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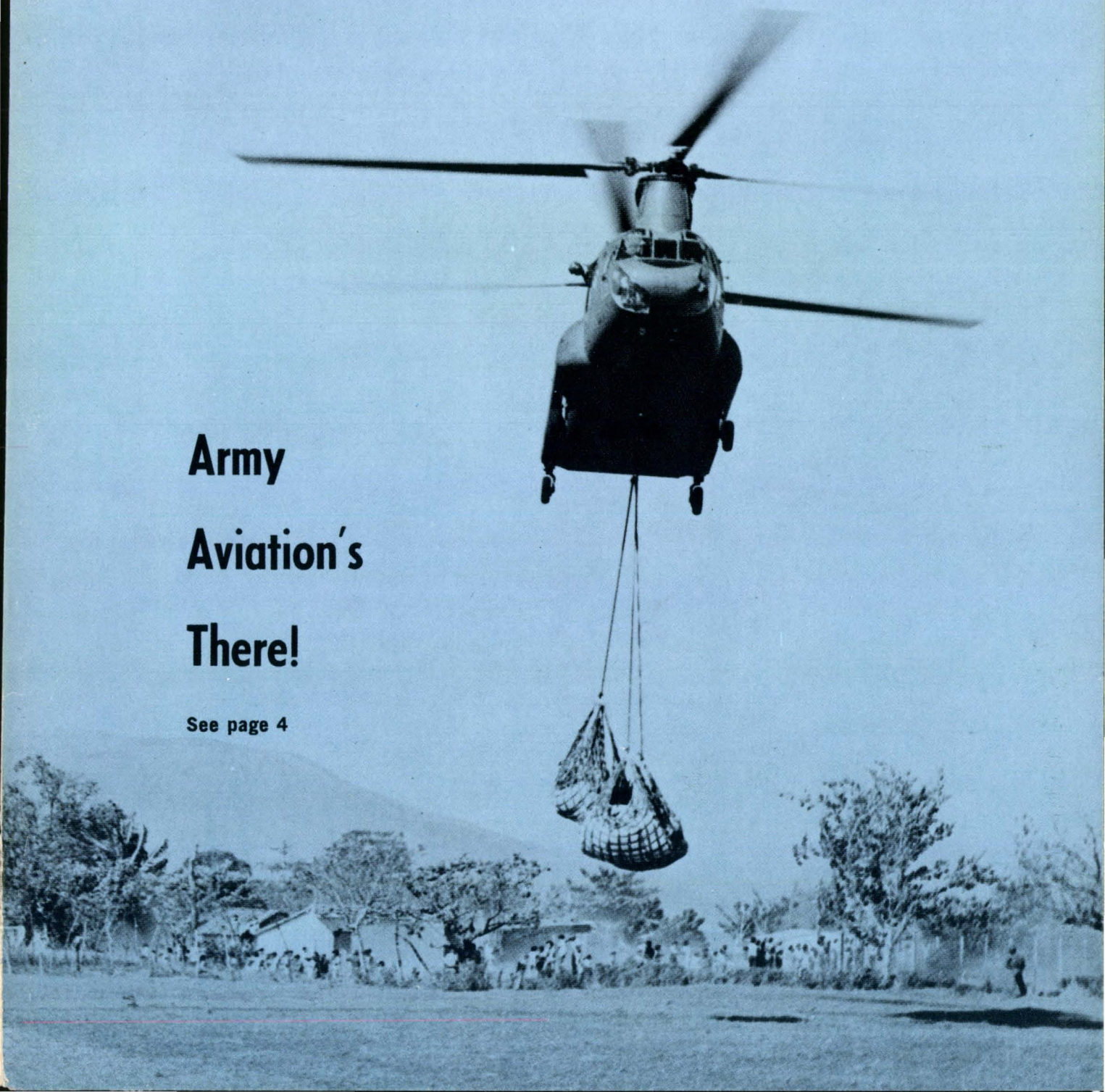
AVIATION DIGEST



Army Aviation's There!

See page 4

UNITED STATES ARMY AVIATION DIGEST

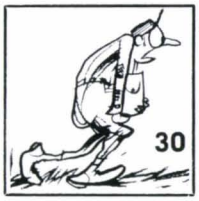
JULY 1973 VOLUME 19 NUMBER 7

DIRECTOR OF ARMY AVIATION, ACSFOR
DEPARTMENT OF THE ARMY
MG William J. Maddox Jr.

COMMANDANT, U. S. ARMY AVIATION SCHOOL
MG Allen M. Burdett Jr.

ASST COMDT, U. S. ARMY AVIATION SCHOOL
COL Earl W. Fletcher

EDITOR, U. S. ARMY AVIATION DIGEST
Richard K. Tierney



PIREPs, CPT R. E. Lawson 1
Operation Managua, LT Steve Lassiter 4
Instructor Training In The Royal Air Force 8
Flight Lieutenant Brian A. Wright, RAF
Aeromaintenance, CPT Robert M. Welter 13
Views From Readers 14
Instrument Corner 15
Get-Home-Itis, LTC Emmett F. Knight 16
Fort Lewis' Instrument Flight School 21
Aeromedic, LTC Nicholas E. Barreca, M.D. 23
Charlie And Danny's Write-In 26
Hello, Summer! 30
Summer Exercises 35
Summer Maintenance 40
The Checklist, James H. Devlin, DAC 42
Pearl's 45
Write To Right 47
USAASO Sez 48

ABOUT THE COVER

A U. S. Army CH-47 Chinook approaches a field near the town of Masaya, a major refugee center in Nicaragua. Army helicopters delivered more than 600 tons of food, clothing and medical supplies to refugees in the wake of a devastating earthquake which leveled Managua. See story, p. 4

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U. S. Army Aviation Digest, Fort Rucker, AL 36360.

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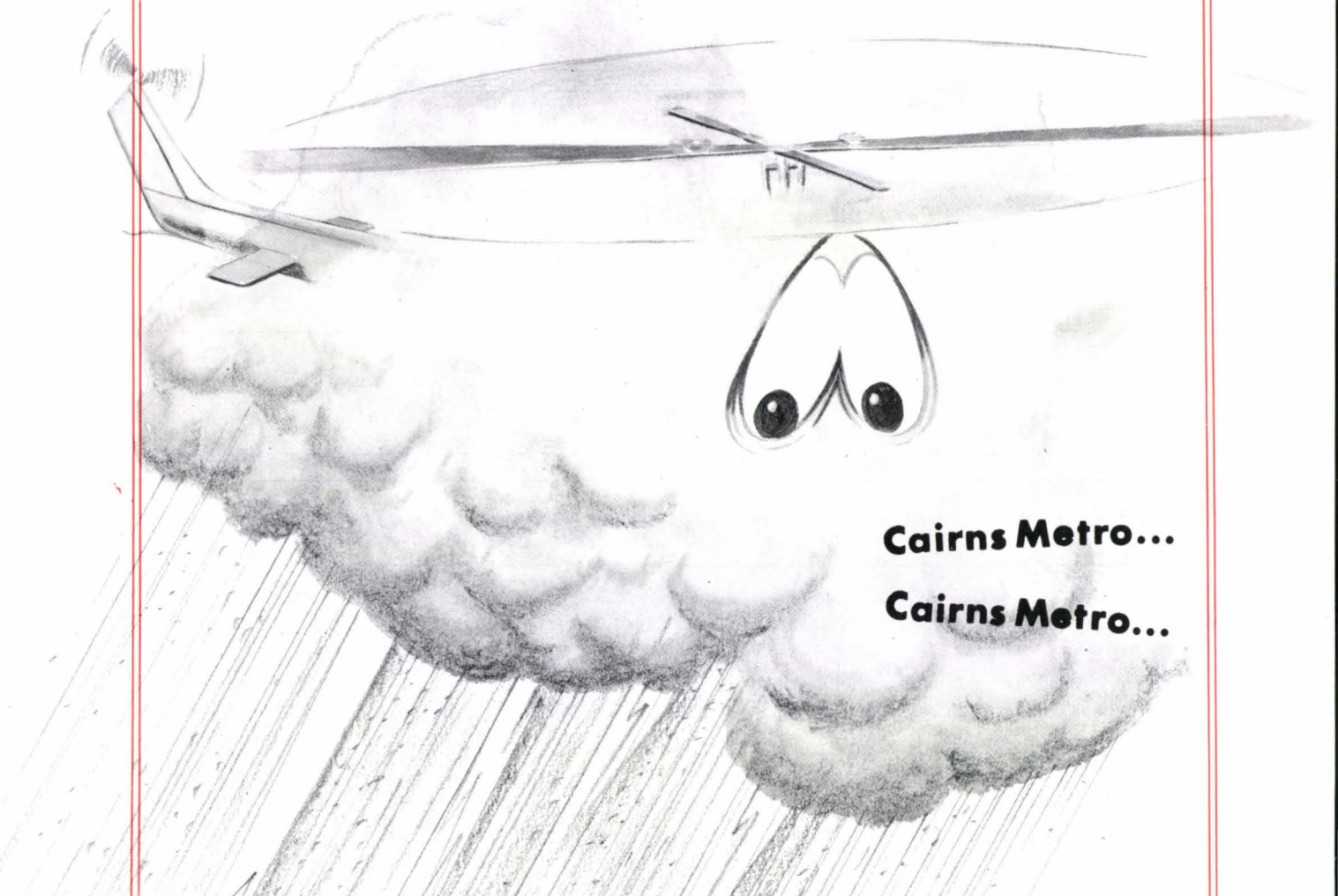
Those not eligible for official distribution or who desire personal copies of the DIGEST can order the magazine from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Annual subscription rates are $8.00 domestic and $10.00 overseas. Single copies are 75 cents each.

PIREPs

A reduction in the operating hours at some weather reporting stations in the U. S. has increased the need for more frequent, thorough pilot weather reports

Captain Robert E. Lawson Jr., USAF
9th Detachment, 16th Weather Squadron



AR 95-1 REQUIRES that inflight and postflight weather reports be made to requesting agencies. Also, any unforecast weather conditions encountered will be reported without request to the appropriate agencies.

Recent and planned reductions in the surface weather observing capabilities at several locations have significantly increased the importance of pilot weather reports or PIREPs. These reports provide aviators and forecasters with timely and accurate

observations of conditions which cannot be observed from the ground, as well as filling the distance gap between current surface observing sites. The aviator reporting meteorological phenomena should be aware of the importance of these observations. Their frequency and accuracy could influence subsequent flight planning and prevent a "busted" aviation forecast.

Aviators should make a habit of reporting PIREPs at every available opportunity. These reports often provide the first indication of the onset of inclement flying weather, especially turbulence and icing conditions. PIREPs are of special significance to the rotary wing aviator. Since rotary wing aircraft are highly susceptible to icing and turbulence problems, a report of these phenomena can prevent a potentially hazardous situation. PIREPs also can provide that extra bit of information which will enable the forecaster to tailor the weather briefing for the particular aircraft and route.

Report PIREPs to your nearest METRO (Pilot-to-Forecaster voice call) station (where you can also update your enroute and destination weather), Flight Service Station, Approach Facility or in person. PIREPs will include:

a. Location

b. Time (GMT)

c. Phenomena reported

1. any hazardous weather (with explanatory remarks such as direction of movement of tornadoes or funnel clouds, thunderstorm coverage and movement, frequency of lightning, electrical discharges, hail, etc.)

2. bases and/or tops of cloud layers and coverage if known

3. smoke, haze or dust layer with top of layer and horizontal visibility in the layer

4. marked wind changes

5. all turbulence with intensity, duration and proximity to clouds

6. All airframe icing with intensity and type

d. Altitude of phenomena

e. Type aircraft.

Airframe icing and turbulence should be evaluated according to criteria listed below. The following terms will be used to indicate the duration of the reported phenomena:

Reporting Term	*Definition*
Occasional	less than one third of the time
Intermittent	one third to two thirds of the time
Continuous	more than two thirds of the time

A summary of PIREP procedures and a listing of Pilot-to-Forecaster Service and Flight Service Stations frequencies can be found in the IFR Enroute Supplement.

Criteria For Evaluation Of Airframe Icing

Trace icing—The presence of ice on the airframe is perceptible, but the rate of accretion (accumulation) is nearly balanced by the rate of sublimation (evaporation). This condition is not a hazard for aircraft without deicing/anti-icing equipment unless encountered for extended periods. Normally deicing/anti-icing equipment is unnecessary.

Light icing—When light icing prevails the occasional use of deicing/anti-icing equipment may be necessary. If the equipment is not used and the flight is prolonged, the rate of accretion may be sufficient to constitute a hazard; however, this condition is ordinarily insufficient to make diversionary action necessary.

Moderate icing—During moderate icing conditions the use of deicing/anti-icing equipment is mandatory or immediate diversion is necessary. If this equipment is not used the rate of accretion is excessive, making even short encounters under these conditions hazardous.

Severe icing—When under conditions of severe icing the deicing/anti-icing equipment fails to reduce or control the hazard. Immediate diversion is necessary.

NOTE: U. S. Army aircraft will not be flown into known or forecast severe icing conditions. If flight is to be made into known or forecast light or moderate icing conditions, the aircraft must be equipped with adequate deicing or anti-icing equipment (AR 95-1).

Criteria For Evaluation Of Turbulence

Light turbulence—Light turbulence may require the use of seat belts. It causes a variation in air speed from 5 to 15 knots. Loose objects in the aircraft remain at rest during the flight.

Moderate turbulence—Moderate turbulence *requires* the use of seat belts. Air speed is affected, varying from 15 to 25 knots. Loose objects tend to slide or roll.

Severe turbulence—Severe turbulence causes the aviator to momentarily lose control of the aircraft. The occupants are thrown violently against seat belts and seats. Loose objects are tossed about the aircraft, and the air speed varies in excess of 25 knots.

Extreme turbulence—Extreme turbulence is relatively rare. The aircraft will be tossed about and control is practically impossible. Rapid fluctuation of the air speed occurs in excess of 25 knots. Extreme turbulence may cause structural damage to the aircraft.

PIREP CHECK LIST

CAIRNS METRO FREQUENCY 128.8 VHF 344.6 UHF

TIME OF OBSERVATION	LOCATION
FLIGHT LEVEL	AIRCRAFT TYPE
TURBULENCE	VISIBILITY AT FLIGHT LEVEL
☐ NONE	_____ MILES
	RESTRICTION
☐ LIGHT	☐ HAZE
☐ MODERATE	☐ SMOKE
☐ SEVERE	☐ FOG
	☐ PRECIPITATION

CLOUDS

BASES COVERAGE TOPS

⦶ ⦷ ⊕

⦶ ⦷ ⊕

⦶ ⦷ ⊕

EXAMPLE: 10 ⦶ 8/⊕ 15 = BASES 1000', BROKEN; TOPS 1500'

OUTSIDE AIR TEMPERATURE	OTHER SIGNIFICANT WEATHER AND REMARKS

RELAY TO METRO VIA PFSV, RAPCON, TOWER, OR IN PERSON

USAAVNC(WEA) Form 1145, 25 Sep 70

A PIREP checklist serves as a handy reminder when reporting PIREPs. The checklist at right is being used at Cairns Army Airfield, Ft. Rucker, AL

Operation Managua

Lieutenant Steve Lassiter
III Corps Information Officer

More than 700 Army Soldiers interrupted their Christmas in 1972 to help the people of Nicaragua when a devastating earthquake struck their capital city. Among the equipment sent by the U. S. Army were four CH-47 Chinooks. Before they returned to the U. S. the helicopters had delivered in excess of 1,200,000 pounds of food, clothing, medical and other supplies to the refugees

ONE OF THE ARCS in the "rim of fire" wrenched under the strain of continental drift shaking Managua, Nicaragua, out of slumber into disaster. The capital city of Central America's largest nation bounced and buckled for 2 hours on 23 December 1972 as a series of tremors struck in the very early morning.

There was little left of Managua after the earthquake hit. More than 60,000 of the 80,000 homes had

U. S. Army CH-47 Chinooks refuel from bladders inside Air Force C-130s. The helicopters were refueled at Tampico, Veracruz, Extepec and Tapachula, Mexico, while flying to Managua, Nicaragua

U. S. Army photographs by Specialist 5 Danny Gates

been badly damaged or destroyed. Only a few manufacturing plants escaped costly damage. Two- and three-story shops and businesses which lined the downtown area were reduced to heaps of adobe, splinters and cracked shingles. Streets within the city were badly cracked, some blocked by the remains of walls which had crumbled over. There was no electricity, no communications, no sewage facilities, no drinking water.

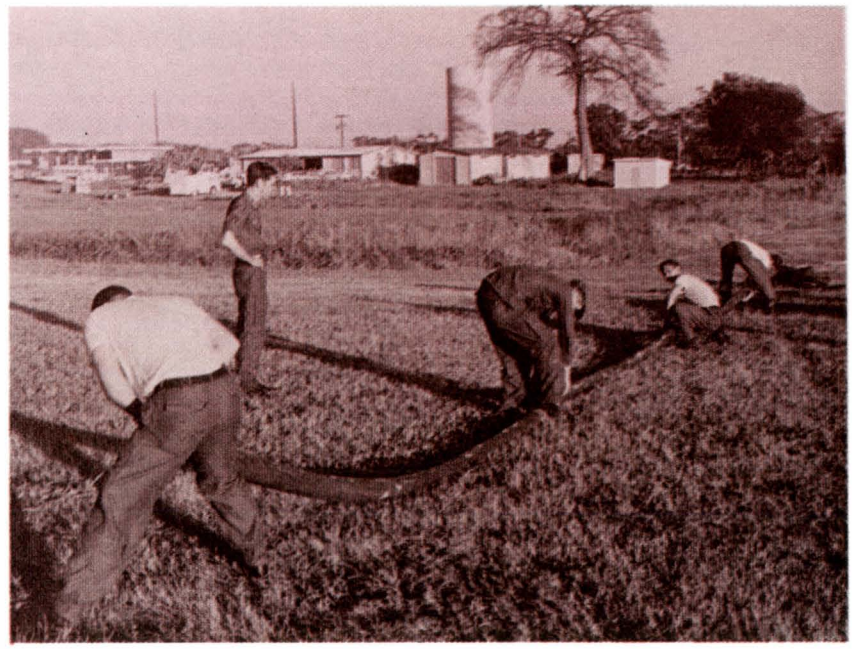
At least 6,000 people were known to have perished under the rubble of their homes but no one could quote the exact number of dead. By the third day of the tragedy Nicaraguan government officials, working with city firemen and local Red Cross officials, ruled it necessary to burn and bury areas of presumed dead as a deterrent to epidemic.

The remainder of the 300,000 people of Managua were evacuated. Some left the country. Others went to relatives' homes in other cities. The majority of the refugees either stayed in Managua or moved to evacuation centers in nearby towns where tent cities were erected to care for the homeless.

Food, clothing and medical supplies from nations all over the world were piled on the docks of the coastal towns of Corinto, Bluefields and El Bluff. Even the warehouses at Las Mercedes Airport were jammed with relief goods.

The problem was transportation. Most of the trucks were committed to demolition and clean-up operations within the city. With the appearance of four U. S. Army CH-47 Chinook helicopters on 1 January the Nicaraguan government had at its disposal the capability of dealing with one of the most urgent problems of the catastrophy: food distribution.

Thursday, 28 December, was a solemn day for those at Ft. Hood, TX. On that day of mourning for former President Harry S. Truman at 1030 hours a message came down through military channels from the State Department. Lieutenant Colonel Frank L. Henry, commander of the 227th Aviation Battalion, took the call from the 1st Cavalry Division staff duty officer. An informal contingency plan for a Managua relief opera-



D Company POL personnel set up the flexible hoses for their refueling site on the grass of Las Mercedes Airport. These sites kept the Chinooks airborne throughout the mercy mission

tion (made up days earlier by Major Ted J. Dolloff, D Company commander) was lying on his desk. The plan had been developed in response to television newscasts of the disaster broadcast on Christmas Eve.

Question: How long would it take to send four CH-47s to Managua by U. S. Air Force C-5A Galaxie?

Answer: Longer than it would take to fly them down based on SATO 12 tests. Several of the Static Air Transportability Operation tests had been conducted by the battalion, the results of which showed at least 8 days for dismantling a Chinook so that it could be loaded on the big transport and 15 days for reassembly. MAJ Dolloff's estimate to fly the Chinooks under their own power was 24 hours to get ready and 3 days enroute to destination.

By 2400 hours on 28 December the four long range, medium lift "C" model Chinooks were "go" for the next morning's departure for Managua. In the interim coordination had taken place between the 227th and higher commands.

Upper left: A Chinook crew recovers cargo nets after a drop of food, clothing and other supplies. Left: Food of the type distributed to the refugees. Below: Evacuees from Managua line up to receive food at a refugee center

A fuel bladder set up on the airport grass and filled by Air Force C-130 transports, which carried the jet fuel from the United States

III Corps had given the battalion authority to coordinate directly with Fifth U. S. Army. Direct coordination also was made with the Readiness Command (REDCOM), Tactical Air Command (TAC) and Aviation Support Command (AVSCOM) with respect to flight route, POL support enroute, international clearances and maintenance parts acquisition.

Since the battalion had no charts of Central America, an initial flight plan was provided. This plan included a 323-mile leg over the remote and dense jungle area of the Yucatan Peninsula. A shorter course proposed by the battalion had been discarded because the IFR chart listed an MEA of 13,500 feet. Coordination with the Foreign Clearance Station at Kelly Air Force Base, San Antonio, TX, revealed that the shorter Veracruz-to-Extepec, Mexico, route had an actual maximum ground elevation of 1,500 feet. The Joint Chiefs of Staff were then informed of the essential route change.

Where contract fuel was not available TAC, in response to REDCOM, would provide fuel delivery by C-130 Hercules aircraft. Diplomatic clearances were to be handled by the State Department. Because of the priority of the mission Major Dolloff was given direct communication with AVSCOM for requisitioning parts. High frequency, single side band radio communication was hooked up to the aircraft for long range communications with higher commands.

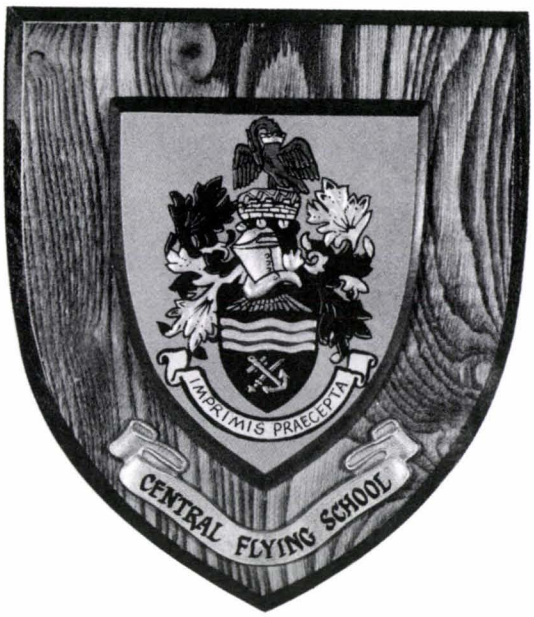
As coordination between the battalion and higher commands continued, coordination also was taking place between the battalion headquarters and the headquarters of its companies and other units to fill personnel requirements.

Of the 64 men who made the journey, 45 were from D Company, including the pilots, crewmembers and maintenance personnel. Others included pathfinders from E Company, 227th; riggers from 15th Survival and Training Battalion; maintenance technicians from the 528th Transportation Company, 13th Support Brigade; a signal officer and interpreter from B Company, 227th; and a photographer from the division information office.

The following day a heavy overcast which had blanketed much of

Continued on page 27

A Chinook helicopter makes its approach to a field near the town of Masaya, a major refugee center. The helicopters delivered more than 600 tons of food, clothing and medical supplies to the homeless people



Instructor Training In The Royal Air Force

Flight Lieutenant Brian A. Wright
Royal Air Force

I AM AN EXCHANGE officer from the Royal Air Force (that's the British one) halfway through a 2-year stint at the U. S. Army Aviation School, Ft. Rucker, AL. Currently I am an instructor pilot.

Apart from questions about soccer and fish and chips, I frequently am asked about the RAF helicopter training system and how it operates. Since there are so many who are interested, I felt an article briefly describing how the RAF carries out its flying training would be of value. I shall restrict my comments to instructor training because I was on the staff of the instructor training school prior to crossing the Atlantic.

All instructor training in the RAF is carried out at the Central Flying School (CFS), the oldest military flying school in the world —the first course having started on 12 August 1912. The rotary wing element of the school is based at RAF Tern Hill, Shropshire, England, where the RAF trains instructors for all the United Kingdom Services—the Royal Navy, British Army and Royal Air Force

Whirlwind helicopter of the rotary wing element, Central Flying School, prepares to land at RAF Tern Hill

The author formerly was on the staff of the Royal Air Force's Central Flying School. The school pairs up each instructor trainee with an instructor who stays with him through the entire 13-week course

—as well as students from many foreign countries. To qualify for selection to the course, students need to have attained a high level of flying proficiency as reflected in their annual assessments and may either be nominated to attend the course or may apply for consideration by the school selection board.

The course lasts 13 weeks and includes about 60 hours flying time on either the TH-13 or Whirlwind helicopters, depending upon whether the student will fly a reciprocating or turbine engine helicopter when he completes the course. The Whirlwind is similar to the UH-19 but it has a gas turbine engine and has proved to be an ideal training aircraft.

The flying exercises are conducted in accordance with a system devised by one of the first CFS instructors which has withstood the test of time. The student instructor is taken through the 30 or so exercises which form the basic flying syllabus, starting with introductory exercises such as effects of controls and leading up to the more advanced exercises such as confined areas and formation flying. The complete syllabus is shown in the accompanying figure. The first three exercises are introductory/familiarization lessons intended for the student instructor to become acquainted with the aircraft and the flying areas used. One specific exercise is dealt with in each flight period and the same instructor will cover the complete syllabus. This compares to the U. S. system where different instructor courses cover separate parts of the syllabus.

Emphasis is placed on preflight briefings and each air exercise is preceded by a briefing lasting about 30 minutes. These briefings are initially given by the instructors, but eventually the students are required to give their own briefings using the training manual as a guide with advice being given by their instructor during the preparation stage. The briefing follows a set pattern and full use is made of the blackboard and other visual aids such as overhead projectors, film loops and models.

Once the objectives of the exercise have been established, the briefing covers all the flying techniques involved, together with a short revision of the relevant aspects of helicopter aerodynamics which the basic student pilot would have been taught in detail during previous ground school lessons. A briefing on autorotations, for example, will cover the effects of variations in altitude, aircraft weight, indicated air speed, rotor rpm, collective pitch and rate of

Central Flying School
Helicopter Instructor Course Syllabus

Ex 4	**Effects of Controls**
Ex 5	**Attitude and Power Changes**
Ex 6	**Straight and Level, Climbing and Descending (including turns)**
Ex 7	**Autorotations (this covers entry and power recovery)**
Ex 8	**Hovering**
Ex 9	**Takeoff and Landing**
Ex 10	**Transitions To and From the Hover**
Ex 11	**Circuits (traffic patterns)**
Ex 12	**First Solo (this only applies to the basic, or initial entry students)**
Ex 13	**Sideways and Rearwards Flight**
Ex 14	**Spot Turns (pedal turns)**
Ex 15	**Ground Taxiing**
Ex 16	**Touchdown Autorotations (including low level, hovering, 180 and 360 turns)**
Ex 17	**Advanced Autorotation Techniques (varying range)**
Ex 18	**Forced Landings**
Ex 19	**Steep Turns**
Ex 20	**Low Flying**
Ex 21	**Navigation**
Ex 22	**Downwind Takeoffs and Approaches, Sloping Ground Landings**
Ex 23	**Quick Stops, Downwind Emergency Turns**
Ex 24	**Marginal Power Operations (carried out at maximum gross weight)**
Ex 25	**Instrument Flying**
Ex 26	**Confined Areas**
Ex 27	**Night Flying**
Ex 28	**High Altitude Operations (familiarization to 10,000 feet)**
Ex 29	**Formation Flying**
Ex 30	**Vortex Ring (settling with power—briefing only)**

In addition to the above the students also receive about 4 hours mountain flying training.

Student winchman receives instruction on hoist operation. The training may be conducted concomitantly with the instructor pilot course

Two Whirlwind helicopters in a low flight tactical exercise, which is part of the Helicopter Instructor Course syllabus

descent. It is considered important that the student knows not only *what* is happening but also *why*.

Once the student fully understands all aspects of the exercise, he and his instructor get airborne together. The time spent on each exercise varies according to its complexity—from about 1½ hours for a simple exercise such as sideways and rearwards flight to over 2½ hours for an involved exercise like confined areas. With six exceptions each exercise is dealt with in the same manner and a total of three flight periods are needed to cover it.

In the first period, the instructor teaches the exercise to the student instructor as he would teach it to a basic student. He goes through the exercise in a logical sequence with explanations and demonstrations, allowing the student to practice each part of the exercise and correcting him as necessary. These four steps—explanation, demonstration, imitation and correction—are the basis of flying instruction.

After this first sortie, and when the student has had time on the ground to assimilate the exercise and study the instructor's presentation, he flies the second part of the exercise—this time with another student instructor. He again goes through the whole exercise, practicing the demonstrations and the sequence in which he intends to fly the exercise. Finally, he again flies with his instructor and gives the exercise back to him with the instructor acting as the basic "student." This last period is the only one which is graded and marks are awarded for flying and instructional technique. Some of the points which are closely examined are:

- Was the exercise presented in a logical sequence?
- Were the demonstrations accurately flown?
- Did the student instructor display a sound sense of flight safety?
- Was the patter, methods of instruction, synchronized with the flying?
- Was the "student" allowed plenty of flying or did the student instructor spend too much time on the controls?
- Was the student instructor monitoring the "student" so as to note and correct any intentional errors he may have been feeding in—and any of the unintentional as well?
- Was the student instructor alert and prepared to take over the aircraft if a potentially dangerous situation developed? This is considered most important and the "student" will normally make typical errors, such as decelerating too high during an autorotation, to see if the student instructor recognizes and reacts to the possible danger.

Following the third sortie, the student instructor is fully debriefed on his performance, and although it is RAF policy that students are not shown their critiques or told their assessments, they are nevertheless kept well informed of their progress.

In order to develop the student instructor's ability to devise his own air exercise sequences six exercises, interspersed through the course, are conducted slightly differently. Before flying these exercises, each student instructor prepares a detailed air exercise plan showing his proposed sequences and demonstrations. This plan is

then discussed with his instructor at a "tutorial" session and, if necessary, revised before he flies the exercise for the first time with another student instructor. The second and final sortie is flown with the instructor acting as the basic "student" and the flight graded.

Two checkrides are given during the course—one at the halfway point after 6 weeks and then a final test at the end of the course. Each takes the same form—a full preflight briefing followed by a flight period covering a specific exercise. After the mid-course check, the students are given a 1-week break with a detachment to North Wales for some mountain flying training. The area is extremely rugged and although the peaks are all under 4,000 feet the strong winds which prevail off the west coast of the British Isles make it an extremely realistic training area.

Left: Mountain flying training at North Wales. The peaks are below 4,000 feet but the rugged terrain combines with strong winds from the west coast of the British Isles providing quite a challenge. Below: The Sioux basic trainer put through paces of confined areas exercise

In conjunction with the flying program there also is an intensive ground school schedule with instruction in subjects such as meteorology, navigation, maintenance, instructional technique and over 20 hours on helicopter aerodynamics. Four seminars are also held during which the student instructors discuss such topics as student assessment and fault analysis under the guidance of an experienced instructor. There are no formal examinations, but each student instructor has three progress checks in each subject during the ground school phase. In each of these checks the student instructor is asked a question and allowed 5 minutes to prepare a 10-minute verbal explanation, which is then graded according to subject knowledge and instructional technique. In addition two 10-minute talks and one 30-minute lesson are assessed in the same manner.

Following successful completion of the course the student is awarded his instructor category; a qualification which is held in high esteem. The initial category awarded to a new instructor is normally a B2 category which places certain restrictions on him such as not being able to send students on initial solo nor to check students out for solo autorotations. After 6 months as a B2 instructor he takes a checkride in order to upgrade his category to B1. After 18 months of instructional experience he would be eligible, if recommended by his squadron commander, to gain an A2 category following a successful checkride with a full exercise briefing and passing an oral examination covering all aspects of flying instruction. The highest category, an Al, is awarded to only the most experienced and able instructors following administration of the same test given an A2, and including the presentation of an illustrated 45-minute lecture on a subject allied to flying.

The CFS course is quite long and undoubtedly hard work. However, flying instructors bear a special responsibility and to enable them to safely discharge it they need thorough and realistic training. It is my belief that the CFS method fulfills these requirements. I can only hope that maybe one day you will also qualify for a tour on exchange to one of the British Services and perhaps find yourself a student at the Royal Air Force Central Flying School.

Whirlwind overflies RAF Tern Hill, home of Central Flying School's helicopter element, Shropshire, England

Management Can Be Refreshing

Captain Robert M. Welter
Department of Maintenance Training
U. S. Army Aviation School

SERGEANT First Class Maintenance experienced a twinge of anticipation as he knocked on the door of his new commanding officer. Many thoughts raced through his mind as he waited the seemingly age long seconds until he was asked to enter. The foremost thought was concerning how long (over 3 years) since he had actually worked in his MOS.

"Come in!" The firm voice broke his reverie.

"Sir, SFC Maintenance reports."

"It's a pleasure to meet you, have a seat. I see by your record, you come to A Company very highly regarded. We need a good supervisor. As you know we have encountered the normal summer personnel turnover and are very short on the experience side. Both the maintenance officer and technician are fresh out of the Army Maintenance Officer's Course and will rely heavily on your experience and knowledge."

Once again the thoughts of misgiving raced through SFC Maintenance's mind. Could he live up to the old man's expectations? Could he capably supervise the maintenance effort of this aviation company?

"What did you do during your tour at Ft. Rucker [AL]?"

"Sir, I was a platform instructor at the Aviation School."

"Good, then you will be very

current on maintenance procedures on the UH-1 helicopter."

"I'm afraid not, sir. I was an instructor in the OV-1 qualification and instructor pilot courses and on the Martin-Baker ejection seat."

Now the commanding officer began to look a little worried as a frown creased his brow. He envisioned a period of low aircraft availability and canceled missions until his key maintenance supervisors gained the experience and knowledge so essential to an efficient operation. Here was another problem, created by the system, that was dumped onto the CO.

"Sir, I did attend the Department of Maintenance Training's (DOMT) Maintenance Management Course," SFC Maintenance's voice quickly broke into the old man's thoughts. SFC Maintenance had now regained his confidence and he sounded strong and reassuring. "DOMT realizes that many NCOs throughout the Army are assigned duties outside their primary MOS. After fulfilling these duties for a period of time (sometimes several years or more) and subsequent reassignment to a field unit and their primary duties, the skills and knowledges of these men had become rusty. To counteract this DOMT established the Maintenance Management Course."

The beginning of this article presents an often all-too-real problem. However, this new course provides maintenance supervisors and other NCOs in the maintenance field an up-to-date review of all current regulations, revised techniques and procedures that are associated with maintenance MOSs.

The resulting course is comprised of 20 training days broken down into 115 actual academic hours of instruction. There are 88 hours of conference instruction, 21 hours of seminars, practical exercises and demonstrations and 6 hours of examinations.

Material in the course covers a wide range of subjects and normally stimulates quite a bit of discussion. The course content is depicted below:

Lesson Plan Title	*Hours*
Introduction	1
Personnel Training	2
Concept of Maintenance	9
Maintenance and Supply Publications	6
Repair Parts Supply	12
Quality Control	4
Maintenance Technical Assistance	1
Aircraft Inspections	6
Interpretation of Mechanical Drawings	2
Maintenance Management Scheduling and Reporting	9
General Maintenance Procedures	6
Army Maintenance Management System	18
Production Control	4
Fuels and Lubricants	2
Recovery and Evacuation	3
Non-Destructive Inspection	2
Weight and Balance	3
Drug Abuse	2
Aircraft Armament	4
Safety	5
Seminar	6

Anyone desiring information or authority to attend the Maintenance Management Course need only to write: Department of Maintenance Training; ATTN: Training and Scheduling; U. S. Army Aviation School; Ft. Rucker, AL 36360; or to call: DOMT training officer, AUTOVON 558-4228/2718; commercial (205) 255-4288/2718.

NOTE: This course was developed specifically for aircraft maintenance by the Department of Maintenance Training at Ft. Rucker for its own use. It is not the intent of this department to conflict with the Maintenance Management Systems Course, No. 8A-F3, conducted at ALMC, Ft. Lee, VA. Personnel requesting attendance must provide funding by their respective unit/organization

VIEWS FROM READERS

Sir:

I'm a newly assigned technical inspector in the 201st Aviation Company. I have been working OJT as a TI for about 75 days.

I have a couple of questions that have been unanswered that maybe you might be able to help me with. Our company has had trouble with blade grip seeping which will develop into a steady leak. One of our maintenance officers seems to think that changing oil in the blade grip every 100 hours may be causing this problem.

It has been company SOP to change blade grip oil every PMP. Now TM 55-1500-210-20 PMP card doesn't have a set time to change oil unless it is contaminated. Can you tell me if there is a set time to change blade grip oil? I would like the page and time it was printed, and also TM number.

My next question concerns the 2407 monthly maintenance report. I was trying to find in TM 38-750 where if you logged everyday work on the aircraft even if the aircraft hasn't flown for 15 days. Also, if the aircraft hasn't been worked on if there should be any type of entry made on the MMR.

If you can answer my question I sure would like a reply. Thank you.

SP5 Michael E. F. Sneed
201st Avn Co (Corps)
APO San Francisco 96240

• **The DIGEST received the following concerning SP5 Sneed's letter from the U. S. Army Aviation Systems Command:**

According to the Utility Helicopter Branch of our Systems Engineering Support Division, changing of lubricating oil is not required time change maintenance procedure. In addition, it is doubtful that changing lubricating oil could cause seal leakage. However, if oil removal method imposes high pressure or reverse pressure (vacuum) on grip seals, seal damage may occur.

In answer to the second question, the Policy and Programs Branch of our Directorate for Maintenance reports:

a. Paragraph 3-9b (a), page 3-23, TM 38-750, 21 Nov 72, requires that

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Detailed instructions for preparing the form and other pertinent information is provided on the back of the DA Form 12-4.

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"ALL organizational maintenance actions will be recorded and reported for aircraft listed in section I, appendix C to include all repair parts replacement or repair, except repairs made to components reported on DA Form 2410 in accordance with para 3-21b (1) (a)."

b. In essence, this means that each day all actions taken on an aircraft must be recorded on the DA Form 2407, MMR. However, should an aircraft be grounded or inactive for any reason, and if no maintenance action was accomplished on a single day, an entry is not required for that day. On the other hand, if the aircraft is inactive for 15 days, but some work was accomplished each day, then an entry would be required for each day to cover each maintenance action taken.

Sir:

I read with much interest "Hey Tower . . ." and "True or False?" in your March 1973 issue. It seems that this issue has more articles which are relevant to aviators than usual. Although your publication, among others, is at best a poor substitute for the experience we no longer get from being able to fly, many of us still desire to maintain our proficiency and the best way is often by reading and trying to relate to past flying days. Articles like those mentioned are in great need, especially until aviator proficiency is again needed and we can fly for proficiency. Keep up the good work.

MAJ Harry L. Fraser
48 5th Artillery Road
Ft. Leavenworth, KS 66027

Sir:

Last November I submitted my application for warrant officer flight training through channels to the Department of the Army. Since submitting my application I have heard less and less about the Army flight program (I am not referring to my own particular application—I have sent a letter to Aviation Branch regarding that—but rather to the aviation program as a whole). Everyone I talk to now seems to draw a blank regarding what is developing within the aviation program. Career counselors are in the dark. Pilots are mystified.

The question that I would like to ask you, then, is: What is the situation with the Army aviation program, warrant officer flight training in particular? Is it closed? Closing? Open to college graduates and commissioned officers only? What are the chances of an active duty member with a private pilot's license, 2 years college equivalency and a GT of 130 or better? (Disregard the last question if you like. I won't ask anyone to tell fortunes!)

I would, though, sincerely appreciate any information you might be able to provide regarding what is happening in the warrant officer flight program presently and the anticipated future situation.

Thank you for your time and assistance.

SP4 Gary Benson
Headquarters Company
SUPDIST Nordbayern
APO New York 09696

• The following was received from the Office of Chief of Information Headquarters, Department of the Army, in response to SP4 Benson's letter:

The Warrant Officer Flight Training Program is still open. Current plans are to train 350-400 warrant officer aviators through FY 75.

It appears that you meet the college level equivalency and GT prerequisites; however, you should check AR 611-85 to see if you meet all of the other prerequisites. Your private pilot license will be given consideration.

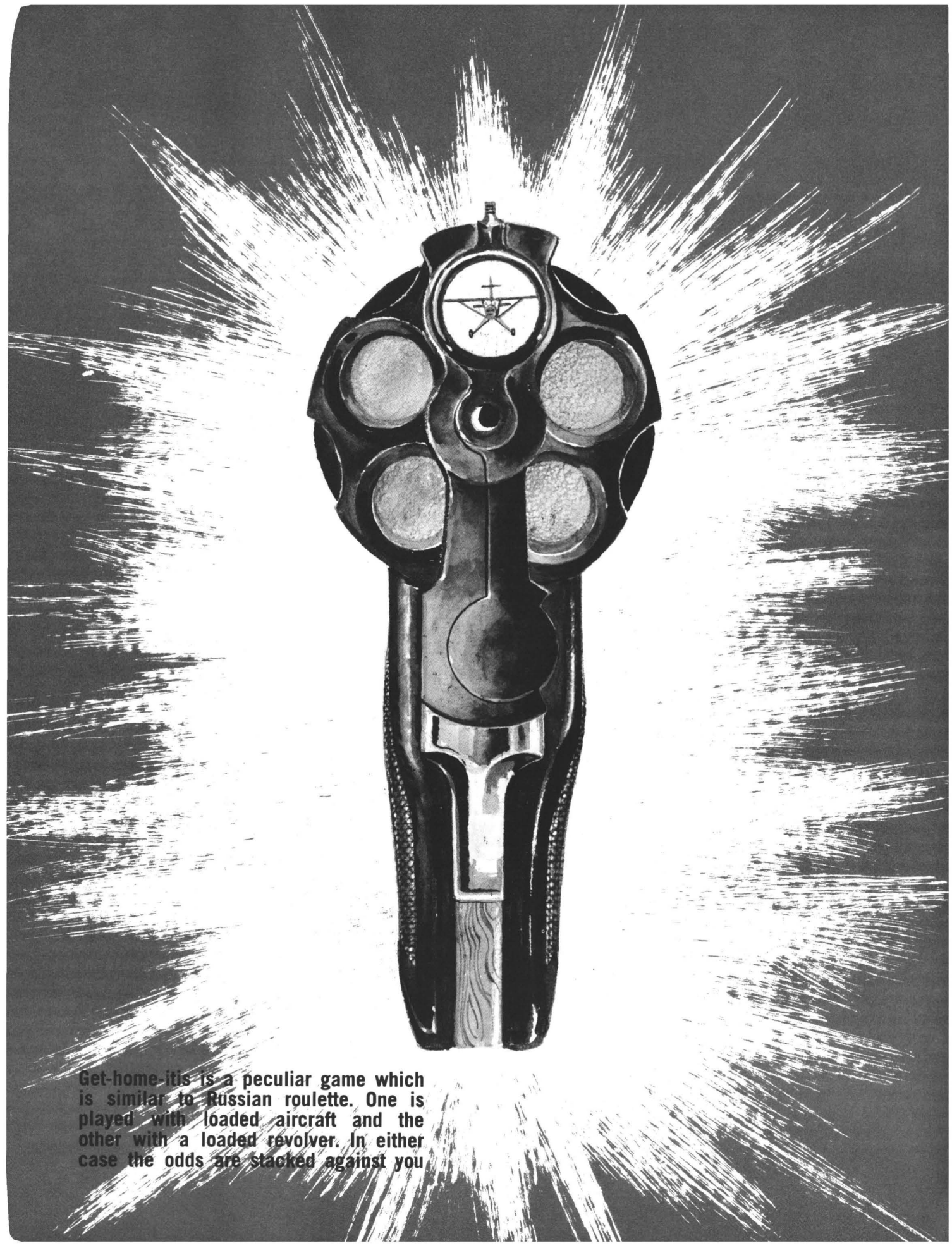
INSTRUMENT CORNER

Q. I have a civilian friend who has recently obtained his private pilot license. We were discussing altimeters and he questioned the Army's use of the "K" factor. Is it true that perhaps we are inducing a greater error to our altimeter by using a correction factor?

A. The U. S. Air Force has researched this problem thoroughly; as a result, the Air Force no longer uses a correction factor. Advice from various sources (including Kollsman Instrument Corporation) revealed that altimeter error, when plotted at various altitudes, results in a sinusoidal curve. That is, for example, an error found to be negative at one altitude may be a positive error at another altitude. The answer then would be this: yes, we might induce a greater error. If we were to apply a correction factor which we determined to be negative at an altitude where the altimeter error was already negative, we would be increasing the negative error. Following up on the Air Force research in this matter, the Army has also decided to discard current altimeter correction practices ("K" factor).

The new correct procedure for setting the altimeter is found in change 4 to TM 1-215 (15 Mar 73), page 2-34, paragraph 2-37, *Setting the Altimeter,* which reads in part: "The current altimeter setting is normally given to the aviator during radio communications with the control tower, FAA flight service stations, and other air traffic control personnel. However, the altimeter setting may be requested at any time. The first altimeter setting is normally made while on the ground. This gives the aviator an opportunity to check the accuracy of the altimeter. To do this, he sets the reported altimeter setting on the barometric scale and compares the indicated altitude to a known elevation. The maximum allowable error is 70 feet. If the altimeter error exceeds 70 feet, the altimeter is not considered reliable. No further corrections are necessary if the altimeter is within tolerance. Additional altimeter settings used should be the current reported altimeter setting of stations along the route within 100 nautical miles of the aircraft. If there is no station within 100 nautical miles, the current reported altimeter setting of the nearest available station should be used."

The AN/PVS-5 night vision goggles with modified air/ground mask featured in the May 1973 AVIATION DIGEST has received compatability acceptance for ground and air helmet wear from all five of the Armed Forces. This may evolve into a joint services procurement contract and substantial reduction in individual item cost.



Get-home-itis is a peculiar game which is similar to Russian roulette. One is played with loaded aircraft and the other with a loaded revolver. In either case the odds are stacked against you

GET-HOME-ITIS

A game that's played by young and old alike. It starts with a leap into the blue, or more probably gray or even obscured sky, because you "just must get home." It can end with you becoming a statistic and not getting home at all

Lieutenant Colonel Emmett F. Knight

THIS IS NOT a new story. In fact, it's a fairly familiar story in our business. The settings change and the scenes shift. The actors also change with regularity and sometimes finality, but the story continues in its infinite variety and with its single common denominator: *poor judgment.*

The plot for our perpetual story centers around a game some Army aviators play. It can be played by young and old alike, but is normally associated with youthful vigor and inexperience. It is a challenging game because it is almost always just a little different and each time presents new thrills for the aggressive aviator. Get-home-itis is that peculiar game which closely resembles Russian roulette, only it is played with loaded airplanes instead. In either case the odds, are stacked against you and the results sometimes fatal.

I'm sure you're all with me now. Remember that hollow feeling in your stomach? The game always starts with a leap into the blue, or more probably grey or even obscured sky, because *we've just got to get on home.* Remember? I remember, and it always makes me cringe a little when I do.

Back in the early 1950s Germany was a great place for a slick wing aviator and his 0-1 Bird Dog airplane. On sunny days those towering Q's were usually there, but they still left plenty of room to "wring her out"; to see if you could still find the school solution for that lazy eight or chandelle; or to just go castle hunting along the Necker River. But remember those winter maneuvers? Remember that weather that invariably socked you into your field strip just when the problem was about to end? And the sucker hole—the one that got you in the air when you "should have stood" on the ground? Remember how it put you on top and closed up behind you . . . leaving no way down?

And the Bird Dog . . . in those days it was the mainstay of Army aviation, and even with that sometimes wild spring steel gear we all grew real fond of her—plenty of power and she'd get in short and get out again too in most cases. But remember her radios? They couldn't even laughingly be called avionics.

The 0-1 had a VHF, okay; and a PRC-9 hung in the wing root with a power pack that cut your cargo capacity in half. So you could talk, maybe, if you were in close. For navigation it was manual loop. I never could get the kink out of the control cable on mine. It was so difficult to turn that it was, to all intents and purposes, fixed along the axis of the airplane.

I had to swing the nose of the aircraft to try to catch the old Dinklesbul beacon as it sent out its coded identifier. That was all you got, too; every minute the identifier repeated twice and then nothing. You had to be quick.

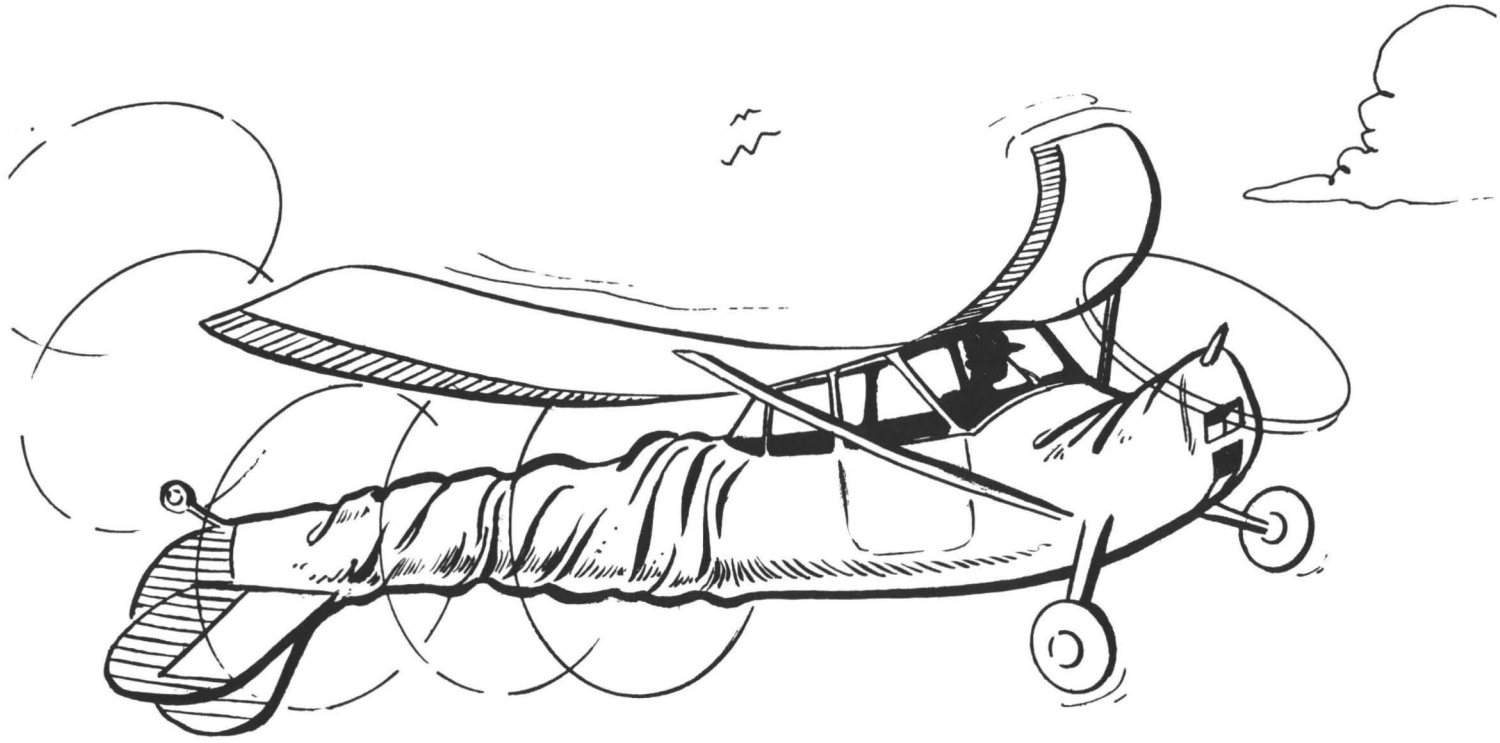
Remember those nav aids? Well, maybe you don't remember all that but I do, and I'll never forget the days that I played that get-home-itis game as a young, enthusiastic Army "ace."

There was one incident in particular that still gives an old man chills. Think back with me: Everyone else had gone home and the weather is tight; maybe a mile at takeoff, maybe a mile and 1,000 feet enroute, the weatherman sez. But we don't have a PIREP; why don't you take a look for us? I'll clear you for VFR!

Some deal, I'm just a 3-3 aviator but it has been socked in for 3 days and I want to get on home.

So, I spin the prop and take to the air . . . boring off and staying low. Hold on to that good old iron compass. Can't! There's rocks in those clouds.

Climb! Air speed! Altitude! Directional gyro! Damn, that artificial horizon won't stay level. When am I going to break out? *Sweat blood!*



Whew, finally breaking out—finally! Only 180 degrees off my heading. Now to head for home and pray that I can get down through the overcast.

One hour and a half over the top and nothing. Where am I? Do I head for Stuttgart and ask for a GCA? But that is 40 miles from home. No wait, there's a hole over there, maybe.

Down! Man this hole is closing up. Watch the angle of bank. Don't get in those clouds. Trees! Power! *It didn't take!* The airplane just shudders through a high speed stall but miraculously falls out the bottom under marginal control and in a valley. Now where in the world am I?

Follow the road. There! That looks familiar. So up the valley, then over the trees and round out, and do it all practically in the same motion. But we made it home all right. Now head for the bar, man, and maybe we can stop the shaking. Celebrate! We played the game and found an empty chamber one more time.

Another day, another railroad, another pilot; same old game! Inadvertent IFR, and he's really into it. So climb. Air speed falls off. Rate of climb slow. More power. Can't seem to hold it level. Feels like it's in a left turn. So, look out the left window to see if you can see the ground; nothing. More power. Stop turning. Try to level the wings. Air speed gone to hell! Look up! Look out the right window, maybe you can see the tops. *There's the ground! Vertigo!* Too late. The pilot is alive, but he'll never fly again. The old get-home-itis got to him pretty good all right. Of course, considering the odds that he built into the game it could have been far worse.

On sunny days those towering Q's were still there, but they still left plenty of room to "wring her out," to find the school solution or to go looking for castles

Heilbronn Army Airfield: 3,000 feet; no nav aids; humped in the middle and very little overrun; no lights; 50-foot trees on one end and a 200-foot hill on the other. This was what we called the "let-down" procedure for Heilbronn: Follow the railroad tracks west until they go into the tunnel, turn due south at 1,000 feet indicated and start a 500 feet-per-minute let-down. Fly for 1 minute and you should be over the threshold at or near the field elevation of 495 feet.

One homeward bound pilot really stacked the deck. Returning home in marginal weather he added the additional hazard of nighttime and then he didn't get it all together until after three-fourths of the runway was behind him. He survived. So did his passenger, but the Bird Dog was never the same. Of course, they were home, so I guess you could stretch a point and call that a get-home-itis draw.

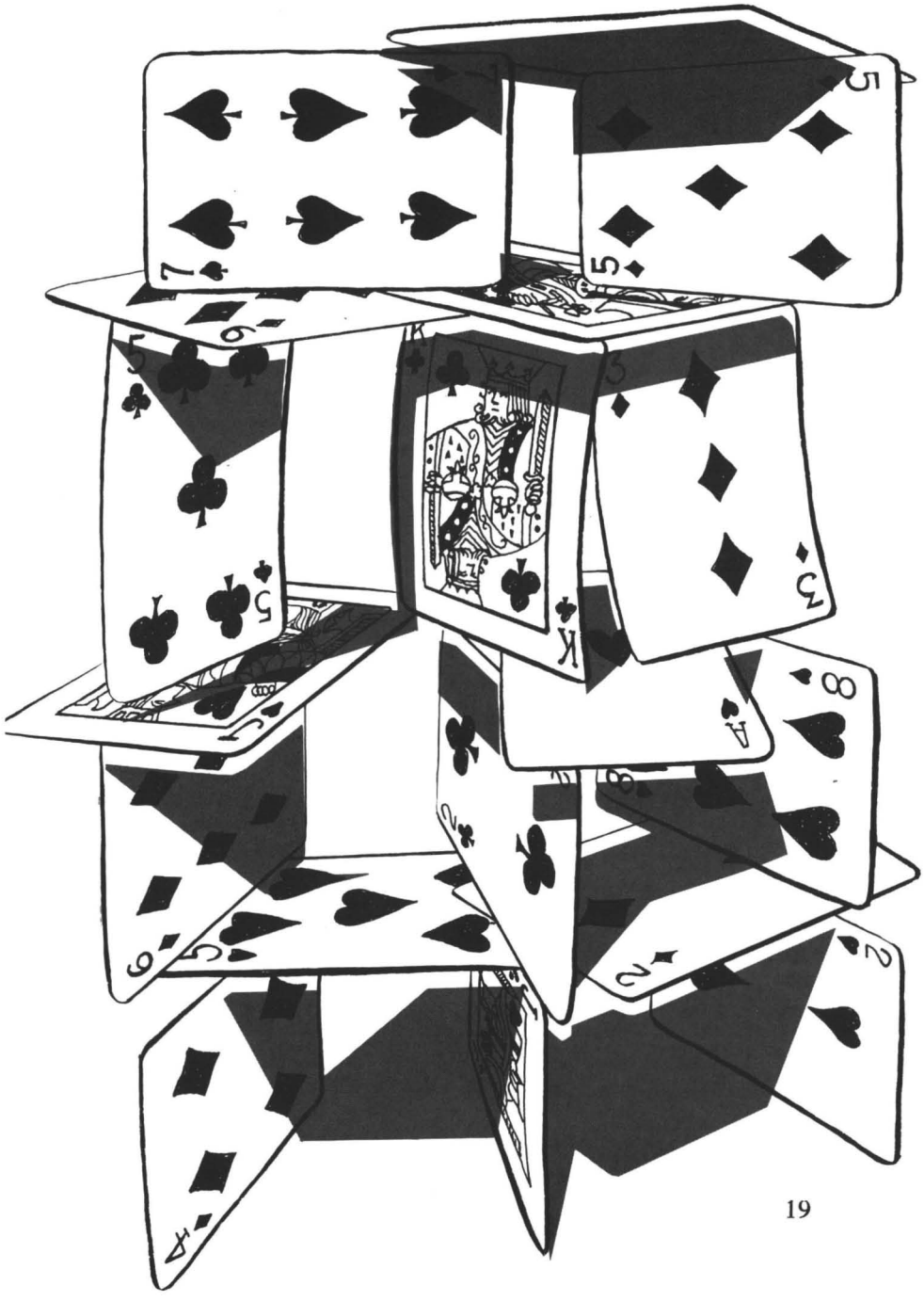
An OH-13 Sioux helicopter heads for home in failing light and intermittent blowing snow. The fire on the hillside, just 5 miles from the waiting wives and children, lasted only a matter of seconds before it was all over. That young aviator whirled the cylinder just once too many times. Another day, another scene, same old game—but we'll need a new pilot.

There were three CH-34 Choctaw helicopters and an OH-13 helicopter lost in one get-home-itis

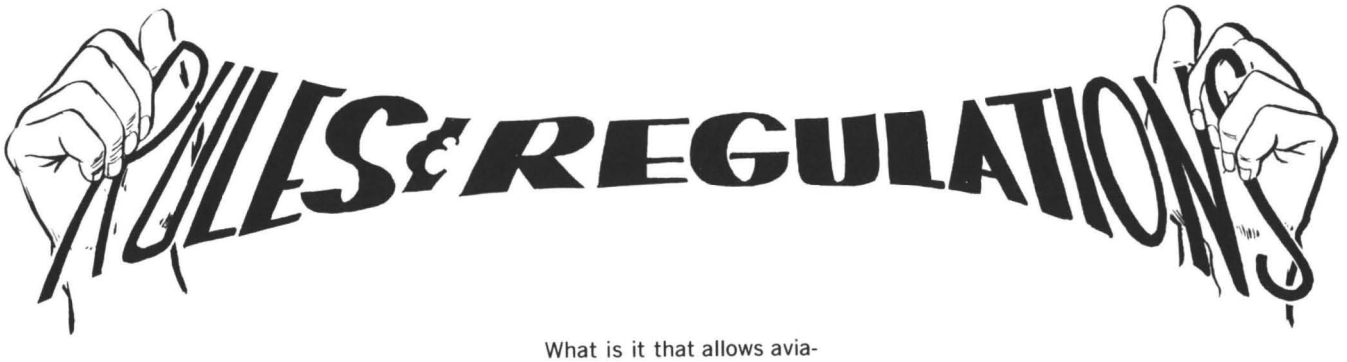
attempt in Germany in about 1957; three CH-21 Shawnee helicopters in Oregon in 1958; and a U-6 Beaver airplane boxed in on the slopes of Mount Rainier in 1959. The years roll by but aggressive aviators continue to be around to multiply the odds. What happens to our hard-earned and continuously honed judgment when its gets *time to go home?*

I remember one sterling young aviator around 1964 in Germany whose manual dexterity and sense of urgency were of such a high order that he was "the general's pilot." He and his UH-1D Iroquois helicopter were always ahead of schedule, even if the takeoff was delayed, and he invariably got the general home on time. One evening he somehow attempted a start with the emergency fuel control switch in the manual position. The resultant overspeed was brief but definite. The only correct action at that point, we must all agree, would have been to shut it down and call for maintenance assistance. The book prohibits further flight until the proper inspection, including the replacement of necessary parts, has been made. Even though all the dynamic components of this aircraft had been overstressed to the point that failure was a good possibility, *it was time to go home!*

To wait for the general's sedan would have taken a couple of hours and besides it was cold and getting dark. This pilot decided to tempt fate. He made a brief inspection, cried "All aboard!" and then flew the general and his staff home. It was 20 minutes of astronomically high risk, but he and his high-ranking passengers managed to beat the



A homeward bound pilot really stacked the deck. He survived but the aircraft was never the same



odds and their collective poor judgment one more time.

Let's shift the scene to the early days in the Republic of Vietnam and a flight of CH-21C helicopters headed for Can Tho at dusk. Now, I admit that a delta rice paddy at night is nothing like downtown Can Tho, but to have one of them run out of gas within ½ mile of the airfield—to tear the helicopter apart at the field splice and have the crew suffer the indignity of wading on in—seems a little too high a price to pay simply to save refueling time on the way home.

Back to the British Zone of Germany in the winter of 1966. A CH-34 helicopter returning after a mission crashed in a blinding snowstorm. There were no survivors. The helicopter went in nose down at a 45-degree angle, with a high rate of speed, less than 3 minutes after takeoff. Snowstorms had been blowing across the hills at about 40 miles per hour all afternoon. Each storm took 30 to 45 minutes to pass and visual flight was impossible inside one. The crewmen had already waited one storm out, but they grew impatient to get home. A German police helicopter landed at the crash site within 10 minutes of impact with good visual conditions.

Why can't we develop *consistent patience*—the kind that allows one to wait with equanimity? When the pressure is on, fellow aviator, remember you are a salaried employe. You don't get paid by the hour nor at piece rates; *you get paid by the month.*

What is it that allows aviators to stretch all those rules and regulations by which we fly our aircraft

There are many variations of the game. How about the UH-1 pilot in Vietnam in 1967 who knew that his exhaust gas temperature was too high and rising, yet pulled pitch just the same? He felt those slight yaws as the compressor signaled the imminent engine failure, but still he pressed on and "she" quit all right—just after he crossed the second airfield on his route back to home base at Soc Trang. That 180 autorotation was a textbook execution, but unfortunately a little too far to stretch. Dark descended rapidly and an infantry company got to play a small part in the game of get-home-itis. Those infantrymen felt just swell guarding the remains all night long in that muddy rice paddy—they sure did!

When are we going to learn a little common courtesy? It "ain't" polite to lean on other people that way, and what was so dang important about that Army cot at home base versus the borrowed one at one of those other airfields?

Now we are well into the decade of the 1970s. Man has the will and the technique and he has learned the discipline necessary to fly to the moon and return home safely in due course that takes discipline. And discipline is a basic Army tenant. But what kind of discipline allows aviators to continue the stretch of those rules and regulations by which we fly? These rules primarily are designed to safeguard lives and protect government-owned equipment. Army aviators must learn the discipline necessary to accomplish the mundane missions in the air and to complete them in due course.

In 1972 in the Republic of Korea a young aviator whirled the cylinder and pressed the trigger, chancing the fatal fall of the hammer in a game of flying roulette. On the second leg of a round robin flight from Taegu to Seoul his OH-58 Kiowa helicopter crashed into the highway while daylight failed and weather choked off the available supply of air which is suitable for visual flight. That, at least, may be the supposition for neither the pilot nor the mechanic with him won this game of get-home-itis.

In 1973 are *you* going to play the flying roulette game of get-home-itis and become a statistic? It is a game, but not *only a game for* aviators. It closely resembles Russian roulette, only it is played with a loaded airplane instead of a loaded revolver. You can talk to aviators young and old and you will find that nearly all have played. You also will find in almost every case that the older aviators began to develop judgment, patience, discipline—yes, and courtesy too, needed to avoid taking part in a "fixed" game of chance . . . one fixed against you.

On instrument training flights a piece of cardboard across the windshield forces the pilot to depend on a dash full of instruments and dials to fly his aircraft.

Fort Lewis'

Instrument Flight School

Fort Lewis Information Office

THE MOST POPULATED regions of the Pacific Northwest do not experience wide extremes in temperature but there are other adverse weather conditions that seriously affect flying. To train helicopter pilots stationed at Ft. Lewis, WA, to fly in this inclement weather, a special instrument flight school has been established.

The school is conducted by the 116th Assault Helicopter Company of the 10th Aviation Battalion. Instrument flying is under control of the Federal Aviation Administration (FAA) on routes served by air traffic controllers and radar. It began operations in January 1972 and was scheduled to close in June 1973. However due to the large influx of aviators and other factors, the school will be continued on a reduced basis.

Students come from all units with aviation sections or aviation related assignments. The course lasts 6 weeks. Usually there are 32 students in training at any one time. They receive 47½ hours of classroom

instruction and 27½ hours in simulators. Flying time is divided into 15 hours of basic instrument, 30 hours of advanced instrument and 40 hours of copilot time.

Most of the training is conducted near Tacoma Industrial Airport, Olympia Municipal Airport and Gray Army Airfield. The basic part of the course is taught at Yakima Firing Center and the airfield connected with it.

At Gray the aviators practice with the ground controlled approach (GCA) system and a nondirectional beacon (NDB). Tacoma Industrial has an NDB and Olympia is equipped with a very high frequency omnidirectional range system (VOR).

Each airport approach involves different headings, altitudes and rules as well as equipment, and mastering the intricacies of each one is essential to earning an "instrument ticket."

In the 2-week primary course at Yakima the pilot learns to read his instruments accurately and correct for errors. Also, he learns how to cope with inflight emergencies and recover from "unusual attitudes."

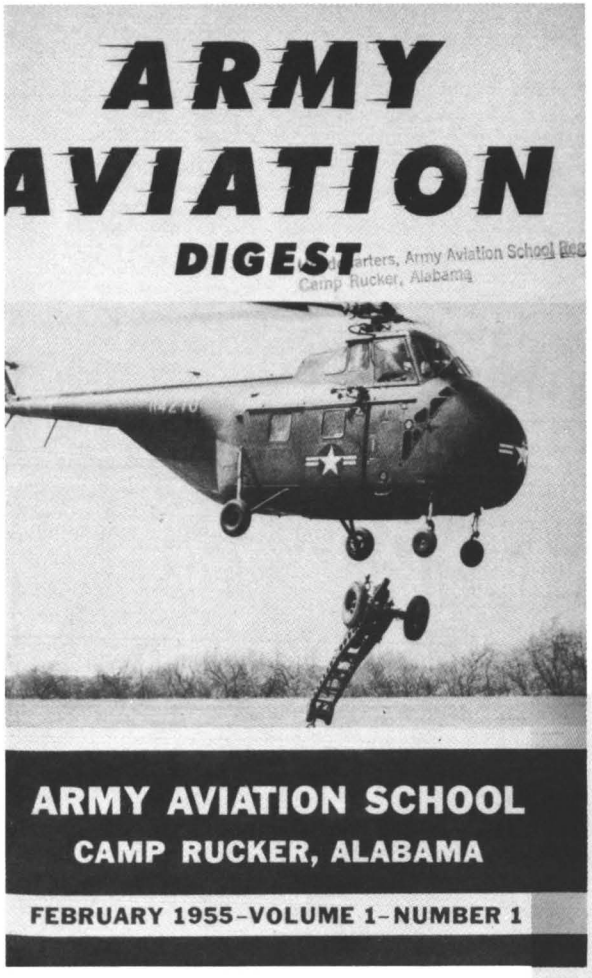
The student learns to fly with all or only a few of the instruments operational. Fifteen flight-hours later he returns to Ft. Lewis to make "perfect by practice" the techniques he's been taught. These include enroute navigation and holding patterns.

Special emphasis is placed on approaches. The student usually has two or more to choose from, but once committed he must be exact in his timing and wind allowances and his arrival at the runway with the proper altitude and heading.

If he is told to divert he must decide what is best to do under the circumstances outlined by the instructor. These may include trying another approach, waiting for better weather or going to an alternate airport.

A flight test and a written exam are the final laps of the pilot's pursuit of his instrument ticket.

If a pilot is going to crash, this ground-bound Link flight simulator is the recommended place to do it. The Link allows pilots in Ft. Lewis' instrument flight school to gain confidence and proficiency before venturing aloft to test their skills. Here, CW2 James K. Mabrey and LT Ronald J. Kraus practice



Aeromedic

Provided by the Society of U. S. Army Flight Surgeons

NOT INFREQUENTLY some of today's Army air crewmen wonder about the heritage of Army aviation. Many recall or express the esprit and tradition of other military flying services, resplendent with famous and flamboyant personages and replete with notable and magnificent events. What about Army aviation's heritage? Does it have one?

A lingering perusal of *The Army Aviation Story* by Tierney and Montgomery will rapidly inform the novice that Army aviation has a long and proud beginning. Too often the present day student of

Colonel William H. Byrne

LTC Nicholas E. Barreca, M.D., reviews the lead article in the first issue of the U. S. ARMY AVIATION DIGEST. The article entitled "Aerial Equilibrium" is reproduced on pages 24 and 25. It was written by the late Colonel William H. Byrne, Medical Corps, U.S. Army, who was the first flight surgeon to have commanded the Army hospital at Ft. Rucker. Above is the cover of that issue showing a UH-19 Chickasaw helicopter, which was then called an H-19

Aeromedic

aviation or life questions the relevance of history. To what end do we study history or reflect upon the past?

A more eloquent flight surgeon addressed the same question thusly: "The Greek philosopher Heraclitus proclaimed that nothing remains the *same*. Another philosopher Parmenides countered that nothing really *changes*. An anonymous wit, probably a Frenchman, combined the two ideas and said, *'Plus ça change et plus c'est la même chose'* [The more something changes, the more it remains the same]."

So, the ageless debate rages on to the present day. *Does* the past really provide useful and illuminating parallels to the present conditions of man and society, *or* have we entered an entirely new era to which an understanding of the past contributes nothing? Restated, do we study history for signs of change or signs of permanence? Perhaps it is best to do both? It's often difficult to understand the present or project the future without a knowledge of the past.

History gives us perspective and perception. To some it provides precept, to others inspiration. Those who ridicule and denounce history could not do so without some insight into the past and lessons learned, unlearned or forgotten.

Army aviation medicine also has a proud and growing heritage. In the adjoining article the late Colonel William H. Byrne, the first flight surgeon to command the U. S. Army Hospital at then Camp Rucker, AL, reflected upon a subject that certainly has not lost its relevance in this age of sophisticated flight.

The first thing apparent upon examination of this accompanying *Volume 1, Number 1* epic is that more than 18 years of light and time have not worn thin the importance and emphasis placed on air crew health and safety. As evidenced in last month's "Aeromedic—Education and Training In Life Support For Army Aviation," this area of concern is perhaps enjoying even greater emphasis. In light of today's more demanding missions and sophisticated aircraft, "aerial equilibrium" or spatial disorientation assumes relatively greater importance.

Have we learned a great deal more since those days of wood, bolts and cloth? Most certainly! The scientific body of knowledge concerning man's sense of balance has increased tenfold to twentyfold. The basic principles remain the same but the complicated functions and interrelationships of our sensory organ systems are now manifest. For instance, we now know that under most conditions only the otolith organ (the utricle and saccule of the vestibular organ) responds to linear acceleration. The semicircular canals respond only to angular acceleration (change in speed and direction simultaneously) under most conditions.

AERIAL EQUILIBRIUM

Colonel William H. Byrne, *Medical Corps*

The views expressed in this article are the author's and are not necessarily those of the Department of The Army or of the Army Aviation School.—The Editor.

When birds in flight enter clouds, fog, or any similar medium, they immediately establish a glide and prepare to land. The reason for this action on the part of such accomplished fliers is that they have lost their VISUAL REFERENCE, such as the horizon. Being less apt at flying than the avian class of vertebrates, the improperly trained or inexperienced pilot under similar conditions is often less fortunate in his landings. The latter would not occur so frequently if all pilots of modern aircraft under blind flight conditions would learn to use and trust the reliable visual references which they have available on the instrument panel, such as the gyro-horizon flight indicator and other instruments.

What causes the mistrust and disregard of the instruments which the pilot knows are accurate and reliable? The mistrust is the result of the pilot being the victim of improper utilization and coordination of three of his senses, sight, muscle sense, and vestibular sense, which, if coordinated, will maintain equilibrium. Stimuli to the brain from one of these senses may produce independent action without any conscious regard to the outcome. Thus, sensory illusions are often produced.

Sight is our most reliable sense, possibly because in the presence of adequate light the stimuli formed and sent to the brain are less subject to misinterpretation by the visual center. In the absence of adequate light, sensory illusions pertaining to vision do occur with an appreciable frequency. Muscle sense (deep sensibility) is variable in its response and of much less importance in the production of sensory illusions. Because of the relatively great sensitivity and power of the vestibular sense and the unreliability of it when acting in the absence of visual reference, it produces illusions more frequently than the other senses.

The vestibular apparatus, v
sensory illusion, is composed of
canals arranged in the horizont
within the bony structure of the
canal, the ampulla, contains hair-
are stimulated by the movement c
to stimulate the above processes
exceed 12 cm per sec per sec.
degrees per sec per sec in order
is analogous to a glass container
container is quickly rotated, the fl
When the container is suddenly
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slowly, the fluid moves with the
between the fluid and the glass.

Illus

The tilting illusion, which
occurs following the detection of
a wing by the semicircular canal
position too slowly to be detecte
that the pilot will lean away from
indications of level flight by the ins

The turn illusion is produce
the vestibular system. However,
the fluid of the semicircular canals
of the original turn. This prod
opposite direction.

If a pilot, during an instru
cockpit this maneuver often stim
to produce the illusion of a snap-

The climbing illusion is freq
It is produced by updrafts that
which in turn affects deep sensibili
action to correct an attitude of the
same sensation of climbing is freq
a turn. Downdrafts will produc
descending.

The visual illusion that is th
in the night formation flying. It
at a wing light over an extended

hich is frequently concerned with hree fluid-containing semicircular l, vertical, and transverse planes ner ear. The dilated end of each ike processes (nerve endings) that the fluid in the canals. In order y linear movement, the rate must Rotary movement must exceed 2 produce a stimulus. This fluid f water. For example, when the id lags behind because of inertia. topped, the momentum continues kewise, if the glass is rotated very ontainer and there is no function

ons

s commonly called the "leans", a rapid change in the attitude of if the wing returns to the level . The illusion is so convincing the original tilting in spite of the ruments.

by a gradual turn undetected by when a rapid recovery is made, continues to move in the direction es the illusion of turning in the

ent turn, lowers his head in the lates another semicircular canal oll.

ent during flight in rough weather. ncrease the pressure on the seat y, thus causing the flier to initiate aircraft that does not exist. This uently present in the execution of the opposite sensation, that of

e most dangerous usually occurs results when a wing man stares eriod of time and suddenly sees

the light move up or down. If he follows his intuition he will either turn away from or into the other aircraft. This is called autokinesis. Pilots have also landed on piers when they mistook parallel rows of lights for a runway. The most common illusion occurs during daylight flying between two cloud banks which slope toward each other and obstruct the view of the horizon. This produces an illusion of tilting and the flier, in an attempt to correct for a non-existent condition, will actually tilt his aircraft.

Summary

The first important fact that the pilot must learn and accept is that in the best of health he will have sensory illusions so long as he continues to fly.

The second important fact is that one must train himself to mistrust his intuition, to accept the illusions, and place his faith in the instrument panel.

A third fact of great importance is the training and utilization of the sense of hearing toward adopting radio-navigational aids and procedures in order to increase his confidence in instruments during IFR conditions.

Instrument flight is an ever increasing necessity in the course of military flying, and each pilot is obligated to become well qualified and maintain proficiency in instrument procedures under IFR conditions.

References

Armstrong, Harry A.... Principles and Practices of Aviation Medicine, 2d Ed 1943, pp. 229–245.

T. O. 30–100 A–1..... Instrument Flying Basic and Advanced, 9 Jun 1943.

AAF Manual 25–0–1... Flight Surgeons Reference File, November 1945, pp. 8–5–4–8–5–8.

NAVAER 00–800–33.. Vertigo Sense, Aviation Training Branch, Office of the Chief of Naval Operations, U. S. Navy, 1949.

Today, we understand that the stimulus thresholds of the vestibular organ and its components are even more sensitive than previously realized. These facts better enable us to understand the types and extent of sensory illusions that occur. These knowledges (see "Aeromedic," April, May and June 1972) and the skills that can result from their study, ensure the air crewman's ability to compensate for his physiological limitations and cope with the unnatural flight environment.

COL Byrne's summary is worthy of reemphasis.

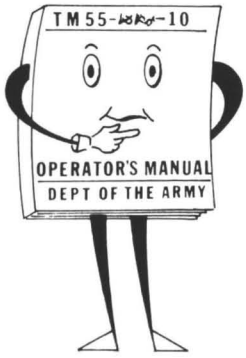
• *The air crewman must learn and accept sensory illusions as the normal expectation of terrestrially developed and limited sensory organ systems.* Once an air crewman realizes that he is susceptible to these phenomena, preparation and prevention become the next logical step of any *logical* man.

• *He must train himself to mistrust his intuition and place his faith in the instrument panel.* The Department of the Army has provided the means to that end in its requirement for complete and formal instrument training for all Army aviators. Confidence and faith can only come from understanding, training and experience.

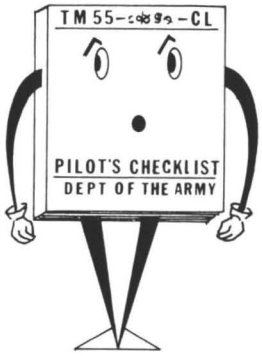
• *He must integrate and organize his sense of hearing, knowledge and application of radio navigation and coordinated control movements toward the goal of effective flight and mission completion.* Many aviators can fly under the hood or in actual weather with an instructor pilot and straight and level. The difficulty comes in trusting oneself and the other guy, as well as getting from point A to point B in accordance with the rules. This takes practice in and out of the actual aircraft and/or weather. Proficiency in instruments means organization, integration and coordination. It implies crew coordination and results only from experience followed by more experience. Many *aspects* of instrument procedures must border on automatic, *almost* unconscious movements or processes. Thus one cannot fly once a month and safely consider himself instrument qualified. He must pursue continued training and experience. Today, this can be accomplished more safely and less expensively in the computerized and sophisticated instrument flight simulators that are becoming available to student and operational pilots alike.

Thus COL Byrne's comments of yesteryear are perhaps more meaningful today than before. The future Army air crewman will be called upon even more frequently to engage his illusive senses in instrument flight. He is and will be formally trained toward this end, but will *he* be able to remain prepared and proficient?

Nicholas E. Barreca, MD
LTC, MC, SFS
Deputy Director
OAET, USAAVNS



Charlie and Danny's Write-In



Dear Danny: I have found that the emergency procedure for a fuel control malfunction (gain in rpm) in TM 55-1520-221-10, page 4-7, paragraph 4-18, differs from the procedure in TM 55-1520-210-10, page 4-11, paragraph 4-32, for the same emergency condition.

Which procedure is correct?

If both procedures are correct, why use the emergency fuel control in the AH-1G and not in the UH-1H?

C.W.A.

Danny's answer: After looking at both the AH-1G and UH-1D/H dash 10s and discussing the matter with several people, we have recommended that TM 55-1520-210-10 and TM 55-1520-221-10 be changed to read as follows:

TM 55-1520-210-10, page 4-11.

4-32. Overspeeding N_2 Governor (high rpm).

1. Increase collective to load rotor and sustain engine/rotor rpm below the red line.

2. Reduce throttle until normal operating rpm is obtained.

CAUTION

Acceleration, deceleration and overspeed control are not provided in the emergency system. Do not move power lever rapidly. Engine overspeed, overtemperature or flameout could result.

3. When conditions permit, retard throttle to flight idle and place governor switch in the emergency position.

4. Advance throttle slowly until operating rpm is obtained and control engine rpm manually by coordinating throttle and collective.

4-33: Underspeeding N_2 Governor (loss of rpm).

1. Enter autorotation and select forced landing area.

2. Gas producer—check to ensure engine has not failed.

CAUTION

Acceleration, deceleration and overspeed control are not provided in the emergency system. Do not move power lever rapidly. Engine overspeed, overtemperature or flameout could result.

3. Retard throttle to flight idle and place governor switch in the emergency position.

4. Advance throttle slowly until operating rpm is obtained and control engine rpm manually by coordinating throttle and collective.

TM 55-1520-221-10, page 4-7.

4-18: Engine Fuel Control Malfunction

Malfunction or failure of the engine fuel control unit or N_2 governor will be evidenced by overspeeding N_2 rpm, compressor stall or flameout.

a. Overspeeding N_2 Governor (high rpm).

(1) Increase collective to load rotor and sustain engine/rotor rpm below the red line.

(2) Reduce throttle until normal operating rpm is obtained.

Acceleration, deceleration and overspeed control are not provided in the emergency system. Do not move power lever rapidly. Engine overspeed, overtemperature or flameout could result.

(3) When conditions permit, retard throttle to flight idle and place governor switch in the emergency position.

(4) Advance throttle slowly until operating rpm is obtained and control rpm manually by coordinating throttle and collective.

b. Underspeeding N_2 Governor (loss of rpm).

(1) Enter autorotation and select forced landing area.

(2) Gas producer—check to ensure engine has not failed.

CAUTION

Acceleration, deceleration and overspeed control are not provided in the emergency system. Do not move power lever rapidly. Engine overspeed, overtemperature or flameout could result.

(3) Retard throttle to flight idle and place governor switch in the emergency position.

(4) Advance throttle slowly until operating rpm is obtained and control engine rpm manually by coordinating throttle and collective.

Continued from page 7

Hood Army Airfield (AAF) broke at noon and the choppers were airborne. Within the cargo holds of each aircraft were maintenance and POL equipment needed to sustain operations during the mission.

It would be a 1,600-mile flight with a stop at San Antonio for refueling and an Air Force briefing conducted by the chief of base operations, Mr. Robert L. Hooper. He covered crossing international boundaries, enroute weather and provided a slide show of airports along the flight route with a commentary on each.

The first overnight stop was made at Brownsville, TX. The next morning the flight of four crossed the Rio Grande River, made a refueling stop at Tampico, Mexico, and stopped overnight at Veracruz, Mexico. On the third day the aircraft turned westward from the Gulf of Mexico to cut across the highlands toward the Pacific coast. Refueling stops were made at Extepec and Tapachula, Mexico, and San Salvador, El Salvador. By 2400 hours on 31 December the Chinooks were on long final to Las Mercedes Airport, slightly east of the devastated Managua. The New Year was noted by the 1st Cav troopers as their ships passed over a blackened void where the center of the city once stood.

By daybreak on 1 January preparation had begun to convert a grassy field near the airport terminal into D Company, Headquarters South. POL personnel, under the supervision of CW2 George L. Sinclair, began setting up two "hot" refueling sites. Maintenance, avionics, operations and supply tents were set up on the grass alongside the taxiway.

MAJ Dolloff attended a briefing held by General Anastasio Somoza Debayle, chief of the Nicaraguan armed forces, and Colonel Kenneth E. Murphy, U. S. Military Group commander, on matters concerning the airlift.

Evacuees from Managua receive food at a refugee center. It is estimated that in this town alone 6,000 people perished under the rubble of homes and at least 300,000 were forced to flee

By Tuesday the choppers were doing their thing. The night before the riggers had moved into the warehouse at the airport and had sectioned off the supplies for loading. The goods were placed into cargo nets which were set on flatbed trailers. Pathfinders had been airlifted into landing zones with homing FM radios and flares to direct the drop zones.

The helicopters were slingloading the nets to Masaya and Grenada, two cities near Managua where the populations had doubled with refugees. The loads consisted of rice, beans, sugar, flour and bananas. In total, 92 tons of food were delivered to the hungry people on that first day.

In the days that followed the Chinooks went to Corinto, a major seaport on the Pacific coast. Loads from the docks were taken to Leon, Chinandega, Esteli and Jinotega.

The Rama Road mission took the choppers to the eastern coast some 200 miles from Managua. From a sandy valley at El Bluff and from the docks at Bluefields the supplies were airlifted to Rama where government trucks waited to take the goods to distribution points in Managua. In this operation a POL point was set up in a field in Rama with flight fuel brought in by tankers via the 160-mile-long Rama Road. The 3-day mission brought over 142 tons of goods out of the warehouses to the streets of Managua.

After the Rama mission the relief effort in the city was in full swing. In total, the choppers had delivered 1,200,000 pounds—600 tons—of food and supplies to a grateful people. Their reaction to what the giant helicopters from Texas had done could be summed up in the words of one of the Red Cross volunteers as he saw the choppers bringing a load, "Ustedes son heros, son heros!"—"You are heroes, heroes!"

The helicopters had done what no other form of transportation

could have accomplished in such a short period of time. For the people of Managua the problem of hunger was greatly reduced. The relief effort was in progress and the business of demolition and reconstruction had begun.

The performance of the pilots and aircraft during this urgent period could only be matched by the preparation and support prior to and during the operation, specifically maintenance and POL support.

While four of the sixteen CH-47C helicopters of D Company operated 1,600 miles south of "homeplate" (Hood AAF), the rest of the company was continuing its support of the 1st Cavalry Division tests with MASSTER (Modern Army Selective Systems, Test, Evaluation and Review).

The maintenance shop in the D Company hangar at Hood AAF was making a major effort to eliminate unscheduled maintenance as well as reduce scheduled maintenance to a minimum. It was MAJ Dolloff's plan to keep the maintenance posture at the hangar at an acceptable level so that when the "Managua Four" returned, Delta Company could continue divisional support requirements without delay.

As for the success of the operation and the reason for the Chinooks' high responsiveness to missions, MAJ Dolloff explained, "Primarily, we owe our ready response during this operation to the priority given our unit by the Department of the Army.

"They gave us authority to deal directly with AVSCOM, which in turn sped up the reaction time to our needs in the area of parts acquisition.

"Another very important consideration was the invaluable background and experience of the men who were part of the maintenance team in Managua. Their foresight in projecting parts requirements—like bolts, rings, tubing and wire—as well as their ability to correctly evaluate and resolve problems as they occurred, greatly enhanced the operational readiness of our aircraft."

Above: A small child hurt in the earthquake which struck Managua is comforted by an Army nurse from the 21st Evacuation Hospital, Ft. Hood, TX. Right: An Army medic of the 21st Evacuation Hospital treats an infant injured during the earthquake

Shortly after the mission came down MAJ Dolloff had the maintenance officers pick those aircraft for the operation which had consistently good maintenance histories, with the special requirement that they all have the instrumentation to be fully IFR capable. Then each aircraft was thoroughly checked by the team's technical inspector. Those parts in the aircraft system which were determined to be defective in any way were replaced. The team then selected backup parts for replacement of items in the system which were considered possible problem areas, but which met the tolerance requirements at the time of inspection.

The equipment the maintenance team brought with it included 150 line items and an airmobile "mobilizer van" which contained special tools, including electronic test gear and hydraulic systems repair equipment. A sheetmetal shop also was brought in the event the skin of the aircraft was damaged.

According to Sergeant First Class Ronald D. Gobel, operations supervisor, "The personnel and

equipment brought along as part of the maintenance team was a representation of the total capabilities of the maintenance shop at the hangar. The 528th Transportation Company people gave us general support capabilities as well."

When problems did arise the maintenance team tackled them and was able to repair or replace the part with little delay. Two hot end inspections required engine changes. The new engines were flown in by C-141 from Ft. Hood where the D Company hangar boys had assembled them for quick installation.

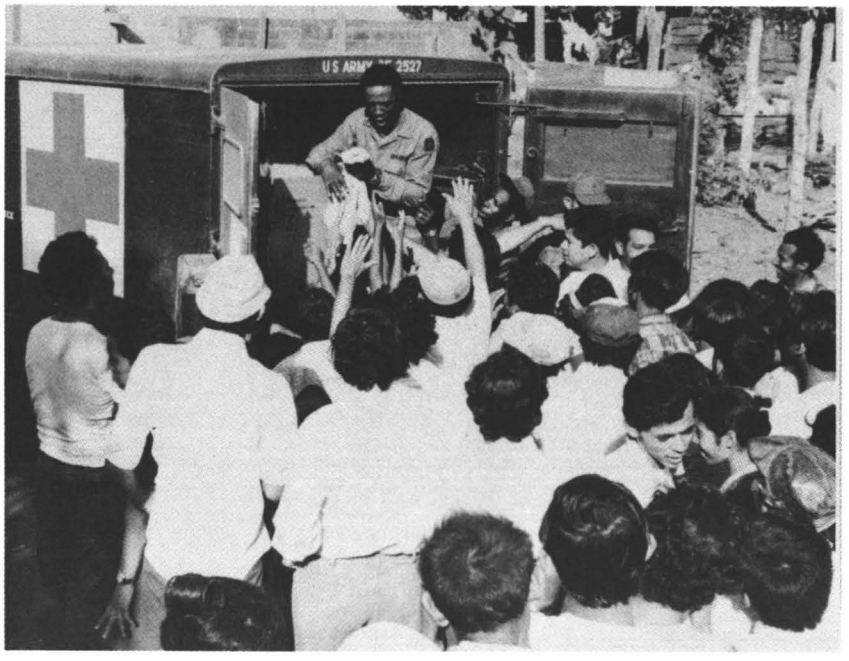
An APU (auxiliary power unit) failure, several tachometer generator failures and an SAS (stability augmentation system) developed problems but all were quickly diagnosed and solved by the troubleshooting expertise of the electrician. Again the small items which had been brought along accounted for valuable time saved.

Another "mobilizer van" was fabricated into an operations center by the D Company avionics section prior to departure from Ft. Hood. The operations center contained UHF and VHF radios as well as FM. The van plus various float radios for replacement and the HF capabilities on the aircraft together enabled continuous communications during the mission.

Two standby aircraft were stationed at Brownsville as a backup for any downed aircraft and for assistance in aircraft recovery.

MAJ Dolloff assigned three pilots to each aircraft based on his estimate for at least 10 hours of flight enroute per day per aircraft. Once in Managua the extra crewmembers permitted the planned rotation of pilots and flight personnel to prevent fatigue.

The POL section provided the Chinooks with the flexibility of operating continuously from any location. One particularly good case in point was the Rama Road mission. A 5-ton truck loaded with hoses, nozzles, a pump and separator, and other portable equipment departed Las Mercedes Airport early on the morning of 7 January. Aboard were eight men —the driver, two pathfinders, a fuel analyst, three men from the POL section including the officer in charge and an interpreter. Their mission was to establish a refueling site at Rama, a small town 40 miles from the Atlantic coast. By the end of the day the site was ready and the choppers were at it again.



An Army medic assigned to the 21st Evacuation Hospital distributes food and clothing on Christmas Day to homeless persons at an open encampment about 10 miles from Managua. The 21st also brought candy for the children and clothing donated from the people of Texas

In addition the POL section was able to provide the choppers with refueling capabilities on the return trip to Ft. Hood. The runway at Extepec was damaged and could not permit the C-130 refueling aircraft to land. To avoid delays the section set up a blivet full of fuel in each aircraft, which they used in lieu of the Air Force delivery (a practice the POL officer learned from tests during the 11th Air Assault Division (T) days at Ft. Benning, GA, in the early 1960s).

The Managua mercy mission involved detailed planning, painstaking preparation and intricate coordination. The mission also required the expertise and experience of numerous pilots, crewmembers and support personnel.

The fact that four CH-47 Chinook helicopters from the 1st Cavalry Division flew from Ft. Hood to Managua, completed their mission and returned to "homeplate"; that they delivered over 1,200,000 pounds of food, clothing and medical supplies to a devastated city—all without a hitch—are tributes to the magnificent accomplishment of this phase of the disaster relief effort and to the value of detailed, advanced planning.

THE ICICLES have melted and the snow has finally disappeared. No more preheating engines or diluting oil. No more worrying if chunks of ice will form to clog fuel strainers. And if the cabin heater won't work, so what? Who needs it? Summer is here!

While it is true that with the passing of winter, cold weather problems have temporarily vanished, it is equally true that a new set is about to take their place. And these can be just as formidable as any found in winter. Does it really matter whether you strike trees because of poor visibility due to snow flurries, or because of insufficient power and lift due to high density altitude? If you should survive a crash, do you fare any better if you freeze to death, or die from sunstroke? The results are the same. Consequently it is just as important to plan for summer flying as it is for winter. Maybe more so.

We can see snow and ice, but not thinning or turbulent air. A typical training flight requiring the hauling of heavy sling loads during the winter may be impossible to duplicate in the summer. A takeoff from a short, confined strip on a summer morning may become a hazardous undertaking just a couple of hours later. Only through knowledge and proper application of this knowledge can we successfully combat the problems associated with hot weather flying.

Air, a mixture of gases, occupies space and has mass; therefore, density. Density, or the concentration of molecules, determines the ability of air to support. The thicker, more dense it is, the greater its support capability. Three main factors influence air density: temperature, pressure and humidity. Of these, temperature and pressure have the most adverse effect. When air undergoes a drop in pressure or a rise in temperature, expansion takes place and the air molecules move away from each other. Air density decreases and so does its ability to support. The reverse holds true if pressure rises or temperature decreases. Humidity has a similar effect. Moisture displaces air, making humid air lighter or less dense than an equal volume of dry air.

This relationship of pressure, temperature and humidity of air establishes density altitude. For practical purposes, we can express density altitude as the relative altitude or load lifting ability of air as it expands and contracts. At times, this expansion and

HELLO, SUMMER!

Cold weather problems have temporarily vanished, but a new set of hot weather hazards is about to take their place

Ted Kontos

Directorate for Education and Prevention
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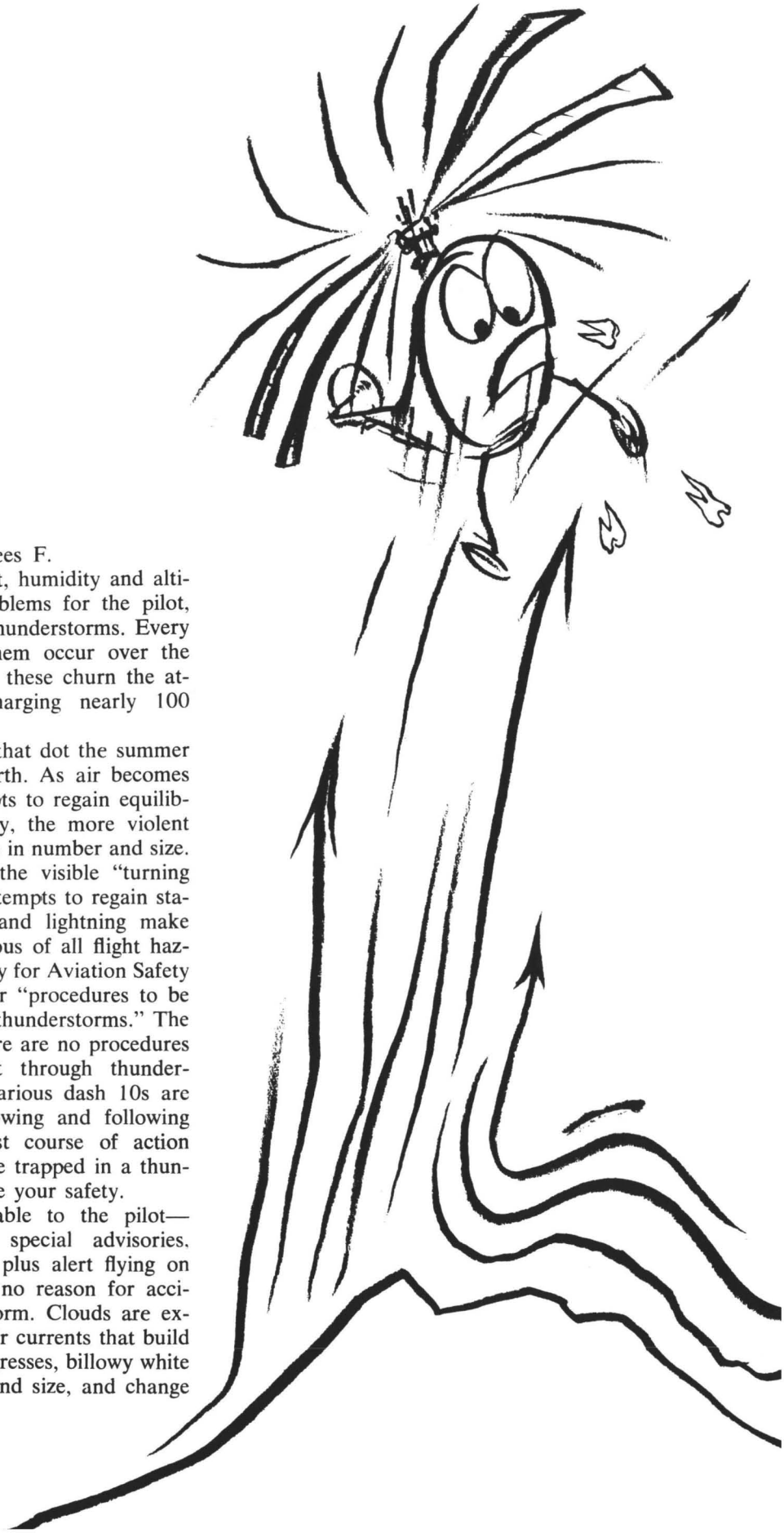
contraction seem unbelievable. At one Army post, for example, the actual elevation ranges from 300 to 500 feet above sea level. Depending on weather and time of day, the density altitude may vary from minus 1,000 feet to plus 4,000 feet. Consider that a UH-1H at a gross weight of 9,500 pounds can clear a 50-foot obstacle with a zero ground run (vertical takeoff) under standard (15 degrees C.) sea level conditions. With a temperature rise to 35 degrees C. the aircraft will require a takeoff distance of 255 feet and an air speed of 20 knots to clear the same obstacle. In desert country, shifts in density altitude are frequent, rapid and, often, greater.

Since lift coefficient is not only dependent on the shape of an airfoil and angle of attack but also on the mass of air causing the lifting force, as density altitude becomes greater, lift coefficient decreases. In helicopters, rotor rpm becomes more critical. Turns can be "lost," engines can be overboosted and the autorotation can become an especially critical maneuver. So much so, that during a single summer, the Army reported 74 mishaps, including 28 major accidents, as having resulted from actual or practice autorotations.

Low density air (high density altitude) also affects engine performance. High humidity alone can cause a reciprocating engine to lose as much as 12 percent of its rated brake horsepower. Since the reciprocating engine operates with a fixed displacement, all air processed is directly associated with combustion. If water vapor enters the induction system, the amount of air available for combustion is reduced. Since most carburetors do not distinguish water vapor from air, an enrichment of the fuel-air mixture takes place. Any increase in inlet air temperature permits the carburetor to further enrich this mixture. Since the maximum power output at takeoff requires a fuel-air ratio richer than that for maximum heat release, still more enrichment takes place—and power nosedives. The end result includes high power settings, increased fuel consumption and high cylinder head temperatures.

While the volume of air flowing through a gas turbine engine may remain constant, at high density altitudes this thinner air contains less mass, and thrust (power) is lost. A temperature of 100 degrees F., for example, reduces the efficiency of a gas turbine engine by approximately 15 percent from that under



HELLO, SUMMER!

standard conditions of 59 degrees F.

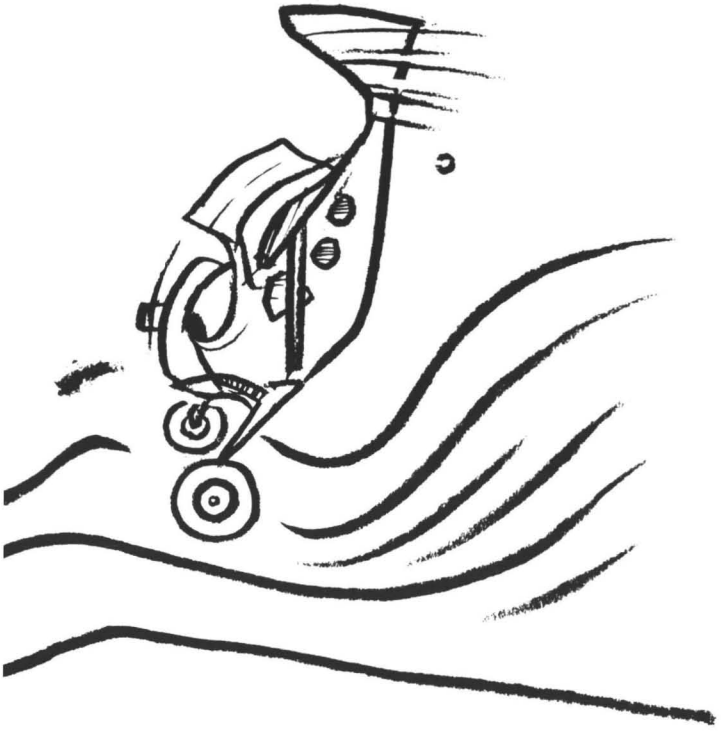
As if the combination of heat, humidity and altitude do not create enough problems for the pilot, summer is also the season for thunderstorms. Every day an estimated 44,000 of them occur over the earth's surface. About 1,800 of these churn the atmosphere every minute, discharging nearly 100 flashes of lightning each second.

The familiar cumulus clouds that dot the summer sky give thunderstorms their birth. As air becomes unstable, the atmosphere attempts to regain equilibrium. The greater the instability, the more violent the reaction, and cumuli increase in number and size. The resulting thunderstorm is the visible "turning over" of the atmosphere as it attempts to regain stability. Severe turbulence, hail and lightning make thunderstorms the most dangerous of all flight hazards. Yet, the U. S. Army Agency for Aviation Safety periodically receives requests for "procedures to be followed for safe flight through thunderstorms." The answer is always the same: There are no procedures that can guarantee safe flight through thunderstorms! Steps outlined in the various dash 10s are for use in an emergency. Knowing and following these procedures are your best course of action should you inadvertently become trapped in a thunderstorm, but they cannot assure your safety.

With all the facilities available to the pilot—weather forecasts, advisories, special advisories, pilot's reports, radar coverage, plus alert flying on the part of the pilot—there is no reason for accidentally flying into a thunderstorm. Clouds are excellent signposts of convective air currents that build cumulus clouds. As the day progresses, billowy white puffs may increase in number and size, and change

in form, often becoming cumulonimbus or thunderstorm clouds with varying degrees of turbulence, rain, lightning and, sometimes, hail. A towering cumulus can change into a raging thunderstorm in as little as 10 to 15 minutes. Excessive radio static may also indicate the approach of a thunderstorm.

Airmass thunderstorm cells build up over land during the heat of the day and usually break in the late afternoon or early evening. However, either airmass or frontal type thunderstorms may be encountered at any time. If storms are scattered, they generally can be circumnavigated. But trying to climb over them, slipping under them or penetrating a solid squall line are definite no-nos.



The heaviest turbulence in a thunderstorm is found in the area of heaviest rain, and downdrafts often extend below the base to as low as 300 feet above the ground in the rain cone. Attempting to take off or land when a thunderstorm is approaching an airfield is an extremely hazardous practice. Gusty surface winds and downdrafts that precede a thunderstorm can be exceptionally violent and have caused fatal accidents. Obviously, the larger the storm cell, the greater the likelihood of destructive hail which can be tossed out of a cloud into the clear sky adjacent to it.

Lightning poses another threat to aircraft. Although there have been relatively few accidents in which lightning was the cause or contributing cause factor, it can be frightening and troublesome. It is more likely to strike sharp or pointed areas of the aircraft, such as the nose, or the tips of wings, elevators, rudders and stabilizers. Theoretically, a bolt should pass through the metal surface without causing damage. This is not necessarily true. Skin at strike points may become split or wrinkled and show signs of burns. In addition, radio equipment and instruments may be rendered useless, and crews may be temporarily blinded by the flash.

When the possibility of lightning strikes exists, cockpit lights should be turned on to help lessen the possibility of temporary blindness from the accompanying flash, and radio equipment not absolutely necessary should be turned off. The safest course is always away from a thunderstorm area.

While the turbulence caused by thunderstorms is the most violent variety, that associated with heat and terrain should not be overlooked. Heated, thinning air rises in the form of thermals, pulling cooler air along the ground. This air boils and bubbles as it

As if the combination of heat, humidity and altitude do not create enough problems for the pilot, summer is also the season for thunderstorms . . . the most dangerous of all flight hazards

HELLO, SUMMER!

flows over hills, and hits peaks and ridges. Under normal conditions, turbulence is little more than an added irritation, making the already difficult task of flying an exacting mission a little harder. But when turbulence is teamed with its hot weather companion, high density altitude, the pilot's position becomes precarious. He may suddenly find himself on the ground after encountering an unexpected gust he would ordinarily have been able to handle with ease.

Anticipating this kind of turbulence, even though it can't be seen, is one way of coping with it. Areas bare of vegetation, hilly or broken terrain and an abrupt change from one kind of terrain to another all lend themselves to turbulence. Undershirts flapping on clotheslines, smoke trails, waving branches and blowing dust serve to tell a pilot the air below him is acting up. Forewarned, he is less likely to run into trouble.

Although the inflight hazards associated with summertime flying are of primary concern to the pilot, the adverse effects of heat and humidity on personnel must not be ignored. Yet, because of the limited physical activity of the aviator and the decrease in temperature with altitude, heat stress in military aviation is often underestimated. But airfields can become extremely hot places, and heat stress during ground operations is likely to be extreme for aviators as well as for ground personnel. Even at altitude in cooler temperatures the heat gained by radiation through the canopy is significant.

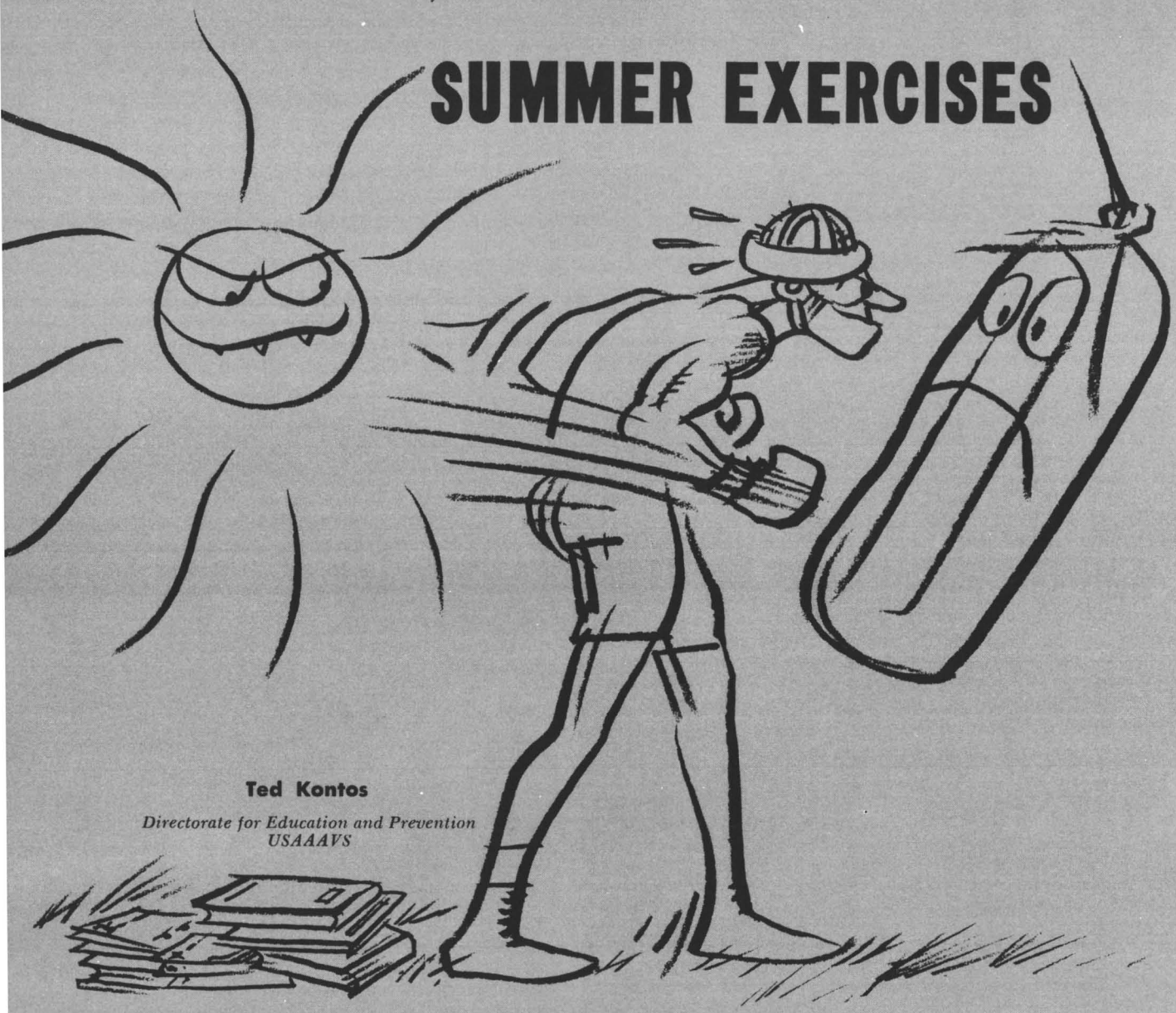
The effects of excessive heat and humidity on an individual can range from simple discomfort and reduced physical and mental efficiency to heat cramps, heat exhaustion and heatstroke. Since water and salt losses cause dehydration and reduced efficiency long before any sign of heat illness, ensuring an adequate intake of water and salt is essential. Even though our bodies can recover after water deficiencies of 10 to 15 percent of body weight, losses of even 1 to 5 percent produce discomfort and a decrease in efficiency. The amount of water required depends on the amount of sweating which occurs and varies from one individual to another. Since thirst is not a dependable indicator, water should be taken frequently. And while the amount of salt taken with food may be adequate under average conditions, additional salt is usually required during hot weather operations. Because salt tablets taken whole tend to cause nausea in some individuals, it is better to dissolve the tablets in water. Two salt tablets in a canteen of water make a satisfactory solution.

We can become accustomed to heat, but it takes time. Approximately 10 to 14 days are required. Abstaining from alcoholic beverages, maintaining a good physical condition and obtaining adequate rest will all help. It is especially important to be particularly careful during the first few days of hot weather or the first few days after moving into a hot geographical area. But regardless to what degree our bodies may become accustomed to heat, water and salt losses must still be replaced. It is the pilot's responsibility to ensure that an adequate supply of water for himself, crew and passengers is included along with survival gear aboard his aircraft. Wearing proper clothing should be another prime consideration as sunburn can be extremely painful and, in many instances, a serious matter.

Yes, winter has gone, and we can look forward to some pleasant summertime flying. But let's keep in mind the hazards associated with hot weather operations—and make certain this summer will be a pleasant one.

Hot weather means different things to different people, but to aviation units it usually means that, once again, it's time for . . .

SUMMER EXERCISES



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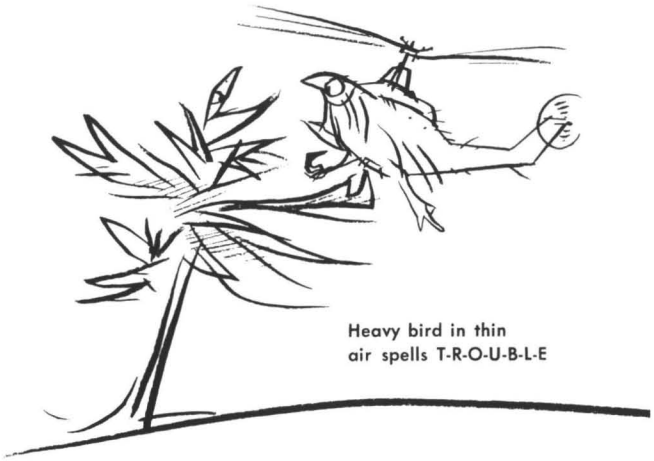
LET'S FACE IT! Depending upon our geographic locations, jobs and personal preferences, many of us tend to become physically less active during the long winter months. While we don't exactly go into hibernation, we seem to enjoy relaxing in front of the television set and letting others do the work—especially members of various collegiate and professional football squads. This period of decreased physical activity generally continues into the basketball season. But when the first baseball is thrown onto the diamond, we suddenly spring to life. We take the grill out of the storage shed, put another coat of wax on our water skis and get ready to take the kids to the beach. Unfortunately, too many of us have had to relearn—the hard way——that it takes a bit of time to get back into the peak of condition after a prolonged period of idleness. Aside from aches and pains that accompany any conditioning program, we rediscover that the heat of summer can hasten fatigue, cause rapid exhaustion, and sometimes, consequences of a more serious nature.

The process of conditioning our muscles, building

SUMMER EXERCISES

up endurance and getting accustomed to the inevitable heat requires time. Fortunately, most of us can afford the necessary time. But if you happen to be an aviator in a unit about to embark on field exercises, and if you have been neglecting your daily calisthenics, time is at a premium. And physical conditioning may be only one hurdle you must clear. What about flight proficiency? Have you been lax in that area also? Sure, you've been down this road before. These exercises are nothing new. You're highly experienced and well qualified and you have performed admirably in the past. Granted, you possess the knowledge, experience and skills necessary to do your job; and nobody can take these away from you. But also keep in mind that even



Heavy bird in thin air spells T-R-O-U-B-L-E

the finest honed blade loses some of its edge with disuse.

Some years ago, a study was made of a group of certified master aircraft welders. These craftsmen were responsible for making intricate welds on gas turbine engine components and primary aircraft structures. To ensure proficiency, each welder was required to pass a rigid practical examination at 6-month intervals. When routinely administered, the tests posed no problems for any. But when the same examination was given to welders immediately upon their return from annual leave, almost none could pass all phases of the test. Yet, after only one or two days back on the job, they did so with ease.

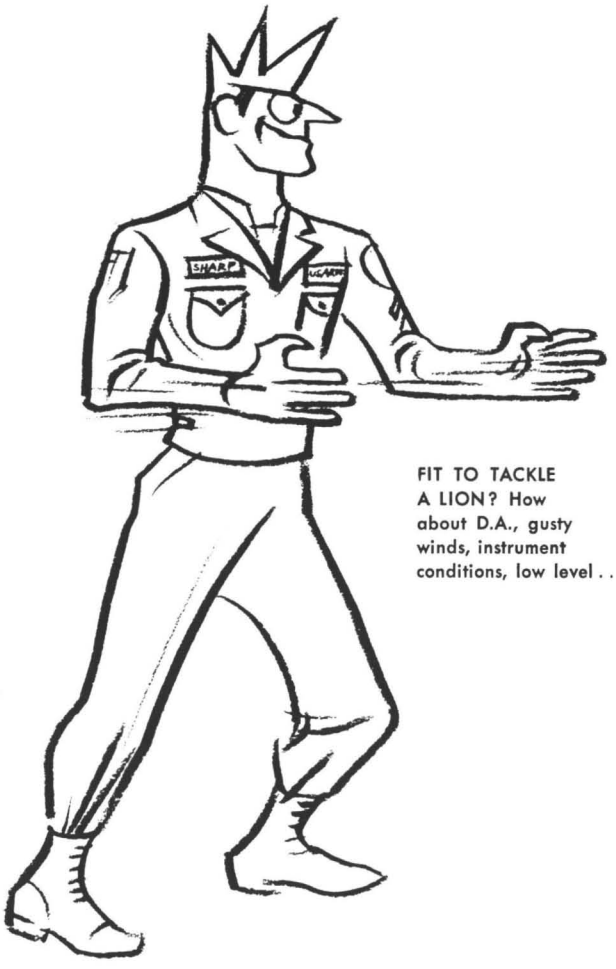
Without a doubt, conditioning to ensure both personal physical fitness and flying proficiency is imperative for peak performance and safety in the field. Failure of aviators to be amply prepared has resulted in numerous accidents and other types of mishaps. In one instance, a highly knowledgeable fixed wing pilot attempted a downwind takeoff, mistook ground speed for air speed, stalled and crashed. In another instance, a helicopter crew that had been hauling troops during the early morning hours resumed operations at noon. During takeoff, the helicopter struck trees and crashed. Failure of the crew to consider the rise in temperature and increased density altitude was the prime cause of this accident. Another pilot ran out of fuel while over rugged terrain and crashed during the forced landing. He was accustomed to flying aircraft that had a longer range capability. While crews involved in these mishaps emerged somewhat redfaced, there were no serious injuries—only damaged aircraft and bent egos.

Other pilots, however, have not fared as well. One banked his aircraft sharply during low-level flight, and the aircraft stalled and crashed. A similar accident occurred when another pilot attempted a maneuver known as a chandelle. In both instances, the aircraft were destroyed and the occupants killed.

Oddly enough, it is often easier and faster for you to get back into top physical shape than to regain peak flying proficiency. Jogging, playing tennis, swimming, riding bicycles, canoeing, hiking and participating in other summer sports, along with some modification of diet (including moderation in the use of alcoholic beverages), can put you back into the pink of condition in a relatively short time. But polishing up your flying proficiency may be more difficult. Aircraft may not be available for your use. The nature of your present assignment may place a premium on the amount of time you can spare for flying. And intervals between flights may, of necessity, be lengthy.

A good place to start is with a check of the latest aviation safety publications to make sure your information is current. This includes a review of your dash 10. Depending on the amount of time you can spare, all sorts of texts, publications and even correspondence courses are available. If you have access to link trainers or flight simulators, excellent! But nothing can take the place of actual flight to sharpen your reflexes and procedures.

On the other hand, maybe you are one of those individuals who stay in top physical condition and maintain flying proficiency year-round. Good! But even if this is true, there are other factors you must consider. In the field you will be working as part of



FIT TO TACKLE A LION? How about D.A., gusty winds, instrument conditions, low level . . . ?

a team—not merely as an individual operating a single aircraft. You may find yourself in severe turbulence induced by large numbers of aircraft operating out of the same confined area. You may be close to other aircraft during flight, and you may have to perform preflight inspections and cockpit checks in a hurry. These are but a few of the conditions you may encounter. In the past, they have directly or indirectly contributed to such mishaps as rotor blade strikes, midair collisions, tree strikes and inflight component failures. Add inclement weather, terrain features which are conducive to strong gusty crosswinds and downdrafts, blowing dust and sand, then couple these to combat-like pressures to perform missions, and mishaps can readily result if careful preparation has not been made.

Before any field exercise begins, every commander sits down with his key staff and maps out plans for his unit. These plans try to cover every conceivable event that might arise. They include safe flight operations, problems involving personal hygiene, maintenance and logistic support, and even a backup plan that allows for emergencies or special problems not predicted. But while the commander is responsible, he cannot do the job himself. He relies heavily on others. In this respect, the aviator plays a key role.

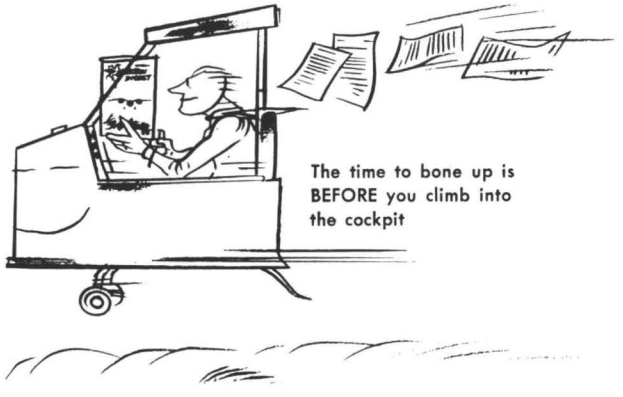
He must do his share of planning and preparation. Even if he is current and proficient, he must realize that there are different levels of proficiency, usually determined by experience. He alone knows his level, his capabilities and his limitations. Further, he is the only one who knows if he has any personal problems which, when added to fatigue, tension and pressure that abound in the field, can be the deciding factor between a safely terminated mission and an accident.

The commander can ensure that the field site is thoroughly reconnoitered and properly prepared—that plans are well laid. He can demand that by-the-book procedures be followed, and that discipline be stringently enforced. But while planning must come from the top, thorough and efficient management dictates that each individual do his share of preparation before men and machines head for the field Following are some points to consider:

Locale

Geographic location is a prime consideration. What temperatures can be expected? What kind of weather? What is the surface elevation? Does it vary drastically? In some areas, surface altitude may vary from 1,500 to 9,000 feet.

What about terrain features? Is the area moun-



The time to bone up is BEFORE you climb into the cockpit

tainous? If so, are the mountains serrated, or round? Are there badlands adjoining the mountains? What about washes, flats, sand plains and bottom lands? While serrated mountains are carved and rugged with many jagged rock outcrops and sections of nearly vertical cliffs, round mountains, as the name implies, are gently rounded, with few vertical cliff sections. Badlands usually adjoin mountains. These are various sized hills of a stoney surface. Washes, or intermittent drainage channels, vary in width from a few feet to more than a mile. Some are simply shallow depressions while others are deep and steep sided. Gravel flats are flat, pebbly plains while sand plains have a loose, sandy surface interspersed with small hummocks, or mounds, around sparse vegetation. Finally, bottom lands are flood plains of rivers made up of silt, fine clay and sand.

Elevation, type of terrain and prevailing temperatures combine to cause problems for the aviator in the field. For example, when we think of the desert, we usually think of heat, particularly that which occurs during the day and which may rise to a temperature of 110 degrees F. or more. But this is outside air temperature (OAT). When the sun is shining and the OAT is 96 degrees F., the metal of a parked aircraft painted olive drab registers 136 degrees F. The pilot's shoulder harness buckle in a parked aircraft reached a measured 150 degrees F. Even inflight cockpit temperatures often average 3 to 6 degrees above OAT. At night, the temperature may drop to 42 degrees F.

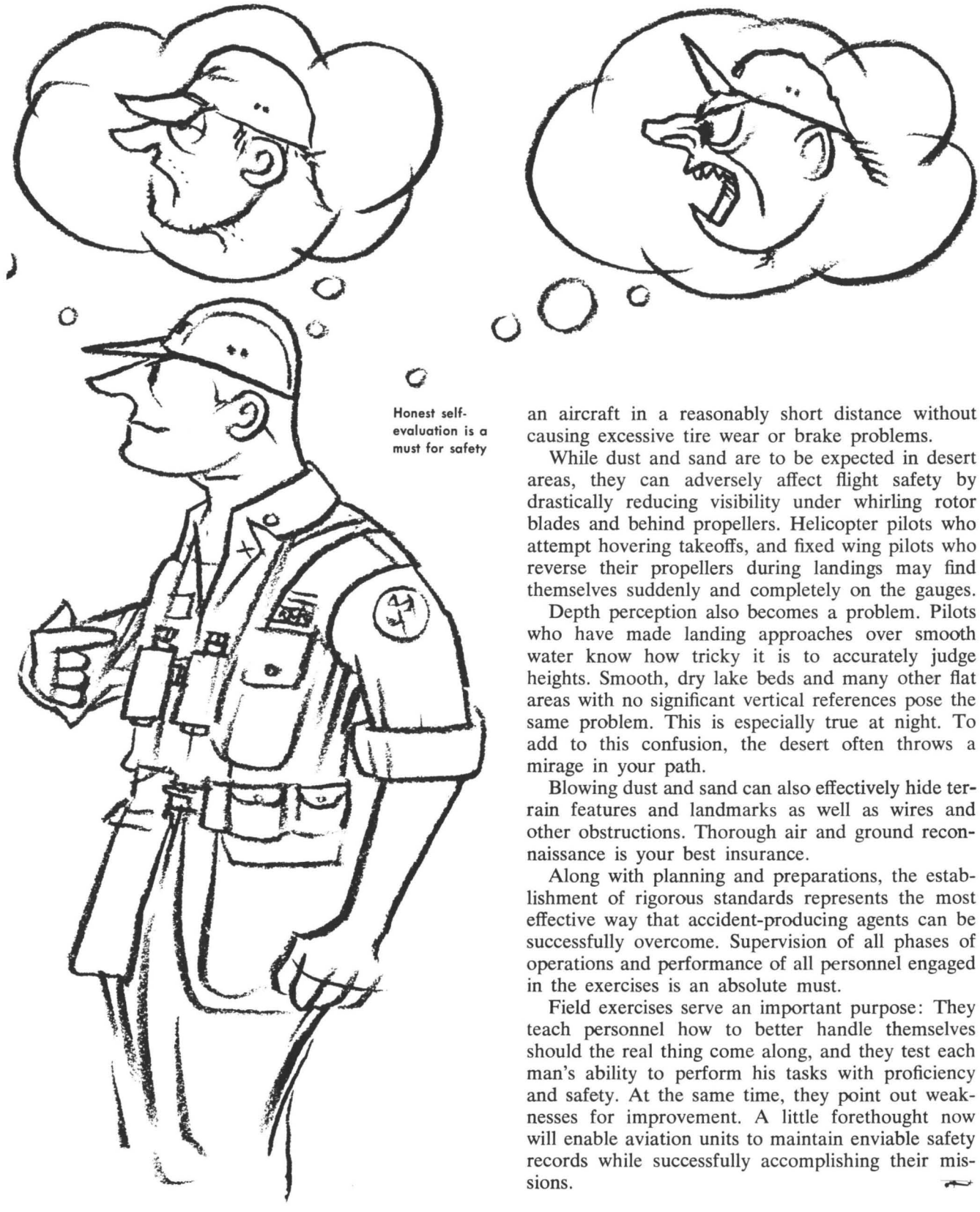
Winds can be highly treacherous in desert country. They can spring up from seemingly nowhere and blow in six different directions around mountains and dunes. Drastic weather changes can occur with equal rapidity.

Dust and Sand

In certain areas of operation, problems associated with heat are magnified by dust and sand. Operating procedures in these areas differ from normal procedures in that additional precautions must be taken. Taxiing aircraft repeatedly over the same area in the desert, for example, can cause the surface crust to break and the landing gear to drop into the resulting hole. The same thing can happen during takeoffs and landings.

If adequate distances are not maintained between operating aircraft on the ground, dust and sand will be blown on trailing aircraft. Aside from clogging air filters, the sandblasting effect produced can cause havoc to windshields and canopies.

Heavy braking can cause brake grabbing and tire failure, while small increments of braking can stop



Honest self-evaluation is a must for safety

an aircraft in a reasonably short distance without causing excessive tire wear or brake problems.

While dust and sand are to be expected in desert areas, they can adversely affect flight safety by drastically reducing visibility under whirling rotor blades and behind propellers. Helicopter pilots who attempt hovering takeoffs, and fixed wing pilots who reverse their propellers during landings may find themselves suddenly and completely on the gauges.

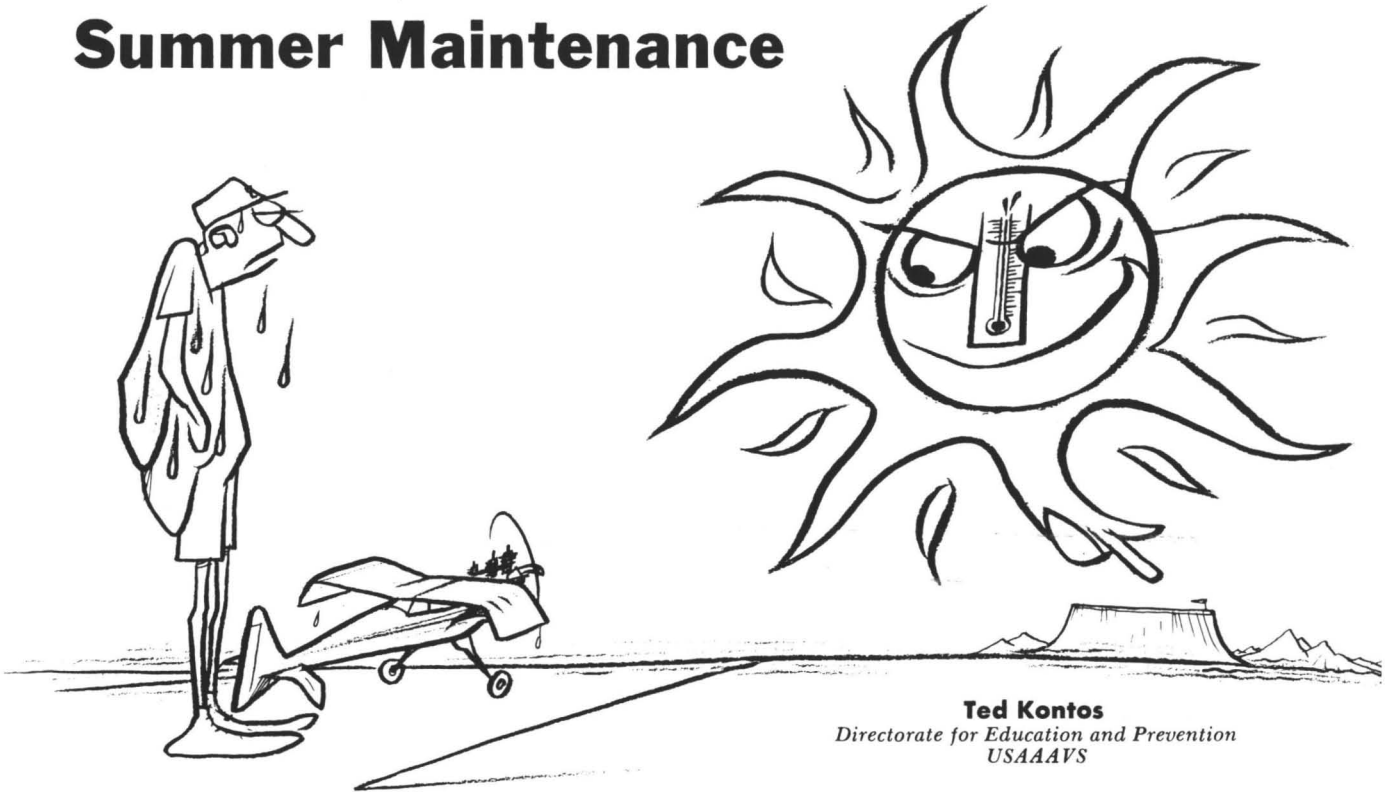
Depth perception also becomes a problem. Pilots who have made landing approaches over smooth water know how tricky it is to accurately judge heights. Smooth, dry lake beds and many other flat areas with no significant vertical references pose the same problem. This is especially true at night. To add to this confusion, the desert often throws a mirage in your path.

Blowing dust and sand can also effectively hide terrain features and landmarks as well as wires and other obstructions. Thorough air and ground reconnaissance is your best insurance.

Along with planning and preparations, the establishment of rigorous standards represents the most effective way that accident-producing agents can be successfully overcome. Supervision of all phases of operations and performance of all personnel engaged in the exercises is an absolute must.

Field exercises serve an important purpose: They teach personnel how to better handle themselves should the real thing come along, and they test each man's ability to perform his tasks with proficiency and safety. At the same time, they point out weaknesses for improvement. A little forethought now will enable aviation units to maintain enviable safety records while successfully accomplishing their missions.

Summer Maintenance



Ted Kontos
Directorate for Education and Prevention
USAAAVS

WHAT DOES IT take to be a winning race car driver? A good machine? Endurance? Experience? Skill? Familiarity with the track? Guts . . .? It takes all of these and more. But race cars are all engineered for the same purpose, and all professional drivers make sure they are in top physical condition before a race. They are all experienced and highly skilled. Why, then, does one car come in first while another never even makes it to the finish line? The deciding factor may well lie with maintenance—how fast and how good! A few wasted seconds during a pit stop—and somebody else takes the prize; an underinflated tire—and it may be a long time before that car sees another track. A race car driver stakes his reputation and his life on his mechanics. So does the pilot.

While good maintenance is always demanding, summer heat amplifies these demands, adds to them and strives to sap the strength and energy of personnel, reducing their efficiency to cope with them. Because of the nature of their work, mechanics are much more susceptible to heat exhaustion than are aviators. Even if exhaustion is not extreme, decreased efficiency can lead to mistakes. Therefore, ample supervision is needed not only to ensure that maintenance is properly performed but also to make certain that mechanics are obtaining adequate water, salt and rest necessary to maintain peak efficiency.

Aside from the direct effects on the human body, extreme heat poses other safety hazards to both personnel and machines. Aircraft surfaces and metal tools exposed to the direct rays of the sun can become hot enough to cause severe burns and blisters. Canopies and other acrylic surfaces soften and can be easily damaged. Fuel drums are more apt to spring leaks; and fuel can vaporize more readily, increasing the chances of fire and explosion. Similarly, oil and grease-soaked rags add to the threat of fire. Obviously, caution is the byword.

To prevent personal injury from hot tools and aircraft surfaces, gloves and mats or pads should be used when practical. If possible, aircraft should be protected from excessive surface temperatures by covering with canvas or native matting. Canopies should be left partly open to permit circulation of air within the cockpit, except during dust or rainstorms. And all windshields and acrylic surfaces should be gently cleaned by flushing with water and using hands to remove any dirt, dust and sand particles.

If fuel is being used from drums, the drums should be kept covered, and if possible, the temperature kept below 102 degrees F. If drum temperatures rise to 120 degrees F. or more, extreme care must be exercised to prevent sparks and possible fire or explosion. As always, only bronze or nonsparking

tools should be used to open gasoline drums, and these drums should be opened with caution to relieve internal pressure and prevent spewing of fuel. Rags saturated with fuel, oil or grease should be disposed of promptly.

Always take advantage of any shade available when performing maintenance, and when practical, try to schedule maintenance during the cooler morning and evening hours of the day.

In some areas, more frequent inspection of some items is required. For example, heat and friction are two great enemies of tires. Tire pressure is more critical and requires frequent checking to prolong tire life and prevent failures. Tires and similar equipment, such as seals and bungee cords, should also be inspected for blisters and other signs of deterioration. Vibration isolators may have to be checked as often as every two weeks and replaced if cracking or permanent set is excessive.

If you happen to be operating in sandy areas, you have additional headaches. The gas turbine engine, for example, easily ingests blowing dust and sand as well as any other particles that may be in the air. This sandblasting effect causes rotating and stationary vanes to change shape. Airflow varies, and the fuel-air ratio is altered. Surge, loss of power, and possibly compressor stall, along with a rise in egt, can result. While small changes in the contour of compression blades due to erosion can be compensated for by readjustment of the fuel control unit, diagnosing the cause is another matter. Other malfunctions can give indications similar to those of sand erosion. But changes in fuel control settings should not be made arbitrarily. Trying to correct an unknown engine deficiency by altering fuel flow is like taking a pain killer without attacking the cause. Be sure before you act!

Sand and dust have equally adverse effects on reciprocating engines. Air filters become clogged, cylinders become scored, compression decreases and loss of power or even engine failure can result. In addition, propeller blades become pitted, fuel, oil and hydraulic fluid become contaminated, and grease fittings and flight control cables become coated with grit. Pitot and static ports become clogged as do instrument air filters. Weight and balance is changed as dead air spaces in wings, fuselage and tail surfaces fill with sand. Both preventive and corrective measures are needed to successfully cope with these problems.

To prevent entry of sand and dust when aircraft are parked, protective covers and dust excluder plugs should be installed on all engine openings, vents, air intakes, exhaust outlets, breathers, over propeller hubs and feathering domes, cowls, and over all other vital components and openings, including pitot and static ports. Similarly, making all possible ground checks before starting engines, and performing runups on hard surfaces when possible will lessen the chances of damage to engines and rotating airfoils, as well as to canopies and surface skin. Care must be exercised when performing all servicing

Sandblasted and scratched canopies can put a pilot on the gauges as readily as any "brownout"

operations to prevent entrance of sand into aircraft and engine systems. When possible, delivery of oil and hydraulic fluid should be directly from can to tank without use of an intermediate container.

Inspections should be frequent and thorough. Filters should be cleaned or replaced at regular intervals, and an adequate reserve stock maintained. Flight controls should be inspected often for freedom of movement, and control cables checked for specified tension. Aircraft and engines should be cleaned as needed. Use of a high pressure spray gun and an appropriate cleaning fluid—not gasoline—is recommended for cleaning engines. But do *not* use steam or a high pressure water hose to clean helicopters.

This is just a token list of maintenance-related troubles you may encounter this summer, along with some recommended preventive and corrective measures. Complete authoritative information is always at your fingertips in the form of appropriate dash 10s and other maintenance publications. Use them, and if you should run into a special problem, don't guess—bring it to the attention of your supervisor. With high density altitudes, the possibility of brownouts from blowing dust and sand, sudden and drastic changes in weather, strong gusty winds and all the other flight hazards common to summer operations, your pilot will have enough on his mind. Let's not add mechanical failures to this list.

The Checklist

James H. Devlin, DAC
Flight Instructor, U. S. Army Aviation School

Air Service Regulation 1-1 **20 June 1920**

SUBJECT: Operation of Aircraft of the United States Air Service

APPLICABILITY: To All Rated Pilots of the United States Air Service or Any Individual Who Might Find Himself at the Controls of an Air Service Aircraft

1. Before attempting flight, make sure you have necessary flight clothing such as heavy sweater or jacket, heavy gloves, fleece-lined helmet with ear flaps and chin strap, goggles, and long, wool or silk scarf to protect you from the cold at flight altitudes even on a hot day. Especially have a parachute as air machines are not too reliable. Be sure to check your parachute as another flyer may be using part of it for a scarf.
2. Make sure you have navigation equipment, such as latest road maps, so you know where you have been and where you are going. (N.B. Don't trust road maps too much since the mapmakers don't know what it looks like from the air.)
3. Preflight machine thoroughly as some aircraft on the line have mechanics working on them the best they know how. *Preflight checklist is contained in the latter part of this regulation.
4. Do not take the machine into the air unless you are satisfied it will fly. If it won't fly you may be in trouble, especially if the neighboring farmers haven't cleared their land of trees and stumps.
5. Never leave the ground with the motor leaking since you might run out of whatever is leaking. If found leaking on the ground, have mechanic stop leak with whatever means is readily available depending on the importance of the flight. If flight is really necessary, use glue or cement.
6. Don't turn sharply when taxiing. Instead of turning sharply have someone lift the tail around. If no one is available to lift tail, shut motor off, get out of cockpit and move tail, then restart engine. In this case there will be no one to give your prop a spin so you will have to walk across the pasture to find a mechanic or other person to help you get started.
7. Never get out of the machine with the motor running until the pilot relieving you can reach the engine controls. If you get out without someone to relieve you, you may have to chase the machine across the pasture. Also, while changing controls do not get near propeller as it may cut you.
8. Pilots should carry hankies in a handy position to wipe off goggles from dust, dirt, rain or oil. See paragraph number 5 above. Also, if your goggles are dirty you may not be able to see a cow, horse or farmhouse ahead of you on takeoff. Besides, dirty or oil-covered goggles are unmilitary.
9. Riding on the steps, wings or tail of a machine is prohibited as it may overstress the airframe and might cause holes to be punched in the fabric cover of the machine. Also refer to Air Service Regulation 5-5 regarding hitchhiking.
10. In case the engine fails on takeoff land straight ahead regardless of obstacles. It is better to go straight ahead into a clump of trees and receive a small bruise than to try to make a turn to a clear area and lose control of the machine and receive more serious scratches. Also, the Air Service doctors are

too busy with more serious diseases and often are not able to get the ambulance started.

11. No machine must taxi faster than a man can walk as the brakes cannot be relied upon to stop the machine before running into a horse or cow walking faster than a man can walk. Damage from this source cannot be tolerated even though in this period of manpower austerity not enough wingwalkers can be supplied for all craft.

12. Make sure the area ahead of you is clear while taxiing by performing "S" turns with machine but not too sharply. See paragraph 6 above for clarification. Swinging your head back and forth to make sure area is clear may make you dizzy due to the vestibular hairs of the inner ear. If this occurs, stop taxiing or at least wait for it to clear up before attempting takeoff. It could cause you to make an irregular path through the pasture on takeoff or cause you to damage craft.

13. Do not taxi through high grass or farmers' crops as there might be hidden tree stumps located there causing damage to the propeller, undercarriage, tires or may even tear the fabric on the machine.

14. Do not trust altitude instruments as they are often unreliable and the manufacturers are not pilots. The vibrations in fast taxiing over rough fields (see paragraph 11 above) and the inherent buffeting in flight during turbulent conditions can seriously damage the aneroid barometer inside the altimeter. Sometimes, because of close tolerances and rust from the machine sitting in the weather, the needles have a tendency to stick together.

15. If you see another machine near you, get out of its way. If on the ground, do not turn too sharply (see paragraph 6 above) and do not taxi too fast (see paragraph 11 above). If in the air do not bank too steeply or too fast, do not apply power to the motor too fast, or do not move controls too sharply. For full explanation see paragraphs 17, 18 and 19 to follow.

16. Before beginning a landing glide see that no machines are below you. The experiment that research and development (R&D) was working on of cutting a large hole in the bottom of the craft beneath the pilot to increase downward visibility was shelved due to the loss of three key R&D personnel without parachutes while trying to increase pilot visibility by enlarging the hole.

17. While airborne do not bank too steeply or too fast as the craft may not be stressed for it due to wood, fabric and wire construction. Since wood has a tendency to decay, fabric tends to rot and wire cables often rust causing breakage, it is not advised to perform the above maneuvers especially in craft over 8 months from date of manufacture.

18. Never apply throttle too rapidly as one of the following will happen: The engine will quit cold from a phenomenon called flooded carburetor; the propeller will overspeed turning into splinters of wood; the engine will be pulled out of its mounts since there are only four bolts holding it to the wooden airframe.

19. Never move controls too sharply due to the delicate nature of the machine. As the wings are fastened to the fuselage with only two wing root bolts each, this is a particularly fragile point. The upper wing is merely attached to the lower wing with thin struts and guy wires, often failing with rapid control movements.

20. Hedgehopping will not be tolerated. Any attempt to rationalize that the 50-foot strand of barbed wire must have been plucked by the landing gear from the mouth of a high flying bird about to make a nest will not be admitted in evidence at court-martial proceedings.

21. No spins on back or tail slides will be indulged in as they unnecessarily strain the machine. The mechanics do well to replace the necessities such as spark plugs without having to retorque a complete fuselage back into its original position. Moreover, it can take up too many man weeks to straighten warped wings and replace stretched guy wires and bent struts. Any pilot found guilty of performing these maneuvers can be made to pay for the repairs.

22. Pilots will not wear spurs while flying. [*Editor's note: For the life of me I can't figure why this one was in the regulation, but we will give it a try.*] Possibly while manipulating the rudder pedals the spurs might have gotten snagged on the floor at a crucial point of flight. The spurs might get caught in control cables slicing or damaging them or they might put holes in the fabric-covered fuselage getting into the cockpit.

23. If an emergency occurs while flying, land as soon as you can. If an appropriate landing spot is not immediately available, don't land but wait for a good landing

site. Do not damage aircraft as it is expensive and quite a few flying officers can be paid for a year for the cost of one aircraft.

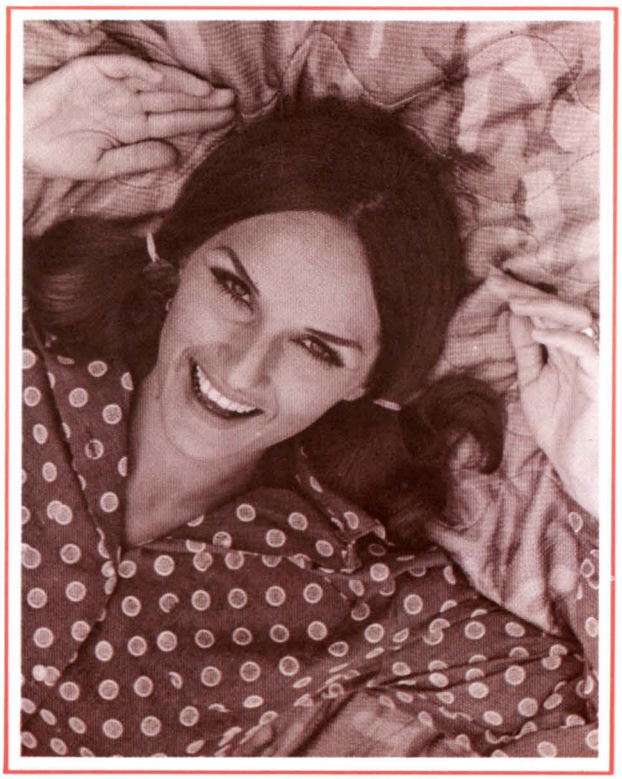
The above are based on the actual regulations concerning operation of aircraft set forth by the U. S. Air Service in 1920. Now, on to the preflight checklist for the Sopwith Camel.

1. As you approach the craft, look at it to see if it has two wings, fuselage and two undercarriages and is parked properly. If not, request replacement machine.
2. Upon reaching the craft start looking at it from the front (propeller end), proceeding around it in a clockwise direction until you are satisfied it will fly.
3. Touch propeller making sure that wood is not rotten nor any splinters felt along the surface. Make sure propeller is not loose where it is attached to engine shaft or you will get vibrations in flight.
4. Look at engine to see if it has proper number of cylinders. If not, refer to operator's manual to see if you have correct number in mind. If you do have proper number in mind, then check with nearest mechanic to see what happened to those missing.
5. Search the engine for loose connections, oil or gas leaks, or missing parts. If any of these conditions exists, check with the mechanic. If he throws up his hands and says, "Beats me, sir!" notify your wife that you will be home early, your CO, the MPs and the OSS, in that order.
6. Inspect wings, struts and guy wires, and if you find broken or rusted strands of wire, have the mechanic replace the wire or put tape over the loose strands so you don't cut yourself.
7. Peer into cockpit to see if seat cushion, safety belts or any instructions are missing. Should this be the case, follow the notification procedures as contained in step 5. If the flystick, throttle or rudder pedals are missing, notify all those above plus a flash report by horseback messenger to the War Department. There may be a sinister plot afoot.
8. Check along right side of fuselage to see if it is all covered properly with fabric, dope and paint. If squadron insignia is faded, report this to paint shop. Periodically check fabric by putting pressure with thumb or other object against skin lightly. Heavy pressure may tear fabric or put hole in it. If this happens, notify fabric, dope and paint shop.
9. Examine tail section including elevators and rudder to see if they move freely and without a squeeking sound denoting rust on the bolts or control cables. For this condition merely have the mechanic squirt some oil in every opening in the tail section.
10. Follow the same procedures for the left side of the craft but don't assume that because it looks the same as the right side that everything is all right. Give it the same careful inspection.
11. Look in cockpit again to make sure you didn't overlook something from the right side.
12. Kick tires to see if they have air in them and if not call air man to put air in them. (Caution note: Do not kick too hard as they aren't steel belted radials. If tires deflate upon kicking, have them repaired or replaced before attempting takeoff otherwise you might think someone has been tampering with your air speed indicator.)
13. Crawl underneath craft on your back to check underside. Be sure hole has been patched up made by R&D personnel mentioned in paragraphs 16 of USASR 1-1 as it could cause extreme draftiness in the cockpit if not repaired, to say nothing about decreased thrust and induced drag.
14. After dusting yourself off go on top of wing and take pitot cover off since there is not enough pitot heat to burn said cover off in flight. There has been no tampering with the craft if you get a zero air speed reading in this instance. For emergency procedures see either paragraph 10 or paragraph 23 of USASR 1-1.
15. After starting aircraft engine and getting ready to taxi, if machine will not move stop engine, see paragraph 7 of USASR 1-1 and check (1) tires flat (2) stuck in mudhole* (3) chocks removed* (4) restraining tiedown on tail skid* (*new items for the revised checklist to be published at a later date).

The whole idea behind regulations, directives and checklists in the 1920s and today is that the U. S. Army is continually attempting to provide you with the best possible means of assuring a safe flight. Use the best possible means at your disposal. Every regulation or checklist item for an aircraft has been brought about by someone visualizing a problem area before it happens or by the possibility of a problem area happening and causing a hazard to safe flight. Learn from the experience of others—follow the regulations and checklists.

PEARL'S

Personal Equipment & Rescue/Survival Lowdown



Protective Flight Clothing and Equipment

Recently, an Army area indicated that the wearing of helmets and Nomex flight clothing was optional for crewmembers while flying the U-21 aircraft. AR 385-32, however, states that protective clothing and equipment are essential to all operations which are inherently hazardous, which can easily become hazardous by unsafe acts of personnel, or which are made hazardous by existing conditions. U-21 mishaps and personnel injuries are continuing to occur due to environmental hazards, pilot error and materiel problems, so an element of risk is definitely involved while flying this aircraft.

Commanders of Army installations and activities are responsible for preventing or minimizing personnel injuries in all Army aircraft. Therefore, commanders must ensure that protective clothing and equipment are worn for safety purposes by all crewmembers in all aircraft during all aerial flights.

Oxygen Masks

Our unit is having trouble locating pilots' oxygen masks for our U-21A aircraft. Some of our pilots were issued masks as part of their flight gear at Fort Rucker, but the pilots who receive local transitions do not have or have not received the oxygen masks.

We would appreciate receiving information on how these masks may be obtained or requisitioned and the authority to use.—Maintenance officer

Oxygen masks may be obtained through routine supply channels. They come in three sizes: large, FSN 1660-809-0390; medium, FSN 1660-809-0379; and small, FSN 1660-809-0391. They are considered as expendable items and one each is authorized per crewmember in aircraft which demand oxygen systems. The appropriate reference is Supply Bulletin 700-50.

In accordance with TM 55-1510-209-20/1, dated January 1972, six disposable masks are provided for the passenger oxygen distribution use, and therefore, require no maintenance. The disposable mask, FSN 1660-105-0522, can be requisitioned through normal supply channels in accordance with TM 55-1510-209-20P, dated March 1973.

Nomex Flight Suit

Should the Nomex flight suit be worn outside of or

If you have a question about personal equipment or rescue/survival gear, write Pearl, USAAAVS, Ft. Rucker, AL 36360

PEARL'S

underneath other clothing in cold climate areas?—Aviation safety officer

This was discussed with personnel of the Bioengineering Laboratory, U. S. Army Aeromedical Research Laboratories (USAARL). The following is a list of parameters to be considered when wearing the Nomex flight suit with other garments in cold climate areas.

• Thermoplastic synthetic materials, such as rayon, nylon, etc. often used in the manufacture of clothing are less resistant to flame than are natural fibers such as cotton, wool, and nonthermoplastic synthetics such as Nomex.

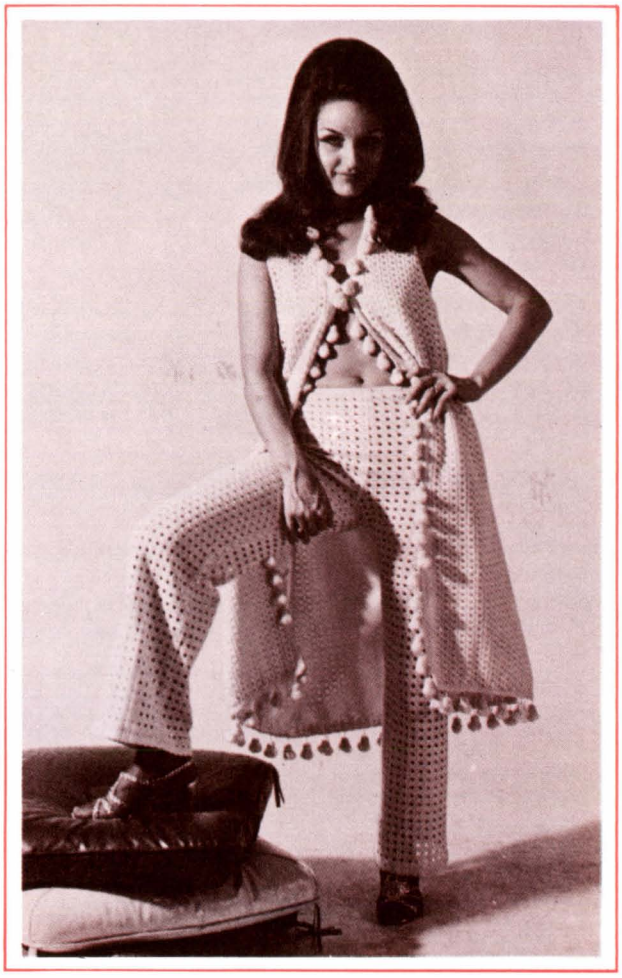
• If it is necessary to wear items of clothing containing thermoplastic materials, then they should be worn outside the flight suit. Nomex, though flame retardant, will transmit heat. The heat so transmitted may be sufficient to ignite thermoplastic materials worn beneath the Nomex.

• Multi-layers of clothing are very effective in affording the wearer protection from flash fires. Therefore, if natural fiber materials (cotton and wool) are to be worn, they may be worn under the Nomex suit if the bulk does not restrict movement. However, a caution is necessary. If the clothing has been starched during its cleaning process, remember, starch will burn. Consideration must be given to this when other than Nomex is worn while operating aircraft.

In cold climates, it is recommended that the 50 percent wool-50 percent cotton underwear be worn beneath the Nomex flight suit. Any additional clothing needed for warmth should be worn over the flight suit.

Emergency Light/Marker

I am seeking additional information pertaining to the emergency light/marker (light stick) shown in the June 1972 AVIATION DIGEST. *I am interested in obtaining some of these light sticks for a research project. Although the article states that there is no military source of supply, I will obtain them from any source available. Any point of contact will also be appreciated.—Civilian reader*



The Cyalume Chemical Light may be obtained from the American Cyanamid Company, Organic Chemicals Division, Bound Brook, NJ 08805.

If you have a question concerning aviation accident prevention, write to Commander, USAAAVS ATTN: Orval Right Fort Rucker, AL 36360

Accident Causes

What are the most commonly occurring causes of accidents?—ASO

Crew error and materiel failure/malfunction are the two cause factors most often responsible for Army aircraft accidents. Analysis of accidents occurring during the period 1 September 1971 to 31 August 1972 revealed the following "types" of crew error and materiel failure/malfunction:

Crew error

- Lack of standardization
- Lack of proficiency owing to limited total experience or limited recent experience
- Pilot slow to recognize a hazardous condition
- Complacency resulting either from fatigue or boredom
- Poor mission planning by the pilot in charge
- Pilot's inability to divide his attention among required tasks

Materiel failure/malfunction

- Engine power plant functional group (primarily the compressor section and the fuel section/recip)
- Rotor/transmission functional group (primarily the tail rotor drive system and the main transmission)

Diet Rules

Are there any dietary rules published for aviators? If so, where can I find them?—ASO

There are no published "diet rules for aviators" as such. However, you will find some diet information applicable to aviators in "Aeromedic—Dysbarism" published in the December 1972 issue of the AVIATION DIGEST. Our flight surgeon says that the aviator needs three well-balanced meals per day. Breakfast should include some protein and not consist solely of the carbohydrates found in the conveniently quick coffee and doughnut or sweet roll. See your flight surgeon for weight-loss diets, and beware of "fad" diets.

Industrial Safety Standards

What standards does the Army now use for industrial safety?—Maintenance Officer

According to DSCPER safety officials, the standards specified by the Occupational Safety and Health Act (OSHA) of 1970 will be used unless Army standards are more stringent. Change 2 to AR 385-10, 17 September 1971, states: "Department of Army will employ safety and health standards promulgated under the Occupational Safety and Health Act of 1970, paragraphs 1 through 9, or standards consistent herewith as they relate to recognized DA industrial type operations, facilities, and equipment comparable to those found in the work environment in the private sector."

Survival Manual

Is there any way a civilian may obtain a copy of the Army's survival manual?—Civilian aviator

Yes. Write the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402, and ask for FM 21-76, "Survival, Evasion and Escape." The price is $3.50.

USAASO Sez

The U. S. Army Aeronautical Services Office discusses

Check The Date On Your Aeronautical Charts: The aviator who navigates with outdated sectional charts may be compared to the fellow who uses an outdated telephone directory—both are going to get some wrong numbers.

Recently, the Federal Aviation Administration (FAA) published a new flight service station VHF radio frequency plan. This new plan has reassigned frequencies which have received little use in the past. Changes have been incorporated on current aeronautical charts, and the new plan appears in part 3 of AIM. Some of the highlights are:

- 122.2 kHz and 121.5 will remain in all stations and *will not* appear on charts.
- FSSs providing advisory service at airports after the tower closes down at night will use the *tower frequency* for this service.
- At nontower airports with an FSS on the field, airport advisories will be issued on 123.6.
- At some limited remote control communication outlets (LRCO) or remoted VORs, the pilot will transmit on 122.1, 122.05 or 122.15 and listen on the VOR frequency.

These changes and numerous others are on your charts and in the AIM. Avoid the frustrations of "wrong numbers"—keep current. The only thing that remains constant in life is change.

All Is Not Lost! Believe it or not a procedure exists to cut through the maze of red tape between the air traffic controller and the policy makers.

Controllers Operations/Procedures Committee (COPCOM) is designed to permit the controller to be heard.

So controllers, raise your voices and be heard! COPCOM is an FAA established program specifically including members of the armed services which encourages controller participation in the development of air traffic control procedures through the organized collection of inputs directly from working level controllers. FAA Order 7110.58A, recently distributed to all Army ATC facilities, is the formal document which sets forth organizational and functional guidelines of COPCOM.

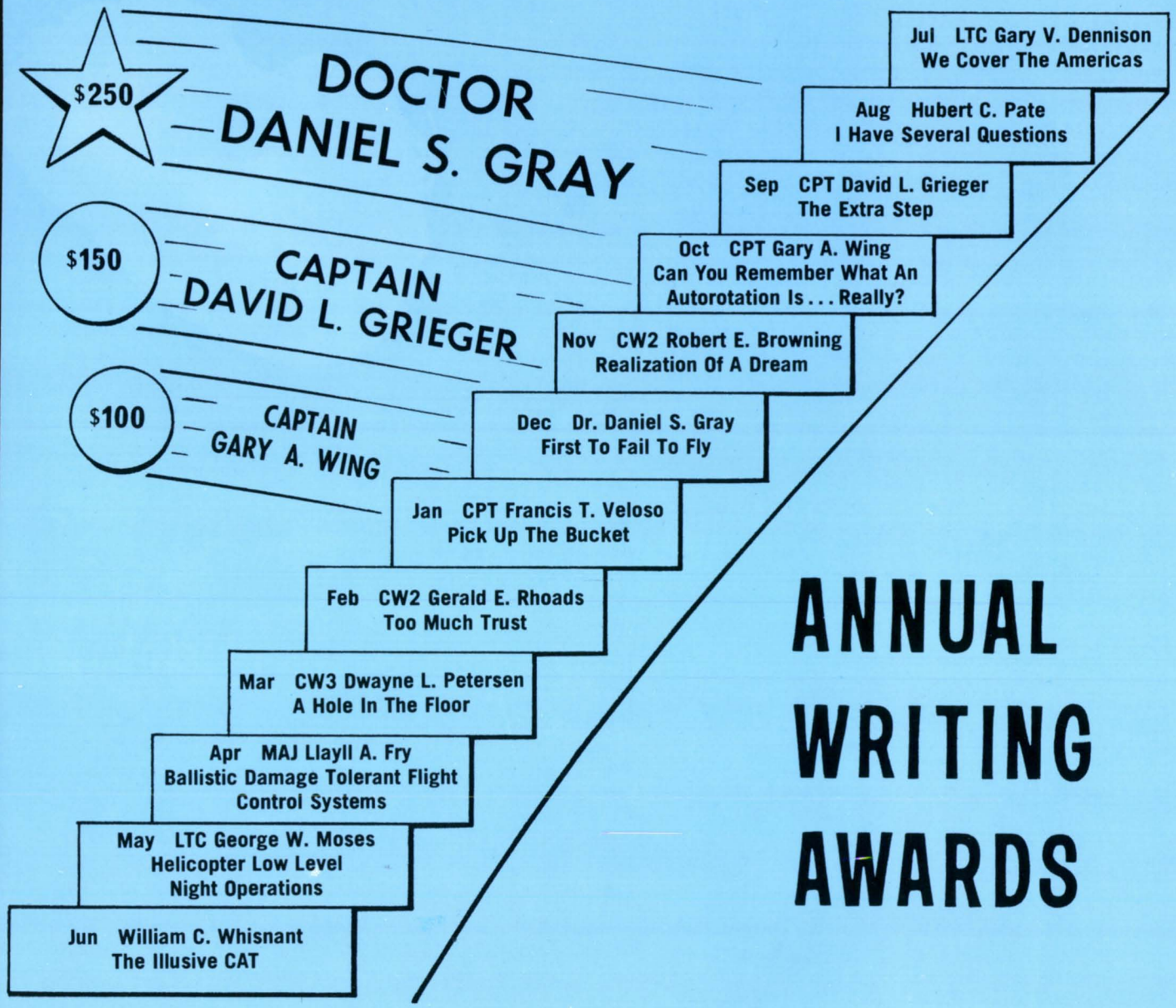
In a nutshell regional committees composed of qualified controllers have been established to handle recommendations of localized interest. Inputs of national concern are forwarded to the Air Traffic Service at FAA Headquarters, Washington, DC. The U. S. Army has controller representation at both regional and the national level.

Get to know your COPCOM representative—he is there to support you. Members' addresses and areas of responsibility are as indicated below:

Representative	*Area of Responsibility*	*Representative*	*Area of Responsibility*
MSG Robert C. Cole HQDA (FDAS-AT) Cameron Station Alexandria, VA 22314	National Member	SFC Bennie L. Adair Office of DARR, FAA Southern Region P. O. Box 20636 Atlanta, GA 30320	Southern
MSG Rlyn L. Pitt Office of DARR, FAA Western Region (AWE-591) P. O. Box 92007 Los Angeles, CA 90009	Northwest/Rocky Mountain/ Western	MSG Joseph B. Bateman Office of DARR, FAA Southwest Region P. O. Box 1689 Fort Worth, TX 76101	Southwest
SFC Claude L. Burdick Office of DARR, FAA Great Lakes Region 2300 East Devon Ave. Des Plaines, IL 60018	Great Lakes/Central	SFC Kenneth L. McElroy Office of DARR, FAA Eastern Region Federal Bldg, JFK Intl Airport Jamaica, NY 11430	Eastern/New England

These individuals are your representatives as professional controllers. If you have any recommendations which will better the system, submit them to your regional representative now.

☆ U.S. Government Printing Office 1973—746-161/5



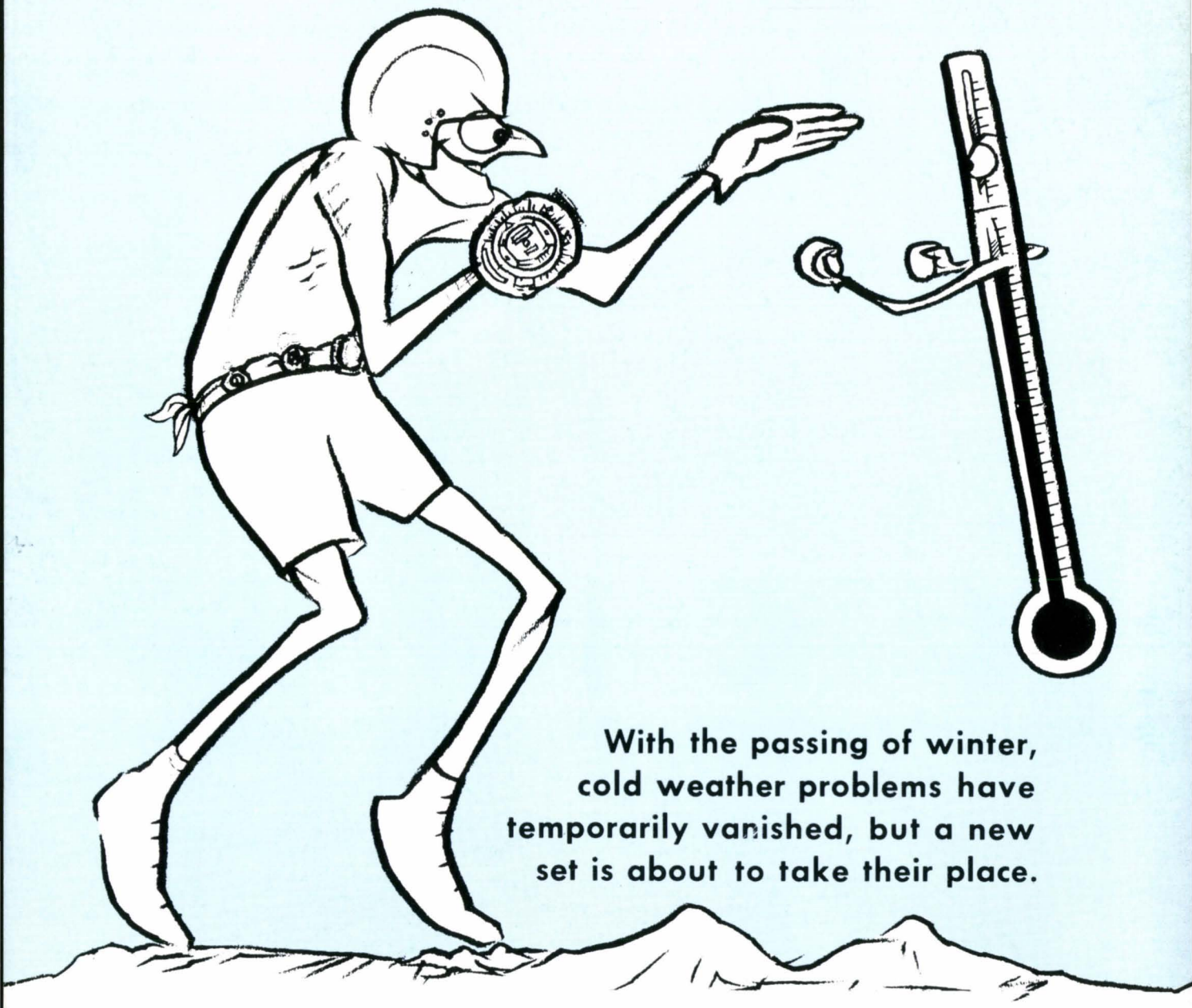
ANNUAL WRITING AWARDS

YOU COULD BE a winner if you submit an article to the AVIATION DIGEST's thirteenth annual writing contest beginning this month. This year's contest will have several new features. The first place monthly winner will receive a certificate plus a $25.00 U. S. Savings Bond. For the first time the DIGEST will recognize a second place monthly winner who will be awarded a certificate. Also, everyone who has an article published will receive a certificate. All authors having articles published will receive credit in their 201 files. Three annual award winners still will be selected from the monthly first place winners. The best of the year will receive a bronze plaque plus a $100 Savings Bond. Second place receives a $75.00 bond and a certificate and third place a $25.00 bond and a certificate.

To be eligible an article must be original and concern Army aviation or related subjects. Dual authored articles are not eligible for the contest, but can be selected for publication.

Winning articles are selected by judges who review the manuscripts in original, unedited forms without bylines. Selection is based on accuracy, completeness, originality, readability, soundness, substance and overall merit.

Authors should include pictures, diagrams or charts available or necessary to illustrate manuscripts. Your articles should be submitted to: Editor, U. S. ARMY AVIATION DIGEST, P. O. Drawer P, Ft. Rucker, AL 36360.



With the passing of winter, cold weather problems have temporarily vanished, but a new set is about to take their place.

HELLO, SUMMER! ▪ page 30

SUMMER EXERCISES ▪ page 35

SUMMER MAINTENANCE ▪ page 40