KAMAN Rotor Tips

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THE KAMAN AIRCRAFT CORPORATION

PIONEERS IN TURBINE POWERED HELICOPTERS

KAMAN Rotor Tips

AUGUST 1962

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THE COVER

Vice President Johnson, General LeMay and General Stone chatting beside H-43B at USAF Academy graduation ceremony. See page 6 . (USAFA photo)

IN THIS ISSUE

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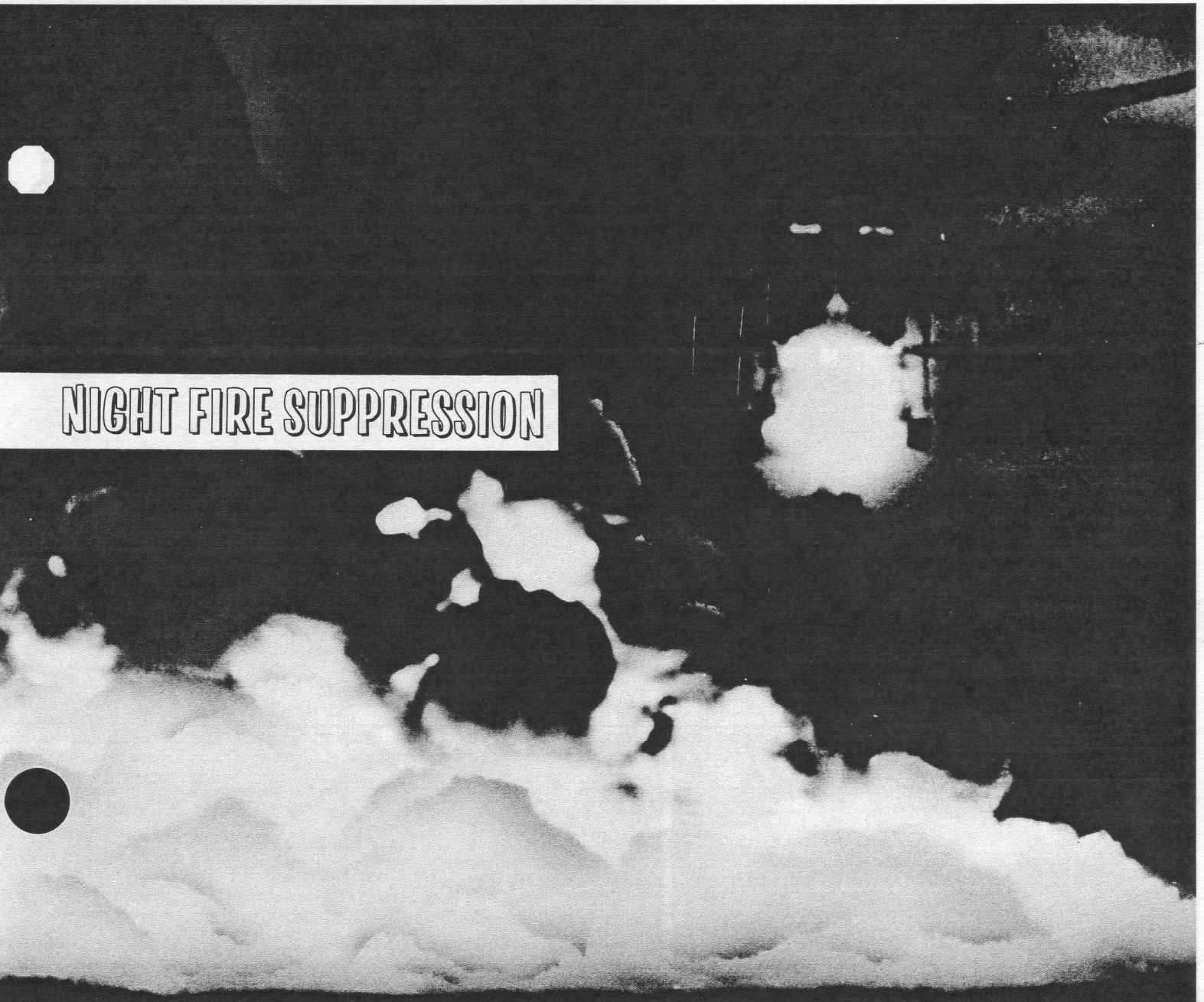


NIGHT FIRE SUPPRESSION

by Capt. Thomas C. Seebo
Webb Air Force Base

In order to perform the mission of fire suppression and rescue, H-43 pilots must know and master the problems of aerial fire suppression under all conditions. There is considerable difference between day and night fire suppression, for example, and carrying out such a mission at night in an unfamiliar area is probably the most hazardous to be encountered. Controlled night fire fighting training, recently authorized by the Air Rescue Service, is not overly hazardous, however.

Since there is still relatively little experience in actual night fire helicopter operations and no schooled solution to all situations, the following discussion of night fire suppression problem areas is offered for information, analysis and evaluation to aid the pilot in theorizing on the action he will take in a given situation. With advance knowledge of the problems to be encountered, pilots will be better equipped to act with the professionalism essential to timely and effective fire-fighting rescue.

PROBLEMS

Blinding ground personnel with helicopter lights

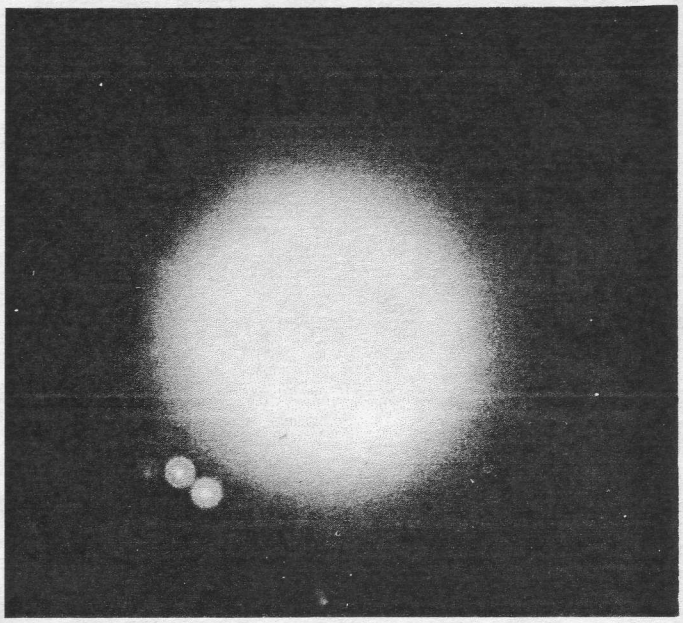
Loss of instrument visibility

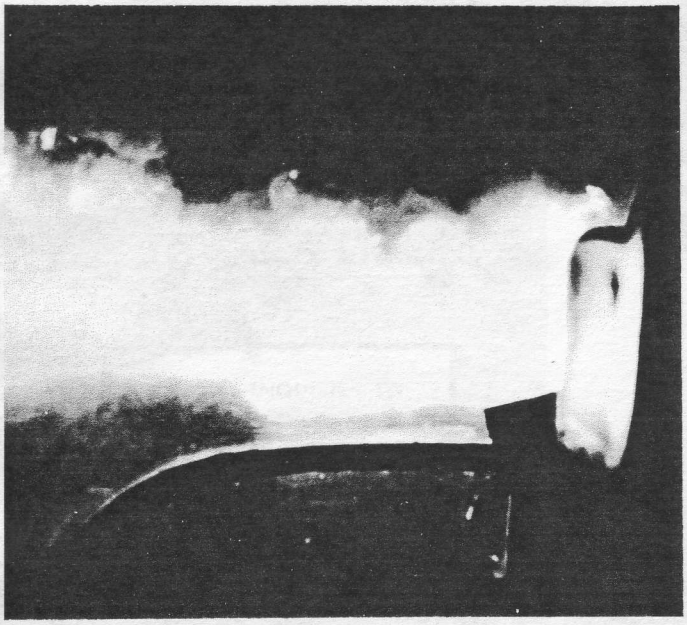
Hypnotic effect of fire

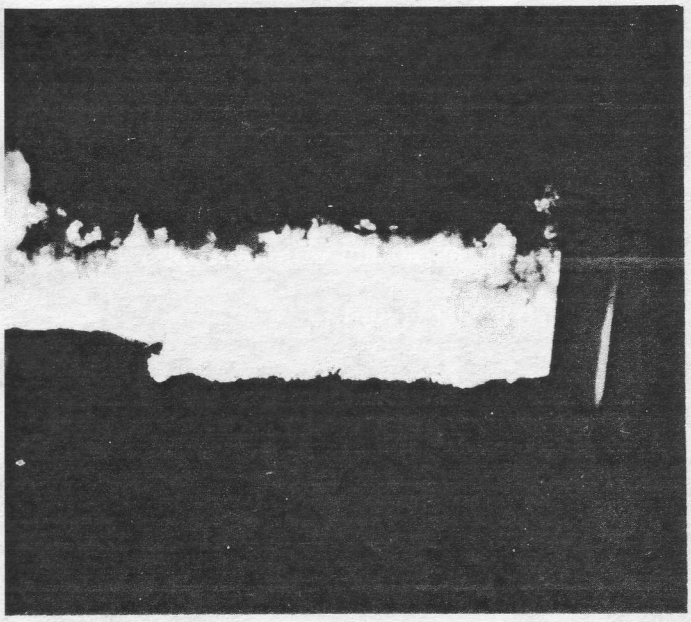
Pilot's loss of visual ground reference

Difficulty in obtaining adequate site evaluation

Spatial disorientation







PROBLEM: Blinding ground personnel with helicopter lights

DISCUSSION: This problem occurs during initial firekit hook-up, during landing approaches, when fighting fires, and when retrieving the firekit from the mission site. Proper use of helicopter lighting is essential. On the firekit pick-up with only the floodlights on, it is easier for the hook-up man to avoid looking directly into the lights. Blinded, he cannot see sufficiently to effect a safe and proper hook-up. On landing approaches the same situation appears. The landing light must be "OFF" if the ground signalman is to be relied upon. Ground personnel can expect to be momentarily blinded should they look into the lights. Spots that limit full vision last for minutes. Particles of sand, etc. that are picked up by rotor-wash magnifies this problem. As the fire diminishes, it is possible for the firefighters hood to refract the helicopter lights. Firefighters should be cautioned in this area. The pilot should be alert for the possibility that ground personnel are trying to operate with the loss of night vision. It is conceivable that they could attempt a side approach being unable to determine the front.

The blinding light problem is also encountered in night hoist and sling operations.

PROBLEM: Loss of instrument visibility

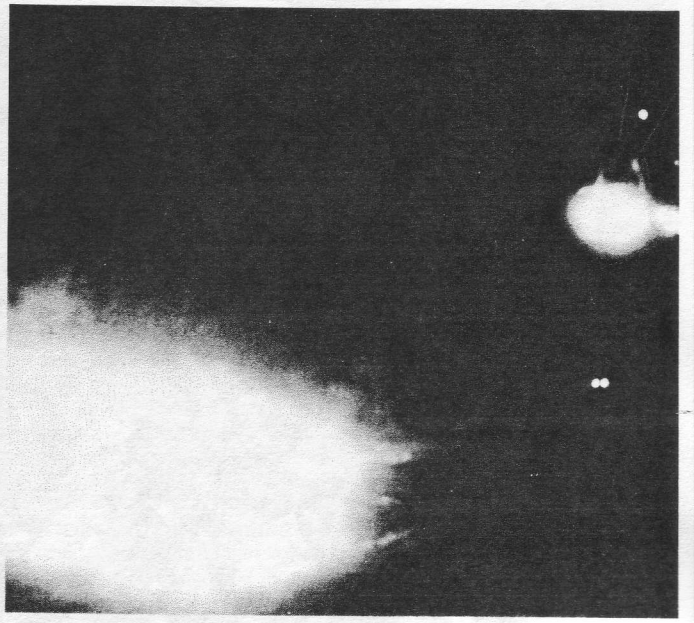
DISCUSSION: Due to the many demands of the firefighting operation, the pilot should give full attention outside the cockpit. The brilliance of the fire will cause the pilot to lose night vision and instrument visibility. Instruments are monitored by the copilot using a flashlight. Before takeoff is attempted, the pilot should have instrument visibility. Perhaps a delay to await return of night vision is warranted.

PROBLEM: Hypnotic effect of fire

DISCUSSION: Fire destroys and distorts horizontal references. The dancing flames have a hypnotic effect which attracts the pilot's attention to the extent that he may be unable to detect aircraft movement. The pilot must make a conscious effort to shift his attention, check altitude, check hover reference, check firefighters, check for hazards to the helicopter, etc. Firefighters make a good hover reference in the fire. The pilot must avoid looking at the brilliant part of the blaze as his perspective can be distorted and erratic aircraft control can result. The copilot should monitor instruments, hover position, and be alert to warn the pilot as necessary.

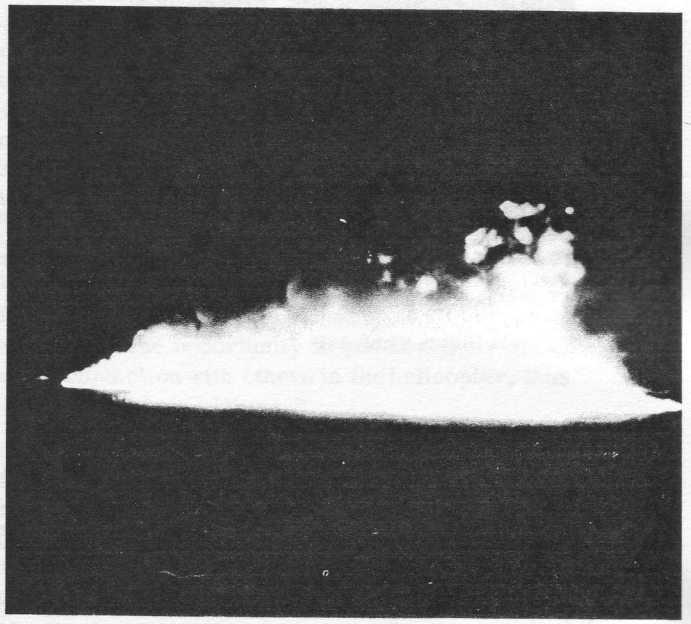
PROBLEM: Pilot's loss of visual ground reference

DISCUSSION: In an actual crash, off base, the crash never seems to occur in an ideal spot. Generally there are high trees, swamp, dry grass, leaves, snow, rain, high humidity, smoke, sand, or dust that complicates the mission. All of these objects will refract the helicopter landing lights. The problem becomes magnified when the light from the fire is also refracted. RESULT: The pilot can lose ground perspective. The pilot can control one light source. Therefore, as the helicopter descends to the site, the pilot should turn "OFF" the landing light as this light refracts greater than the floodlights. When illumination from the fire is sufficient to maintain visual contact, it is advisable to turn "OFF" the floodlights. Use floodlights as the fire diminishes.



PROBLEM: Difficulty in obtaining adequate site evaluation

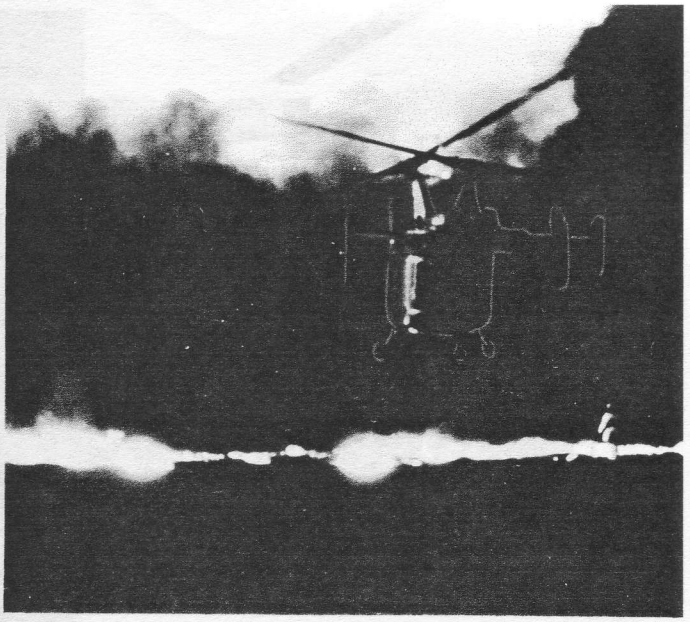
DISCUSSION: When people are trapped in a burning aircraft, there is apt to be an over-anxious attitude on the part of rescue personnel. This over-anxiousness can result in an inadequate site evaluation. If haze is present, floodlights will restrict visibility. A prompt, complete landing area determination must be made. A slow, steep approach provides more time to determine the aircraft commitment and insures a safer go-around if necessary.
Remember to consider the possibility of the H-43B exhaust igniting inflammables that may be up wind of the fire.*



*An engineering change proposal has been submitted to the Air Force by Kaman Aircraft which, if accepted, would modify the tail pipe and should eliminate this possibility - Ed.

PROBLEM: Spatial disorientation

DISCUSSION: Dancing flames, flashing lights, loss of horizontal and vertical references, glare, shadows, and undetected aircraft movement combine to cause spatial disorientation (vertigo). This can be avoided by concentration and determination. The pilot and copilot must understand that vertigo is very dangerous. Should it occur, the copilot must take control of the aircraft.



These many problems make it appear that night firefighting is too hazardous to attempt. With operating experience in this night firefighting environment, however, these problems become second nature. Confidence is gained. Training will assure sufficient knowledge, experience, and ability to effect timely rescue in all conditions.

TWENTY NIGHT FIRES— Shown are the Det. 32 personnel who participated in the 20 night fire suppression exercises upon which this report is based. In front are T/Sgt. Dan W. Long, fireman; and Captain Seebo, Detachment Commander. Standing are Lt. James L. Butera and Lt. William F. Glover, Jr. The night fire exercises were photographed by A1/C Leland B. Bernard, 3560th Air Base Group, Webb AFB.

THE AUTHOR

Capt. Thomas C. Seebo is Commander of Detachment 32, Central Air Rescue Center, Webb Air Force Base, Texas. In helicopter assignments since 1954, he has totaled 3000 flying hours of which 2500 are in helicopters and 300 are in the H-43B. A base rescue assignment at Webb AFB followed three years with the 71st Air Rescue Squadron in Alaska.

During the spring of 1961, he coordinated and conducted exercises using the H-43B in support of ground vehicles and termed the operation "SKYIR."

Previous military service, 1944-47, was as aerial gunnery instructor and C—47 flight engineer. An AFROTC commission was obtained in 1951 from Oklahoma State University while majoring in Architectural Engineering. Current military service and pilot training commenced in 1953.

Big Day For H-43B Crew

DISTINGUISHED COMPANY—Generals Stone and LeMay chat with Vice President Johnson beside HUSKIE which flew them to USAF Academy Graduation exercises.

To the crew of an H-43B from Stead AFB, Nev.; fell the honor of ferrying Vice President Lyndon B. Johnson and Gen. Curtis E. LeMay, USAF Chief of Staff; to the recent graduation exercises at the Air Force Academy in Colorado Springs, Colo. Also aboard the H-43B on the aerial trip from the airfield to the parade ground were Maj. Gen. W. S. Stone, Academy Superintendent; and Col. H. Burris of the Vice President's staff.

Lined up, waiting for the HUSKIE to touch down was an honor guard of cadets who formed a corridor for the Vice President's walk to the speaker's stand where he addressed the 297-man, gold-sashed graduating class. More than 8,000 cadets, families and spectators jammed the academy parade ground to view the impressive ceremony.

For the H-43B crew this climaxed a busy week at the Academy for they were on standby with the fire suppression kit at the airfield. Seventy aircraft participated in the air show which preceded the graduation exercises.

Capt. B. J. Wingfield was H-43B pilot, Major R. M. Atchley, co-pilot; S/Sgt. J. R. Chesson, crew chief; A1/C D. B. Dunn and R. L. Webb, mechanics; T/Sgt. R. C. Finlayson and S/Sgt. J. S. Hoban, firemen. (USAFA photo)

HU2K-1 ACTIVITIES

Kaman Aircraft reps who will serve as Field Service Representatives when the HU2K-1 joins the fleet, recently completed a maintenance course at NAS Lakehurst, N.J., as an accelerated introduction prior to undergoing highly-specialized training at the company plant. The course, primarily established for Navy personnel, was conducted by military instructors attached to NAMT Det. 1070 and utilized one of the HU2K-1 maintenance trainers built by KAC for the Navy.

The decision to send "contractor reps" to Lakehurst was based primarily on the spirit of cooperation which has existed between the Navy and contractor since work first began on the maintenance trainer. Navy experts worked closely with KAC engineers during the year-and-a-half of research and planning which are represented in the device. As a result, the trainer is one of the most efficient ever developed and training time can be cut drastically through its use.

With this in mind, KAC accepted an invitation from NAMTG, Memphis, Tenn., to use the Lakehurst facilities to complete their quota of students for these classes and at the same time the field representatives taking transitional training could receive the benefit of the "nut-shell" instruction provided by the trainer.

Another benefit which the reps received while at Det. 1070 was the opportunity afforded to study Navy training methods and also to discuss with the instructors the questions which had been asked by Navy personnel attending preceding classes. Information of this type, supplied by knowledgeable instructors is, of course, invaluable to the men who will later work closely with Navy HU2K-1 maintenance crews. Contrariwise the Navy instructors received benefit from discussion with the reps to help refine their training course.

Earlier, the Navy instructors had attended an eight-week course at KAC in the operation and maintenance of the trainer, two of which were constructed by Kaman Aircraft for the Navy. One was sent to the detachment at Lakehurst, the other is now at Det. 1071, NAAS Ream Field, Calif.

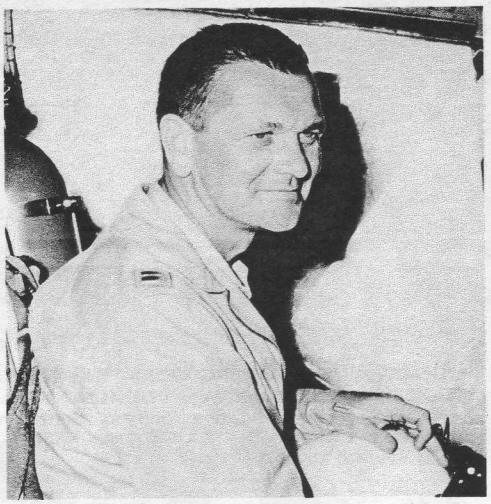
ADMIRAL UTILIZES HU2K-1 DURING VISIT— Rear Admiral Paul D. Stroop, Chief, Bureau of Naval Weapons; visited Kaman facilities at Bloomfield, Bradley Field and Moosup, Conn., recently. The Admiral flew as co-pilot in the SEASPRITE during the trip between Bradley Field and Moosup.

Each of the maintenance trainers consists of four panels: (1) Hydraulic; (2) Flight Controls, Transmission and Power Plant; (3) Electrical; (4) Navigation System. All of the panels are mobile and the main trainer can be disassembled in three minutes so that its individual main components, such as the Automatic Stabilization Equipment, can be studied in separate classrooms. This allows the various specialty ratings to receive simultaneous and uninterrupted instruction, thereby eliminating the need to wait while one group is checked out in a specific area. Afterward, when the trainer is reassembled (again a matter of minutes), these specialists are afforded the opportunity to see how their areas function in conjunction with others in the helicopter, thus giving them the "whole picture."

To make the trainer as realistic as possible, actual aircraft hardware has been used throughout and all of the panels include provisions which enable the instructors to simulate possible malfunctions in the various systems and components. In this way, maintenance personnel receive first-hand experience in trouble shooting on representative components under ideal conditions K

SPECIALISTS— KAC employees who recently attended the HU2K-1 training school conducted at NAMTD 1070, NAS Lakehurst, N.J.; and their instructors. Kneeling, left to right, are R. E. Schwarz, R. E. Lambert, D. G. Beasley, W. C. Morris, E. F. Geblein, L. C. Lyman, KAC. Standing A. P. MacCracken, AEC, F. H. Brightman, AMSC, A. J. Niemotka, ADJC, D. W. Weiner, ADJ2, S. E. Waldrop, AMHC, J. C. Brandon, ADR1, D. W. Glaeseman, AEC, Instructors; F. Heffernan, KAC; W. R. Hoyle, ATC, Instructor.

USAF HUSKIE BREAKS ANOTHER RECORD



CAPT. CHESTER R. RATCLIFFE, JR.

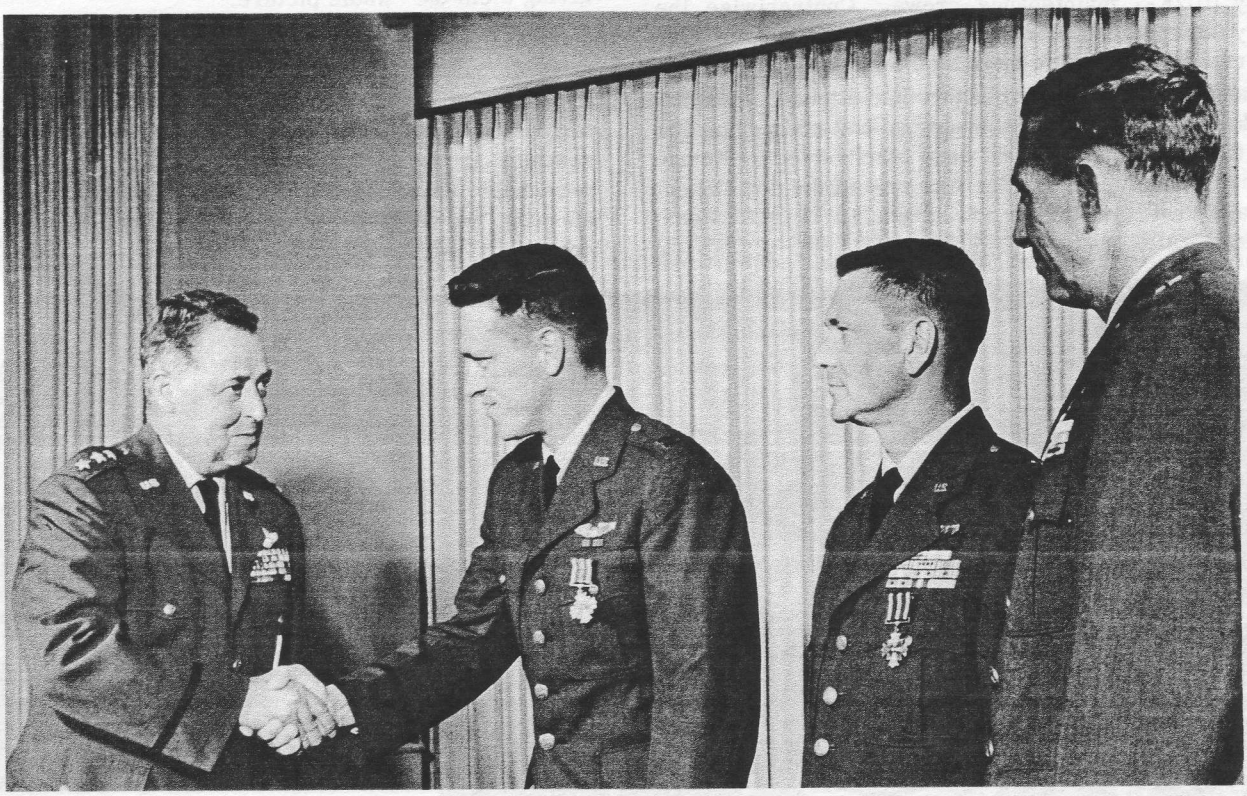
An Air Force H-43B HUSKIE has claimed a second international distance record within a three-week period. Both of the records were previously held by the Soviet Union.

Established on July 5th was a straight-line distance record of 900 miles. The flight originated at Hill Air Force Base, Utah, and ended eight hours and 27 minutes later near Springfield, Minn. Pilot on the flight was Capt. Chester R. Ratcliffe, Jr., Commander of ARS Det. 24, CARC, MATS; Kincheloe Air Force Base, Mich. The previous record of 761.027 miles was set by a Soviet Mi-1 helicopter on September 21, 1960.

On June 13th, three weeks before Captain Ratcliffe's flight, Capt. Richard H. Coan of ARS Det. 52, EARC, MATS; Charleston Air Force Base, S. C.; flew an H-43B 656.258 miles around a closed course near Mono Lake, Calif., to break a record of 625.464 miles set by a Soviet Mi-1 helicopter in June, 1960.

The H-43B, manufactured by Kaman Aircraft Corp. of Bloomfield, Conn.; now holds five international records for helicopters. The three other records held by the HUSKIE are: Altitude without payload, 32,840 feet, set Oct. 18, 1961 by Lt. Col. Francis M. Carney of Stead Air Force Base, Nev. Altitude with a 1,000 kilogram (2,204 pound) payload, 26,369 feet, set May 25th, 1961, by Capt. Walter C. McMeen of Luke Air Force Base, Ariz. Both records were previously held by Russia. Time-to-climb to 9,000 meters (30,000 feet) in 14 minutes, 11 seconds, also set by Colonel Carney and previously held by France.

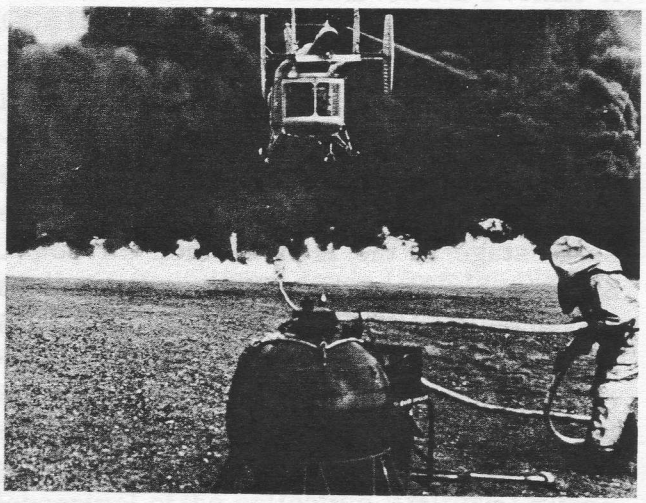
The H-43B, which is powered by a Lycoming T-53 gas turbine engine, is an Air Force utility helicopter now stationed at nearly 50 Air Force bases around the nation and overseas. Air Rescue Service, MATS, has established the HUSKIE as its standard helicopter and is using the aircraft for local base rescue duty.



HONORED—Captain Ratcliffe and Captain Coan were awarded Distinguished Flying Crosses recently for breaking the Soviet helicopter distance records. The medals were presented by Lt. Gen. Joe W. Kelly, MATS Commander, at his headquarters, Scott AFB, Ill. Present at the ceremony was Brig. Gen. Joseph A. Cunningham, ARS Commander. Shown are General Kelly, Captain Coan, Captain Ratcliffe and General Cunningham. (USAF photo)

MISSION REPORT FROM LUKE AFB

by 1st Lt. Carroll L. Wright
Information Officer, Det. 15

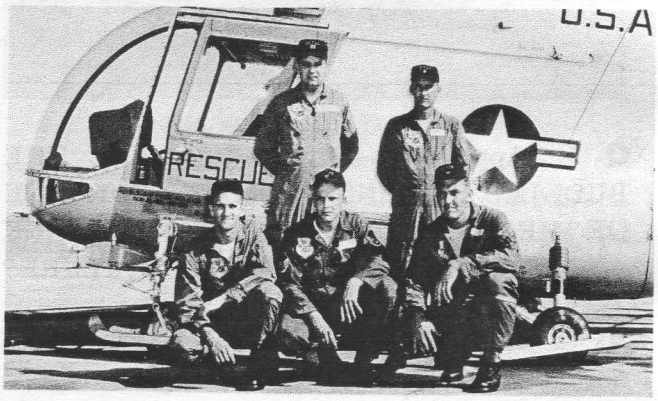


Detachment 15, WARC (MATS), Luke AFB, Arizona; offers the following record of mission accomplishment as a record of interest to see if any other LBR can top it.

On 24 April 1960, Capt. Walter C. McMeen, Det. 15 Commander, flew the first rescue mission with the H-43B in the field. This mission appeared in the July, 1960, Rotor Tips which is published monthly by the Kaman Aircraft Corp. Captain McMeen was placed on the Scroll of Honor for his accomplishment. This one mission proved the outstanding capability of the H-43B "Huskie" as a rescue vehicle and thus was the begining of a long list of mission accomplishment in the H-43B. All missions that will be mentioned were flown in the H-43B and cover the period from 24 April 1960, to 5 July 1962.

The most outstanding mission accomplishment developed on 5 July 1962. On this date, this detachment accomplished the one thousandth (1000th) actual scramble mission with the fire suppression kit. The fire suppression kit is carried when an aircraft declares an emergency inflight with intentions of landing at Luke. It is also carried to any aircraft accident which may occur within 15 miles of the base to furnish fire suppression and rescue coverage. The 1000th emergency developed when a T-33 pilot, Capt. James R. McCulloch, 4512 CCRTRARON, declared an emergency and was inbound to Luke for landing. The helicopter was airborne in less than two minutes with the fire suppression kit. The T-33 pilot landed his aircraft safely and the helicopter returned to the alert parking area. Once again the every-day routine had been acted out uneventfully. Not all of the emergencies have ended this way though, because the fire suppression kit has had to be used on eight (8) occasions. On one occasion, after the fire kit was used, the helicopter returned the kit to the ramp to be recharged. After the kit was recharged, the helicopter returned to the crash scene to continue the firefighting operation. The fire trucks from the base had not reached the scene yet. The aircraft had crashed in a freshly irrigated field and the fire trucks could not reach it because of the mud. The interesting thing about this mission was the fact that the crashed aircraft was only about 300 yards off the end of the runway. It took the fire trucks approximately thirty minutes to rig a fire hose long enough to reach the scene. During all this time, the helicopter was the only fire suppression vehicle that could reach the scene.

This Detachment has flown a total of 1104 missions during the above mentioned period. These missions cover all types such as bailouts, military crashes, civilian crashes, military evacuations, civilian evacuations, search and recovery, and scrambles with the fire suppression kit. There have been eighteen bailouts of which one had to be picked up with the hoist because of the rough terrain the pilot had landed in. Out of thirty-four evacuations, twenty-eight were civilians. The hoist was used to pick up fifteen of these evacuations and the Stokes litter had to be used on two occasions because of the extreme injuries involved. Thirty-two aircraft have crashed within our area and eleven have been within fifteen miles of the base. The H-43B has aided greatly in the recovery of eighteen deceased persons. The majority of these individuals



1000th SCRAMBLE—Crew of the H-43B which carried fire suppression kit for the 1000th time in support of an aircraft with an inflight emergency. Front row, left to right, are A1/C Robert J. Stone, fireman; S/Sgt. George S. Edwards, crew chief; A1/C Frankie E. Hill, fireman. Rear, Capt. Harold D. Salem, co-pilot; 1st Lt. Carroll L. Wright, pilot and rescue crew commander. (USAF photos)

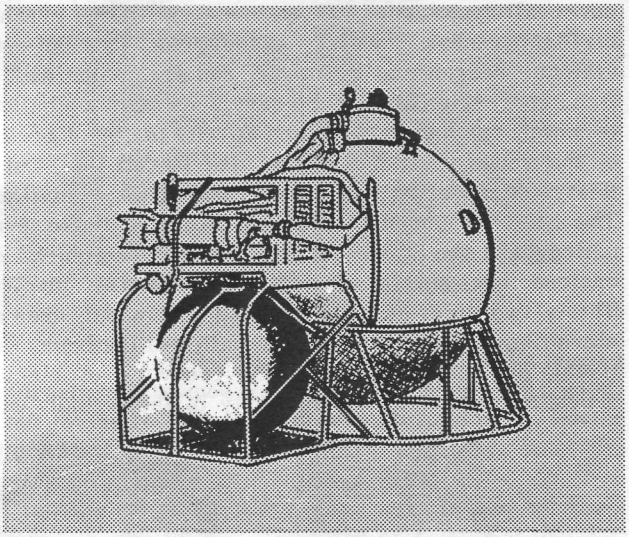
were in extremely rough terrain which made their recovery next to impossible by any other means. These missions were flown all over the State of Arizona. They cover an area from a few miles next to the Mexican border to the depths of the Grand Canyon.

This detachment has flown 1020:30 hours in the H-43B as of 5 July 1962. We have found the H-43B requires relatively little maintenance once it is placed in commission. There have been times when parts were on shortage and the aircraft would be AOCP for a short period of time.

These missions combined with the professional attitude of the members of this Detachment speak for themselves. Both the civilian and the military populace have grown to depend on the professional ability of this Detachment and its members have tried to meet the obligation both day and night. The H-43B has played the largest part in the mission accomplishment. It has definitely proven itself to be an extremely versatile vehicle for both fire suppression and rescue. K

Q's AND A's

If you have a question regarding Kaman Aircraft maintenance, send it along to Rotor Tips. The Service Department's analysts will be glad to answer it.



Q. (Applies H-43A, H-43B) ARE THE BUBBLES SEEPING FROM THE SURFACE OF THE FIRE SUPPRESSION KIT AIR TANK AN INDICATION OF IMMINENT FAILURE?

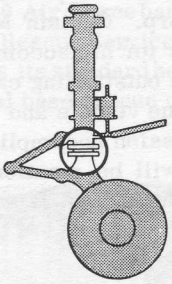
A. No, the bubble seepage is due to normal expansion of the Fiberglas layers during charging of the tank. The expansion of the tank is normal. The tank, in the normal course of use, comes in contact with foam and water and the Fiberglas, being porous, allows the moisture to penetrate. When the tank is pressurized, expansion takes place at a greater rate inside the tank than outside and the moisture trapped within the Fiberglas is forced to the surface causing small bubbles to escape, thus giving the appearance of a leaking tank. - W.J.R.

Q. (Applies HOK-1, HUK-1, H-43A, H-43B) WHAT ARE THE SIX "RIGHTS" OF LUBRICATION?

A. 1. The right type. 2. The right quality. 3. The right amount. 4. The right condition. 5. The right place. 6. The right time. - C.W.J.

Q. (Applies H-43B) WHAT COULD CAUSE A HEAVY DOWN LOAD ON THE COLLECTIVE PITCH STICK?

A. A malfunctioning rudder lock solenoid valve, P/N 7-V-7099, can cause this condition. Both the collective limiter and the rudder lock utilize oil pressure from the same stage of the transmission oil pump. Should the solenoid valve poppet fail to seat properly, it will allow the oil pressure to bleed by, thus robbing the collective limiter of its normal operating pressure and creating the stick down loads. The condition is most likely to occur with the DSAS switch "ON." To relieve the download, switch the DSAS "OFF." A future revision to T. O. 1H-43B-2 will include this troubleshooting information. Refer to handbook T. O. 9H8-4-132-3 for a detailed breakdown and troubleshooting chart on the solenoid valve. - W.J.W.



Q. (Applies HOK-1, HUK-1, H-43A, H-43B) WHAT IS THE PURPOSE OF THE TWO LOCK NUTS AT THE BASE OF THE AUXILIARY STRUT CYLINDER?

A. The lower nut is the gland nut which retains the piston wiper seal; and the upper nut establishes the freedom of the swivel of the strut and should never be over-tightened or strut-bind will occur. - F.E.S.

Q. (Applies H-43B) WHAT IS THE MIL-SPEC FOR THE GRAY LACQUER USED IN THE H-43B COCKPIT AND CABIN?

A. The Mil-Spec for this lacquer is MIL-L-006805B. The number for the color, which is dark gull gray, is 36231. - F.E.S.

Q. (Applies H-43B) IS THE DOWN STOP ON THE PILOT'S COLLECTIVE STICK RIGGED LOWER THAN THE STOP ON THE CO-PILOT'S STICK?

A. Yes, the pilot's collective stick down stop is rigged lower than the stop on the co-pilot's stick to insure full closing action of the collective limiter valve in the down direction. Centrifugal loads from the blade control rods and spring loads from the collective limiter cause a twisting action in the collective torque tubes. The pilot's down stop is rigged lower to compensate for this twisting action and assures positive pilot control of the collective limiter. Complete collective stop rigging procedures can be found in the latest issue of T. O. 1H-43B-2. - W. J. W.

Q. (Applies HOK-1, HUK-1) WHY IS THERE A DIFFERENCE IN THE ALLOWABLE OVERSPEED IN THE 1340AN-48 AND -52 ENGINES?

A. The difference in allowable overspeed between the two engines is in relationship to the blower ratio. If an engine is driven to overspeed and the engine blower ratio is high and the compression ratio is the same for both engines, the detrimental effect of poor fuel-air mixture is added to the detriment of the overspeed. The engines are the same except for the impeller shaft intermediate gear assembly, the impeller shaft assembly and the carburetor elbow adapter. This is borne out by the operational difference in the manifold pressure. - A. A. W.

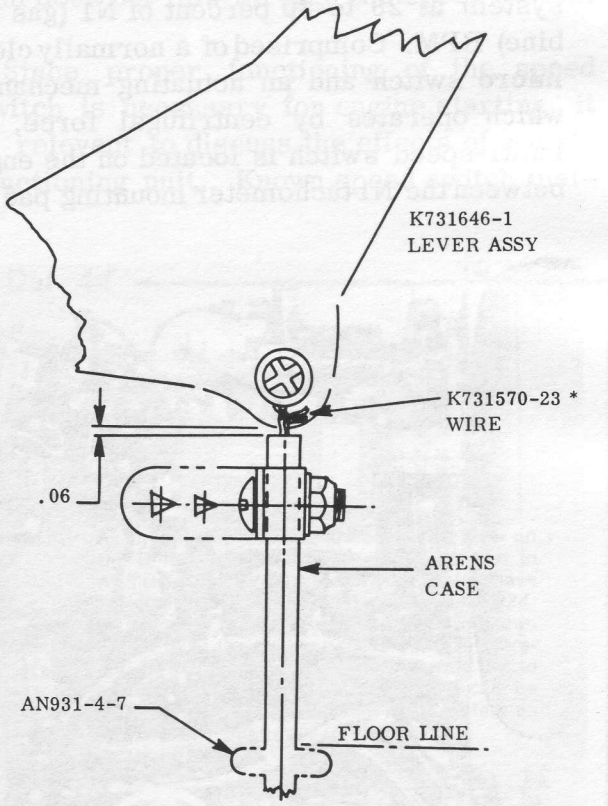
Q. (Applies H-43B) SHOULD WASHERS OR SHIMS BE USED ON THE ENGINE MOUNTS?

A. Washers should be used only on the engine mounting bolts as required but neither washers nor shims should be used to fill the gap between the fitting, housing and rodends or bearings. The warning decal, "Do not use washers or shims on engine mounts," is aimed at preventing this from occurring. The gaps between the right rear engine mount housing and the bolt head; the left rear housing and the fittings; the right forward rod ends and the housing and fitting; and the left forward rod end and fitting are necessary for engine expansion and operational torque loading. - A. A. W.

Q. (Applies H-43B) IS IT PERMISSABLE TO MANUFACTURE THE MANUAL CARGO RELEASE WIRE, P/N K731570-23, LOCALLY AND, IF SO, WHAT PRECAUTION SHOULD BE OBSERVED?

A. It is permissable to manufacture this release wire locally, but the finished product must conform in all ways with the drawing specifications. Using a lighter gauge wire than the .040 specified can result in kinking and subsequent malfunctioning of the manual release. - W. J. R.

MANUAL RELEASE INSTL K731570



* NOTE
K731570-23 WIRE (.040 MUSIC WIRE)

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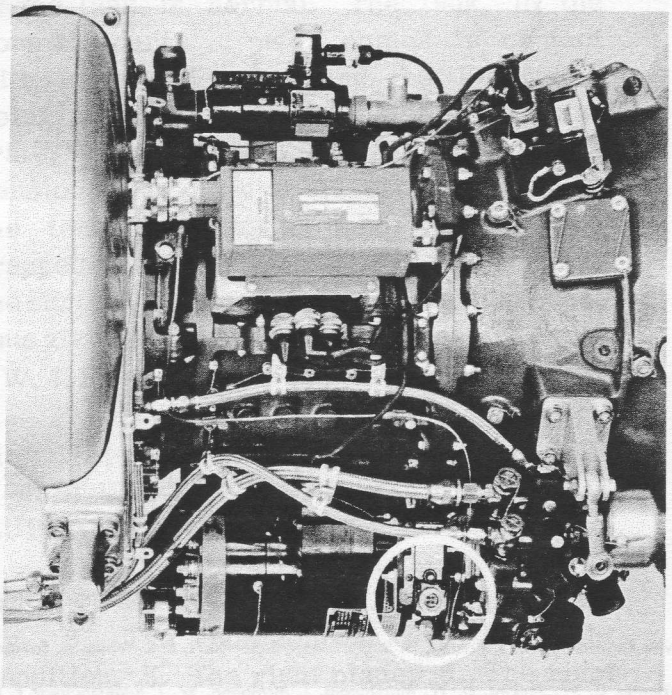
KAMAN SERVICE ENGINEERING SECTION—*G. D. Eveland, Supervisor, Service Engineering, E. J. Polaski, G. S. Gart, Asst. Supervisors; E. L. White, A. Savard, G. M. Legault, Group Leaders.*
ANALYSTS—*R. A. Berg, P. M. Cummings, M. T. Fiaschetti, P. A. Greco, E. Hermann, C. W. Jenkins, D. W. MacDonald, J. McMahon, W. J. Rudershausen, F. E. Starses, W. J. Wagemaker, N. E. Warner, A. A. Werkheiser, M. Whitmore, W. H. Zarling, R. W. Olsen.*

MULTI-SPEED SWITCH OPERATION AND MAINTENANCE

by W. H. Zarling
P. A. Greco
Analysts, Electrical-Electronics
Field Service Department

When starting the engine in most helicopters, it is necessary to press and then hold the start button until the engine is in operation. In the H-43B HUSKIE, however, the start is made by merely pushing the button momentarily and then releasing it, thus setting the automatic engine starting system in operation. This allows the pilot time to prepare for flight while the engine is starting and also minimizes the time required to get the helicopter airborne and on the way to perform its rescue mission.

Once the engine is started, the automatic starting system is deenergized by the multi-speed switch. This switch, P/N AE47-2 and -3, is preset to deenergize the starting system at 28 to 30 percent of N1 (gas turbine) RPM. Comprised of a normally closed micro switch and an actuating mechanism which operates by centrifugal force, the multi-speed switch is located on the engine between the N1 tachometer mounting pad and the N1 tachometer. The multi-speed switch and N1 tachometer are mechanically driven by the N1 reduction accessary gear box.



The electrical location of the speed switch is shown in figure 1, which represents the latest production configuration of the engine starting system. The switch operation in relation to the other components in the system is as follows: When the aircraft's start button is depressed, circuit connections for current flow are provided from the D. C. essential bus to the junction of the speed switch and ignition system. At this point the current divides into two paths, one to the ignition system and the other to the speed switch. Since the speed switch contacts are normally closed, current flows through to the prime fuel solenoid, the starting relay and the starter relay. This action opens the prime fuel valve allowing prime fuel to flow into the engine; energizes the starter relay, allowing APU or battery current to flow to the starter; and energizes the starting relay. The starting relay contacts are connected in parallel across the start switch, functioning as a "latching" switch, and provides a path for current flow into the starting system. At this time the start button can be released and the starting system remains self energized.

A normal engine start should be accomplished when N1 RPM reaches 28 to 30%. The speed switch actuating mechanism is adjusted to actuate the micro switch between these percentages. When this occurs, the path for current flow through the speed switch is opened, deenergizing the prime fuel solenoid, the starter and starting relays. This action opens the paralleled contacts of the starting relay, connected across the

H-43B ENGINE STARTING SYSTEM SCHEMATIC (S/N 59-1540 & SUBS)

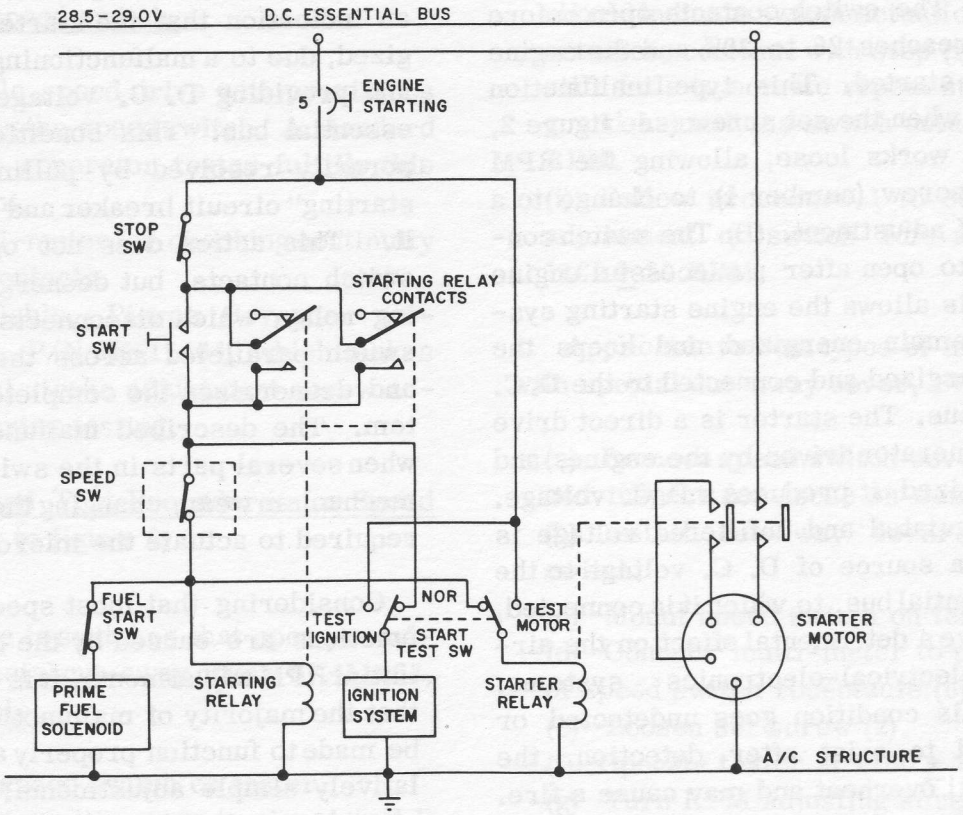
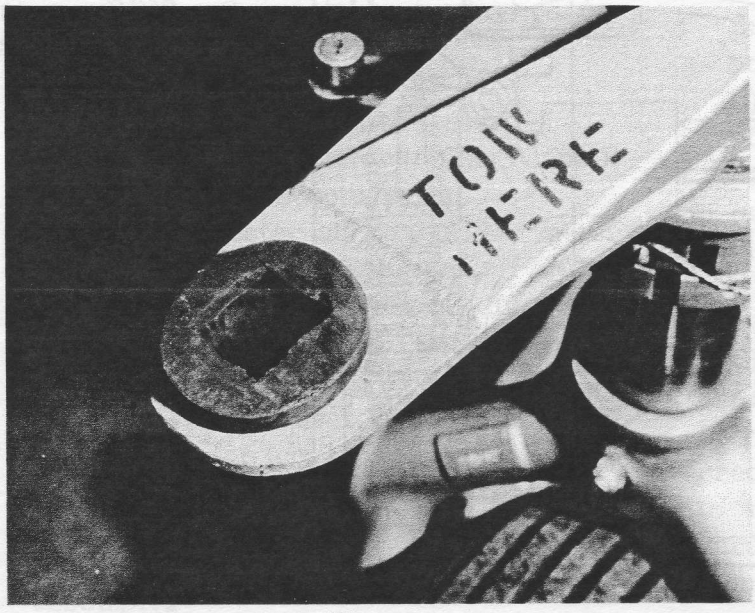


Figure 1.

start switch, and deenergizes the complete starting system. The complete starting system cannot be energized again until N1 RPM decreases below 28 to 30%. However, it is possible to make an air start with N1 RPM in excess of 30% as only ignition is required to start the engine. This can be accomplished by depressing the start button and holding it until the engine is started. This action provides a path for current flow direct to the ignition unit, as stated previously. The current for the ignition system does not flow through the speed switch.

Since proper functioning of the speed switch is necessary for engine starting, it is relevant to discuss the effects of a malfunctioning unit. Known speed switch mal-

Helpful Info From Det. 44



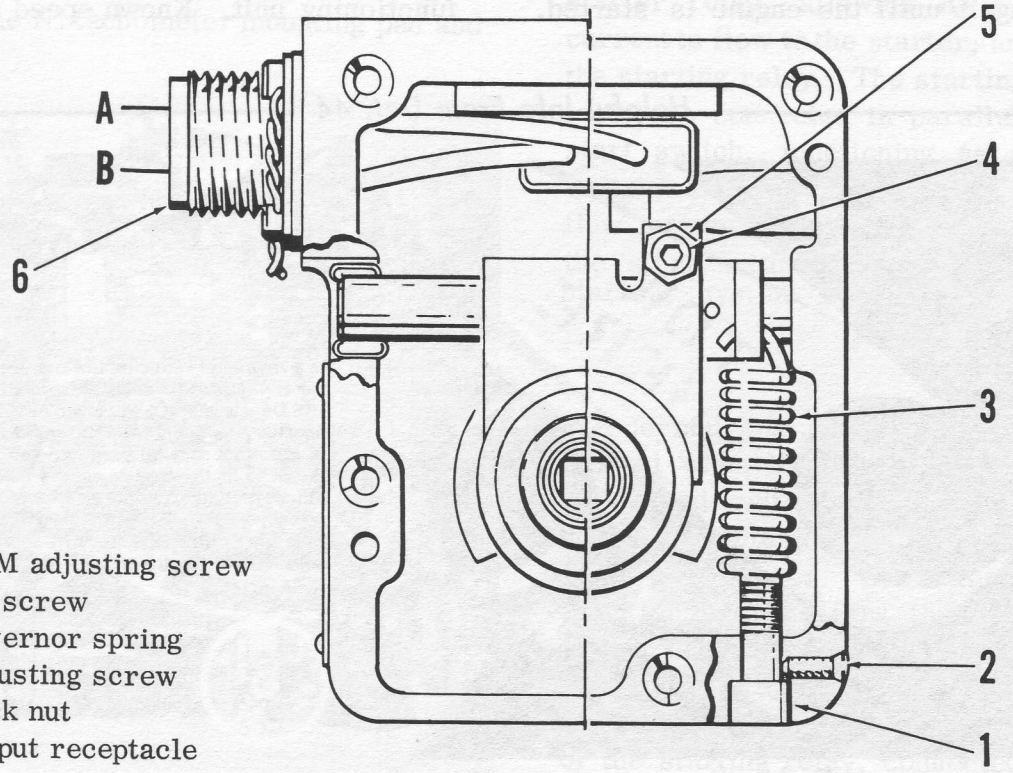
As a means of reducing tow-bar fitting wear on the H-43B nose wheel, personnel attached to ARS Det. 44, EARC, Westover AFB, Mass.; have inserted rubber liners as shown. An AN931B24-28 grommet may be used or a similar liner can be cut to fit the towbar access hole. The fore-and-aft motion experienced when towing is also partially absorbed by the liner which can be used on H-43A, HOK-1, HUK-1 helicopters as well. (USAF photo)

functions are classified primarily into two types: (A) The switch contacts open before N1 RPM reaches 28 to 30% and the engine cannot be started. This type malfunction is caused when the set screw (see figure 2, number 2) works loose, allowing the RPM adjusting screw (number 1) to change to a lower RPM adjustment. (B) The switch contacts fail to open after a successful engine start. This allows the engine starting system to remain energized and keeps the starter energized and connected to the D. C. essential bus. The starter is a direct drive starter-generator driven by the engine, and when energized, it produces a D. C. voltage. This unregulated and unfiltered voltage is providing a source of D. C. voltage to the D. C. essential bus, to which it is connected, and can have a detrimental effect on the aircraft's electrical-electronics systems. Also, if this condition goes undetected or is allowed to exist after detection, the starter will overheat and may cause a fire.

The recommended means for detecting this type of malfunction after the engine is operating, is to remove the APU, switch off the aircraft's battery and D. C. generator and then determine if any lights in the cockpit are glowing. If lights are glowing, it is an indication that the starter is still energized, due to a malfunctioning speed switch, and providing D. C. voltage to the D. C. essential bus. This condition can be temporarily resolved by pulling the "engine starting" circuit breaker and then re-setting it. This action does not open the speed switch contacts, but deenergizes the starting relay, which disconnects the "latching" switch paralleled across the start switch and deenergizes the complete starting system. The described malfunction is caused when several parts in the switch's actuating mechanism wear, changing the stroke length required to actuate the micro switch.

Considering that most speed switch malfunctions are caused by the changing of the initial RPM adjustments, it is safe to assume that the majority of malfunctioning units can be made to function properly after a few relatively simple adjustments. It is recommended that the following procedures be adhered to when adjusting a speed switch, P/N AE47-2 and -3. The procedures are divided into three groups corresponding to the type of malfunction encountered and taking into consideration the availability of a special cut-away cover, P/N SK-11464.

Figure 2.



1. RPM adjusting screw
2. Set screw
3. Governor spring
4. Adjusting screw
5. Lock nut
6. Output receptacle

The following equipment is required to adjust and test the speed switch.

(a) Variable speed drive with provisions for mounting the speed switch. A standard tachometer generator tester fulfills this requirement.
(b) A multi-meter for checking continuity of switch contacts.
(c) If available, Pierce Governor cut-away cover, P/N SK-11464, which makes the internal stroke adjustment screw accessible during testing.

Adjustment and Test Procedures for Speed Switch (Refer to figure 2)

1. Applicable to switches that open prematurely and special cut-away cover, SK-11464, is not available.

(a) Mount speed switch on tester.
(b) Connect multi-meter to pins A and B of speed switch receptacle (6).
(c) Loosen set screw (2).
(d) Operate tester at 1160 ± 20 RPM.
(e) Adjust RPM adjusting screw (1) for switch actuation.
(f) Apply "Loctite," grade B(7-2), to set screw (2) and tighten.
(g) Re-check to assure that switch actuates at 1160 ± 20 RPM and that the switch re-sets.

2. Applicable to switches that fail to open at any RPM and special cut-away cover, SK-11464, is not available.

(a) Mount speed switch on tester.
(b) Connect multi-meter to pins A and B of speed switch receptacle (6).
(c) Operate tester at 1300 RPM, meter should indicate switch actuation. If switch actuates, follow procedure 1. If switch fails to actuate, continue with step (d).
(d) Turn tester power "OFF."
(e) Remove speed switch cover assembly and inspect for loose or damaged parts.
(f) Loosen lock nut (4) and turn stroke adjusting screw (5) one turn clockwise.
(g) Tighten lock nut (4) and replace cover assembly.
(h) Operate tester at 1300 RPM, meter should indicate switch actuation. If switch actuates, continue with step (i). If switch still fails to actuate repeat steps d, e, f, g and h until the switch actuates at 1300 RPM.
(i) Follow procedure 1 to continue with adjustment of switch for actuation at 1160 ± 20 RPM.

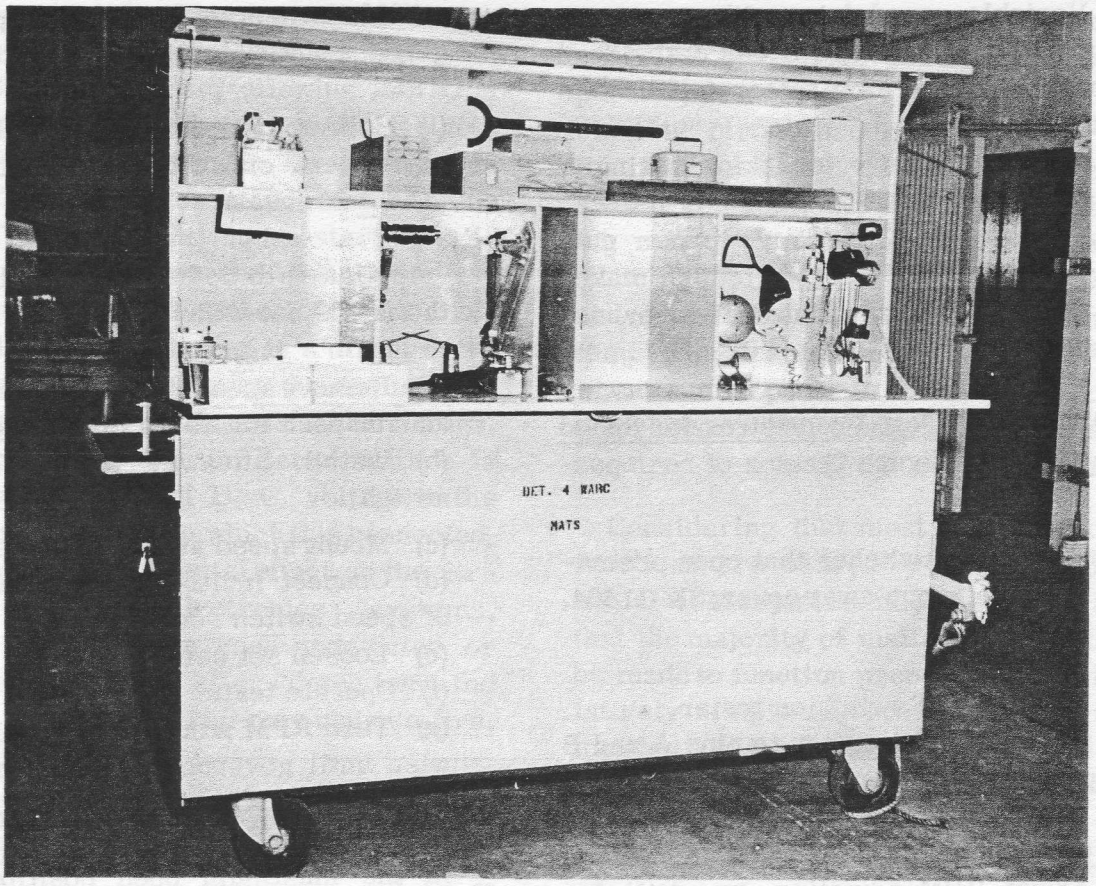
3. Applicable to both types of malfunctions, with special cut-away cover, SK-11464.

(a) Remove speed switch cover assembly and inspect for loose or damaged parts.
(b) Install cut-away cover on speed switch.
(c) Mount speed switch on tester.
(d) Connect multi-meter to pins A and B of speed switch receptacle (6).
(e) Loosen set screw (2).
(f) Operate tester at 1160 ± 20 RPM.
(g) Turn RPM adjusting screw (1) clockwise until governor weights are closed and then turn RPM adjusting screw counter clockwise until the governor weights are in the maximum open position. Note: Governor weights are visible through the cut-away cover.
(h) Operate tester at 1300 RPM, loosen lock nut (4) turn screw (5) clockwise until switch is actuated.
(i) Turn screw (5) an additional 1/2 turn for overtravel and secure with lock nut (4).
(j) Reduce speed and check to make sure the switch resets.
(k) Adjust RPM adjusting screw (1) to actuate switch at 1160 ± 20 RPM.
(l) Apply "Loctite," grade B(7-2) to set screw (2) and tighten.
(m) Turn tester power "OFF."
(n) Replace the cut-away cover with original cover and recheck switch actuation RPM.

Changes, based on operating experience, are now being made in the switches to further increase their reliability. It is hoped the preceding information will prove of value to maintenance personnel. Questions regarding the multi-speed switch, or any other component, are always welcome.

Portable Dock Box Aids Det. 4

by John D. Elliott
Field Service Representative



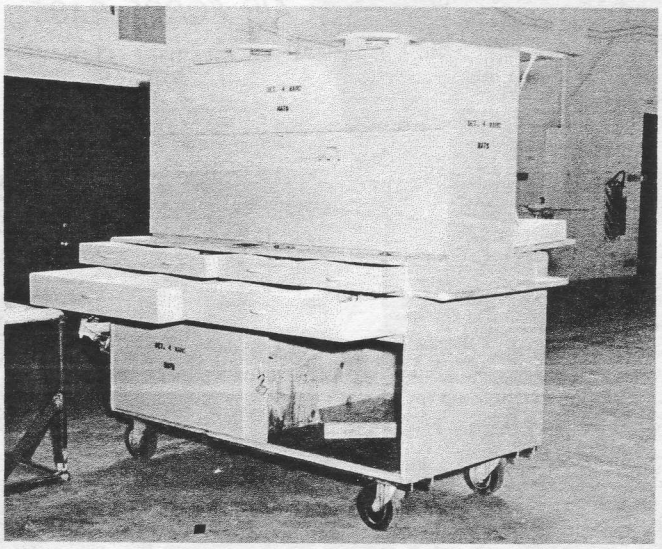
ARS Det. 4, WARC, Paine Field, Wash. - T/Sgt. James E. Johnson of this detachment has come up with this inexpensive, but highly efficient, mobile dock box as a means of expediting H-43B maintenance. Soon after checking into the detachment, Sergeant Johnson decided that a portable dock stand would be of help to maintenance personnel. He checked around the base until he found an armament box with the proper dimensions and then began a conversion project with the result shown.

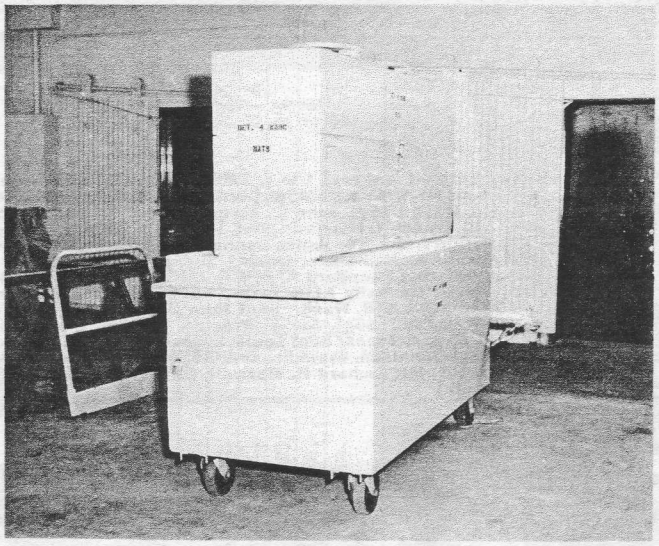
The dock box, mounted on four wheels, allows special tools and other items to be taken to the aircraft rather than taking the aircraft to the tools. The top of the box has a door on the front which opens down to provide a small writing table or a work bench for minor maintenance jobs. On the left side of this door, a file is mounted to house the PE cards. Each individual slot is marked and the partitions are slanted so the cards will not fall out when the door is raised or lowered. Inside the door, on the top part of the box, is storage space for special tools. Each tool has a specific place marked with a tag. The door to the top portion has locks for security.

The bottom portion of the dock box has sliding doors with large compartments for storage of larger items such as engine slings, etc. Large special tools are also stored in this area. Often used items such as grease guns, oil cans and some bench stock items are stored in this portion of the box. Installation of a small bin area is being considered to store common usage items for periodic inspection. The sliding doors are secured by locks.

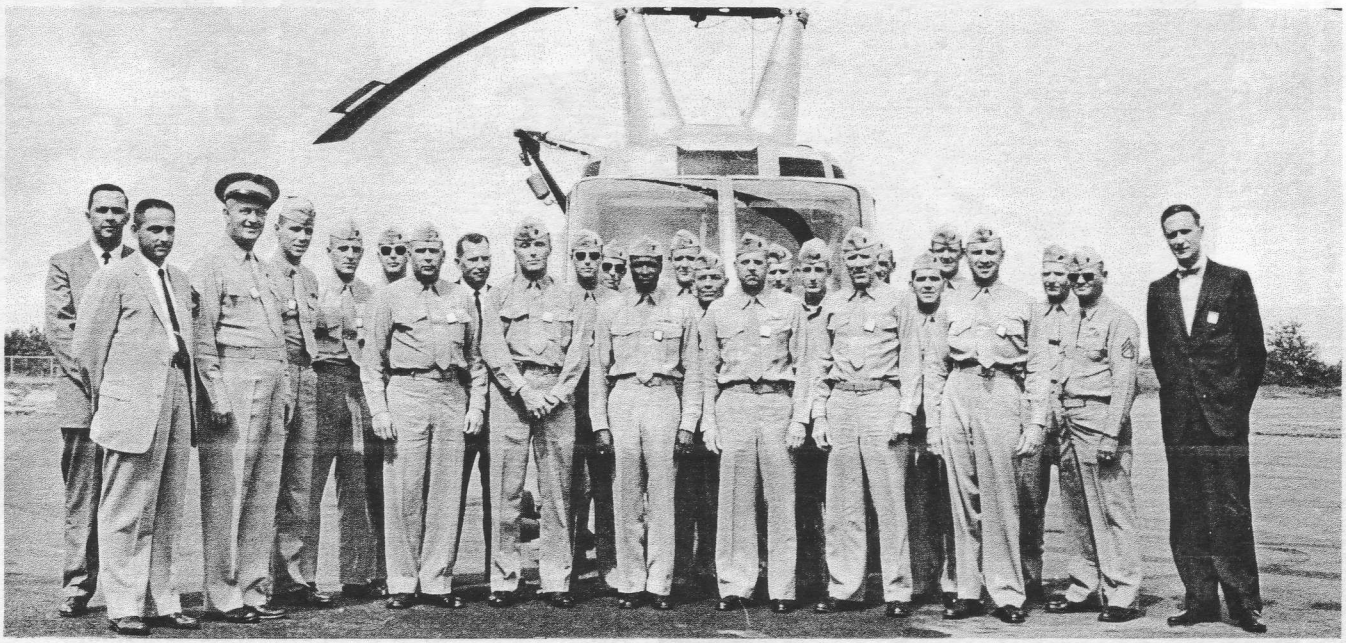
The advantages of this portable dock box are many, and for the most part, apparent. The box is especially useful for periodic inspections but is certainly not limited to this. The box allows easy reference to tools, keeps them in a centrally located place and makes inventory very easy. Having the PE cards near the aircraft saves man hours going back and forth to the Maintenance Office and frees the Dock Chief to be near the aircraft while the inspection is being performed. The chances of misplacing a card are lessened because the box is so handy to replace the card when the work has been accomplished. Small items which can normally be lost easily are located so that they are always available. Items such as glue, gaskets etc. have a specific place in the box and are returned to that place when the men are finished using them. Each separate compartment in the box can be locked, so loss from pilferage or borrowing is held to a minimum.

Sergeant Johnson is continually working to improve this dock box but his basic idea, coupled with his initiative to improve the efficiency of the unit during periodic inspections, deserves special mention. His contribution to Detachment 4 has meant savings in man hours, government equipment and has helped to maintain quality maintenance of Air Rescue Service Aircraft.





ONE-MAN AIRLIFT—With the assistance of an HOK-1 crew from VMO-2, Gy/Sgt. Sam Griffiths, 40, of the First Marine Air Wing at Iwakuni took this means of stimulating interest in physical fitness at NAS Atsugi, Japan. The 22-year Marine Corps veteran, voted "Mr. Physical Fitness" of 1960, stopped at Atsugi during an inspection of Special Services facilities in the Far East. The tour is being conducted in conjunction with President Kennedy's Physical Fitness Program. Pilot of the helicopter is Marine Capt. Robert D. Myers and L/Cpl. James E. Turner is crewman. (Pacific Stars and Stripes photo)



VMO-1 VISITORS-Personnel attached to VMO-1, MAG-26, MCAF, Jacksonville, N.C.; were conducted on a plant tour during a recent visit to Kaman Aircraft. Shown are, left to right, William Wells and Raymond Vokes, Field Service Department; M/Sgt. Raymond B. Taylor, Lts. Donald P. Reichert, Patrick J. McMorrow, William N. Simmons, Robert L. Norton; Ray G. Russell, Field Service Representative; Capt. Robert J. Thompson, Lt. William S. Ebersole, Capt. John A. Conniff, S/Sgt. Frank Williams, Capt. Charles A. Carey, Maintenance Officer; GySgt. Earl J. Lehrman, Lt. Col. Earl W. Cassidy, Commanding Officer; M/Sgt. Forrest G. Alexander, Lt. Ansley S. Horton, Maj. Herbert A. Nelson, Executive Officer; GySgt. Eldon R. Laraway, S/Sgts. Nicholas P. Difabritus, Ivan J. Vlach; Maj. Joseph Keller, H&MS-26; S/Sgts. Harvey Dunn, Lloyd L. Love; Herbert Langenfeld, Military Operations Research Department.

GRADUATION

H-43B TRAINING
SHEPPARD AIR FORCE BASE

3750TH TECHNICAL SCHOOL, USAF (ATC)

JUNE 19, 1962—Front row, l to r, TSgt Alfred H. Dewey, Det. 29, Vance AFB, Okla.; SSgt Ralph W. West, Det. 39, Laughlin AFB, Texas; SSgt Robert L. Julian, Det. 34, Biggs AFB, Texas; SSgt Thomas J. Kennedy, 1001st FMS, Andrews AFB, Md.; A1C Philip Arkeila, Det. 26, Selfridge AFB, Mich.; SSgt Curtis Washington, (Instr.) Sheppard AFB, Texas; A2C Gerald O. Chase, Det. 45, Pease AFB, N.H.; SSgt James T. Barnett, Det. 16, Williams AFB, Ariz. Rear row, Mr. Fred Morrison, (Instr.) Sheppard AFB.; SSgt Douglas Drier, Det 35, Kirtland AFB, N.M.; SSgt Berkley E. Naugle, Det. 51, Myrtle Beach AFB, S.C.; SSgt Walter H. May, Det. 53, Craig AFB, Ala.; A1C John A. DeBell, Det. 54, Moody AFB, Ga.; SSgt Douglas E. Lightcap, Det. 42, Dow AFB, Maine; A1C Jesse Glazier Jr., Det. 1, 54th ARS, Thule, AB, Greenland; A1C Dan R. Maloy, Det. 48, Dover AFB, Del.; A2C John E. Laurenson Jr., Det. 45, Pease AFB, N.H.

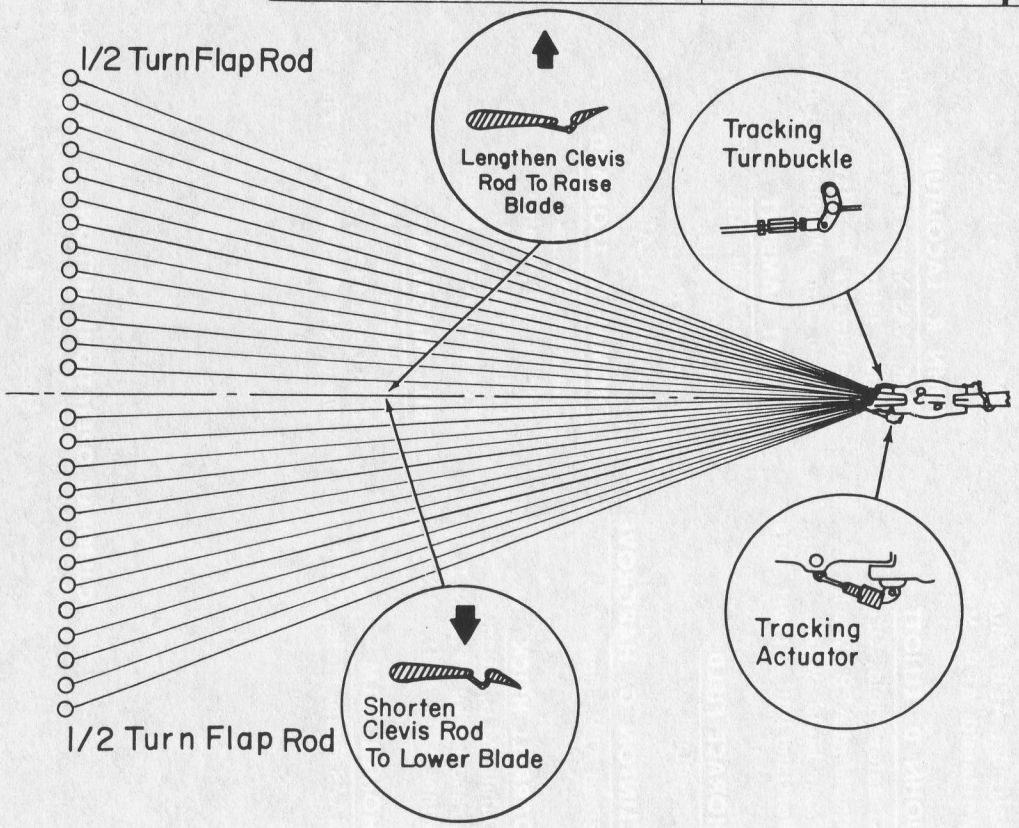
JULY 3, 1962—Front row, l to r, SMSgt Elton L. Tisdale, Det. 16, Williams AFB, Ariz.; SMSgt Curtis W. Schmeisser, Det. 4, Paine Fld, Wash.; SSgt John G. Turner, Det. 8, Glasgow AFB, Mont.; A1C Ernest W. Harris Jr., Det. 14, Nellis AFB, Nev.; TSgt Buddy B. Curry, Det. 38, James Connally AFB, Texas. Rear row, SSgt Leonard A. Nicholson, (Instr.) Sheppard AFB; Mr. Fred Morrison, (Instr.) Sheppard AFB; Mr. J. H. Birkes, 3566th Fld Maint, James Connally AFB, Texas; SSgt Samuel L. Pilgrim, Det. 59, Andrews AFB, Wash.; SSgt John G. Regan Jr., Det. 47, Langley AFB, Va.; SSgt Joe L. Proctor, Det. 35, Matagordo Island AF Range, Texas; SSgt Louis J. Hosier, Det. 36, Laredo, Texas; TSgt Dennis M. Franklin, Det. 35, Matagordo Island AF Range, Texas; Mr. Richard H. Maxwell, (Instr.) Sheppard AFB. (USAF photo)

JULY 31, 1962—Rear row, l to r, SSgt L. A. Nicholson (Instr.), Sheppard AFB, Texas; Mr. Richard H. Maxwell (Instr.), Sheppard AFB; A1C Fred Scott, Holloman AFB, N. M.; A1C Michael G. Stingel, Det. 46, Suffolk County AFB, N. Y.; A2C Dorman E. Black, Det. 50, Shaw AFB, S.C.; MSgt George R. Mitchell, Hq. EARC, Robins AFB, Ga.; Mr. Andrew Hadlow (W 10), Andrews AFB, Md. Front row, A1C Odell E. Lee, Det. 43, Griffiss AFB, N. Y.; SSgt Curtis Washington (Instr.), Sheppard AFB; SSgt Harvey G. Myer, 401st CAMS, England AFB, La.; SSgt Lowell M. Bynum, Det. 58, Brookley AFB, Ala.; A1C Andres B. Perez, 67th AR Sqdn., APO 123, N. Y.; A1C Floyd M. Baker, 41st ARC, Hamilton AFB, Calif.

AUGUST 14, 1962—Front row, l to r, TSgt Donald B. Sanders, Det. 39, Laughlin AFB, Texas; SSgt Wayne E. Dondero, Det. 44, Westover AFB, Mass.; SSgt William D. Snyder, Det. 39, Laughlin AFB,; A1C Harvey A. Meltzer, 48th ARS Eglin AFB, Fla.; TSgt James L. Johnson, Det. 4, Paine Field, Wash.; Mr. John R. Moseley (F 7), Dom FM Maxwell AFB, Ala.; A1C Thomas E. Arms, (Instr.) Sheppard AFB. Rear row, A1C Jesse B. Pope, Det. 27, Traux Field, Wisc.; A1C Alexander Montgomery, Det. 5, McChord AFB, Wash.; TSgt George C. Risser, Det. 23, KI Sawyer AFB, Mich.; A2C Luis Carreras, Det. 46, Suffolk County AFB, N.Y.; A2C Bobby G. Evans, Det. 43, Griffiss AFB, N.Y.; A2C Lenzy Autry, Det. 52, Charleston AFB, S.C.; A2C James T. Sloan, Det. 15, Luke AFB, Ariz.; SSgt Francis C. Johnson, 48th ARS Eglin AFB, Fla.; Mr. Richard H. Maxwell, and Mr. Fred Morrison, (Instrs.) Sheppard AFB.

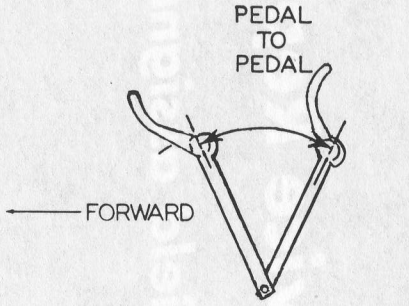
ROTOR CONE & TRACKING ADJUSTMENT CHART H-43B

ADJUSTMENT			RESULT			
Location	Number of Blades Adj.	Tracking Actuator	Movement at Blade Tips	Rotor Speed % Autorotation	Flap Control Rod Clevis	Pedal to Pedal Displacement
1 Hole at Turnbuckle	1	0.01 in.	1/8 inch	N/A	N/A	N/A
1 Hole at Turnbuckle	4	0.01 in.	1/8 inch	.15%	N/A	N/A
3 Holes at Turnbuckle	1	1/32 in.	3/8 inch	N/A	N/A	N/A
13 Holes at Turnbuckle	1	0.13 in.	1-5/8 inch	N/A	N/A	N/A
13 Holes at Turnbuckle	4	0.13 in.	1-5/8 inch	2%	1/2 Turn	N/A
1/2 Turn Flap Control Rod Clevis	4	0.13 in.	1-5/8 inch	2%	N/A	N/A
1/2 Turn Flap Control Rod Clevis	One Rotor Both Blades	0.13 in.	1-5/8 inch	N/A	N/A	2.00 inch



DESIRED 94% RPM with 10 PSI Approx.

By Bringing Rotor Tip Path Plane UP Rotor RPM DECREASES	By Bringing Rotor Tip Path Plane UP Gas Producer RPM INCREASES
By Bringing Rotor Tip Path Plane DOWN Rotor RPM INCREASES	By Bringing Rotor Tip Path Plane DOWN Gas Producer RPM DECREASES



FOOT PEDALS
VIEWED FROM LEFT SIDE

PERMISSIBLE RUDDER PEDAL DISPLACEMENT	
In Hover	- 1/4" Rudder Displacement
In Cruise	- 1/2" Rudder Displacement at 90 Knots
In Autorotation	- 1/2" Rudder Displacement

The purpose of this chart, devised by Edward White of Service Engineering, is to show what happens when rotor cone and tracking adjustments are made. The adjustments appear to the left of the center line of the rotor hub; the results to the right. Since all blades do not have the same aerodynamic characteristics, the results of the adjustments are approximate. Maintenance personnel should continue to use the applicable sections of T. O. 1H-43B-2 when tracking blades.

Kaman Service Representatives

on field assignment

DONALD P. ALEXANDER
Charleston AFB, S. C.
Myrtle Beach AFB, S. C.
Seymour Johnson AFB, N. C.

STANLEY M. BALCEZAK
Far East

WILLIAM C. BARR
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Reese AFB, Texas
Sheppard AFB, Texas
Vance AFB, Okla.
Webb AFB, Texas
Kirtland AFB, N. M.

R. C. BOYD
K. I. Sawyer AFB, Mich.
Kincheloe AFB, Mich.
Selfridge AFB, Mich.
Wurtsmith AFB, Mich.

JOHN D. ELLIOTT
Kingsley Field, Ore.
McChord AFB, Wash.
Paine Field, Wash.
Portland Int'l Airport, Ore.

HORACE FIELD
Greenland

CLINTON G. HARGROVE
Stead AFB, Nev.

DARRELL HEICK
Duluth AFB, Minn.
Grand Forks AFB, N. D.
Minot AFB, N. D.

HOMER HELM
NAAS Ream Field, Calif.

GAROLD W. HINES
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George AFB, Calif.
Luke AFB, Ariz.
Nellis AFB, Nev.
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THOMAS C. LEONARD
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Loring AFB, Maine
Pease AFB, N. H.
Westover AFB, Mass.

BILL MAGNAN
NS, Mayport, Fla.
NAS Cecil Field, Fla.
O&R, NAS Jacksonville, Fla.

EDWARD F. NOE
England AFB, La.
James Connally AFB, Texas
Laredo AFB, Texas
Perrin AFB, Texas
Randolph AFB, Texas

RICHARD REYNOLDS
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DONALD TANCREDI
Okinawa

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NAS Agana, Guam
NAS Cubi Point P. I.
NAS Sangley Pt. P. I.
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W. G. Wells, Asst. Supervisor, Field Service Representatives.
R. W. Spear, Asst. Supervisor, Training