Interceptor

JANUARY 1968

ninth anniversary issue

FOR THE MEN RESPONSIBLE FOR AEROSPACE DEFENSE

Interceptor

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spotlight

A camel is a horse designed by a committee.

departments

special features

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Hq ADC Field Printing Plant
Ent AFB, Colorado

OUR COVER

We, the staff, pay homage to the men and women in the Command who have provided another year of aerospace defense while recording the lowest accident rate of any fighter command in history.

memo
from the CHIEF OF SAFETY

IN RETROSPECT

COL OLIVER G. CELLINI

During 1967, the Air Defense Command enjoyed the lowest major aircraft accident rate ever achieved by any major air command using fighter type aircraft. The overall accident rates of 4.4 and 4.5 per 100,000 hours flying time for the regular and Air National Guard units, respectively, were achieved while flying more than 280,000 fighter hours in F-89J, F-100C, F-101B/F, F/TF-102A, F-104A/B, and F-106A/B aircraft. In addition to the appreciable reduction in the rate at which accidents occurred, the reduction in the numbers of aircraft destroyed has been particularly gratifying. Only 14 of our century series birds ended up in the aluminum scrap pile last year compared with 24 in 1966. Also the *total* number of destroyed aircraft (16) in 1967 was reduced markedly below the 34 in 1966.

In the fatality category, similar reductions were made. Twenty-two of our crew members were fatally injured in aircraft accidents, 15 of these were in one EC-121 accident. Only one man was killed in an ejection attempt (too low and descending rapidly), while 14 made the decision to walk home, and made it. The fatalities, by type aircraft, are as follows:

T-33A (2)	Crashed during landing (non-ADC crew).
B-57 (2)	Aircraft stalled on final.
F-102A (1)	Fire warning light, lost control.
F-104B (1)	Aircraft disintegrated in flight (non-ADC accident).
F-104B (2)	Crashed during flameout landing.
F-106A (1)	Lost instruments—delayed ejection.
EC-121 (15)	Fire in flight—ditching attempts.

Our major accidents (minor accidents in parentheses) are as follows:

F-100	1 (0)	B-57	1 (0)
F-101	6 (1)	T-33	2 (2)
F-102	7 (1)	EC-121	1 (1)
F-104	2 (1)	U3A	0 (1)
F-106	5 (2)	C-54	1 (0)
	Total 26 (7)		

(Note: Aircraft not listed were accident free.)

While reducing the numbers and rates of accidents, it must be noted that our aircrews successfully coped with more than 2400 precautionary landings.

Another area of concern has always been support flying. These are the unsung heroes who work long hours and get little credit. Their job is not glamorous; it is just necessary for the total effectiveness of our operation. These aircraft (C-47, C-54, T-39, etc.) were flown more than 100,000 hours with only one major and one minor accident.

You may have noticed that in the above figures, I have combined the statistics of our fine ANG units with those of our regular units. And well they should be. The day of the "Weekend Warriors" of years ago has long since passed as evidenced by their continued increase in effectiveness and decrease in accident rates (6 major accidents and 1 fatality).

The credit for this outstanding accomplishment must go to the commanders, supervisory personnel, crew members, as well as all the support people. I strongly recommend that we not rest on our laurels. Our 1968 goal is to improve our record of 1967.

HOT LINE

U-3A SURVIVAL KIT

The 456th Fighter Interceptor Squadron at Castle AFB has come up with what we think is a handy survival kit for the U-3A. Other units flying the "Blue Canoe" may find this a useful life support addition, so here's the lowdown on construction and contents.

The metal container is easily fabricated in the sheet metal shop, using either aluminum or galvanized metal. Lid latches can be obtained through supply stock channels. The dimensions are: 12 inches long; 8 inches wide; 8 inches tall. The completed unit is secured to the shelf in the rear of the aircraft by "J" bolts and a battery clamp bracket, as shown in the photograph. Installation of the kit does not cause a change in weight and balance.

Contents are:

- 1 Signal Mirror
- 3 Boxes of Matches
- 1 Survival Manual
- 1 Whistle
- 3 MK 13 Day-Night Flares
- 1 Signal Kit A/P25S-1 (Pengun Flares)
- 1 Beacon URT-21
- 1 Transceiver RT-10
- 2 General Purpose Rations
- 1 First Aid and Survival Kit
- 1 Snake Bite Kit
- 1 Btl Insect Repellent
- 1 Wrist Compass
- 1 Finger Saw
- 1 Plastic Canteen
- 1 Dye Marker
- 1 Fishing Kit
- 1 Sunburn Ointment
- 1 Strobe Light SDU-5/E
- 1 Pocket Knife
- 2 Pr Wool Socks
- 1 Candle

Thanks to the 456th for passing on the word.

MORE ABOUT ICING

An EB-57A departed a base in the "banana belt" and climbed to 33,000 feet. After 15 minutes at this altitude, the pilot noted a 500 lb/hr fuel flow fluctuation in the number one engine. The fluctuation stopped momentarily when the throttle was retarded. When it began again, the fluctuation increased to 1000 lb/hr accompanied by a 2 percent engine RPM fluctuation. Additional power reduction was followed by a flameout. Two airstarts in the normal system were attempted at 16,000 feet and 14,000 feet without success. An airstart in the emergency fuel system proved successful and an uneventful landing was accomplished. After the landing, the number one engine was switched back to the normal fuel system and it operated normally.

Investigation revealed that there was excessive water in the left wheel well fuel filter. It is suspected that the water froze and obstructed normal fuel flow to the engine. Remaining fuel in the aircraft was not contaminated and all other components of the fuel system checked out normally.

That old devil "ice" is still at it, and always will be unless someone invents a foolproof water sponge for aircraft fuel systems. But until that joyful day, let's remember that we can save ourselves anxious moments at altitude if we check the fuel sump drains on the ground. Don't be a victim of "ice folly"!

P.S. T-33 jocks take special note. We've been reading a lot of messages on suspected icing incidents in the T-bird. Be absolutely certain the fuel sumps have been drained before climbing in the "pit."

come fly with me

Formation may be described as the art of maneuvering an aircraft into a position of close proximity to another aircraft for show or tactical, emergency or practical purposes. Notice the usage of the word "art" which, according to Webster, suggests skill in performance acquired by experience. To stretch the thought trend to a logical conclusion, let's add that formation is an art which requires skill, which in turn is acquired by experience, which in turn is gained through repetition, which is called training.

In contrast to the noble aspirations contained in the above definition, there are two expressions which are frequently tossed about in conversations on the subject of formation. "He's a natural formation pilot" and "The mission doesn't require it" are perennial favorites. Both statements are loaded with dangerous, false beliefs.

In reality, the only natural thing in formation is the increase in PSI output of the adrenalin pump as the distance between airframes decreases. If you don't believe it, ask any RIO about the gasp-per-minute increase on a formation mission. It's hard work until proficiency reaches a point where the crew chief doesn't have to pry your fingers from the stickgrip and throttle after landing. And a few "square-filling" flights per quarter won't make the fingertips any more nimble. Sure, it's easy enough to pair up and tear off into a sun-filled sky or even join up on top of the overcast; then hang in there without too much bouncing around for a half hour or so, and terminate the exercise with several low-go-show approaches to be followed by a split-up and separate GCAs. There are a lot of "natural" formation pilots around who can handle themselves with expertise under these circumstances. But how many of the natural types can "formate off" into a 400 foot overcast, climb through twenty thousand feet of murk dark enough to use instrument lights, then come back down for a low vis formation landing? That takes experience and proficiency. This is not to say that old heads with the most experience make the best formation pilots. It's not necessarily so. Just as it is true with instrument flying that rust sets in rapidly between infrequent practice sessions, so also with formation. If there is an advantage gained through experience, then it comes through an extended learning process whereby certain tricks of the trade are picked up along the way.

Although one "fright flight" is worth a thousand words, it's not the recommended method for gaining experience since the outcome is usually in doubt until touchdown. The only sensible approach to increasing experience and consequently skill level, is to fly formation frequently, that is to say every time the opportunity presents itself. The more difficult weather conditions should be attempted gradually and in increments of severity. Those weather conditions which are hazardous to single aircraft operations are obviously no less hazardous to formations. Discretion is the better part of professional pride when there is a question as to whether skill available is sufficient to cope with a particular situation where heroics aren't required. Eventually, good judgment, patience, and perseverance will pay dividends. A sweat-filled goatskin is an indication that more effort is required. Proficiency goes up in direct proportion to the diminishing size of the sweat stain. Keep in mind that the only "natural" formation pilots are of the feathered variety and, come to think of it, they practice every day.

Whenever the statement is made that the mission doesn't require formation proficiency, it ought to be apparent that the reference is to filling semi-annual training requirements. Being a combat-ready fighter pilot should mean more than meeting training minimums. Formation is part of being a fighter pilot and it does have mission applications. What is the most expeditious method of launching a large number of aircraft under a flush condition? How can armament be launched accurately when the FCS has crumped? How can weather be penetrated safely when the radios are out, the attitude indicator is spinning, or the navaids are pointing to the moon? What is the quickest way of emptying a holding pattern which is crowded with "minimum fuels"? It's true that these examples do not represent normal circumstances in the day-to-day operations of a squadron. But that doesn't make them any less important. Most pilots get into difficulty because of inability to handle the unexpected. Why not be prepared?

Formation ability is a valuable asset to the individual pilot not to mention the boost it gives to unit pride and morale. What better sight is there to see than a parade of fighters smoothly feeding onto a runway and taking off in pairs with flawless precision? The qualified observer is quick to praise or criticize because he can see with his eyes a representation of that unseen quality known as skill. There's nothing more depressing than having been in a "same day, same sky" formation circus and getting heckled for it. On the other hand, the gait is a little crisper and the conversation a little livelier after putting on a public demonstration of the way it should be done. There is something personally rewarding about maneuvering in harmony with another aircraft.

The unit pride developed through formation proficiency has been known to favorably affect overall performance in mission accomplishment.

There are three essential elements of knowledge which make formation not only feasible but safe. Without them it becomes an occupational hazard. The first of these is standardization, a dirty word to some, a life saver to others. Standardization establishes the rigid ground rules for the orderly progression of events from start engines to shutdown.

Imagine the chaos which would result if every pilot was left to his own designs on join-ups, aircraft positioning, cross-over techniques, day and night visual signals, lost wingman procedures, etc. This is basic knowledge and must be possessed if such a thing as flight integrity is to be preserved. USAF and major command publications contain procedures which have been established for wide application. Base local operating procedures have an important function in the standardization concept because of the operational differences which exist at various bases within a given command. Channelization sequence, weather minimums, and traffic patterns are but a few of the areas involved and are published in local supplements to the command series, such as the ADC 51-series. Theoretically, if all pilots were thoroughly familiar with all of these procedures, then mission briefings need only consist of those items which the leader considers essential for a compiete understanding of mission objectives. Unfortunately, this is not the case, and briefings usually consist of lengthy discussion on those apsects of formation which should be considered basic knowledge.

Aside from procedural knowledge, there is a little thought of and less acquired knowledge which is also necessary, especially in close formation. It's called cockpit familiarization. Formation often requires reaching for switches without being able to take your eyes from the other aircraft for more than an instant. It also requires a visual check of instruments occasionally, where no more than a quick glance is safely possible. Much frustration and porpoising are experienced when the correct switch can't be found or the correct instrument spotted. One natural tendency is to delay switch activation and gauge check for a more opportune moment. That usually results in the action being forgotten, to be followed later by an unexpected blow to the nervous system. Another tendancy is to make a hazardous but brief cockpit search. That usually results in a mid-air collision. The whole mess can be avoided by knowing in advance where to reach or look. There is small margin for error in formation and it can be measured by the distance between canopies.

Directly or indirectly, the breach of air discipline has contributed to more formation accidents than any other cause factor. Air discipline provides the control necessary for safe and efficient formation flight. Overall control is the responsibility of the flight leader. Self-control is the responsibility of each of the individual flight members. The leader must insure that he does nothing which will put the flight in jeopardy. He must fly his aircraft in a manner which is not beyond the capabilities of his least experienced wingman. In close formation, he is the eyes and ears of the entire flight. He must pass instructions to his wingmen by precisely executed visual signals or correct voice transmissions. A misunderstanding can lead to an accident. Wingmen have the obligation to follow the instructions of the flight leader without exception. Skylarking or other maneuvers unauthorized by the leader are reckless and create hazardous situations. A leader should never have to worry about where his wingmen are or what they are doing. Precision teamwork is the product of a well disciplined flight, and a well disciplined flight will never get into trouble.

Standardization, cockpit familiarization, and air discipline are essential elements for good, safe formation. Without them, it's a potentially hazardous endeavor and only a matter of time before someone becomes involved in a mishap. With them, all that remains is the development of skill through repetition or training. This process involves hard work and concentration, no less than acquiring instrument proficiency.

Sometimes, the effort required is compounded unnecessarily by misunderstanding, poor judgment, or poor technique. It is most noticeable in the following areas:

The Takeoff. Formation takeoff requires precise timing between leader and wingman. Generally, the leader, by his actions at the beginning of his takeoff roll, influences the reactions of his wingman. If his actions are too quick, the wingman is caught with his "g" suit down. If they are too slow, the wingman is apt to anticipate excessively. Both situations result in a yo-yo takeoff roll.

Another tendency on the part of a leader is to pay too much attention to the wingman's position during the roll, usually at the expense of aircraft control. This results in erratic directional control and excessive speed at liftoff which, in turn, forces a rapid grab for sky and a hurried cleanup of the bird. It's the best way to trap the wingman's nose gear in the Voodoo.

If two aircraft are excessively mismatched, the most difficult situation exists when the wingman is overrunning the leader. The use of speed brakes as a drag device is undesirable because at the lower speed range they are not effective and at the higher speed range their activation can adversely affect aircraft performance at a critical point, such as liftoff where over running is generally most pronounced. Coming out of afterburner is equally undesirable for the obvious reason that it may not re-light. The safest procedure is to allow the wingman to take the lead. If weather permits, then positions can be reversed after the birds are cleaned up. Otherwise, the wingman should keep the lead until once again VFR.

The Leader. A frequently quoted statement is that a good leader is one who has been a good wingman. It means that he has spent enough time in the number two slot to appreciate what it's like to be on the wing of a ham-fisted, inconsiderate leader. He considers as just so much rubbish the philosophy that "if you can't hack it, back to training status." He knows that anyone can shake a wingman loose by erratic maneuvers. In other words, he believes in flying his aircraft in a manner that will give wingmen every opportunity to "hang in there." This means accepting a small overshoot or undershoot of altitude or heading instead of an abrupt level-off or steady-out in weather. It means keeping enough airspeed and power so that the wingman doesn't have to use speed brakes and idle power to keep from overrunning. It means calling for checks that can be accomplished before entering weather, not after. Keeping in mind the basic purpose of formation — togetherness, the leader who doesn't lose wingmen is doing his job skillfully.

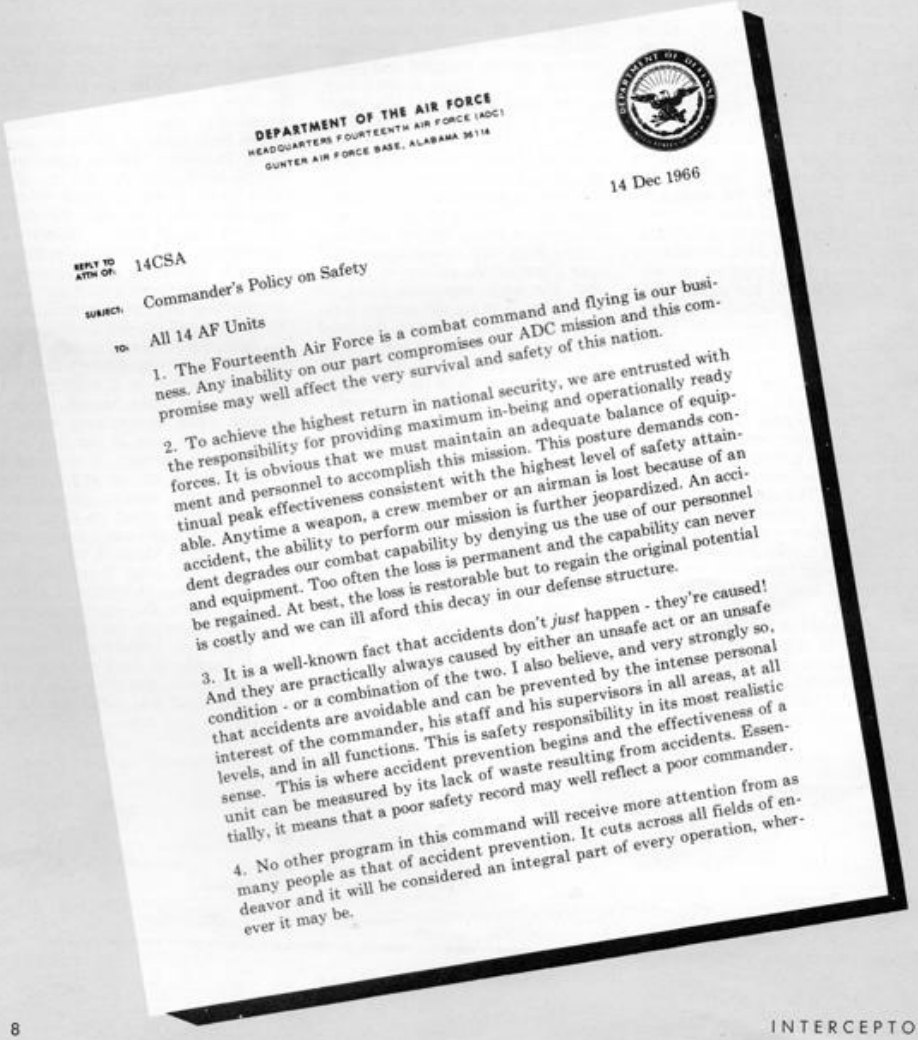
The Wingman. Concerning spread type formations, suffice it to say that the most important thing to remember is to fly the correct position. That means keeping the head and eyes out of the cockpit and on the leader. It's not at all difficult to catch a wingtip in the ear during a fuel check. It has been done!

Excluding combat considerations, the most difficult formation to fly is close formation. Day or night, heavy weather conditions present a strong challenge to the intrepid wingman. When the going gets too rough and tough, it's sometimes wise to break off and go it alone. This, in itself, presents a hazard, however. Chances are that while attempting to stay on the wing, little or no thought is given to aircraft attitude. At the time the decision is made to break off, the aircraft attitude is unknown. Transition from visual reference of the lead aircraft to the cockpit for instrument interpretation is made by a rapid movement of the head and eyes. The combination of unknown attitude plus rapid head movement is ideal for the onset of (you guessed it) vertigo. The delay caused by mental confusion can result in either a mid-air with lead, or an unusual attitude from which recovery is unlikely. The situation develops primarily in cases where proficiency is low, regardless of experience level.

The most advantageous wing position in weather has probably been discussed over a pair of matched martinis as often as any other topic on flying. And to say that emotion frequently replaces straight thinking might be considered an understatement. However, cautious agreement can be reached on the fact that the wing position for a fly-by is not necessarily the optimum for weather. The usual rule of thumb for maintaining uniform show position is to line up two or more reference points on the leader's aircraft, stack slightly low with wingtip clearance. In thick weather, this technique is unsuccessful because there are times when the only visual reference with the lead aircraft is a wingtip light and that has been known to disappear while maintaining wingtip clearance. In spite of the fact that there are a number of successful techniques for staying in formation under dense weather conditions, some wingmen insist on flying the show position and can't understand why they have to break off.

Like a few other things on this planet of ours, formation is habit-forming, once the nervous system is able to overcome the initial shock of exposure. Sometimes it's too much trouble to keep on a steady formation diet. But who said being a fighter pilot was easy? An RIO, maybe? ★

14th Air Force Commander Speaks



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS FOURTEENTH AIR FORCE (ADC)
GUNTER AIR FORCE BASE, ALABAMA 36114

14 Dec 1966

REPLY TO ATTN OF: 14CSA

SUBJECT: Commander's Policy on Safety

TO: All 14 AF Units

1. The Fourteenth Air Force is a combat command and flying is our business. Any inability on our part compromises our ADC mission and this compromise may well affect the very survival and safety of this nation.

2. To achieve the highest return in national security, we are entrusted with the responsibility for providing maximum in-being and operationally ready forces. It is obvious that we must maintain an adequate balance of equipment and personnel to accomplish this mission. This posture demands continual peak effectiveness consistent with the highest level of safety attainable. Anytime a weapon, a crew member or an airman is lost because of an accident, the ability to perform our mission is further jeopardized. An accident degrades our combat capability by denying us the use of our personnel and equipment. Too often the loss is permanent and the capability can never be regained. At best, the loss is restorable but to regain the original potential is costly and we can ill aford this decay in our defense structure.

3. It is a well-known fact that accidents don't *just* happen - they're caused! And they are practically always caused by either an unsafe act or an unsafe condition - or a combination of the two. I also believe, and very strongly so, that accidents are avoidable and can be prevented by the intense personal interest of the commander, his staff and his supervisors in all areas, at all levels, and in all functions. This is safety responsibility in its most realistic sense. This is where accident prevention begins and the effectiveness of a unit can be measured by its lack of waste resulting from accidents. Essentially, it means that a poor safety record may well reflect a poor commander.

4. No other program in this command will receive more attention from as many people as that of accident prevention. It cuts across all fields of endeavor and it will be considered an integral part of every operation, whatever it may be.

5. The functions and activities described in various safety directives, prevention programs, and plans are not novel. Safety is still a command responsibility - but it does require the personal interest and participation of every officer and airman in this command. If this individual officer or airman happens to be a supervisor of an individual involved in an accident, his supervisory responsibilities for safety are multiplied and paramount as far as that accident is concerned.

6. One point I want to make clear is that my primary concern is not safety just for safety's sake — but the acceleration of mission accomplishment through increased operational readiness. The basic blueprint for safety lies with understanding it. I personally subscribe to the philosophy that safety is an integral part and product of an efficiently planned, supported, and executed mission.

7. All this boils down to one simple word - professionalism. Professionalism is the key to any safe operation. It means doing what you are supposed to do, when you are supposed to do it, and in the way you're supposed to do it - the right way. This is realistic safety — the kind of safety that results from professionalism — "professionalism" by all — and at all times without let-up.

Walter B. Putnam

WALTER B. PUTNAM, Maj Gen, USAF
Commander

Major General Walter B. Putnam is commander of the Southern NORAD/CONAD Region and Air Defense Command's Fourteenth Air Force, headquartered at Gunter AFB, Alabama. In this position he is charged with the protection of all or part of a twelve-state area in the southeast and southwest United States against aerospace attack.

Still active at the controls of the Air Force's most modern and fastest aircraft, he has flown a long line of aircraft starting with the Curtiss P-6.

Major General Walter B. Putnam

THE AIRCRAFT TIRE

We felt that a presentation on the History of the Aircraft Tire would be interesting reading to those who have in one way or another contributed to the wear, tear, and destruction of aircraft rubber tires, and to all of us who depend on their reliability. For this we turned to a company who pioneered in the development of aircraft tires, the Goodyear Tire and Rubber Company of Akron, Ohio. The article was furnished by the Company with special acknowledgement to Mr. Charles F. Bush, manager of tire development for Goodyear.

Airplane tires are not much to look at. They are round and black, just as they've always been. Care and maintenance are handled "by the book," and they seldom come up for discussion at pilot or crew chief bull sessions.

Yet the tires used on today's jet fighters and bombers are one of the marvels of modern aviation. Compared with older models, they are as radically new and different as the airplanes themselves.

As airplane weight has increased from 2,000 pounds to several hundred thousand pounds, tires capable of handling the heavier weight have been developed, even though they are still built with the same basic ingredients used when the first pilots pushed back their goggles, loosened their scarves, and proclaimed that landing skids just weren't getting the job done.

This has been accomplished even though some tires have had to be made smaller so they can fit in the smaller wheel wells designed into planes to permit greater speeds.

The story of the airplane tire deserves a prominent place in the history book of aviation.

The first tires used on airplanes were bicycle tires.

This was a beginning, but not a very good one. Bicycle tires had a disturbing habit of separating from the rim under the impact of landing, even though they often were glued on the rim before takeoff.

The first tires built specially for airplanes came from The Goodyear Tire and Rubber Company in 1909. Mated to a special bolted rim and built with wire in the base, or bead, the tires stayed in place.

When a leather tread was added, the tires also gave good resistance to punctures, a major benefit at a time when planes could be seen landing in all types of fields, often by necessity rather than choice.

By 1910, the company's airplane tires were being manufactured in five sizes, to fit Wright, Curtiss, Martin, Farman, Bleriot, Antoinette, and other pioneer planes.

The first major test of the new airplane tire's durability came in 1911 when Calbraith Rogers flew from Sheepshead, N.Y., to Pasadena, California. Although actual flying time was just a bit more than three days, the trip required 84 days and 63 landings to complete. The tires performed extremely well, by 1911 standards.

The next spectacular improvement in tires didn't come until 1928.

Aviation had given a sneak preview of its value in World War I, and in the decade following the war, the industry experienced a rapid growth. Barnstormers, using surplus military planes, interested thousands in flying. Commercial airlines started springing up in all parts of the country, quickly graduating from single-engine to multi-engine aircraft.

As planes became larger, heavier, and faster, major problems developed in ground handling. Hopping, bouncing, ground loops, and nose-overs became common. Tires then in use were just too rigid to permit airplanes to operate safely and efficiently from the still primitive airports.

To solve the problem, Goodyear developed the Airwheel, a puffy, doughnut-shaped tire that introduced several aviation tire engineering principles that are still in use today.

The Airwheel was mounted on the wheel hub, eliminating the need for a wheel. This meant a very wide tire could be built for good flotation without increasing landing gear weight. Also, the Airwheel featured low inflation pressure of only 10 to 15 psi, compared with the 65 to 90 pounds required in older type tires. This allowed the Airwheel to take the shock out of hard landings and take the bounce out of takeoff and landing rolls over rough ground.

Since development of the Airwheel, there have been many other significant improvements in aviation tire design and construction. But since most of these have been internal, they are not so easily recognized.

"Evolutionary instead of revolutionary," is the way Goodyear's Aviation Products Division describes them.

Most of the improvements have

been triggered by plane speed and weight increases, especially among military aircraft. Today's military jet airplanes operate at speeds two and one-half times those of the first military jets used near the end of World War II. Those early jets had landing speeds of 120 miles-per-hour. By the end of the Korean conflict, speeds were up to 200 mph. Today, 250 mph at take off is common and 300 mph takeoff speeds are experienced.

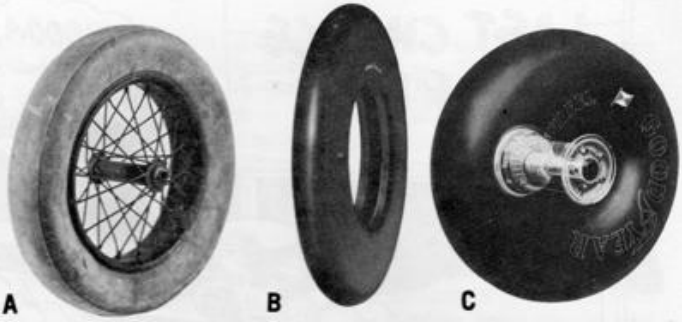
Upgrading tires to handle these high speeds required a great deal of thought and design experimentation by tire manufacturers. Centrifugal force acting on one ounce of tread on a 30-inch tire creates a force equal to 500Gs at 100 mph. At 200 mph, the force rises to 2,000 Gs. At 300 mph, it is equal to 4,500 Gs.

A good example of the way the speed problem has been handled is found in Goodyear's new deep skid tire being evaluated on the F-100 and the F-106 by ADC. A special filamentary reinforcement placed in the tread and combined with better rubber compounds makes possible nearly twice as many landings between tire changes.

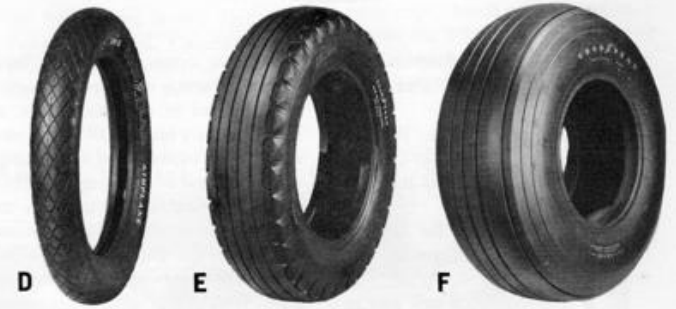
To handle the tremendous weight of today's planes, tire manufacturers have used a variety of techniques. The use of larger fabric cords — but fewer of them — in tire plies has helped increase strength without increasing tire size or weight.

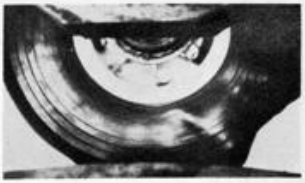
In addition to improved design, improved testing procedures have played a big part in making airplane tires safe and dependable. When Goodyear built its first airplane tire, testing consisted of dropping the tire from the top of a three-story building to see if it could withstand the shock of hard landings. Today, testing is accomplished on a $2-million, multistage dynamometer that allows research engineers to duplicate nearly all operational conditions of taxiing, takeoff, and landing by varying load and speed, and including yaw and camber. High temperatures resulting from supersonic speed also can be simulated.

Airplane tires, like the airplanes they serve, are in an almost constant state of change. But the objective is always the same: safe takeoffs and landings and long service life with a minimum of maintenance.



The shape of things in airplane tires — and how that shape has changed — is revealed in this series of photos. Photo (A) shows a tire of the type used on the first military aircraft. The 20 x 4 tire was built about 1911. The very slender Streamline tire (B) came in the early '20s and was designed to reduce drag in the pre-retractable gear days. Goodyear's ultra-low-pressure Airwheel tire (C) mounted directly on the hub. Introduced in 1928, it provided high flotation and smooth operation on the rough, often muddy sod fields of the day. The All-Weather tire (D), introduced in 1929, featured a diamond tread pattern. Few early airplane tires had a tread pattern. But the advent of aircraft brakes made the tread pattern important. The diamond pattern was retained on the shoulder of the post-World War II tire (E), but the rib tread was proving its worth. The modern tire (F) has a wider tread than its immediate predecessor. Also, there have been many changes in the tire's internal construction to make it longer wearing and more dependable.





Centrifugal forces acting on a tire increase greatly as airplane speed increases. This high speed photo of a tire on a test wheel shows the tire recovering its shape after contact with the ground.

"Wedgebottom, since when don't we secure the gear doors after a tire change?"

"Gee, Sarge, I forgot. But no sweat, the boys at the Last Chance Corral would have picked it up, if the pilot didn't!"

"Wedgy Boy, fasten the skirt to the strut or I'll fasten you to the flagpole!"

All is well that ends well and in this hypothetical situation, it can be said that timely supervision nipped a potentially hazardous situation in the bud. If we could ask ourselves how often in the past year alone has the correct application of supervision saved the day, the answer would probably stagger the imagination. But probabilities don't establish statistics, and the statistics we can sink our teeth into point out what should have been done and not what has been done successfully. It would be more meaningful, then, to ask ourselves how often in the past year has the absence of proper supervision resulted in the loss of life, a bent bird, or a busted ORI? The answer can be easily found in a variety of reports and even in our own personal experiences. No one has to put on a full court press to convince us that correct and timely supervision is necessary on a day-to-day basis. With that in mind, there is obviously no place to go but up.

But wait! Let's throw a hooker into the game and ask ourselves to what degree is supervision effective. Can we attain our highest goals and standards solely through the vehicle of supervision, or is it necessary from time to time to substitute some other management device in order to achieve that elusive, last bit of perfection we seek? Although great strides have been made in reducing the accident rate during recent years, it appears that steps are being taken in the latter direction.

Shortly the Last Chance Inspection will become the law in ADC land. This is the procedure where a last minute maintenance inspection is made on aircraft just prior to taxiing onto the active runway for departure. The purpose is to detect any malfunctions or discrepancies which may have gone unobserved prior to taxiing or which may have developed during taxiing. Several units in ADC have been using this procedure for some time and with satisfying results.

The Last Chance Inspection in no way reduces the responsibility of the crew chief and pilot in performing preflight inspections, or the mobile control officer in performing a final visual check on departing aircraft. In this regard, it can be said that the Last Chance Inspection is redundant. Redundancy has a tendancy to grow out of proportion as

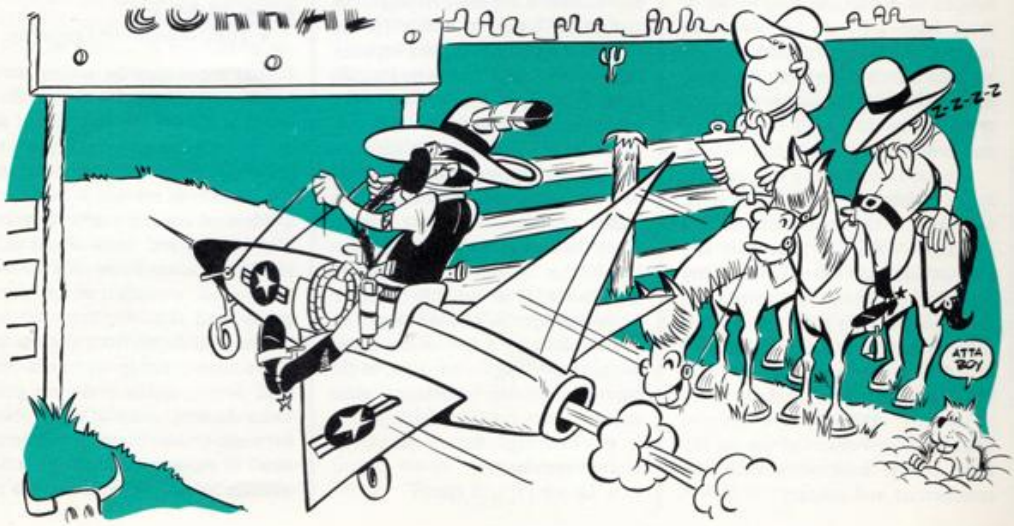
evidenced by the fact that we have so many regulations with supplements to supplements. This is in contrast to the concept of doing things right the first time. Why, then, is a check and doublecheck approach being advocated for flight line activities?

Proponents of the Last Chance Inspection believe that every effort which can be made toward eliminating accident potential is vital to our defense posture. Shortages in trained personnel, combined with an extensive OJT program and an aging interceptor fleet, have created a heavier-than-ever workload for supervisory personnel. As a result, supervision is being spread too thin from a safety point of view. With every aircraft lost through negligence or oversight, there is an uncorrectable reduction in our ability to perform the mission effectively. Replacement aircraft are not forthcoming in the predictable future. Necessity dictates that we preserve our resources in being. The Last Chance Inspection is designed to do just that.

Those who oppose Last Chance do not disagree with the obvious objectives of the procedure. The difference of opinion occurs as to the method which should be used in achieving the objectives. Since no less responsibility is required of crew chiefs, pilots, and mobile control officers, and if unacceptable standards are present, then corrective measures should be applied at the source of the problem, namely the flight line and/or operations. Increased vigilance on the part of supervisors and a keener sense of responsibility on the part of all concerned will produce the desired results prior to aircraft leaving the chocks. Between the chocks and take off position, clean taxiways and an observant mobile control officer are the necessary safety ingredients. Adding the Last Chance Inspection merely divides responsibility four ways instead of three.

Regardless of which point of view we hold, there is one fact which can't be denied. Careless or improper ground procedures have, in the past, caused airborne incidents and accidents. Otherwise, there would be no requirement for additional safeguards. ADC is taking positive action to correct the situation. If we believe in protecting our operational resources, we must give our fullest support and cooperation.

There is a danger, however, which, should be recognized and avoided when expanding a check and doublecheck system. Our opening flight line drama describes what can happen. We cannot become complacent or self-satisfied in the knowledge that any errors we make will be detected and corrected somewhere "down the line." There is no guarantee that the next guy doesn't have "pass the buck" fever. So, it behooves all of us who share in getting the birds airborne to do the job right the first time, all the time. And as a consolation to those who prefer other methods, if the boys at the Last Chance Corral come up with empty hands consistently, then maybe the substitute will be retired to the bench and the first team can get on with the ball game. ★



Collision Avoidance

"It only takes *one* mid-air collision to spoil your whole day." Spoken frequently in jest, yes, but many unfortunate people have become painfully aware of how true it really is. For some, it has cost their lives and spoiled the rest of the lives of their families.

A mid-air collision usually occurs when two airborne vehicles attempt to occupy the identical parcel of airspace at precisely the same moment. Mid-air collisions have been happening ever since there was more than one aircraft; they are still happening; and they *may* continue to happen in the future. But, do *all* of them have to? ? A few of them, maybe, according to mathematical probabilities, but certainly not *all* of them. Mid-air collisions are conspicuous by their high fatality rate and costly loss of aircraft.

We have come a long way in aerospace technology and haven't done too badly in the science of collision avoidance. One way to look at this is by asking ourselves, candidly, why haven't there been a *lot more* mid-air collisions than there have been? Considering the tremendous increase in volume and speed of air traffic in the last few years we find this to be a perfectly valid question, and, indirectly, a well-deserved pat on the back of the aviation world, both commercial and military.

However—we are standing on the threshold of a new era in manned suborbital flight. The jumbo jets, the C-5A, AWACS and the IMI, the SST, and AMSA (Advanced Manned Strategic Aircraft) are going to be with us in a short period of time. The SR-71 is already flying and the F-12 is in the developmental stage. In addition to the higher speeds generated by the newer aircraft, the jumbo jets will be carrying fantastic quantities of cargo, and the passenger versions over 350 priceless human lives.

Consider the cost in money and human lives if a troop-carrying C-5A and an F-12 were to collide (perish the thought) in mid-air and both aircraft destroyed. There is no guarantee that it won't happen. The frightening thought of such an event substantiates the fact that all the time and money spent in the research, development, and acquisition of a viable collision avoidance system would be a mere drop in the proverbial bucket compared to the potential losses if a reliable collision avoidance system isn't developed.

Let's look at a few of the things we have working for us, now, in the way of collision avoidance techniques:

- Visual vigilance on the part of aircrew members.
- Ground search radar.
- Airborne radar.
- Codeable transponders.
- Anticollision light beacons.
- Conspicuous paint jobs, i.e., international orange or red and white, etc. One forward-thinking airline uses stylish pastel colors on their aircraft which seems to make them stand out more at a distance.
- Special operating areas for test flights, intercept training, student training, etc.
- Staggered cruising altitudes for IFR and VFR flights, and for different magnetic courses.
- Maximum speed of 250 KIAS below 10,000 feet.
- Positive controlled aerospace.

And there may be others we've overlooked. The point is that these methods are the present state of the art of collision avoidance, and we are still having a few mid-airs and for a variety of reasons at that.

Most of our air traffic is below 10,000 feet, and most of our mid-air collisions are below 10,000 feet. All aircraft, regardless of speed, capacity, and size, originate and terminate their flights from airports and it becomes readily apparent that high density traffic areas are going to be the focal point of the problem for some time to come. It will be the *heart* of the matter, so to speak. As aircraft become larger and more ex-

pensive, capable of carrying more cargo and more of that even more precious cargo—human lives—this problem will undoubtedly receive a very high priority—even to the detriment of the private pilot who doesn't have a transponder. This problem is more pronounced at large metropolitan airports and joint use airports, and more easily dealt with at purely military airports, reference, of course, being made to the greater mixture of traffic at civil airdromes.

Looking into the not-too-distant future, we see the situation unfolding whereby conspicuous paint, anti-collision lights, and visual vigilance just won't do the job. When two SSTs carrying their precious cargoes at supersonic speeds are approaching each other head on at very high closure rates, they must have a collision warning system that is somewhat more effective than the human eye; that is not to imply that this is the primary method today in the positive control areas. The closure rates are such, however, that human response is still capable of avoiding a mid-air if visual contact is made at an effective range.

The overall success of a collision avoidance program (which probably cannot be accurately measured) depends not on one particular aspect or phase of collision avoidance, but the sum total of all the systems presently in effect, many of which we have mentioned. Progress, of course, breeds many new problems and supersonic air carriers are going to be fertile in this respect. The only portion we are touching on here is collision potential.

Let's assume that as a fully loaded supersonic transport levels off at 45,000 to 50,000 feet for the cruise portion of its flight that the visual phase of collision avoidance is lost due to its high cruise mach. What can we add to the system to make up for the loss of visual collision avoidance? Suppose radio contact is lost — suppose other contingencies arise which compound the problems? We still need a collision avoidance system.

There *is* one on the way, and, like all other new systems, it may be considered initially clumsy and expensive (about 20 to 30 thousand dollars per unit — of course this would drop with quantity production). But the important thing is that it's not on the drawing boards—it's being used on aircraft that are flying almost daily *and it is working*. It has an acronym for a name, EROS, which stands for Eliminate Range O (Zero) System — Range Zero being, of course, the collision point. This system is being developed by McDonnell Douglas and is a product of an unfortunate collision between two McDonnell aircraft which were both undergoing flight testing near St. Louis several years ago.

It is a cooperative system which consists of an electronics package carried in a Sparrow missile pod under the fuselage of the F-4 series aircraft that are being flight tested in the SOA near St. Louis. It is complemented by a ground station. This program is serving a two-fold purpose: its primary purpose was to prevent a recurrence of the ill-fated test flight collision; and it also proved the principle to be a reliable collision avoidance system. EROS II is now being developed for use by the commercial airlines incorporating advancements which permit world-wide operation.

The system has now been proven on more than 5,000 operational jet flights. Basically it amounts to this: it gives the pilots of aircraft equipped with the system 60 seconds warning of potential collision with another equipped aircraft, followed by a simple escape recommendation of either "fly-up," "fly-down," or "level-off." It is interesting to note that the final response and action taken is still left up to the human element, the pilot. The system functions when aircraft are turning, climbing, descending, or in level flight. And it will give the same 60 second warning even with aircraft having a combined closure rate of Mach 4! Another significant feature is that the system will reportedly separate a *group* of equipped aircraft—not just two of them.

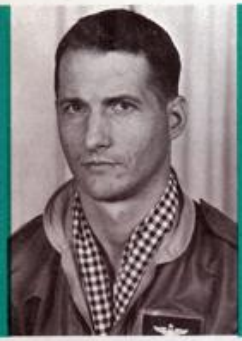
It should be made clear that this collision avoidance system is not a substitute for visual alertness, Air Traffic Control, ADC search radar, or airborne search radar. It is, in actuality, an advantageous adjunct, a supplement to the system, and, in time, with refinements and standardization, may become universal in usage.

If *all* military, and *all* commercial airlines were equipped with it, a great percentage of the collision risk would be eliminated at all altitudes and all airspeeds. And as prices were reduced by quantity production, even corporation aircraft could be equipped with it. Eventually, even private pilots may be able to afford the system.

To quote an old Chinese proverb, "Longest journey begins with first step," it appears that the first step towards a viable universal collision avoidance system has been taken. ★

EDITOR'S NOTE: As we were going to press it was brought to our attention that the FAA and airspace users were outlining their requirements to the Avionics industry for a light weight (approximately 25 lbs), inexpensive (less than $3,500), economical (less than 150W) pilot warning indicator (PWI) to alert pilots to nearby aircraft. It would be self-contained (noncooperative) and operation would be based on infrared techniques.

we point with



CAPT GEORGE E. DAVIS
13 FIS, Glasgow

1LT JAMES M. SLATTERY
5 FIS, Minot

CAPT CARL W. GOODWIN
124 Ftr Gp (ANG), Boise

1LT JOHN W. WOJNAROSKI
95 FIS, Dover

CAPT JAMES D. McBRIDE (USMC)
75 FIS, Dow

CAPT WILLIAM H. BENNER, JR.
75 FIS, Dow

1LT RODNEY C. ORRISON
25 Air Div, McChord

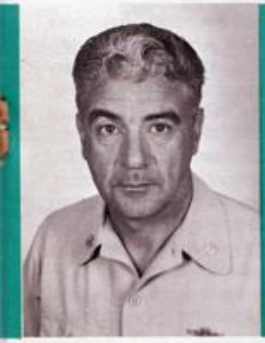
1LT HARRY E. RODMAN
4781 CCTS, Perrin

PRIDE 1967

CAPT PETER J. HAERLE
343 Ftr Gp, Duluth

MAJOR ROGER S. WILKES
4677 DSES, Hill

CAPT LAWRENCE A. WETTERHALL
4677 DSES, Hill



MAJOR ROBERT E. ROCQUE
Hq ADC, Ent

CAPT JAMES B. FALL
4684 AB Gp, Sondrestrom

MAJOR WILLIAM R. DAVIS
27 FIS, Loring

MAJOR ROBERT C. OSBORN
27 FIS, Loring

ORI

OPERATIONAL READINESS INSPECTION TEAM

HQ, ADC

THE GUY IN THE REAR SEAT

Neither occupant of the two-place all-weather interceptor business can go it alone. Where and *how* the airplane goes, depends on the intrepid *Aircrew*. The collective professional competence of our aircrews and of the entire system, of course, allows 200 million freedom-loving Americans the luxury of living normal daily lives without fear of being annihilated by a sneak, hostile, enemy attack. How well the aircrew performs will determine how well we will survive if and when such an attack should come. However, this article was written primarily for the RO, the guy in the rear seat.

Performance among ROs can readily be compared to that of any other category. The truly outstanding ones are usually recognized and appropriately rewarded. Conversely, the slackers, the uninformed, and the "couldn't-care-less" types usually receive their due. It's the guys in the middle we're most concerned about—the average and above average guys who get the job done, day in and day out, but who are usually taken for granted even when they have a perfect day with "three for three". These are the ones who need a little encouragement once in a while, a pat on the back, a kind word when the job is well done. Obviously, some plaudits are being handed out, but where the attitude of the unit is to ignore the better feats, let's hand out a few more credits.

Do you ROs remember (I know you older heads do) the days when ROs, and pilots as well, were simply the aircrew? You flew gunnery or rocketry, pulled alert (but not too often), and made certain that you showed up at beer calls. Only a selected handful of aircrew members had additional duties and they spent more time on those jobs than they did flying. A little later as times changed almost every aircrew picked up an additional duty of some sort. More than one RO has pulled himself out of the hole because he performed an additional duty in an outstanding manner and impressed his rater at ER time. I'm not minimizing the importance of your primary duty (1564), but don't sell those additional duties short. They can make or break some of you. You might try making more of that heretofore insignificant additional duty you have.

Now, back to the rear seat. Since there have been a lot of moves in recent years (via projects "Blue Nose", "Fair Share", and now "College Share") the majority of ROs have been stationed at one of the coastal bases. Think back to those black and dreary nights, no horizon and not a star in the sky, when PRIME requirements demanded more low altitude intercept training. The pilot checked the gauges while you pursued the target, locked on, and said, "It's your dot." Then, depending on the target altitude (and it was mighty low if the T-bird pilot was one of the unit's very own and always tried to prove how much ocean spray he could get into the intakes without flaming out), your concern was divided with altimeter crosscheck to assist the guy up front. Two heads are better than one and four eyeballs better than two, etc. At best it can be a hairy situation. That's when you become more than just an RO. I'll bet there

are more than a few Six and Deuce jocks who wish they knew what an RO was. Then we have those high altitude front snaps with a marginal radar that keep breaking lock. You press on, start your pull up at "B" range, finally lock on just outside of "min lock", and say, "It's your dot, and lots of luck." I wish I had a nickel for everyone of those that's been salvaged. It also goes without saying that in a heavy ECM environment, you can conjure up all sorts of wild situations where only the professionalism of the RO has been the difference.

"And the beat goes on" and on . . . tense moments during recovery when the RO took some of the load off the pilot, to make it a routine mission . . . time saved, and confusion minimized with the FAA center, because the "gunner" took the radios . . . more comprehensive debriefings, which saved maintenance and/or the DC some gray hairs, because the RO took notes. Some of our best pilots were once ROs and gained from their experience.

Fifteen years ago, they were saying that the dual place concept was nearing its end, and that ROs should start thinking about other career fields. Today, ROs are still performing the same basic job. Granted, the equipment is more sophisticated and it takes more talent to pull off a successful mission, but you're still an RO, and who knows when it's all going to end. The point is, don't give up because you're a good RO, and when some guy approaches you and feels compelled at some time to ask "RO?", you look him straight in the eye and say, "Yes, sir, and damn proud of it ! ! ! "

TOM WILLE, Colonel, USAF
ORI Team Captain

'68 FLIGHT SAFETY OFFICER

"Hey guys, here comes the sea gull around again. Get a handful of rocks to throw!"

The Safety Officer is referred to fondly as a sea gull by some squadron pilots. When questioned further, these same pilots will define a sea gull as someone you have to throw rocks at to get him to fly. Once you get them in the air, they fly in circles making loud noises.

Those of us who have been around for a while can trace the plight of a squadron Safety Officer through many phases. Many years ago this poor fellow was usually looked upon as the guy who had a problem walking and chewing gum at the same time. His office was a table in the corner of the briefing room and his job was to put up posters on walls of the flight rooms and take a few ground safety posters over to the maintenance hangar and tack them up on the wall or bulletin boards.

Slowly things began to change, little by little. Aircraft began to become more sophisticated. Into our vocabulary came words like Mach 1.2, nuclear storage area, missile checkout buildings, and SAGE.

Along with the new words came concern about cost effectiveness, effective management of resources, and someone who had an understanding of all functions that a squadron performs. Agreed that this role was for the Squadron Commander, however he needed someone at the working level to be his eyes and ears around the squadron. He needed information he could not find in reports which go to higher headquarters. What was needed was information about how well the people on the flight line knew their job. What type of supervision was being provided the airman on the night shift? Did the pilot know his aircraft as he should? What type of training program was there for aircrews? These and a hundred other questions needed to be answered.

No longer was the Safety Officer the one we mentioned before. Now,

in some of the squadrons, the Commander began to realize he would need a pilot who was highly qualified in the unit aircraft, a person who could communicate with all echelons of command; someone who could write and put ideas in a way that all could understand; someone who had the confidence of the workers in the squadron.

To be effective, this Safety Officer had to work directly for the Commander. He must have his support and backing to accomplish the job as it should be done. No one in his right mind would criticize someone who has a direct say so in writing his OER.

Let's take a minute to look at the present organization within Safety. We agree that the Safety Officer position varies among the commands in their organizational structure. In some commands, the function is a separate staff agency, responsible and reporting directly to the Commander. In other commands, the Safety function is established under the supervision of the Director of Operations or the Inspector General.

In Air Defense Command, the Flight Safety Officer (FSO) works directly for the Commander at all levels. This position is in harmony with the most progressive developments in Safety management in industry and government. It is considered essential to afford the Safety function the opportunity to effectively accomplish the many, many tasks associated with top level management.

Let's take a look at what working directly for the Commander provides in the way of environment for the Safety Officer.

- He will have the complete cooperation from his Commander.

- He will function as a management consultant for the Commander. He can provide him with timely information upon which management decisions can be made to increase mission effectiveness.

- He can provide additional management analysis capability for the Commander.

- Maintain Safety supervision over subordinate units through programmed efforts.

Some real advantages of direct contact with the head man are:

- Communication with the Commander and communication of Commander with the Safety Officer will be more efficient.

- Management levels between ultimate authority and staff working level would be reduced to absolute minimum.

- The Safety function as a self-sufficient, separately organized staff agency will enhance the Safety image.

- Uniform organizational alignment as a separate staff agency would be conducive to uniform and simplified administrative methods and procedures.

These are all nice, fancy words, but has this individual called a Safety Officer been instrumental in reducing accidents? We will concede that accident prevention is very difficult to measure. No one can point his finger at one specific area of improvement and say, see, I did this. However, we have made a steady attack on accidents and over the years the ADC rate has gone down and down. Take a look at the progress that has been made in the last eight years:

YEAR	1960	1961	1962	1963
RATE	10.0	8.9	8.9	7.3

YEAR	1964	1965	1966	1967
RATE	6.7	4.6	5.6	4.4*

*Thru 17 November 1967.

From 1960 through the first ten months of 1967, a total of 7 years and 7 months, ADC has had the lowest rate for 5 of these years of the 4 major fighter commands. When it did not have the lowest accident rate, it was second and a close second at that.

Our Safety Officers are not without education. There are no less than fifteen schools available to the individual who wants to be a Safety Officer. Some are for missile safety, ground safety, and flight safety. The most important ones for a Flight Safety Officer are, first, "Flying Safety Officers Course" at the University of Southern California. It takes 10 weeks to complete and when you finish, you are given a 1925 AFSC which is a fully qualified Safety Officer. The second school for an FSO is "Advanced Safety Management Course" at the University of Southern California. It lasts for six weeks and the requirements to attend are to possess a 19-25 AFSC and be a Major or above.

The FSO job is not easy if done well. It requires an individual to do all the work of a squadron pilot, plus many more hours of walking the flight line, stopping in at the various shops conducting surveys, writing reports, attending meetings, and giving ground school from time to time. If done correctly, the Safety Officer should be one of the most knowledgeable people in a unit. We will acknowledge that some of our FSOs hide behind the job and use it as a crutch to get out of unpleasant tasks that some of the other people have to do. Fortunately, these are few and far between.

In many ways the job is thankless. The hours are long and the pay does not increase with the longer hours. The FSO usually has someone on his back for some reason. The job will get tougher as the years go on, but the people are good and we think that they will get better. They have done well in the past and we think they can do even better in the future. ★

1967 INTERCEPTOR INDEX

RECOLLECTIONS OF A FIGHTER PILOT

Boy, this club is dead for a Friday night. Wonder where all the SEA returnees are? Hey, Innkeeper! Another toonie for a talented tiger. Hmm. What a grouch! Nobody has a sense of humor anymore.

Can't imagine what gave me the idea that airplanes came equipped like cars with ignition key, gear shift, and gas pedal. Took a while to get used to air first, then ignition, then primer, then mixture; or something like that. Spent beaucoup hours trying to learn those emergency procedures also — canopy closed, mixture rich, prop 2050, throttle 21, gear and flaps up, and so on. And those flight instructors, always bellowing sweet nothings into your ear. It was a long time before the urge to kill left me, at least five minutes after one of them jumped out and told me to try hard not to hurt myself. What a revolting comment! But he may have had a valid reason or two for saying it.

Thinking back on those Primary Flying School days, I can't say it was a breeze. More like a gale. All those John Wayne movies didn't help either, especially the day the engine quit on takeoff and I just barely made it back to the overrun. The triumphs must have outnumbered the tribulations, though, because they let me graduate to Basic School.

I sort of came into my own, flying that smooth handling T-bird. I have to laugh to myself when I think about almost smothering in the oxygen mask for the first couple of flights. And there weren't any noticeable differences in instructor temperament. I swore they took nasty pills for breakfast. Even so, the going wasn't too rough, probably because I had since learned that airplanes didn't turn square corners. The puzzle pieces were falling into place and when I got those silver wings for keeps, the John Wayne movies came back strong. Which reminds me that I almost clobbered the joker who squeezed the tips together on those pliable lead wings they handed out at graduation. Good thing I had five extras. A minor crises arose when someone passed the rumor that we were all going to B-47s. It turned out to be another joker.

The morale hit an all-time low during the first half of Advanced Flying Training while thrashing around the sky in a T-bird making weather penetrations, under the hood. I did learn how to work the gauges, though, and that came in handy later on.

The big day finally arrived for my first flight in the F-86D of electronic fuel control fame. At last a checkout without an IP in the back end! Never thought he'd get off the wing at the end of the runway. And those memorable words of encouragement before he bounded out of sight: "Don't forget! If the eyelids close on takeoff, you've got 13 seconds before she blows." But the throat lump dissolved once I got on the runway, ran the engine up, lit the afterburner, let it stabilize, then — released the brakes. The thrill of flight was short-lived, because a half hour later it suddenly occurred to me that I was going to have to land the bird alone. But the old proverb that the first one is always the best one proved accurate again. It was great sport learning to fly the old "Doggie," from the supersonic dive in afterburner from 45,000 feet to the low level intercepts at 8,000 feet. The academics weren't bad either. No celestial navigation. Never could hold that sextant bubble steady. But the time couldn't pass quickly enough because the next step was an operational unit.

Sure was a thrill walking through the gates of a fighter squadron for

the first time. But the shoeleather returned to the pavement when the first pro I talked to told me not to unpack my bags because I was Number One for overseas. In the meantime, I could go down to the T-33 target section and checkout to maintain proficiency. That's when all the work under the hood began to pay off. The next year was a series of deployments to strange fields whenever the weather turned sour. It also ushered in the first strands of grey hair. Finally, a brand new fighter arrived on base and the squadron developed a few vacancies. I managed three checkout rides before the fleet was grounded for a big modification. I was beginning to wonder who was out to get me. Then, the program cranked up again and I became combat ready just in time to get that long overdue overseas assignment—to fighter bombers. That was different. Can't say the prospect of new horizons wasn't welcome. At least it wasn't B-47s.

After nearly succumbing to the rigors of winter survival training, I made it to Europe. European weather was something else. Bad all the time, it seemed like. It made refueling, low level navigation, bombing and strafing, and formation downright hairy. Especially since I hadn't done any of this before. But all of the fighter jocks were pros and stuck together like postage stamps out of a vending machine. We had more than our share of accidents during the first year. Lost a batch of birds for varying reasons, none attributable to pilot error. Things like catastrophic fuel leaks, autopilots going wild at low altitude, torching on takeoff, and afterburner pigtail failures made life interesting. The Flying Safety Officer thought he was in a Kamikaze outfit. But it all turned out OK because a high pressure area moved in and blew the protection lid off the supervision pot. Maintenance eventually earned the Dandylion Trophy and everybody else got the Outstanding Unit Award. Can't say it wasn't a pleasure to go first class.

By safety standards, few if any of the pilots could have qualified for the Peter Pureheart Award. Buzzing beach beaver, flying with headaches of unmentionable origin, submarine hunts and other pressure valve activities fell into wedgehead categories. But there was a difference. Everyone knew their limitations and no one exceeded them. Those who showed signs of weakness in ability or judgment were quietly asked to seek employment elsewhere. I guess it was the old story of one man's porridge being another man's poison.

I returned to the land of the big BX with some misgivings even though I had aged 10 years in 4. No doubt everyone hates to leave a top drawer unit. But I didn't shed a tear when I went to the footlocker and exchanged the winter woolies for summer orange.

With the tremendous pressure gone, plenty of time was available in the new squadron to engage in a dangerous hobby — thinking. After all these years I hadn't moved out of the Blue Four slot. It was time for a change. I used to chuckle to myself when the guys complained about a 70-hour work week, so I split the difference and put in 90 studying everything in sight and applying it. Amazing how the little extra effort paid dividends. A couple of TDY training schools followed, and when I came back, no more Blue Four. Added responsibility took care of that.

It wasn't long before the SEA assignment came through. For some reason, I had the impression that I was at least Number Ten Thousand on the list to go. Probably because I used to shudder at the thought of possibly joining a few of my buddies in that famous NVN hotel. But what the heck, over! All the years spent training in high speed, superduper jets suddenly seemed pointless unless I got on with it. So naturally I went over in prop-driven Skyraiders. Such versatility!

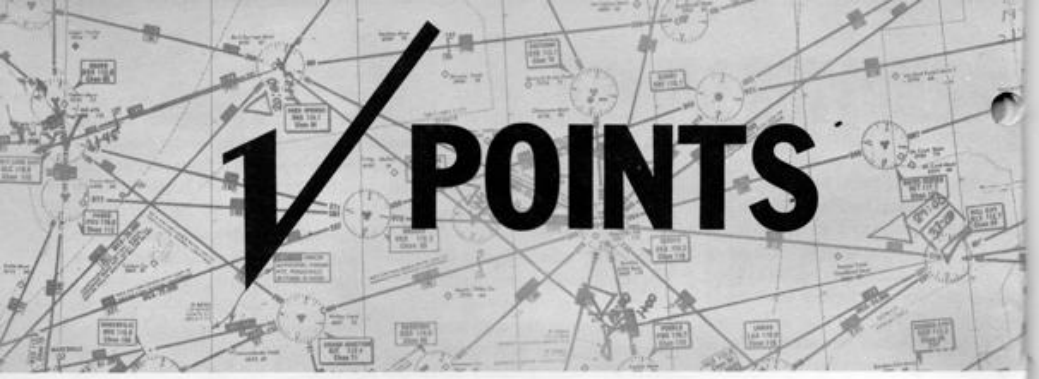
I should stick with beer. It lasts longer. Innkeeper! Another toonie for . . . Another martini on the rocks, please. Maybe I'll get an olive this time.

They told me that combat was impersonal until the first round landed in the cockpit with you. I didn't have to wait that long. Right away it became personal with the first hole in the wing. Everything after that developed character, and more grey hair. Self-pity became irrelevant one night when a group of Army types drowned us with champagne because they had just been saved by some close air support. Six for six in an ORI doesn't come close to giving a fighter pilot the sense of personal satisfaction in his profession that the genuine gratitude of those Army guys instilled. But one leads up to the other.

Anyway, with some skill and a lot of good luck I managed to make the rotation date and left the jungle boots behind. Now I've got a good job as a staff officer, but no longer combat ready. There are moments of nostalgia.

Innkeeper! One more for the road and one for my friend here. What's that? He's a yumac bird and doesn't drink! Good for him!

Well, here goes a chug-a-lug for my fighter pilot buddies, wherever they may be. Cough, cough, sputter. Boy, those ice cubes are hard to swallow. Better leave before I become a glass eater. ★



√ POINTS

This section of the magazine has been designed for you. Be you a headquarters type at any level, a commander, safety officer, pilot - interceptor, transport, light aircraft - radar intercept officer, mechanic, a civilian in industry, weatherman, doctor, designer, or Indian Chief. This is your corner.

We solicit your ideas, items, notes, photographs, sketches, and pictures. The writing should be less than a paragraph - preferably a sentence or two.

We would sincerely appreciate your inputs mailed directly to: The Editor, INTERCEPTOR, Box 46, Ent AFB, Colorado 80912.

√ The Green Pennant Safety Program is a nationwide affair. In cities where the pennants fly, traffic accidents involving students have been reduced substantially, and young people have developed a greater awareness for safety. School administrators, police officials, and civic leaders are enthusiastic about the program. Parents praise it; the students take pride in it. The Green Pennant which flies at your children's school helps make your city a safer place in which to live. (General Motors)

√ If an aircraft flying at 1800 mph emerges from the clouds on a collison course with an aircraft 3000 feet away the two aircraft will collide before either pilot can do anything about it. If the distance were only 500 feet between aircraft, they would collide without either pilot seeing the other. (ADCSG)

√ Defensive driving includes the use of seat belts. Smart operators and passengers use them. Do YOU? (ADCSA)

√ Weapons safety training over a period of years has resulted in a noticeable reduction in firearm accidents. There is still considerable room for improvement, indicated by the many shocking smallarms incidents that occur each hunting season. Firearm safety is especially difficult, as most people are not aware of the problem. REMEMBER — guns don't kill people, people kill people. Safe gun handling is the mark of the expert. (ADCSA)

√ Use your safety publicity materials sparingly. The National Safety Council funds have been cut nearly 65% for Calendar Year 1968. All safety personnel are urged to contact their local funding officers for help. It may be they **can** help. (ADCSA)

Deuce Pilots—A proposed F-102 in-depth Compressor Stall Study is being supported by the Directorate of Aerospace Safety. SAAMA will most likely be the focal point if and when it goes into motion. (ADCSA)

On 10 December 1930, Dr. Hoyt Taylor demonstrated the doppler method of detecting aircraft in flight. (ADC-PS)

Consistent, regular physical exertion (e.g., running, squash, tennis, etc) has several rewards. It helps you burn excess calories and fat, tones up your muscles, provides a means to increase your heart and respiratory reserve, and it is **mentally** relaxing. Let's do ourselves a favor and improve our mental and physical welfare through **regular** exercise. (ADCSG)

Recent tests with a specially instrumented aircraft have proven that Otis AFB runway 32 is the roughest runway of any ADC base. (60FIS)

A modification of the drag chute on F-102 and F-106 aircraft has been directed in T.O. 1F-1614 dated 22 August 1967. Paragraph 6A states, "Locate gores #1 and #2 of the canopy and stretch radial tape bordering area of ring slot #1 (slot nearest canopy vent) . . . ." Some drag chutes have been modified incorrectly, i.e., the modification has been performed on the slot nearest the bottom of the chute rather than on the slots nearest the vent. The vent is the top or apex of the chute where the pilot chute is attached. This incorrect modification accomplishes nothing in increasing chute inflation reliability. All units should inspect modified chutes to insure that this modification is properly performed. (ADCSA)

One Major Air Command has voiced its opinion and feels that the SA-20 Seat Style Parachute **"with its variety of cables, lanyards, interferences with leads and lap belt, continues to be a major problem and a definite safety of flight hazard"** and further that **"a close look at the aircrew member seated in his aircraft portrays a completely confused mass of intertwining, overlapping cables, lanyards, etc."** Does this paint a familiar picture to some of you? (ADCSA)

Check Point . . . **check** your attitude indicators frequently when VFR . . . **write** them up if they're not what you'd want them to be if you were IFR on a precision approach to minimums. A/I error and malfunction reports are on the increase. (ADCSA)

Check Point . . . F-106 people, **check** and re-**check** your speed brake hinge fitting installation. (ADCSA)

safety officers' FIELD REPORTS

WILD RIDE, F-102A. Loss of aircraft control on takeoff. All pretakeoff checks were normal and brakes were released. Afterburner was selected, nose wheel steering disengaged, and at 125 KIAS, the nose was raised to takeoff attitude. Immediately upon leaving the ground, the left wing dropped approximately 15 degrees and the aircraft began veering sharply to the left. The pilot attempted to raise the left wing with full right aileron, but had no response. The aircraft continued turning to the left with approximately 15 degrees of bank and nose high attitude, proceeded over the grass infield separating the runway from the main taxiway, then over the T-33 parking ramp. While crossing the grass, the pilot read an airspeed of 150 knots and retracted the gear. Airspeed continued to increase from that point on, and positive aircraft control was regained. The Control Tower, observing the erratic flight path of the aircraft at takeoff, initiated the primary crash circuit. The pilot did not report any difficulty, but was advised to return for a precautionary landing. Post-flight inspection of the flight control system revealed no discrepancies; however, the airspeed indicating system was found to be indicating approximately 10 knots higher than actual airspeed. It appears that the aircraft became airborne at too slow an airspeed, went into a partially stalled condition, which resulted in the left wing dropping, and reduced effectiveness of the elevon control surfaces. As airspeed increased and the partial stall condition was broken, positive control was regained and no further difficulties encountered. The defective airspeed indicator has been replaced and the aircraft was test flown satisfactorily.

SEAT KIT, F-106B. The aircraft was at 45,000 feet MSL when the rear seat instructor pilot's personal leads disconnected from the Firewel survival kit. The front seat pilot declared an emergency, made a rapid descent below 10,000 feet MSL, and landed immediately. Investigation revealed the most probable cause to be materiel failure of the rotating disconnect lock (kit-to-man assembly).

SMOKE IN COCKPIT, T-33. Shortly after takeoff the cockpit began to fill with smoke. The aircraft returned immediately and landed. Investigation revealed the starter control relay box cover had been incorrectly installed at another base causing internal shorting.

HYDRAULIC FAILURE, F-106A. Just after making a planned missed approach, the aircraft developed flight control oscillations, a combination of up to 45 degrees roll and 20 degrees yaw. Hydraulic gauges reflected pressure drops, but not system failure. After four to five minutes the oscillations subsided and the aircraft landed. Investigation revealed the hydraulic rudder package had failed internally.

AIRBORNE DRAG CHUTE, F-106A. The pilot activated speed brakes at FL350, .93 M, and experienced sudden deceleration forces because of drag chute deployment. Chute would not release until aircraft was on approach for landing. A complete check of the drag chute system failed to reveal the cause of initial deployment. Since the chute was not recovered, it is not known why the shear pin did not effect release.

STUCK THROTTLE, F-102A. The aircraft experienced a frozen throttle. Takeoff and climb to FL 320 were normal. Some difficulty was noticed retarding throttle at level off. A front pass was completed, and on breakaway throttle became very difficult to move. RTB was requested and throttle retarded to 85% where it stuck, until 10 miles from base at 8,000 feet. A straight-in approach and landing were accomplished with no more difficulty in moving throttle. Cause of malfunction resulted from water entering throttle teleflex cable and freezing at altitude. Corrective action was to remove throttle teleflex cable, clean and lubricate cable, dry out housing and reinstall. No further problems have been encountered.

DUCT PLUGS, T-33. The pilot experienced engine vibration on climbout. Power reduction revealed that throttle would not retard below 89% RPM. Pilot made straight-in approach and landing. Engine was shut down by closing the main fuel shutoff valve. Less than half the runway was utilized. Investigation disclosed that the intake duct plugs had been drawn into the plenum chamber - most probably during an engine run the previous night - and had prevented complete throttle reduction. FOD inspection revealed no aircraft or engine damage. Corrective action included fastening duct plugs together and a required 781 writeup when plugs are installed. Additionally the duct plugs will be accounted for during preflight inspection.

THE WAY THE BALL Bounces

1 JAN THRU 30 NOVEMBER 1967

Thru November 1967	4.5	5.0

MO	ADC	MO	ADC	MO	ANG
70	456 FIS	41	87 FIS	58	162 Ftr Gp
50	62 FIS	40	444 FIS	46	112 Ftr Gp
43	48 FIS	34	414 Ftr Gp	46	132 Ftr Gp
41	4600 AB Wg	32	18 FIS	46	141 Ftr Gp

ACCIDENT FREE

ACCIDENTS FOR November	1st AF	4th AF	10th AF	14th AF	4600	ANG
CONV						1
T-33						
F-100						
F-101	2					
F TF-102						1
F-104						
F-106						
B-57						
F-89						
EC-121						

MINOR ACCIDENTS THIS PERIOD — 1

1 JAN THRU 30 NOVEMBER 1967

	ADC	ANG
JET	5.8	4.5
CONVENTIONAL	0.9	11.5

BY AIRCRAFT		
T-33	2	0
F-89		0
F-100	36	
F-101	9	
F TF-102	6	6
F-104	26	
F-106	7	
B-57	6	
EC-121	2	

we point with

Flt Lt Peter E. Griffiths (RCAF)
37 Air Division
Goose AB, Labrador

PRIDE

LIGHTNING STRIKE (T-33)

Flight Lieutenant (now Squadron Leader) Griffiths was flying an ADC T-33 with a passenger on a cross-country mission. No severe weather was forecast for the flight, nor was any painted by radar during the entire flight. They were cruising at Flight Level 270, IFR, in smooth stratoform clouds. Severe turbulence and heavy icing were suddenly encountered, and shortly thereafter, a blinding flash filled the windscreen causing the occupants a momentary loss of vision. The pilot briefed the passenger to prevent any undue anxiety on his part, and then proceeded to assess the damage to the aircraft. The airspeed was dropping through 200 knots and the flight instruments were not responding properly. Engine instruments were in the green, but were extremely hard to read due to the heavy turbulence. Aircraft control was maintained by the use of the needle and ball, and an immediate descent was requested through Center.

Center, however, had lost radar contact, and refused descent clearance. Tacan positions were given by the pilot, but still no radar contact could be made. The pilot tried vainly to assist the controller in determining his position which was only 130 nm from destination, but the severe band of weather prevented radar identification. Finally Center, realizing the pilot's situation, granted clearance to descend, using information supplied by him to effect control. Power was reduced, and an appropriate pitch attitude was established. At approximately 12,000 feet the aircraft entered a clear area between heavy cumulus, and a visual descent continued. Before landing, the pilot slowed the aircraft and performed several flight checks. The aircraft responded normally and an uneventful landing was made.

Investigation revealed failure of the SIF transponder and the pitot system. Lightning had struck the pitot tube.

This RCAF pilot's calm analysis of a sensitive situation coupled with outstanding flying ability enabled him to save a valuable aircraft and qualify for the ADC "We Point with Pride" award.

AFTER BURNING

Address your letters to The Editor, INTERCEPTOR, Hq ADC (ADCSA-E) Ent AFB CO 80912
To be published, your letters must be signed,
but names will be withheld upon request.

MORE ADCPI

We are constantly on the lookout for improvements in our Traffic Safety Training Program. I have seen some of your ADC Programmed Instruction booklets for other areas of safety and I consider them outstanding publications. Your traffic safety booklets should be a valuable asset to our program.

Request one copy of each of the following Programmed Instruction booklets be forwarded to Chief, Safety Division, 3535 Nav Tng Wg (ATC), Mather AFB, CA 95655.

ADCPI 62-10 Basic Physics of Automobile Movement
ADCPI 62-11 Drugs, Alcohol, Fatigue, and the Driver
ADCPI 62-17 Driving Techniques and Procedures
ADCPI 62-18 Road Markings, Signs, and Rules of the Road
ADCPI 62-19 Odds, Judgment and the Driver
ADCPI 62-21 Communications
ADCPI 62-22 Limits of Man
ADCPI 62-23 Supervision

Lt Colonel John C. Hurt
Chief, Safety Division
Hq 3535 Navigator Tng Wg
Mather AFB, California 95655

***Thank you for the kind words. We hope that the booklets prove useful.**

RE-RE-PRINT

Thanks for re-running my article, "Grow Old Along With Me," and for the copies.

May I point out that, while you picked it up out of Combat Crew, Combat Crew got it from the original publisher, Air Facts Magazine, 70 Nassau Street, Princeton, N. J.

The editor, Leighton Collins, might appreciate a correction on that, and perhaps a copy of the November 1967 issue for his file.

Thanks again—also for running the proper lines from Browning, and, above all, for not letting the typesetter change "empathically" to "emphatically! (Third paragraph from the end).

Robert W. Duncan
Humanities Division
Edwardsville, Illinois 62025
Southern Illinois University

***After searching seven dictionaries we find our empathy was emphatically not working toward "empathically" rather than "emphathetically." Credit should be given for this article as Professor Duncan says, and a copy has been mailed to Mr. Collins.**

NTSB AND SAFETY

I noticed an item in the Hot Line in your October issue regarding the availability of your Programmed Instruction booklets. Showed the item to my boss and he 'lowed as how it would be a good idea if we ask for some of them for possible use in our training and prevention program.

As you may recall the Bureau of Safety transferred from the Civil Aeronautics Board to the Department of Transportation last April. We are now part of the Department and called the National Transportation Safety Board. Along with that change the NTSB is also concerned with safety in all modes of transportation including rail, maritime, highway, and pipeline in addition to air transport. We still have our National Aircraft Accident Investigation School in Oklahoma City, Oklahoma, where I am teaching on an irregular basis.

Anyway, to get back to my reason for writing, we would like to know if we could have copies of the ADCPIs listed, along with permission to use them, possibly, in future prevention programs. We would, of course, give credit to you for any quotations or extracts we would be authorized to use.

ADCPI 62-1 through 62-7; 62-10 through 62-19; 62-21 through 23.

Robert L. Allard
Air Safety Investigator
Bureau of Aviation Safety
National Transportation Safety Board
1825 Connecticut Ave NW
Washington, D. C. 20591

***Prevention is our business, also. The copies are on their way.**

JET ENGINE TRAINING

We subscribe to your magazine and enjoy it thoroughly, especially the articles on engine problems. We noticed the paragraph on Programmed Instruction booklets in the Hot Line of the October 1967 issue. As instructors in the jet engine accident investigation business, we feel that several of your booklets would improve our knowledge in this area. Could we please have one copy of each? Those not pertaining to flying will be utilized in the jet engine branch for safety instruction to the basic jet engine course students. We particularly utilize Down and Out, Field Reports, and We Point with Pride.

If you can spare a copy of any or all of the listed booklets, please send to Jet Engine Branch (TSDAD). Attn: Course 3AZR-43270-6, Chanute AFB, IL 61866. Keep up the good work.

MSgt George A. Robbins
NCOIC Jet Engine Accident
Investigation Course
Hq 3345 Technical School
Chanute AFB, Illinois 61866

***Your books are on the way. We are happy to know that our Programmed Instruction booklets are of help.**

the Cold Hard Facts..

Surface Conditions have a drastic effect on landing roll.

Let's look at a typical landing under varying conditions. With a dry runway and normal drag devices, we have a 4,000 foot roll-out.

The same bird under the same conditions except the RCR is down because of rain. We get 2,000 feet added to our landing roll.

It begins to get a bit hairy when the bird tries to land on an icy runway. Even with drag chute, flaps, and speed brakes, this 4,000 feet becomes 9,000 feet.

Now we go off the deep end. We take away all normal drag devices, put him on the icy runway, and see him go three counties before getting stopped.

(COCKPIT CAUTION)^2 = SAFE WINTER OPERATION