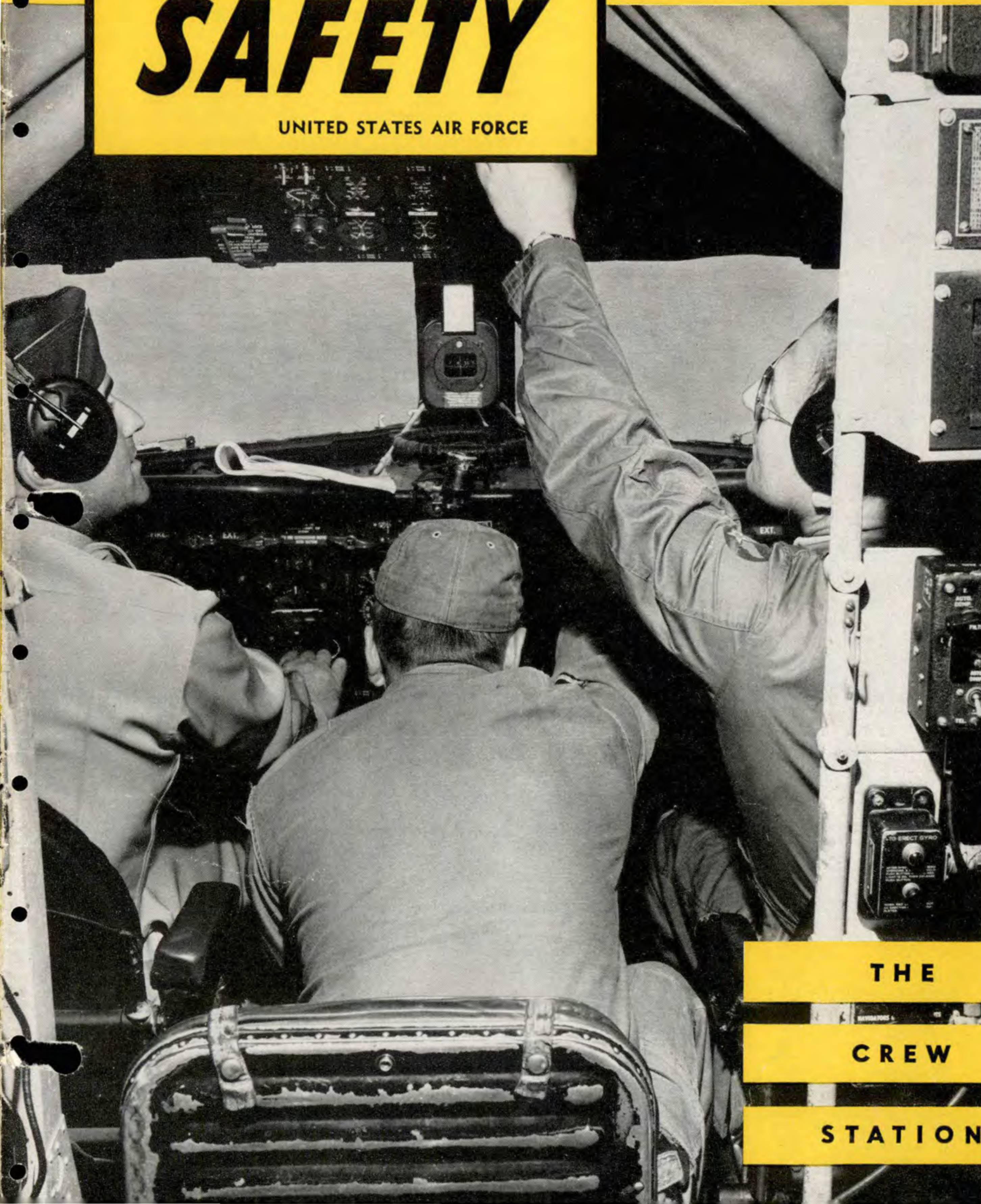
FLYING SAFETY

UNITED STATES AIR FORCE

JUNE 1957



THE CREW STATION

File Thirteen

I would like to quote some information recently received from the Aero-Medical Safety Division of this Directorate: "A spot-check of a unit operating jet aircraft revealed that of the 76 pilots who were issued helmets and masks, 34 had returned the masks to Personal Equipment for cleaning within the past 30 days; 15 pilots were using masks that had not been cleaned within the past 30 days; 10 were 60 days overdue, nine were 90 days overdue and eight pilots were using masks that had not been cleaned within the past 120 days. T. O. 15X-1-1 requires that oxygen masks be inspected every 30 days. Experience has taught us that masks which are used every day should be checked every 10 days." So be sure that your mask is being properly inspected. . . . In a recent aircraft accident, the pilot was (supposedly) at the Minimum En Route Altitude on airways. Actually, he was 15 miles off the airway and he hit a mountain. Subsequent inquiry among pilots indicated that many of them did not realize that the MEA provides terrain clearance ONLY FOR THE WIDTH OF THE AIRWAY. Check with your Flying Safety Officer for more details about this accident. The whole story will be included in the June FSO Kit. . . . For the latest procedure in getting your radar advisories from GCI, check the latest Radio Facility Chart. The call sign is now "Stargazer."

'til July,

Perry J. Dahl

Superintendent of Documents
U. S. Government Printing Office
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USAF PERIODICAL 62-1

the first... ...and last

The first half of our yearly Flying Safety Program has ended. The purpose of the entire program is to concentrate on the known causes of the majority of our aircraft accidents. The specific cause factors, discussed each month, are realistic, for they are based on actual statistics. With everybody's cooperation, this approach should reflect favorably on the accident picture. The subjects featured in the first period were The Supervisor, The New Pilot, Your New Aircraft, Flight Planning Today, The Emergency and The Crew Station. They are all in the "personnel error" category.

★ • • • • • • • • ★

During the next six months, we plan to publish articles about other predominant causes of aircraft accidents. Here are the subjects listed by months:

- July — "Power Plant"
- August — "Personal Equipment"
- September — "Maintenance Today"
- October — "The Skies"
- November — "Most Probable Cause"
- December — "Military Flyer"

To achieve our accident-prevention goal, each officer and airman must contribute to the program . . . for "The Prevention of an Aircraft Accident . . . Doesn't Happen by Accident."

Evolution did not

Deception Rides The Skyways

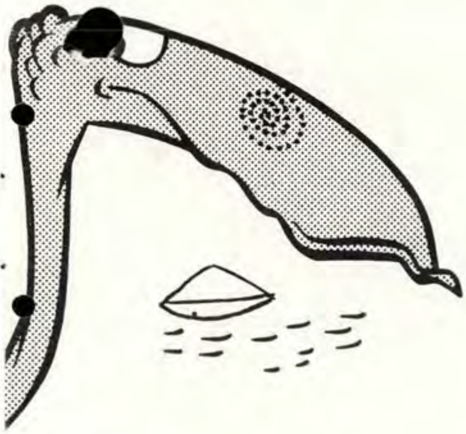
Jeff Sutton, Research Engineer, CONVAIR, San Diego

"I BECAME disoriented while descending through the clouds, lost control during transition to instruments and went into a split S. The altimeter read 200 feet just before I blacked out in the pull-up . . ."

This pilot lived to tell about his illusion. Until rather recently the word "illusion" was one for the clinic and musty books on psychology. But, suddenly, it has become important in aviation lingo, the recognized ghost behind numerous aircraft accidents, a common cause behind the label "pilot error." It will become more important as aircraft performance advances.

Despite this, we fail to tell the pilot all we know about illusions or even to pound home the simple rules which will give him an edge over the situation when it does occur. Fortunately some pilots learn to recognize and even anticipate the onset of certain

. . . anticipate the above mach aircraft that rove today's skies . . .



kinds of illusion. Others fly into the never-never land of complete disorientation with little or no awareness of what is happening or what to do when it happens. A few pilots appear highly immune; others appear particularly susceptible. But one thing is certain: Sooner or later every high performance fighter aircraft pilot will face frantic, terrifying seconds during which the human brain loses all contact with reality, when the objective world is completely cut off. It is a life-or-death moment.

Many pilots, aviation writers and other aviation personnel use the word "vertigo" to describe disturbing, confusing or just plain disorienting effects of all kinds. The word performs a disservice. Its generality masks the fact that certain types of illusion accompany certain types of aerial maneuvers or visual fields. Consequently, the specific course of action required to combat one type of illusion might not hold for another; it might even be very bad. Of course, not all illusions are clear-cut entities. A number of different illusion-producing factors may combine to form a diffused, generalized pattern of total disorientation —a fabric of mental chaos.

The occurrence of illusion is due to an inadequate frame of reference, ordinarily provided by the eyes, two different equilibrium senses in the inner ear, and pressure and tension senses distributed throughout the body. But it's the eye and inner ear organs—the semi-circular canals and otoliths—which are most important. The canals give the perception of rotation; the otoliths inform the brain of body attitude relative to the direction of gravity as well as changes in linear acceleration.

Two Conditions

In general, most illusions can be pinned down to two conditions:

- Accelerations which produce inner ear effects.
- Absence or reduction of cues in the visual field.

Or, these conditions may combine to create real chaos. Fatigue and emotion (primarily fear) intensify illusory disorientation and add to the general disruption in pilot performance. Illusions produced by these conditions are sometimes classed as visual and non-visual, although components of each may be present during a single generalized period of disorientation.

"I couldn't tell which lights were stars and which were fishing boats." The reporting pilot was the victim of a visual illusion. He had been flying over a calm sea on a clear moonless night and had lost his horizon. Familiar visual cues were absent. The sky and the surface of the sea had become *one*. He felt as if he were in the center of a great orb whose surface was sprinkled with lights, and direction had ceased to exist. But he was smart. He went on instruments and he lived to tell the story.

Visual illusions appear to be somewhat less common than the non-visual variety but are not, perhaps, less dangerous. They occur because visual cues are misinterpreted—conditions favored by night and weather formation, lost horizons, and dim and unflickering lights pinned against dark, unstructured backgrounds. They involve errors in interpreting the meaning of lights or seeing lights under conditions of poor depth perception. A pilot may judge inclined cloud banks as being horizontal and respond by changing the attitude of his aircraft. A wingman may interpret his own motion as motion on the part of the flight leader. These are the things of which accidents are made.

The pilot who "joins up on a star" or sees a light split asunder (double vision associated with fatigue) is experiencing visual illusion. Lights are highly important to the pilot. They form the major part of his night visual field. But they can be friend or foe. On the whole, they're tricky. Errors in their recognition, perception and relative movement are common.

". . . frantic, terrifying seconds . . ."

"I couldn't tell which lights were stars and which were boats."

The autokinetic illusion offers an example. The pilot who fixates a steady light against a dark background may see it appear to move in random fashion. Woe is he who tries to track it! This effect can be demonstrated by staring for a few moments at a fairly bright and relatively isolated star. Some pilots have reported the effect from airport lights during night landing approaches; others have reported it at altitude during night formation. Apparently, blinking lights do not always destroy the effect; and it's the exceptions that hurt.

"I thought I was flying straight and level but my instruments indicated a diving bank." Fortunately, this pilot believed his instruments. Not all pilots do. Illusions of this type, involving attitude and motion, appear extremely common—and dangerous.

This kind of disorientation usually develops under instrument flight (IFR) conditions or when the visual field is cut down or unstructured. Lack of visual orientation throws the load on balance mechanisms of the inner ear. Unfortunately these and other body equilibrium senses were designed for the slow-tempo life on good old terra firma. Evolution did not anticipate the above-Mach aircraft that rove today's skies. These senses weren't designed with high-speed aerial maneuver in mind. Their functions are dubious when such conditions pertain.

Inner Ear

The semi-circular canals lie roughly at right angles to one another in the non-auditory labyrinth of the inner ear. They are filled with fluid which, when moved, bends tiny hair cells which transmit direction to the brain. They tell you when you're rotating. During prolonged spin the fluid movement stabilizes and the sensation of rotation is lost. Conversely, during sudden deceleration in spin, inertia of the canal fluid bends the hair cells and gives the sensation of turning in the opposite direction. The otolith organs of the inner ear also act on the inertia principle. They are small calcium carbonate crystals set at the tips of tiny hair cells. During acceleration the inertia force of the crystals bends the hair cells and—presto!—a message. But its contents may be all haywire.

The inner ear organs have a low threshold of tilt, about 2 degrees/sec/sec. Consequently, if the aircraft rolls to the left, for example, and recovers slowly, the vestibular organs will not record the recovery. The pilot—if he is not instrument-wise—will believe that he is still in tilt. Or the plane may roll so slowly that the changed attitude is not recorded. If it recovers rapidly, the pilot may sense that recovery was from level position, and thus believe that he is in tilt when actually he is straight and level. These illusions are called the leans; they can be deadly. Illusions arising from skid likewise involve the misinterpretation of inner ear cues.

Many pilots are familiar with the graveyard spiral. Following recovery from spin, the illusion of turn in the opposite direction can be so compelling that attempts to correct, put the pilot back into the original spin—perhaps into a spiral too tight for recovery. But straight and level flight also has its perils, especially when the visual field is blanked. Sudden acceleration gives the illusion of climb, abrupt deceleration, the illusion of dive. These effects are characterized by subjective feelings of realism. They seem to be the real McCoy, but your instruments say otherwise.

Many illusions are of the mixed variety—visual, vestibular and somatic components are involved. The reduction of visual cues gives the vestibular and somatic senses a strong pipeline to the brain, too strong for the eyes to over-ride. The oculogyral illusion is a good example.

Following spin or during abrupt deceleration in spin, objects in the visual field may appear to rotate about the pilot in the opposite direction. The illusion is related to nystagmic sweeps of the eyeball (slow sweeps with rapid snap-backs) which result from angular acceleration.

Another illusion, the oculogravic effect, involves both apparent motion and body displacement. A pilot may feel that he (and consequently his plane) is changing attitude while, at the same time, objects in the visual field appear to possess related movement. The sensation may occur in reverse when the pilot comes out of a spin. Related illusions are those which give the sensation of climb while banking, or the sensation of dive while recovering from a spin or dive. The force of these perceptions may cause the pilot to correct automatically—a good way to become a statistic.

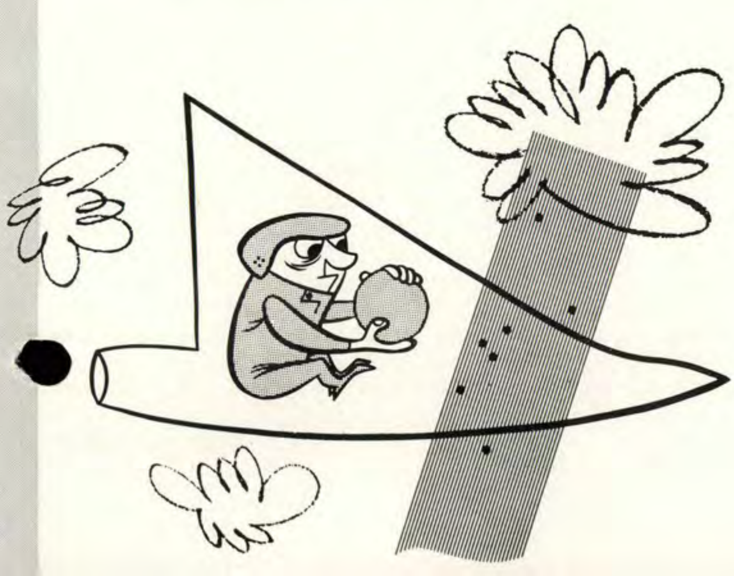
"I bent over to tune in the radio compass. When I straightened up I was dizzy and disoriented." The pilot making the above report offers a good example of how sudden head movement produces illusion. Head movement made in a plane at right angles

"Woe is he who tries to track it!"

to the plane of positive rotation can result in violent dizziness and nausea, the well-known coriolis effect. A pilot can achieve this by the simple expedient of bobbing his head up and down during a spin. But don't try it. At least not when you're airborne.

The examples given are representative of common types of illusion with which pilots should be thoroughly familiar from earliest preflight days. Illusions of attitude and motion can be induced easily on rotating chairs, centrifuge devices and Link trainers. Beginners, and even experienced pilots should be exposed to artificially-induced illusions until they are thoroughly familiar with their characteristics. The pilot should be able to assess the probability and kind of illusion which might accompany maneuvers under given conditions. He should know when and how to go from contact to IFR (there is danger in sudden transition), he should be taught to keep his eyes moving, scan instruments with least possible fixation time, avoid sudden head movements and, most importantly, to trust his instruments. Intuition and subjective impressions (when high accelerations and poor visual conditions are present) are about as reliable as the well-known crystal ball.

"Intuition and impressions are about as reliable as a crystal ball."



Training Aids

Training aids should include diagrams of the inner ear to illustrate function of the semi-circular canals and otoliths, and how these organs respond under various inertia loads. Such visual aids should help the pilot understand the origin of illusory sensations in flight. Finally, the pilot should be taught to act without hesitancy (shift to instruments) when conditions requiring this are suddenly imposed, even if unplanned. He should know the danger in flying half instrument and half contact during marginal or IFR weather. This is a sure illusion-getter.

He should learn to refer to instruments during night visual flight rules weather. Above all, he should know that some illusions herald their arrival with unmistakable symptoms. But others come unobtrusively—upon the velvet feet of death. ▲

Crew coordination is a must with today's multi-place aircraft. Orders given by the aircraft commanders must be clearly understood, for one mistaken word or gesture can result in a busted aircraft.

what did he say?

Captain Raigh Mason, Stead AFB, Nevada.

FLYING TIME per se is not an indication of correct inflight communications procedures. Many aircrews have been using incorrect techniques for years and getting away with it, but the next paragraph relates an example of why you can't be too careful when it comes to yakking over the "intercom."

An aircraft commander was herding his C-124 down the final approach and as the approach progressed, it suddenly became obvious that he was much too short. He called to the engineer for "takeoff power" and the panel man did just that. He took off the power. And the aluminum overcast grated to a stop, considerably short of the runway.

Different Meanings

It is unfortunate that so many people fail to realize that the same words or actions, in the same continuity or context, often have different meanings when expressed or interpreted by various individuals. If a man flies for some time with the same co-pilot, flight engineer or navigator, he gets to know them so well that he fully understands their special uses of words and gestures. He knows that certain members of the crew are dependable or undependable, quiet or talkative, bashful or boisterous, excitable or phlegmatic, and this knowledge is a help to him when interpreting their communication processes. With such a crew, a great deal of the communication may be unspoken. Frequently it will consist of overt body motions, such as hand signals, a shrug of the shoulder or a nod. However, such indistinct methods of communication should be held to a minimum, even among familiar crewmembers.

On "pick-up" crews the confidence, familiarity and teamwork that ordinarily comes from flying together, is not strongly developed and unless each man is carefully briefed on the use of signals, oral or visual, there is a good possibility for some sort of communications failure.

With the high speeds of our newer aircraft, even less time is available for making decisions and passing pertinent information on to crewmembers. Failure to communicate effectively (due to human error) may lead to indecision, delay, failure to accomplish vital procedures, errors in procedural or emergency techniques and panic. Errors resulting from such discrepancies generally fall into three categories, namely, when the communication is *insufficient, excessive or misinterpreted.*

Typical Cases

Let's check a few typical cases resulting from insufficient or inadequate communication.

The Hold-out or Silent Type: The commander of a four-engine aircraft was informed by ground facilities of another aircraft in the same area at the same altitude. Neither the aircraft commander nor the copilot alerted the other crewmembers of the presence of this other airplane. The personnel in the aft of the plane failed to exercise the required vigilance and shortly thereafter—crash!

There were several fatalities, and both aircraft were destroyed. Suppression of information by the pilots, which was vital to the safety of the crew, was responsible for this accident. True, the crew should have been watching for other aircraft but a little reminder may have paid big dividends. All of us get a little drowsy or careless occasionally, and assuming that all crewmembers are really alert can be a fatal assumption.

Too Busy to Talk: In a four-engine aircraft accident, none of the crewmembers informed the passengers that a crash landing was imminent, although six minutes elapsed from initial engine failure to ground impact. Unwarned, several fatalities occurred because the passengers did not have their safety belts fastened.

The pilots stated that they were so busy performing emergency procedures they didn't have time to alert the passengers. A lot of emergency procedures can be accomplished in six minutes and still leave time for a few words on the interphone.

One wonders . . . were the crewmembers inadequately trained in emergency procedures? Didn't they fully realize their responsibility to all passengers? Or did they become just flat panicky?

Feather-Heads: In a twin-engine aircraft, one engine was lost on takeoff. The pilot calmly feathered one prop and the copilot happily feathered the other. Both were apparently puzzled because the plane stopped flying. Since the boys weren't speaking to each other, no corrective procedures were accomplished and they landed in the drink. They swam out of this one.

The major cause of this accident was the failure of those individuals to inform each other of the emergency and the action taken. Such communication negligence in the air can lead to trouble. You've got to "get the word" to all crewmembers.

Too many accident reports contain such statements as these:

- The number of radio transmissions and the manner in which they were made, added to the confusion and were a contributing factor to the accident.
- Excessive interphone communications hampered crew effectiveness and increased confusion.
- Considerable confusion was created when more than one agency gave instructions to the pilot.

Too much chatter from either the outside or inside sources can create as serious a situation as too little communication. The files at Norton AFB contain many reports of accidents similar to the ones following:

Too Many Cooks: A big-busted bird encountered engine trouble. The copilot was talking to four or five ground stations. The pilot of a nearby aircraft was suggesting emergency procedures and some crewmembers of the disabled bird were contributing their ideas. The aircraft commander was getting all kinds of conflicting advice from too many sources and this resulted in a state of confusion. The entire crew bailed out.

Investigation revealed that the seriousness of the emergency had been magnified and that the plane could have been landed safely by using standard emergency procedures. It is easy for any of us to become a little confused and perhaps overlook important items when five or six people are screaming at us. Although everyone contributing advice meant well, they only added to the difficulties and confusion of the situation. Excited and confused by conflicting suggestions, the aircraft commander took the wrong advice.

Panic: The pilot of a twin-engine aircraft flying in an Arctic area was making an IFR approach. Two of his crewmembers spotted a mountain through a momentary break in the overcast. Naturally, they became "shook" and started screaming: "You're going to hit the mountain!"

The pilot, disturbed by the near-panic behavior, involuntarily tightened his bank, lost control and "went in." Only the pilots survived.

Silent Type

Too Busy Type

Feather-head Type

The pilot's opinion was that the accident was caused by the shouting and confusion that existed during his instrument approach. Excitement, confusion and panic all are contagious. A less hysterical warning of the sight of that mountain probably would not have disturbed the pilot. A tragedy might have been averted.

Unless you can contribute advice that will definitely aid the pilot in making the correct decision, "stay off the horn!" If you do get in the ball

"He said, "Get off the brakes." I thought he said, "Get on the brakes."

game, make your suggestions in a calm, easy-going manner.

Accidents resulting from misinterpreted orders are caused by our natural tendency to "short-cut" to save time and labor—to use gestures and fragmentary speech instead of complete instructions.

Gestures are "motions of the body or limbs intended to express an idea . . . to enforce or emphasize an assertion." If effectively used, they replace and/or reinforce the spoken word. Just be sure that Joe interprets your gestures correctly.

When using a word or phrase instead of the complete instruction, be sure that your listener is capable of interpreting correctly your abbreviated version. The basic rule to remember in giving instructions is that the lower the experience level of the listener, the more detailed your instruction should be.

Say Again: "Sergeant Zee told us to prepare to ditch. Some misunderstood . . . they released belts, stood up and prepared to bail out."

When the pilot ditched, there were fatalities among those passengers who thought they were to bail out. Perhaps the "Sarge" had a new plate and didn't enunciate clearly or the passengers may have been panicky and didn't realize what they were doing. In these cases, we don't get the other side of the story.

Signals Over: "When I moved my hand forward for the elevator trim tab, the copilot misinterpreted this as *gear up.*"

Fortunately, however, everybody got out of the burning plane safely.

A little clarification on hand signals before the pilots took off would have prevented this accident. In most accidents of this type, the pilots are "flying strangers" and are not familiar with the other's communication techniques. The wise pilot will make sure that his gestures will not be misinterpreted.

On or Off: "My instructor told me 'to get off the brakes.' I thought he said 'Get on the brakes' . . . the aircraft nosed up."

In an emergency situation, when procedures must be accomplished rapidly, "on" and "off" can sound very similar. In this instance, misunderstanding of a one-syllable word led to a major accident.

An accident in which communications are a factor may never happen to you. Nevertheless, this type of accident has happened to a lot of experienced flying personnel.

Remember, communications to your crewmembers (oral and visual symbols) are intended to bring out one particular response from them. If they "don't read you," you may become a flying safety statistic. When you order or gesture for a particular procedure to be accomplished, you are assuming that the following job components are clearly understood:

What is to be accomplished?

Who is to perform the action?

When is the action to be executed? (Immediately or delayed?)

Where is the action to take place?

How, specifically, is the action to be accomplished?

To an experienced crew, one well coordinated as a team, a word or gesture may convey all of the above components. If flying with an inexperienced or composite crew, however, such an assumption could be very hazardous. You must be certain that your cues, verbal or otherwise, cannot be misinterpreted.

Know the crew you fly with and be sure that you speak the same language. See that everybody "gets the word." Develop the right habits and use them all the time. Don't let a short cut in speech be the short cut to an accident statistic! ▲

Air Crew Coordination

Major Wesley S. Mink, Bomber Branch, D/FSR.

WHAT IS crew coordination and what does it mean if you don't have it in your crew? Remember the old story about the B-29 that lost No. 3 shortly after takeoff?

"Feather three," the aircraft commander shouted, and the copilot obligingly feathered the remaining three.

That's lack of crew coordination. And that's no laughing matter.

Toward the end of World War II a senior Air Force General was fatally injured in a major accident resulting from the fact that a new and inexperienced copilot mistook the general's signal to tighten the throttle friction lock during takeoff roll, for a gear-up signal. The gear was retracted while the aircraft was still firmly on the runway.

This was an accident that need never have happened and one that could have been avoided if the late general had simply briefed his copilot on what to expect from him.

No Briefing

More recently, the similar failure of a B-47 commander to brief his unfamiliar crew, almost resulted in a major accident and in the loss of the aircraft. The crew consisted of an aircraft commander from a staff crew, a copilot from a numbered crew, a staff observer and a crew chief. Although these four crewmembers were well acquainted with one another, and although each was qualified in his respective position in the B-47, this was their first flight together.

After a normal briefiing the crew departed, ferrying the B-47 to a northern ZI base for static display. At the end of the two-day display, the crew prepared to leave for home and at this time another briefing was conducted by the aircraft commander. Procedures to be followed in case of emergency, including bailout, crash landing and ditching were covered thoroughly. Takeoff and flight to the home station were normal. The weather was good, 10,000 overcast and seven to 10 miles visibility, in light rain. A normal pattern was flown and touchdown made approximately 1500 feet down a 10,000-foot runway. The aircraft commander attempted to deploy the drag chute but —and this is where the trouble began —the chute failed.

"Well," the commander said casualy over the interphone, "I guess we won't have a chute."

The aircraft commander's feet were still on the floor boards and he had made no attempt to brake because airspeed was still excessive for effective braking. But—about this time the B-47 decelerated momentarily and the main gear tire blew.

"Are you on the brakes?" he asked the copilot.

"Yes," the copilot answered, "I thought I'd help you out."

The aircraft commander advised the copilot to get off the brakes and brought the aircraft to a normal stop, turning off the runway onto the taxiway where he shut down the engines.

The damage to the aircraft consisted only of the blown tire and some minor dents in the nosewheel door and the bottom of the fuselage. But it might have included the whole aircraft, as well as the lives of the crewmembers, for the aircraft commander had not only failed to brief the copilot on procedures to be used in the event of chute failure, he also had failed to brief his unfamiliar crew on the basic fact of crew coordination. He had failed to take into account the dangerous tendency to carry over from one crew to another the habits and attitudes each of them may have developed during flight.

Even more recently an RB-66 crew at a midwestern base nearly met with disaster because of the lack of crew coordination.

Not unfamiliar with one another, this crew had trained and flown together for some time. But they had never faced an emergency together, and returning from a photo reconnaissance mission one day, the aircraft commander entered the traffic pattern and attempted to lower the gear for landing. The gear failed to extend even though all hydraulic pressures indicated normal. He therefore instructed the gunner to enter the crawlway and depress the emergency control over-ride on the landing gear solenoid to lower the gear.

The gunner complied and the gear lowered and locked. At this time the aircraft was on base leg to land. After getting the okay that the gear indicated down and locked, the gunner released the emergency over-ride. The gear retracted. The pilot advised the gunner of this. Still in the crawlway, the gunner depressed the emergency over-ride again and the gear went down again. To make a long story short, the gear cycled from the UP to the DOWN position three times while this aircraft was on final approach and the runway control officer is probably still sick. A safe landing was made only because the last time the gunner depressed the emergency over-ride, he held it down until the aircraft had turned off the runway and the engines were shut down.

What had happened to cause this incident? The pilot's landing gear handle was in the UP position. Except for a persistent gunner with a thorough understanding of the aircraft's hydraulic system, that crew would have had a wheels-up landing.

But if a mechanical failure and the pilot's forgetfulness triggered this emergency, it was something else that made it worse—a lack of crew coordination resulting in unpreparedness to meet the emergency as a practiced team.

These are only a few of a great many incidents and accidents caused by a lack of crew coordination, and perhaps we ought to define these terms more clearly.

Definition

Coordination, the dictionary says, is "an organizing of different parts or groups into a functioning whole." It also is stated as, "the ability to function harmoniously."

A coordinated aircrew is a number of men all functioning together as a single man. In the handling of one of our modern jet bomber or transport aircraft, this is a primary requirement for successful flight.

The first problem confronting a newly appointed aircraft commander therefore is the problem of organization around this concept of crew coordination. He must train his crewmembers not only in all phases of their own work but in every aspect of each other's work that touches their own. Thus, in an emergency, each man will know what to expect from all the rest and will understand the problem as it is seen from every point of view. This is by no means a simple thing to do. It requires diplomacy and discipline, understanding and tact. Even with all of this, effective crew coordination comes only after long hours of flying, training and study.

But the net result is worth the effort. In the first emergency you'll either know it's there or wish it was. For, to the air crewmembers, their first real emergency is their graduation exercise. Decisions and action must be rapid and must be right. The well coordinated crew will cope with the situation. The others, unless they're lucky, will fail to meet it and another Form 14 will be included in somebody's file. ▲

"No, I didn't say anything about feathering."

In some aircraft, unless you have good coordination in the use of the interphone, it will resemble a . . .

PARTY LINE

Major David R. Lewis, Cargo Branch, D/FSR.

EACH YEAR an undetermined number of aircraft accidents are caused or induced by cockpit design. While that was not considered the primary cause of the accident in this story, it was an important, contributing item. The real culprit was the interphone system. It wasn't busted either—just doing its normal job, but this time, its normal job wasn't good enough.

As you probably know, the C-124 is a rather large airplane and has a nice spacious cockpit. Because of this spaciousness, however, the crew must rely almost entirely on the interphone for communicating with each other. So, unless you want to yell your head off, you'll use the interphone whenever you fly this bird.

On most aircraft whenever a mike button is depressed to use the interphone, any transmissions to that position are cut out. Also, while the interphone is in use, radio transmissions into the airplane will probably be so garbled that no one will understand them. Consequently, some discretion is necessary when using the interphone in aircraft such as the C-124. Unfortunately, discretion was not used in this instance.

This particular C-124 had been on a flight to North Africa and was arriving back in the ZI when this accident occurred. There were ten persons aboard, six crewmembers up front, and three crewmembers and

In the C-124, somebody talking on the interphone will garble the voice reception from the outside.

one passenger in back. The crewmen had adequate rest prior to commencing the flight, however, they exceeded authorized crew duty at the time of the crash.

Destination of the flight was a southeastern coastal base. Weather forecast for ETA was sky obscured with one mile visibility in ground fog. The alternate, another southern base, was forecast to have 1500 broken, with five miles visibility.

When approximately two hours from destination, a weather advisory was received, stating that upon arrival the visibility would be up to $1\frac{1}{2}$ miles, with 15,000 broken. As the big bird approached its destination, the visibility was reported to be $\frac{1}{4}$ mile. The pilot entered the holding pattern and contacted operations on the ground for further information. He was informed that visibility was forecast to be at or above minimums in half an hour. He was further advised that two bases, much closer than his planned alternate, were available with clear skies and seven miles visibility. With this in mind, a decision was made to hold, since there would now be no problem in reaching an alternate safely.

As Forecast

The forecaster must have really polished the crystal ball this time, for in half an hour the base was declared at minimums. The report now read 15,000 broken, $\frac{1}{2}$ mile visibility in ground fog, temperature and dewpoint 62 degrees and wind calm.

An airliner holding below the '124 was cleared for an ILS approach and within five minutes was rolling down the runway. The pilot stated that he had seen the approach lights for some distance out and, in fact, had made an almost completely visual approach with little or no reference to flight instruments.

The C-124 had necessary equipment for an ILS approach and the pilot had previously flown an ILS run at this base. Like most pilots in Air Force circles, however, he elected to use GCA for his approach.

As the GCA run progressed, it seemed to be routine in all respects. On final, those words we all love to hear—"on course on glide path"—were coming in loud and clear. About two miles from touchdown, though, the interphone entered the picture and words weren't clear anymore.

The airplane was about 50 feet above minimums when the pilot asked the copilot if he could see anything yet. This was a mistake, for the instant his mike button was depressed, the pilot could no longer hear GCA. The copilot's answer further extended the time that GCA was cut out so the warning that the airplane was now 20 feet below glide path was not heard. What the pilot did hear was "not yet," followed almost immediately by "we're in the trees, pull up!"

The glide slope needle on the ILS indicator was deflected full up during this part of the final approach. This went unheeded by the pilot. In addition, the APS 42, which could have been used for monitoring the approach, was idle. At the last two stops, it had been used to monitor the approach but this time the navigator had "closed out" for a bit of sack time as soon as landfall was made.

When the copilot shouted the warning to pull up, the pilot glanced up momentarily and saw the trees. Simultaneously, he was calling for maximum power, shoving throttles forward and pulling the wheel back. He was just a bit late though, for as the power took hold and descent stopped, they hit the trees. Immediately, thereafter, No. 3 engine failed.

Airborne

As the plane struggled out of the trees, the pilot ordered gear and flaps up. Flaps were retracted first because the pilot suspected hydraulic troubles and believed that if the gear was retracted first, he possibly wouldn't be able to bring up the flaps. His logic in even bothering the flaps may be questionable since he only had 20 degrees down, but he was correct in suspecting hydraulic troubles. The exposed hydraulic lines on the main gear had been damaged so one gear only came part way up and the other wouldn't budge.

No ADI

When the engineer increased power, he neglected to turn on the ADI. Then, because of a misconception which he had as to the results of turning ADI on with engines at full power, he decided to leave it off. To further reduce avialable power, the oil coolers had been rendered inoperative. So, oil temperature on all three remaining engines was right up against the peg. With the dragging gear and only three engines, which were putting out considerably less than maximum power, the '124 was barely able to attain a thousand feet.

Immediately after the collision and during at least part of the climb, there was an understandable period of time when all hands were busy. Further, because of the size of the beast, a lot of interphone conversation was necessary during this period. This use of the interphone, plus a few rapid channel changes, prevented the GCA controller from effectively giving instructions to the pilot. When contact was finally re-established, the airplane was no longer on the GCA scopes so the pilot was instructed to re-home on the outer marker.

Missing Antenna

This created another problem. The collision had removed most of the antenna from the belly of the airplane. This was unknown to the copilot, however, so he tuned in the outer marker to one compass and the middle marker to the other. A comparison of the bearings shown on the two compasses indicated that something wasn't quite right and a little experimentation revealed the difficulty. An attempt was then made to obtain a loop bearing, but about this time GCA was on the horn again. They had a target on the scope and wanted identifying turns made. After staggering through a couple of turns, which didn't help the altitude any, they were informed that the target was apparently another plane.

About that time the pilot remembered that the OMNI antenna was back in the tail section of the plane and probably wasn't damaged. The local OMNI frequency was set up and from all indications, the set was okay. An inbound track was promptly assumed and in a short while GCA had the airplane in positive radar contact.

Approximately 35 minutes had now passed since the trees got in the way on the first approach. Number 4 engine was cutting out frequently and No. 1 was losing power. An abortive attempt to reduce power to lower the oil temperature had only resulted in loss of altitude. The big bird was now struggling along at 500 feet and was straining to hold that. The engineer had been instructed to keep all engines running as long as possible but now he warned the pilot that No. 4 couldn't last much longer.

The inbound heading to the OMNI station placed the '124 on a dogleg to the final approach. The turn to final heading was a little short, so corrections were given which returned the airplane to track. Course was maintained then until about three miles out, when the plane drifted off to the right of the center line.

The azimuth corrections given were in a "no-gyro" fashion. The GCA operator had apparently misunderstood previous transmissions concerning radio compass failure and believed the directional type compasses were out. The copilot made an attempt to correct the situation but was unsuccessful, since the controller's mike was keyed continuously.

On this approach the airplane was down to 500 feet and still losing altitude when the final controller took over. When the airplane drifted off at the three-mile point, azimuth corrections were given to the left until about one mile out, when the bird was back on track again. The final controller was giving a last correction to the right which should have lined the airplane up with the runway—when the flight engineer came out with the news that he'd just feathered No. 4.

There goes that interphone again! And once again the pilot missed a GCA transmission at a critical point of the final approach.

Just then a string of lights appeared dimly through the fog. Instictively, the pilot headed for it but the copilot told him that the lights were from vehicles on the highway and that the runway was off to the right. It was too late to make the runway but in order to avoid the highway, a hard, right turn was necessary. During this turn, the right wingtip struck the ground—and then the farm was really bought! They crashed inside the airfield boundary. The C-124 was destroyed and three of the four people in the cargo compartment were killed. Miraculously, all crewmembers up front lived.

GCA Checked

An AACS maintenance and flight check of the GCA unit involved in this accident, revealed no discrepancies that could have caused this accident. The GCA operators were well qualified. Informal test runs by C-124 aircraft revealed later that no matter what portion of the target blip was used as center point, the aircraft should still have had adequate terrain clearance.

A prominent contributing factor was use of the interphone during the GCA run. You may recall that on three occasions the interphone blocked out ground transmissions that possibly could have "saved the day." What's your verdict? It is very clear that some modification of the C-124 interphone system is necessary, for there comes a time in every birdman's life when he has the urge to talk and listen at the same time.

It is too late now to keep this accident off the books but we can use the lessons learned here to prevent future accidents. Be sure that you know your airplane and its limitations, and don't let it get you into a similar situation. You may not be around to explain what happened—as this crew is, fortunately. An added thought is to also know your crewmembers and their limitations. Be sure that they are trained in such basic items as *when or when not* to use the interphone. ▲

Cockpit Daze

Maj. Raymond W. Staudte, HEDCTAF, Randolph AFB.

WHAT CAUSES an aircraft accident, when both the aircraft and the pilot appear to be in perfect working order? Even more important . . . "What can we do about it?"

An aircraft flies into one end of a cloud and fails to come out the other side. A pilot flying under instrument or night conditions suddenly finds himself rolling over on his back. Or, on a clear, bright day, a pilot dives into a ground gunnery target, apparently making no effort to pull out.

Sometimes the reason is—and it can be a dangerous one—FASCINATION! It might be called by other names: Cockpit hypnosis, fixation or even "asleep-on-the-job." There are two important factors involved:

• You may have been looking at the wrong instrument at the wrong time. You may have taken a reading from the radio compass indicator instead of from the slaved gyro. You may have had your head in the cockpit when you should have been scanning the horizon.

• The second factor—and just as important—is that of looking at the right object but taking the wrong action or no action at all. Such a case might be an improper or inadequate instrument cross-check. It might be just plain "asleep-at-the-switch." We are sometimes so intent on doing a bang-up job that we find ourselves concentrating on many things at the same time. Occasionally, we leave out the very thing necessary for perfection or safety. We might find ourselves flying a perfect heading and rate of descent on a GCA, but our airspeed has fallen off and . . . here come the crash crew!

Why does fascination or fixation, or cockpit hypnosis, take place? In order to operate efficiently we must be able to focus our attention where it is needed and when it is needed. We must "take in all the sights" and use only those that are necessary to accomplish the job at hand. What causes a pilot to become hypnotized by a particular instrument, target or light? Why does he become "stare crazy?"

As we take a look around, it's natural to take in first the sights which catch the eye—like colors, contrast, movement or simply those things which are the least difficult to distinguish.

Many sights compete for our attention at the same time. Which one should we pick? As we gain experience, we learn to pick out those which will do us the most good at the time, depending on what we're trying to do. It's a cinch we can never use all that nature throws our way. Only through training and experience can we become proficient in using up those resources properly. To put it bluntly, we've got to pay attention to what we're doing.

Pilots who fly around in a daze are looking for trouble, and, unfortunately, other people sometimes get hurt.

Day dreaming uses up precious moments which should be devoted to something more important. A long delay in cross-checking instruments can result in disorientation such as getting off course, altitude, airspeed or attitude. Failure to scan the skies frequently might result in a mid-air collision. That second or two devoted to fascination robs us of a second or two which we could use for decisions or reaction time.

The drone of the engines or a monotonous radio signal tends to hypnotize us, particularly on long, straight-and-level flights. Things happen so slowly that we are unable to operate properly. The interest lags when we're not busy doing things. This is the cause of many automobile accidents on long, straight highways when drivers fall asleep at the wheel and run into the car ahead.

At night, flashing or rotating lights might sidetrack our senses. Can we afford to have our attention diverted while on final approach for landing?

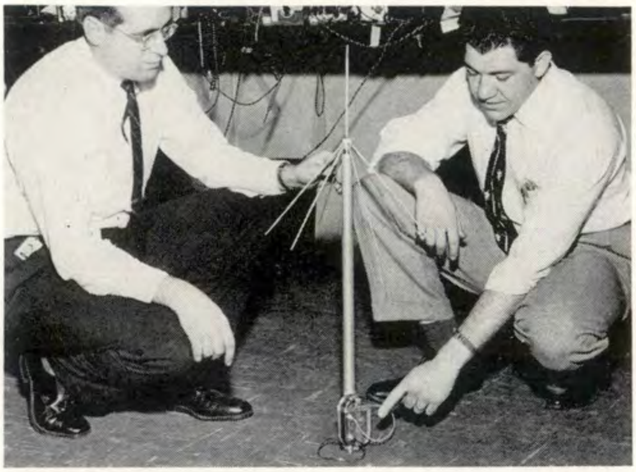
Now that we know what the problem is, how are we going to solve it? Records show it to be more evident among the very inexperienced pilots. The answer then must be in training and in the development of habits. Are we building the right habits?

Attentiveness is something that has to be learned. Try explaining nuclear fission to a four-year-old and you'll notice that he loses interest immediately because it means nothing to him. As we fly more and more, we learn that our time must be divided, so much to inside the cockpit and so much to the outdoors.

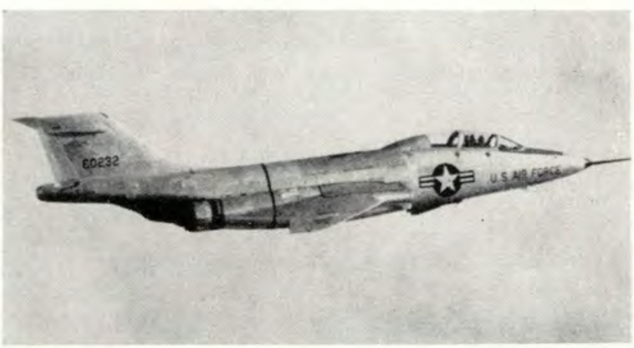
But let's not permit experience to go to our heads. The minute we do that, we relax and become a perfect target for hypnosis or fixation. The natural reaction is to duck when you're a target for something unpleasant or dangerous. There is no way to duck this problem. You have to lick it. To quote some over-used but still up-to-date advice: "Stay Awake and Stay Alive." ▲

Keep Kurrent

NEWS AND VIEWS

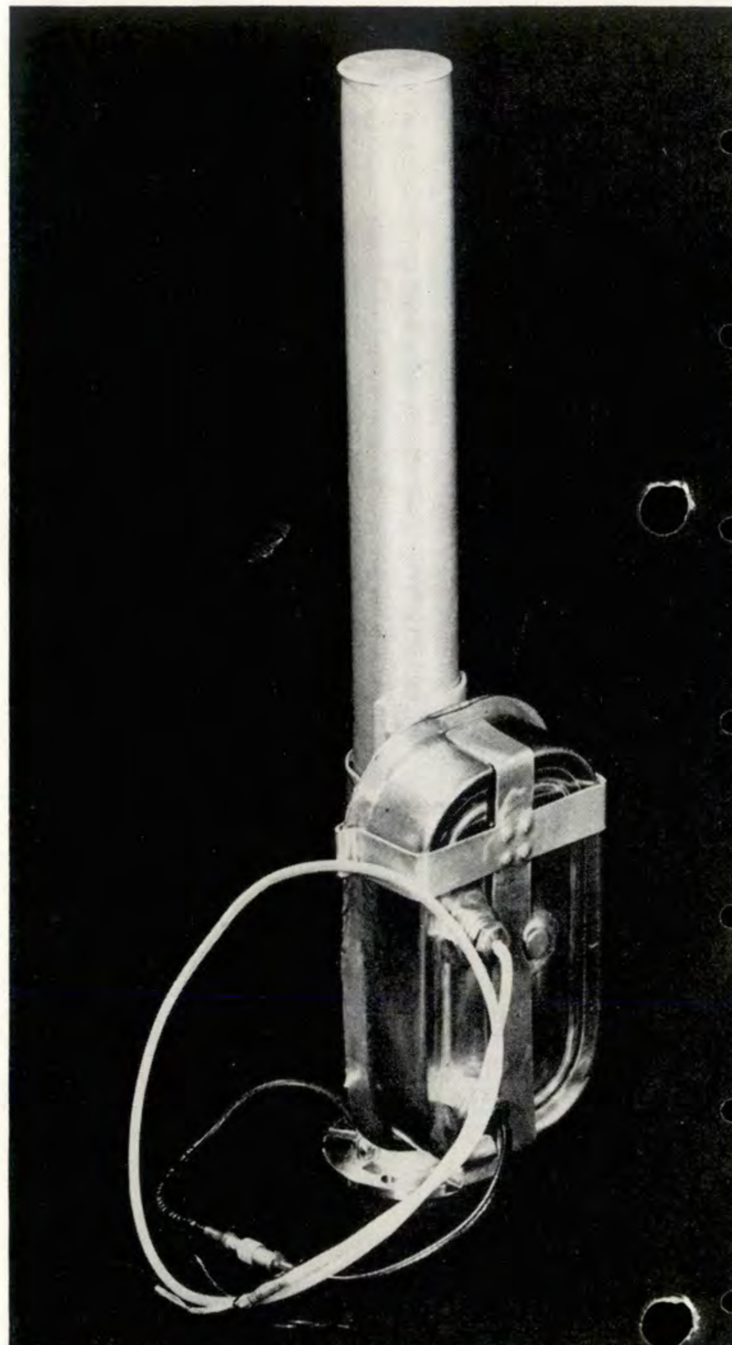


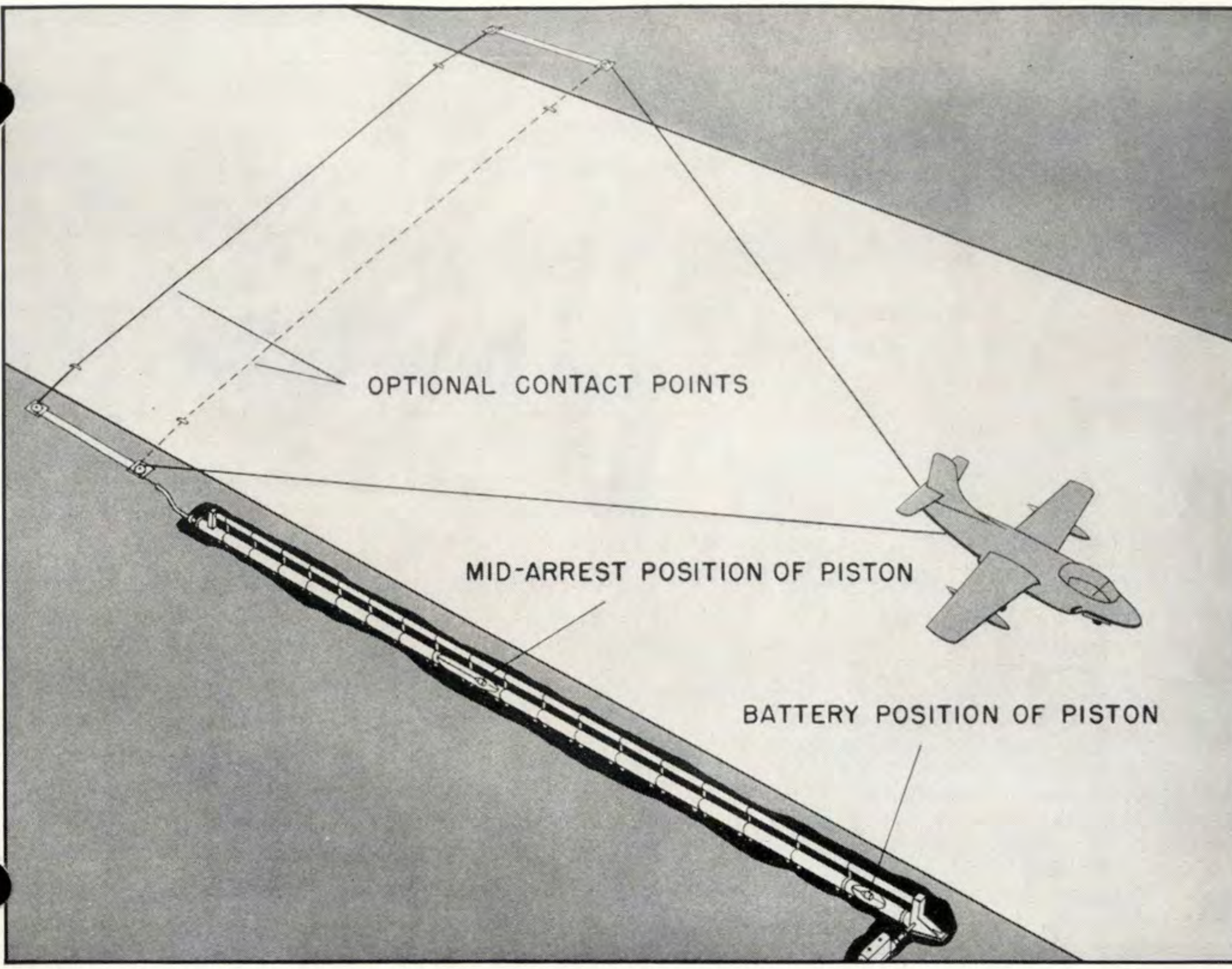
Sardine Can—A UHF Beacon Transmitter that fits into a standard size sardine can and a 12-inch tube that explodes into an antenna has been developed by Fairchild. Designed as an emergency signalling and communications device, the "sardine can" can be modified for voice or code. The transmitter weighs in at eight ounces and the hermetically-sealed tube is exploded into action by a gun powder charge.



Above, is pictured the new, two-seat F-101B interceptor. It is one of three types of the Voodoo series designed for the Air Force.

Below, is the Lockheed C-130 taking off from a snow-covered, northern lake. With this ski-and-wheel version, versatility is the keynote.



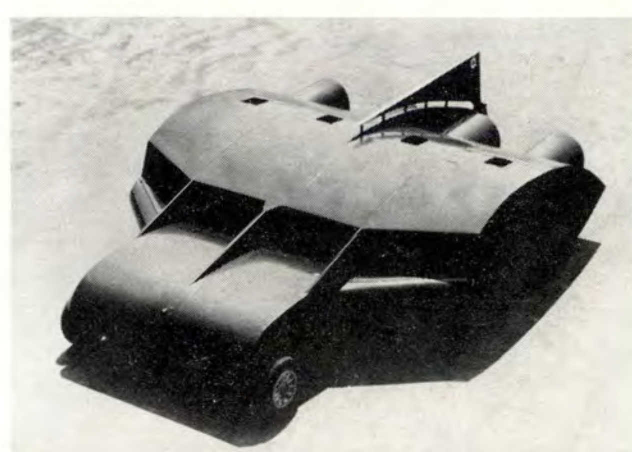


A Squeeze Play—A new method of landing jet fighters on short runways by "squeezing water" has been developed by the All American Engineering Company. It works this way: The landing aircraft engages the cables with a hook. The cable is attached to a piston in a water-filled pipe and upon engagement, the cable pulls the piston through the water, absorbing the energy created by the moving aircraft. Aircraft have been stopped within 100 yards without damage to the planes or the arresting gear.

Jet Hotrod—A car that reaches speeds of more than 200 mph may seem a little imaginative even in these days of ever-increasing highway horsepower, but just such a vehicle makes routine trips almost every day. No need for highway travelers to panic, however, since the car is held firmly to a test track operated by the All American Engineering Company.

The jet car rides on four ordinary aircraft wheels with rubber tires, but there its similarity to any other car ends; for, powered by four J-33 engines, it was built to simulate an aircraft. It is used in developing and testing aircraft arresting gear and can attain the speed of a landing jet aircraft and at the same time push a load comparable to the weight of a bomber.

The bright red hotrod roars down a track and slams into a runway barrier arresting cable. Through these runs, the landing gear of various aircraft can be tested for strength and shock absorbency.



Here is an article on the latest instrument developed to more closely control the approach-for-landing phase of flight. It is referred to as the Max-Min indicator. With this instrument, it is hoped that overshoot and undershoot landings will soon be a thing of the forgotten past.

α the ALPHA GAGE

Melvin Shorr, Wright Air Development Center.

CONTROLLING aircraft during the approach phase of flight is becoming an increasingly difficult problem as higher performance aircraft are developed. Aside from general pilot opinion on this subject, statistics show that overshooting and undershooting account for a large portion of all accidents. This trend can be attributed to the fact that modern aicraft have higher landing speeds, and to the decrease in the range of accelerating and decelerating capabilities associated with engine thrust and aircraft drag.

This low range of accelerating and decelerating forces makes it difficult to compensate for incorrect speeds inadvertently attained during the approach; at the same time the high speed of approach to the touchdown point reduces the time available for these accelerating forces to change the speed. In other words, while the requirement to hold accurately a given approach speed and make good a given touchdown point has become more severe, the forces available and the time available for the pilot to accomplish this have decreased.

One obvious possibility for alleviating this serious situation is to try to provide improved instrumentation—some new display which will provide a better visual indication and thereby tighten the servo loop incorporating the aircraft, the pilot and the desired approach conditions.

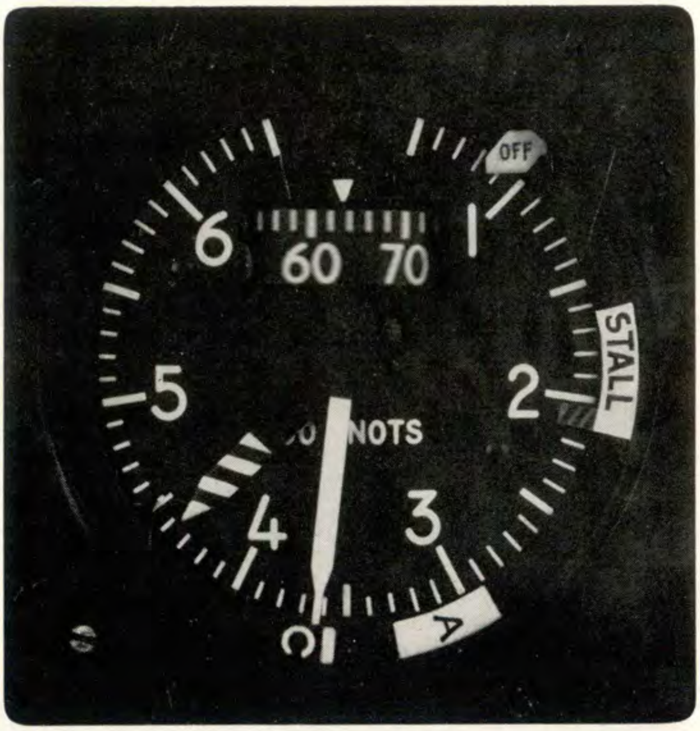
During the last ten years much work has been done along these lines. Theoretical studies have been made; new mechanical devices and different types of displays have been invented and proposed. A great deal of flight testing of several experimental systems also has been done.

One outstanding product of this effort is the Flight Director display used with the Instrument Landing Approach System. Others could be mentioned; however, it is intended to limit this discussion to one particular problem, that of holding the correct speed or angle of attack during the approach.

In addition to the airspeed indicator which always has been the standard instrument for this purpose, innumerable devices have been proposed and many have been used, at least experimentally. These have gone by several names, such as "lift indicator," "angle of attack indicator" and "stall warning indicator."

The reason for needing to control accurately the approach speed is well known. If the speed is too high, a successful flareout and touchdown cannot be made at the desired point over the runway, and the landing run will be too long. If the speed is too low, aircraft response to control surface movement will be poor and a stall may occur.

As already pointed out, approach speed can be controlled with reference to either angle of attack or airspeed itself. If either one of these is held



Here is the actual instrument. The various indices move around the outside of the dial. The indices are adjusted to the aircraft upon installation.

at the proper value (and the other is not correct), the incorrect pitch angles will be quickly incurred and will be obvious to the pilot, either by direct visual reference to the landing field or with reference to the glide slope as shown on the crosspointer indicator. Engine power must then be adjusted to make the pitch attitude—and consequently the flight path angle—correct.

The fact that indicated airspeed and angle of attack are essentially equivalent for this application does not necessarily mean, however, that one may not be used more easily and effectively than the other.

The Reason

A brief reminder of what happens at high angles of attack will help to give an insight into this problem.

During the approach for a landing, it is desired to reduce the speed as much as possible. As speed is reduced, it is necessary to increase the angle of attack in order to maintain enough lift to support the aircraft. As the angle of attack is increased to compensate, in the lift equation, for a decrease in speed, the point is eventually reached where lift no longer increases with angle of attack. This is the stall point. As this point is approached, the flow pattern about the wing changes radically, resulting in a loss of effectiveness of the ailerons, an increase in drag and a loss of lift.

The high drag then decelerates the aircraft until the available aerodynamic forces on the tail surface are not great enough to control the aircraft effectively in pitch and yaw. In some aircraft, particularly the delta wing type, control surface effectiveness may decrease to unsafe levels long before the actual stall angle of attack is reached.

The important point in the above consideration is that stall or loss of control due to a high angle of attack always occurs on a given wing at a fixed value of angle of attack (at least within the pressure altitude ranges of landing fields). It is independent of speed, gross weight and vertical acceleration. Stalling speed on the other hand is dependent on gross weight and vertical acceleration. These facts lead to the conclusion that there would be less work involved if the approach were flown with reference to the angle of attack indicator rather than the airspeed indicator. This way the correct value would always be the same.

The gross weight of the aircraft would not have to be known and corresponding adjustments made as are required when the airspeed indicator is used. The pilot could more confidently and accurately stay within the narrow band between a dangerous stall on one side and excessive flare

At right is shown the angle of attack sensor installed on the F-102A.

speed on the other. Also, if an emergency should arise requiring a vertical acceleration appreciably greater than one G, the maximum amount which could be obtained without inducing stall or seriously reducing control surface effectiveness would be shown accurately on the angle of attack indicator.

These considerations seem to make it clear that an indication of angle of attack would be useful for this purpose and the question might be asked, "Why hasn't the angle of attack meter been generally installed on aircraft?" There are several specific reasons but generally it has been felt that it would "not pay its way."

No suitable combination with another instrument had been developed until recently and consequently additional instrument panel space would have been required. The indicated airspeed meter could not be removed since it was used for other purposes such as takeoff, initial climb and limiting speeds. It also has a firm position for use with ILAS and GCA. Furthermore, it has a reputation for almost perfect reliability, something that could not even be hoped for in the near future in any known angle of attack system.

Measurement of angle of attack and its significance have been known as long as the airplane itself. Flight tests of many devices of this type have been made by the Directorate of Flight and All-Weather Testing of WADC and also by other flight testing activities between 1946 and 1954.

Early in the program comments of the flight test pilots could be summed up as, "It works all right but if it weighs anything or costs anything, don't use it. We can do very well with the standard airspeed indicator. Furthermore, even if we have an angle of attack type of approach indicator, we will still check the airspeed indicator frequently during the approach because we know we can trust it."

Although there were some exceptions, this feeling appeared to be quite general among pilots. Some pilots did indicate, however, that they would not use the instrument even if it were installed because it would be a distraction and would take time which is needed to watch the other instruments.

As a result of these flight test evaluations, landing approach indicators of the angle of attack type were not installed on aircraft.

In 1954, further tests of instruments to control the angle of attack and airspeed during landing were made on B-47 aircraft. This time a more favorable response was obtained from pilots who indicated they might be able to make good use of such instruments. Improved dial displays probably contributed to this change of attitude.

Undershoot and overshoot accidents such as these is the reason behind the development of a better "approach for landing" indicator.

Since there was still a problem of panel space and, more important, a desire by pilots to have both airspeed and angle of attack displayed at one location on the instrument panel, efforts were accelerated to provide a combination airspeed-angle of attack indicator.

New Indicator

The result of this effort has been the "MAX-MIN" airspeed indicator which gives limiting maximum speeds in terms of Mach number and minimum speeds in terms of angle of attack as well as the usual IAS.

The indication of limiting maximum speeds has been incorporated in airspeed indicators for many years, since airplanes began to fly fast enough to encounter critical Mach number.

The minimum speed reference with respect to angle of attack is new. A sketch of this instrument is shown in the illustration. Actually, the new feature consists of more than a minimum speed index which represents the stall speed. In addition there are various moving indices showing optimum values including approach speed, all with reference to angle of attack. These indices are attached to a sector of a narrow ring about the outside of the instrument dial. This ring is moved by a tiny electrical servo in

response to angle of attack which is sensed by a remote mechanism. The conventional self-powered, case-contained indicated airspeed mechanism which has been so reliable for many years is retained.

The relative position of the indices is adjusted to the particular aircraft at the time it is installed. If the optimum conditions for a given wing are changed by flap position, then a tie-in must also be made to a flap position sensing element. No additional panel space will be required since the minimum speed indices are incorporated into the airspeed indicator dial.

During approach, the pilot has only to adjust his speed until the speed pointer is at the approach index (A). This index will be wide enough so that, if desired, the pointer can be held at the high speed edge of the index during the early part of the approach and the speed gradually decreased to the low speed edge of the index during the final stage. This procedure will result in flying at the optimum speed and angle of attack regardless of gross weight. The indicated airspeed scale will, of course, be retained in this range. The net result is that all the information required can be seen by a glance at this one instrument.

The angle of attack sensing element now planned for use with this instrument is the self-aligning vane mounted on the side of the aircraft. Although there is a need for better types of sensing elements, this type is considered to be the best available at this time. The exact type selected will depend on the aircraft on which it is to be installed. Extensive development and flight test effort is being expended in this area to obtain more conclusive data on the performance of present sensors and to develop better ones.

Speed Control

A few comments should be made about the "Landing Speed Indicator" or "Speed Control" which was discussed in the article "Taking the IF Out of LIFT," (FLYING SAFETY, April 1956) and which is being proposed for giving indications of proper landing speeds or deviations from proper landing speeds. These have been found, in flight tests, to provide a satisfactory indication to control aircraft approach speed. In particular, some of the instrument displays have been favorably received by pilots in comparison to the small size indicator of angle of attack. However, in evaluating these instruments for present and future use by the USAF, it must be kept in mind that these instruments have not introduced a new flight parameter having a peculiar significance or merit during landing approach.

The sensing element consists of a small vane protruding through the skin of the underside of the leading edge of the wing. This vane is displaced varying amounts by the airflow changes about the wing. This displacement is transmitted electrically to the computer. It is fair to consider these articles as devices which measure angle of attack. The accuracy with which they measure angle of attack can be made reasonably good for small ranges, say, for example, that required for the landing approach.

Accuracy decreases as the aircraft attitude departs from this particular angle of attack, the amount of error depending on the particular device, the gross weight and the installation. Use of such instruments to give the optimum angle of attack or speed over a reasonably large range of angles of attack does not, therefore, appear feasible. In other words, if this instrument is adjusted to give optimum approach speed, it would probably be inaccurate when used to give other optimum speeds or angles of attack. For this reason it appears preferable for most applications to install sensing elements designed to give accurate values of angle of attack over the complete range.

Flight Tested

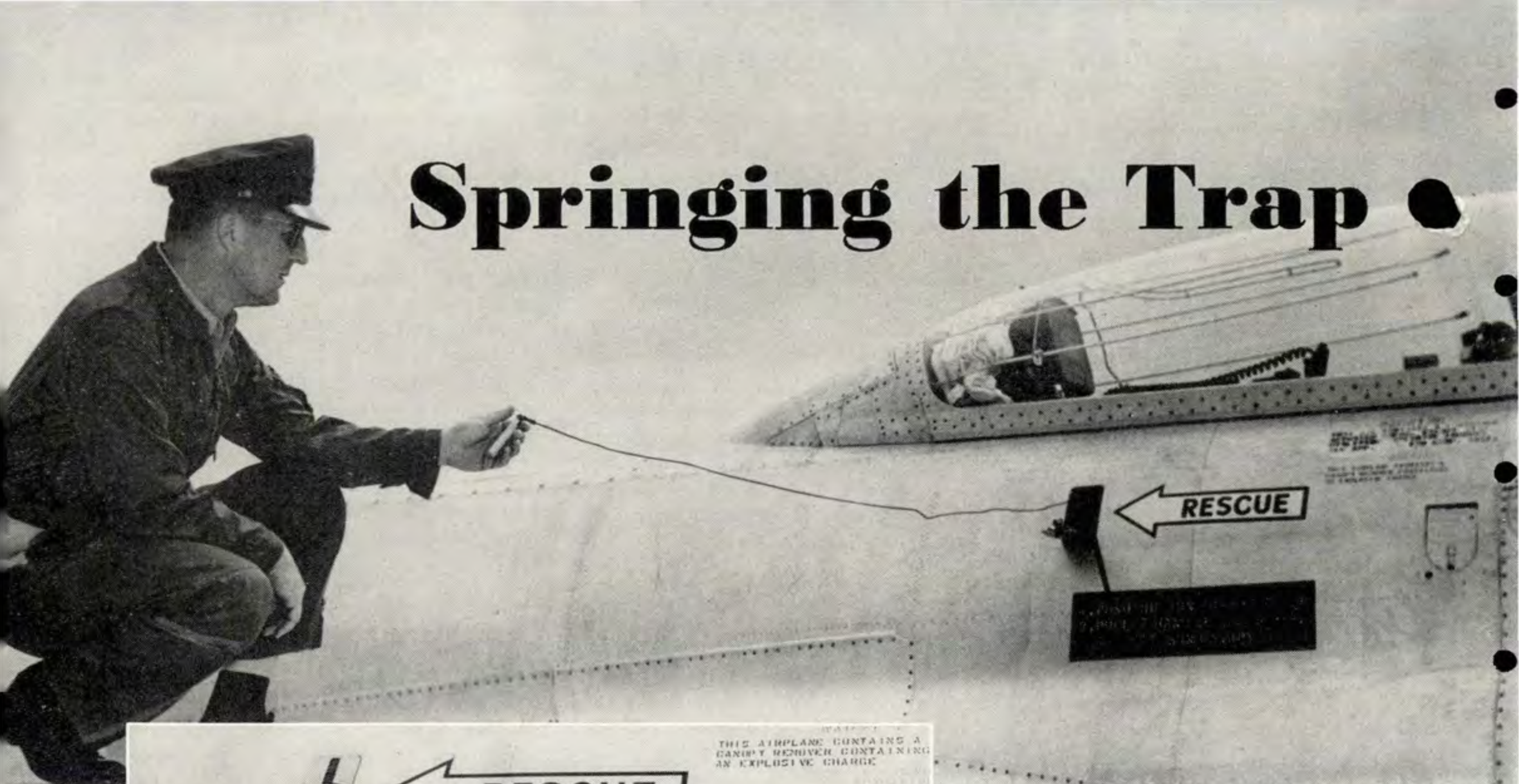
Last winter, the MAX-MIN airspeed indicator was flight tested at WADC. These first instruments have minimum speed markings to define the speeds for the downwind leg, the bleed down range, best flare, stall and most efficient cruise. Test results indicate that the first four of these values could be held effectively and consistently with the instrument. No flight tests have been made to verify the usefulness of the cruise control marker. These flight tests have provided the information necessary to determine the final characteristics to be built into the instruments.

Final assembly and adjustment of forty-six other instruments under contract can now be done. These instruments will be given extensive service tests by SAC and MATS.

It is anticipated that it will take some time and effort for pilots to learn how best to use and gain confidence in this angle of attack function. Initially, it is expected that computed approach speeds based on gross weight and allowance for G loads in turns will be used with the speed markers serving only as a double check and to verify present procedures.

Hopefully, the angle of attack method of control will prove in practice to be so convenient and generally superior that the more laborious method of computing the proper airspeed will be relegated to a standby status. Looking a little further into the future, it appears that these angle of attack functions can be integrated even more conveniently and naturally into the new experimental integrated instrument panel displays of the vertical scale type now being developed. ▲

Springing the Trap



WHAT! ANOTHER PIN!

As if we weren't already pin-happy, another pull-before-takeoff-type pin has been added to late series T-33s.

Beginning with aircraft serial number 53-5879 and subsequent, except 54-1522 thru 54-1583 and 54-2689 thru 54-2728, a gas initiator (with safety pin) for the external canopy jettisoning mechanism has been installed on the right wall of the rear cockpit above the console.

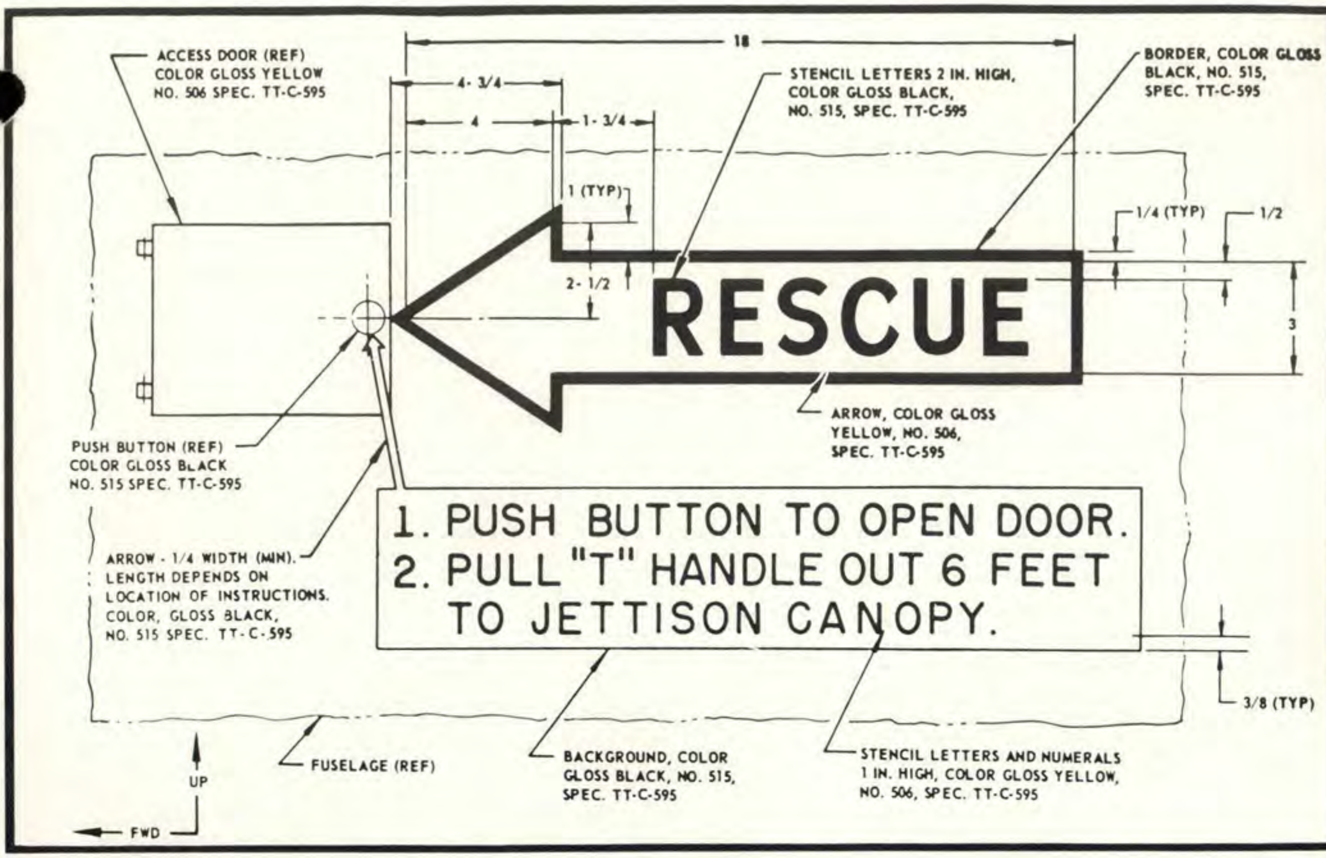
If the pilot or crew chief fails to remove the pin, it will be impossible to blow the canopy with the external lanyard. This could be serious in the event of a crash landing where the pilot is incapacitated and unable to blow the canopy from inside the cockpit. Since the pin is in the rear cockpit only, it is an item which can be easily overlooked by a pilot flying solo or when carrying passengers who are not familiar with the airplane.

Regardless of the pin-pulling procedures on your base—be it pilot or crew chief—be sure to include this pin in the "pin count" prior to taxiing out.

CAPTAIN Jim Flytype had just taken off from his home station in an F-86E. He was on an engineering test flight and while climbing through 15,000 feet, he noticed that his engine RPM was slowly decreasing. He turned back toward the base and checked the throttle to make sure that it hadn't slipped back from the full GO position. The throttle was forward all right but 75 to 80 per cent rpm was all the engine would deliver, and that was dropping steadily.

He could never make it to the field so he picked a dry lake bed.

Jim played the approach and just about the time he thought he had it made, he attempted to jettison the canopy. He pulled the armrest up but nothing happened!



Pictured above is an actual reproduction of the markings as prescribed by the Technical Order.

The '86 touched down in a slightly tail-low attitude, skidded several hundred yards and came to rest at about a 45-degree angle from the flight path.

Jim was dazed when the fighter finally stopped but he noticed that the canopy was still on the airplane. The jettison handle was up and he pulled on it again. Still nothing happened.

He turned on the battery switch and tried to raise it electrically but the canopy wouldn't move. Jim reached for the manual release and jerked on it. It refused to budge.

Seeing fire along the trailing edge of the flaps, Jim suddenly got that helpless feeling of being trapped. He turned off the battery switch, took off his chute and harness, stood up in the seat and pushed against the canopy with his back. The canopy resisted like a stone wall.

Smoke had now filled the cockpit and Jim had difficulty breathing. He hurriedly put his helmet and mask back on and switched the regulator to 100 per cent oxygen. The oxygen pressure gage read zero!

To get the pilot out, a by-stander busted the canopy with a camera.

Captain Jim Flytype became desperate. Rather than burn to death, he decided that he would attempt to eject himself through the canopy. He strapped himself back into the seat as fast as he could; fastened the chin strap of his helmet, tightened his belt and harness, put his feet in the stirrups, and squeezed the trigger. Nothing happened! (He didn't know that this bird had not been modified and was one of the series where the canopy must go before the seat will fire.)

Fortunately for Jim, his crash landing was seen by a pilot flying a trainer in the local area with a cameraman who was taking movies. When the pilot circled the '86 at low altitude, he could see Jim in the cockpit—the canopy still on and fire starting aft of the wings. He made a wheels-down landing near the crashed plane, and, using the 30-pound camera as a mallet, beat a hole in the canopy large enough for Jim to crawl through.

Within a few minutes, fire consumed the aircraft.

This may read like the plot of an old movie on a late hour TV program, but it is a true story and it happened in 1956.

The files of accident records contain reports where the pilot was not so lucky. The reports which are most disheartening are those about a pilot or a crewmember who lost his life because persons on the ground did not know how to use the external emergency release.

Being burned to death is not a pleasant thought. Probably this is one of the greatest fears of all animals (including human). Legends tell us that all animals are inherently afraid of fire.

National disasters have occurred when large numbers of people were trapped in theaters, night clubs, circus tents and hotels. The aircraft presents a greater hazard than do most structures, for it is normally loaded with large quantities of highly volatile fuel.

Aircraft designers have gone to great extremes to provide emergency exits and devices for getting people out of disabled airplanes. It is up to us to know the use of this equipment.

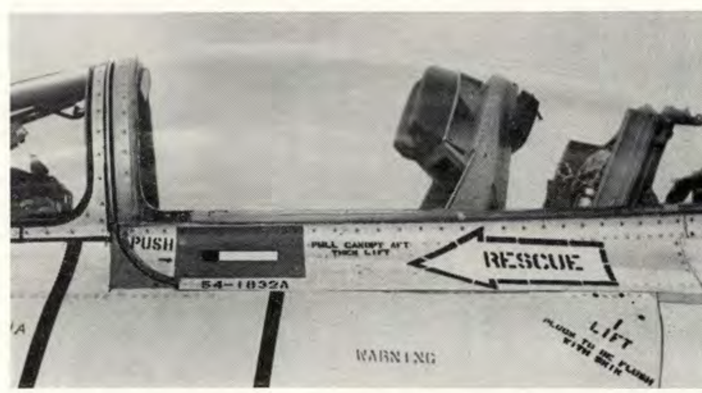
Normally, crewmembers are fairly familiar with emergency exit procedures for aircraft operated at their own base. But, how about the latest series transient aircraft? If an F-104 or an F-101 made an emergency landing at your base and was burning, and you were the first person to arrive at the scene, would you know how to blow the canopy? If you were the pilot of that burning aircraft, you would certainly *hope* that *somebody* knew how to remove the canopy, if you couldn't jettison it yourself.

In this connection, T. O. 1-1-636, Paragraph 3-86, dated 1 November 1956, contains important information to help ground crews locate the external canopy release. It lists the specifications for painting a large yellow arrow, pointing to the canopy release actuator. Yellow letters (one inch in size), explaining *how* to operate the system, are painted on a black background.

You can do much toward making the Flying Safety Program effective by seeing that this tech order is complied with on your base.

Operations might schedule frequent briefings of crash crew and maintenance personnel, crewmembers, air police and others working near the flight line. Each should know *what* to look for and *how* to use the canopy external release mechanism, in the event they are the first to arrive at the accident scene. One of the points often missed or misunderstood is that the external system is not a trigger action. The lanyard must be pulled and held—for 10 or 15 seconds. Give it time to work. It may seem like a long time.

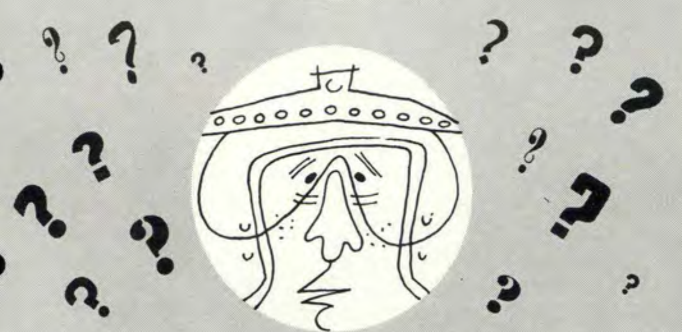
Base Flying Safety Officers can boost the program by inviting representatives of local community organizations (such as the fire, police and sheriff departments and the State Highway Patrol), to participate in a discussion about the use of this mechanism. Here, again, be sure that you explain explicity *what* to look for and *how* to use it. ▲



Shown here are two shots of the external release markings on the F-100A.

How Well Can You Remember?

If you miss more than four you had better check those back issues.



April (Flight Planning)

1. The letter "L" attached to a compulsory reporting point symbol in the Radio Facility Chart indicates a position report must be made only if you are flying below:
   (a) 15,200 feet.
   (b) 17,000 feet.
   (c) 29,000 feet.
2. When holding below 19,000 feet you are expected to hold at a true airspeed not to exceed:
   (a) 155 knots.
   (b) 180 knots.
   (c) 200 knots.
3. Contrails disappear when the tropopause is penetrated.
   (a) True.
   (b) False.
4. The heavy black line on the facsimile constant pressure chart is made for any wind velocity in excess of:
   (a) 50 knots.
   (b) 75 knots.
   (c) 80 knots.
5. The jet stream shifts:
   (a) Southward in winter.
   (b) Southward in summer.
6. With TACAN when you are directly over the station, the distance measuring indicator:
   (a) Will read Zero.
   (b) Will be inoperative.
   (c) Depends on altitude.

May (The Emergency)

7. A 15,000-pound T-Bird will glide as far as an empty one.
   (a) True.
   (b) False.
8. With a closing speed of 600 mph, head-on, with the approaching aircraft at 1.16 miles, you would have ....seconds warning, if you were looking straight ahead.
   (a) Five.
   (b) Seven.
   (c) Nine.
9. You are equipped with an automatic parachute and lap belt. The parachute will open automatically only if:
   (a) You open the lap belt manually.
   (b) Eject below 2000 feet.
   (c) Let the lap belt open automatically.
10. The F-1B timing device is set to open the parachute in ....
    (a) One second.
    (b) Two seconds.
    (c) Three seconds.
11. With the MA-5 and 6 automatic lap belt, it is impossible to close the belt without using the key.
    (a) True.
    (b) False.
12. On a GCA, the rate of descent varies with wind direction and velocity.
    (a) True.
    (b) False.

June (The Crew Station)

13. On some of the late model T-33s a safety pin for the external canopy jettison mechanism is located:
    (a) Above the right console, front cockpit.
    (b) Above the right console, rear cockpit.
    (c) None installed.
14. The latest instrument (Max-Min airspeed indicator) developed for use during the approach, also can be used during climb and cruise, and is based on measuring:
    (a) Lift over the wing.
    (b) Airspeed.
    (c) Angle of attack.
15. In a C-124, when a crewmember uses the interphone system, radio reception from outside is:
    (a) Not affected.
    (b) Completely eliminated.
    (c) Garbled.
16. The outside location of the external canopy jettison mechanism is marked by:
    (a) A large red arrow.
    (b) A large black arrow.
    (c) A large yellow arrow.

ANSWERS

1. (a)	5. (a)	9. (c)	13. (b)
2. (a)	6. (c)	10. (a)	14. (c)
3. (a)	7. (a)	11. (b)	15. (c)
4. (a)	8. (b)	12. (a)	16. (c)

REX SAYS

THE TOWER cleared me into take-off position for a local flight in an F-86F. I advanced the throttle and allowed the RPM to stabilize at 80 per cent. I then placed the emergency fuel switch in the ON position and advanced the throttle. The RPM hung at 84 per cent, then I heard a slight rumble. The RPM dropped and the tailpipe temperature went to 1000 degrees. I immediately stop-cocked the throttle, turned off all switches and evacuated the aircraft. The Fire Department put out the fire.

A check of the engine showed that the turbine buckets and nozzle diaphragm were subjected to extreme heat. The fuselage was burned through just aft of the turbine wheel.

REX SAYS*—So now you know about compressor stalls. Sometimes—as in this case—it helps to retard the throttle instead of advancing it. The clue is when it balks.*

RETURNING from a mission in an '86F, I was approaching the base from the southwest at 12,000 feet when a very definite power loss occurred. Throttle movement had no effect on RPM and tailpipe temp read 250 degrees. I thought I had a flame-out and stopcocked the throttle. At 10,000 feet, 22 per cent rpm and 190 kts, an airstart was accomplished. The tailpipe temp, however, wouldn't go above 250 degrees and the RPM wouldn't go above 22 per cent. Since I was in good position to make a flameout landing on the base, I stopcocked the throttle, advised the tower of my intentions and landed without further mishap.

I'll have to admit that my face was somewhat red when they told me later that my trouble was due to the main fuel control failure. They checked the emergency control and it was okay. I could have saved some gray hairs if I had just throttled back, switched to Emergency, and gone back into business.

REX SAYS*—You darned near made the team—the team that keeps pranging because they won't use the equipment they've got. This sounds something like the catcher dropping the ball on the third strike—! Your first strike: not using the emergency system. Your second: Stopcocking an engine that was doing something for you in preference to nothing at all. Your third: an unnecessary flame out landing. Head for the showers—but thanks for passing it on.*

★ ★ ★

ON BASE LEG gear check, the left main indicator remained in the unsafe position and the light in the gear lever remained on.

I called mobile to check my gear on a low pass. They said it appeared to be down and locked, but the gear doors were still open. Mobile told me to stay in closed pattern and pull the emergency gear lanyard on downwind.

I raised the wheels, flaps and speed brakes and made my pattern. The utility pressure was checked okay. On downwind the speed brakes, flaps and gear were put down. The left main still remained unsafe. Emergency lanyard was pulled completely out and the gear still indicated unsafe. The aircraft was yawed with no results.

I was advised to come in because the gear appeared down and locked. Final was hot in case the gear was not locked. Upon touchdown the left wheel folded. I applied full power, picked up the left wing and then the gear indicated safe. I leveled out and landed without further difficulty.

Been out of this world, Gridley?

REX SAYS—Good thinking. Bouncing's okay—but keep it hot till you know the gear is going to stay.

★ ★ ★

WE WERE ON an initial F-100 checkout mission. We got our clearance to roll, and turned 'em loose. Just as we were hitting 120 knots (in afterburner), a tug chugs onto the runway towing an 86H. He was dead ahead of us, and too close for us to leap. When he saw us coming, he increased his speed trying to beat us across. It was too late to abort, and that tug doesn't have jato. And they talk about race drivers.

Luckily, my student had enough room to go around without running off the runway. Had I continued down my side of the runway, I would have met the '86 broadside. I fell in trail with my student and took off about 30 degrees off the runway heading to avoid jet wash.

REX SAYS—It's enough trouble trying to keep debris such as nuts and bolts out of jet intakes, let alone tugs and '86Hs. You did an excellent job in missing the tug and airplane. Your base could stand to look at its airdrome traffic control procedures. Whatever happened to the light from the tower arrangement?

★ ★ ★

HERE IS a real way to get valuable cockpit time.

Take three pieces of paper and on one, make a sketch of every switch, gage, lever, lanyard, light, button and knob that you can find on the left panel, and label them "on-off," "up-down," and so on. If you can find a cockpit with the seat removed, it will give a better view of the rear panels.

Do the same with the front panel on the second sheet of paper, and the right side with the third. You need not be an artist, but do the very best you can so as to give fidelity to proportion and placement. It may seem like a big job, with a lot of gizmos to draw, but as you will find out, it doesn't take long. Once the drawings are completed, you will be amazed at how much you have learned about the cockpit interior.

REX SAYS—The above was suggested by the aggressive Flying Safety Officer of England AFB, Louisiana. Like he says, you will be amazed at how much you learn.

REX SPECIALS

A RECENT accident report stated that the pilot was unable to operate the night flare end of the distress signal, Mark 13, Mod 0. Since this is a signal designed to be used in time of emergency, malfunction thereof could greatly reduce a pilot's chances of being rescued. Here is a description of this vital equipment.

Signal, Mark 13, Mod 0, is a combination distress signal for use under day or night conditions. It can be carried conveniently in pockets of life vests, flight suits, life rafts or other survival equipment. It is particularly adapted for use by crewmembers downed at sea.

The signal contains an orange smoke canister in one end and a pyrotechnic flare pellet in the other. Both ends of the metal tube are closed by a soldered cap to which is attached a pull ring.

Upon removal of the soldered closing cap, a brass wire attached to the bottom is pulled through a small cup coated with a friction-igniting composition. This action results in igniting the pyrotechnic flare or the smoke composition, depending on which pull wire is removed.

Smoke emission time is approximately 18 seconds; flare burning time is 18 to 20 seconds. The soldered cap on both ends of the signal is covered with a paper cap to prevent accidental ignition. Also, each end of the signal is waterproofed and insulated against transfer of heat from one section to the other.

Use of the flare is simple. It consists merely of deciding which type of operation you want (smoke or flare) and pulling the ring. If this is too difficult to remember, there are pictures on the case, and you can't go wrong. One thing that some have found a spot tricky is the matter of deciding which end the flare is in. That one is simple too. It's under the dots. For the engineer in the crowd, the flare end can be identified by a series of embossed projections extending around the case approximately one-fourth of an inch below the closure. Now for a couple of "Don'ts":

• Don't aim the thing at your head. Hold it up and out. You want someone else to see the thing. And,

• Don't (to get overly simple) light both ends at the same time. Besides burning your eager little hand, only one end is good at a time: the smoke by day, the flare by night. It's the only time that either can be seen.

★ ★ ★

SEVERAL Operational Hazard Reports about ammunition links jamming the aileron controls in the F-86H are on file. In one instance, the stick locked several inches left of center. The pilot could move the stick to the left but each time it would jam in the same off-center position. Another report indicated that the ammo link chute for the upper left gun had fallen down, and 49 of the 50 links remained in the left gun bay.

REX SAYS—This is certainly an accident potential. Armament personnel, Maintenance crews and pilots should take a close look at this item to insure that an airplane is not lost due to ammunition or links jamming the aileron push rod.

Rex Says:

I WAS FLYING an F-86D. Starting a penetration from 20,000 feet, I noticed I had no speed brakes nor utility hydraulic pressure. When I reached traffic altitude, I slowed to 170 kts and lowered the gear. The main gear showed down and locked, but the nose gear indicated unsafe.

I reached for the emergency gear handle and pulled. The canopy immediately left the aircraft and I realized what I had done. The canopy lock handle is located slightly to the right of the emergency gear handle. One is a T-handle—other a hook.

***REX SAYS**—The lessons come hard sometimes. You've got to think, then look, then do. Don't trust to feel unless you have no other choice.*

★ ★ ★

I CALLED gear down on base leg but I didn't check my selsyn indicators as I was concentrating on not overshooting my final turn. I did not hear Mobile Control tell me to go around. However, I did see two red flares and started a go-around immediately. As I opened the throttle, I saw that the indicators showed my gear to be up.

The '86 settled momentarily and I felt the drop tanks scraping the runway. My airspeed was 140 knots at this time. I continued the go-around and landed without further difficulty.

***REX SAYS**—You were luckier than most pilots. During 1956, there were 251 USAF gear-up landings. Sixty-five of these were nearly identical to your case. The pilots called the gear down and locked, but they either did not put them down or didn't check them down.*

There were 251 gear-up landings during 1956.

dream about Flying-BUT DON'T....

FLY ABOUT DREAMING!

REX SPECIALS

I WAS NUMBER TWO in a flight of four F-89s approaching the base for a landing. My transmitter was out; however, I was receiving five by five. Just as I flared, the tower told me to take it around. As I pulled up and started to raise the gear, I noticed that the gear handle was already up. My next attempt was a normal gear-down landing. Thanks to an alert tower operator, I was saved from a head-up, gear-up landing.

***REX SAYS**—Kudos to the glass-box-boys. Your story is similar to many I've heard. The GCA troops are right in there too. Shows what can happen when everybody gets into the act: YOU CAN PREVENT ACCIDENTS. If the tower is screaming so loud, you can't hear your warning horn, listen to that boy. He's trying to tell you something.*

CROSS FEED

LETTERS TO THE EDITOR

Tiger Training

As a reader of FLYING SAFETY over the years, I would like to commend your very excellent product. The article entitled "Bail Out" in the February issue by Captain Harry Tyndale is particularly good. In addition to being readable and informative, it focuses on mental attitude and psychological conditioning — fundamental but often overlooked factors in aircraft accidents and incidents.

With reference to the article, "The Big Picture," in the same issue, I would like to take exception to the thinking exemplified by this statement: "Training must be directed toward the pilot of lowest proficiency rather than to the pilot of average or superior ability." Such a course of action can only produce a substandard fighter force. The payoff in air combat is to the winner. There is no second-place money. There must be a better approach.

A comparison of statistics in "The Big Picture" and those in the article, "Down and Locked" (also in the same issue), suggests that we may be asking too much of younger, less-experienced pilots; however, there may be an erroneous bias in that the newheads carry the load of the difficult, single-place, all-weather interceptions. The facts do indicate that the first few hundred hours of jet-fighter experience is the hump to get over.

Captain Tyndale's article suggests an area of profitable digging. Accelerate the Blue Flame program and let more of the old-brown-shoe Air Force earn their pay on the alert line rather than in the Gooney Birds and Baker—'scuse me—Bravo two fives. Phase the newheads in as they demonstrate capability.

Colonel Harry B. Allen
Chief, Tactics & Techniques Div.
Hq CADC, Ent AFB, Colorado

The policy of concentrating on the pilot of lowest proficiency is based on the theory that a flight, for example, is no stronger than its weakest member and that no combat capability is sacrificed by bringing the weakest man up to par. Thanks for your interesting observations. Anyone else care to comment?

Flying Safety on the Airways

I've just read "Flying Safety on the Airways," in the April issue and believe the article is excellent and one that definitely should not only be read by all but also should be incorporated into a booklet or manual on instrument flying procedures.

. . . From nearly four years in Flight Service there are points which I believe pilots tend to misunderstand. For example, in the past three months we have averaged about two or three near-miss reports per week.

To cite one instance, a commercial airliner cruising northbound on Victor 137 IFR and clearing at 14,000 feet, reported a near-miss of 25 feet with three jet aircraft over Palmdale proceeding southbound at 14,000 feet. This airliner was on an IFR hard altitude, 14,000 in the clear. The jets evidently were flying Victor 137 following the prescribed even altitude for a southbound heading. In my opinion, the only true protection airways offer for separation is when actual instrument conditions prevail all the way up as high as airplanes can fly and therefore all traffic is controlled. Because many pilots believe that an assigned altitude IFR airways gives them proprietary rights and protection at that altitude, it is my personal belief that they, the pilots, are not as alert to the dangers of collision as they should be. It is also my personal opinion that there is too little knowledge by military pilots of the operation of civil aircraft, particularly commercial airlines. As you know, military regulations always comply with the CAR and in most instances are more stringent and actually afford greater safety factors.

It is common practice, based upon reports from the CAA Aeronautical Center, Will Rogers Field, Oklahoma, for airliners to climb through an overcast, get on top and cancel their IFR clearance. This is perfectly legal under CAR. Air Force pilots may not fly over even a broken cloud deck on VFR clearance.

I also believe there is a great misunderstanding among military pilots as to the correct procedures for proceeding to an alternate and that the alternate as listed on the DD 175 is not copied by an ARTC Center and therefore not forwarded by the original center to the center of destination.

These comments are merely personal observations on points which I feel that the lax pilot does not fully understand. I think your article is accurate, concise and really needed.

Lt. Col. Harry N. Young
1229th AACS Sq (Flt. Svc)
Hamilton AFB, Calif.

Plans are in the mill to reproduce "Flying Safety on the Airways" under separate cover. Thank you for your comments on the subject. Here's hoping the article corrects some of the common errors committed.

Do-it-Yourself

As FSO for the 49th Fighter Bomber Wing, I felt the distinct need for a new and better flight safety bulletin board to replace the old "eye sore" in our base ops. I attempted to requisition a USAF type but found out it was no longer an item of issue, so decided to design one myself and have the Installations Engineer build it. The enclosed picture and plan are results of my efforts.

As designed, it will serve three purposes: (1) a flight safety and statistics bulletin board; (2) a magazine rack for other flight safety literature, and

(3) an attractive and interesting board that warmly welcomes flight crews on their arrival to base ops. Confidential information or statistics can be omitted by placing a card marked "Conf" in that slot.

This flight safety bulletin board in our base ops has attracted quite a bit of attention. I've had calls from FSOs at other bases asking for a copy of the plans. Probably they have had the same problem. I should like to offer the plans to anyone who wants to build this board. I feel that by publishing the picture and an item in FLYING SAFETY, anyone interested could write to the FSO, Misawa Air Base, APO 919 San Francisco, and I would gladly send them a copy of the plan. The only change necessary would be the wing and base designations.

I hope to hear from you soon.

Capt. Joseph F. Sanchez Jr
FSO, 49th F-B Wg.

One of the finest boards we've seen. Since receipt of this letter, Capt. Sanchez has been returned to the ZI. Perhaps the boys at Misawa can still answer questions concerning the bulletin board.

More Margin

Your excellent publication is so much in demand at this base that it is extremely difficult to keep reference copies on hand for more than a few days after it is received.

To alleviate this situation and to set up a reference library containing all publications for the year, we have been putting several issues aside for binding and display in our magazine and PIF file in base ops, and here is where the trouble starts.

The holes that we punch in Flying Safety Magazine need to be set so close to the edge that the paper soon tears and we lose the book. And if we set the holes in farther from the edge, we lose a portion of the article and, worse yet, the reader's interest, since he has to pry the pages apart to get at the printed material.

Please . . . give us about 7/16″ more margin to work with in binding . . . or, how about publishing the book with holes already punched?

Capt. Cornelius J. Klapthor
Asst Base Ops Officer
Hq 824th AB Gp, Carswell AFB.

Sorry, no can do. The established criterion for printing prohibits it. How about checking with your Librarian as to the possibility of binding the issues in book form?

Survival Training

Last February there were two accidents near this base which required the immediate use of survival equipment. Unfortunately, one pilot neglected to wear his exposure suit, was forced to bail out, landed in water of 32°F, and died from over-exposure. The other pilot was wearing his exposure suit but did not remember how to inflate the life raft. This, plus the fact that he could not swim, caused him to panic. Fortunately, however, a fishing boat picked him up shortly after he landed in the water. This pilot was an "old head" at the game but had not been re-briefed on the use of survival equipment.

These two accidents brought up the question, "Why the laxness in knowledge of survival equipment?" In a survey to find the answer it was discovered that 40 per cent of the pilots at this base were not sure how to inflate the life raft. Since most of our flying in this area is over water, this was a shocking discovery. The answer, of course, is the need for survival training for all pilots.

During the survey mentioned above, several interesting articles were found in past editions of your magazine on the proper use of personal equipment and survival information. However, in view of the incidents mentioned herein, the need for more articles on the subject of survival is evident. Much is being said about flying safety but survival seems to be forgotten by many.

Maj. W. H. Moore
Asst. for Safety, 39th AD
APO 919 San Francisco

'Tis shocking, all right, to read about that 40 per cent figure! A future issue of FLYING SAFETY will carry an article about the proper use of survival equipment.

Single Engine

The flight handbook on the RB-57 quotes a safe single engine speed of 155 knots. For the B-57B and C, a speed of 155 knots is also quoted. The B-57E handbook gives a speed of 120 knots with powered rudder and 160 knots without powered rudder, for a safe single engine speed.

The handbook further states that if you are on the final approach with all available drag produced and below 500 feet with safe single engine speed, or slightly lower, you are committed to land. In my opinion, this statement should be given a great deal of respect. If I find myself in this position with a little too much speed, in lieu of a go-around, I intend to full stop even with the possibility of proceeding off the end of the runway.

The B-57 has been operational now for more than two years. Experience has shown that an attempt at a single engine go-around can be highly entertaining; in fact, too much so in many cases. This letter is written in an attempt to get comment from other pilots through this magazine on the subject. I feel we should mix this one up for the benefit of all concerned.

Capt. Paul R. Pitt
Flight Commander
17th Tow Target Sq
Vincent AFB, Arizona

Your comments regarding single engine go-arounds in the B-57 certainly ring the bell. Records on file at the Directorate of Flight Safety Research seem to verify the supposition that too many pilots have taken the subject too lightly.

If there are any other B or RB-57 drivers who care to throw in their two-bits worth, we would like to hear from them.

Getting the Word

Jane Howard is illustrating the subject covered by the article, "What Did He Say?" on page six. Have you ever mumbled a word or two to your copilot, along with a frantic gesture and, in return, received nothing but a "This boy is trying to tell me something" look? If so, the article may set you straight.


Mal Function
MAL
Mal's assigned to ferry crew.
To him the crew chief is brand new.
They all take off in big iron bird.
For briefing, Mal says not one word.
On GCA Mal gets too low.
Calls, "Takeoff Power," they must go.
The crew chief did as he was told.
Took off the power . . . and Behold. . . .
MASTER
POWER SWITCH
ALL 6
ON
OFF
RUNWAY 1 MI.
. . . . . CRASH!