. Seems that one of his pet projects centers around the Air Force version of the Alaskan bush pilot. He's really got 'em up at this base. Guys that leap off into the murk when the birds are walking and the polar bears are hibernating.

Unlike most of our visitors, Captain Davidson came loaded for bear (force of habit, undoubtedly). He had a ream or two of facts, figures and photos. "This is the way we operate," he said. "Look it over and see if there isn't a story here for FLYING SAFETY." After reading it, I agreed, and dispatched it post-haste to Flying Safety Magazine.

BUSH PILOTS -- USAF Style!

1st Lt. John A. Piganell, Ladd AFB, Alaska

CIRCLING over a pioneer "bush" strip at one of the remote satellite bases in Alaska, a C-47 pilot eyes the match-like landing field cautiously. It runs up the side of a mountain; the approach comes through a valley between other mountains, and a blanket of snow covers the runway. The pilot has been here many times before, still, each time he returns it looks impossible.

On the ground a hundred expectant faces turn upward. To them the C-47 means vitally needed cargo, mail and replacements. It is their main and often only line of supply. To them the "Old Gooney Bird" means success or failure, good living or poor existing.

The heavily loaded C-47 starts down the long final approach, almost obscured by the mountains. Every bit of knowledge ever learned and a hundred new techniques are called upon by the pilot. His judgment must be perfect the first time, for there is no go-around through the towering mountains.

The lumbering C-47 touches the hard packed snow and bounces slightly, but even before the tailwheel touches the ground, the pilot applies almost takeoff power to taxi up the sloping runway. Another load of life and defense has arrived.

Bush flying, one of the most hazardous of operations, calls for the ultimate in flying skill and a constant awareness of safe procedures. Not only must the bush pilot fly in such extreme temperatures as 50 degrees below zero and land on extremely short rough strips, but he must also navigate over tractless wastes of Arctic tundra with few or no navigational aids. Radio ranges are few and far between north of the Alaskan Mountains and often are unreliable.

With airframe ice, heavy turbulence and icy runways almost daily threats, the bush pilot is confronted further with unusual conditions such as white-outs, severe downdrafts and high winds. A white-out is peculiar to the Arctic regions in winter. With visibility unlimited a pilot flies instruments because the high overcast blends with snow-covered tundra, causing the horizon to disappear.

In the small, scattered outposts of the bleak Arctic the bush pilot is all-important.

During the spring the thaw causes gaping holes in the runways. The melting snow seeps through the hard packed dirt, and the runways become slick and dangerous.

Spring and fall bring the worst weather. Low overcasts and heavy icing conditions are encountered more often than not.

Summer weather is a relief, but Alaskan summers are short and over before the bush pilot can enjoy the good weather. Winter and its sub-zero temperatures, snow, ice, fog and long hours of darkness keep him busy.

Every pilot, realizing the importance of airlifting supplies, realizes also the unusual conditions involved. These Air Force bush pilots carry with them on every flight personal survival kits, along with bailout kits and survival gear issued by the Air Force. In the event of a forced landing or bailout these pilots know it may take days or weeks before help arrives. Unlike the States, the nearest phone is not just down the road. There is no road.

To show its appreciation for safe flying during unusual and extreme conditions while delivering vitally needed cargo to satellite bases, the 11th Air Division has instituted a "Master Bush Pilot Certificate." This coveted award is earned only by pilots to whom flying safety is a byword.

During a typical three-months period, 11th Air Division pilots airlifted almost 2000 tons of cargo and flew over 3000 hours. This impressive record is the pride of every pilot in the 11th Air Division. To these men who must perform a dual job of working at their desks and flying tons of cargo per year go the admiration and appreciation of the 11th Air Division.

Good news for troops; supplies, mail and contact with outside world arrive with bush pilot.

The "Master Bush Pilot Certificate" is a project of Capt. Burdon L. Davidson, Flying Safety Officer, Ladd AFB, and is to be awarded to those pilots whose desk jobs are supplemented by secondary and vitally urgent flying jobs. These desk jockeys are required to fly two days per week and fulfill the following conditions.

To be awarded the certificate, a pilot must "first-pilot" an aircraft into most of the satellite bases within the 11th Air Division Command, fly 300 or more first pilot hours in the Alaskan Air Command and not be involved in an aircraft accident while in the theater.

How does an Air Force pilot become a bush pilot? Regardless of the number of hours a pilot has behind him, he must begin anew for this peculiar operation. First, with an instructor pilot he must be route-checked into the remote satellite bases. He observes several landings from the right seat at these bases then makes two landings on each of the bush strips.

If he has shown good judgment and safe procedures, he becomes first pilot. But before he is turned loose, he must have either 1000 hours total first pilot time and 200 hours in the C-47, or 2000 hours total time and 100 hours in the C-47.

This is by no means the end of his bush training. Through a well organized flying safety program and an Arctic Flying Indoctrination School, the newly arrived pilot learns the added techniques of safe flying in the Arctic. The many fine points learned through years of experience in bush flying, those points that mean the difference between landing safely under extreme conditions and crashing, are called to his attention. The old timers give him more information about the peculiarities of each bush strip. Every day and every flight are a constant training program, and only when the pilot rotates two years later with an accident free record, can he say he is an accomplished bush pilot.

Maintaining proficiency in flying into the bush strips is the responsibility of the pilots, even though they must hold down desk jobs.

Brig. Gen. Donald B. Smith, Commander of the 11th Air Division at Ladd AFB, Alaska, has indorsed the "Master Bush Pilot Certificate" because of the incentive created among the pilots to deliver cargo and personnel to the satellite bases of his command efficiently and safely. ●

SUPPLEMENTARY FLIGHT INFORMATION

Lt. Col. Robert L. Van Ausdall
Senior Air Instructor
Maryland Air National Guard

There is a wealth of information between the covers of the SFI and it's put there for your use.

The author, right, believes the multitude of facts in SFI tie in directly with flight safety.

The careful pilot makes use of the information that is provided for his benefit in the SFI.

A publication which is more readily available and yet probably least used by pilots is the Supplementary Flight Information document (sometimes known as ***SFI****).*

This document can be directly tied into flying safety because of the multitude of facts it contains. Facts which have saved many lives in the past. Facts which may save ***YOUR*** *life sometime in the future. Do you know what information is available to you in this fine book? This article will brief you on some of the facts.*

HOW many times have you heard a pilot over **"BRAVO"** Channel ask the tower, "When does official night time begin?" or "What is the correct time?"

How many times have you searched for the latest AFR 60-16 to clarify a procedure or to re-check your takeoff minimums or the requirements for an alternate airport?

Do you remember the requirements for fuel reserve?

Do you know where you can quickly learn the location of Air Rescue Service Units? Of Regular Foreign Clearance Bases?

The answer to all of these and to hundreds of other procedures are easily found in the Supplementary Flight Information document.

The Supplementary Flight Information document begins with a set of conversions; listing barometric readings from inches to millibars, Centigrade degrees to Fahrenheit, barometric inches to altitude and nautical miles to statute.

This set of conversion factors is followed by a Sunrise and Sunset Table for given latitudes and any meridian. Time signals and standard frequencies of WWV and WWVH are listed with an explanation of how to receive the exact time by radio while airborne. A group of Navy Time Signal stations and their frequencies are also shown. These signals are absolutely reliable to 0:05 second.

One of SFI's main uses is to supply a list of commercial radio stations for every state in the United States. But no station listing will be found for any U. S. locality for which there is no record of an airport. For cities with more than one radio station the most powerful station or that station which maintains the longest hours of operation is usually shown.

In these days when economy cuts and new trends in navigational equipment are forcing the closure of several CAA Radio Ranges, the use of this section of the SFI will increase. For each radio station, remember that there will be a column listing hours of operation, magnetic bearing and distance to the airport.

Broadcast Stations are likewise listed for Alaska, the Azores, Bermuda, Greenland and Iceland plus a complete listing of *all* stations operating in Canada.

QUQUG or **QILIO** are examples of ICAO NOTAM coding. Such coding is somewhat familiar to most pilots. Most of them know they can find the key somewhere in a weather station or in base operations but how many of them know the key is located in its entirety in the Supplementary Flight Information document? This code can come in very handy on numerous occasions. For example, at locations such as some Air National Guard bases or P fields where CAA facilities have weather sequences, there may not be someone handy to decipher the NOTAMS for you. These NOTAMS are most important in the winter months in advising of runway conditions in areas of ice and snow or freezing rain.

Your SFI contains an explanation of direction finder service. It gives HF VHF/UHF procedures and explains how a DF works. It tells a pilot the various classes of steers; the proper phraseology to use; how to alert DF stations; how to contact F.C.C. D/F stations, and how fighter aircraft with An/ARA-8 VHF D/F (better known as the "Dog-Uncle" homer) can home on ground stations.

Do you, as a pilot, know what CIRVIS means? CIRVIS is *C*ommunication *I*nstructions for world-wide *R*eporting of *V*ital *I*ntelligence *S*ightings from aircraft. Who reports, what to report and how to report are clearly covered in SFI.

International procedures for such things as altimeter settings, communication distress, position reporting, radiotelephony and units of measures are covered in a section of SFI called General Procedures. This chapter which would be of most value to an aircraft on an overseas flight also covers ICAO charts and place-name abbreviations, ocean station vessels, meteorological broadcasts, ADIZ Areas with their coordinates, designated mountainous areas and other matters of a general scope.

ATC Procedures and Regulations

If you are one of those pilots who has to sweat his way through the written portion of an instrument check once a year, next time pick up this chapter in the SFI document and read it, or better yet, study it. You'll find numerous answers and explanations, definitions and even a copy of AFR 60-16 contained here. Also included are the 60 series of Civil Air Regulations, covering rights-of-way, acrobatic flights, minimum safe altitudes, airspace restricted areas, radio failure, visual flight rules and instrument flight rules.

Believe it or not, there is even a section devoted to the USAF procedure for making a radio range orientation, with easy-to-read diagrams. Another page diagrams standard holding procedures. ILS, GCA, Flight Service, Flight Plans, Air Traffic Control and Approach Control are all defined and explained in plain language.

That's not all! A page is devoted to standard light signals and the uniform system of hand signals for parking. Another to in-flight and post flight weather reports and pilot to forecaster service. Still another to two-way radio failure and servicing.

Emergency — Rescue

This is it! *EMERGENCY* is the chapter which is so seldom read until it is needed. Then it becomes the most important bit of print that ever hit a page. If you ever find yourself on the wing of an aircraft that you have just bellied in away out in the boondocks and you wonder just what you should do next, reach in and pull the Supplementary Flight Information document out of the chart case and read the chapter on *EMERGENCY*. Air Rescue Service and the location of ARS Units are explained. Recognition of emergency visual and radio signals, body signals, mirror emergency signals and standard aircraft acknowledgments are in diagram form. An international ground-air emergency code, Paulin signals and parachute signals round out a full chapter of how to save your life.

This article is only a briefing on the Index of the SFI. But were you one of the many who have been unaware of some of the things contained in SFI? If you will take one more step and reach for the nearest SFI and review it, you can refresh your memory on many more interesting facts. Perhaps when the time comes you can save your life or that of someone else through the use of this little used book. ●

There apparently is a spark of genius in every man and we find that even the newer members of the team often crop up with some mighty sound ideas.

Two recent inventions bear out this thinking. The first, a rapid fire flight computer, was sent in by Capt. Larry M. Killpack of the 526th Fighter-Bomber Squadron. After reading this one-pager you'll agree that Captain Killpack has done a bang-up job for the Air Force.

The next two pages are devoted to the brain-child of 1st Lt. George M. Boyd of the 318th Fighter-Interceptor Squadron. His idea may well save many lives and dollars. Both men deserve a salute from the troops for their initiative and ingenuity.

Spin AND Win

By
Capt. Larry M. Killpack
526th Ftr.-Bomber Squadron

Capt. Killpack checks out a fellow squadron member on use of computer for a cross-country.

CAPTAIN Killpack was informed that his organization was soon to receive F-86's and this set him to thinking that a range computer comparable with that for the F-84E would prove of extreme value to the organization. Accordingly he went ahead on his own, and after four months of work, produced the computer seen in the accompanying photo.

Captain Killpack claims no credit for the design of the computer inasmuch as it was patterned after one developed for the F-84E by personnel at the Air Proving Ground, Eglin AFB. We can't quite agree with his thinking, however, for by revamping the computer he made it possible to have the latest flight data immediately available. In addition, he scheduled numerous flights himself in order to supplement existing flight data and arranged this information so that it would be easily and accurately available by a twist of the wrist.

One of the things immediately noticeable about the computer is its construction. It is home made but has the look of a professionally manufactured article. Captain Killpack investigated the possibilities of commercial fabrication but found the cost prohibitive. His experience in amateur photography provided the solution. He had four-inch black and white prints made of the rotating faces of his master computer and 4¾ x 6¾ inch prints made of the stationary faces. Next, he utilized a flat-iron to iron the prints to stencil paper, using Kodak Dry Mounting Tissue as the adhesive. Following this step, scissors and razor blades were used to round the faces and cut the windows. The parts were then taken to the parachute shop, where they were matched and riveted together.

That's about all there was to it. The end result was a mighty fancy range computer that most anyone could make for a total cost of approximately 25 cents.

Naturally this little gem isn't quite as desirable as one made from plastic but most pilots have included one in their letdown books and thus protected, should last for several years.

On querying personnel concerned as to the reliability of Captain Killpack's computer, we were informed that on the farther-faster side of the computer, some inaccuracies were found at different cruising speeds.

For flights of several hundred nautical miles about five per cent more fuel was used than the computer indicated for expected consumption. However, as range was increased, the errors at different speeds decreased until they were negligible. The data on the climb and descent face have proved to be correct if the climbs and descents are properly controlled.

Members of Captain Killpack's organization feel that his contribution has added greatly to the effectiveness of the group.

We of FLYING SAFETY also tip our hats to Captain Killpack. ●

DIAL-A-BASE

1st Lt. George M. Boyd
318th Ftr.-Intercp. Sq.
APO 23, C/o PM, New York

WHEN I was at the Air Force Radar Observer School down at Waco, I realized I was pretty weak in navigation. I kept asking myself, "If you can't find your way around in a B-25 at 205 IAS, how can you navigate at the greatly increased airspeeds flown in an F-94?" It was quite a question and I gave it a lot of thought.

In fact, I thought about it all during my hassle with radar down at Tyndall. After graduation I moved up to McChord AFB. By then I had come up with what I thought was the answer—a gadget I call the Dial-A-Base.

The Dial-A-Base is intended as a navigational aid for all weather operations in local areas. It incorporates, in compact form, the principles of radio facility charts and of current area maps. It facilitates rapid location of an alternate in case of an emergency in jet aircraft. With the realization that time is of prime importance during any in-flight emergency, and particularly in jet emergencies, I included on the Dial-A-Base that information which aircrews must have quickly in an emergency.

The Dial-A-Base pictured here was designed for the local flying area around McChord Air Force Base. McChord is the center of the radius of action. However, the gadget is readily adaptable to any locality. In addition to being useful during emergencies when rapid selection of an alternate is necessary, the Dial-A-Base, if used in the local area during other than emergency conditions, will help flight crews to become more familiar with local facilities and checkpoints. Personnel flying aircraft which carry electronic equipment that assists in navigation may make good use of the side of the wheel devoted to unit navigation.

Possibly pilots and observers at other bases might find a local Dial-A-Base helpful. See what you think of it.

Designed to the configuration of a navigational computer, the Dial-A-Base is about six inches in diameter and fits nicely in the breast pocket of a flying suit. It is composed of three revolving discs or wheels similar to the circular slide rule. The side labeled "Dial-A-Base" is printed with the major emergency procedures and has a window for reading the facilities information pertinent to the installation dialed. The middle wheel is divided into 12 segments, representing 12 air bases (military are in black, civilian in red) which may be used for landing in case of emergency. The necessary field information is listed in standard AF Flight chart form, and includes:

- Outbound headings from McChord AFB, in numerical order.
- Name of installation.
- Nautical distances from McChord.
- Radio name and frequency.
- Field elevation and lighting facilities.
- Runway surface and length.
- Inbound headings, in numerical order to McChord.

The reverse side of the wheel is devoted to unit navigation and includes approximate outlines of 12 checkpoints to aid observers and pilots in determining location and to assist pilots in navigation. After dialing a checkpoint, you read through the window:

- Outbound heading from Hood Canal (orbit point).
- Name of the checkpoint.
- Kind of checkpoint (lake, inlet, island).
- Nautical distance from Hood Canal.
- Minimum altitude for safe navigation over the checkpoint to or from Cape Hood.
- An outline picture in green of size and shape (on course) at 20,000 feet altitude.
- Inbound heading to Hood Canal.

Lt. George Boyd points out how "Dial-A-Base" can be used as emergency safety insurance.

Left, one side has major emergency procedures and a window to read facilities information pertinent to base dialed. Right, reverse is devoted to unit navigation. Below, mileage chart gives distances, vectors to bases.

The Dial-A-Base can be constructed on any light, semi-pliable material readily available on the commercial market. The red, green and black ink used should be a kind that is plainly visible under different types of cockpit lighting.

To accompany the computer, a mileage chart (in nautical miles) was devised, giving distances and vectors for the stations listed on the Dial-A-Base. This is a sliding device which may be attached to the computer, and includes a space for listing flight plans.

A little test was set up in our squadron to show the effectiveness of the computer and the attached chart. One crewmember was given a radio facility chart and a local area map. Another was given the Dial-A-Base. The second man figured his alternate base, vector and distance in 20 seconds while the officer with the chart and maps was still hunting through the index.

After the Dial-A-Base had been put into use, one of the squadron members came up with an idea for a plotting board to be attached to the back of the radar operator's console. This board can be removed or left attached, as the radar observer wishes. Location of fighter and target aircraft can be plotted on the board's plexiglas face. Each board has a grease pencil attached. The map is sandwiched between the face and back of the board and can be changed at will. The local area map is oriented according to variation (which was —22 degrees E in this case). All headings given can be flown without conversion, minimizing human error.

It looks as though the policy of having the radar observer act as navigator and attend all briefings with his pilot is a worthwhile one. The guy in the back seat is not helpless. He can take a big load off the pilot's back by knowing what's going on in and around the aircraft. Radar navigation is invaluable in case of radio failure or bad weather. In our squadron, pilots are directed to let the radar observer talk them down with airborne radar.

The Dial-A-Base and the plotting board, as I have described them, work extremely well for us. They look to me like extra life insurance for the pilot and radar observer. And for the taxpayer, they can be money in the bank. If the ideas appeal to you, try them. The time and expense involved is small. And you may get big results. ●

NAUTICAL MILEAGE CHART	BELLINGHAM	BOEING	BOWERS	CHEHALIS	CLALLAM	LARSON	OLYMPIA	PAINE	PORTLAND	SEA-TAC	WHIDBEY	YAKIMA	NAUTICAL MILEAGE CHART
	76	135	129	56	161	111	55	193	82	28	158	BELLINGHAM
76		79	59	60	122	42	23	117	7	51	93	BOEING
135	79		104	138	49	97	90	122	77	118	28	BOWERS
129	59	104		90	153	18	80	67	55	102	102	CHEHALIS
56	60	138	90		178	73	51	156	64	37	153	CLALLAM
161	122	49	153	178		147	128	166	122	152	63	LARSON
111	42	97	18	73	147		62	84	38	83	100	OLYMPIA
55	23	90	80	51	128	62		140	28	31	109	PAINE
193	117	122	67	156	166	84	140		112	164	114	PORTLAND
82	7	77	55	64	122	38	28	112		56	90	SEA-TAC
28	51	118	102	37	152	83	31	164	56		138	WHIDBEY
158	93	28	102	153	63	100	109	114	90	138		YAKIMA

NOTES

WELL DONE!

2d LT. FREDERICK E. GRIFFITH

64th. FIGHTER INTERCEPTOR SQDN.

Lt. Frederick E. Griffith earned his Well Done commendation when he was able to prevent possible injury to his observer and himself and to save an F-94 from total destruction through his outstanding airmanship and flying technique.

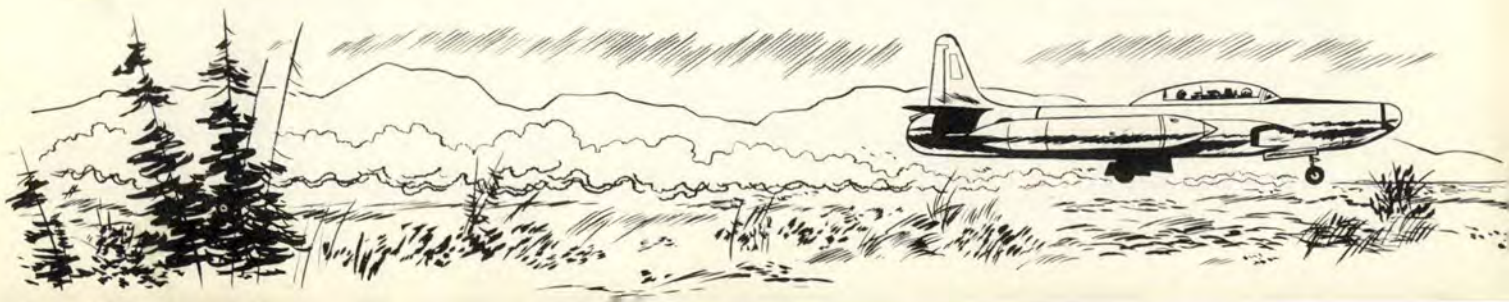
Lt. Griffith was on a routine instrument training flight at 17,000 feet when, ten minutes from the base, his generator warning light came on and his loadmeter read zero. He was unable to return to Elmendorf as this necessitated making a letdown through 9000 feet of overcast with instruments that might fail at any minute. He turned south as the weather briefing had indicated that cloud cover in that area would be scattered to broken.

After flying for a quarter of an hour on the new heading a break in the undercast was discovered, but it was too small for a VFR letdown. At this time the tips ran dry. Griffith kept the fuselage tank filled by periodic use of the internal fuel tank switches. However, he was not certain how long output from the battery would be sufficient to keep the fuselage tank filled.

At this time another break in the undercast was sighted and Griffith decided he would have to complete his letdown through it or bail out. After getting down between cloud layers he finally broke out at 1000 feet. A search was immediately made for a suitable forced landing area. Several clearings were sighted but Lt. Griffith decided to keep searching while fuel remained.

He had picked a clearing when he noticed a road and decided to follow it hoping it would lead to a building that could be used for shelter. In following the road he located a radio range and shortly thereafter a short landing strip.

Lt. Griffith decided to make a wheels-down, short field landing and, if necessary, retract the gear if he ran off the strip. On final approach he had insufficient battery output to lower his flaps. Despite this, Griffith made a safe landing on the 3500-foot strip, stopping 75 feet from the end, with no damage other than a blown tire.



Spinning THE

The following article on F-86 spin characteristics is the most up-to-date information available.

FLYING SAFETY will continue the policy of bringing its readers the latest information on current USAF aircraft and their characteristics as rapidly as possible.

★ ★ ★

IT is mid-afternoon as an F-86F airplane prepares to take off. The test pilot's schedule indicates that today he is to practice spin recovery. If you were that pilot, would you have any questions on the spin recovery characteristics of the F-86F?

Probably not, for you know that the F-86 airplanes have consistently demonstrated their ability to recover from any type spin using the standard recovery procedure or the hands-off method. However, maybe in the back of your mind a little doubt still persists; maybe you remember hearing about an accident which indicated that an F-86 was lost because of failure to recover from a spin.

SABRE

George S. Welch
Senior Test Pilot
Engineering Flight Test
North American Aviation, Inc.

★

First man to fly the F-100 Super Sabre at supersonic speeds in level flight, Welch has been testing North American planes since 1944. Prior to that time he was a major in the U. S. Air Force.

In 33 months of combat service in the Central and Southwest Pacific during World War II, he won the Distinguished Service Cross, Distinguished Flying Cross, Silver Star, Air Medal and a Presidential Unit Citation.

During this service he was credited with shooting down 18 planes, four of which were bagged over Pearl Harbor when he and one other officer were the only pilots from his field able to get in the air that day.

At North American he has made first flights with the F-86 Sabre Jet fighter series A and E, the F-86D Sabre Jet interceptor, and the YF-93, in addition to the YF-100 in which he exceeded the speed of sound in level flight on the first test run.

★

Loss of an F-86 in this manner is somewhat puzzling, to say the least. The factory, in over 100 actual spin tests has never been able to find an F-86 series airplane that would not recover from any type spin.

On page 17, you can follow a pilot through two spin tests. In one, the spin is entered from a normal, upright one G stall; in the other, the spin is entered from a three G climbing turn.

As an example of the extent of factory flight and wind tunnel spin tests, F-86s equipped with the slat or extended leading edge have demonstrated their spin characteristics in all of the following situations: In both clean and drop-tank configurations; with flaps and gear down and with flaps and gear up; both erect and inverted at low speed; ailerons neutral, against and with the spin; with speed brakes open and closed; power on and power off; forward and aft center-of-gravity positions, and out of accelerated stalls at low speed and at Mach .9 (snap rolling).

Factory test pilots who have had extensive F-86 flight time say they have never experienced any kind of spin or spinning maneuver from which recovery could not be accomplished by use of the standard recovery technique. In fact, the pilots report that it is difficult to keep an F-86 in a spin.

For example, to maintain spins entered by snapping out of a high Mach number turn at altitude, a stick pull force of 50 to 60 pounds and a rudder force of 200 pounds are required from trimmed level flight. Thus, the test pilots are convinced that merely neutralizing the controls is sufficient to effect spin recovery, although recovery in this manner may take an extra turn to complete. Therefore, it is concluded that in all non-spin-recovery accidents reported, the wrong recovery procedure was used.

One factor that may be contributing to the use of the wrong spin recovery procedure for the F-86s is that potential jet pilots receive their training in the two-place T-33 trainer.

The T-33 has different spin characteristics than the F-86 series airplanes. In a recent article in Flying Safety Magazine on the correct spin recovery procedure for the T-33, it was specified that once the airplane is in a spin, the throttle should be in idle position, with the ailerons held in neutral but with *the stick held full aft.* The article went on to state that a smooth pressure should be applied to the rudder against the spin. Finally, after spin rotation stops, back pressure on the stick should be released. It further cautioned that popping the stick forward might throw the airplane into an inverted spin.

The spin recovery of the F-86A, D, E and F series is quite different from the procedures learned for the T-33 trainer. To recover from a spin in the F-86, the pilot must release all controls, or he may kick hard opposite rudder and move the stick forward to neutral simultaneously if a quicker recovery is desired. It is MOST IMPORTANT NOT TO HOLD the stick in the aft position after opposite rudder is applied, as this results in a spin in the opposite direction.

All pilots should remember that they have a "flying tail" which is powerful enough to hold the airplane stalled and in a spin, regardless of rudder manipulation, if the stick is held back. Spins have been entered and recovery completed with the throttle positioned at Military Power; however, retarding the throttle to idle reduces altitude loss during the spin.

Inverted spins may occur if the airplane stalls during aerobatic maneuvers. The inverted spin is characterized by a roll into a normal 45-degree dive during every three-quarters of a turn. Recovery can be initiated at any time by neutralizing controls and dropping the nose as the airplane rolls upright.

When spin entry occurs from an accelerated turn with external drop tanks installed, it is different from an entry with the airplane in the clean configuration. With drop tanks, the airplane momentarily rolls into a spin in the opposite direction to the original turn. It spins one or two turns in this direction and then sharply reverses itself and spins in the original direction (direction of accelerated turn).

Recovery is accomplished as during a normal spin by applying hard opposite rudder and moving the stick forward to neutral simultaneously. Remember, the only difference between spins with and without drop tanks installed is the initial spin entry. The first turn with drop tanks on the aircraft is opposite to the original accelerated turn direction.

Factory spin tests indicate that on the average, a normal spin turn requires five seconds and the airplane loses between 1000 and 2000 feet per turn.

Once spin recovery is initiated, airplane rotation will completely stop within three-quarters of a turn and altitude loss to complete spin recovery and pull-out will be approximately 5000 feet. Therefore, it is recommended that if a spin is entered below 7000 feet terrain clearance, the pilot should bail out. ●

To help prevent further accidents resulting from spins, the following information and recommendations are offered:

1. Do not trim into a turn.

2. If the airplane snaps out of a turn at any speed, enters a spin from a low-speed, straight-ahead stall or enters any form of a spin-type maneuver, NEUTRALIZE STICK AND APPLY OPPOSITE RUDDER SIMULTANEOUSLY.

3. It is of utmost importance that the stabilizer be released or the stick brought forward to approximately neutral. RECOVERIES CANNOT BE RELIABLY EFFECTED IF THE STICK IS HELD BACK. Also, because of recovery attitude, full-forward stick is not recommended.

4. If confused as to what recovery technique to use, release all controls.

5. A recovery characteristic of the F-86 is that THE SPIN SPEEDS UP MOMENTARILY DURING RECOVERY. Therefore, don't let this mislead you into thinking your recovery technique is ineffective.

6. It is considered that the spin recovery procedure in the Pilot's Handbook is the equivalent of that given in recommendation No. 2.

7. After rotation has stopped, BE CERTAIN you have sufficient airspeed before initiating any pull-out.

8. To minimize altitude loss in a spin and recovery, retard throttle to idle.

First spin will be entered from a 1 G stall straight ahead.

Now at 35,000 feet. RPM 70%. Pulling nose up. 140 knots, buffet starts. 130 knots, airplane yawing. 120, 112 knots, 36,700 feet, fully stalled. Full right rudder, stick full back. Into right spin. Throttle retarded.

Airplane noses down to vertical.

Nose comes up to horizon, wings level.

Rolling to the right, nose drops.

Airplane noses down to vertical. Slight rudder buffet.

Complete second turn, nose comes up to 10 degrees below horizon, wings level.

Rolling to the right.

Airplane noses down to vertical.

Third turn, nose comes up to 40 degrees below horizon, wings level.

Rolling to the right.

Airplane noses down to vertical.

Fourth turn, nose about 60 degrees below horizon, wings level. Heavy rudder buffet.

Now for recovery. Hard left rudder and stick to neutral.

Spin speed increases momentarily, then slows.

Spin rotation stopped in ½ turn. In vertical dive. Airspeed increases.

Started 3 G pull-up at 25,000 feet. 210 knots.

Recovery complete, flying level at 23,000 feet. Everything fine.

This will be a four-turn spin to the left from a 3 G climbing turn.

Altitude 35,000 feet. Military Power and 100% rpm. Now turning to left. 2 G, now 2½ G. Heavy rudder buffet. 3 G at 150 knots. Stick full back, full left rudder.

Airplane diving vertically into left spin. Throttle retarded.

Nose comes up to horizon, wings level.

Rolling to the left. This is second turn.

Airplane noses down to vertical.

End second turn. Nose comes up to horizon, wings level. Same as first turn.

Rolling to the left.

Airplane noses down to vertical.

Nose comes up to 10 degrees below horizon at end of third turn.

Rolling to the left.

Airplane noses down to vertical. It's winding up faster now.

Fourth turn, nose comes up to about 60 degrees below horizon, wings level.

Hard right rudder, stick to neutral. Spin rotation speeds up momentarily.

Spinning stops in ½ turn.

Am now diving vertically, wings level. Speed increases.

Pull-out from dive completed. I'm level at 200 knots at 25,000 feet.

Keep Current

NEWS AND VIEWS

ARS Emergency Evacuation – Recently a crew from the 55th Air Rescue Squadron made a landing on remote Fletcher's Ice Island, a few hundred miles from the North Pole. The mission was flown to evacuate an airman stricken with acute appendicitis.

Flying an SA-16 amphibian, the crew made a wheels-up snow landing using a special ski attached to the hull. The patient was loaded aboard in sub-zero weather and placed on a litter and the amphibian made a JATO takeoff guided by flare pots. During the return flight, ice packs were applied by a medical technician to keep the appendix from rupturing.

The rescue plane made a normal landing at Thule after a refueling stop at Alert, Northwest Territory, Canada. The rescue plane was piloted by Maj. Bernard Bailey and Capt. Donald Detwiler, members of the 55th Rescue Squadron. The 55th Rescue Squadron belongs to the 6th Air Rescue Group which provides emergency rescue service for installations of the Northeast Air Command.

★ ★ ★

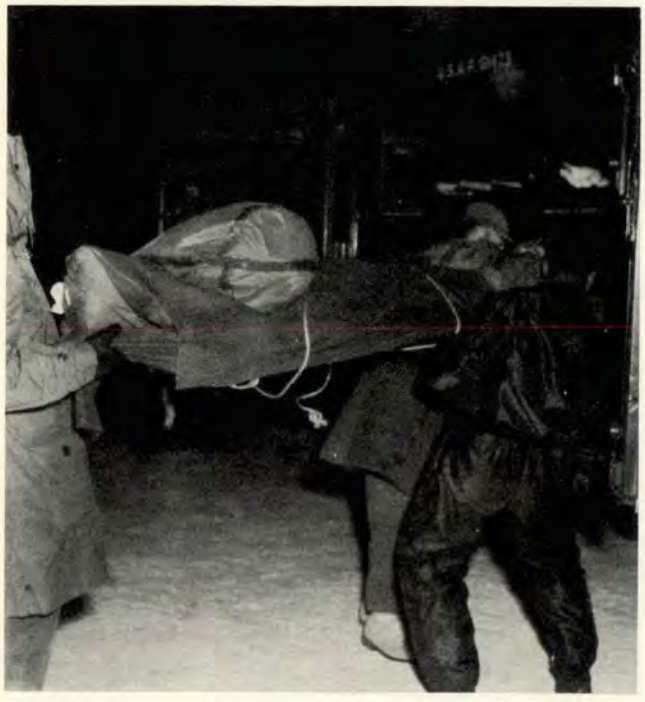
Letter from AACS on GCA Capability – In order to alleviate a possible misinterpretation by pilots as to the capability of GCA radar to control aircraft below the published minimums, it is requested that the information below be disseminated to all major air commands and, in turn, to all pilots through flying safety meetings, etc., to thoroughly explain the capability of GCA to control aircraft below published minimums during an emergency and/or practice approach.

A survey conducted by the Office of The Inspector General, USAF, during August, 1953, indicates that the minimum approach altitudes, as published for GCA, had been widely misinterpreted as the maximum safe limit of the GCA capability. In most instances where the GCA minimums were, for example, three or four hundred feet, this was considered as a mandatory pull-up point even during VFR practice approaches.

The GCA equipment is designed to provide accurate data in relation to both azimuth and elevation all the way to touchdown point. The accuracy of the equipment increases progressively as the aircraft approaches the touchdown point; i.e., at a range of one mile a deviation of 25 feet from the prescribed glidepath would be detectable. A deviation of 12-15 feet would be detectable at a range of ½ mile, etc. The only reason a minimum altitude has been designated is to provide a safety margin for any human error on the part of both the pilot and the GCA operator. This minimum in no way applies to the capability of the radar unit.

Many tests have been conducted over the past few years with ground controlled approach radar utilizing various types of aircraft (including jets) in all types of weather condi-

Successful completion of flight by 55th Rescue Squad., 6th Air Res. Gp.



One of the Air Force's hottest and newest aircraft—supersonic F-100.

tions. These tests demonstrate conclusively that GCA is capable of controlling any type aircraft accurately all the way to touchdown, *dependent only* on the proficiency of the pilot flying the approach and the GCA operator interpreting the radar scope and issuing the instructions.

★ ★ ★

D-Ring Trouble — The Medical Safety Division, Directorate of Flight Safety Research, reports that recently there have been several instances of parachute D-rings coming out of their pockets during ejection bailouts. This resulted in difficulties in finding the D-rings to open the chutes. If the incidents had occurred at low altitudes the serious consequences are obvious.

Wright Air Development Center has made tests to determine the forces needed to withdraw the ripcord grip. Approximately 13 pounds of force 90 degrees to the long axis and 23 pounds of force applied downward or parallel to the long axis are required to pull the D-ring from a properly installed ripcord pocket.

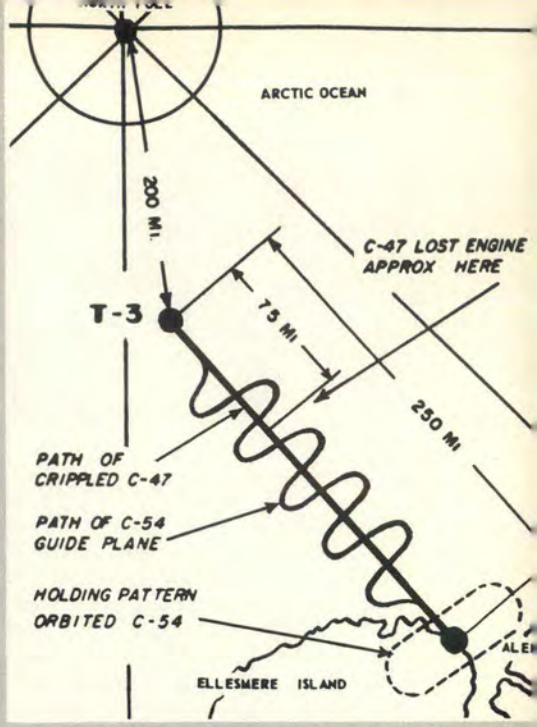
Crewmembers, parachute riggers and personal equipment technicians should be aware of T. O. 13-5-2, section II and T. O. 13-5-3, section V. These tech orders require the repair or replacement of any pocket which allows the grip to fall out, or any pocket which is so tight that withdrawal is difficult.

★ ★ ★

Arctic Navigation Assist — Two C-54s of the 6614th Air Transport Group on fall resupply duty teamed up recently to provide welcome aid to a Thule based C-47 which lost an engine while returning from T-3. Navigational aid and radio assistance from the two aircraft made it possible for the C-47 to get home safely under extremely adverse conditions (and we do mean adverse).

The goonie bird had been out of commission on Fletcher's Ice Island, within 200 miles of the North Pole, for 10 days. During the time the aircraft was on the island the sun went down permanently for the Arctic winter and a period of twilight set in. The lack of sun and stars over T-3 during this time made it impossible to use celestial navigation to determine the direction to Thule. And naturally, the aircraft's compasses were useless due to the proximity to the North Pole.

A plan was set up which enabled the two C-54s to give navigational and radio assistance to the C-47 after takeoff. One C-54 circled over T-3 while the other orbited over Alert on the tip of Ellsmere Island. The second C-54 was to provide an easily seen landmark in case the returning aircraft flew wide of their course.



Takeoff was routine and the two planes leveled off and headed for home. However, about 75 miles out the left engine on the goonie suddenly quit. Although this was only about one-third of the way to Alert, the ice haze over T-3 made it very doubtful that a successful landing could be accomplished if the plane returned to the island. The crew elected to continue on to Alert.

Cargo and equipment were jettisoned but the C-47 lost altitude and airspeed before leveling off at 4500 feet and 90 mph. The C-54 providing navigation was unable to slow down to the C-47's airspeed without stalling. In order to keep the goonie bird on course it was necessary for the C-54 to "S" back and forth along the course in a zigzag pattern. This increased the problems of the navigator tremendously as fluctuation and error increased on his compasses.

Headwinds added to the navigation difficulties, as the two aircraft moved slowly across the frozen surface of the barren Arctic Ocean for nearly two hours. Finally, the second C-54 was sighted circling over Alert and a safe landing was made.

Despite the possibilities for navigational error and the difficulties of plotting a zigzag course by dead reckoning, the flight hit their destination right on the button.

Flying the C-54 which guided the crippled C-47 to safety were Capt. Gerald L. Martin, pilot; Capt. Charles F. Anderson, copilot, and Major Billy B. Boothe, navigator.

Below is the fifth and latest of the F-86's—the H. The cannon-like object protruding from F-86H nose is an airspeed boom used only in flight test work to make exact airspeed calibrations.

CROSS FEED

LETTERS TO THE EDITOR

Fly Your Flight Plan

During a recent tour as airdrome officer, two incidents occurred which illustrate what I think is one of the great problems facing the USAF Flying Safety Program today: the pilot who takes a chance for no reason except that "he wants to get home."

A T-6 pilot landed here enroute to Godman Field at Fort Knox. Weather at Godman was IFR due to local rain and there were no suitable alternates within range. Finally, at approximately 1900, with weather marginal enroute, the pilot cleared VFR to Standiford Airport at Louisville. After his departure the Weather Officer told me that the pilot intended to change to an IFR flight plan to Godman after takeoff because that was closer to his home. Sure enough, an hour later Flight Service advised that he had changed to IFR to Godman. By this time, Godman was below white card minimums. Flight Service advised him to proceed to Sewart where he landed approximately three hours after takeoff. He was still a long distance from home and had tied up Flight Service for a considerable period of time, as a result of his changes in flight plan.

The other was a B-25 crew which took off at 0100 for Wright-Patterson. Weather at Wright-Patterson was 300 feet and one mile, just barely above GCA minimums. It was late at night and the pilots had been flying since early afternoon, returning home after a flight to a southwestern base. The flight was completed successfully.

Here are two cases of pilots who performed flights at night in marginal weather for no other reason than to get home, regardless of what mission symbol appeared on the Form 1.

Granted that this is an all-weather Air Force and that a certain number of flights must be undertaken in adverse weather conditions to perform essential missions or to provide needed training. It appears to me, however, that considerable progress could be made toward reducing the USAF accident rate if more pilots would place good flying practices ahead of personal desires when planning flights.

Capt. Robt. F. Myers, USAF
516th TCW(M), Memphis Mnpl Arpt.

No comment necessary. Both pilots were wearing their lucky shoes.

★ ★ ★

Shoulder Harness Bracket

Here is a picture showing this bracket and its installation on an F-94B airplane. The two main purposes in the installation of this unit, developed by Capt. Laurence W. Lackey, a Flight Leader in the 318th Fighter Interceptor Squadron, are *safety wise* and *tactical.*

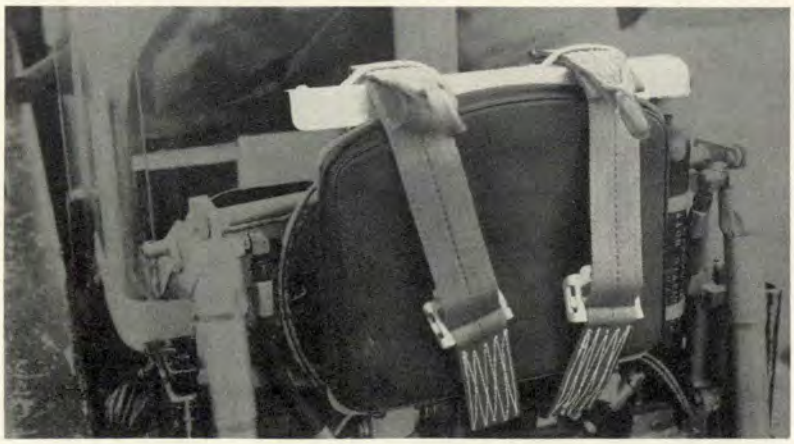
The bracket provides a place for the shoulder harness to be stowed that keeps it out of the seat ejection mechanism, and keeps it off the seat where it is prone to collect mud, tar, etc., carried into the cockpit on the pilot's shoes. The tactical advantage is that the pilot can fasten his harness without aid from the crew chief, thereby appreciably speeding up scramble time.

This bracket has been installed on all aircraft in this organization and has met with enthusiastic approval by all pilots. The installation time is negligible and can be done during any inspection. I feel that this unit would be practical on any of our present fighter aircraft.

I believe that publication in your magazine would be the fastest method of informing all interested fighter interceptor outfits of the advantages in the use of this bracket.

Capt. Walter W. Irwin
FSO, 318th Ftr-Int. Sqdn
APO 23, PM, NY, NY.

Capt. Lackey's brain child has met with enthusiastic approval of all pilots in his unit.



★ ★ ★

Things Equal

On page 13 of the December issue of FLYING SAFETY, the following equation is presented in the article, "Going Direct," by Capt. John C. Neill:

$TC \pm W = TH \pm V = MH$

$353° - 20° = 333° - 3° = 330°.$

Things equal to the same thing must be equal to each other, and $TC \pm W$ is not equal to MH except in the case where $V = O$ and TH then becomes equal to MH.

I enjoy reading FLYING SAFETY each month and think your methods of presentation are excellent.

Maj. Ralph D. McKee
WADC Area B, W-P AFB.

★ ★ ★

Maj. McKee is right and we were wrong.

PREPARE TO DITCH

George A. Llano, Ph. D.
Tropic Section, ADTIC
Maxwell AFB, Alabama

Dr. Llano's first-hand knowledge of sea survival had its beginning when as a youth he spent several years sailing along the Atlantic Coast. This experience was supplemented by military duty during WW II, field testing sea survival equipment. He has spent many days and nights in all kinds of seas, judging the qualities of life rafts and signaling devices. To test the anti-exposure suit, he cold-soaked 36 hours in the Gulf of Maine without food. While testing the distillation kit in January of 1945, Dr. Llano had an opportunity to put his sea-survival knowledge to work — he was lost from escorting craft during a squall in the Straits of Florida for two days.

Top, one paddle supports a mast, the other is used for steering. Bottom, knowing how to use distillation kit can save your life.

Below, coming into shore for a landing over a reef is dangerous. At this point a man needs all his strength to combat undertow.

EVERY airman is faced with the possibility of a forced landing. Those who make a safe descent to earth are blessed with an advantage; they may walk or they may rest. Theirs is the initiative to hold, while they make plans or await rescue.

A sea-ditching may also be successful, even if you can't walk away from it, for you can float or swim from that last bubble and eddy that marked the spot of your descent. But you will drift, never sure where you are, always wondering where you are going. You can never relax, for you will find the sea a restless, greedy element that at any time of day or night may be whipped into a fury by winds from some quarter of the sky. At first you will exist from hour to hour. Then from day to day. You are in a world which is like an inverted bowl with an ever-tilting horizon of falling and rising waters that in times of storm will appear to be forever crashing downhill to engulf you. Your life raft will be your comfort, but it will rarely take you to still waters; it will support and confine you. In storms and squalls it will come alive and turn into a shaking, slapping, sliding and always uncontrollable thing as it skids into the trough of a wave or rises to the insecure, hesitant perch of each curling crest.

Yours will be a world of monotonously hissing waters, but after a time these become as soundless as the roar of a seashell held to the ear. Your life becomes an existence between the glaring heat of sun, sky and sea and the penetrating cold of darkness. It is the nausea that leaves you weak and the hunger that parades visions of foods you never had — while you make a banquet of a bloody-feathered sea bird. It is persistent thirst, while you stare numbly over oceans of water, every drop denied you.

A castaway can never sit in comfort, and standing becomes an impossibility. Sleep is a fitful, aching sensation without rest. Emergency stores and equipment will appear meager and pitiful, but as time goes on you will hoard all, and live in a nightmare of losing them. Survival at sea is the most desolate of all emergency sensations, and yet, in spite of the loneliness and the hardships, men have endured over 100 days at sea against almost impossible odds.

This is a picture that no sensible airman would want a part in, but the record proves that airmen of the United States Air Force have repeatedly suffered the privations of castaways, and in doing so, have set a standard for endurance, courage and ingenuity in the best traditions of the sea.

Effects of Ditching

Few can comprehend the physical and psychological effects that are a part of all air emergencies. Shock follows swiftly the realization that a landing is imperative. The order is given: "Prepare for ditching!" This is it — and you work, unconscious of your mechanical movements, to prepare yourself for the impact. For in a few hurried minutes, the airframe, engines and instruments which thousands of dollars forged into a purposeful machine to cruise the skies will become a derelict hulk. And the hours of training and experience that bind aircrews into one skilled unit will now be tested by a vast, always capricious, and at this moment a very unfriendly element, the sea.

You're On Your Own

One long sea voyage may make a deep water sailor of a landlubber. He learns with time, and from the knowledge and actions of his more experienced mates.

An airman has no time for a shakedown cruise; he must learn fast, for his first mistake may be his last. He must readjust his thinking and living from the element of the air and speed to that of the water and waiting.

His first lesson begins when he steps off into the life raft; if the raft bobs away, he sinks into the water. One thought is uppermost — to rise and stay afloat. But he also must hold his position and then head for the tantalizing safety of the life raft. He must swim—not just struggle. He must learn to breathe properly and not to gag on the bitter salt water, to let the waves break over him and not to panic, to conserve his strength and to let the water buoy him. And above all, to act consciously and efficiently. In each movement he must hold to life. Yes, the lessons come fast, and they must be retained, for from this moment until the last hour, his ability to adjust to his circumstances will provide the only insurance that the sea honors.

Skill vs. Chance

Luck and chance often play a role in survival, but to gamble on the chance that sometimes wins when skill and preparation seem to fail is foolhardy.

Your Mae West means life. Be sure it's ready.

The success of the United States Air Force in saving its aircrews and passengers is not a matter of haphazard opportunity. It is a remarkable coordination of intelligence, repeated training and good equipment that restores confidence and hope and provides an equity against time and the sea.

Training includes practice ditchings, preflight briefings, attention to small details, constant reminder by means of life raft and equipment exhibits and lectures on techniques. But best of all is the presence of equipment on the aircraft which serves as a continuing reminder that your Air Force takes no chances where safety is concerned.

Behind all of this stands the USAF Air Rescue Service on 24-hour alert. ARS is ready to answer all distress calls, no matter the hour or season, with patient and methodical search as long as there is any reasonable hope for survivors. Because of teamwork, training and better equipment, the present era of over-water flights will see fewer and fewer of the prolonged survival records which highlighted World War II.

Equipment For a Purpose

The equipment that goes into your life raft was not selected haphazardly. The numerous items are the answers to the demands rising from the past experiences of the many airmen who came back to tell, complain and suggest. True, there have been improvements and refinements through Air Force research but only with one thought in mind — to improve each item for its most efficient use.

"The life raft is basic equipment and is as seaworthy a boat as was ever snapped into a small package."

The life raft is your basic item of equipment and is as seaworthy a boat as was ever snapped into a package. It is in essence an enlarged inner tube, and at first introduction, as confidence-inspiring as an old wash tub. To favor aircraft payload and range, the raft is trimmed of all excess weight, and then shaped and nudged to fit into the restricted space of fuselage or wings. Yet it functions automatically, and with an instant's tug becomes a marvelously buoyant sea craft that will weather the daily buffeting of waves or the sustained seas of a typhoon.

Water and food stores are a critical problem in all sea survivals, both are bulky and never available in desired quantity. Specialized and not always appealing candy-base foods have been provided because water is the crucial item, and when on a short or limited water supply the human body cannot easily eliminate the waste from heartier protein and fat diets. Toward the end of World War II, the research and development branches of the Air Force came up with a rather startling answer to the water problem — literally to get rid of the water stores!

In place of the heavy, bulky dozen or more tins of expendable water, two items have been substituted in life raft equipment: the Sea Water Desalting Kit and the Sea Water Distillation Kit. The former consists of six chemical briquettes. Each briquette is capable of making one pint of fresh water from an equivalent amount of salt water in about 30 minutes of kneading and shaking. Moreover, the six-briquette container takes up no more space than the old pint can!

Six to one are pretty good odds but the seawater distillation kit gives even better odds. This kit has a daily flow under best conditions of about one quart of fresh water by means of an ingenious arrangement whereby the sun furnishes the heat and the ocean provides all the water. Deflated in its container it stows into the space taken by three one-pint water cans. Inflated, it has a life expectancy that will match any period of survival.

The Long Swim

The simple fundamentals of a successful survival are best learned in the school of experience but the factual record always leaves something to the imagination. Reading of it, one may well ask: How much of that could I have taken?

Let's take the case of a United States Navy pilot who, one sunny morning in 1942, was making life miserable for a Jap transport. He stood 5 feet, 4 inches, and in spite of his 120 pounds you will acknowledge that he was a big man. Somehow or other, this chap hasn't gotten around to writing his thriller, and for lack of a copyright title we call it "The Long Swim."

His troubles began when he was shot down and sat momentarily groggy from the impact of the ditching. Things got really rough when his radioman and he struggled on the surface minus their dinghy.

The pilot explained how they lost the life raft. "My radioman already had the life raft out and was about to inflate it, but I yelled 'Don't inflate it. The Zeros will strafe us.' Then I passed out again. As I came to, the nose of the plane was starting down. As the tail went down, it pulled the life raft with it..."

Buoyed up by life jackets and with shore some 25 miles away, there was no alternative but to swim.

The pilot stated, "I got the radio operator to take his shoes off, but then he pulled his pants and underwear off, too. He wasn't a good swimmer. He wanted to stop and rest and take it easy. I'd swim ahead and make him catch me."

The long afternoon dropped into night but the radioman's spirits dropped even faster so that only with coaxing, encouragement and example was the pilot able to keep the man going through part of the night. By early morning the radioman was gone.

Still game, the pilot took a fix on the nearest land, estimated his distance to be about ten miles, and began his systematic breaststroke and scissors kick against the current, waves and wind. He was determined to make it by four o'clock of that afternoon and so he rested only five minutes each hour.

When night fell, he was about six miles short of his goal. He bumped into a coconut and suddenly realized that after 30 hours he was hungry and thirsty. Here was food and drink, but with no way of piercing the husk and shell, he discarded it regretfully and began to swim again.

After being in the water this long, the pilot said: "I got so exhausted that I could only stay awake by ducking my head under the water, and then the water would get in my nose and throat and ears and I was just too damn dry and thirsty to spit it out. I felt that if I couldn't make it to

the island by the second morning, I never would make it during the day under the hot sun. That made me panicky and gave me strength to swim a little harder . . . I told myself that I was a cheap specimen if I could come so close to land and couldn't get closer."

He swam all night, taking bearings on the stars. When these were blotted out, he navigated by wind direction, his teeth chattering with cold. A rain squall slashed the surface of the sea and he rested, head up and hands cupped to get some water but the accompanying wind and current carried him parallel to and past the shoreline.

Desperately he marshaled his weary body in a final attempt to hold his position, and once more passed out from exhaustion. He lay, oblivious, for about ten hours, and then awoke while dreaming of the fresh rain of the night before, only to find that he was gulping sea water without tasting the bitter flavor. His face was swollen; one eye was burned shut but he managed to keep the other pried open.

"I saw that the wind was now taking me right again, so I swam downwind, hoping that I could make land by seven that night, my third in the water.

"Early in the evening I got to the last 200 yards. I dropped my legs and saw that the water was only waist deep but had a sharp coral bottom . . . so I half swam and half walked, cutting my hands and feet . . . but I knew I was making it and was safe."

He lay still on the beach, resting ten feet from eternity, 73 hours after beginning the unequal struggle with the Pacific Ocean.

The loss of dinghy and equipment was an unfortunate occurrence, for with the dinghy the radioman's life might have been saved. The decision not to use it until all danger from strafing was past was a natural one. But the equipment should have been freed from the aircraft and kept in readiness. The life jacket saved the day for the pilot, especially since it was the type that permits sleep and rest. Without it, in the total absence of food and water and in view of his enormous effort, he would have foundered.

However, the other man also had a life jacket. But you may recall that he shed not only his shoes but his pants and underclothing. The pilot took off his shoes but kept on his clothes. He believes this gave him some protection from the cold water. The fact that the radio operator was a poor swimmer was not too serious, but he had no heart for the effort. In this respect the ensign was supreme. He showed remarkable levelheadedness and courage in his battle for survival. He took bearings with a measured eye, estimated his distances, timed his effort and above all set himself a goal. He noted the wind with care and when night hid the shoreline he went by the stars. When the stars were clouded over he swam by wind direction. He lost consciousness but never his judgment; he lay exhausted and gained a breathing spell. He ached and pained and hoped and struggled. And he made it, although he didn't have much to work with except a strong desire for life, preferably on land.

On Again . . . Off Again

This Navy pilot's feat should make any other story anticlimactic, but the ocean is full of tricks that can try a man's soul. No one knows this as well as an Air Force lieutenant who parted company with his Mustang in June of 1945 over Jap held waters. This incident lasted only seven days and all the while the lieutenant had the feeling that it would be a short, not too rough survival experience. He was unhurt, had a good one-man raft, some chocolate rations, water and a de-salting kit and a variety of signaling equipment.

He knew he was on the route between the home base and targets, and he was determined to make his presence known to all friendly flights. So he checked the signaling equipment. He found a smoke bomb, some flares and some water dye. He knew a little dye on the surface of the water would go a long way. Anybody could spot the orange-green color. He rummaged some more and found a small package labelled ".45 tracer." Fortunately, he was lucky enough to have hung on to his .45! He felt he was prepared, with nothing left to chance. From now on he would operate strictly by the book.

Friendly aircraft flew overhead but no one saw the flares, the smoke, the sea dye color, or the .45 tracers, or heard the indignities hurled up at them.

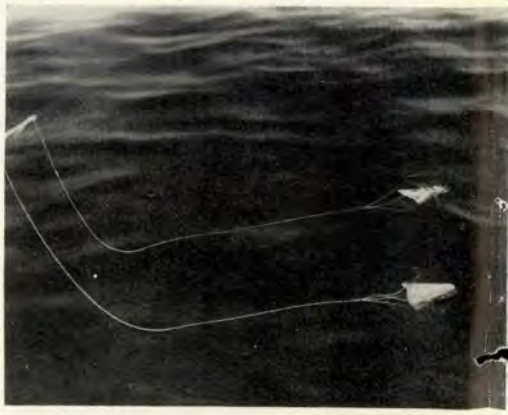
Four days passed by, marked by periodic gnawings on a chocolate bar that was finished on the fifth. Then the emergency water was used up and the pilot hauled out the de-salting kit. He had read the instructions over and over and knew just what to do. He found the plastic bag, dropped in a package of the chemical and added sea water to the filling line. Gently he kneaded the briquette to a powder. A taste proved it was still too salty. The instructions said to shake for an hour, so he kept on shaking the bag. Finally, time was up. He held the bag over his head, carefully loosened the screw plug and drank. It wasn't bad, just a little warm. So he tied the bag to the raft and let it hang overside to cool.

That night the sky was black with clouds that seemed to hang low over the long oily swell. The Lieutenant noticed the approaching storm but coiled his body within the confining bulge of his life raft, determined to sleep it out. He awoke before daylight to a wind that screamed like a banshee and flung stinging spray into his face. The waves seemed to take hold of the raft and give it a spin, sending it skidding over the water in a series of jerky pushes.

With dawn he saw in amazement the waves rising to tower over his infinitesimal craft which, for the moment, lay quietly in the shelter of a trough. Swiftly they elevated him to the crest; up and down he shot as if on a roller coaster. Five times, maybe more because he lost all count, the invisible hand of the wind flipped his life raft over, and as many times he righted it and dragged himself back into it. Doggedly, he fought the life raft, the sea and the wind.

On the seventh day the wind died down, but the sea still raged as he began weakly to take stock of his situation. He had lost all but one pint of water; that was the pint he had tied over the side of the raft to cool.

He took a drink and went to sleep,



never doubting that he would be found eventually.

He was spotted by an alert crewmember of a Navy submarine a few minutes after it had surfaced for fresh air. The sub had come up from its anchorage under the ocean where it had lain to weather the 100-knot typhoon which even at a 200-foot depth had rocked the submarine to a 10-degree roll. The crew found him babbling incoherently, his body covered with salt water sores, badly sunburned and lacerated by the life raft fabric. Yet he managed to climb aboard without help. For that reason, the crew refused to believe that the Air Force lieutenant had ridden out the storm.

This pilot had good equipment but he should have made it fast to the life raft. It was no fault of his that the signals failed to attract attention. High flying aircraft are not easily contacted with manual signals, and when their crews are intent on a mission or course, they rarely bother to scan the monotonous waste of the sea. His passive drifting and measured use of food and water helped prepare him for the ordeal of the storm he hadn't planned for; yet that was the only preparation he could have made.

He might have used his clothing more efficiently to protect himself from the sun's rays, but there was little he could have done to ease the salt water sores or lacerations from the life raft fabric. Luck and chance gave him a helping hand where sensible and methodical planning seemed to have failed. He fought to stay alive, never faltering in the hope that he would be found.

What Would You Have Done?

Davey Jones' Locker is full of good intentions robbed from many a remorseful soul who, through inadequate planning or the confusion of the moment, failed to grasp his chance for survival.

Those who hung on and won out can tell of their experiences which, since they survived, may be accepted as the right actions. We who listen may criticize, for criticism often comes easy from a comfortable chair, but if you were to place yourself for a moment in one of these situations, what would you have done?

Let's say that your fighter quit over Cold Bay. You make a successful forced landing only a half mile from shore. The sea is calm, and with your Mae West you should have no trouble getting to the beach.

The plane sinks in 20 seconds, but before it does you tumble out, fearful of the suction that may drag you with it. The seat parachute is still fastened to your body, so naturally you float, but with your face under water and your rump high and dry. You want air, but you won't get it until you unsnap the leg harness. This is slow work, but you do it. At last you are right side up, gasping, but settling lower into the water. Haven't you forgotten something? Your life vest! Boy, jerk that CO_2 release!

The biggest sea weed in the world grows in Cold Bay, and you know it, for the stuff lies all around. With considerable effort you push it aside and move forward. The heavy boots feel like lead, and catch repeatedly in the sea weed.

You struggle and thrash, but you've been spotted and a rescue airplane drops a raft to you. See it? It lies a hundred yards away, a dry, saucy yellow dish that is already beginning to swing and drift with the outgoing tide. You try again, and then you feel the tug of the shoulder harness and the dragging chute you forgot to remove. You take it off and swim some more, pushing the chute before you. Why? It barely supports you. You're panting and exhausted; 20 minutes have gone by and time is running out.

In a hazy sort of way you know you want to live but at the same time you've resigned yourself to drowning. Only your subconscious calls it "resting." You feel comfortable and a little sleepy.

When you first splashed into the sea, the water was biting cold. Your stiff, numbed fingers could barely re-

Left, sea anchors help to stabilize a raft by keeping it pointed head-on into the wind.

★

Right above, knowing survival procedures saved this pilot. Chute used as anchor aid.

★

Right, below, housekeeping in a life raft is at best, crowded. If each occupant has a specific duty, he can add to good will of group.

". . . the value of good equipment and training cannot be overestimated . . . familiarize yourself with equipment—know where it is before aircraft leaves base."

Chutes open full as airborne boat nears water for a perfect drop. Correct use of signaling equipment enabled the rescue plane to spot the survivors in their small raft.

lease the leg harness straps. You felt the cold first in your hands, then gradually it spread throughout your body. After a while you didn't notice it; that was just about the time your vision became blurred. You felt weak from something else besides exhaustion. You felt like quitting but this did not disturb you greatly.

Cold water survival is a race against time, and in water below 31°F., cold water is fatal within a half hour. If you are injured your time is reduced. You can make a half mile; three quarters is a possibility, and maybe even a mile if wind, tide and current are with you, if there are no obstructions and, most important, if you are in top physical condition.

With a raft, you can last longer—over ten hours even though soaking wet, for the air temperature doesn't drain away your body heat as consistently as the cold water of the sea.

Without a lift raft and with a Mae West vest, your only protection is your wet clothes. Slight as that may appear it is a proven fact that they do help. Above all else, you must keep moving! You must struggle toward your goal to keep warm and to keep muscles limber. You've got to produce as much body heat through exercise as you lose to the ocean. With good physical condition and continuous movement, you should not die of cold as long as you are able to keep struggling. If you float passively or hang on to any floating object, your chances are almost nil, and you will go that much faster.

The sensation of coldness doesn't last long or may be entirely absent, because it acts on the skin almost as a local anesthetic. When you get on the life raft you'll pain from cold, a welcome pain that tells you that you still have a fighting chance. With cold there also comes a sense of panic, a sensation you've experienced many times before when you dove into a cold, spring-fed pool. Now it's an uncontrollable, maniacal panic that you will not recognize or remember. Within one half to three-quarters of an hour, you may experience a feeling of resignation and comparative comfort which all the will power you can command will not budge one iota.

How can you swim without getting wet? If you can keep dry, you may stay warm. You could rub fat over your body, but 20 seconds hardly gives you time to unzip your jacket, not to mention all your other heavy flying clothes.

The answer lies in the anti-exposure suit — a light, one-piece, rubberized coverall that incloses all your body but your face and hands, and seals the water off at the neck and wrists. It fits loosely over your clothing and traps the air, providing buoyancy and some insulation against the cold water. This can be worn under the Mae West, or it may with practice be donned in a few seconds short of 20—just before ditching if you don't panic. The boys who flew the Aleutians never had it — but it's ready now for all future emergencies.

Signaling Methods

The assortment of signaling equipment that the Air Force's supply experts stuff into the glory hole of a life raft would put Noah to shame. But it is done with purpose and method, for survival often depends on how well you let others know where you are. No one knows that better than the man in the drink with only his head above water, and that showing up for that instant between troughs when a wave lifts him for one teasing glimpse of the horizon. What is the expert's answer to this dilemma?

All personnel are provided with a bright orange-colored life vest to keep afloat. Its color is distinctive, but the area exposed is so small that many a search aircrew has flown over swimming survivors without seeing them. Because color isn't enough, each life vest contains four items of personal equipment:

There is a whistle which may be

heard in calm weather by a close-passing vessel. In a good stiff breeze you may have trouble hearing it yourself.

At night you may also use the waterproof, floating flashlight which is pinned or tied to your vest. This may be seen at 100 yards under favorable night weather conditions.

Fluoroscein dye marker which is cemented in a small packet to the vest is proof that good things come in small packages. When sprinkled on the surface, the dye powder tinges the water a yellow-green and is usually visible for two hours at an approximate distance of ten miles from 10,000 feet. Its effectiveness is dependent on wise use, for you must remember two things about sea dye. First, it is expendable. Secondly, its purpose is to increase your area of visibility so that others may see you, but the length of visibility is shortened by rough weather which disperses the dye quickly and cancels all your efforts.

The dye is no good at night and is less effective to attract ships at sea than aircraft. On release, the sea marker will make a bright green splotch about 100 feet or more in diameter. It has good contrast with the sea even on dull days, and any pilot who may be attracted by an oil slick will show even greater curiosity over this color—if the survivor uses it wisely. This is no gamble, brother, but a test of your good judgment! Don't use it when you hear aircraft above a continuous cloud cover or low on the horizon.

The last item is the signaling mirror which experience has proved to be one of the most effective and most frequently used signaling devices. It is small, simple to use and will reflect sunlight for a distance of eight or ten miles. It must be focused definitely on a moving object and on a clear sunny day it will reflect the equivalent of about eight million candlepower. All fliers over land have experienced the momentary distraction that comes with the flash of light from an aluminum barn roof, a quiet pool of water or the reflection from an automobile windshield. This mirror serves to distract and attract and, in the same way, to hold the attention.

There's the story of a C-47 transport flying south over the Coral Sea at 10,000 feet with a crew of three, all engrossed with the approaching relief of the flight's end. The pilot became so annoyed at a persistent glare that picked at his face that he finally dipped left for a look of explanation. The source was small and continually winking but he could see no reason for it. He started a letdown and at about a thousand feet, all three saw the one man raft, the man and the mirror, now flashing wildly.

There was another case, that of a British pilot who dunked into the Gulf of Aden with a Mae West and a tin of iron rations, but no mirror. A teammate came flying by, minutes after he had ditched, apparently unaware of the tragedy. There were just seconds in which to act but with great presence of mind he flashed the shiny tin bottom of the ration can towards the aircraft. So lived a pilot to fight another day.

The life raft contains other signaling equipment. One is the hand smoke signal of fire-orange or other colors which will emit a dense smoke that lasts for about 18 seconds. During the day under favorable conditions this may be seen at a distance of seven to eight miles.

Flares and Very signals can be used during the day or night. The Very signals come in cartridges and must be fired from a hand projector. They are red, white or green rocket signals which rise to above 200 feet and may be seen up to one mile during daylight hours. These last from five to seven seconds and stand out at night for much greater distances. They are the traditional signal of distress at sea. In addition to these items, the life raft may have lights which are visible at night up to five miles, more fluorescein dye, a corner reflector, the Gibson Girl and the bright yellow of the raft itself.

The corner reflector is a passive signal but it assists radar equipped search planes and ships in locating life rafts at greater distances regardless of day or night and in fair or foul weather. It consists of a lightweight, umbrella-like contraption that is erected over the raft. It is a screen of metal which reflects back to the source a large portion of the radar energy that strikes it. The effective range is two to eighteen miles, and it has been picked up on ship's surface radar at five miles.

The Glamorous Gibson Girl

There never was a more virtuous gal in a life raft than the Gibson Girl. Her voice is legendary, yet many times she has been ignored and left to sink ignominiously with the plane. The reason is not difficult to understand, for this handcranked radio transmitter, the Gibson Girl in G. I. parlance, is never stored in the life raft. She comes in a compact bundle that has to be wrestled separately into the life raft by one man, usually the radio operator. At sea, her voice has a range of 1000 to 1500 miles, sending out an SOS that provides a fix on the location of the life raft and makes it possible for rescue craft to home on the distress signal in spite of fog or darkness. The antenna is raised by means of inflated balloons or a box kite. Once these are aloft, they also provide a visual signal which may be seen from ten miles.

There are many stories about the Gibson Girl. This one not only re-emphasizes her value but illustrates how difficult it is to spot, not one man or one life raft, but several men and life rafts on the surface of the sea.

A B-29 aircraft commander who ditched in the Bay of Bengal reported, "The Gibson Girl floated near the airplane until picked up by one of the crew. When opened it was found to be perfectly dry. We sent our first message, using the box kite to lift the aerial. The wind died down so we had to reel in the antenna, dry the kite and release it again. But we found that in a strong wind the kite can be flown even if wet. Messages were sent during the three-minute period beginning at 15 minutes after the hour and also every time an aircraft was sighted. On the morning of the second day a Beaufighter homed on our set. It flew over our dinghies twice without locating us, then turned away to the northeast and disappeared. About 15 minutes later it returned with a B-29 which homed in on our set. Soon after

This rescue boat was delivered because crew member could use emergency signal mirror.

"Like water off a duck's back" anti-exposure suit provides dry, warm, buoyant protection.

Swim, using a simple stroke, to keep warm and maintain body heat at an efficient level.

this a British search ship sighted our aerial and kite, decided to investigate it and picked us up. The Gibson Girl was the main factor in the location of our crew."

Lady Luck Shows Her Hand

With all this equipment for "hollering" at sea, it would appear that under average conditions survivors would stand a better than fair chance for recovery. Unfortunately, there are many other factors that force themselves into this picture.

Have you ever seen a sea anchor? No, we don't mean a heavy iron shank with flukes and a connecting cable. A sea anchor never holds fast. It floats high in the water or sometimes just under the surface.

A sea anchor for life rafts is relatively small, a floppy piece of cloth or rubberized fabric which can be folded much like a handkerchief. It is shaped like a bucket without a bottom or sometimes like an open, hollow cone with a short line by which it may be attached to a life raft.

This piece of sea equipment is a real hand-me-down from the old sailing days when clipper ships used them to heave-to and rest a storm out. With a sea anchor a life raft can also be stabilized in a rough sea, for by dragging through the water, it buoys down the bouncy air-filled raft and keeps it from capsizing. But supposing that you do lose your sea anchor, what then?

When you are out on a shipping search you see a lot of water, a sleepy, monotonous job. Any little change is good for a look-see and a chance for variety. This was the routine being followed by a PBM some 1800 feet above the Pacific when one of the crew noted a disturbance in the water. With the thought that it might be the plume of a submarine, the pilot dived the aircraft for the spot—and found a raft in which sprawled an unconscious man holding to a life jacket which dragged in the water and streamed a small, frothy wake.

After rescue, he told what had happened: "There were three of us in the raft. No sooner had we got aboard than because of the heavy sea and possibly the shock of our water landing, all three of us were violently seasick. *Before we recovered ourselves, the sea anchor broke away.*

"From that time on, we were a chip bobbing up and down those long green swells. From the bottom of the trough they looked two stories high. At the crest, the white water would break over us in a wall of foam. About three of those and over we went, losing most of the gear which we forgot to tie down.

"There we were, practically no survival equipment, getting tossed in the water every few hours. In 11 days the raft capsized 16 times. The sixth day was the worst. We capsized six times. After pulling himself aboard the last time, A—— died of exhaustion.

"Then the last day was bad too. B—— drowned. He just couldn't get on the raft the 16th time. That was two hours before I was picked up. If our sea anchor hadn't broken away, maybe all of us would have come through alive. Maybe . . ."

Yes, maybe . . . And but for the drag of a life jacket, and if the men who saw the wake had instead glanced away for a moment . . . ? And if the exhausted castaway had been conscious, what might he have done? Yell, pray or just wave his hands?

It is almost impossible to enumerate all the factors of success, the separate items or actions that have helped each man to escape the sea. One would have drowned without his Mae West; another would have perished without his warm clothing. Many lived to bless a plastic whistle, a flashlight, a tin of water, a bar of chocolate, or the Very light that wouldn't go off on the first strike. On these little things and the hope and desire for life, men have come back resolved that next time it would be different.

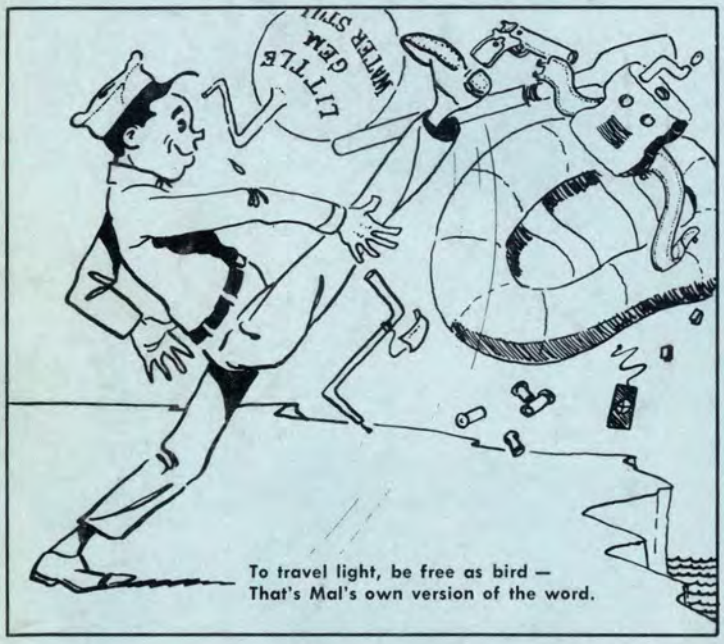
The incidents cited above are not hard luck stories. Those will never be written because there are no survivors. Nor are these presented with the intent to instill fear but rather to impress men with the seriousness of sea survival and to emphasize the fact that equipment isn't everything. But the value of good equipment and training cannot be overestimated, and since that equipment is provided, one should make every effort to use it. The success or failure of a sea survival begins before the aircraft leaves the home base. Familiarize yourself with your equipment, know where it is located in your aircraft and if you should ever need it, get it off! Get it all off! And hang on to it! Remember that when the aircraft commander gives the order, "Prepare for Ditching!" he doesn't guarantee you time or chance. He's warning you that in a very few seconds you may be on your own, and hoping that in a pinch you may be able to help him. ●

You may have to SWIM for it.....

Someday, somewhere, some intrepid birdman who has just been dunked in the drink may get rescued by the likes of these two fair damsels. But the smart crewmember won't count upon it. The man who knows what to do and when to do it if he goes down in the brine, will help to save himself. Know your survival procedures and equipment.

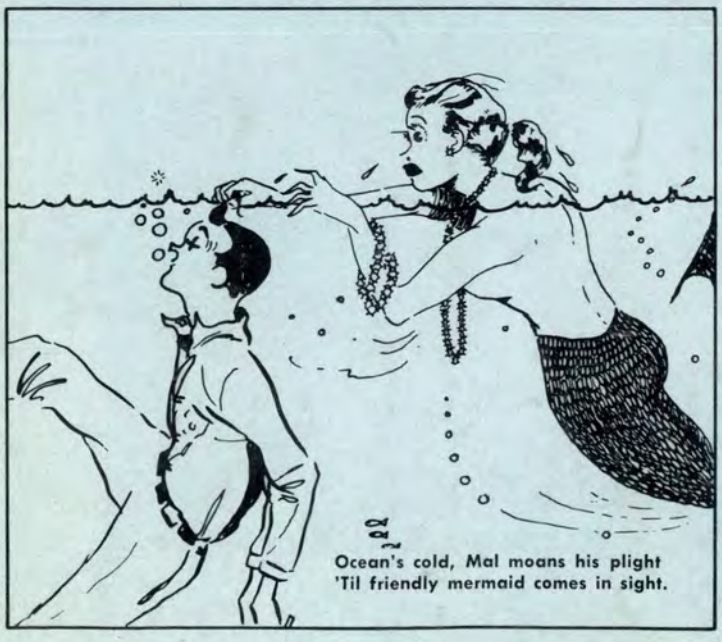
Mal Function

To be prepared for any fate
Is Air Force thought for current date.



To travel light, be free as bird —
That's Mal's own version of the word.

Engine trouble; must ditch plane
Mal now yearns for dry terrain.



Ocean's cold, Mal moans his plight
'Til friendly mermaid comes in sight.

'Tho Mal dreams of small-size boat
Chance of rescue is most remote.

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