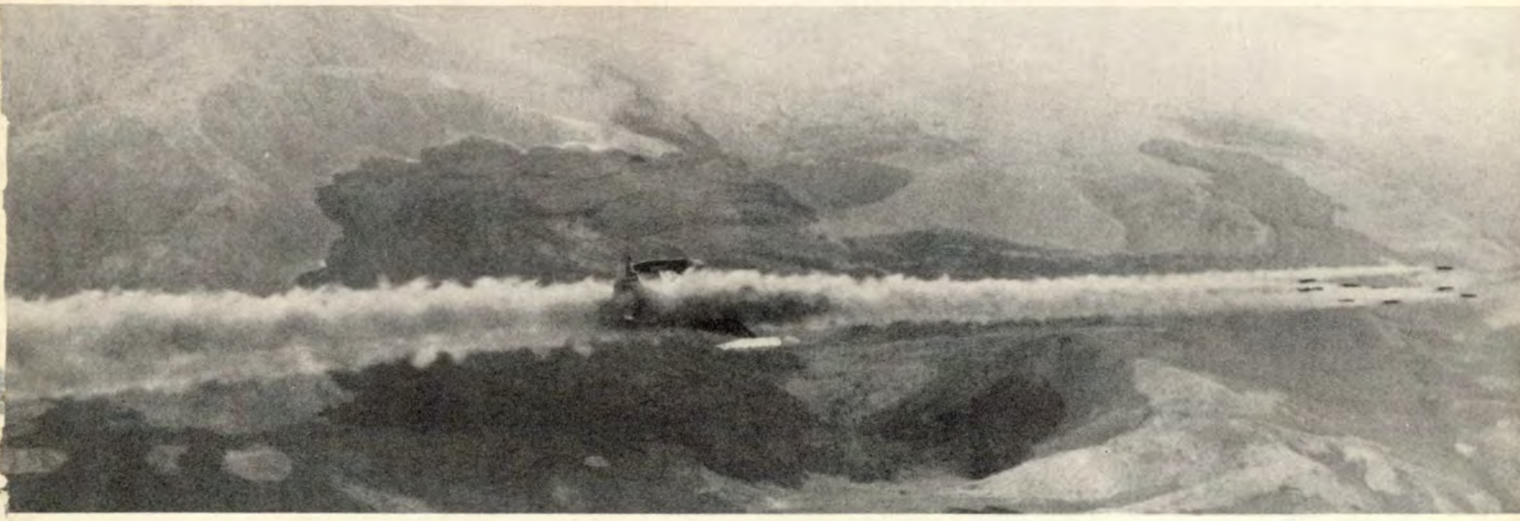
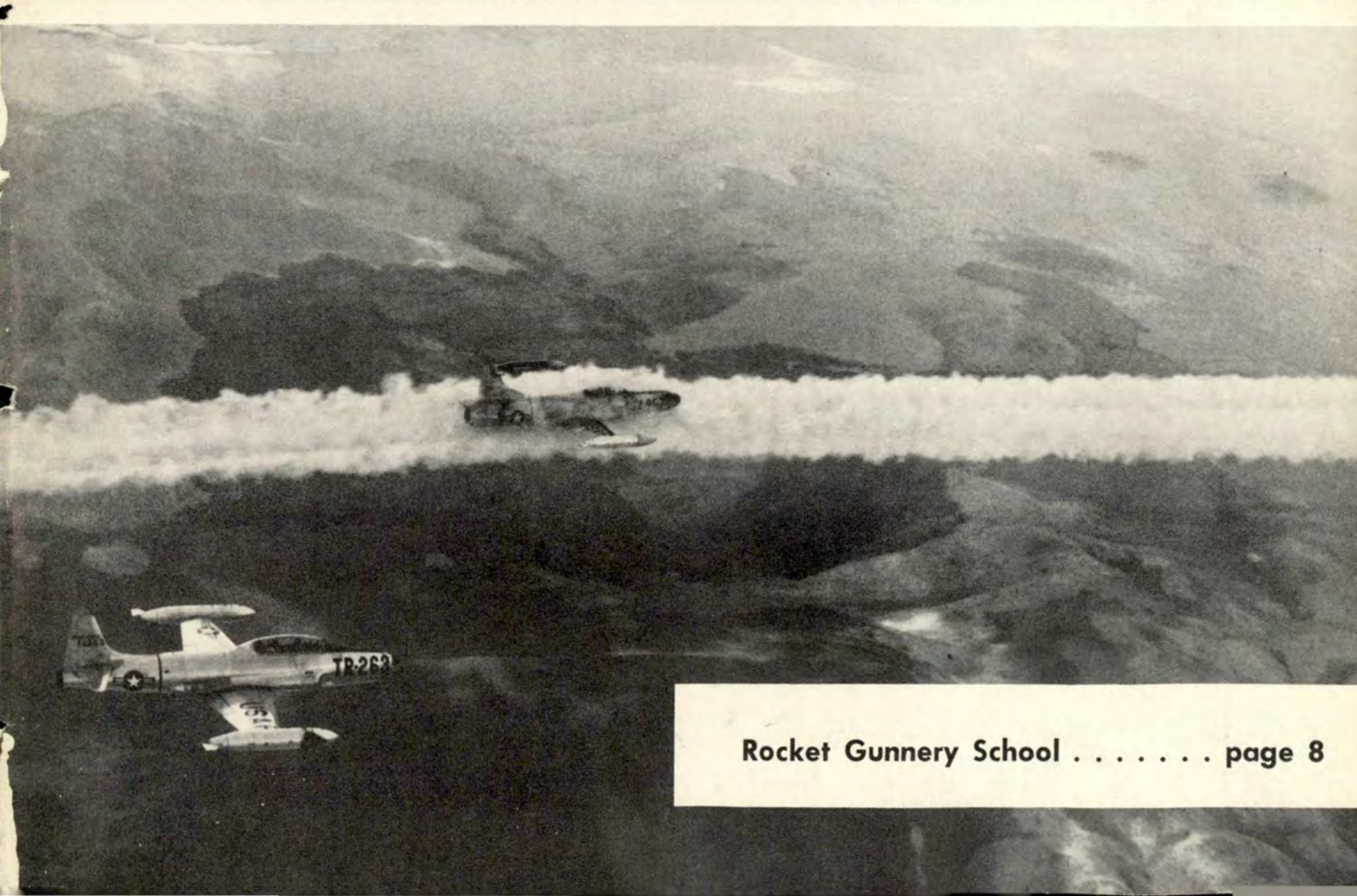
SEPTEMBER 1954

FLYING SAFETY

UNITED STATES AIR FORCE





Rocket Gunnery School . . . . page 8

VOLUME TEN NUMBER NINE

FLYING SAFETY

CONTENTS

★ ★ ★

SUBSCRIPTIONS

FLYING SAFETY magazine is available on subscription for $3.00 per year domestic; $4.25 foreign; 25c per copy, through the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished.

★ ★ ★

The printing of this publication has been approved by the Director of the Bureau of the Budget, June 4, 1951. Facts, testimony and conclusions of aircraft accidents printed herein have been extracted from USAF Forms 14, and may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious. No payment can be made for manuscripts submitted for publication in FLYING SAFETY magazine. Contributions are welcome as are comments and criticisms. Address all correspondence to the Editor, FLYING SAFETY magazine, Deputy Inspector General, USAF, Norton Air Force Base, San Bernardino, California. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from FLYING SAFETY without further authorization. Non-Air Force organizations must query the Editor before reprinting, indicating how the material will be used. The contents of this magazine are informational and should not be construed as regulations, Technical Orders or directives unless so stated.

USAF PERIODICAL 62-1

Department of the Air Force
The Inspector General USAF
Major General Victor E. Bertrandias,
Deputy Inspector General

★ ★ ★

Brigadier General Richard J. O'Keefe
Director
Directorate of Flight Safety Research
Norton Air Force Base, California

★ ★ ★

Flying Safety Staff

Editor
Maj. Joseph P. Tracy

Managing Editor
Capt. John H. Moore, Jr.

Associate Editors
Capt. Perry J. Dahl
1st Lt. James A. Hamilton, Jr.

Art Editor
M/Sgt. Steven Hotch

Contributing Editor
Virginia C. Asmus

Production Assistant
T/Sgt. Carl E. Fallman

Staff Photographer
T/Sgt. Nicholas Shekitka, Jr.

Circulation Manager
T/Sgt. G. J. Deen

★

This month's cover illustrates that firepower plus is the keynote of the present-day interceptor. A hit by a single rocket is capable of knocking out the largest bomber ever built.

★ FLYING SAFETY AWARDS ★

In recognition of exceptionally commendable accident prevention records, engraved bronze Flying Safety Plaques have been awarded to the nine organizations and installations listed below for the period January through June, 1954. These units have contributed to the increased economy and effectiveness of the Air Force by promoting outstanding accident prevention programs and achieving exemplary records.

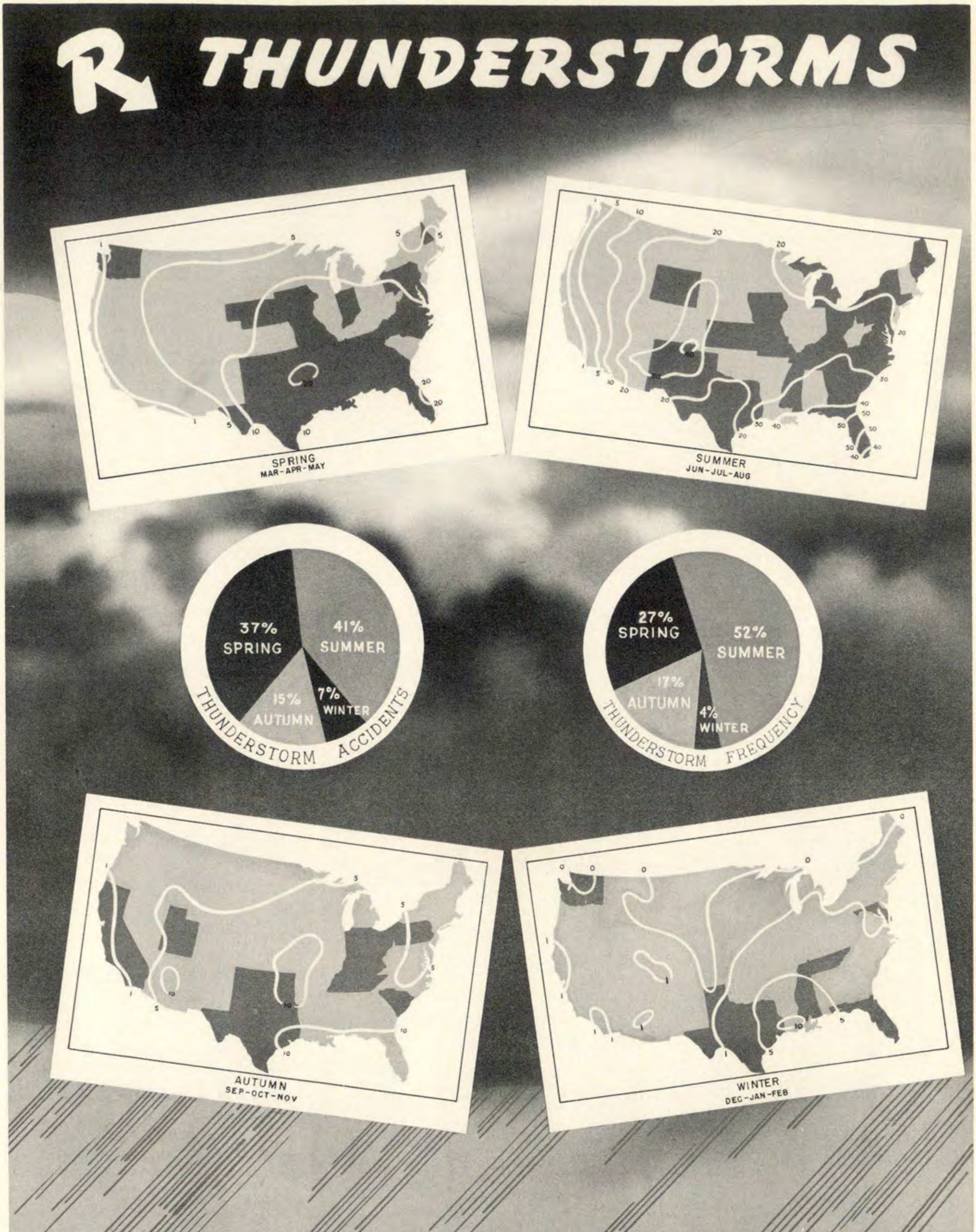
Such achievement is marked every six months by award of the Flying Safety Plaque.

For Meritorious Achievement in Flight Safety

January through June, 1954

CONGRATULATIONS ARE EXTENDED TO THE FOLLOWING WINNERS

- **Atlantic Division (MATS)**
- **Carswell AFB (SAC)**
- **10th Air Div, Elmendorf AFB (AAC)**
- **345th Bomb Gp, Langley AFB (TAC)**
- **575th Air Def Gp, Selfridge AFB (ADC)**
- **Randolph AFB (ATRC)**
- **3800th AU Wg, Maxwell AFB (AU)**
- **318th F-I Sq, Thule AB (NEAC)**
- **119th F-B Sq, Newark Arpt. (ANG)**


℞ THUNDERSTORMS
SPRING
MAR-APR-MAY
SUMMER
JUN-JUL-AUG
37% SPRING
41% SUMMER
15% AUTUMN
7% WINTER
THUNDERSTORM ACCIDENTS
27% SPRING
52% SUMMER
17% AUTUMN
4% WINTER
THUNDERSTORM FREQUENCY
AUTUMN
SEP-OCT-NOV
WINTER
DEC-JAN-FEB
R. Guy

AWS has prepared an article covering all phases of thunderstorm development and related flying hazards for FLYING SAFETY. We believe this information will be of significant value to all pilots.

THUNDERSTORMS are essentially shower clouds in which electrical discharges can be seen as lightning and heard as thunder by a person on the ground. They present a major hazard to flying because of the violent vertical motion of the air, with strong up-and-down movements in close proximity to each other.

In its process of development a thunderstorm appears to be a cumulus cloud gone wild. Lightning and thunder, usually gusty surface winds, heavy rain and occasionally hail accompany it. All these phenomena are indicative of complex processes going on within the cloud. Consequently, the problem of flying during thunderstorm conditions has been one of major concern ever since commercial and military aviation advanced to the point where flight activities are not confined to periods of good weather.

Recent research has determined that all thunderstorms are fundamentally similar both in structure and in the weather elements they contain. Structurally, the thunderstorm contains many centers of convective action which are called "thunderstorm cells." The largest storms contain many cells and cover an area ranging from approximately 20 square miles to more than 200 square miles. In many cases, the tops of well-developed cells extend well up into the stratosphere.

Each cell may develop more or less independently of those adjacent to it The evidence indicates that each cell passes through three different stages in its life cycle. The progression to succeeding stages depends upon the formation and fall of rain and the entrainment of the surrounding air into the cloud. That is, the air flowing in through the sides of the cloud and mixing with the updraft.

• The first or cumulus stage of development is characterized by updraft throughout the cell. During the initial stage, as the air becomes unstable, the atmosphere attempts to regain its balance and re-establish a stable condition. The greater the instability the more forceful is the overturning required to return the atmosphere to equilibrium, and increased amounts of cumulus and cumulonimbus are formed. A thunderstorm is a violent manifestation of this overturning in the atmosphere's struggle for stability.

• The second or mature stage is noted by the presence of both updrafts and downdrafts, at least in the lower half of the cell. Rainfall at the surface begins with and continues throughout the mature stage. The downdraft area increases in size until, in the lower levels, it extends over the entire storm cell. This is considered to be the end of the mature stage. During this stage the cell reaches its greatest height, which is normally about 40,000 feet, although an occasional cell extends higher than 60,000 feet, and many complete the life cycle without extending higher than 30,000 feet. The mean of the maximum heights reached by 199 Ohio thunderstorms, as indicated by radar, was 37,500 feet.

• The third and last, or dissipating stage, is indicated by weak downdrafts prevailing throughout the cell. Thunderstorm cells usually vary from one to five miles in diameter. The cells are usually in any stage of development, but the majority in a storm are either at the peak or dissipating stages.

Duration of Thunderstorm Cells

Stage	*Duration*
Cumulus	10-15 minutes
Mature	15-30 minutes
Dissipating	30 minutes

Thunderstorm cells are the areas of greatest turbulence. As applied to thunderstorms, turbulence usually connotes a sequence of irregular vertical or horizontal motions of the air within the storm area. It is during the mature stage that turbulence reaches a maximum.

It is known now that the thunderstorm consists of a group of cells in which are concentrated the gustiness, drafts, hail and other weather elements that make flights near the storm extremely hazardous. Thus, it is necessary that the pilot be familiar with the thunderstorm, its attendant hazards, its geographic distribution and its relationship to past aircraft accidents. Based on observational data for a period of over 50 years throughout the United States and a valuable six-year study, "Analysis of Weather Elements as Cause Factors in USAF Aircraft Accidents 1947-1952," the maps and charts on the opposite page show the relationship between the frequency of aircraft accidents and the occurrence of thunderstorms. There is a direct variation of the frequency of thunderstorm days with the seasons.

The months of highest thunderstorm frequency are July and August, and those of lowest frequency are December and January. Aircraft thunderstorm accidents follow a similar seasonal pattern.

The mean number of thunderstorm days for each season is portrayed. States which are more darkly shaded represent those in which accidents occurred. Most thunderstorm aircraft accidents happened in the areas of the greatest mean number of thunderstorm days. The area having the greatest number of days per year with thunderstorms is central Florida. There are relatively high values (as well as a number of thunderstorm aircraft accidents) for the entire southeastern portion of the country, and an area of secondary maxima centered roughly over northeastern New Mexico and southcentral Colorado. The Pacific coastal regions have the least number of days during the year with thunderstorms.

Certain topographic features provide an ideal location for new thunderstorm development. Mountains or rugged relief of any kind, as contrasted with smooth terrain, are very favorable. Islands and peninsulas, as well as other heat sources, are conducive to the formation of afternoon storms.

Thunderstorms may occur individually, or in groups and masses that at times present an almost solid wall of convective clouds. Besides the usual difficulties of flight in clouds, the thunderstorm presents the additional unique difficulties of lightning, hail, heavy turbulence and frequent squall lines.

The squall line is usually described as a line of high winds, characteristically several hundred miles in length and usually of short duration. Throughout the eastern United States, the pre-cold front squall line is the predominant scene of thunderstorm activity, particularly from May through September. Generally, the thunderstorms associated with squall lines are little different from any others except for a tendency to be more severe, especially in producing effects at the surface, such as strong, gusty winds.

Records, however, show that turbulence is the most prevalent danger in thunderstorms and a very significant element in associated accidents. This hazard was especially prominent in accidents occurring in August, contributing greatly toward loss of aircraft control and unsatisfactory landings. The difficulties of maintaining proper flight attitude or airspeeds within highly turbulent clouds often lead to serious structural damage.

Turbulence is generally recognized under two broad categories — gusts and drafts, corresponding to two fairly distinct types of response experienced in an airplane. In a draft, the aircraft is displaced in altitude in one direction over several seconds of time because of the mean upward or downward motions of the air. Gusts subject the airplane to a series of sharp accelerations without a systematic change of altitude. These accelerations are caused by abrupt changes in velocity of the drafts and by small vortexes or whirling masses of air. The larger gusts are invariably associated with strong drafts.

Thunderstorm analysis shows that rain, as measured at the surface, is closely associated with the downdrafts. In the eastern and southern United States the average duration of thunderstorm rain at a given station is about 25 minutes, although it is highly variable from case to case. An airplane will frequently encounter high water concentrations in an area of updraft where the upward motion prevents any of the water from falling out of the storm.

Of more concern than rain in the determination of flight hazards associated with thunderstorms is the occurrence of icing. Research aircraft have encountered ice at the 20,000-foot level. The levels near and slightly above the freezing level seem to contain the maximum concentrations of heavy icing, hail, turbulence and the majority of lightning strikes. A review of the six-year accident summary indicates that hail damage was very apparent during spring and summer thunderstorm accidents.

Let's face it, "old anvil head" will always be with us. Knowing his associated hazards will help keep you out of trouble. ●

Thunderstorms in the dissipating stage are easily identified by an anvil-like head. Weak downdrafts prevail throughout the cell.

This article, reprinted from COMBAT CREW, explains the relationship between flying speed and gusts during penetrations.

THUNDERSTORM FLYING

J. W. Johnson, Convair Project Structures Engineer

A PILOT or flight crew forced to fly in or through a thunderstorm may logically question the ability of the aircraft's structure to withstand the loads imposed by flight through a disturbed atmosphere. It is not impossible for structural failure of a major nature to occur under extremely turbulent conditions.

The aircraft designer considers this type of flight operation in the structural design. Normally one of the more severe design conditions is either gust at high speed or the so-called "light weight bump" condition. These specific design conditions are based on data obtained from recording instruments installed in commercial and military aircraft engaged in routine flights, together with data obtained from deliberate flights into turbulent areas undertaken to seek out the most severe conditions. These data are studied, and the result is the most logical gust intensity usable for design. Military aircraft of conventional type are usually designed to a *50k* effective gust. The expression *50k* gust is defined as a 50-foot-per-second gust acting with an efficiency k on the airplane. The value k is usually about 0.6; thus a 50 fps (feet-per-second) gust is an effective gust of 30 fps.

What happens to an aircraft encountering such air? Pictured is an airfoil section with the angle it makes with the relative wind denoted by the letter A (see Fig. 1).

The total lift coefficient on the section is $C_L 1$, often expressed as the unit m per degree of angle of attack. The lift coefficient is then equal to $m \times A$. Lifting force is expressed as $L = C_L DSV^2$ where:

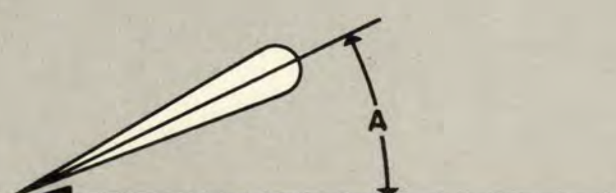
L=lifting force in pounds

D=density of air

S=wing area in square feet

V=indicated speed in mph

FIGURE I



Equilibrium will be maintained if the lifting force equals the weight of the airplane. Therefore, the angle of attack can be determined since other values in the above expression are known.

The next diagram shows the effect of an up-acting gust of intensity 50k, on a wing moving at a forward velocity V. The change in angle of attack, $_\Delta A$, for the section resulting from gust is 50k/V expressed in radians (see Fig. 3). The added lifting force resulting from the gust is:

$^\Delta L = {}_\Delta C_L DSV^2$ (Equation 1)

Angle of attack due to gust varies inversely with aircraft speed and directly with the gust intensity; and lifting force varies with the square of the speed, so a simple expression for lifting force due to gust will be:

$_\Delta L = 5kmVS$ (Equation 2)

The load factor, $_\Delta n$, due to the gust effect may be obtained by dividing through equation 2 by the aircraft weight, W, then:

$_\Delta n, = 5kmVS/W$ (Equation 3)

A better understanding of the gust effect may be obtained by following through a practical example. Given the following data:

W=airplane weight...250,000 lbs.
S =wing area........5,000 sq. ft.
V =indicated airspeed....200 mph
m=C_L per degree............0.1
k =effective gust factor........0.6
D =air density..........0.002558

Substituting these values into equation 3 yields a value $_\Delta n = 1.20$ (approx.). Addition of the normal 1G load factor results in a design factor of 2.20. Stress in the structure in-

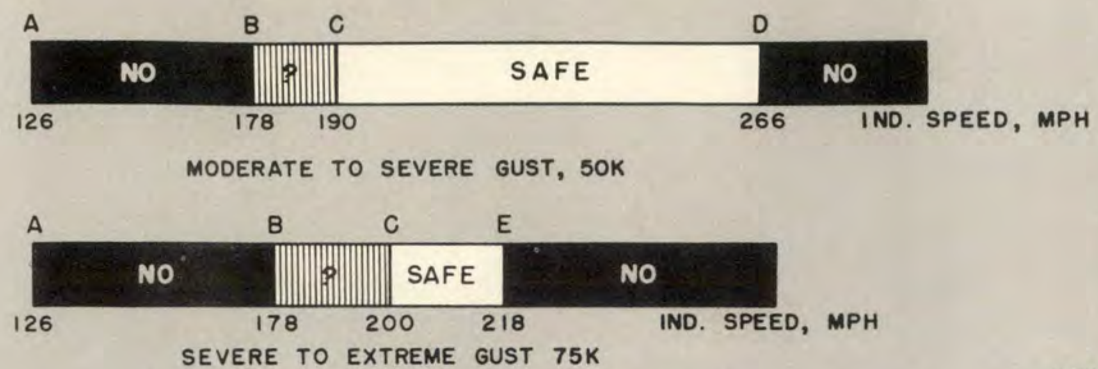


FIGURE 2

creases with factor; thus the most critical condition will be found when variables in equation 3 result in the highest factor. A check at a particular gross weight will prove most critical for wing structure when wing fuel is at a minimum. The fuel provides a relieving shear and moment since it is opposite in direction to that of air load. Assume in the above example that a 1G loading produces 30 units of bending moment and structural failure occurs at 84 units. The result is an allowable factor of 2.80 or an allowable gust increment Δn of 2.80 − 1.00 or 1.80. Reference to equation 3 above, other values remaining constant gives an allowable speed in excess of 300 mph. The optimum structural speed will be the lowest consistent with other contingencies since this will maintain stresses at low level.

The minimum speed at which an airplane can maintain level flight is known as the 1G stall speed. Flying into a turbulent area will increase the stall speed since the incremental load factor resulting from the gust will require increased speed.

Typical speed limitations are shown above for an aircraft weighing 280,000 pounds at an altitude of 30,000 feet (see Fig. 2).

A=1G stall speed
B=normal cruising speed
C=stall speed at gust intensity
D=high speed limitations
E=structural limitations due to gust.

Speed limitations imposed by stall-out due to gust are not considered too serious by most authorities. The gust acts for a relatively short period of time, so the aircraft will recover before a serious stall will develop. The purpose of this article is to acquaint the pilot with limitations which exist. The minimum safe flying speed should be no less than cruise. Another possibility for penetration speed usable on B-36 models is 1G stall plus 70 mph which will, in some cases, result in an increase above cruising speed.

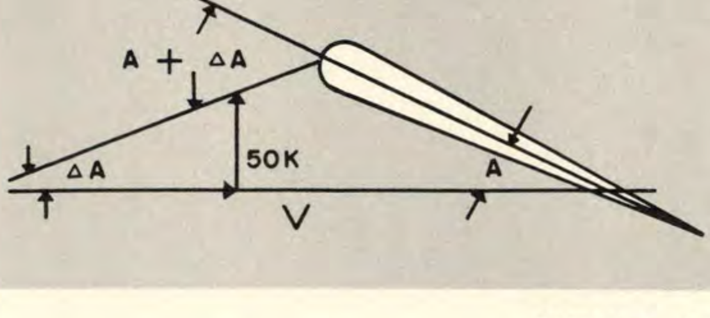
The bulk of the discussion has been directed toward gust effect on the wing. Similar effects will exist on other portions of the aircraft, particularly the fuselage and tail sections. A 1G balance plus gust is often the design condition for the horizontal tail and aft fuselage. In this case, the gust is assumed to act only on the horizontal tail. Major weight items are usually designed by the gust factor at minimum flying weight and maximum speed.

Gust intensities may be divided into three classifications; namely, 1. light to moderate 25k, 15 fps effective; 2. moderate to severe 50k, 30 fps effective; 3. severe to extreme 75k, 45 fps effective.

Data compiled over a considerable period of time shows the probability of encountering gusts of these magnitudes are: (1) 1 in 5000; (2) 1 in 1,000,000; (3) 1 in 50,000,000. This data is based on average conditions and may change appreciably in some areas, as witness the effect of the jet stream on flying conditions in the Korean theater of operations. The most intense gust measured to the writer's knowledge is in the order of 100 feet per second, or an effective velocity of 55 feet per second.

Basic rules to follow prior to entering a turbulent area are: Set power and pitch and maintain these settings through the disturbed area; disregard indicated speed readings since they may vary greatly in the turbulent area of flight. ●

FIGURE 3



WELL DONE

Capt. Robert B. Weinard

469th FIS, 516 AD Gp

McGhee-Tyson Arpt, Tenn.

CAPTAIN Weinard was leader of a flight of two F-86As that scrambled at Eglin AFB to intercept five B-47s. After orbiting at 42,000 feet for approximately 15 minutes, Captain Weinard started a left turn. However, the control stick was frozen and he found it was impossible to move the ailerons. He checked the aileron boost and hydraulic pressure, thinking the boost had failed, but all pressure indications were normal.

Capt. Weinard then slowed the aircraft down and managed to turn the plane by using rudder control. Full trim had no effect on the ailerons and the aircraft was flown back to Eglin at slow speed, using rudder to keep the wings level.

With the field in sight, a shallow descending turn was started. At 12,000 feet gear and flaps were lowered and tower approval was received for landing. The base leg extended over the Gulf and considerable turbulence was encountered crossing from sea to land.

While Capt. Weinard was attempting to maintain a level attitude, using rudder only, the F-86 often yawed up to 30 degrees. On several occasions the plane went into steep vertical slips and appeared to be completely out of control, but each time he was able to bring the aircraft back to level flight.

A round-out was completed over the end of the runway and the aircraft touched down, left wing low, approximately 15 degrees across the runway.

Capt. Weinard, through his outstanding skill and technique, regained control and completed the landing without damage to the aircraft. ●

Talley Ho—and SPLASH

ADC pilots are learning the latest techniques in rocket gunnery firing at the recently established Yuma AFB interceptor school.

DOWN YUMA way, they're training a new breed of cats, nowadays. This feline prototype is still a fighter pilot, so it follows that he is a Tiger, but the Tiger is changing his stripes. In many respects he might well be called a technical Tiger. Technical because he must make intercepts in all kinds of weather; because he will be guided to his target by a man on the ground; because probably he will never see his target except as a blip on a radar screen, and because when he does "lock on," a computing machine actually will fire his rockets automatically at just the precise instant needed to intercept the target.

The Air Defense Command established the rocket gunnery school at Yuma AFB to teach pilots the latest techniques in rocket firing and to weld the interceptor crew (either pilot and radar observer or just the pilot in single seat interceptors) and the GCI controller team into a smooth-working unit. The success of the training is evidenced by the scores shot at the air-to-air rocket meet held in June of this year.

There are two separate but integrated primary mission units at Yuma: the 4750th Air Defense Sq. (Weapons) charged with training the TDY organizations in rocketry and intercept techniques; and the 4750th Tow Target Sq., charged with all of the tow missions.

At the gunnery school, arming and de-arming areas are under the supervision of designated NCOs.

The GCI training unit at Yuma, which is part of the 4750th Squadron, has a two-fold mission. Primarily, it provides proficiency training for ADC controllers and secondarily, it furnishes GCI control for the ADC interceptor squadrons training for weapons qualification.

Each unit, upon reporting in to Yuma, has a liaison officer assigned to it from the training squadron. His job is to work closely with the visiting unit, conduct initial briefings on Phases I, II and III and facilitate the program so that a maximum of training may be accomplished in a minimum of time.

In the flying training program, Phase I is devoted to acquainting pilots with procedures and in upgrading the interceptor pilots for the actual firing sorties of Phase III. All crews arriving at Yuma with less than 40 hours time in their aircraft or less than 40 aerial intercepts will be required to engage in Phase I training. Upgrading to Phase II is based on each individual's ability to learn.

In Phase I, T-33s, flown by qualified instructors, are used to simulate targets. Normally, target altitude is 25,000 feet unless visibility is restricted due to weather. The target is flown at 180 knots IAS and the interceptors at 280 knots IAS. All missions require two-way radio communications, with the operational channel and the alternate channel being assigned at the time of the mission briefing. IFF is used on all missions.

Intercepts are broken off any time visual contact is not established at a minimum of four miles. There is no established altitude separation between target and interceptor in Phase I work. It is the responsibility of both pilots to maintain sufficient clearance at all times. Regardless of whether or not the mission is completed, all aircraft must depart the Phase I area when a minimum of 1500 pounds of fuel remains.

Phase II Training

In Phase II, intercepts are made on two T-33s, flying approximately 5000 feet apart to simulate the tow aircraft and target used in the last stage of training. Three interceptors per target are used to insure that pilots and controllers will become proficient in close control work with multiple fighters.

Once again, all missions are under GCI control, with a minimum of five successful intercepts per pilot flown. These five intercepts are recorded by direct scope cameras and are assessed by qualified instructors.

The lead, target and interceptor aircraft are flown at 20,000 feet. In the event the intercept is too close, and evasive action becomes necessary, such action will be taken only by the target aircraft. This added precaution eliminates any possibility of a collision occurring. With two miles to go, the target aircraft makes a check as to the position of the interceptor, and if contact is not made visually, the intercept is broken off. Initial airspeeds are 200 knots IAS for the target and 300 knots IAS for the interceptor. When possible, these airspeeds are increased the last three days of Phase II to call attention to train angle changes as they are related to airspeed changes. Critiques are held after each mission to explain mistakes and improper procedures and to analyze the techniques used by the interceptor teams.

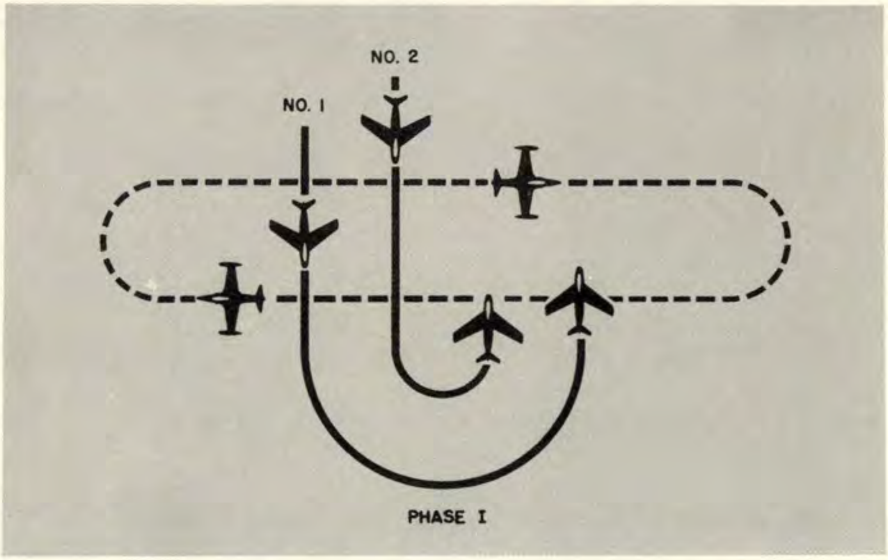
Phase III Firing

The missions flown during Phase III are flown at different altitudes and airspeeds to focus attention on the different target-interceptor speed ratios. To get maximum target utilization, six fighters fire at each target, with three aircraft in the pattern at a time. All firing is accomplished on a towed target equipped with two spinning reflectors used to get better radar returns.

A standard cockpit procedure is used during Phase III when aircraft are armed with live rockets.

- Immediately after arriving at his plane, a pilot determines that all appropriate circuit breakers are pulled.
- After entering the cockpit, the pilot checks the circuit breakers again, sees to it that the rocket master switch is in the OFF position and that the rocket firing selector is in AUTO.
- All armament switches and circuit breakers remain off until the aircraft has been started and taxied to the arming area at the end of the runway. Here, the circuit breakers are reset and the engine run up to 65 per cent. The pilot then places his hands outside the cockpit while the armorers check for stray voltage.
- If the voltage check is satisfactory, the all-clear signal is given.
- The pilot then turns the rocket master switch to the camera position and checks for a green light. If the green light is on, he returns the switch to jettison and prepares for takeoff.

Rockets are fired only after the chase pilot has cleared the interceptor with two miles to go.



In the Phase I pattern, two interceptors make 90-degree practice runs against a T-33 "target."

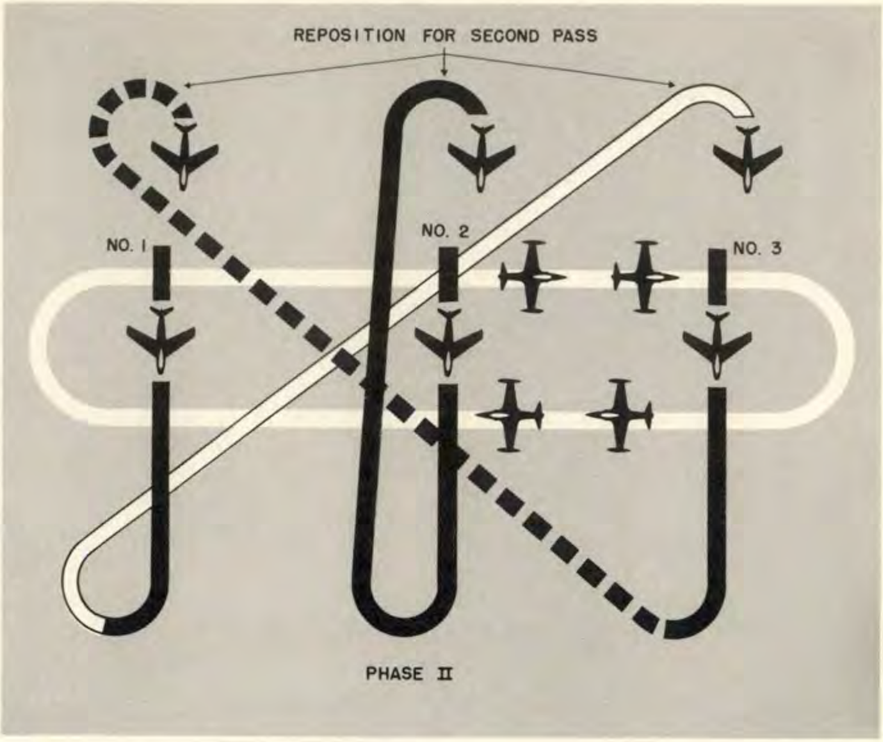
All aircraft on the mission, including the tow ship, operate on a common radio channel, with an alternate channel assigned in case of primary channel malfunction. Each mission is flown under the direct control of GCI and, in the event that GCI becomes inoperative, the mission is aborted. The flight leader makes radio contact with GCI immediately after takeoff, and each member of the flight checks in with the controller.

On all firing missions a chase pilot is assigned to the interceptor to insure that the interceptor pilot is locked-on the target (not the tow ship) and that he is within the prescribed angle-off limits. The chase pilot is charged also with seeing to it that all radio transmissions are made correctly by the interceptor. Because these transmissions will vary with different types of aircraft, he must be familiar with all aircrew armament series memoranda.

During the intercept run, the chase pilot transmits a "Tally Ho" as soon as he sights the tow ship. Then, with two miles to go before firing, he observes the position of the tow ship relative to the interceptor and transmits "Clear" or "Break" to the interceptor pilot. By lining up his aircraft with the interceptor and checking the slave compass he makes certain that the plane about to fire accomplishes a 90-degree beam intercept (plus or minus 30 degrees). If these limitations are exceeded the chase pilot instructs the interceptor to "Break," and at that time the attack is discontinued.

For scoring purposes, after the interceptor has fired, the chase pilot observes the apparent rocket dispersal and the flight of the rockets in relation to the target. Finally, he makes sure that the interceptor pilot accomplishes his final armament check before leaving the range.

Immediately after leaving the IP the chase pilot positions his aircraft four plane lengths (approximately 150 feet) directly behind and slightly below the interceptor. Then, with the "Clear-to-fire," he repositions three plane lengths out and 20 feet above the fighter on the side from which the target is approaching. This provides elevation and azimuth clearance from the target and minimizes the possibility of the chase plane flying into falling rocket parts.



In Phase II patterns, 90-degree approaches are used to practice getting the correct "lock-on."

GCI Control

Student controllers, under close supervision, guide the interceptors to the target area, line them up on the target and pick them up again after they have fired.

From the controller's viewpoint, the mission starts when the interceptors are airborne. The fighters take off at 20-second intervals and check in with the controller on the assigned radio channel. The controller makes a radio check with each plane by giving the pilot a vector and angels (altitude) to the operational area. The interceptors climb at 100 per cent military power, 300 knots IAS.

The controller then must identify and place each fighter and the target, preferably by checking their respective courses and by IFF interrogation. If this is not possible, positive identity is made by position reports and given course changes.

Next the controller plans interceptor spacing. With 20-second intervals on takeoff, the planes will be in trail about three miles apart, which is not adequate spacing for firing passes.

Spacing on the 90-degree beam approach should be planned so that the interceptors will "splash" the target at one-minute intervals. If this spacing is set up, the distance between interceptor paths will be equal to one minute of target travel and the distance between the interceptors will be equal to one minute of interceptor travel. The controller makes sure also that the fighters and the target are in a straight line to insure that the angle-off for each interceptor will be equal.

On the first pass, if the fighters are overtaking the target (that is, the target is going away from the controller), obtaining the desired spacing is simple. The fighters then can continue to their turn-on-points in trail, with two to three mile intervals, and they will reach the turning point with the desired spacing.

If the target is coming toward the fighters on the first pass, spacing can be obtained by fanning them out as they approach the displacement line. If in-trail spacing is still not adequate after they reach the displacement line, No. 2 and No. 3 may be allowed to displace (move out) several miles farther from the target path. When approaching the target from a head-on position, spacing in trail should be equal to one minute of interceptor travel plus one minute of target travel to obtain the desired spacing on the 90-degree approach. Turn-ons then will be one minute apart.

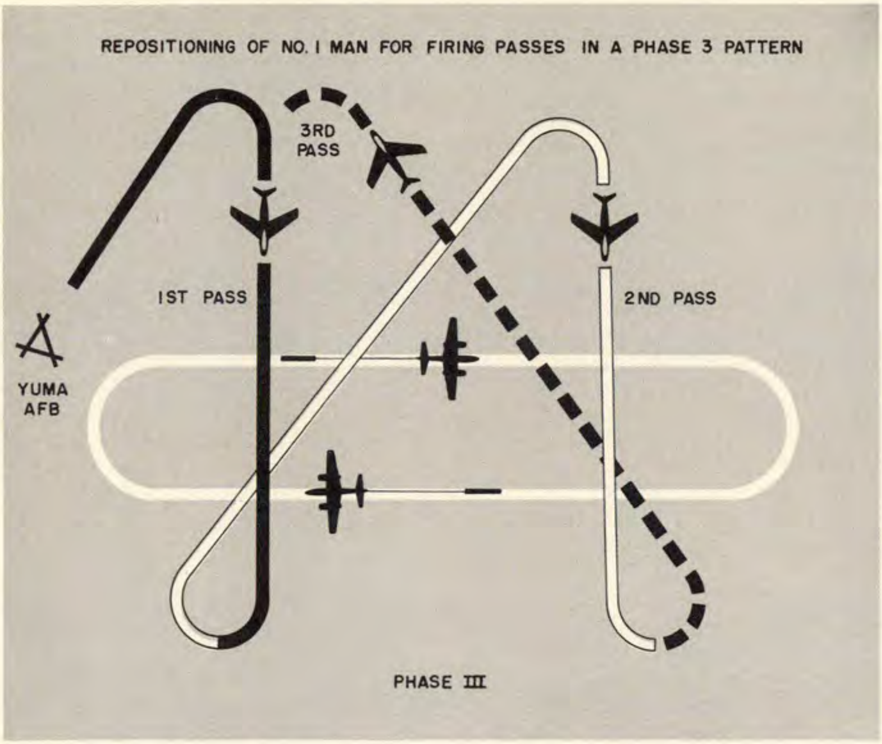
A Phase I mission is flown with the target aircraft flying a race-track pattern tracking on predetermined headings. The first of two interceptors is positioned by the controller to attack on a 90-degree beam lead collision course interception.

The interceptor displacement should be approximately 25 miles after the initial turn-on to the 90-degree beam approach, which allows the fighter about three and one-half minutes on the final approach.

After break-off the controller gives the interceptor a recovery vector that places him 25 miles off the target course and positions the aircraft for another intercept on the target's reciprocal course. Using this position, each interceptor can be given four intercepts during a 50-minute tow target mission.

On a Phase II mission, using two T-birds flying in trail, 5000 to 6000 feet apart to simulate the tow plane and target, three interceptors make dry, practice runs to obtain correct target separation from the tow ship while locking-on to the target.

A 3:2 speed-ratio (fighter 300 knots IAS, tow ship 200 knots IAS) is used in Phase II. The tow plane and the target track on pre-determined headings such as 80 and 260 degrees, at the same altitude. On such



In Phase III, interceptors fire, break and are repositioned by the controller for the next run.

a mission the interceptors make their first attack from 170 degrees. If they are not at attack altitude before turning on the final approach, they must level out with the target before making the interception. All succeeding passes are then made in only one direction from north to south.

Displacement from target is still 25 miles to allow the fighters three and a half minutes on final.

The fighter pilot calls a "Judy" immediately after he obtains a lock-on. If he doesn't call by the time he has two miles to go, the controller breaks him off. If the interceptor "has a Judy" the target aircraft pilot then calls "Tally Ho" when he has a visual on the fighter aircraft.

Finally, after the pilot gets a pull-out signal, he calls "splash" and the controller resumes control and breaks him off to the rear of the target.

To reposition the interceptors, the controller must cross the interceptors' paths to maintain the same order of attack. If each fighter were given a 180-degree turn after the splash, their order would be reversed. On the next pass the No. 1 pilot would obtain about a 40-mile displacement while the No. 3 man would have only a 10 to 15-mile displacement from the target path. The chart shows how the controller can switch interceptor positions and cross their paths to reposition them correctly.

On Phase III missions the controller makes a radio check with each chase aircraft as well as each interceptor. Patterns are about the same as those flown during Phase II. However, each interceptor has a chase plane flying close formation to insure that he is in proper firing position and to keep the fighter clear of any strange aircraft that occasionally stray through the gunnery range area.

Approach pattern and radio calls are the same as those used in the previous phases but after reaching the "two mile point" the radio channel must be kept clear of all transmissions. At this time the tow aircraft should be directly ahead of the interceptor and the chase plane can tell whether the fighter is locked-on the target or the tow ship. It is during this phase that the chase pilot clears the interceptor pilot to fire or breaks him off the pass.

Each participant in the mission, that is, the interceptor pilot, the chase pilot, the tow pilot and the controller, must have two-way radio contact with all other participants. This is an absolute necessity as anyone who sees a dangerous situation developing must be able to call "Break." (They all have the break prerogative.)

As an example, if the chase pilot sees that the interceptor has more than a 30-degree angle-off on his 90-degree beam approach he then calls to the fighter to "Break."

Fuel and oxygen checks are made after the first, third and each succeeding pass. Interceptors are not allowed to begin another pass if they have less than 1500 pounds of fuel.

The B-45 tow aircraft crews are another indispensable part of the interceptor training program. By following established SOPs and getting maximum aircraft utilization they enable the TDY units to receive full training in the allotted time.

Before the start of a tow mission, the aircraft commander briefs the crew on the overall procedure to be used, with emphasis on possible in-flight emergencies. The crew chief reports on the aircraft's status and the tow reel operator reports relative to the tow reel and target equipment.

The rolled up, 9′ x 45′ marquisette target is carried in the plane's bomb-bay. If the tow altitude is 20,000 feet, the B-45 is slowed up to 120 mph indicated at 21,000 feet. Next, the target is attached to a cable at least 5000 feet long, released and reeled out of the bomb-bay at 400 to 600 fpm. If tow altitude is 30,000 feet the procedure is the same, except that the target is let out at 3000 feet above tow altitude.

Contact is maintained with the GCI controller throughout the mission. The controller positions the tow ship in such a way that he can get the interceptor on the firing pass immediately after the target is let out.

In any case where an interceptor pilot doesn't follow the SOPs to the letter, the tow squadron can cancel the rest of that individual's missions until he gets enough additional training to be capable of flying armed rockets against a tow.

After a mission the B-45 lets down, drops his target from 2000 feet at 150 mph over the target recovery area and returns to base. The aircraft commander must plan his mission so that he will have a minimum of 500 gallons of fuel on initial approach.

Ever since high flying, fast bombers became capable of bombing a target in any kind of weather, using radar, our first line of defense has been the U.S. Air Force interceptor. The training received by the Air Defense Command's pilots at Yuma AFB is one more strong link in this Nation's chain of defense. ●

the HEAT is OFF

MAN, sometimes considered the weaker link, may one day have the capacity to withstand the rigors of supersonic, high-altitude flight better than the machines that carry him. Now being studied and tested as a possible addition to the ever-growing list of protective clothing is an air conditioned anti-exposure suit.

An experimental model of the suit, developed by the Air Research and Development Command's Wright Air Development Center, already has proved satisfactory in early trials. The test program is being accelerated because of the rapid development of high-performance aircraft.

As its name implies, the suit is designed to provide dual protection. It provides air conditioning for protection against heat and is equipped with insulation and a water-proof outer shell for protection against cold and water. In addition, it can be used with an anti-G suit and with a partial pressure suit.

Man's battle with the elements, so far as flight is concerned, began when Orville Wright lifted the first airplane off the ground at Kitty Hawk. At that time the only protective device needed was a pair of goggles to protect the eyes from the wind.

As flight became more commonplace and speeds and altitudes increased, the need for protective devices grew by leaps and bounds. First came the parachute and seat belt, then insulated clothing and oxygen masks. As the range of aircraft was extended to include flights across continents and over oceans and between temperate and torrid zones, the anti-exposure suit became a must.

With the advent of higher speeds, gravity forces had to be reckoned with and the G suit was developed. As planes climbed higher, pressurization became necessary and took the form of both cabin pressurization and pressure suits.

The air conditioned suit became a necessity as planes approached the speed of sound and beyond. At these high speeds a new problem was encountered that was promptly named the "thermal barrier."

Actually, the thermal barrier is not a barrier in the sense of a sonic barrier. Airplanes that have passed through the sound barrier have found flight conditions relatively calm above the speed of sound. But there is no point at which airplanes can pass through the thermal barrier and find a relatively cool climate.

Air entrance assembly, with quick disconnect and sealing hose snapped over entrance port.

The V-closure, with the zippered flap opened, illustrates how the water barrier is knotted.

For additional comfort the insulated liner is worn as a part of the anti-exposure suit.

Heat increases as speed increases. It has been determined that at Mach 3, or three times the speed of sound, at sea level, temperatures at the airplane skin will go up to 1000 degrees Fahrenheit. Not only man, but instruments and most other fittings inside the airplane would be baked to a crisp inside such a flying oven.

Thus, air conditioning of high speed airplanes became a necessity. The big problem, it soon developed, was to construct an efficient air conditioning system that left room in the airplane for little necessities such as the pilot and his equipment.

Instruments have been designed to operate efficiently at a maximum of 165 degrees Fahrenheit. Tests showed that such a temperature was feasible insofar as air conditioning system weight and space factors were considered. But for man, loaded down with an anti-exposure suit, anti-G suit and partial pressure suit, such temperatures would be unbearable. He would not be able to fly long enough to accomplish a mission.

Starting with the anti-exposure suit, AeroMed Lab engineers and medical men soon determined that a water-proof insulated suit which would enable man to withstand temperatures of 30 degrees Fahrenheit indefinitely and would protect him for about one hour at −30 degrees, would be comfortable up to 50 degrees, but not for long above that mark. At the normal 80 degrees in a cockpit, the pilot's efficiency would be impaired after about two hours, and at the 165-degree goal of airplane air conditioning, the pilot would be unable to operate after 30 minutes of flight.

Therefore, without the cooling effect of the air conditioned anti-exposure suit, it would be impossible for a pilot to operate efficiently.

In approaching the problem of making a suit comfortable from a temperature, bulk and weight standpoint, the engineers and medical men decided to take advantage of the cooling quality of evaporation of man's own perspiration.

This posed a problem in that some people are "poor sweaters," but in 1953 it was discovered that even they produce sufficient water for heat transfer by evaporation under the conditions encountered in this case.

A new principle for air distribution throughout the suit was developed. This abandoned completely the principle which seemed to be most natural, the use of air distribution hoses for cooling.

The suit finally developed consists of two layers of thin, impermeable fabric. The inner layer is provided with a large number of small holes, through which the air passes during ventilation. Sandwiched between the two layers is a flexible spacer material, which facilitates airflow in all directions. Larger holes go through both layers and connect inside and outside of the ventilating suit, to facilitate the air motion exchange.

Between the two layers of the suit is a flexible material which facilitates the airflow.

Visible at the left is the connection hose attached to the anti-G suit worn underneath.

By using the standard cabin air conditioning system, cooling air is introduced into the suit through a flexible hose with throttle and quick-disconnect. The air flows through the suit and exits through four valves at the end of each extremity. The exit valves are opened by the outcoming air and closed watertight by a spring as soon as the airflow stops.

Since the suit is to double as an anti-exposure garment and must be water-tight, the neck and both wrists are sealed by elastic rubber seals. The lid on the quick-disconnect will close on separation and prevent water from entering the suit. It is shaped in such a way that it will not accidentally open if the wearer is dunked.

The point where the air supply hose penetrates the outer shell is sealed with a sealing hose which can be folded backward and snapped over the rim of a plastic threaded port. The port can be closed with a cap screw when the ventilated inner suit is not used.

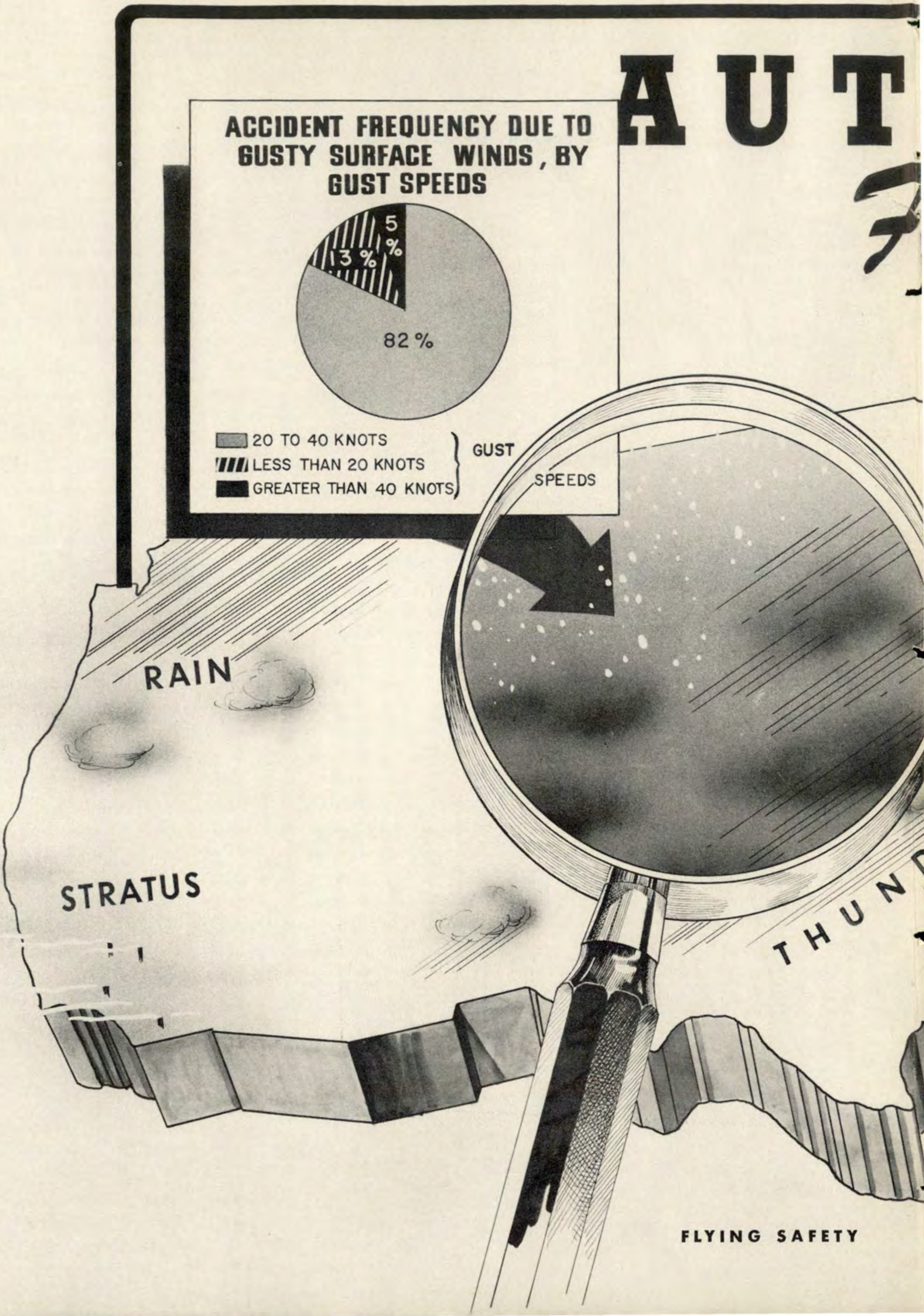
To combine this suit with an anti-G suit, a second plastic cap screw has been placed on the left side. A third one would be added on the right side if the use of a partial pressure suit is intended.

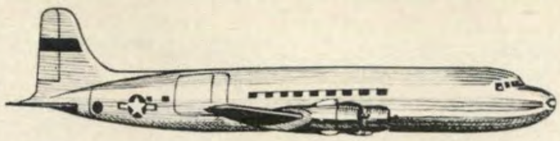
A watertight suit as complicated as this one also needed a special closure to make donning easier. A V-shaped zippered flap opens to disclose a water barrier which is tied into a tight knot.

Preliminary tests were conducted on two men and then averaged. In all tests, the volunteers wore the air conditioned anti-exposure suit, a set of medium weight underwear, a back parachute, a crash helmet and in some tests, an oxygen mask. The tests were run for three hours each with the men in sitting positions.

Starting with an outside temperature of 90 degrees in the first test, increasing to 120 in the second, 140 in the third and 165 in the next five tests, the ventilating air temperature was reduced from a high of 127 degrees down to 45 in the sixth, seventh and eighth tests.

Since these and additional tests have proved that air conditioning of a pilot's suit can maintain him in thermal comfort even when the cockpit temperature is 165 degrees, use of this suit will make it necessary only to maintain the 165-degree temperature inside an airplane. This, in turn, will save bulk and weight in cabin air conditioning. ●

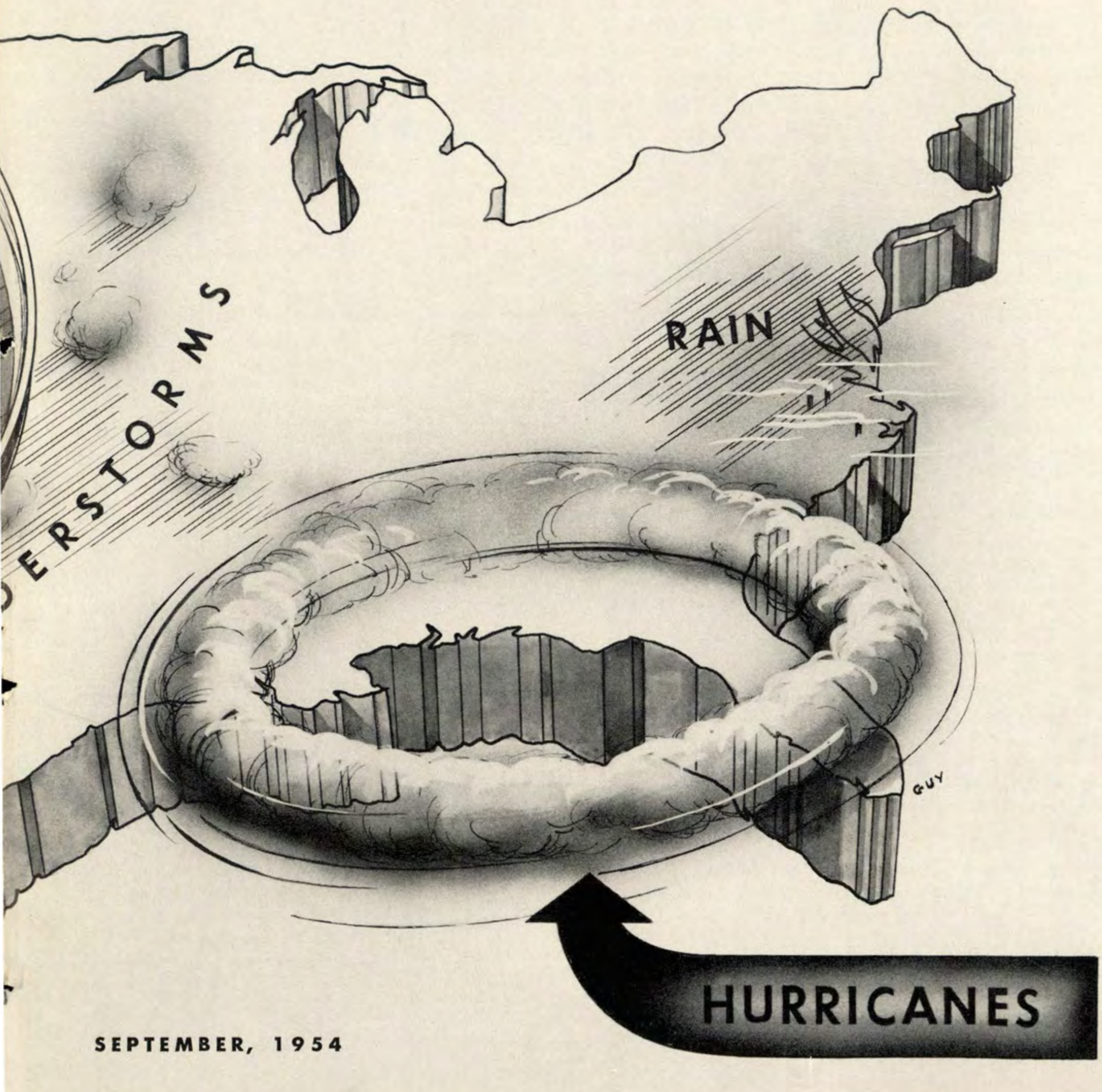

AUT
ACCIDENT FREQUENCY DUE TO GUSTY SURFACE WINDS, BY GUST SPEEDS
5 %
13 %
82 %
20 TO 40 KNOTS
LESS THAN 20 KNOTS
GREATER THAN 40 KNOTS
GUST SPEEDS
RAIN
STRATUS
THUN



UMN

Hazards to flight during the fall months are discussed in this article prepared by Maj. Clarence E. Everson, Directorate of Climatology, AWS.

lying Hazards



AUTUMN, in many ways, can be considered a sort of catch-all season as most of the familiar weather hazards occur to some extent during the autumn months. This is to be expected, since the autumn season constitutes a transitional period between summer and winter weather situations. Although thunderstorms do not occur as frequently in autumn as in summer, they do appear often enough to be considered among autumn flying hazards, particularly in the middle and late portions of the season. Except for the hurricane, no one weather hazard is quite so prominent in autumn as it is in one of the other seasons of the year.

A collection of aircraft accident data for a recent six-year period was studied to determine which weather factors contributed to the greatest number of accidents during autumn months. Only those accidents in which weather was a factor were considered in this analysis. The relationship between primary contributing weather factors and the percentage of accidents is illustrated on page 14.

Surface Winds

The most significant feature demonstrated by this analysis is the fact that the largest percentage of aircraft accidents in the autumn season were due primarily to unfavorable surface winds. Unfavorable surface winds caused almost as many aircraft accidents as a combination of any other three of the factors. This may be a bit surprising, since it might well have been anticipated that such factors as cloudiness or restrictions to visibility would head this list.

Unfavorable surface winds are defined as cross winds, gusts or a combination of the two. Gusts were reported in a high percentage of the cases of unfavorable surface winds.

On the preceding pages the chart shows the relative frequency with which gust speeds in selected ranges contributed to aircraft accidents. This representation clearly demonstrates that gust speeds in the range of 20 to 40 knots contributed to aircraft accidents much more often than did speeds of over 40 or under 20 knots. This is probably because gust speeds in the range from 20 to 40 knots occur far more often than do speeds greater than 40 knots, and that gust speeds under 20 knots may be less critical for most flight operations.

Most of the accidents resulting from unfavorable surface winds took place in three general areas. The south central United States was the area in which the greatest number occurred. A significant number occurred in the east coastal states, while the southeast and northeast coastal states appeared to be preferred regions, with few accidents in which wind was a factor. A third area of importance in this report was the southwestern part of the United States.

Surface wind speeds of 15 to 25 knots, which are most frequently associated with gust speeds in the 20 to 40-knot range, occur most often in the midwestern states, particularly in an area defined by Wyoming and South Dakota on the north and by Texas on the south. In this area, these wind speeds occur on the average from 20 to 35 per cent of the time. The higher percentage values are found in the Kansas, Oklahoma and the Texas Panhandle area.

Most of the accidents in which rain, clouds and fog were primary weather factors took place in the east and west coastal states and the Great Lakes region. The same areas coincide closely with the regions of greatest frequency of occurrence of those weather factors.

Thunderstorm activity is less pronounced in autumn than in summer, but still constitutes a definite autumn flying hazard. Thunderstorms are more frequent in the midwestern states than in western states. The number of thunderstorms decreases as the season progresses, so that they tend to become a less significant hazard in late autumn than in early autumn. Only a small percentage of those accidents due to thunderstorms actually took place within the region of greatest thunderstorm occurrence. The Ohio Valley stands out as a preferred area for thunderstorm-caused accidents.

During middle and late autumn, hazards common to the winter months begin to appear on the scene. Freezing precipitation and snow account for only a small percentage of accidents, but should not be disregarded as definite hazards. The north central states and the Great Lakes region are the areas primarily affected by these factors.

Hurricanes

The most outstanding feature of the autumn weather situation is the hurricane, with its destructive winds and torrential rains. The paths of many of these hurricanes pass over the Gulf coastal and south Atlantic coastal states or in that vicinity.

The hurricane season begins early in the summer and extends through most of the autumn period. A study of records compiled over many years shows that a greater number of hurricanes have affected the United States during the autumn months than during the summer months. During June and occasionally in July, hurricanes tend to develop in the western Caribbean Sea and move in a northwesterly direction into the Gulf of Mexico. They then follow a path either into Mexico or the Gulf states. During August and September, and sometimes in July and October, the tendency is for hurricanes to develop south of the Cape Verde Islands. These quite often recurve in the Caribbean or in the Gulf of Mexico, after which they tend to move north or northeastward, their path taking them into or near the southeastern states. In late September, hurricanes once again tend to develop in the western Caribbean Sea and follow paths similar to those followed in June, while in October and November they are more likely to recurve to the north or northeast and pass over or near Florida.

Hurricanes move slowly, usually at about 8 or 10 knots. Winds associated with them are exceptionally strong, speeds of 100 to 125 knots not being unusual. The diameter of hurricanes varies somewhat, in some cases being as little as 50 or 75 miles while diameters of over 500 miles have been noted. Heavy rainfall is generally associated with hurricanes, on occasion exceeding 20 inches in a 24-hour period.

Specific information on the number of aircraft accidents attributable to hurricanes is not available. However, it is believed that this number is relatively small in comparison to the number of accidents resulting from other weather factors. Timely hurricane warnings for a given area permit taking the necessary precautions against this hazard. Nevertheless, the fact remains that the hurricane, one of the most dramatic of weather features, does represent a most serious flying hazard during the autumn season in the Gulf and Atlantic coastal states.

To summarize, a wise pilot will remember that autumn flying weather incorporates many of the hazards of both winter and summer weather, and will plan accordingly. ●

OFF FOR LANDING!

THE THEORY goes something like this, "heavier than air machines, correctly designed, can perform sustained flight with the aid of sufficient propulsion."

This story concerns the B-25, a versatile aircraft about which there is no doubt as far as its flying ability is concerned — with the aid of two R-2600s, that is. Likewise, there is little doubt as to its rocklike tendencies when *both* fans cease to rotate.

This episode really started when a pilot made a left turn onto the downwind leg in a B-25. The mixture controls were placed in full rich, propeller controls advanced to 2200 RPM, fuel booster pumps switched on and the landing gear lowered. The copilot checked the engine instruments and stated that they appeared normal. Seconds after the gear was lowered, a third crewmember, seated behind the pilot, shouted that the left engine was cutting out. The left engine was observed to run rough and vibrate in its mounts while black smoke began pouring from the stacks.

Shortly thereafter, the copilot noticed black smoke emanating similarly from the right engine with subsequent partial power loss. Upon the first indication of trouble, both propeller and throttle controls were advanced full forward. The mixture controls were put into the cruising lean position and, after no change in engine performance was noted, returned to full rich.

From the beginning of the engine malfunctions, the pilot primarily concentrated on maintaining airspeed and directional control of the aircraft. He stated that he started descending rapidly while maintaining 150 MPH airspeed. Seeing that it was impossible to reach the runway, the pilot feathered the left engine and selected a field for a forced landing. The landing gear control was placed in the up position and, prior to touchdown, the master ignition switch was turned off. The fuel booster pumps were not turned off at any time. The aircraft made contact with the ground on its partially retracted main gear and skidded to a stop.

Fortunately, double engine failure doesn't happen too often. When it does happen, investigation as to the cause takes on a different slant than the run-of-the-mill engine failure investigation. It just isn't likely that both engines will fail at the same time due to metal fatigue, a blown jug or for any other similar reason.

Investigation of this accident uncovered the possibility of flooding the engine by excessive fuel pressure. It was determined that B-25 aircraft engines equipped with Holley carburetors are subject to flooding when fuel booster pumps are turned on, if inadequate voltage control on the aircraft electrical system allows voltage to exceed normal limits. This condition can cause complete loss of engine power.

There are two B-25 modification programs underway to eliminate this engine flooding deficiency:

• Replacement of Holley carburetors with Bendix carburetors, which operate satisfactorily over a much wider range of fuel pressures.

• Provision of an overvoltage protection feature in the electrical circuit to prevent overspeeding of the boost pumps in the event malfunction causes excessive voltage in the system.

Pending modification completion, a pilot should check the recently issued Safety of Flight Supplement to the B-25 Pilots Operating Instructions. This supplement warns of the possibility of engine stoppage due to excessive fuel pressure from the booster pumps and instructs pilots to leave the pumps off for landing until the modifications are made.

In addition, since a modified aircraft is not easily recognizable by the pilot, the unmodified aircraft will be placarded to indicate that booster pumps should be left off for landing.

The Flight Supplement concerns itself primarily with booster operation on landing; however, it figures that overspeed on takeoff could have the same dire results unless proper pre-takeoff checks are made. By heeding the Safety of Flight Supplement and the Pilots Operating Instructions you can't go wrong. Page 31 of the Dash One outlines the procedures for checking fuel booster pump operation prior to takeoff. The whole secret is in the voltage and/or fuel pressure output. An excessive voltmeter reading and/or fuel pressure indication in excess of 8 PSI is a clue to possible trouble and calls for scratching the flight and a Form I writeup. ●

ANYMOUSE  *and his hairy tales*

Judging from reports received from the field, it looks as if the article on Anymouse in the May issue has stirred up considerable interest among the troops. Near accident reporting systems are in effect in several major commands, and many base flying safety officers have started local programs also. In order to get maximum coverage, FLYING SAFETY is printing some of the reports recently received. Crew members are encouraged to send us any narrative of a near accident or unusual experience for publication. Remember, as the name implies, it isn't necessary to sign your *anymouse* reports . . . just give us the facts.

IT WAS one of those black, raining, miserable nights and we were preparing for a cross-country flight. After a careful walk-around inspection, the copilot and engineer followed me into the cockpit of our C-47. We received clearance from the tower and started out toward the active runway.

The weather forecaster had given us a thorough briefing and we were expecting stratus-type clouds with rain and light to moderate rime ice.

Following runup and accomplishment of the normal amplified checklist, my copilot and I ran through the night-instrument check. Everything, including auxiliary equipment such as de-icer boots, carburetor heat and windshield anti-icing worked OK.

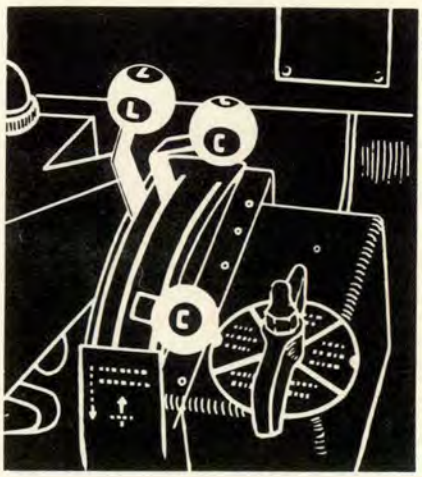
We received tower permission to take off and away we went, into the black. Passing through 1000 feet on instruments, I requested the copilot to check engine instruments and to turn off the fuel booster pumps, one at a time. It was then the copilot shouted that the right carburetor heat was up in the red *and climbing*.

Now, let us go back to the pretakeoff preparations. During the checking process the co-pilot had actuated the carburetor heat controls and, after a temperature rise on both engines was noted, returned them to the cold (forward) position. He then pulled what he thought to be the carburetor heat control lock to the aft (locked) position.

The three controls, right carburetor heat, left carburetor heat and the lock, are side-by-side and feel and look very similar.

The copilot had inadvertently pulled the right carburetor heat to the hot (aft) position thinking it was the control lock. We had taken off with the heater controls in this position.

Fortunately, with the aid of a flashlight, the controls were repositioned before any serious trouble occurred; but don't think we didn't have a few anxious seconds.



Using that flashlight was a good idea; it was just used (about 1000 feet of altitude plus runway length) too late. On night flights, before and after positioning switches and controls, get some light on the subject. This is particularly important during the pre-takeoff and landing checks.

This might be a good time to bring up the differences between carburetor heat set-ups in C-47s. There are three types; one incorporates the ram, hot and filtered positions, another has the cold (forward) and hot (aft) controls with in-between positions and yet another has a control behind the pilot's seat tied in with the temperature controls located to the right on the pedestal.

Know your airplane and use your light at night—It's good insurance.

Two F-86Fs were "rat racing." The leader nosed over into a dive at a reduced power setting and executed a four G pull-up at about 13,000 feet. In the meantime, the No. 2 man had fallen back and was hustling along to catch up and regain his proper in-trail position.

At the point of pull-up the No. 2 man pulled back abruptly on the stick and simultaneously poured on full throttle. He noticed the tailpipe temperature had increased to 1000 degrees and sensed a compressor stall.

The pilot immediately lowered the nose and reduced power to correct the over-temperature condition. The temperature returned to normal and the aircraft was returned to base and landed without further incident.

On a routine flight, another F-86F had three compressor stalls and a subsequent flameout. A normal airstart was made, but the tailpipe temperature went to 1000 degrees for about four seconds before returning to normal.

Experimentation proved that throttle manipulation, other than a very slow movement, caused a compressor stall and a high tailpipe temperature. By exercising care and making throttle movements slowly and in small increments, the pilot was able to fly the F-86 home, baby it around the pattern and land it normally.

Compressor stalls are indeed with us. If you keep in mind what causes them, you greatly increase your chances of getting things under control and landing without further compressor difficulty.

A compressor stall is nothing more than improper fuel-air ratio. The stages for setting up an unfavorable fuel flow condition are:

- *Having the emergency fuel system on or alerted (either intentionally or by electrical malfunction) followed by rapid throttle movement.*
- *Fuel regulator malfunction resulting in improper fuel scheduling followed by rapid throttle movement.*

The trick lies in recognizing quickly that a compressor stall has occurred. The key to minimizing danger or damage lies in your left hand (that's the throttle hand, son). So, avoid those abrupt throttle movements and there's no sweat.

★ ★ ★

A student took off in a T-33 to practice acrobatics. He climbed to 15,000 feet and circled, expending tiptank fuel.

As soon as the tiptanks were dry, he executed a few chandelles and then performed a loop followed by an immelmann. He then tried to do a clover leaf. He entered it at 17,000 feet, indicating 320 knots with a power setting of 90 per cent RPM. He completed the first leaf of the maneuver satisfactorily. As he started into the second leaf, from an approximate 30-degree nose-low attitude, he came back on the stick, pulled about 3 G and blacked out.

The student recovered from the blackout at approximately 7000 feet and found he was in a vertical dive. He retarded the throttle instantly and applied considerable back pressure to

recover. The airspeed was at or near the red line, and the student blacked out again.

Upon regaining his senses, he discovered he was at 3000 feet in a 60-degree nose-low attitude. Immediately he fed in full nose-up elevator trim, pulled back on the stick and blacked out for a third time. This time he woke up to find himself at 8000 feet going straight up. A vertical recovery was accomplished at 130 to 150 knots I.A.S. and the aircraft was successfully returned to the base. Damage to the horizontal stabilizer occurred during the violent pull-ups.

★ ★ ★

The hazards involved in pulling an excessive amount of G forces are pretty obvious. Aside from damage to the aircraft, incapacitating the pilot of a high speed aircraft, even for only a few seconds, places him in an undesirable position, to say the least.

In this particular episode, the actual pulling of the G forces was secondary to the fact that the pilot attempted maneuvers beyond his capabilities. It's justs plain good sense never to attempt difficult acrobatics in an airplane with which you are not too familiar, until the maneuvers have been demonstrated to you by a qualified instructor pilot and you're convinced of your own proficiency.

By the same token, it is obvious that the hazards involved in taxing your ability to the breaking point applies to all types of flying, not just acrobatics. Skill and proficiency gained through practice will equip today's Air Force pilot for the type of flying required of him, whether it is performing acrobatics or accomplishing a socked in instrument letdown.

Know your airplane, know yourself, fly accordingly. No one knows your capabilities as well as YOU.

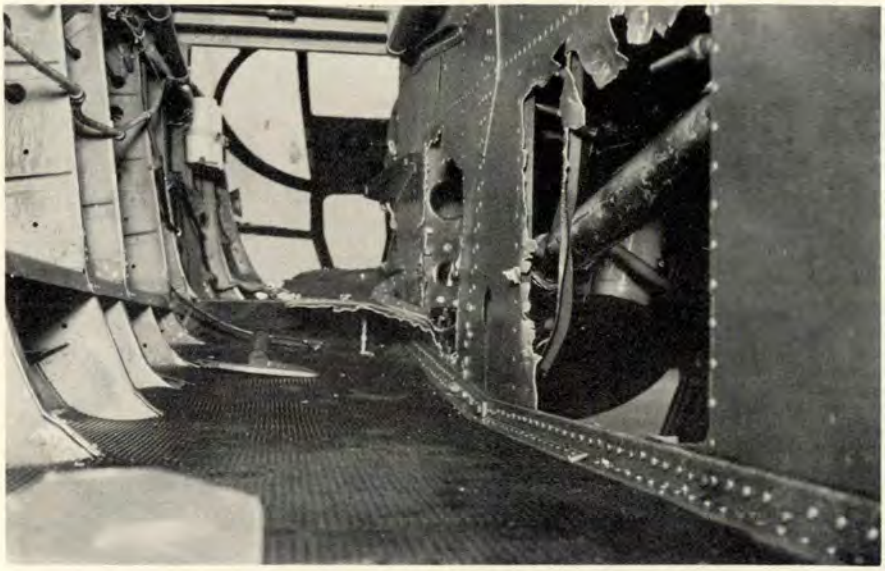
★ ★ ★

A T-33 fired up and started taxiing out to begin a two hour cross-country flight. The T-bird had been cleared by the tower to take the runway, and upon reaching the takeoff position, most of the pre-takeoff checks had been accomplished. The main and leading-edge wing tanks had been checked for operation and there were five green and no red lights showing.

Almost immediately after getting into takeoff position the tower advised that an emergency aircraft was on a long final and that the '33 was cleared for IMMEDIATE takeoff.

In expediting, the pilot either forgot or neglected to take time to pull power and check the tiptanks for proper feeding. You guessed it, the tips wouldn't feed and the pilot ended up kicking them off before landing.

The lesson here is obvious. You're asking for trouble, needlessly, when you omit any part of that pre-takeoff check. When you have to get off in a hurry (on a scramble, for example) practice getting that checklist accomplished in an orderly, systematic manner. Sometimes speed is vital, and if you have a set checklist, you can get off fast, and have everything available to accomplish your mission.



An interior view of the B-25 shows where, with the aid of a fire axe; pilots chopped holes in the panels to locate the broken section of the hydraulic line.

A fire extinguisher was used as a weight after the first transfer attempt had failed.

End of the line

IT WAS about 0930 of a spring day, and business was strictly routine in the Shaw AFB tower. The operator on duty was watching an airplane grow from a silent black speck in the pale blue sky to a full size B-25 approaching the traffic pattern for landing. He exchanged the usual information with the '25 pilot.

Business in the aircraft cockpit was routine, too. Aboard the '25 were a USAF pilot, 1st Lt. Elton J. McClure, and an RAF exchange officer, Flight Lieutenant Desmond Nixon, both stationed at Shaw. They had been on a training flight in the local area.

All this quiet routine came to a sudden end, both on the ground and in the air, when in the traffic pattern Lt. McClure placed the landing gear handle of the '25 in the down position and received an unsafe indication. McClure immediately advanced the throttles and pulled up above traffic altitude, while Nixon relayed the news to the control tower operator.

Now earnest activity began. The tower operator alerted the crash crew, then quickly got in touch with the operations officer and the engineering officer. In short order, these two men, accompanied by the base commander and his executive officer, gathered on the parking ramp outside operations and watched the crippled aircraft cruising in the distance.

Meanwhile, aboard the '25 the two pilots were holding a consultation. They decided they might have a faulty hydraulic line. They had enough fuel to stay airborne while they investigated the situation, so while Lt. McClure flew the aircraft, Flight Lt. Nixon grabbed the crash axe and began to chop holes in the panels covering the lines.

Within a few minutes he had located the bad line. But the situation hadn't improved any, for the question now was how to make repairs in the air. The latest news was radioed to the tower operator, who in turn relayed it to the waiting group on the parking ramp.

These men now held a consultation of their own. The faulty line easily could be repaired in the air, if the pilots had the necessary parts. It was a big *if*. Naturally, the '25 wasn't flying around the local area loaded with spare parts and tools.

But the men on the ground had an idea. Before they tried to put it into action, however, they wanted to be sure the pilots had isolated their trouble. Another B-25 was parked on the ramp, so while the stranded pilots churned round and round overhead, the engineering officer and his men lifted the parked aircraft on jacks and destroyed the same hydraulic line in order to simulate the conditions that existed in the air.

Satisfied that the pilots had diagnosed the trouble correctly and that the line could be repaired in flight, Colonel J. R. Dyas, the base commander, accompanied by a copilot, the operations officer and an engineering officer, climbed into a C-47 to accomplish a peculiar kind of rescue. Their self-assigned task was air-to-air transfer, from the C-47 to the B-25, of a kit containing the necessary tools

The cut rope, minus the repair kit and parts, was mute evidence of a successful transfer.

The C-47, flying above the disabled B-25, lowered the necessary parts and tools. With less than one hour of fuel remaining, wheels were finally down and locked.

and parts to make repairs in the air.

While the C-47 took to the air, the Shaw AFB executive officer settled down in the cockpit of another B-25 parked on the ramp and prepared to radio instructions on making repairs.

Around the radio in base operations, anxious ears listened to the conversation between the C-47 and the B-25 pilots. Along the flight line, anxious eyes watched the horizon. By now fuel reserve in the B-25 was getting low. The two pilots could stay aloft only about two and a half hours more. Either they repaired the line in that length of time or they skidded down the runway, sans wheels.

It was past noon when Colonel Dyas maneuvered the C-47 into position above the B-25. The engineering officer aboard tied the repair kit to a long rope. At 1245 the first pass was made, but the rope had too little weight on it and there was too much play to make a successful transfer. The kit was hauled back aboard the '47 and a fire extinguisher was attached to the tools and parts for additional weight.

Again the rope was lowered. This time it swung within Flight Lt. Nixon's grasp but a gust of wind pushed it into one of the propeller blades, slashing the rope. The kit hurtled off into space.

There was one more kit aboard the '47, but apparently there was no way to get it to the pilots in the B-25. A crash landing seemed inevitable. But Colonel Dyas had another plan. The transfer could be made in a manner roughly similar to that used for midair refueling.

He instructed McClure and Nixon to knock out a section of the plexiglas in the nose of their aircraft. The audience around the operations radio knew this had been accomplished when they heard Flight Lt. Nixon's crisp British voice observe to no one in particular, "There's a bloody gale blowing through this aircraft!"

Carefully, Colonel Dyas maneuvered above the '25. The engineering officer lowered the second kit. Like threading a needle, he slipped the rope through the open canopy section of the plane below. The rope was cut, and the parts and tools were in Nixon's arms. Now it was all up to the two pilots in the B-25.

Cold air blowing through the cockpit forced them to lose altitude. They dropped down to 2500 feet where the air was warmer. With a little over an hour's fuel supply left, they began their repair work, while the C-47 continued to fly escort.

In less than half an hour, the '25 pilots reported that the new section of line was installed. However, lack of pressure still prevented the gear from extending. Colonel Dyas advised Lt. McClure to bleed the line a little to allow some of the air to get out. After doing this, Flight Lt. Nixon went to work on the hand pump. Finally, enough pressure was built up to get the gear down and locked.

At 1434, with less than an hour's fuel left, the B-25 touched on Shaw's runway, relatively intact.

The credit for this operation lies not with just one or two individuals but with a whole group who, with their combined skill and spirit of cooperation, were able to work together to do what no one of them could have done alone. ●

The plexiglass nose panel was knocked out to serve as an entrance for the repair kit.

Keep Current

NEWS and VIEWS

The Eyes of SAC — The eyes of America's Strategic Air Command are its photo reconnaissance units, and the Boeing RB-47E, newest photo-recon plane to go into service with SAC, is well equipped to serve as such. Similar in performance and dimensions (except for a longer nose) to the standard six-jet B-47 medium bomber, the RB-47E's equipment includes 16 cameras, any seven of which can be carried at one time, depending on the mission.

With their airplane serving as a backdrop, pilot, copilot and photographer-navigator of an RB-47E are shown here with their available photo equipment. The cylindrical objects in the foreground are cartridge flares, while those at the extremities of the "V" are flash bombs. The remainder consists of the 16 cameras and two photocell-operated shutter trip units.

★ ★ ★

Good to the Last Drop — A four engine airliner lost hydraulic pressure and the gear did not retract all the way after taking off. The fluid continued to leak at a slow rate. The captain elected to land and needed some kind of fluid to pump the gear into place and lock it. The liquids from the buffet were put into the hydraulic system (such as coffee, juice, etc.) and last but not least the wash basin water from the powder room was used. A short time later the gear was pumped into place and locked and a successful landing was made, with no damage to the aircraft.

★ ★ ★

Straight and Narrow — Recently, the 18th Fighter-Interceptor Squadron at the Minneapolis-St. Paul International Airport completed transition to F-89D aircraft. To facilitate movement of the aircraft in and out of the alert hangar and to eliminate the possibility of scraping the hangar walls with the rocket pods, an assistant line chief designed a nosewheel guide rail which has proved almost foolproof. Locally manufactured by Air Installations, the guide consists of a rail bolted to the center of the hangar floor in position to fit between the two wheels of the nose gear, making it impossible for the plane to deviate from proper alignment.

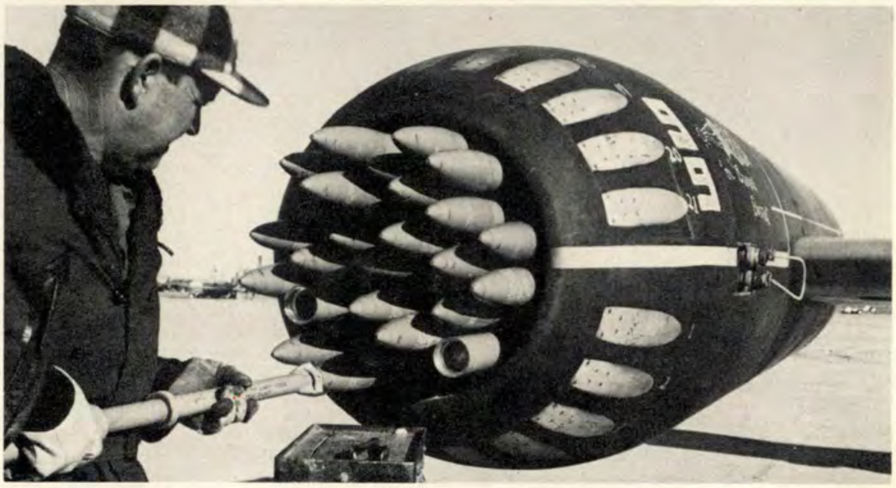
This could be adapted for F-86 and F-94 aircraft by placing the nosewheel between two rails.

★ ★ ★

Foul or Fair — For flying 3,500,000 accident-free miles, equivalent to 150 trips around the world, the 1st Weather Wing of Air Weather Service and its three reconnaissance squadrons recently received an Air Force Flight Safety Award at Hickam AFB, Hawaii.

The bronze and mahogany plaque was presented to the wing, while each squadron received a trophy in the form of a B-29 model for the total of 17,479 hours flown without an accident in the last six months of 1953.

Flying daily missions over vast areas of ocean in all kinds of weather, these reconnaisssance squadrons help to fill in the otherwise blank spaces



Above, the range of the F-89D is increased by jettisonable pylon tanks. Right, one of the twin pods is being loaded with 2.75 inch rockets. Each pod carries 52 rockets.

on northern hemispheric weather maps. Part of their mission includes typhoon reconnaissance, which means penetration of the eye of each reported typhoon in order to forecast its probable path and rate of violence. Nearly 60 such penetrations were made during the period for which the awards were made.

Credited with major responsibility for this fine record is the aggressive flying safety program conducted by the wing headquarters. Every opportunity to utilize modern maintenance methods is realized and repeated emphasis is placed upon all phases of basic flying proficiency.

★ ★ ★

Bomber Jumps Logs—To test the strength of the landing gear on a 400,000-pound heavy bomber, the giant plane was run over a series of logs at 90 mph!

Crews reported the aircraft had a "fantastic" appearance as it successfully went through the tests, typical of rigorous investigations given new aeronautical developments for civil and military use.

"The wing center section (almost immediately above the main landing gear) seemed to hump up like a cat confronted by a dog," crewmembers said. "And the wingtips seemed to remain at the same distance from the runway, while the center section humped over every log."

ODDS and ENDS

• Electrical systems installed in the big transports operated by the nation's airlines contribute much to the efficiency and safety of modern air transportation.

In one late-model transport, the wiring required would stretch over 27 miles. To complete installation in a single plane, 7,224 individual pieces of wire must be used, in addition to 144 electrical wire harnesses and 85 radio harnesses.

• A tiny 50-hp. engine developed by an aircraft company operates at a speed of roughly 40,000 rpm (almost 20 times that of an average auto engine). A gas turbine, it is smaller than a two-foot cube! Among other uses, it serves as an airborne electrical generator.

• In World War I, it took fighter planes an hour to climb to 6000 feet. Today, some jet fighters can reach altitudes greater than 10,000 feet in less than two minutes.

• Engineers in the Measurements Standards Laboratory of an aircraft engine manufacturer daily make measurements to within one-thirtieth of the thickness of a human hair. These engineers have responsibility for the accuracy of master gages, master gears and measuring rods used in engine production.

the case of the DISCONNECTED PILOT

EVER wonder how much good a G suit really does?

Well, think about this. It is a true story of a real Sad Sack.

Four jet fighters took off on a formation flight. One plane soon aborted because of mechanical difficulty, so it became a formation of three. The instructor led up to altitude, tried a little of this and that, and executed a few turns and maneuvers. He then started a split S maneuver from about 30,000 feet. He pulled a fairly constant 3½ to 4 G and leveled off at about 19,000 feet. He then checked his formation.

No. 2 man was there; No. 3 man was gone.

At that particular moment the No. 3 man was in a semiconscious stupor, his hands were off the stick, his head was in his lap, and he was in a steep dive.

Here is what happened. During the split S his G suit became disconnected. However, he continued to follow his flight leader and somewhere in the maneuver began to pull around 5 or 5½ G. Neither he nor any other pilot should have done this. No one can continue to pull that many G very long and remain conscious. This is because human bodies are somewhat like sacks, and under positive G all things movable sag down. Blood, which is most movable, sags into the legs and lower abdomen. Then the brain, deprived of the oxygen which blood carries, soon blacks out. This case was no exception. Through too many G over too long a period, the pilot became, literally, a sad, unconscious sack.

Strangely enough, in this instance unconsciousness helped. When he blacked out, he slumped forward with his head in his lap. When his head was lower, his heart was able to pump more blood to his brain and he began to recover. When he began to recover, he realized that the aircraft was out of control and he tried to reach the stick. However, the G forces were so great that he was hardly able to move. Finally, the G forces let up and he was able to take over.

By that time the crisis had passed. Before he had regained control the plane had gone through the lowest part of its dive and had begun to climb again. The aircraft had been so trimmed that even with an unconscious pilot, the nose gradually raised until it leveled out of the dive, then began to climb. At the lowest part of the dive it had descended to an altitude of about 3000 feet.

This pilot was both fortunate and unfortunate. He was fortunate in the way his aircraft was trimmed. He was unfortunate in having had his G suit become disconnected. And that accidental disconnect points up the real heart of the matter. G suits are important. By exerting pressure on the legs and abdomen they keep pilots from becoming Sad Sacks. Sometimes the suits may be hot and sometimes they may be uncomfortable, but when connected tight and checked right they can be depended upon. One cannot always depend upon having nose-up trim. ●

★ When fastening the G suit hose, listen for a positive click to be sure that the quick-disconnect is seated properly.

★ On initial cockpit check, momentarily depress the button on the G suit pressure regulating valve. This inflates the suit temporarily and serves as a check to insure that the equipment is functioning as it should.

★ Check to see that the regulating valve is set on *Hi* or *Lo*, depending on the mission to be flown.

★

WELL DONE

LT. ZEAGLER was engaged in a practice night intercept mission in an F-94C. After he shut off the afterburner at 43,000 feet, the engine flamed out. His position was approximately 60 miles north of Philadelphia and he immediately set up a glide back toward the city.

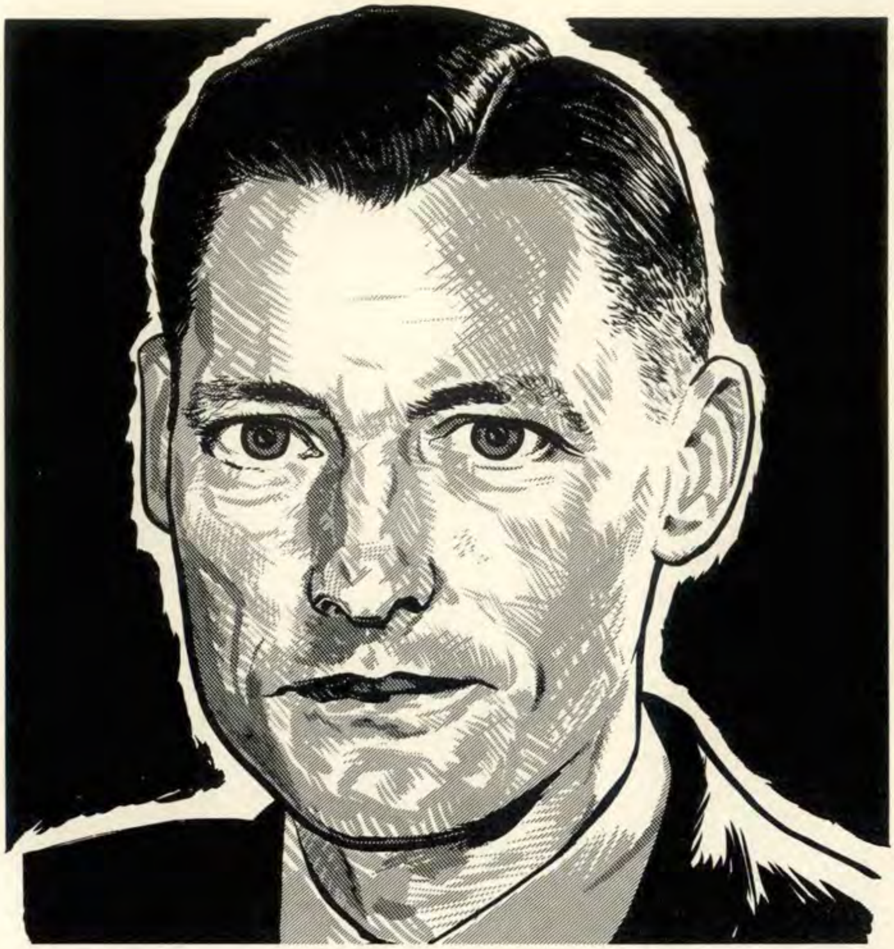
At 20,000 feet an attempted airstart was unsuccessful. Three more attempts were made before the battery failed, rendering the radio, lighting, dive brakes, wing flaps and the intercom between pilot and radar observer, inoperative.

Both heating and pressurization were lost and the instrument panel, canopy and windshield were completely frosted over. Lt. Zeagler wanted to jettison the canopy in order to have better visibility but, since the intercom was inoperative, he was afraid the radar observer would bail out. (The squadron SOP states that any time the canopy is jettisoned during an emergency, the radar observer will immediately eject unless otherwise advised by the pilot.)

His wingman, who had followed Lt. Zeagler down during the letdown, lost contact with him in the rather dense haze and smoke layer over Philadelphia.

With visibility extremely restricted, and without the aid of dive brakes or wing flaps, a flameout traffic pattern was set up over the municipal airport. In spite of the combination of unfavorable conditions, Lt. Zeagler skillfully guided the F-94 to a successful, night flameout landing. ●

★



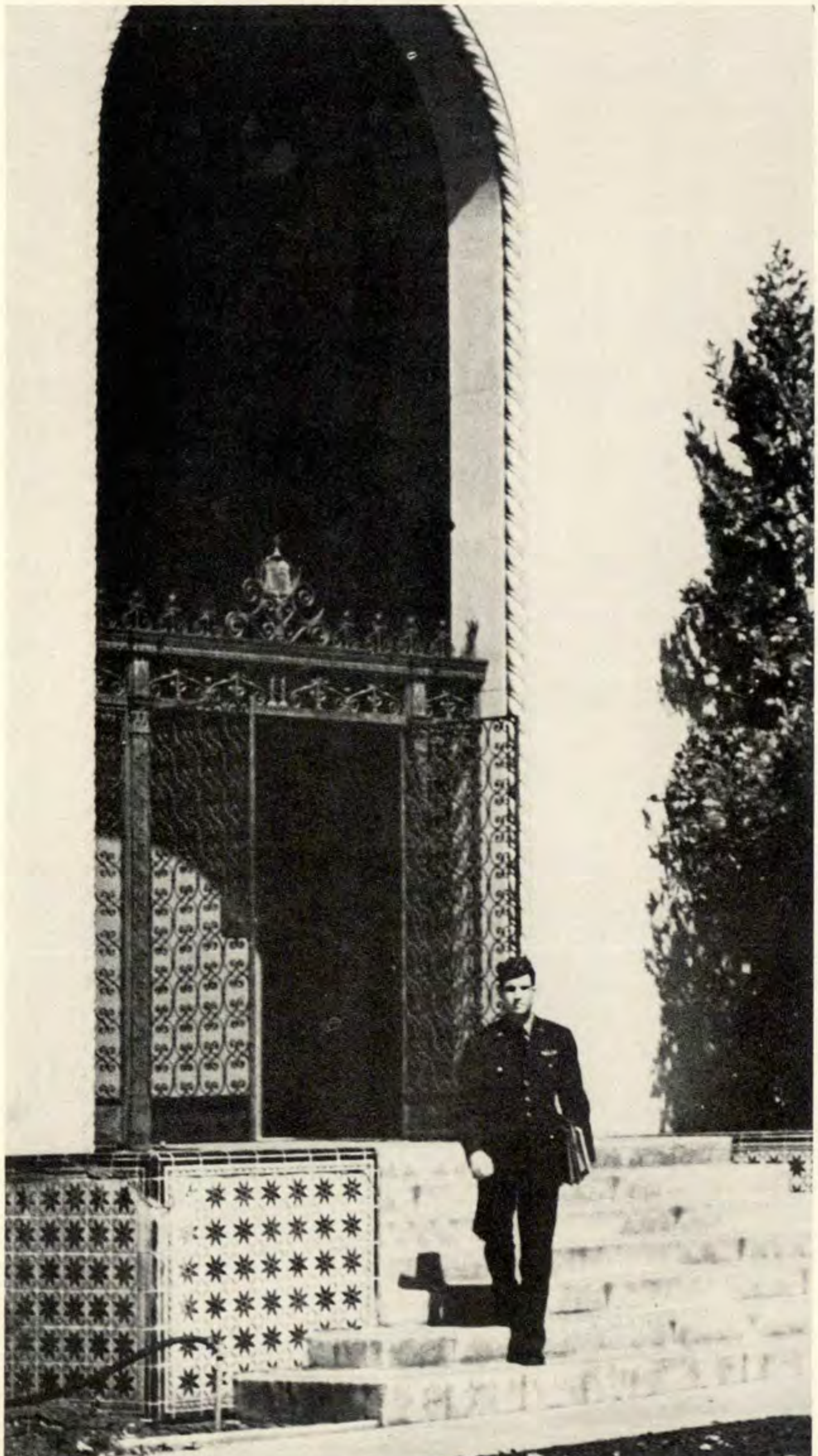
1st Lt. Quitman C. Zeagler

332d FIS, New Castle Co. Arpt. Wilmington, Del.

School for Safety

Maj. Harry E. Dice, Jr., FSO, 7th Bomb Wing, Carswell AFB

Reprinted from COMBAT CREW



Flying safety officers from all over the U. S. Air Force are packing up their bags these days and heading for the University of Southern California to the only school of its kind in the world — a special school for Flight Safety Officers.

Started in March 1953, this unique school has already attracted the attention of the Civil Aeronautics Association and representatives from several foreign governments. An important purpose of the school is instructing flying safety officers on how to impress pilots, crews and maintenance men with a greater realization of the importance of safe practices and also to foster a sense of "flying safety consciousness." This strongly emphasizes a theory SAC has always maintained — that "flying safety is everybody's job."

If anyone thinks the Flight Safety Officers' school is a "rest cure" or a chance to "goof off" and flirt with pretty co-eds, he is badly mistaken. The course is a good one, but also a difficult one, requiring a minimum of two to three hours home study per day to keep up. Classes start at 0800, and there are seven 50-minute periods every weekday. It isn't easy for most students to start back to school and dust off their physics and math and juggle sines, cosines, tangents and complicated formulas that sometimes fill the whole blackboard in the classroom. Seven semester hours of college credit, given for the six-weeks' course, will give you some idea of how intensive it is.

The instructors are all experts in their field and each has prepared his own textbooks especially for this school. The student is allowed to keep his books which form the nucleus for a valuable flying safety library and serve as a source of information for ready reference.

The 212 school hours are broken down as follows:

Aeronautical Engineering 72 hours
Accident Investigation
& Prevention .... 67 hours
Aviation Physiology ... 18 hours

Psychology of Flight . . . 18 hours
Educational Principles . . 18 hours
Field Trips . . . . 14 hours
Centrifuge . . . . 2 hours

The aeronautical engineering portion of the school is the most difficult — but also the most interesting. It starts off easily enough with a brief review of algebra, physics and trigonometry, and then rapidly gets into the theory of flight, high-speed aerodynamics, stability and control and strength of metals and aircraft structures. The engineering portion of the course is extremely valuable to all pilots, not just flight safety officers. Basic fundamentals reviewed include: Bernouli's equation, lift-drag ratio, aspect ratio and power required vs. power available.

Instructor Harry H. Hart, B. S., makes the section on high-speed aerodynamics most interesting. The study of Mach. effects, critical Mach. and effects of sweep-back on compressibility and ultra-sonic heating takes two weeks. This is an important part of the course, because, as aircraft get faster and faster and the Air Force converts more and more to jets, even bomber pilots must learn about supersonic flight. Stability and control, especially at high speed were studied and considerable time was devoted to the discussion of tuck-under and pitch-up encountered while going through the trans-sonic speed range. The advantages of such innovations as completely irreversible controls, flying tails and wing tip ailerons used to prevent wing tip torsion, which causes aileron reversal at high speeds, were brought out.

The last two weeks of the engineering class are devoted to the studv of stress analysis of various metals used in aircraft construction. Torsion forces, compression forces, and shear forces on steel, 24ST and 25ST aluminum are discussed. One whole day is spent in the lab where stress machines actually measure the forces necessary and demonstrate the type break caused by the failure of brittle and ductile materials. In the case of an aircraft accident involving materiel failure, this knowledge is most valuable in determining whether the break was caused by a design deficiency, overstress on the part or metal fatigue failure.

The physiology class is taught by Dr. Paul Evans, former Air Force flight surgeon who is now resident physician at Los Angeles County Hospital. His informative lectures and discussions deal with the role of aviation physiology in flight safety. Roughly 65 per cent of all USAF aircraft accidents can be attributed directly to human error. Of these, 12 per cent can be attributed to mental and physical stresses, such as hypoxia, fatigue, high G loads in maneuvers and carbon monoxide. It is necessary for the crewmember to adapt successfully to the constantly changing environment of flight if accidents are to be prevented. This adaptation is largely accomplished by the use of such complicated personal equipment as oxygen masks, pressure suits, bailout bottles and exposure suits. As the airplane has long since outstripped the adaptability of man without these aids, knowledge of their proper use is essential to the safety of all who fly.

One Saturday morning during the course each student is scheduled to ride in the human centrifuge. This device looks for all the world like a freak ride in an amusement park

Students sit in on daily world-wide accident briefing conducted at Norton AFB by Brig. Gen. Richard J. O'Keefe, Director of Flight Safety Research.

or an overgrown see-saw that goes 'round and 'round instead of up and down. It consists of a long beam, pivoted in the center with a seat suspended at one end and a counterweight on the other end. By controlling the speed of rotation, it is possible to apply a constant radical acceleration or G force on the subject.

The cockpit is equipped with a standard aircraft seat with safety belt and shoulder harness, but in spite of its familiar appearance it does little to quell the feelings of apprehension experienced by everyone the first time he rides in the gadget.

A system of red and white signal lights on the panel, operated by push switches held in the right hand, indicates to the operator the condition of the subject. This is necessary, because human tolerance to G forces will vary tremendously from one person to another, or even in the same person from one day to the next.

One student in the class passed out at 3½ G, whereas one other — a fighter pilot accustomed to high acceleration forces — could function perfectly at 7 G. The average pilot, however, can withstand about 3½ to 4 G before grey-out, black-out or pass-out occurs.

Since the brain is an organ that weighs only one-fiftieth of the total body weight but requires one-fourth of all the oxygen used, it is apparent that it will suffer most from a lack of oxygen-carrying blood. The eyes, too, require large amounts of oxygen, and this is why dim-out or grey-out occurs first when the heart is unable to supply blood to the head because of adverse G forces.

Black-out is caused at slightly higher G forces and is a condition where the subject is still conscious but unable to function because of restricted vision. Pass-out, or complete unconsciousness, generally occurs at about .7 more acceleration force than black-out. When this happens, the subject is completely incapacitated. Even after the G forces are removed, it generally takes an appreciable length of time — say 10 to 15 seconds — to fully regain consciousness.

The anti-G suit was also used on the centrifuge runs. This suit is very effective. It is most impressive that the subject can remain fully conscious and alert even while subjected to two more G than that which caused black-out on a previous run without the suit.

With the development of high speed and high altitude airplanes designed to withstand large aerodynamic forces, the problem of human tolerance to acceleration has become extremely important. It behooves each pilot to learn as much about this problem as he can.

Psychology of flight is a relatively new term, but it, too, has its place in aircraft accident prevention. This class is taught by Dr. Neil Warren, another former flight surgeon, who helped develop the famous stanine tests. Doctor Warren has conducted numerous studies for the Air Force and is currently engaged in a project to devise an index of accident exposure. His plan would give different weights to various types of flying. For example, an hour in a fighter is considered more dangerous than an hour in a transport. The plan may produce a more realistic accident rate scoring system.

The class was taught that in the analysis of human error accidents psychological factors are often found to be the underlying cause. The purpose here being to teach the accident investigator not only to look for what caused the accident but *why* it was caused. For example, a pilot lands wheels-up and causes a major accident. The accident is written up as pilot error, and that's the end of it. The real question is — Why did the pilot forget to lower the gear? Did he have something else on his mind, trouble at home, a sick child or financial worries?

However, the most important application of this subject to the safety of flight is felt in the field of human engineering. This term is defined as designing and building a machine (aircraft) to fit the individual rather than trying to make the individual conform to the machine. One example of the application of this theory is the cockpit standardization program. It is now recognized that forcing an individual to change a certain fixed habit pattern by non-standard location of controls and switches is definitely a hazard to safety of flight.

When United Nations troops entered the compounds from which South Korea had released the prisoners, they found many still inside. This only serves to illustrate that there is always someone who never gets the word. That is why *Educational Principles and Methods* is another subject offered at the school. It is taught by Dr. Louis Kaplan, who emphasizes the role of the flying safety officer as an educator in putting across the flying safety programs and campaigns. The course includes public speaking, how to organize and conduct a meeting, graphic presentation and press relations.

The importance of press relations is illustrated by the story of the small plane which crashed in a farmer's field. No one was injured, and the news would probably have rated only a small paragraph in the local newspapers. However the story ended up on the front page all over the country with much unfavorable publicity, because the military guard at the wreckage got into a fight with the newspaper photographer and smashed his camera because he took a picture.

Mr. Frank G. Andrews, formerly assigned to the Directorate of Flight Safety Research at Norton Air Force Base, conducts the class in Accident Prevention and Investigation. Air Force Regulation 62-14 and Air Force Manual 62-5, the basic guides for the accident investigator, are covered in great detail. The formation of a sound pre-accident plan is discussed and illustrated and the student is taught its advantages.

The accident prevention portion of the class is by far the most important phase of the school, for it is here that the information learned in all the other classes is put to actual use. The accident prevention programs carried out by the various Air Force commands, sub-commands, and at base, wing and squadron level are fully discussed. By a free exchange of ideas, and by studying methods previously proved successful, the prospective flying safety officer is taught how to set up a program to fit the needs of his organization.

The value of the school should become more and more evident in a reduced Air Force accident rate as its graduates return to their units and apply the knowledge and principles learned. The cost of the school is mighty cheap insurance for the millions invested in pilots and crews and equipment. The needless loss of life and property caused by preventable aircraft accidents can and must be reduced. The preservation of our combat potential by training men at this school to become specialists in aircraft accident prevention is certainly worthwhile. It is considered a valuable contribution to the security of our nation and the peace of the free world everywhere. ●

DON'T TABLE THOSE REPORTS

On page 18 of this issue we have presented a few hairy tales sent in by pilots who wished to share their experiences — and mistakes. By publishing these reports we move a little closer to attaining an important USAF objective — elimination of all avoidable aircraft accidents. So far, this year shows progress, with an all time record low in July.


Mal Function
Mal's assigned to rocket school,
Thinks such a deal is really cool.
Diagrams and such, just tripe.
This kid *knows* he now is ripe.
USAF
Mal locks-on to king-size eagle,
Believes this pass is strictly legal.
Fires before he gets the word,
This is end of one large bird.
Irate chase pilot quite upset,
Has a hunch Mal is no-bet.