TAC ATTACK

FEBRUARY 1973

THE SWINGERS....
Pg 16

for efficient tactical air power

TAC ATTACK

FEBRUARY 1973
VOL. 13, NO. 2

Tactical Air Command

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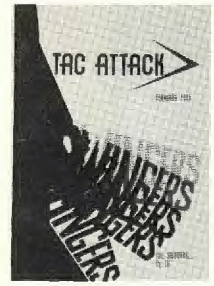
HISTORY OF THE SWINGERS... Pg 16



CURRENT INTEREST

DEPARTMENTS

TACRP 127-1

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Angle of ATTACK

FIFTY-FIVE

Remember that number, 55. That's the number of TAC aircrewmen killed as a result of TAC-involved aircraft accidents in 1972. Let me say it again, 55! We had to dig into the records of the fifties to find a year to equal that record. Even ten years ago, we lost fewer crew members than in 1972. That year, 53 aircrewmen were killed in 76 accidents. This year, that number plus two were lost in only 30 accidents.

Now these aren't numbers I'm talking about, these are people . . . TAC people. So you'll pardon me if I get a little emotional. And here's why. More people were killed in TAC aircraft accidents last year than were captured by the enemy in 1972 prior to the December 18 offensive. And those captured refers to all Air Force, not just TAC. Think about that! And here's something else. Add seven to TAC's aircrew fatality figure and you get the total number of Air Force aircrewmen reported as KIA in 1972 prior to December 18. It hits close to home when you realize that TAC lost almost as many people to non-combat aircraft accidents as were lost by the entire Air Force in a WAR.

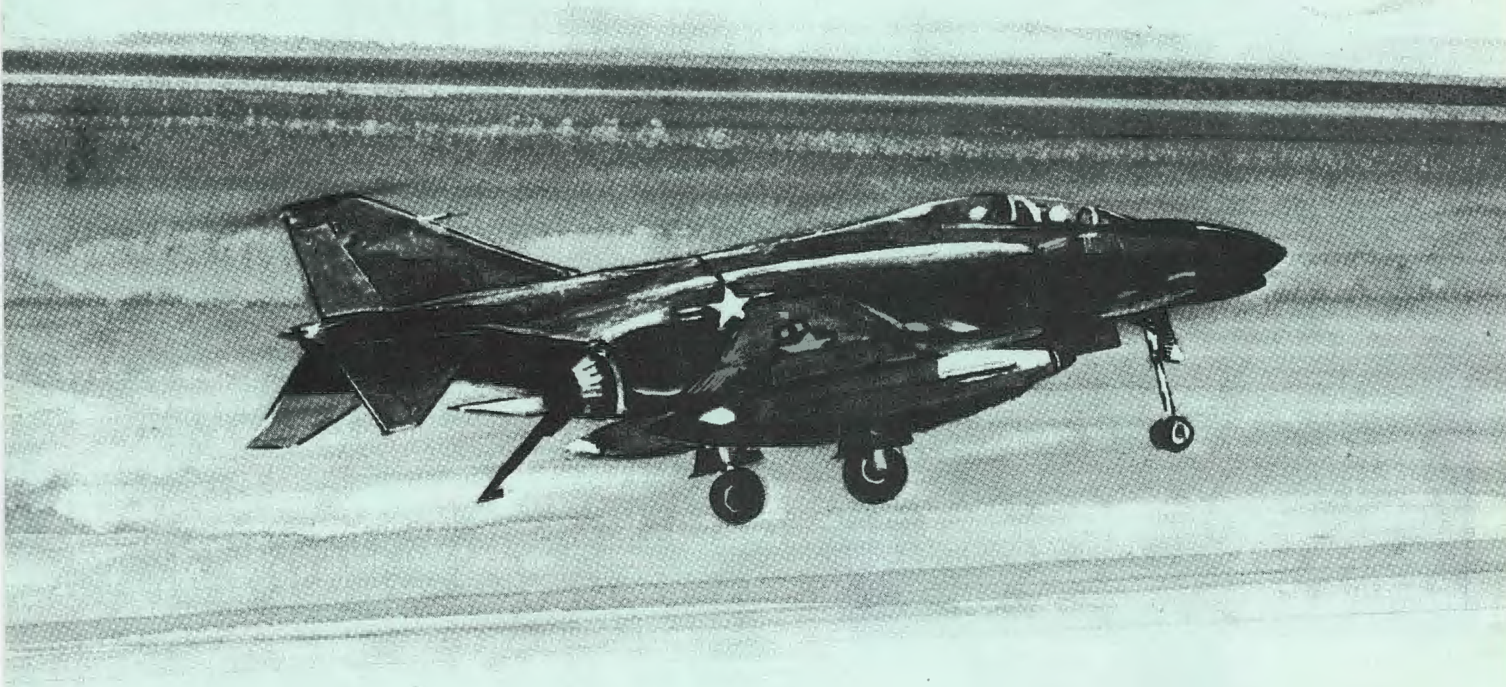
Seventeen of our aircrewmen were lost in just two accidents. Both accidents involved C-130 aircraft, both accidents resulted from midair collisions, and both accidents involved aircraft from two different commands being in the same place at the same time.

While the cause factors extend across both commands involved, there are some lessons we should have learned from each accident. For instance: Do you, as an aircrew member, know the rules of engagement as they apply to you in such cross-command missions as air-to-air, ADC intercept missions, and refueling missions? And how about the many exercises in which you participate? Do you know the operating parameters? And what about host-tenant agreements and FAA-Air Force agreements governing the airspace around your base? Do you know the rules as they apply to you? Are there deficiencies in the rules? If so, have you reported them?

At the close of 1971, TAC recorded the best year ever in terms of accident prevention. But, with regard to fatalities, 1972 was one of the worst. Now, we must all apply the lessons of last year to make 1973 the best in TAC's history. Aircrew lives depend on it.

E. HILLDING, Colonel, USAF
Chief of Safety

F-4 MINUS TWO



by Capt Jim Young

The flight manual calls it "Utility System Failure, With Single PC and/or Engine Failure." People in the know call it "Hairy." You call it anything you like, but you'd better THINK about it now.

Since August of 1970, five Air Force F-4s have been lost in situations involving this type of emergency. The accident aircraft in every case was lost on or near the final approach phase of flight. Over the same period of time, almost no incidents of this type have occurred. If you discern from this that once you're down to a single PC system, you're backed into a corner or stuck with a critical situation – you're probably right. This is one of those classic situations that absolutely requires, in my opinion, that you hangar fly it thoroughly prior to actually encountering it, if you expect to handle it successfully.

The "what ifs" for this emergency fall into three categories: a dead wing and manual rudder, a single engine with manual rudder, and a single engine with dead wing and manual rudder. Let's look at each one in turn.

"What if" you have a dead wing and manual rudder (loss of utility and one PC system)? The dead wing is going to give you some noticeable changes in aircraft response to lateral controls. What it boils down to is the fact the aileron is more effective than the spoiler. For this reason, you shouldn't try to turn into the dead wing. It would be more difficult to level the wings than to bank. By always turning away from the dead wing, the reverse is true. In this particular set of circumstances, with both engines running, the manual rudder won't be of as great a consequence as in the next two instances. Obviously, you should avoid situations where any use of rudder is required, if at all possible. You're not going to have rudder feel trim available either, because of the utility failure. The only rudder you're going to get is from a STRONG leg.

The next "what if" is a manual rudder, single engine. (Loss of utility and loss of engine.) Here the lateral controls, both wings, are operational. The big hooker here is the yaw induced by single engine operation. When the airspeed gets down to normal approach speeds, the handling qualities are significantly degraded. In addition, depending upon which engine has failed and where your angle of attack probe is located, the angle of attack indicator will read erroneously high or low. Therefore, of necessity, airspeed must be used in lieu of AOA. We'll talk a little more about the effects of manual rudder use in the third situation.

The third "what if" is a combination of all of the above (loss of one engine, loss of one PC system, and loss of utility). You have a dead wing, manual rudder, and are single engine. This is about as bad as you can get and still keep flying. The asymmetric thrust will yaw the airplane into the dead wing, tending to roll it in that direction. Your good wing has a reduced capability to counter this roll tendency, and the manual rudder is of limited value. It is worth noting here that the Dash One says that lateral control response is reduced below 300 knots and continues to be degraded down to final approach speed. That tells you something right there. Later on, down the page in the flight manual, it says that a MINIMUM of 230 knots should be maintained for a maneuvering airspeed. Note the word MINIMUM! Most F-4 jocks queried on this point were rather emphatic in saying that they'd be faster than 230 if the bird would do it. Losing airspeed later during the approach to at least get down to a max approach end engagement speed isn't considered by most F-4 types to be an insurmountable problem. If there's one thing the F-4 does well, it's slowing down while still airborne.

It's going to take some pretty keen judgment in the final approach phase to hack it. If your problem occurs with time to spare, and if other circumstances permit, you may want to perform a controllability check. Remember the minimum altitude of 5000 feet AGL. If at this point in your emergency you are still juggling checklist pages, remember that for any of the above situations, you do not, repeat, do not, want to blow the flaps down. A no flap approach is recommended. Also, there doesn't appear to be much reason in your controllability check to get any slower than your programmed barrier engagement speed, assuming a barrier is available. The reduction of your gross weight to minimum practicable will help out for barrier engagement speeds as well as improving handling qualities. Another key point is to get rid of any asymmetric load. The last thing you need in this type of situation is anything asymmetric.

It might be useful at this point to look at the results of some flight tests conducted by McDonnell Douglas in conjunction with an accident investigation. The following is an extract from their report.

"At the request of the accident board, three profiles were flown at St Louis by three different MCAIR pilots. Each pilot tried to duplicate the accident situation but without external stores. They were all in general agreement that with the weight [40,000 pounds], configuration [2 external fuel tanks and an SUU-20 on the right inboard station], and conditions affecting the accident aircraft, the maneuvers attempted by the pilot [a left turn onto final at 180 knots with gear and half flaps] requires close attention and rapid throttle response during turns to prevent deterioration to an out of control situation. It was found that afterburner power was required shortly after entering the turn in order to maintain a level turn at 180 knots, 15 degrees left bank, 40,000 pounds gross weight, right engine in idle, and loss of rudder boost.

Analysis of the effect of asymmetric failure indicates that the rudder will trail with the relative wind over the aircraft. At 200 knots, with the left engine at military power, right engine in idle, gear down, the rudder-trail angle would be approximately 4.8 degrees right rudder. This, combined with the effect of asymmetric thrust, would cause an estimated side-slip angle of 12 degrees (aircraft nose right). Aileron deflection required to prevent roll (with no rudder input) would be 32 degrees. With 300 pounds of force exerted by the pilot on the left rudder pedal, the rudder would reach approximately 2.8 degrees left rudder deflection and the side-slip angle would be reduced to 3.8 degrees aircraft nose right. With this condition, only 10 degrees aileron deflection would be required to prevent the right roll.

The above data suggest that with an asymmetrical engine power setting, if a roll rate due to side-slip is allowed to develop and corrective pilot rudder effort is not immediate and maximum, recovery from the roll would probably require full aileron travel and would be marginal. At lower airspeeds, recovery from these conditions becomes even more cirtical."

A single engine/PC failure coupled with utility failure, as the above evidence indicates, can be hairy! The degradation in the flight controls combined with the asymmetrical thrust is going to test not only your flying skills but your preparation. If you haven't thought this emergency through via Emergency Situation Training, as outlined in this magazine, January 1973 issue, or haven't "hangar flown" it with your buddies, you're really going to be backed into a corner. The F-4 minus two can be handled, but you'd better handle it now, before it happens for real!

WEAPONS WORDS

I THINK I THOUGHT I THUNK

by Lt Col William R. Barrett
Chief, Missile Safety Branch
Hq TAC

Just a few years back (two, I think), I was flying C-46s in North Africa — for the benefit of those not around when the Air Force wore brown shoes, this machine was a pretty fair twin engine transport. I was at base operations in Cairo — see I told you it was a long time ago — when this incident happened. Waiting on maintenance to get my bird ready, I saw a full load of passengers board another C-46 which had aborted earlier. Almost as soon as the engines were started, they were shut down and moments later the passengers and crew disembarked. I suspect because several flights were late, maintenance felt pressured and a replacement aircraft appeared in record time. The flight crew did their part by going through their best get-home quick checklists as the passengers were again enplaning. Suddenly the door opened and passengers began to deplane, and most curiously tracked toward the front of the plane to look at the right engine — sans propeller. Don't get the idea that maintenance and preflights were all that bad, the C-46s had an excellent operational and safety record during this period. It was the same mishap cause factor that permeates our accident statistics today — the human factor. In this case, too many people trying to do their thing too fast!

With the proliferation of jets, fewer passengers run to the nearest TR counter because the pilot loaded them on an aircraft without a propeller. But, it hasn't solved our human problem. Personnel error, which is people doing their thing carelessly, caused, in 1972, over 34 percent of our explosives mishaps. Flight crews continue to push wrong buttons which cause mishaps, while ground crews seem to invent ways to secure ordnance to the aircraft so it will fall off when not expected. With all this effort toward the wrong direction, it seems to us who read all types of mishap reports, that people are working harder to devise even more ingenuous ways to get it done wrong. So you aren't convinced? Well, try thinking about these 1972 happenings. First, we might wonder about what the sergeant was thinking while inserting inertia tubes with cartridges into BDU-33 bomb signal cavities. He did alertly notice that an already installed inertia tube was not properly seated; it was protruding about one-half inch above the signal cavity. But he did not THINK as he thumped the protruding inertia tube with the second and third fingers of his right hand — sans fingers!

The crew was set for the fifth pass on the bomb range and over the IP, the pilot announced "Hack" for a time check. The backseater, without much THOUGHT on the matter, "hacked" his watch along with actuation of the switch for stores release — sans one store!

A life support specialist could not find the canopy open switch, but did find and opened a small panel (jettison). He THUNK that pulling the lever behind the small panel would open the canopy — sans canopy initiators!

We could look at many more unbelievable happenings, but you get the idea — we still have the human problem. We can only think a little. THINK, THOUGHT, and THUNK on your part will help a lot.

WEAPONS MISHAPS

TAC DEC 72	TAC THRU DEC 1972	TAC THRU DEC 1971		ANG DEC 72	ANG THRU DEC 1972	ANG THRU DEC 1971
			EXPLOSIVE			
6	131	121	TOTAL	1	27	24
3	38	57	Personnel	1	15	17
3	59	48	Materiel	0	12	7
0	34	16	Other	0	0	0
3	14	2	MISSILE			
0	4	23	NUCLEAR			

TACTICAL AIR COMMAND

AIRCREWMEN of DISTINCTION

CAPT GROVE

1LT COPE

SSGT DAVIDSON

Captain John W. Grove, First Lieutenant Cohen G. Cope, and Staff Sergeant Edgar H. Davidson, 703rd Tactical Air Support Squadron, 68th Tactical Air Support Group, Shaw Air Force Base, South Carolina, have been selected as Tactical Air Command Aircrewmen of Distinction for the month of December 1972.

On 8 November 1972, Captain Grove and Lieutenant Cope, both qualified aircraft commanders, and Staff Sergeant Davidson prepared their CH-3E for a routine training mission with Lieutenant Cope scheduled as pilot. During ground taxi, Lieutenant Cope noticed that a little extra control pressure was required to turn left; however, this was attributed to strong crosswinds. He then applied power to initiate a five foot hover before takeoff. As the helicopter broke ground, it immediately began turning to the right at a rate of approximately 180 degrees per second. Lieutenant Cope applied full left pedal (the rudder pedals in the helicopter are anti-torque devices which control the angle of attack on the tail rotor), but this had no effect on the turn rate. Because of his higher level of experience in the aircraft, Captain Grove assumed control of the helicopter and continued to apply full left pedal, but still to no avail. To avoid ground contact, Captain Grove and Lieutenant Cope increased power which caused the turn rate to increase. An emergency was promptly declared as the crew realized they had lost tail rotor (anti-torque) control. The auxiliary servo system was the suspected cause of the difficulty and was immediately turned off; however, this only resulted in a further increase in turn rate. The auxiliary servo system was restored as the helicopter, now at 100 feet AGL, became almost uncontrollable with severe nose up and nose down attitudes. Captain Grove called for the crew to tighten seat belts and lock shoulder harnesses. He then quickly coordinated emergency landing procedures. Lieutenant Cope was directed to shut down the engines when the aircraft approached the ground and to apply the rotor brake on impact. At approximately ten feet above the runway, the engines were pulled back to ground idle, the rotation of the helicopter stopped, and the aircraft settled to a landing a little harder than normal. The rotor brake was applied, the engines were shut down, all electrical switches were turned off, and the crew departed the aircraft safely.

The outstanding airmanship, crew coordination, and judgment displayed by this crew in response to a serious emergency prevented the loss of their CH-3E helicopter and possible injury to all involved. The actions of Captain Grove, Lieutenant Cope, and Sergeant Davidson qualify them as Tactical Air Command Aircrewmen of Distinction.

GEAR-UP LANDINGS OR . . .

let it all hang out

by Maj Tim Brady

Did you ever fly with a pilot who, at some time in his past, had landed gear-up because of his own error? Watching him shoot an approach is a lesson in attentiveness as far as the landing gear is concerned. On final, be it an instrument approach or a VFR type, you can see his eyes dart to the gear handle and indicators with amazing regularity. He may even bounce a fist off the gear handle with about every tenth heartbeat. The path his eyes trace during his instrument crosscheck becomes somewhat misshapen to include the landing gear indicators. Barring mechanical problems, the chances are that he will never again land with'em up and locked.

Come to think of it, have you ever known or heard of anyone who made that same mistake twice? The statistics aren't available but you can bet that it hasn't happened too many times. The grinding noise the machine makes somehow ingrains a lasting lesson in the lander. In that statement there is a solution to the problem but, unfortunately, such a lesson is a mite too expensive to be included in the UPT syllabus.

The numbers of pilot caused gear-up mishaps Air Force wide has remained relatively constant since 1969, as you'll note in the tabulation below.

BY YEAR

1965	11
1966	12
1967	10
1968	14
1969	8
1970	7
1971	7
1972	8
TOTAL (since 1965)	77

BY AIRCRAFT

C-130	2	CH-3	1
U-3	6	T-29	1
B-57	5	F-84	7
C-133	2	A-1	6
C/KC-97	1	T-33	5
C-123	4	T/A-37	4
B-66	1	F-102	3
C-131	1	F-100	3
C-7	3	F-105	2
XC-142	1	U-2	1
0-2	9	F-4	2
C-47	1	T-38	2
OV-10	3	QU-22	1

BY SITUATION

Single Seat or Flown by Single Pilot	42	Multi-Crewed	35

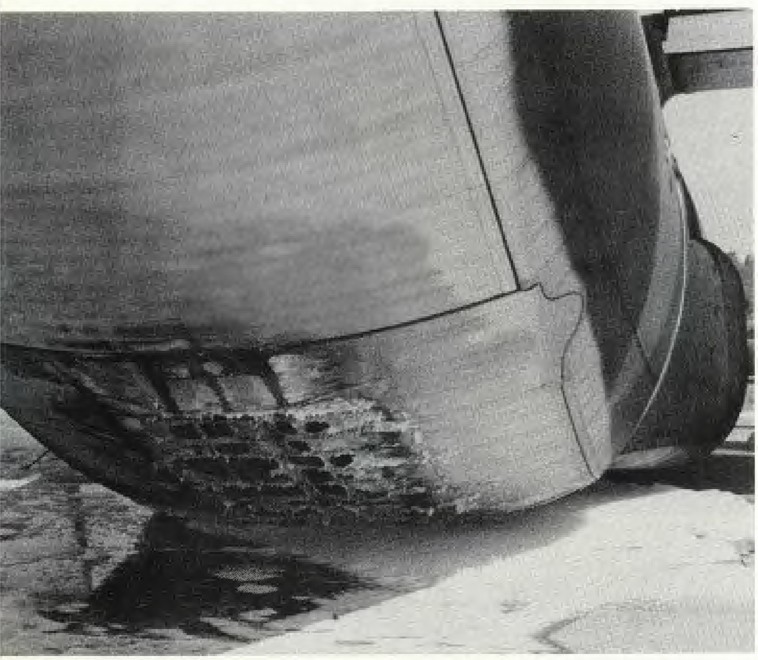
gear-up landings

The improvement in the average number of gear-up mishaps per year since 1969 compared with previous four years is notable, but eight per year is still a frustrating eight too many. This gear-up landing frustration was succinctly expressed by a commander in his indorsement to an accident report.

> "... It is apparent that accident boards in the past have failed to prevent our accident (this was the 133rd gear-up landing in the past ten years) and I feel we're no closer to a solution today than we were ten years ago. Within a week of our unfortunate accident, a twin engine corporation aircraft with a highly qualified pilot landed gear-up at (commercial airfield). A regional commercial carrier based in (commercial airfield) also experienced a similar gear-up landing within the recent past. A new approach to this problem must be found. We know that in the past, blaming the pilot simply does not prevent the reoccurrence of gear-up landings. The Air Force must exercise leadership in the area and test the new resources available to resolve this problem. Unless this is done, we may reasonably expect that more and possibly costlier aircraft are going to land gear-up."

Less than two months after this commander made the statement, another Air Force aircraft landed gear-up.

In the past, horns, lights, buzzers, and aural tones in the headset have been installed to warn the pilot that the gear was not down when it should have been but it's obvious these devices aren't doing the job for which they were designed. At least they didn't do it in 77 cases in the past eight years.



But of course we can't lay the blame on the warning devices. They're only supposed to work if an error has been committed. You make a mistake and the horn/light/buzzer tells you about it but only IF you observe the light or hear the horn or buzzer. There's the kicker. You must first perceive the warning device. It seems that in many cases, once the pilot has made up his mind that the gear is down and has channeled his attention to landing the aircaft, all the gear warning horns, lights, and buzzers in the world aren't going to sway him from his appointed duty.

In addition to the warning devices, we've developed handy things called checklists that tell us to put down the gear. But sometimes distractions enter the picture and force our attention away from the job at hand. For instance, if, as you're reading this article, a bomb goes off in the next stall, you're going to be distracted momentarily. When you get yourself all pulled together again, chances are you aren't going to remember the exact point you quit reading when the explosion occurred. And unless you force yourself back into the article and maybe re-read a couple of lines, you just might wind up skipping a few. If we make an analogous shift and transpose the john to the seat of an aircraft, the article to a checklist, and the bomb to an unexpected radio call, the formula for distraction is complete. And if, after distracted, we don't re-read a couple of lines, the gear may still be in the well when the landing slide is complete. It takes a conscious mental effort to overcome distractions and unless we force ourselves back into the real situation, that checklist is as worthless as last year's change to 60-16.

Then there's the old habit pattern substitution syndrome. Let's say that you've developed the habit pattern: reduce power in the pitch, roll out on downwind, get the gear, the flaps, and turn. A very definite and habitual number of steps. But throw a distraction in about the time you would be reaching for the gear handle, such as a beeper coming through too loud and clear. You reach down and flip the UHF selector switch off "both" ... then lower the flaps and turn. You have substituted the UHF selector switch for the gear handle. While you've made the correct number of moves with your hands, and accomplished the correct number of steps, the gear is still tucked. Unless you retrace the steps, you may land gear-up.

Some hold that the more people in the cockpit, the less the chance of making a gear-up landing. If that were so, we would never hear statements like, "How could five people in the cockpit miss the fact that the gear handle was UP before (and after) touchdown?" And, if you'll direct your attention to the tabulation, you'll note that multi-crewed aircraft have been landed gear-up almost as many times as single-seat aircraft or aircraft flown by a single pilot. So adding more people is not the answer. What, then, is the answer?

To find it, the Air Force Inspection and Safety Center has initiated a Required Operational Capability (ROC), stating as its objective: A device is needed that will effectively insure that aircraft are correctly configured for landing. This ROC was sent to all the major air commands for ideas and inputs and, at the present time, the complete package is being put together incorporating the inputs from the MAJCOMS to forward to the air staff.

In the ROC, several devices were discussed as possibilities:

AUTOMATIC LANDING GEAR

Wire the gear-down circuit to the approach or landing position of the wing flaps so that if the gear is not already down, it will be lowered automatically when the flap switch is put to the approach or landing position.

This device obviously, would not be appropriate for all aircraft; however, it might work on aircraft that have a flap position that is used only for landings. Another drawback to this device is that it removes the pilot from the decision loop and in doing so, transfers responsibility from the pilot.

RADIO ALTIMETER WARNING DEVICE

Incorporate a gear warning device into the radio altimeter which would provide a cockpit warning to the crew if the plane descended through a pre-selected height above the ground with the gear up.

This device carries with it the inherent disadvantage of all the warning devices of the past. Existing warning devices have not prevented gear-up landings. The ability of the pilot to set up a psychological barrier between what he is doing and what the warning device is warning has accounted for many gear-up landings. Adding another would not seem to solve the problem.

OTHER WARNING DEVICES

Select an item that the pilot must look at and cannot ignore during a landing approach and incorporate a gear warning device with it. Such as:

Masking the approach speed range of the airspeed indicator with a flag if the gear is up.

This might work for those airplanes which use the approach speed range only during the landing phase. But for those that take off at 100 knots, cruise at 100 knots, and land at 100 knots . . . well. And for those aircraft which use the approach speed range for other things such as airdrops, etc. . . . well.

Incorporating a gear warning device into the angle of attack indicator or Heads Up Display (HUD) in some aircraft. On the surface it sounds good, but it's still a warning device.

THE MIRAGE SYSTEM

Adopt the device presently installed on the French Mirage IIIE aircraft used by the Australian Air Force. It consists of an audio frequency oscillator wired in series with the landing gear microswitches, the command radio transmitter, and a button on the instrument panel or other convenient location. If the gear is down and the button is pressed, the circuit is completed and a distinctive tone is transmitted over the aircraft radio. In operation, the tower operator withholds landing clearance until he hears this tone in response to,"Check Gear Down." In using the button and tone oscillator, the pilot may develop the habit of pressing the button in response to the tower radio transmission, "Check Gear Down," but the oscillator responds to fact: no gear, no tone.

This appears to be a good solution because of its simplicity and applicability to all aircraft. Pilots are already conditioned to not land without landing clearance and the addition of this device would merely change a verbal response to a button response.

You can see some of the disadvantages of this system. For instance, what if the tower is saturated and misses the tone transmission. Add to that a pilot who has developed a habit pattern of pressing the button rather than giving the response of "Gear Check," plus the gear in the up and locked position and zingo . . . gear-up landing.

Perhaps we can capitalize on the anticipated habit pattern the pilot will develop using a device of this kind by merely not exposing the button until the gear handle is down. If, in his concentration, the pilot automatically reaches for the button to respond to "Check Gear Down," he wouldn't find it. In all likelihood, his concentration would be broken and he would momentarily shift his attention to the landing gear. Might work!

These are just a few of the potential solutions to the gear-up problem; presumably, many more are being researched. And it may very well turn out that there is no single foolproof solution.

We, at TAC ATTACK, will endeavor to keep you informed as the developments unfold in this search for the best answer to the gear-up landing problem.

In shutting down this article, let's end it with an obvious statement.

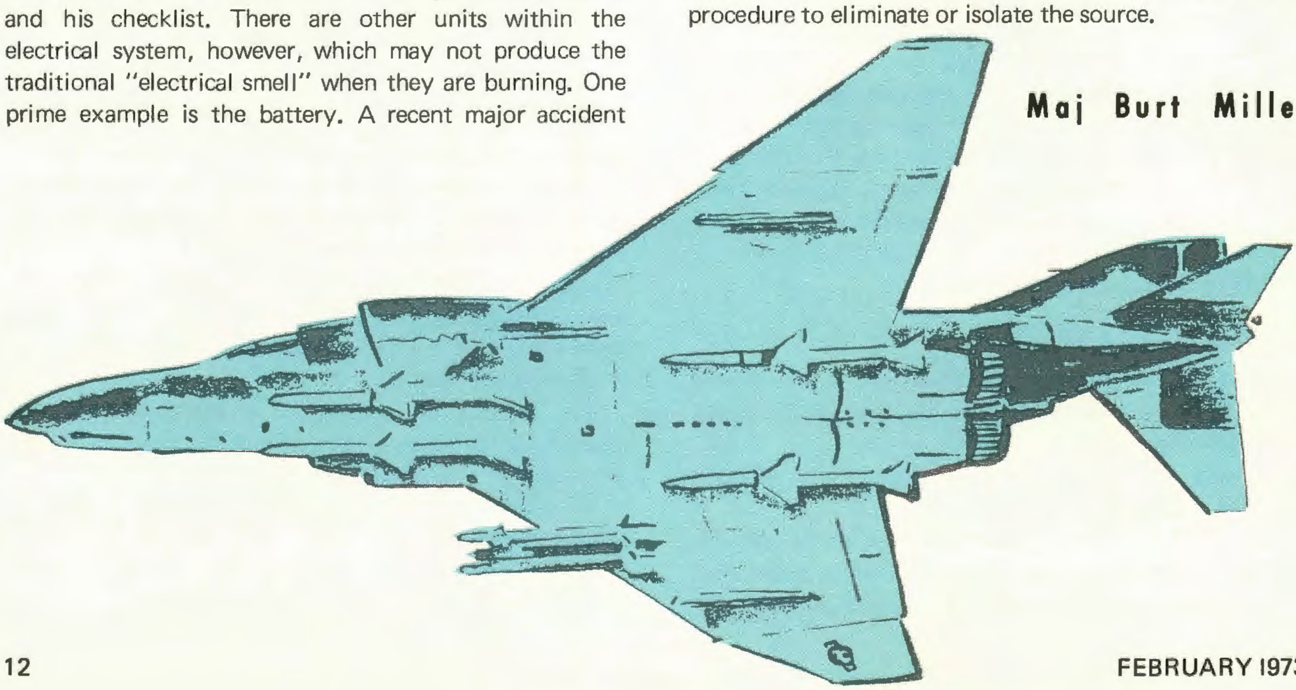
THE LANDING GEAR IS STILL YOUR RESPONSIBILITY.

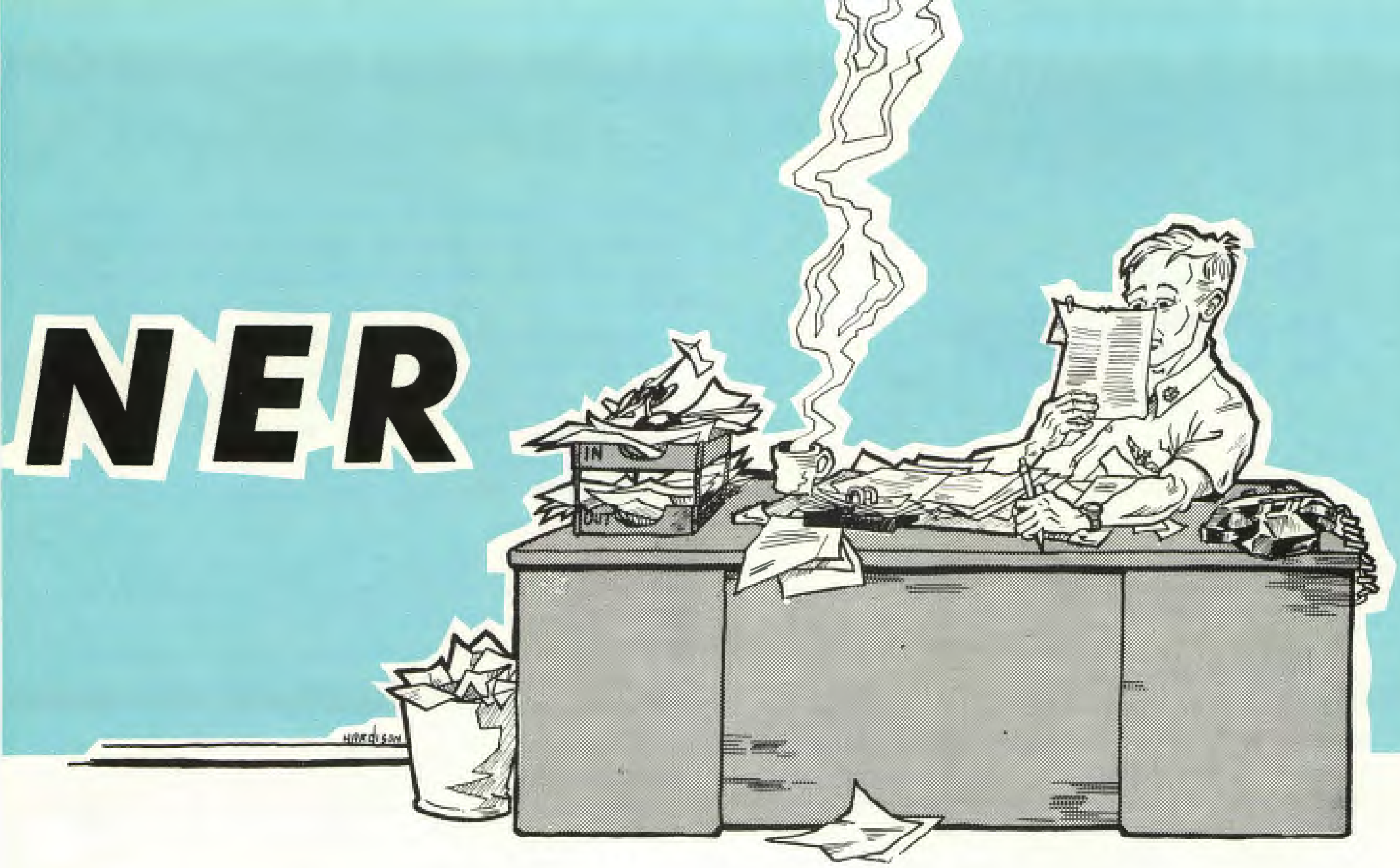
SPO COR

F-4 EMERGENCY PROCEDURES

O_2 – 100% – THEN WHAT? Probably the easiest Bold Face emergency procedure we have to memorize is "Elimination of smoke and fumes." Unfortunately, maybe it needs to be stressed that while this procedure is simple, we can't stop right there. The smoke/fumes usually have a source. Barring engine related fires for which we usually get a fire or overheat light and which don't usually result in smoke in the cockpit, our primary source of smoke has been from the aircraft electrical system. Ordinarily an aviator can recognize the characteristic odor of burning insulation or wiring, and will probably immediately dive for the generator switches and his checklist. There are other units within the electrical system, however, which may not produce the traditional "electrical smell" when they are burning. One prime example is the battery. A recent major accident which started with a battery fire, proves the point. At one time in the sequence of events the rear cockpit was so filled with smoke that the WSO disappeared from view. Neither crewmember was able to identify the source of the smoke as electrical. Because of this fact and other circumstances, the pilot never accomplished the electrical fire emergency procedures. The crew eventually had to blow the canopy and finally depart the aircraft. History reveals that smoke in the cockpit usually has a source. More important, the source is usually within the aircraft electrical system. One hundred percent oxygen only prevents asphyxiation while you move on to the proper procedure to eliminate or isolate the source.

Maj Burt Miller





F-4 ANOTHER SUBJECT

After takeoff for a routine local proficiency mission, the pilot raised the gear handle and an intermediate/unsafe right gear indication was observed. The jock kept the airspeed below 250 knots, checked the landing gear control circuit breaker IN, and recycled the gear lever to the DOWN and UP positions "several" times. The gear would only indicate safe when the handle was in the DOWN position. The pilot elected to abort the mission and reduced fuel load. While dumping fuel and maneuvering for the landing approach, the gear handle was again recycled through the UP and DOWN positions "several" times. On final, the gear was once again placed in the DOWN position, a DOWN AND LOCKED indication was observed, and the aircraft was safely landed. Investigation revealed the right main gear inner door actuator piston rod was broken. No way that gear was going to indicate UP AND LOCKED!

Although the Dash One does not specifically stipulate or limit the number of times a gear should be cycled to the UP position, I thought most jocks followed that old philosophy, "If it's down, don't mess around." It would still appear to be excellent advice.

Maj Burt Miller

DEAD PILOT FACTOR

QUESTION:

What do these accidents have in common?

An F-100 failed to complete a joinup at night and crashed two minutes later. The pilot did not eject. Cause – undetermined, most probable – pilot factor.

An F-4 flight leader struck the ground during descent in marginal weather. The pilot did not eject. Cause – pilot factor.

An F-4 hit the ground on base-to-final turn for skip bomb. The pilot did not eject. Cause – pilot factor.

A C-123 rolled inverted and crashed on short final. No survivors. Cause – supervisory factor (instructor pilot).

ANSWER:

1. All crewmembers were killed.
2. Crewmember factor was the cause or most probable cause.

When an aircraft accident occurs in which there were no crewmember survivors and the cause is assessed as pilot factor, we label it as "dead pilot factor." It's not a particularly ingratiating term, but it gets the point across.

Is it unusual to find "dead pilot factor" as the final

SPO CORNER

cause factor on accident reports?

To find the answer, TAC Safety looked at 262 accidents which occurred from 1968 to 1971, involving TAC and TAC-gained Reserve forces. Crewmember error was listed as the primary or most probable cause in 72 percent of the accidents in which there were no crew survivors. In the cases where at least one crewmember survived the accident, crewmember factor (supervisory, instructor pilot, pilot) dropped to 45 percent.

Quite a startling difference, but what does this really mean? Well, it could mean two things. First, it would be easy to say that pilots are their own worst enemy in attempting to salvage a bad situation (pilot induced). Or secondly, we could say that accident boards are ill-equipped to handle investigations without living-breathing flight recorders to tell the story.

That pilots would stick with an aircraft to their death is hard for the living to accept. However, we have observed that pilots, as members of accident boards, tend to be critical and frequently jump to the conclusion that the accident pilot made a mistake simply because the opportunity was there for him to do so. (Occupational guilty conscience?)

Or for another example, time after time pilots will blame themselves for a hard landing, then explain what they did wrong to the squadron commander and/or the DO, only to find out the airspeed indicator was erratic or the flight controls were binding.

This "occupational guilty conscience" may be a small part of the answer, but we believe the larger part lies in the reduced capability of accident boards to accurately pinpoint the cause when there are no crew survivors. Statistically, there is evidence to support this theory since 18 or 25 TAC undetermined accidents in the 1968 to 1971 time frame involve accidents with no survivors.

An investigative problem does exist, as evidenced by the difference between the 72 percent pilot factor for no survivor accidents and the 45 percent pilot factor for accidents with survivors. But the problem may go deeper than just the statistical causes required to feed Air Force computers. Since TAC and the Air Force take corrective action on each and every accident, a significant percentage of this corrective action may be misdirected, doing more harm than good, without eliminating the cause of the accident. And, if a costly materiel modification is implemented without true need, then dollars are wasted that might be better used elsewhere. Finally, if the cause is not correctly pinpointed, other valuable aircrews and aircraft may be lost.

Without doubt, the last point is the most important. Historically, we are having fewer and fewer accidents in Tactical Air Command. But the cost per accident is going up and up, just as the cost of aircraft continues to rise. If we accept the theory that our investigations are incomplete, then it is going to cost a lot while we wait for trends to develop or for subsequent accident boards to stumble on real cause factors.

Let's recognize that part of the cause may be pilots with an overpowering drive to save a lost aircraft. Whether or not that is the case, we need to continue to emphasize education to cover the possibility. We need to bring it to the forefront of discussion and keep it on the surface . . . keep talking about it from every conceivable direction.

And it becomes obvious that we need to improve the quality of our investigations.

To this end, the TAC Office of Safety has recently organized a special investigative branch within the Flight Safety Division to explore all methods of improving field investigations of aircraft accidents. With these efforts and with continued education in this area, we hope the percentage of "dead pilot factor" vs "live pilot factor" accidents will eventually approach each other at zero.

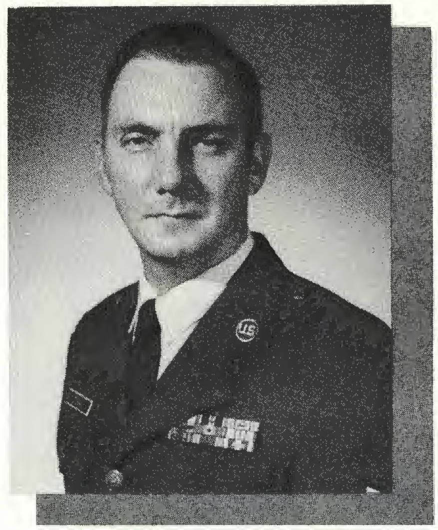
Lt Col Lou Kenison

This space intentionally left blank
awaiting your input to
"EMERGENCY SITUATION TRAINING".
Check the Jan. issue of
TAC ATTACK for further poop.

TACTICAL AIR COMMAND

Maintenance Man Safety Award

Master Sergeant Carey L. Stegall, 834 Avionics Maintenance Squadron, Hurlburt Field, Florida, has been selected to receive the TAC Maintenance Man Safety Award for December 1972. Sergeant Stegall will receive a letter of appreciation from the Commander of Tactical Air Command and a Certificate.

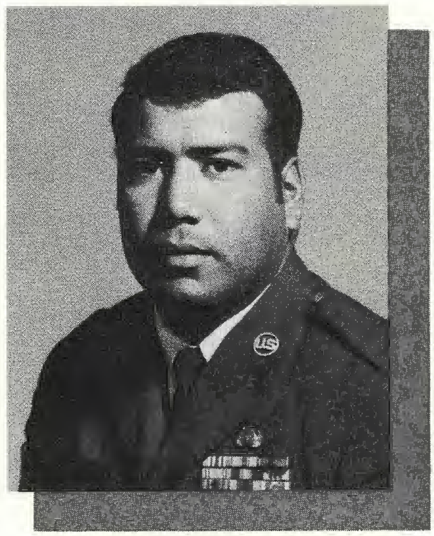


MSGT STEGALL

TACTICAL AIR COMMAND

Crew Chief Safety Award

Staff Sergeant Robert F. Ramirez, 316 Organizational Maintenance Squadron, Langley Air Force Base, Virginia, has been selected to receive the TAC Crew Chief Safety Award for December 1972. Sergeant Ramirez will receive a letter of appreciation from the Commander of Tactical Air Command and a Certificate.



SSGT RAMIREZ

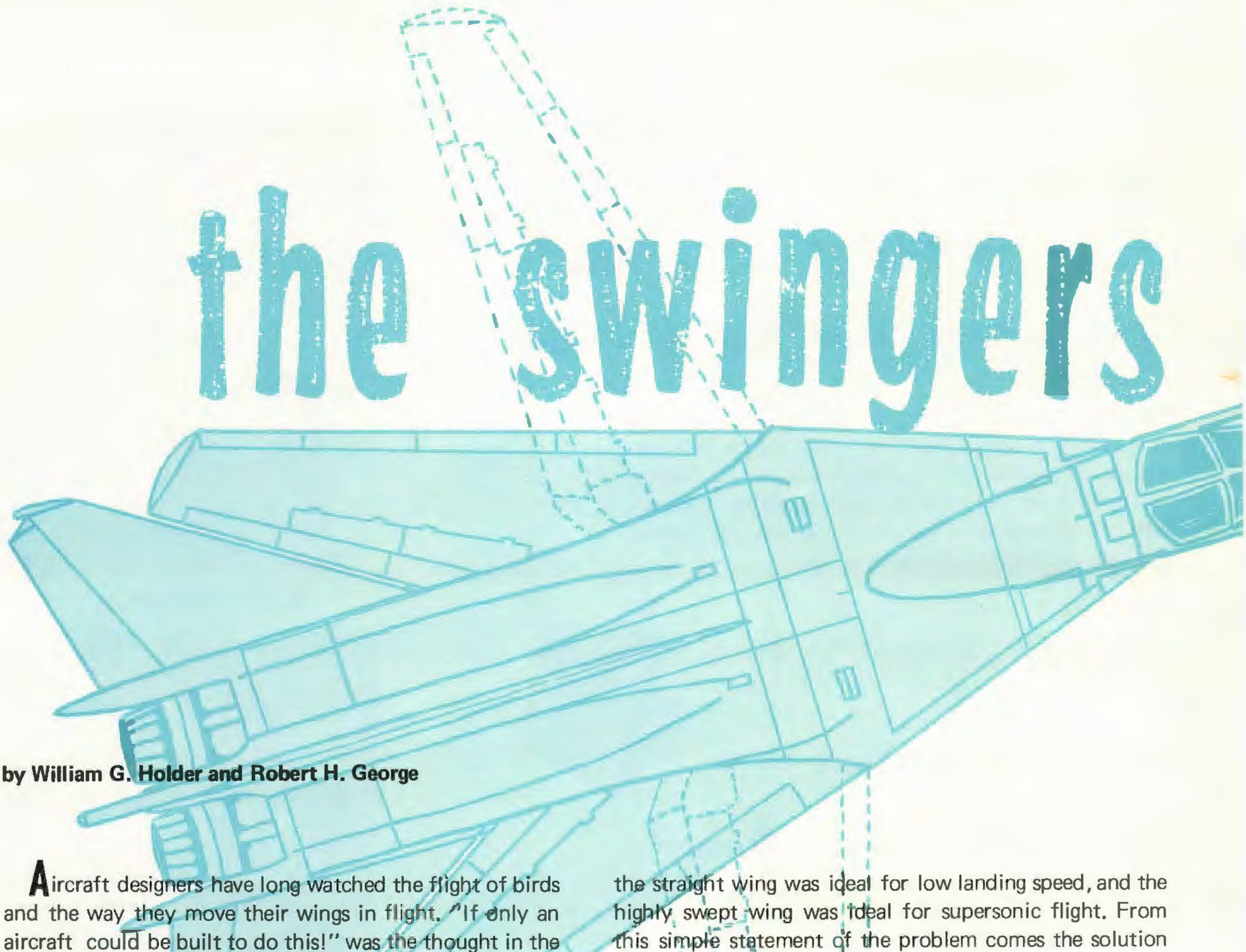
TACTICAL AIR COMMAND

Ground Safety Man of the Month

Sergeant Victor A. Mortenson, Jr., 2nd Aerial Port Squadron, Little Rock Air Force Base, Arkansas, has been selected to receive the TAC Ground Safety Man of the Month Award for December l972. Sergeant Mortenson will receive a letter of appreciation from the Commander of Tactical Air Command and a Certificate.

SGT MORTENSON

the swingers



by William G. Holder and Robert H. George

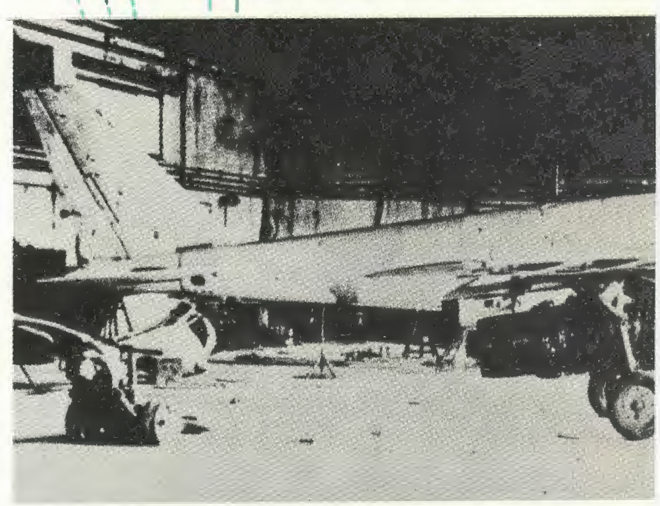
Aircraft designers have long watched the flight of birds and the way they move their wings in flight. "If only an aircraft could be built to do this!" was the thought in the designers' minds.

For many years, even before the Wright brothers' epic flight, inventors have been working on moving wings for airplanes, wings that increased and decreased their length and width, wings that oscillated longitudinally, wings that flapped like birds' wings. Some of these contraptions were actually built, and some of them even flew — sort of.

The PRACTICAL idea of movable wings was introduced at a scientific convention in Rome in 1935. Dr. Adolf Busemann, a young German designer, read a paper on aircraft wings and high-speed flight. Dr. Busemann's paper started aero engineers thinking about the advantages of movable wings. They found that one of the greatest advantages of sweptwings was the reduction of aerodynamic drag at high speeds. Research has since established that an airplane having zero sweep (wings at right angles to the centerline of the airplane) will produce the same drag at 540 miles per hour as an airplane having wings swept at 60 degrees flying at over a thousand miles per hour.

But some engineers realized that the movable wing concept had inherent disadvantages. When sweep angle increased, drag decreased but stalling speed increased. So the straight wing was ideal for low landing speed, and the highly swept wing was ideal for supersonic flight. From this simple statement of the problem comes the solution — variable sweep.

One of the scientists who was particularly impressed by the Busemann theory was Dr. Albert Betz of the Aerodynamics Research Institute of Göttingen, Germany. He set about to do further research on the idea. The work of Dr. Betz was noted by engineers at



The world's first swingwing aircraft, the Messerschmitt P-1101, never

Messerschmitt, who felt that the concept might have an application to several high-speed aircraft that the company was considering. Messerschmitt conducted extensive wind-tunnel testing to insure the validity of the theory.

THE MESSERSCHMITT P-1101

In 1942 Messerschmitt began preliminary work on a design dubbed the P-1101. For over two years it was nothing more than a study program, but in September 1944 it was decided to produce one prototype aircraft. The German plans called for a single-place, mid-wing, single-engine aircraft with a 40-degree wing sweep. Attractiveness of other aircraft designs caused the P-1101 program to be considerably cut back, but it was decided that the prototype would be completed to serve as a flying test-bed for wing sweep and for new turbojet engines.

By this time, however, it was clear to the Germans that the war was almost over. In early 1945 a company of American infantry overran the P-1101 development facility. The Messerschmitt technical personnel had left everything in perfect order, allowing the Americans to continue the swingwing research.

Although the basic engineering drawings and calculations for the P-1101 were never recovered, the aircraft was moved intact to Wright-Patterson Air Force Base, Ohio, where it was publicly displayed in 1945. Many observers considered the P-1101 a freak of engineering design and of little practical value. This, of course, would in future years prove to be very erroneous.

The P-1101 was truly an advanced aircraft for the time of its development. Its two-piece wing had steel spars, with wooden ribs, and a 40-degree sweep. The pressure cabin was located well forward in the upper part of the fuselage, followed by the fuel tanks, undercarriage retraction space, and a tail cone. The 1101's wing span was some 27 feet, the wing area 170 square feet. The top speed was over 600 miles per hour at altitude.

Thus, the end of the war prevented the Germans from completing their first swingwing aircraft. There was one other aircraft using the movable wing concept, The P-1114. This novel design incorporated a provision for moving the entire wing assembly fore and aft along the fuselage to compensate for center of lift movement as flight speed increased.

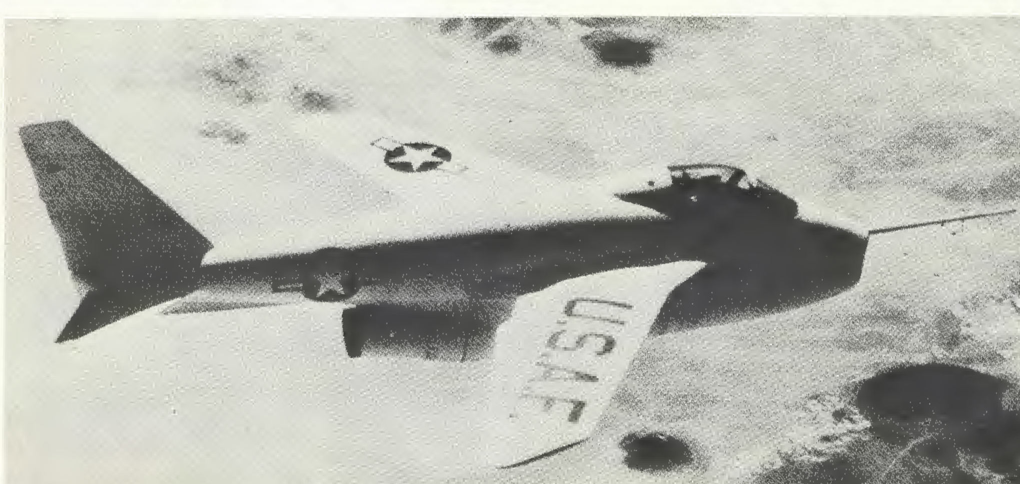
Why the swingwing concept did not receive more attention cannot be definitely determined, but one main reason for the lack of interest was that engines were not powerful enough to propel the aircraft to the speeds at which variable sweep would make important contributions to performance. Also, the advanced German designers seemed to be more intrigued with the delta-wing design.

THE BELL X-5

One hot morning in June 1951, a potbellied little white airplane streaked along the desert runway at Edwards Air Force Base, California. Then the skilled hands of Bell's chief test pilot guided the tiny plane into the air, and America's first swingwing aircraft had taken to the sky. It bore a marked resemblance to the P-1101.

Early in 1948 the Bell Aircraft Company, aided by the loan of the P-1101, began design studies on an aircraft that could change its wing sweep in flight. For a time it looked as though the Air Force might buy 24 of them, but an unfavorable evaluation of the Air Materiel Command reduced the program to a two-aircraft research endeavor. Designated the X-5, these planes were expected to demonstrate the best sweep angle for interceptor

lew.



The Bell X-5, first U. S. variable-wing aircraft. Note the similiarity to the Messerschmitt P-1101.

aircraft. It was made clear, however, that the X-5 was only a research tool, not intended for production, ever.

Not exactly the sleekest jet aircraft ever built, the X-5 looked something like a flying tadpole. The two-position adjustable wings were variable in sweep between 20 and 60 degrees. The X-5 had a takeoff weight of about 9500 pounds, the adjustable wing assembly weighing 1350 pounds. The engines of the plane were placed below the wing in the lower fuselage, to accommodate a variety of plants and to have the engine out of the way of the sweep mechanism.

The mechanism for operating the sweep variation was truly an engineering masterpiece. The wings were mounted on hinges just outboard of each side of the fuselage. Inside each wing, near the leading edge, was attached one end of a ball-bearing screw jack. Shafts were then passed through the interior of the wings and into the fuselage, where they were driven by a gearbox. When the motors of the mechanism were operated, the screws rotated the wings on their pivots, changing the angle of the sweep. But the wings did more than just sweep when they were operated. In order to compensate for changes in pressure and center of gravity, it was necessary to slide the wings along rails mounted in the fuselage. At 20 degrees sweep, the entire wing assembly slid forward on the rails until, at 60 degrees sweep, they were about 27 inches forward of their starting positions. The sweeping and positioning actions took place simultaneously.

On the fifth test flight of the X-5, the sweep mechanism was operated for the first time. By the ninth flight, the sweep had been operated through its total limits. About that time, a strange characteristic of the X-5 was noted in the tests. At low speeds, almost all the available elevator action was required to level out the X-5 for landing. It had to be accelerated just before touchdown to keep from flying right into the ground.

Even though the X-5 had several deficiencies, a good deal of high-level interest was shown in it as a tactical fighter. Its advantages over bigger and heavier fighters of the day (e.g., the F-86 and F-89) were its much greater maneuverability and the fact that it could be carried in the C-119. But its complicated sweep mechanism and its limited fuel capacity and firepower led to its demise as a production fighter.

On 13 October 1953 one of the X-5s crashed when it failed to recover from a spin at 60 degrees sweep. The other now rests safely at the Air Force Institute of Technology, on loan from the Air Force Museum.

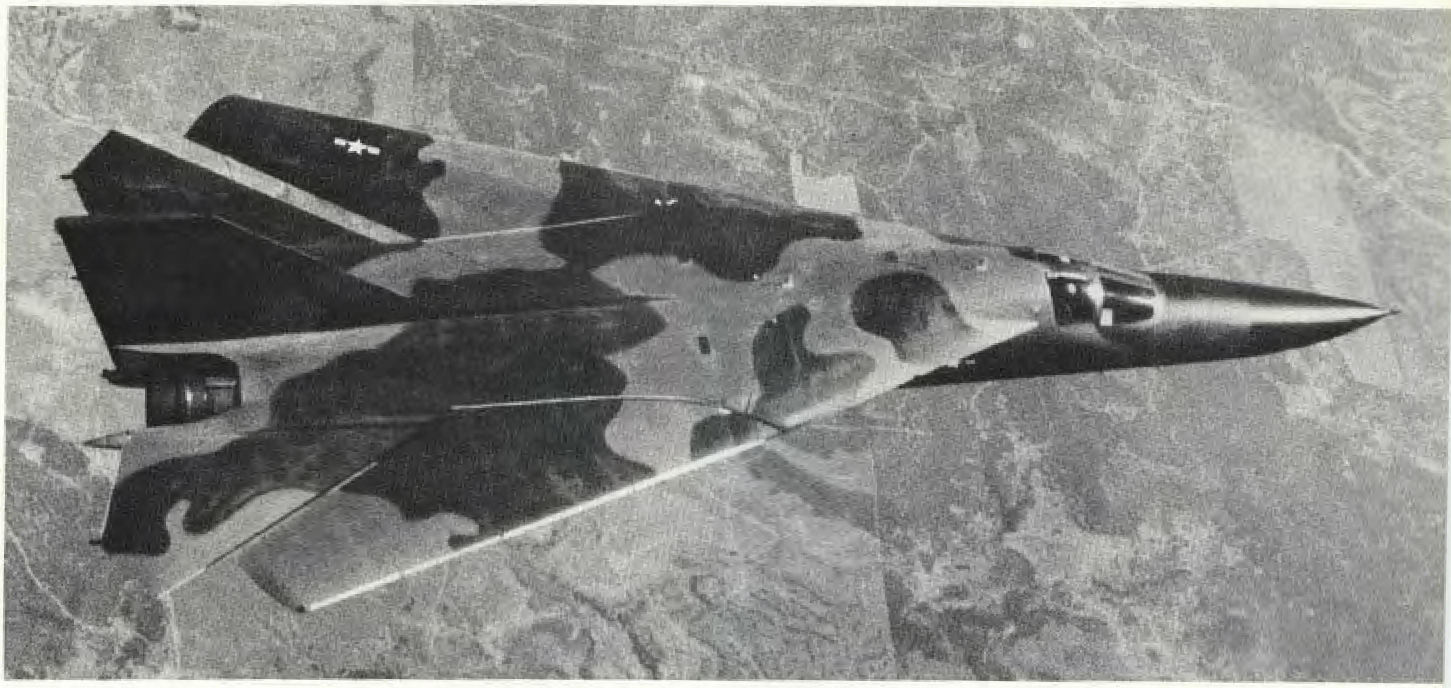
THE GRUMMAN XF10F

Even though the X-5 had been eliminated from consideration, it did not end the immediate history of the swingwing. Shortly thereafter, another strange airplane rolled out at the Flight Test Center. This was a great-grandson of the famous F4F Wildcat, and it featured two-position, inflight-variable swept wings.

The Grumman XF10F Jaguar was powered by a Westinghouse J40 engine which generated 11,600 pounds of thrust. Its variable-sweep wings were mounted high on the fuselage. The wings were held straight for landings but could be swept back to 40 degrees for high-speed flight. The Jaguar featured a delta-shaped horizontal tail mounted atop the vertical fin. This replaced the conventional swept surface originally used.

The first of two XF10F prototypes flew in May 1953. For a time, it was thought that 30 of these might be ordered, but the XF10F proved to be a disappointment.

The Navy's XF10F, a swingwing built by Grumman.



The F-111, TAC's swingwing aircraft.

THE CONVAIR F-111

The Air Force's newest fighter-bomber, the F-111, and its strategic counterpart, the FB-111, were the next of the swingwing aircraft. Several versions of this multimission aircraft have been built, including the bomber version FB-111 which has longer wings than the fighter version. The F-111 began life in 1959 when the Air Force defined an operational requirement for an advanced fighter (the TFX), which would later become the F-111.

Much of the technology involved with the F-111 design evolved from the X-5 and XF10F. However, with the F-111 sweep design, a slightly different approach was employed. In this aircraft the wing would sweep on its own pivot, well outboard of the fuselage. With this technique, the aerodynamic center remained relatively stationary throughout the wing's full sweep.

Fully extended to 16 degrees sweep, the wing creates maximum lift, allowing short takeoffs and landings. As the speed increases and drag grows, the span and surface area are decreased by sweeping the wings to a maximum of 72.5 degrees. The wingtips come quite close to touching the leading edges of the tail. In the "folded position," the F-111 can move along at Mach 2.5 at altitude and supersonic on the deck. The wings can be placed in any intermediate position to perform any specific mission requirement.

Each wing pivots around an 8.5-inch-diameter steel pin, while the wing sweep is controlled by a hydraulic actuator. Working much like an automobile jack, large screws extend to determine the position of the wings. A pistol grip in the cockpit is the pilot's control device. In the event damage occurs to the primary hydraulic system, a utility system will automatically cut out flow to nonessential subsystems in order to furnish power for the wing sweep and flight controls.

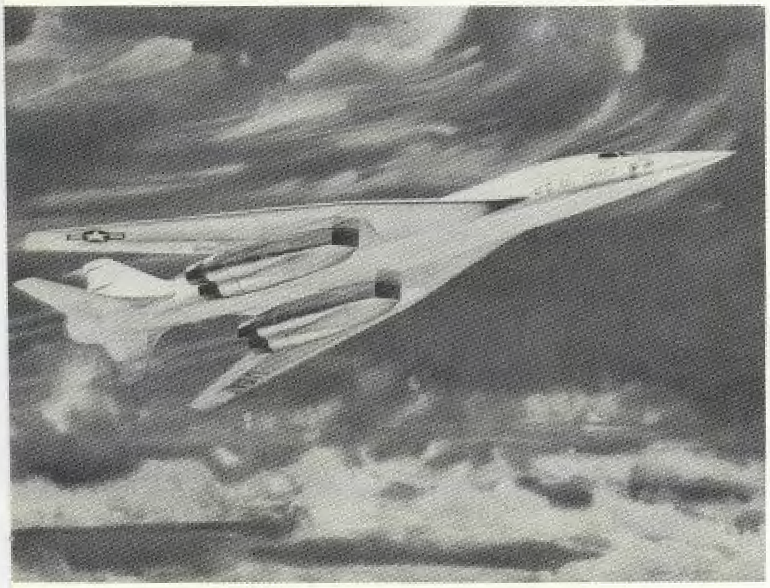
The F-111's variable-sweep wing is going to play an important part in some aerodynamic testing. Shortly, an F-111 will be fitted with the so-called "supercritical" wing, which is specially designed to reduce high-speed drag. Equipping the F-111 with this wing is expected to greatly increase maneuverability and increase transonic performance without affecting the aircraft's handling characteristics. The results of this testing should be very important to the F-111 and high-performance aircraft of the future.

THE B-1 STRATEGIC BOMBER (NORTH AMERICAN ROCKWELL)

For over a decade the Air Force has been looking for an aircraft to replace the B-52s and the B-58 fleet.

The so-called AMSA (Advanced Manned Strategic Aircraft) was the paper project for an advanced bomber (B-1). The AMSA also was to employ a swingwing. In November 1969 the Air Force released its request for

the swingers



The proposed B-1 (artist drawing).

proposals for the B-1 to interested bidders of the aerospace industry. The airframe contract was won by North American Rockwell, and General Electric won the engine contract.

Recently, North American displayed a full-scale mockup of the B-1. The "Big White Bird" is, indeed, a beautiful piece of airplane. The construction of the mockup was a big step toward possible future production of the B-1.

The B-1 will be able to fly at treetop level at almost 700 miles per hour and more than 1400 miles per hour at altitude. With its swingwings, it will be able to land on very short runways – quite amazing for an aircraft in the 350,000 to 400,000-pound weight class. The B-1's swingwing mechanism is considered by engineers to be the most complicated system in the aircraft. As many as 35 different swingwing designs were examined before North American Rockwell decided on the present truss-type wing-pivot design.

So as to compensate for shifts in pressure and center of gravity, the B-1 uses a complex fuel system that transfers fuel within the fuselage to maintain aircraft stability. To maintain proper balance, fuel will be used from the mid-fuselage tanks first, from the wing tanks second, and from the forward and aft fuselage tanks last. Fuel can be pumped from the forward and aft fuselage tanks to the mid-fuselage tanks as the wings swing. An on-board computer will normally handle this intricate transfer, but it can be controlled manually from the cockpit. The sweep rates are geared to particular flight conditions and are slow enough to allow the fuel transfer to maintain the center of gravity.

The B-1's wings can be swept or extended normally with only two of the four hydraulic systems. The wings can be swept from 15 degrees for takeoff and landing, to sharply swept back at 67 degrees for high-speed flight. While engineers consider it highly unlikely that the wings might jam, the B-1 CAN be landed with wings fully swept – but, needless to say, it would be a much "hotter" landing.

The B-1's first test flight is presently scheduled for the spring of 1974, with operational status in the late seventies. The B-1, engineers say, will last the rest of the twentieth century. It is, therefore, very possible that the entire Strategic Air Command fleet will be swingwing in the eighties, with the FB-111 and the B-1.

THE GRUMMAN F-14 TOMCAT

When the Navy canceled procurement of the F-111B, they found themselves in need of another aircraft to replace the F-4 Phantom. Once again the Navy went for another swingwing design in the F-14 Tomcat. The plane is being built by Grumman, long a manufacturer of Navy aircraft.

The F-14's variable-sweep wing is the result of a tremendous amount of research work. One of the most advanced F-14 developments is "glove vanes," which extend automatically from the leading edge near the fuselage at Mach 1, offsetting the shift in the F-14's aerodynamic center. This leaves the horizontal stabilizer free for maneuvering, minimizing trim drag penalties and increasing combat agility. Also flap activation is coordinated with the automatic wing sweep for maximum performance. The F-14's maximum sweep is 68 degrees (from a minimum of 20 degrees), when the wing and tail surfaces are, for all practical purposes, one.

The F-14's sophisticated Mach-sweep programmer provides for fully automatic wing sweep as a function of speed and altitude. Therefore, the pilot can obtain the maximum performance under any flight condition. As is true with the B-1, the F-14 pilot can manually control the wing sweep, but even then the programmer will maintain limited control on the pilot's action.

With its swingwing and powerful engines, the F-14 may make a formidable addition to the Navy's striking power.

THE MIRAGE G8 and the PANAVIA 200

Our report on swingwing aircraft would not be complete without mentioning the swingwing aircraft of Europe.

The presently flying French Mirage G8 is the culmination of Mirage's experience in swingwing aircraft, having built the G1 and G4 prior to the present G8 configuration. At full sweep the wings and tail have only a slight slit of space between them. It is powered by two engines and has a top speed of Mach 2.5.

Indications are that the G8 might well be the first variable-geometry aircraft to be ordered by the French Air Force. It could be a replacement for the Mirage III in the late seventies.

During the same period the British-German-Italian Panavia 200, the new multimission aircraft, is designed to enter service with the Royal Air Force, the German Luftwaffe, the German Navy, and the Italian Air Force.

The variable-sweep wing is the key feature that gives the 200 such a wide diversification of capabilities. Swept forward, it provides high lift capability,giving STOL performance from semi-prepared fields and a very long loiter time. Swept fully back, it gives a low-drag, high-speed capability with very good response at low levels.

Powered by two Rolls-Royce RF-199 engines of advanced technology design, the 200 is capable of Mach 2+ at altitude. Wing sweep range is from 20 to 70 degrees.

BOEING'S INITIAL SST

The first design of Boeing's supersonic transport (SST) might have been the biggest swinger of them all.

When the sides were being formed for the battle to decide who would build the SST, it came down to two different SST concepts — the delta-wing design of Lockheed and Boeing's swingwing. Boeing won and went about the job of building the largest swingwing ever. But that was not to be. The decision was made in 1969 to abandon the swingwing and go with a fixed, double-delta shape. Now the whole SST program has been scrapped.

One of the main reasons for the switch from the swingwing design was the tremendous weight penalty incurred by the swingwing mechanism. It was quoted that the weight penalty for the variable geometry was over 40,000 pounds, about 6 percent of the gross weight.

SWINGWING IN SPACE — THE LOCKHEED FDL-5

In the late 1960s, Lockheed and the Air Force Flight Dynamics Laboratory conducted tests on a swingwing spacecraft. The spacecraft was designed to be a model for a reusable launch vehicle.

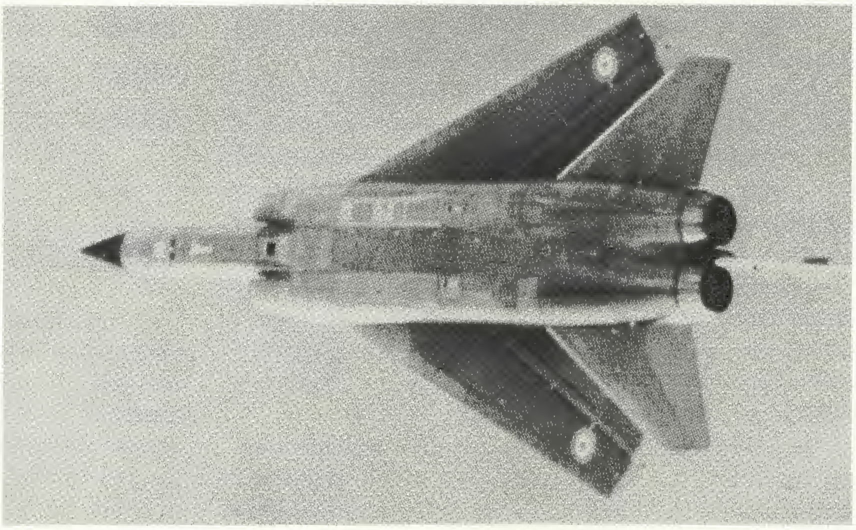
The triangular-shaped spacecraft has a small vertical tail with a movable rudder. The small delta wings swing into the airstream from the sides of the vehicle, about halfway down its length. The wings would be used after the spacecraft had re-entered the atmosphere and slowed down for a conventional aircraft-type landing. The future may see some application of this concept in returning space vehicles.

Those early experimenters who strapped contraptions on their backs and to their arms and jumped from precipices and bridges, frantically flapping their arms, knew the birds had something. While this review has shown that the swingwing has a firm hold on its domain of aeronautics, it is not as sophisticated as our bird imitators — it doesn't flap; it merely swings. But it does fly!

Reprinted, with permission of the Editor, from AIR UNIVERSITY REVIEW, November-December 1972, pages 53-62.

The French Mirage G 8,

a swingwing mach 2.5 fighter.



CHOCK TALK ...incidents and incidentals

CLEARANCE READBACK

The Flight Safety Foundation frequently issues bulletins to pilots regarding the necessity of repeating ATC clearances to avoid misunderstanding. The following classic case of a tow-tractor driver misunderstanding an ATC clearance illustrates the importance of a clear understanding of all communications and especially those from the tower regarding towing an aircraft in an active movement area.

A copilot was making the takeoff at night in a B-707 and was nearing rotation speed when the captain saw, to his horror, a wide-bodied jet dead ahead being illuminated by the 707's landing lights. The wide-body was crossing the runway under tow ahead of the 707.

The 707 captain took control, rotated and banked the aircraft as much as he dared. Fortunately, he lifted the left wing and pods of the 707 over the wide-body's tail.

He did not see any lights on the wide-body and had not been warned of its presence by the tower.

Later analyses showed that the normal height of the 707 above the runway at the point where the incident occurred was calculated to be 25 feet – which is some 30 feet below the tail of the wide-body. The fact that a collision did not occur is attributed to superb airmanship by the captain of the 707.

Air traffic control transcripts revealed the tractor driver had called the tower and stated, "We have a wide-body parked at the gate and we want to push back and take it over to the maintenance area." The tower replied," . . . approved, use route one."

Because an aircraft in the meantime had become ready for departure, the tower called the tractor driver and instructed him to " ...plan to use route two and hold short of two seven right." This was acknowledged by the tractor driver. Later the tractor driver called, stating, ". . . . we're at the route two, ready to cross two seven." The tower then cleared the 707 for takeoff and responded to the tractor, " . . . you're not at route two – route two is at the two seven right runway pad . . . " which was acknowledged by the tractor.

A short time later the tractor driver called the tower and said, " . . . you know you cleared me across that taxiway and the jet just about got us." The tower replied, " . . . negative, I did not clear you to cross, I told you you were not at route two and to proceed to the two seven right runup pad." About that time the pilot of the 707 came on and said, " . . . you saw that, didn't you?" The tractor driver said, " . . . I thought I was on route two; I'm very sorry about that."

The probable cause of this incident was a tractor driver's unfamiliarity with the numbered taxi-tow routes, and misunderstanding that the route information given by ground control was a clearance to cross an active runway.

COULD A SIMILAR SITUATION OCCUR AT YOUR BASE?

Flight Safety Foundation

HISTORY

"One fatality and seven injuries." This was the shocking statement reporting the aftermath of a C-130B tire and wheel explosion. It is sad indeed because the waste of human resources could have been prevented, if the wheel had been given due respect.

The maintenance support Hercules had been offloaded and was being taxied to the parking area. During one of

with a maintenance slant.

several turns, the crew felt the aircraft lurch in an unusual manner. They attributed this to a malfunction in the nose gear system.

The engineer and a scanner got out and inspected the nose gear. Finding nothing unusual, they signaled the pilot to taxi slowly forward while they checked the rest of the gear. After about four feet of travel, the engineer called a halt and signaled for engine shutdown. He had found some metal shavings and A PIECE OF BROKEN WHEEL RIM by the left main rear wheel. Although this discovery should have indicated a wheel failure, the 781 write-up was to the effect that the left REAR BRAKE HAD DISINTEGRATED.

The maintenance crew assigned to the repair job ran into trouble from the beginning. After the gear was jacked and the axle nut removed, the wheel did not slide off as was expected. In fact, it wouldn't budge at all. Pressure was applied by several individuals, and the tire was forcibly tapped from the inboard side. One airman was standing outboard of the wheel, prepared to catch the outer bearing when the wheel came loose. Instead, he caught the full force of the blast as an explosion propelled the wheel off the axle and across the ramp. The casualties: one dead and seven injured.

CAUSE: The tire was not deflated before an attempt was made to remove it.

This ground accident synopsis was taken from the February 1963 issue of AEROSPACE ACCIDENT AND MAINTENANCE REVIEW. Why? To show that history repeats itself.... and it does so because we let it.

Late in 1972, two airmen were injured when a tire which they were disassembling came apart with explosive force; it had not been deflated despite warnings posted in and around the shop, readily available tech data, and four separate maintenance operating instructions requiring tire deflation prior to removal of wheel assemblies from aircraft.

What's your shop's accident history? Will it repeat?

MEETING ADJOURNED

The following safety meeting account, duly signed by the 12 members of the safety committee present, was submitted to a supervisor:

The subject of this month's meeting was "accidents." We read the Five-Minute Safety Talk entitled, "Accidents Are Caused." The impact of this subject was profound, and at the conclusion of the reading a heated discussion arose.

During a lull, a member of the group raised his hand to ask a question, and accidentally knocked a coat off the rack, which fell over the head of a second member. While removing the garment, the temporarily blinded member struck the window with his elbow, scattering glass all over the floor.

In picking up the glass, two others got cuts on their hands. The group leader grabbed the push broom to sweep up the mess, but in the crowded room, either the handle of the broom or another member moving out of the way dislodged a fire extinguisher from the wall, which fell and discharged, spraying the rest of the group with chemicals.

The member who originally raised his hand to ask the question said he forgot what he was going to say and, instead, complained of the cold air coming in through the broken window. Since there is no cure for the common cold, it was decided to adjourn the meeting, and the members went back to work.

Navy Safety Review

MANUFACTURED LOCALLY

Shortly after takeoff in the C-130, the oil quantity on number 4 engine began to decrease. The crew turned the Herky around and headed for home plate, then shut the engine down on landing roll when the oil pressure began to fluctuate.

When maintenance dug into the oil system, they discovered an oil pressure line which was supposed to be 21 inches long only measured 20 inches. The line reached from point A to point B without any problem, but without that extra inch there was no "give" to the line. It pulled loose from the fitting.

Maintenance also found out that the line had been manufactured locally. Luckily, there was no fire.

TAC TIPS

. . . interest items,

HOT CHECKLIST

Ever wonder why the C-130 instructor pilot berates his students for placing checklists, clipboards, etc., on the instrument panel glare shield?

Other than the fact that the checklist can slide off the panel during takeoff and inflict grievous injuries (depending on where it lands, and it always lands someplace uncomfortable), here's a better reason for not putting anything on the glare shield.

During the final phase of a formation landing, the copilot placed his checklist on the glare shield above the instrument panel. At round out the copilot noticed smoke coming from the area of the checklist and windshield. He picked up the checklist and it immediately burst into flames. Quickly, he dropped it to the floor and stomped out the fire with his number tens. Smoke, fumes, and no doubt a bit of confusion followed but the crew was able to complete the formation landing (as well as the smoke and fumes elimination checklist) without further incident.

What happened? When the copilot tossed the checklist on the glare shield, the wire binder on the checklist made its way under the rubber boot that shields the windshield NESA electrical terminal. Contact! Current flowed through the wire, heated it up, and set the checklist binder on fire.

There's nothing in the mill to make checklist binders out of Nomex, but we can pass the word that the glare shield is not a good place to store anything.

THEY'RE RIGHT !

If you fly an F-4E, and are pretty knowledgeable concerning tank jettison limitations, then you know that a centerline tank can be jettisoned between 175 KIAS and 390 KIAS. If you're the type that chases down and reads notes in the Dash One, then you know that between 350 KIAS and 390 KIAS below 15,000 feet, the tanks may contact the airplane and cause minor damage. The photo here shows the minor damage one F-4 received to the underside of the airplane, the aux air door, and door 83R, while jettisoning a centerline at 2000 feet, 350 KIAS, and 1 G level flight. Looks like the Dash One writers know what they're talking about. They're right!

mishaps with morals, for the TAC aircrewman

WHAT IS IT ?

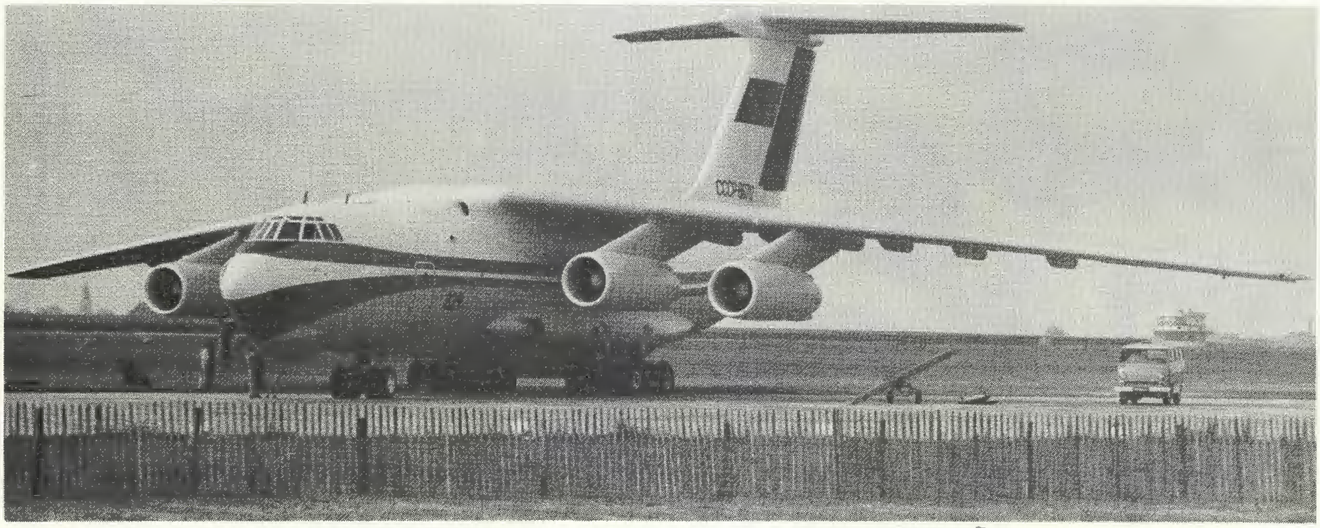
C-141?

AMST (Advanced Medium Range STOL)?

Nope! Try IL-76, Soviet-built airlifter.

These photos represent the sum total of what started out as an article on Soviet tactical airlift. Unfortunately, most other information on this subject, while voluminous, is classified. However, assuming you meet the necessary security clearance criteria (need to know, etc) and are interested, you might pay a visit to your local intel shop for more information. Take a look at the structure within the Soviet air arm, the missions, the airplanes, the rotations, and some of the airdrop techniques and procedures they use.

You'll be surprised at what you find.



NUMBERS

Some people around TAC have yet to accept the training philosophy or the products of ISD (INSTRUCTIONAL SYSTEMS DEVELOPMENT), or SAT (Systems Approach to Training) as it was once called. TAC began using Instructional Systems Development in 1969 to train C-130 aircrew members and is now training A-7 pilots under the concept.

Basically, ISD is a training system which emphasizes what the aircrewman needs to know to accomplish the job safely and efficiently and discards the stuff that is "nice to know" but not essential to the job.

The airlines were the first to employ this shift in training philosophy and this article written by an airline captain provides an insight as to why it was needed.

The words have a familiar ring and apply not only to the airlines but also to the aircrewmen of TAC.

by Capt W. R. Broocke
National Airlines

I have a proficiency check in the offing, and instead of writing this article I should be on my books memorizing the numbers which are dear to the hearts of the mechanically oriented folks who will ask me about them, but what I have to say has been bubbling inside me for a long time, so I may as well let it all hang out.

The fact is that so many of the numbers are meaningless or useless to me that after thirty years of receiving military and civilian flight checks, it is simpler for me to memorize them than it is to justify them.

When I get in the box in a few days, I will know that the CSD low pressure light comes on, with no gauge to herald these sad tidings, at 90-160 pounds.

I will know that the annunciator panel will show a differential current flow.

I will be able to glibly state that the exciter ceiling is 60 KW without the faintest idea of what an exciter ceiling is.

I will know that there are 35 vortex generators on each side of the vertical fin, despite the fact that we only check to see if any are missing on our preflight.

When asked, I will respond promptly that the air cycle machine turns 56,000 to 57,000 rpm with a design maximum of 62,000 rpm, although there is nary a tachometer to read these numbers from.

When the duct temperature hits 88 degrees Centigrade, I will say that an overheat light will come on, and the mixing valve will go to full cold, although the duct temperature gauge is in Fahrenheit and has no yellow or red markings.

Need I go on? I think I would be merely belaboring the obvious if I were to continue with examples of how we have tried to mechanize something that is nearer to being an art.

I will have at my fingertips the temperatures that turn on the various fire and overheat lights, the pressures that turn on the low pressure lights, the numbers for the tire pressures, strut extensions, and many others.

And when I walk out the door a free man, I will promptly forget them, for I won't need them until my next check.

A few genuinely meaningful numbers are branded in my mind, though, and I will probably still be muttering them when I am in my wheel chair recalling past glories, because I need, use, or fear them. Some of them are in the book, some of them are not and should be, but their recall is instant because of their immediacy.

I know what numbers to look for in a hot start, and I know what N_1 will read at 38 percent N_2 when we have a failed N_2 tachometer.

In order to decelerate from the barber pole to 250 knots in level flight, power off and clean takes eight miles, three miles with full speed brakes, and descending at 1000 ft. per min., power off and full speed brakes, I'll unwind 1500 feet on the altimeter while making this speed reduction.

We apparently have two different species of humans who live around DCA (Washington National) and LGA (LaGuardia), for at DCA their ears don't become sensitive until we reach 2 DME NW, 3 DME S, or 1500 ft., at which point we must throttle back to 1.5 EPR and hang on until we get to 10 DME out, even though we might be at 10,000 ft. by then, depending on the radar vectors. Around LGA the ears are wired just the opposite, for when we take off there we must throttle back to 1.6 EPR at 800 ft. and continue climbing to 1200 ft., at which point the people suddenly become deaf it would seem, for then we can go back to full bore while continuing the remainder of the anti-noise acrobatics.

I hope it is apparent by now that I am not blindly opposed to the use of numbers, for even Shakespeare had to know what date the rent came due and how many quarts of oats it took to feed his horse if he had one, but I am very much against having to remember those which contribute nothing toward safety or efficiency.

I can detect a trend away from the worship of numbers, nuts, and bolts, thank heavens, and it is long overdue, but I have wondered how we ever got in this fix in the first place. I think it was probably brought about by a process of psychological or aptitudinal inbreeding. For example, suppose at some time in the dim and distant past it was assumed that only redheads would make good carpenters. Under this assumption, redheaded apprentices would be sought and encouraged, redheaded carpenters would be favored for supervisory positions and ultimately

NUMBERS

would end up in positions of power.

Then suppose some nut crops up with the silly idea that blackhaired people can be just as good carpenters as redhaired ones. The custom of redheaded carpenters by this time has its self-perpetuating force, for everyone, carpenters and noncarpenters alike, even though they might even be a little in sympathy with the nut, have only to look at the carpenter force and see nothing but a sea of redheads. They could only conclude, based on undeniable physical evidence, that to be a good carpenter you must be a redhead, and the kook who suggested otherwise would be carried off by his elbows.

And so it is with pilots: those bicycle mechanics from Dayton are our immediate forebears and are due our homage, but they left a legacy that to be a pilot it is first necessary to be a mechanic. It is going to take some doing and a lot of diluting to bring about the more realistic idea that it is more important to convert into action a lofty calling to the artistry of flying an aircraft, the dream of Leonardo da Vinci, and only secondarily important to know what goes on in its innards.

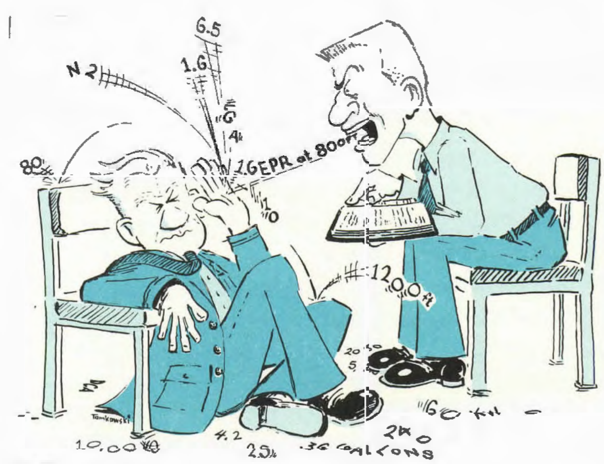
It is discouraging, then, to hear a check pilot address a class of trainees and say that the flying and emergency procedures were being well executed but that they didn't know the equipment well enough. Admittedly this was some time ago, but he was a classic illustration of the mechanic turned pilot, and the implication was that it would be OK if the flying slipped a little provided they knew how far it was from the ground to the top of the rudder.

At this stage I would be a sap to start knocking check pilots, and I couldn't even if I wanted to, for I think I know why a pilot would want to become one in the first place. They are, on the whole, superior pilots who do not find the routine of taking off at point A, flying to point B, and landing there enough of a challenge to make the job interesting as a steady diet, so they digest huge volumes of esoteric information and reach the attention of management. This, with their previously demonstrated superior flying ability, shortly gets them anointed as check pilots, then they are caught up in the system. They are allowed the use of an airplane or simulator for only a few hours, but they have to do something with a pilot up for a proficiency check for the better part of two days. They knock off the necessary questions in an hour or so and then have to piece out the time with some of the far-out stuff they had previously learned to keep from going out of their gourds.

As I said before, I can see a hopeful trend. Our Chief Pilot, Captain L. J. Royall, once told our ground school class, "When a red overheat light comes on, it don't make a damn if it lights up at 240, 260, or 280; something is too hot — do something!"

And do something we have done and will do. When the CSD low pressure light comes on, I will not reflect about what number would appear on the gauge if we had one; I will simply disconnect the generator. Similarly, I will not concern myself about whether the total capacity of the hydraulic system is 36 gallons or 360 gallons. My concern will be with the top 4.4 gallons, the part that shows up on the quantity gauge, and what to do if this starts dropping.

I have often toyed with the idea of writing a book with two parts. The first part would be on what is needed to know in order to successfully fly an airplane, and the second part would be on what is necessary to pass a check. The trouble is I don't feel competent to write the second part.



What to do? We have to know the numbers, even though some of them are meaningless, for they are the passwords to our careers. We can, though, try to keep them in proper perspective, and eventually, perhaps by the weight of our numbers, the poets may yet supplant the plumbers.

I haven't the nerve of one successful line pilot friend whose views are similar to mine. An FAA inspector once asked him, "What's behind those holes in the engine housing?"

"Owls, maybe?" replied my friend. →

Reprinted courtesy of AIR LINE PILOT, November 1969 issue.

From a collection of anonymous stories published in 1942 by the Army Air Forces, TAC ATTACK presents:

Lessons That Live

No. 5 of 17

Courtesy of Lt Col H. M. Butler, 4500 ABW/SE

TOO MUCH WEATHER

Eight months' experience in Pursuit flying had made me pretty cocky. On several occasions I had flown on instruments in a P-35 and had experienced no particular difficulty; therefore the numerous stories and warnings I had heard from the old-timers about flying on instruments in this type of craft had *no* effect on me. In fact, I rather welcomed an opportunity to go through a little "weather" now *and* then. Well, I learned my lesson, and the hard way.

Late one winter afternoon, flying back to the home base from an outlying station, I ran into the "weather" I had been looking for. The ceiling, from a doubtful one thousand feet, went right down to the ground.

That didn't bother me; I just started climbing, holding my course and keeping my radio tuned to the next station. No sooner did I actually get into the stuff, however, than the ship started icing up. The wings, cowling and part of the canopy became coated. My engine was losing power fast, even with the benefit [illegible] heat, but still the thought of executing a 180 [illegible] never entered my arrogant mind.

In less than a minute I was in a downward spiral, the weight of the ice and loss of power being too much for the sturdy little ship. As I lost altitude some of the ice melted off and as I brought her under control again I figured that if I remained at that altitude I could continue. A minute later, however, it was worse than ever. At an altitude of less than two thousand feet I went into another spiral and then abruptly into a spin.

Trying to get that ice-coated ship out of a spin on instruments was the hardest job I ever had in my life. The altimeter read sea level as she finally came under control. A glance out of my now ice-free canopy showed that I was just off the ground.

For a few seconds I wildly dodged *trees*, barns, farmhouses and sheds, trying to *find* a field and make a landing. It was then sleeting hard, but I finally got my ship into a farmer's field with no damage.

I just sat there, every nerve a-quiver, thanking the Lord for allowing a fool like me to live.

letters to the editor......

HELP WANTED

WANTED – A new Editor for TAC ATTACK. Qualifications: Grade of Major, with recent pilot experience in any TAC aircraft. Must be SEA ineligible and possess some writing ability. Reporting date: late June 1973. Interested individuals may contact Lt Col Neal or Maj Brady, TAC/SEP, Langley AFB, Va (Autovon 432-2937) for additional information. Take it from someone who knows . . . it's a good job . . . Ed.

CORRECTION

The January 1973 issue erroneously showed the Maintenance Man of the Month Award winner, Master Sergeant Driver, as being assigned to the 834th Avionics Maintenance Squadron, Eglin AFB, Florida. We know better. The 834th Avionics Maintenance Squadron is part of the 1 Special Operations Wing which, of course, is located at Hurlburt Field, Florida.

REUNION

The 8th Tactical Fighter Wing will hold its annual reunion 2-4 March 1973, Sheraton Park Hotel, Washington, D. C. For further information contact Lt Col Carly L. Bradway, OJCS/J-3 (EUMEAF Division), Pentagon, Washington, D. C. 20301, telephone OX5-7903/57909, or Lt Col R. L. Markey, 1111 19th Street (AF/SAGF), Arlington, Virginia 22209, telephone OX4-8571.

REUNION

The First Annual AC-130A/E Reunion will be held in the summer of 1974, in Las Vegas, Nevada. All former Spectres, Sandys, and Jolly Greens are encouraged and invited to attend. Request names and current addresses be forwarded ASAP to 16th Special Operations Squadron, Reunion Committee, APO San Francisco 96304. Expect a flyer confirming specific dates and hotel, along with a request for reservations.

DISTRIBUTION

Aeronautical Systems Division's Prototype Program Office (ASD/YP) is now the Air Force OPR for two major new projects, the Lightweight Fighters (YF-16, General Dynamics; YF-17, Northrop) and the Advanced Medium STOL Transports (Boeing and McDonnell Douglas). Since these are prototypes of aircraft that may eventually enter the TAC inventory, it is necessary to have as much crosstalk as possible between organizations. One method is through such things as TACRP 127-1, TAC ATTACK. We are not now on the distribution list of this fine magazine but would like to begin receiving it as soon as possible.

Lt Col William E. Thurman
Asst Director, Prototype Program Office
HQ, Aeronautical Systems Division
Wright-Patterson AFB, Ohio

You're on for two copies. We'd welcome an article (or two) on any or all of the aircraft you mentioned. Ed.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1973-514. 007/7

TAC TALLY

MAJOR ACCIDENT RATE COMPARISON

	TAC		ANG		AFRes	
	1972	1971	1972	1971	1972	1971
JAN	0	1.6	0	16.7	0	0
FEB	0.8	1.6	0	11.6	0	0
MAR	1.6	3.1	6.3	7.0	0	0
APR	2.8	2.7	8.1	4.9	0	0
MAY	4.0	2.5	6.3	5.7	0	0
JUN	4.8	2.6	5.1	6.9	0	0
JUL	4.2	2.9	6.2	7.1	0	0
AUG	4.6	2.7	6.4	7.8	1.9	2.7
SEP	4.6	3.2	6.2	7.4	1.7	2.4
OCT	4.2	3.2	6.0	6.9	3.0	2.1
NOV	4.0	3.3	5.9	6.9	2.7	2.0
DEC	4.0	3.2	6.6	6.4	2.5	1.8

AIRCRAFT ACCIDENTS

UNITS

	THRU DECEMBER			
	1972		1971	
	ACDTS	RATE	ACDTS	RATE
9AF	6	3.2	10	3.9
1 TFW	3	8.9	2	5.2
4 TFW	0	0	0	0
23 TFW	0	0	0	0
31 TFW	1	4.3	3	12.8
33 TFW	0	0	0	0
68 TASG	0	0	0	0
316 TAW	0	0	0	0
317 TAW	0	0	0	0
354 TFW	1	4.1	2	7.6
363 TRW	1	2.9	1	3.4
4403 TFW	0	0	2	13.8

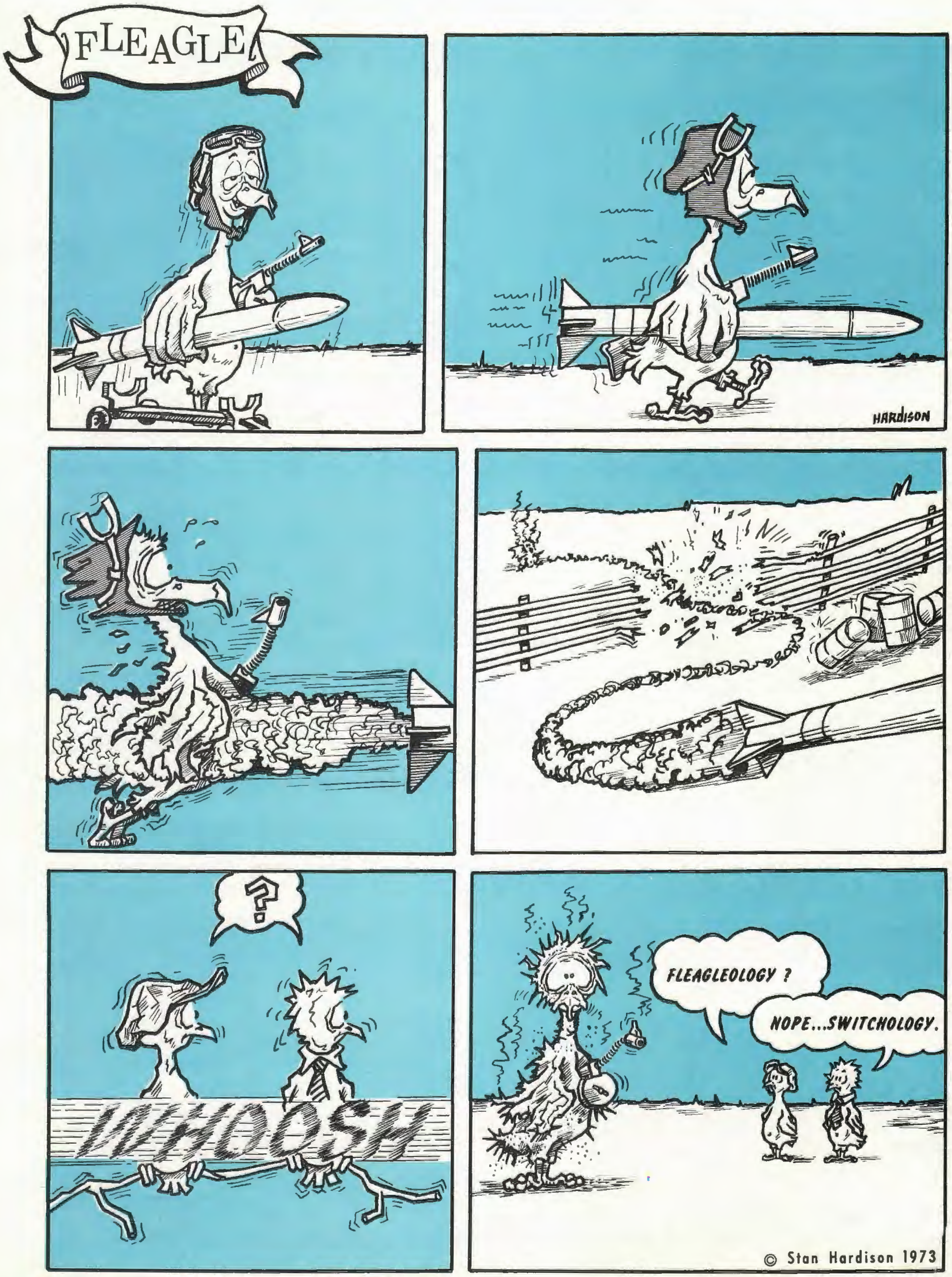
	THRU DECEMBER			
	1972		1971	
	ACDTS	RATE	ACDTS	RATE
12AF	14	3.6	7	1.9
27 TFW	1	4.8	1	4.2
35 TFW	1	3.6	1	2.5
49 TFW	4	8.7	0	0
58 TFTW	3	5.1	4	8.2
67 TRW	0	0	0	0
71 TASG	0	0	0	0
313 TAW	0	0	0	0
314 TAW	0	0	1	2.9
355 TFW	1	3.3	0	0
366 TFW	1	5.9	0	0
474 TFW	2	7.0	0	0
463 TAW	0	0	0	0
23 TFW	1	9.8	0	0

TAC SPECIAL UNITS

	1972 ACDTS	1972 RATE	1971 ACDTS	1971 RATE
1 SOW	1	2.1	4	6.4
2 ADG	0	0	0	0
57 FWW	3	14.9	1	5.1
ADS	2	–	1	–
4410 SOTG	2	8.2	1	3.6
4485 TS	0	0	0	0
4500 ABW	0	0	0	0
OTHER	4	–	1	–

SUMMARY

	TAC			ANG		
	DEC 72	THRU DEC 1972	THRU DEC 1971	DEC 72	THRU DEC 1972	THRU DEC 1971
TOTAL ACCIDENTS	3	51	33	3	22	23
MAJOR	2	32	25	3	18	17
AIRCREW FATALITIES	15	55	25	0	3	7
AIRCRAFT DESTROYED	3	32	21	2	15	16
TOTAL EJECTIONS	1	32	24	4	13	12
SUCCESSFUL EJECTIONS	0	22	21	4	13	9
PERCENT SUCCESSFUL	0%	68.8%	88.0%	100%	100%	75%


FLEAGLE
HARDISON
?
WHOOSH
FLEAGLEOLOGY ?
NOPE...SWITCHOLOGY.
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