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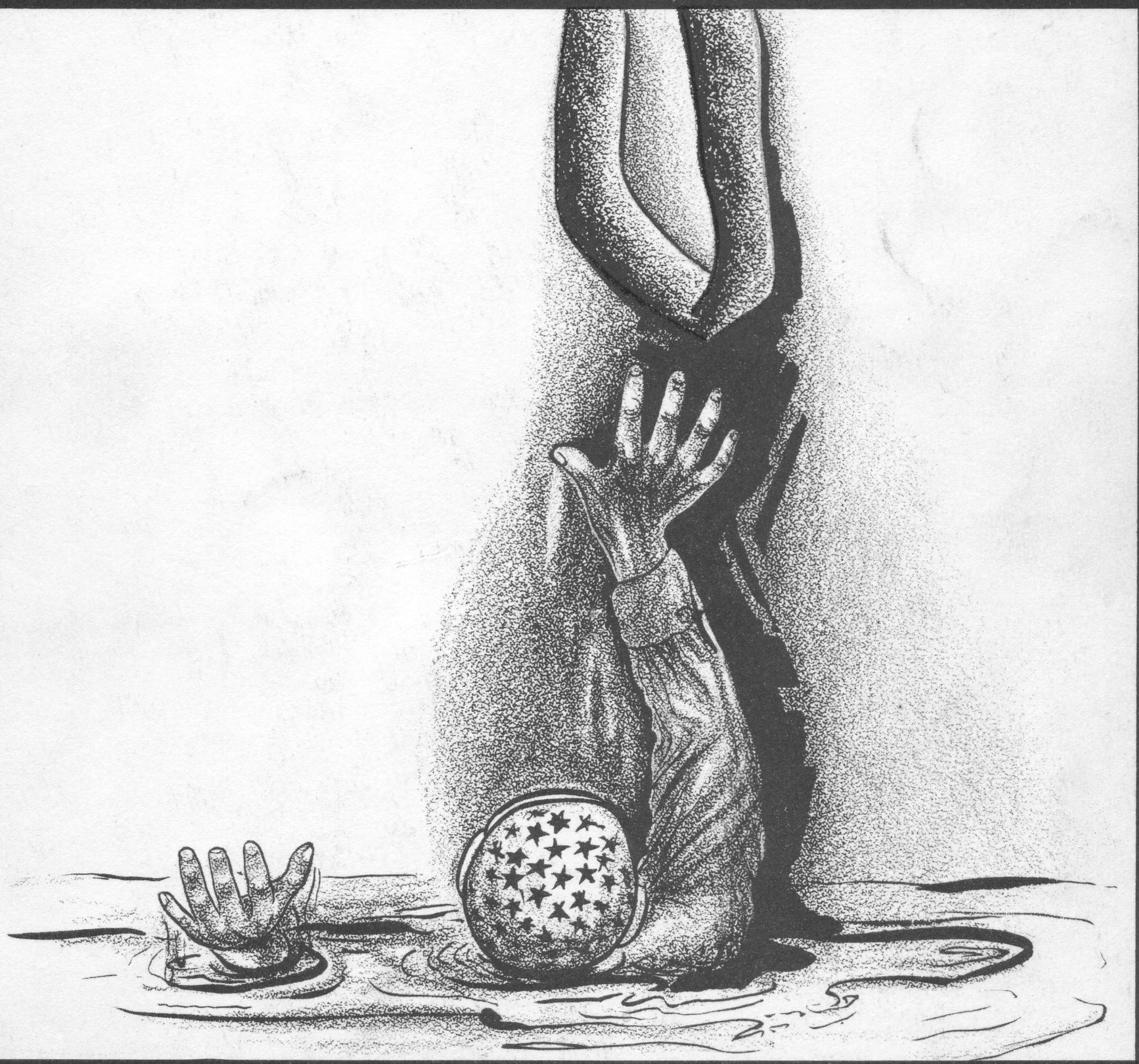

THE KAMAN AIRCRAFT CORPORATION

PIONEERS IN TURBINE POWERED HELICOPTERS

KAMAN

Rotor Tips

JANUARY, 1961

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IN THIS ISSUE

THE COVER

To the man awaiting rescue, the hoist and helicopter represent a lifeline in the true sense of the word.

it could be YOUR .... LIFELINE

by C. L. MORRIS
Asst. Vice President
Field Service Manager

Life-saving capability has always been one of the primary operational concepts for helicopters... a sky-hook, independent of terrain and other restrictive factors... a rescue hoist, operated from an airborne platform, lowering a lifeline to snatch someone from the brink of disaster.

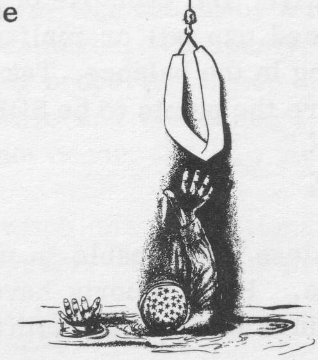
But if that lifeline fails....?

What about those terrified people in the Philippine floods a few months ago, huddled in a stake-body truck, fearfully watching the wind-lashed, rising waters that surrounded them? The rescue hoist failed on the HUK-1 flying overhead and if it hadn't been for the consummate skill of the pilot, hovering the helicopter with the landing gear literally inside the walls of the truck so the people could scramble aboard; what would have been their fate?

What about the boy who dropped 20 feet to the deck of a ship when the rescue cable parted? Will others be as lucky as he was and escape without serious injury?

The aircraft and hoist designers are exerting maximum effort to assure that the basic hoist design and installation are as trouble-free as humanly and mechanically possible. From there on it is in the hands of the operational and maintenance teams. When the helicopter crewmen leave the security of the ready room and launch on a mission, will they complete the rescue—or will they return empty-handed, weary, and beaten; with sorrow in their hearts because something in the lifeline failed to work?

On the Kaman synchropters - the HOK-1, HUK-1, H-43A and H-43B models - the electrically-operated rescue hoist has certain operational and maintenance requirements in common. These



EDITOR'S NOTE: *This article by Mr. Morris replaces his regular column, "More From Les." The column will be continued in subsequent issues of Rotor Tips.*

NEXT MONTH: ***AIRBORNE FOAM KIT***

common factors will be discussed in this basic article. The factors that are specific to only certain models are discussed on supplementary inserts in this issue. It is suggested you read and retain the sheet that applies to the models you are operating, and discard the others to avoid confusion.

It is most urgently recommended that you review all applicable sections of the handbooks and technical orders. Then take a long and critical look at the life line. Will it save you if you happen to be next on the list?

COMMON FACTORS FOR THE HOK-1, HUK-1, H-43A, H-43B RESCUE HOISTS.

These rescue hoists are electrically operated. They wind 100 feet of cable around a drum. The cable is guided through a level-wind device that travels back and forth on an endless "Yankee" screw thread. They are equipped with an explosive cartridge-type cable cutter for use in case of cable fouling. They have a friction brake which automatically engages when the power is shut off, and automatically disengages when power is applied to raise or lower the cable. On the end of the cable is a large hook with a safety guard to prevent the load from slipping off the hook. There is a down-limit switch and an up-limit switch, to prevent overtravel and damage at either extreme. There are cable guides and pulleys. And of course there are the manually-operated switches for the pilot and the crewman, as well as the circuit breakers, and the arming switch for the cable cutter.

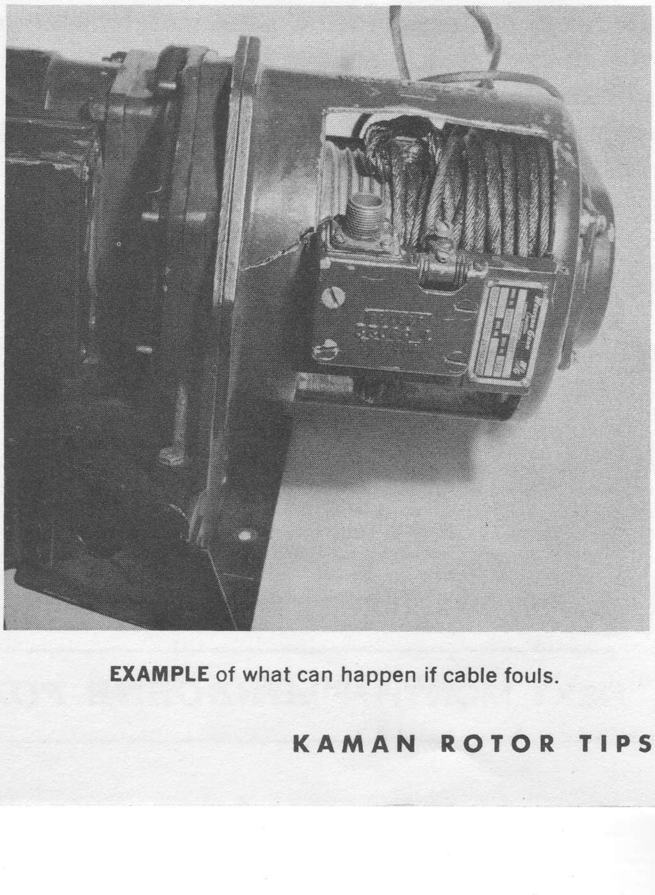
Sounds like a straightforward system, doesn't it? But each one of those items just mentioned can fail or malfunction and a life can hang in the balance. Take them in order. Here are the points to be SURE of:

CABLE

Stainless steel cable is used for obvious reasons. Field reports have been received indicating some success with 5/32-inch standard 7 x 19 aircraft cable. The prerogative for using such non-authorized cable must be left to the respective operating activities since such cable does not come within the specified tolerance of 0.186 inch to 0.192 inch, and has a tendency to untwist when load is applied. The cable diameter must be within the limits cited. A larger cable will fill the drum too fast causing the cable to start back on the next layer before the level wind has completed its travel. For these reasons, procuring services specify a non-twist cable, assembly FSN R1680-560-1348-AKAT for the HOK-1 and HUK-1 and FSN 1AJC-1680-684-0161 for the H-43B. A FSN will be assigned to the H-43A cable assembly when a request for procurement is received.

LEVEL WIND

Before the cable feeds onto the hoist drum, it passes through a level-wind device which is driven back and forth by means of a diamond-shaped follower, traveling in an endless screw thread or groove in a rotating shaft. If dirt or grit is permitted in this groove, the follower will scrape it up and when there is sufficient accumulation, it will jam. Instances have occurred where the build-up of foreign material caused the follower to cock and contact the sharp corner where two grooves crossed, damaging both the follower and the



EXAMPLE of what can happen if cable fouls.

shaft, and jamming the hoist. The groove and shaft should be kept clean at all times in anticipation of an emergency requirement. A dry lubricant such as powdered graphite may be used sparingly (to avoid packing), but do not use oil or grease which would collect dirt and dust. Obviously, the level-wind must be rigged in strict accordance with the handbook; otherwise it will get out of phase with the cable on the drum and fouling can occur.

CABLE CUTTER

Recent experience has shown that the cable cutter can be a source of considerable trouble if improperly installed. The cable passes through a slot which is elongated to permit freedom for the cable as it winds from one end of the drum to the other. Two nuts retain the cutter housing to the mounting bracket. If the housing is allowed to twist when the nuts are tightened, the cable may chafe on the edges of the slot. This could occur in operation if the nuts are not properly torqued. In addition, the cutter housing can be moved endwise by backing off one nut and tightening the other. If this adjustment is not properly made, the cable may contact one end of the slot at one extreme of cable travel, and chafing will result. Also, some cutters may have sharp corners on the inside surface of the slot. This would increase the possibility of cable damage in case of misadjustment. Action is in process to assure that the cutter slot is properly positioned on installation in the field (keeping the cable taut while the adjustment is being made); to establish a specific torque of 500 lbs. inch (plus or minus 50) for these nuts; and to add a 3/32 - inch radius to the edges of the slots that don't already have it.

The cable-cutter circuitry and switches must be in good shape, of course. Review the handbook and follow the required checks, replacement of cartridge, cap, etc.

BRAKE

The hoist brake may be the source of some difficulty if the adjacent shaft bearing grease seal leaks. The grease then mixes with the powder that has been produced by brake wear, and when sufficient heat is generated during subsequent hoist operation, the mixture can develop into a shellac-like substance on the brake surfaces. This can cause the brake to hang up and prevent the hoist from operating. A change proposal is in process to provide a shaft bearing with an improved grease seal and the addition of a vent hole in the hoist brake housing to allow dust from the brake lining to escape. In the interim the problem should be alleviated by adherance to the operating recommendations provided under Motor Overheating paragraph. In the event the problem does arise, it is usually possible to locally disassemble the brake section of the hoist, clean up the disc surfaces, and put the unit back into operational condition. Care must be exercised on reassembly to avoid injury to the brake coil wiring.

HOOK

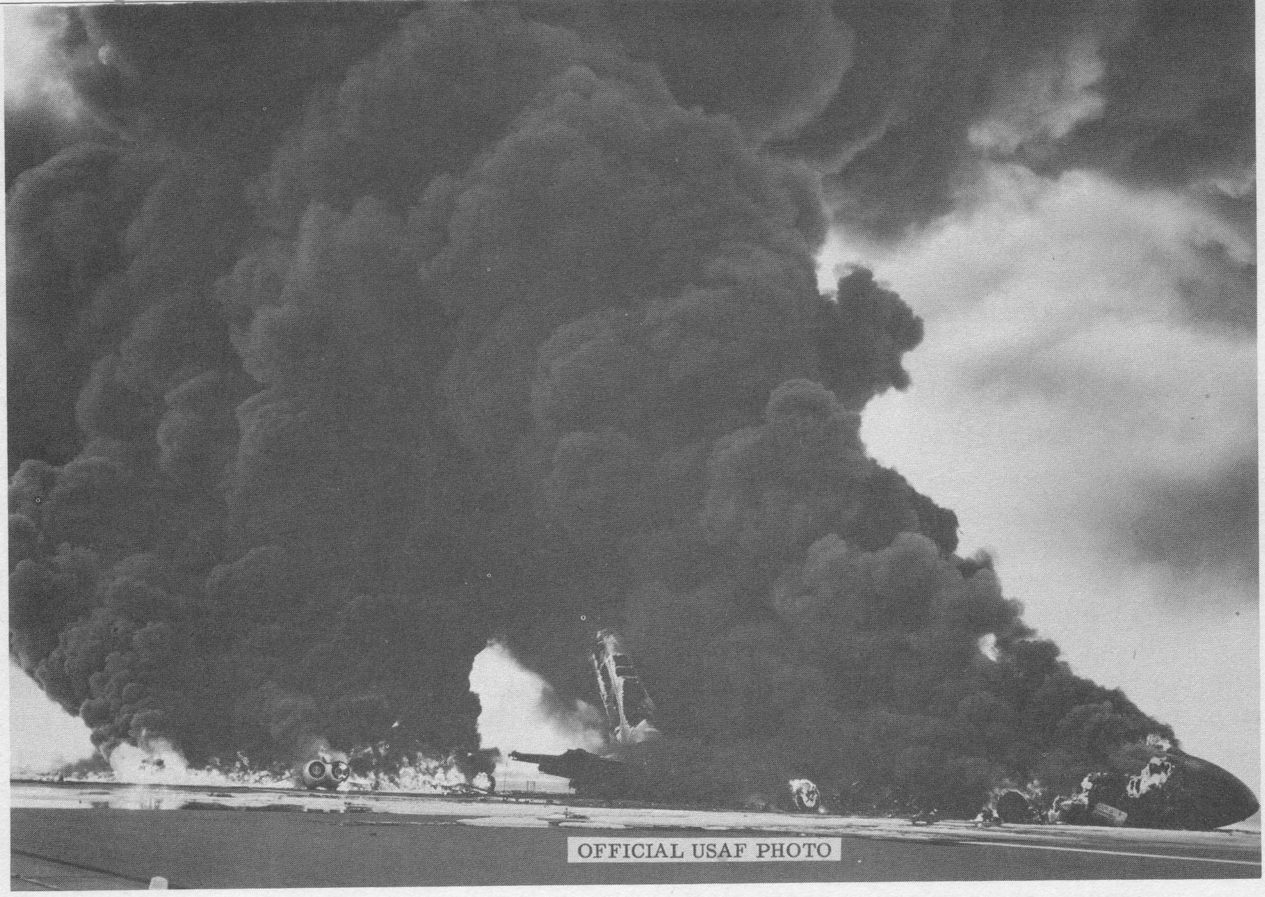
All models now are equipped with a stainless steel hook of the proper specification to eliminate the corrosion that was a factor in the earliest deliveries. No further problems of this sort should be experienced. In common with the military and the rest of the industry, however, we are still looking for the best solution to prevent the lifting ring from ever becoming disengaged from the hook. The present safety guard is being further refined toward this end, and if current tests prove satisfactory, the information will be forwarded promptly through proper channels.

LIMIT SWITCHES

The down-limit switch reacts to the cable diameter as it unwinds from the drum. The only serious trouble with this switch occurred when the switch arm was caught by a loop of fouled cable and damaged. Obviously, if the hoist is functioning properly, a loop will not develop in the cable and the damage to the switch arm will not occur.

The up-limit switch offers additional need for attention, however. If it is not properly

continued on page 18


OFFICIAL USAF PHOTO

ALL WERE SAVED - An Air Force H-43B Huskie from the 4170th Strategic Wing and its courageous crew have been credited with playing a key role in saving the lives of the 10 crewmen and passengers aboard this B-52 Stratofortress which was destroyed by fire last month after a crash landing at Larson Air Force Base, Washington.

Capt. Howard J. Cochran was the pilot and 1/Lt. Donald R. Couture was co-pilot of the H-43B which carried out its life-saving mission while fuel cells exploded one after another in the furiously burning bomber beneath it, threatening to set off the entire 128,000 pounds of fuel aboard. One explosion blew the helicopter several feet backward through the smoke-filled sky but, undamaged, it resolutely returned to its task. Fire-fighters aboard the Huskie were M/Sgt. Samuel R. Hoar and T/Sgt. Henry M. Ivey.

Despite the terrific heat, the pilot hovered the helicopter between 20 and 30 feet over the crash for approximately 30 minutes, using the Huskie's rotor downwash to drive the flames away from raw fuel spilling from the bomber's ruptured tanks. This allowed the crewmen to scramble to safety and also aided the fire-fighters on the ground in their battle to save the giant aircraft. Only one member of the B-52's crew, the tail gunner, was injured after leaping almost 20 feet to the concrete runway. One of the Larson AFB firemen, who pressed close to the bomber in the valiant but futile effort to extinguish the blaze, suffered burns on both hands.

The H-43B's mission began when the alert was received that the B-52 and a KC135 jet tanker had been involved in an aerial accident during a refueling exercise. The bomber, with one wing damaged, was directed to Larson. The tanker, its refueling boom ripped off, landed safely at Fairchild Air Force Base.

The H-43B was airborne with its fire suppression kit and the runway was lined with fire trucks when the B-52 made the emergency landing and then caught fire. When the bomber came to a stop the waiting H-43B immediately released the fire suppression kit next to the burning aircraft; however, the helicopter pilot decided not to use the kit since the fire trucks were arriving at the scene. The helicopter then took a position over the nose of the burning aircraft, forcing the flames, smoke and fuel back so the crew could escape. K

LIFELINE AT WORK - A Navy HUK-1, shown below, from the aircraft carrier USS Valley Forge hovers over the stern section of the American tanker Pine Ridge before lifting another of the crewmen to safety. The aircraft, attached to Helicopter Utility Squadron Two, Lakehurst, N. J., air lifted nine of the 28 crewmen who were rescued last month by helicopters from the Valley Forge.

Flying the HUK-1, Commander Charles B. Campbell Jr., commanding officer of HU-2, rescued four of the survivors. He was accompanied by Vincent M. Proto, ADR3; and Keith L. Heliin, AMH2. Lt. (jg) Frank J. Erhardt Jr., with Charles E. Reuter, ADR3; as crewman, made five rescues in the HUK-1.

The waves were still running at 10 feet or more when the first helicopter pickups were made and the wind was blowing at about 22 knots. One-by-one the relay of helicopters went through the touchy and hazardous routine—hovering in a fixed position above a weather deck of the tanker's stern and lifting the survivors singly on the rescue hoist. Tricky part of the operation was in keeping the rising and falling hulk from hitting the 'copters or striking the survivors as they were reeled upward to safety aboard the HUK-1.

A witness said, "The bow section was heavily waterlogged and riding vertically in the water, the stern section of the tanker was wallowing badly in the heavy seas. Helicopters had to fly close to a small weather deck over the after end of the ship to dangle a sling to the men waiting below.

"The aircraft were in constant danger of being hit by the stern section as it rose and fell, or of being pushed against the smoke stack. Time after time they were forced away to make a new approach. As each helicopter went in to make a pickup, others circled in an approach pattern nearby."

The Pine Ridge was ripped apart by mountainous seas raised by gales of 50-60 knots, 100 miles east of Cape Hatteras, N. C.—storied graveyard of the Atlantic. The tanker was out of New York City for Corpus Christi, Texas, when the bow broke away and capsized, throwing eight of the crew, including the captain, into the water. The rest of the 37-man crew were in the stern section of the ship.

When the Pine Ridge began breaking up, distress signals summoned the Valley Forge from Florida waters. The Coast Guard also responded to the call for help. The Valley Forge launched her first helicopter at 6:45 a. m. and completed the hazardous rescue operation by 4 p. m.

FINAL CHECK-OUT is given the Automatic Stabilization Equipment (ASE) on the HU2K-1 trainer at Kaman Aircraft by Navy personnel from the Naval Air Mobile Trainer Group at NAS Memphis. Left to right are O. Z. Williams, AEC; A. P. MacCracken, AEC; D. W. Glaeseman, AE1; F. G. Bober, KAC instructor; R. C. Mack, KAC design engineer; and H. G. Davis, AEC. Other members of the group, which recently completed evaluating the trainer, are F. H. Brightman, AMCA; W. A. Ruthford, AMCA; R. L. Welch, AD1; W. C. Morris, ADC; A. J. Niemotka, ADC; J. C. Brandon, AD1; C. F. Robertson, AMCA; and S. E. Waldrop, AMCA.

A SPECIAL H-43B MAINTENANCE TRAINING CLASS was held last month at Westover Air Force Base, Mass., by Kaman Aircraft instructors for members of the base rescue unit which recently received the turbine-powered helicopters. Left to right, standing, are Raymond Vokes, KAC; S/Sgts. William D. Perkins, Jr., Collin R. Hammock and Joseph H. Dodd, Jr.; A2C Robert L. Schrader, Donald Tancredi and Gerald Legault, KAC. Kneeling are S/Sgt. B. Cutris Ellis, A2C Burton A. Kinney and A1C Maurice F. Morin.

PARACHUTE JUMP AT ROBINS AFB—FIRST FOR HUSKIE

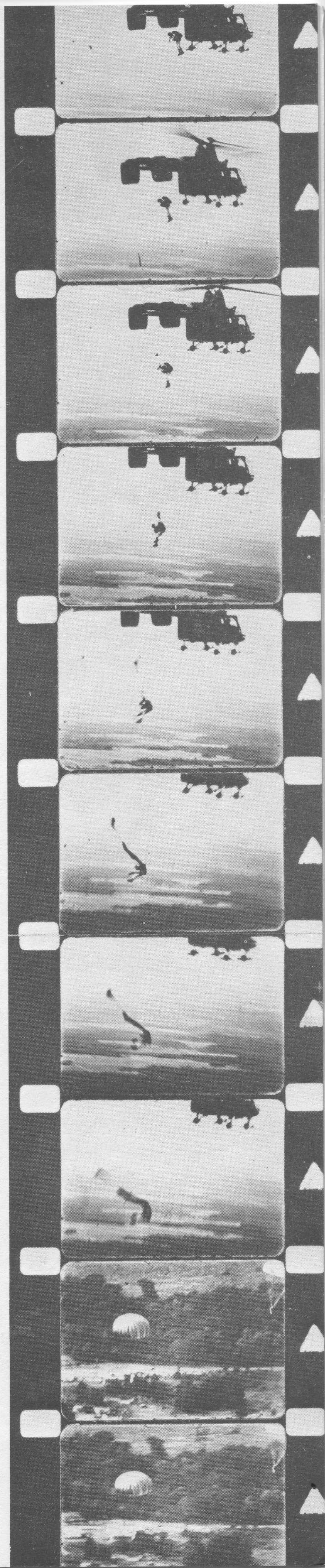
OFFICE OF INFORMATION, HQ. WRAMA, ROBINS AIR FORCE BASE, GA. —— A jump by two Robins AFB parachutists has marked a "first" for the Kaman Aircraft Corporation's H-43B "Huskie" helicopters. Two "Huskies" have been acquired by the base for use in search and rescue operations and the jump was a simulated rescue attempt. It was the first time that a jump has been made from the Huskie.

The versatile H-43B proved its worth as Staff Sergeant W. P. Timbrook and Senior Master Sergeant Sam Neira left it at an altitude of about 1500 feet and plunged toward a life-raft canopy which had been spread on the ground as a target. Both Sergeants landed close to the canopy, a feat which was no surprise to those who know them. Although this was a first for the "Huskie", the jump was no novelty to Timbrook and Neira, paramedics assigned to the Strategic Air Command's 4137th Strategic Wing at Robins who are working with the Headquarters of the Warner Robins Air Materiel Area in search and rescue efforts. For Sergeant Neira this was the 620th jump and Sergeant Timbrook chalked up his 110th jump.

The "Huskie" is powered by a free turbine and is particularly suited for rescue work because of its high rate of climb, ease of control, maneuverability, and other factors. It is manufactured by the Kaman Aircraft Corporation of Bloomfield, Connecticut.

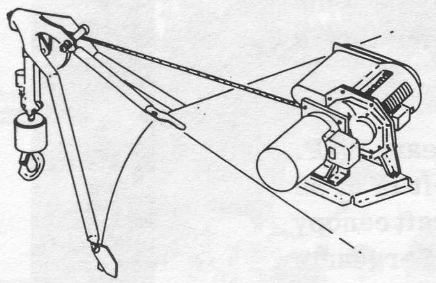
T/Sgt. Virgil McCord was Flight Chief for the operation and the pilot of the aircraft was Capt. John Slattery, recently assigned to Robins and a member of the Headquarters Squadron. He first became interested in 'copters when he was serving with the Marines in Korea. After suffering frostbite he was evacuated by one of the craft. Returning to the States for discharge, he applied for aviation cadets and requested 'copters as his aircraft. He says he hasn't regretted it at all. He came to Robins from Brookley AFB where he participated in 46 search and rescue missions. He'll work in search and rescue at Robins.

An interested spectator at the practice rescue operation featuring the Huskie's first paradrop was Robert Lambert, Field Service Representative for the Kaman Corporation. He agreed that the test was a great success. K



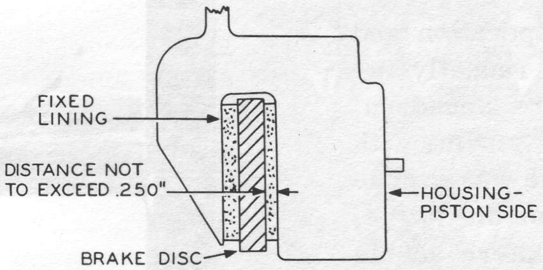
Q's AND A's

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. WHAT IS THE FEDERAL STOCK NUMBER FOR THE RESCUE HOIST CABLE ASSEMBLY? (Applies HOK-1, HUK-1, H-43B)

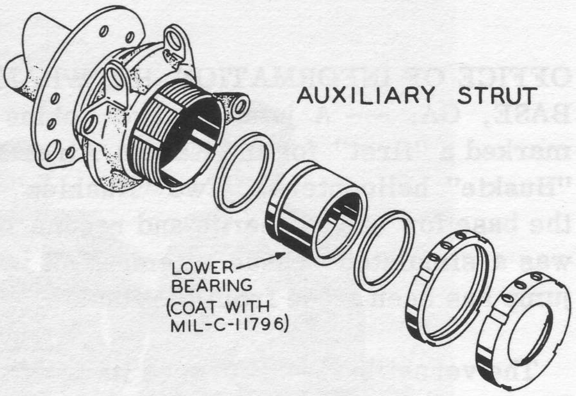
A. FSN R1680-560-1348-AKAT applies to HOK-1, and HUK-1 cable assemblies P/N K386223-1. FSN 1AJC-1680-684-0161 applies to H-43B cable assembly P/N K731607-1. Federal Stock Number for the H-43A, P/N K386223-1 has not yet been assigned. — A.D.C.



Q. HOW CAN EXCESSIVE WEAR ON WHEEL BRAKE LININGS OR "PUCKS" BE DETERMINED? (Applies HOK-1, HUK-1, H-43A, H-43B)

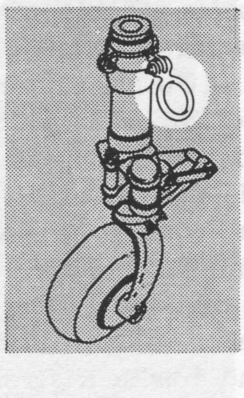
A. Excessive brake lining wear can be determined by inserting a feeler gage between brake housing and disc with brakes held "on." If this distance is greater than 0.250 the linings or "pucks" should be replaced.

Complete procedures for servicing brake assemblies are given in NAVAER 03-25GAC-502 and T.O. 4B-1-32. — W.J.W.



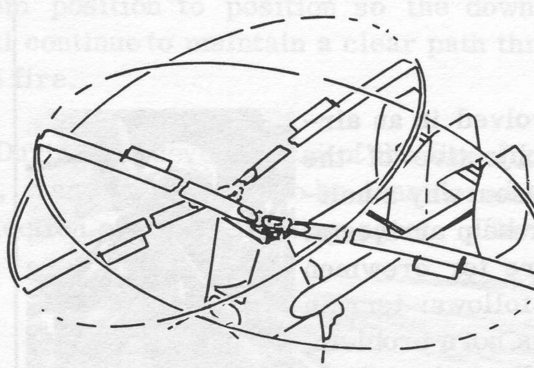
Q. WHAT IS THE CAUSE OF THE HEAVY CORROSION IN THE OLEO STRUT CYLINDER LOWER BEARING SEAL AREA? (Applies HOK-1, HUK-1, H-43A, H-43B)

A. Cleveland Pneumatic Tool Co. strut drawings call out a protective coating for all bearing surfaces during assembly. The protective coating acts as a dielectric insulator moisture barrier to prevent the galvanic action of dissimilar metals between the bronze lower bearing and the aluminum cylinder. It is believed that field organizations are cleaning the inside of the strut cylinders and lower bearings during strut seal replacement, and are not applying the protective coating during reassembly. Recommend that MIL-C-11796 or MIL-C-16173 be used for this purpose. — R.S.W.



Q. IS IT PERMISSIBLE TO TOW THE HOK-1, HUK-1 AND THE H-43A HELICOPTER BY USING THE AUXILIARY LANDING GEAR TIE-DOWN RINGS? (Applies HOK-1, HUK-1, H-43A)

A. NO! The tie-down rings have been designed for athwartship loads (i.e.: from side-to-side). Applying forward loads to the tie-down rings while towing could result in structural damage to the upper support fitting with possible ultimate failure. Also, use of a tow bar inserted in the two rings has resulted in damage to the strut. (A recommendation to revise Fig. 2-72, Item 10, Page 2-87, T.O. 1H-43A-2 and Fig. 2-73, Item 10, Page 132, NavWeps 01-260 HBA-2 is in process. Towing Instruction in Section I, Para. 1-18, T.O. 1H-43A-2 and Section I, Para. 1-21, NavWeps 01-260 HBA-2 should be followed). — R.S.W.



Q. WHAT ARE THE ROTOR OVERSPEED LIMITATIONS AND WHAT ACTION SHOULD BE TAKEN AS A RESULT OF VARYING DEGREES OF OVERSPEED? (Applies HOK-1, HUK-1, H-43A, H-43B)

A. The normal maximum rotor operating limit for the HOK-1, HUK-1 and H-43A is 250 rpm. Higher rpm will reduce lifting efficiency, and will impose unnecessary stresses on the rotor system. The following action should be taken in case it occurs:

The limits listed below apply to either in-flight or on ground overspeed.

250 to 279 rpm - visually inspect rotor blades.

280 to 312 rpm - overhaul blades, hubs, teeter pins and lag pins.

over 312 rpm - scrap blades, hubs, teeter pins and lag pins.

The normal maximum rotor operating limit for the H-43B is 105% or 260 rpm. Again, higher rpm will reduce lifting efficiency and will impose undue loads on the rotor system. The following action should be taken when this is encountered:

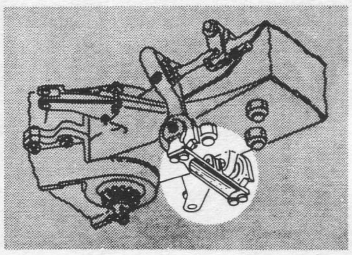
105 to 111% - (260 to 275 rpm) on ground, is permitted for necessary ground rigging or pre-flight checks and does not require a special inspection.

105 to 111% in flight - (260 to 275 rpm) visually inspect rotor hubs, blades and accessible control linkage from azimuth to flaps.

111 to 117% - (275 to 290 rpm) visually inspect rotor hubs, blades and accessible control linkage from azimuth to flap, in addition, the drive shaft between the engine and transmission must be overhauled.

Over 117% - (290 rpm) scrap the azimuth spindle assembly, and all controls from the azimuth to flaps. The hubs, blades and lag and teeter pins also must be scrapped.

NOTE: The rotor tachometer is calibrated to 110% but indicates 117% at full clockwise travel of the indicator needle, against the stop. See T.O. 1H-43A-1 and FID B-15, 25 March, 1960. — C.J.N.



Q. I UNDERSTAND THAT THE IN-FLIGHT TRACKING TIE-BAR PART NO. K359279-11 AND -12, LOCATED UNDER THE ROTOR BLADE U-CRANK CAN BE INADVERTENTLY INSTALLED BACKWARD CAUSING IMPROPER RIGGING AND INTERFERENCE IN THE ACTUATOR LINKAGE. HOW IS THIS CHECKED AND HOW IS IT CORRECTED? (Applies HOK-1s with In-Flight tracking equipment, HUK-1, H-43A)

A. It's easy to spot. The chamfered side, with the concave surface, should face outboard. If one is found reversed, simply remove the four (4) bolts with the heads safety wired, and switch the tie-bar end-for-end. Install the bolts and safety wire. See FID No. A-54, dated 9-9-60. Revision to applicable handbooks are forthcoming reflecting the above. — N.E.W.

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Report FROM THE READY ROOM

FIREFIGHTING WITH THE HUSKIE

BILL HOERMAN
Test Pilot

Immediate aid for crew members involved in an aircraft crash fire—that's a primary objective of the H-43B's fire-fighting mission. The reason why a helicopter must be used is basic, the sooner help arrives at a crash scene the better the chances are for crewmen survival. The main advantages are as follows: terrain interference enroute to the crash scene is not a problem, rapid deployment of the fire-fighting kit allows for effective suppression of the flames before they have become too large, an aerial ambulance is available for rapid movement of injured personnel to the hospital. The fire-fighting kit is intended to suppress the fire long enough to provide entry by fire-fighting personnel but not necessarily to accomplish complete extinguishment.

Although the fire-fighting mission does require special training for pilots and crewmen, it is not considered difficult. The H-43B is especially well suited for this mission due to its rotor downwash characteristics, excellent stability characteristics in a hover, power available, unobstructed cabin space, and excellent cockpit visibility.

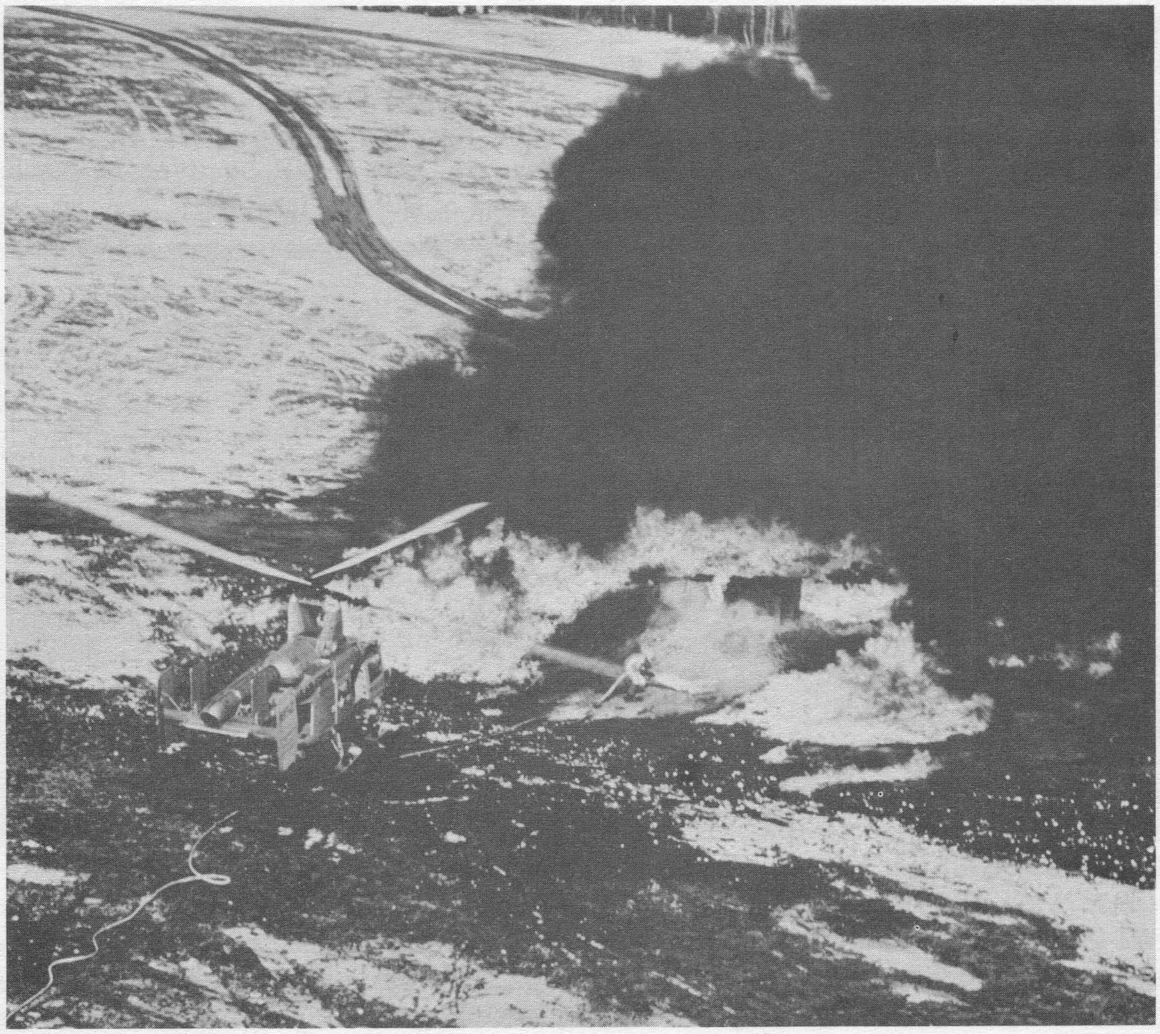
The fire-fighting team includes a pilot, and two rescue technicians trained in first aid. The team can vary, depending on local conditions, to include a co-pilot, and/or another rescue technician. The need for the utmost in crew coordination cannot be emphasized too strongly. This coordination should definitely include the ground personnel who will be hooking up the fire-fighting kit. Any member of the crew who is not properly trained and briefed can cause the mission to end in failure.

It must be remembered that the majority fire-fighting practice will be accomplished under near ideal conditions, with flight and personnel safety the paramount consideration. Therefore, the crew should fully realize that standard training techniques may have to be altered in the event of an actual crash, due to the terrain, obstructions, wind conditions, etc.

After delivery of the fire suppression kit and the rescue team to the scene of the crash, the main function of the H-43B is to provide rotor downwash. When combined with the foam sprayed by the lead fireman, this downwash maintains a "habitable" path and allows the rescuer to safely walk between the walls of flame to the downed aircraft. The downwash also provides both the firemen and aircraft occupants with cool air for breathing purposes and increases the firemen's visibility by blowing the flames and smoke aside. The H-43B pilot can also compensate for wind changes by rapidly moving the helicopter from position to position so the downwash will continue to maintain a clear path through the fire.

During the development of the fire-fighting kit, many factors had to be considered in the selection of a fire-fighting agent. The primary consideration was the effectiveness of the agent when used in the helicopter downwash. The secondary consideration, but also very important, was the weight of the kit and the agent. There were only two types of agents available that could be considered, dry chemical and foam. After many tests, it was determined that foam was far superior in many ways. Dry chemical and its containers were heavy, caused nausea to the firemen, had no permanency (i.e., the fire would flare up after it apparently had been put out). These problems were eliminated with the use of foam. We have made entries into fire of 1500 gallons of JP-4 with the present kit with no trouble.

At this point I believe it would be a good idea to go through a simulated rescue procedure for those not familiar with it.



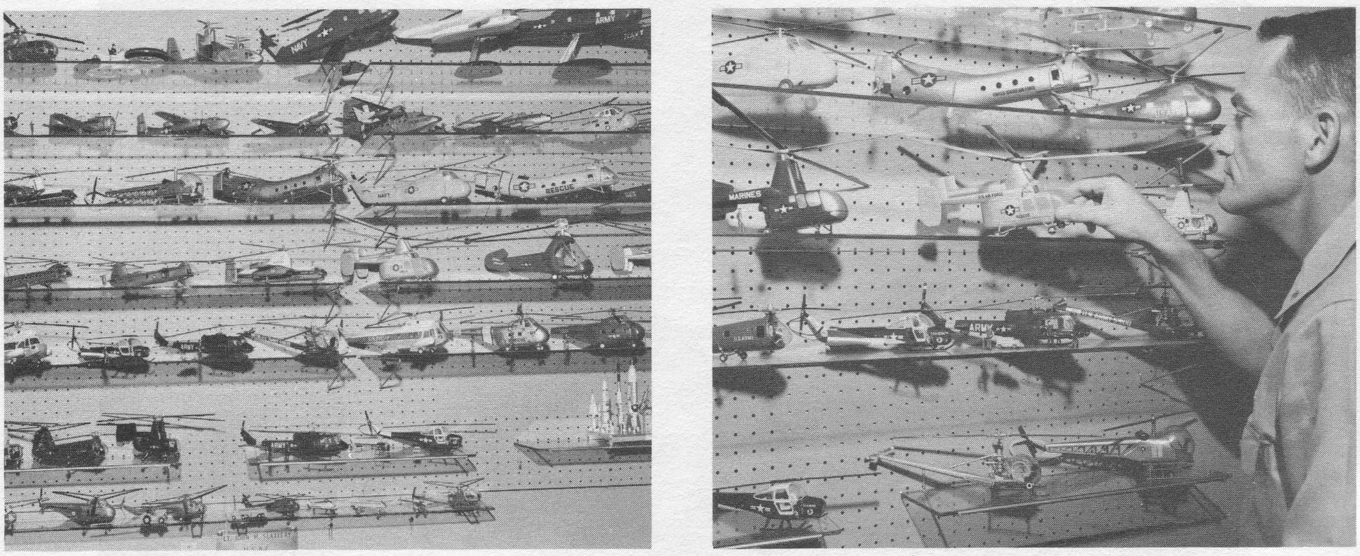
HOVERING HUSKIE uses rotor downwash to blow flames down and away from burning "aircraft" as two firemen cut their way to the simulated cockpit with foam.

After being alerted, the pilot, firemen and ground crew run to the helicopter on the line. Due to the fact that the aircraft had already been preflighted and all necessary switches turned on, the start is made immediately, during which time the pilot and firemen are strapping in. As soon as the engine is started, the rotor brake is released. As soon as the rotors are up to sufficient rpm, the aircraft is made airborne, made possible by the turbine engine which requires no warmup. As soon as the helicopter is in a hover, the ground crew accomplishes the hookup of the fire-fighting kit.

The helicopter with its firemen and the fire-fighting kit proceed directly to the crash scene. Upon approaching the fire, the helicopter pilot sizes up the situation with respect to wind direction and its speed, terrain slope and obstructions. After deciding a safe approach can be made (into the wind if possible), the pilot sets the fire-fighting kit on the upwind side and approximately 75 feet from the fire. The helicopter is then moved away from the kit and is landed to let out the firemen, direction depending on wind, after the firemen have actuated the fire-fighting kit, the helicopter comes into a hover to work with the foam to open a path to the downed aircraft. As the firemen enter the fire, and make a path with the foam, the helicopter is hovered in the best position to protect the occupants of the fire. After the downed crew members have been removed from the fire, the helicopter lands to allow firemen to load the injured personnel in the litters that are provided. The helicopter is then flown to its destination as the situation dictates.

In summary, I feel that the crash fire concept as performed by the Huskie is a very sound and sensible approach to the aircraft safety program. Provided it is given the wholehearted support by Command, Supervisory, Operations and Supply personnel, it definitely will perform the mission for which it is intended.

More detailed descriptions of the techniques to be used when hooking-up the fire suppression kit, directing the rotor downwash during rescue, ect., will be given in a subsequent issue of Rotor Tips. K



CAPT. JOHN SLATTERY, USAF, of the Search and Rescue Section, 2853rd Air Base Wing, at Warner Robins Air Force Base, Ga., adds the latest model, an H-43B HUSKIE, to his impressive collection. He is currently flying the turbine-powered aircraft. An enthusiastic helicopter booster who will talk shop at the proverbial drop of a hat, Captain Slattery also keeps detailed information on all types of 'copters neatly cataloged in a file cabinet. Most of the models he assembled in his workshop. "Putting them together is the best way to learn the different types," he says.

DESIGN FOR SAFETY

by LEONARD STRUMPF
Chief, Structural Design

In the early stages of design of a helicopter many different elements are given consideration in order to produce a final design which will embody the best features of performance, reliability, maintainability, and safety. One area which has always received a great deal of emphasis at Kaman is safety of the crew in the event of a crash.

Recently, Kaman's concern in this area paid off when an H-43B Huskie crashed at an Air Force Base. Although the helicopter was severly damaged, the crew escaped with only minor injuries. Witnesses on the spot indicated that it was the rugged overturn characteristics of the Huskie which were responsible for the injury-free survival of the crew. This design feature prevented the roof and sides of the helicopter from collapsing in on the crew. It may be of interest to discuss the many things that were considered before this design was finalized and incorporated in the H-43B.

There is a great deal of data available which shows that, given the proper kind of protection, crew members can survive crashes which produce high peak "G" loadings. Military specifications establish certain minimum acceptable strength levels for seats, lap and shoulder belts, etc. Adequate protection, however, requires more than just designing the seats and their supports for some high "G" loads; in fact the capability of absorbing crash force energy is of prime importance. It requires that the cockpit and surrounding airframe be a well integrated design so as to afford the maximum amount of protection for the crew.

Previous experience with other Kaman helicopters, the HOK and the HUK, had shown that the forward shelf, to which the pilot and co-pilot seats are attached, had a great deal of built-in strength and could withstand extremely severe loadings without damage. There were a number of instances where, in spite of severe ground impacts, the forward tray suffered only a minimum of damage and rigidly hung on to the seats and their occupants. The same kind of construction has been designed into the H-43B. In addition, it was decided to incorporate some sort of turnover structure in order to improve the crew's chances for survival in the event of a rollover or an impact on the side of the helicopter.

In attempting to design an adequate turnover feature into the helicopter, Kaman engineers were faced with several problems. How would it be fitted into the overall structural design and arrangement of the helicopter? In order to do a satisfactory job it would have to be well mated to, and become a part of the primary structural elements of the aircraft.

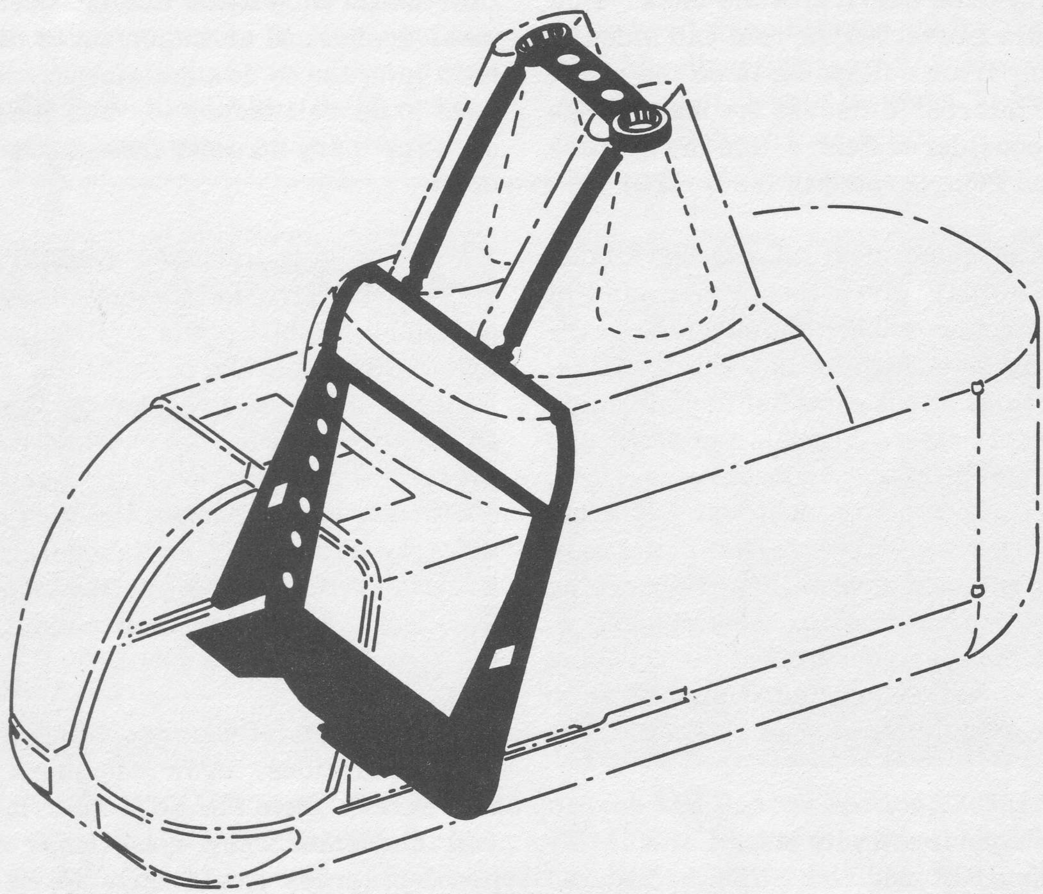
How would it influence visibility? Kaman helicopters have long been known for their excellent visibility and certainly, since the prime mission of the H-43B for the Air Force would be local base rescue, good visibility is obviously required. In addition, the fire suppression technique developed at Kaman requires good coordination between the pilot in the aircraft and the fire fighters on the ground and once again good visibility is a necessity. The design must not compromise this essential feature.

How would it influence such things as rescue hoist operations, crew members entry into and egress from the helicopter in both normal and emergency conditions? All these problem areas would have to be accounted for before the design could be finalized.

After considering the above requirements it appeared that the optimum arrangement would be to place a bulkhead somewhat aft of the pilots' seats. This arrangement was mocked up and then evaluated by engineering, flight test, and service department personnel. The design as finally incorporated in the H-43B represents an integration of ideas and comments from the above departments.

The major element in the turnover structure is the canted bulkhead just aft of the pilots' seats. This bulkhead is a continuation of the rotor pylon forward support structure and is continuous into the lower tub assembly of the forward shelf. It is one of the primary structural members of the airframe and as such is of rugged construction. In addition, the bulkhead is reinforced by triangular beams which run from the upper to the lower door sill. Together these elements form a solid support for the forward shelf, the sides, and the roof of the helicopter in such a manner as to prevent the cockpit area from collapsing in on its occupants in the event of a rollover. This has been accomplished without compromising any of the desirable features previously mentioned.

Every effort is made during the design and development stages of the helicopter to root out those areas where malfunctioning of some part of the machine would lead to an accident. In spite of this, however, accidents do occur, and we at Kaman are gratified that the objective of providing a maximum of safety for the crew, and the detail engineering to achieve this objective, has been successfully demonstrated in an H-43B accident incurring major damage from rolling and tumbling fuselage impact. K



DESIGN FOR SAFETY

SCROLL OF HONOR

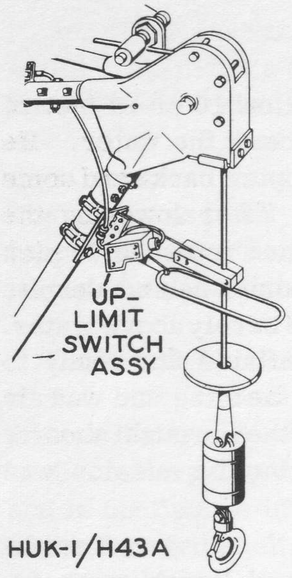
A Navy pilot and two crewmen have received Scroll of Honor awards from Kaman Aircraft for the rescue of a 12-year-old Guamanian boy whose sinking outrigger canoe was being driven by heavy seas toward an island reef.

Lt. (jg) A. E. Weseleskey, USN, of Station Operations, NAS Agana, Guam; piloted an HUK-1 on the mission which was accomplished despite 20-knot onshore winds and heavy rain. He was accompanied by Aviation Machinist's Mate 3rd Class Edward R. Molloy and Airman Richard W. Jordan.

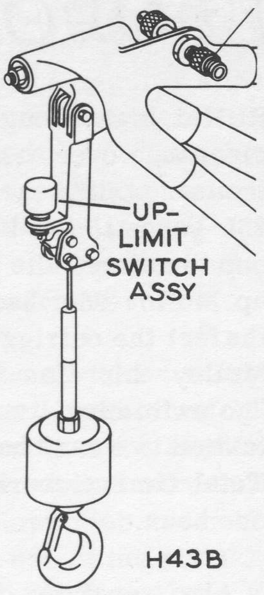
In order to assist the boy in the canoe, Molloy was lowered from the helicopter but an unexpected complication arose when the helicopter's hoist motor malfunctioned with 25 feet of cable out. When Jordan found it impossible to make emergency repairs, he signalled to Molloy who then placed the young canoeist in the sling and made sure he was secure. Lieutenant Weseleskey took the HUK-1 high enough to allow 10 or 15 feet of clearance over the surface of the water. He then air taxiied the helicopter backward some 250 yards to the beach. After lowering the boy to safety, the pilot then returned to pick up Molloy who had remained behind despite the fact the outrigger was barely above water. Molloy, his Mae West inflated and ready to "go swimming," entered the sling and was air taxiied to a sand bar and then brought aboard. Total time airborne during the mission was one hour.

Also receiving Scrolls of Honor were Lt. (jg) Thomas J. Chider, USN, and his crewman, Aviation Machinist's Mate 3rd Class John E. Prekopa, HU-2, NAS Lakehurst, N. J., for rescuing two of four persons aboard a fixed-wing aircraft which stalled on a single engine approach to a carrier. The Lieutenant and his crewman were manning an HUK-1 which was on standby rescue duty aboard the carrier when the accident occurred. K

RESCUERS HONORED—Bill Magnan, Kaman Aircraft Corp., representative presents honor scrolls and "rescue pins" to Lt. Frank Heggood of NAS Jax and Duval Road Patrolman John Britts who combined to make a dramatic rescue of a man stricken while at sea. The awards were presented last week in a ceremony in the office of Sheriff Dale Carson in the County Courthouse Building. On left is Road Patrol Chief William F. Johnston. Official Navy photo.



HUK-I/H43A



H43B

continued from page 5

rigged in accordance with the handbook, damage will result to the cable or other parts of the hoist installation. Be sure of this rigging. Up-limit switch and bracket damage can also result from a malfunctioning hoist motor brake.

GUIDES AND PULLEYS

These devices are installed in order to minimize wear and tear on the cable. Sometimes sharp edges or deep gouges are allowed to develop which can only lead to trouble. Accumulations of dirt and foreign matter add to the difficulties. If the bolts across the edge of the pulley are left out, or installed without a sleeve when required, the cable may jump the pulley and jam.

SPARES

Detail spares are available in the supply system, of course, for such items as cable cutter cartridge, bulk cable, and miscellaneous small parts. It may be helpful to point out, however, that the hoist motor may be obtained separately; or that the winch, drum and level-wind assembly (less cable) may be obtained without the motor. Original procurement under the H-43A program was for complete assemblies, however, only eight of these were shipped. The balance of spares were supplied as separate components.

OPERATION

The importance of having well-trained personnel, experienced with the particular rescue hoist installation to be used, cannot be over-emphasized. For example, in one model helicopter, a certain drag angle on the cable may cause the up-limit switch to shut off the hoist motor, while in another model everything may still be functional at a considerably greater drag angle. The control of the swaying cable, the guidance of a cable during feed-out, or the cycling of the motor to "chase" the waves in an over-water rescue, all introduce a skill requirement that can only be gained by experience. It's a poor time to "check out" on the operation of a particular hoist with a survivor dangling from the end of a cable during an actual rescue operation.

In the last six months, two rescue missions were accomplished DESPITE the fact the crewmen had no formal training in hoist operation. In both instances the circumstances were such that inexperienced personnel were aboard when the call for help was received. The pilots in each case, while enroute to the rescue site, did a commendable job of briefing their involuntary crewmen on how to operate the hoist and manipulate the cable, but in the excitement, they neglected to give them any instructions on the extreme importance of staying clear of the helicopter controls. Things got pretty hairy when the crewmen pushed themselves around in the seat by bracing a foot against the rudder pedal, used the cyclic stick as a hand-hold while they leaned out of the helicopter, or shoved the collective stick full down as the rescuee came in over the side.

Both these experiences point out that, no matter what the circumstances, the pilot should know that those in the helicopter he is flying understand the importance of staying clear of the controls and, during a rescue mission, they are checked out on the hoist controls. His life, and the lives of others, could depend upon this knowledge.

Those who man the rescue helicopters have shown time and again a willingness to "stick their necks out" in order to perform rescues far at sea, at night, or over rugged terrain. Good maintenance and operational know-how, when combined with this spirit of service, form a truly dependable lifeline. Remember —IT COULD BE YOURS! K

CURRENT CHANGES

FIELD INFORMATION DIGESTS (KAMAN)

Applies - H-43B

No. B-24, Supplement No. 1, 21 December, 1960
Visual Inspection of Rotor Hub Assemblies for Surface Damage.

No. B-33, 23 December, 1960
Positioning of Clamp on Rotor Shaft.

No. B-34, 22 December, 1960
Collective Pitch Lever Management to Avoid Area of Reduced Control.

TIME COMPLIANCE TECHNICAL ORDERS (USAF)

Applies - H-43A

T. O. 1HA2-5-5-501, 6 December, 1960
Replacement of Disc. Assembly P/N K777010-1 With P/N K377552-5 H-43A Fan Assembly P/N K777003-1.

Applies - H-43B

T. O. 1H-43B-517, 1 December, 1960
Replacement of Fuel Filter P/N 52-2145-002 With Filter P/N 52-2438-001 - H-43B Helicopters.

T. O. 1H-43B-528, 7 December, 1960
Modification of Longitudinal Damper Mounting Structure H-43B Helicopters.

Frank Horn, well known at most military bases where Kaman helicopters are operating, has been appointed Assistant Field Service Manager at The Kaman Aircraft Corporation. The appointment was made by Charles L. Morris, Assistant Vice President and Field Service Manager.

Mr. Horn, who has 12 years experience as a helicopter pilot, joined Kaman in 1957 as a Service Pilot. Later he served as Customer Operations representative and more recently with Flight Test where he did a large part of the experimental test flying with the H-43B. When the helicopter was introduced into Air Force operations he spent considerable time in the field assisting military pilots in their transition to the new helicopter.

A veteran of 14 years with the Marine Corps, Mr. Horn served during World War II and the Korean conflict, first as a transport pilot and later as a helicopter pilot. Afterward he had extensive high-altitude, commercial helicopter operational experience in the Rocky Mountain area.

As assistant field service manager, he will draw on this background to assure continuing high-level support for operating units where Kaman helicopters are based.

Kaman Service Representatives

on field assignment

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LIFELINE!

THE HUK-1 AND H-43A RESCUE HOISTS

The basic article in this month's issue of Rotor Tips discusses factors of a general nature, common to the rescue hoists on all Kaman synchropters. The comments on this page are directed specifically to the HUK-1, H-43A hoist. If you do not operate HUK-1s or H-43As at your base, it is suggested that you DISCARD THIS INSERT TO AVOID CONFUSION.

MOTOR OVERHEATING

On the HUK-1, H-43A rescue hoist, there are two common causes of motor overheating. One cause is the potential dragging of the brake as described in the basic article in this month's issue of Rotor Tips. The other is excessive cycling of the hoist motor. These hoists reel in 100 feet of cable per minute (instead of 75-fpm as on the HOK-1). Thus, the starting loads are greater. It is recognized that when a true rescue mission is being performed, the hoist will be started and stopped as necessary to accomplish the job. However, specific safe cycles are being developed and will be incorporated in future handbook revisions. Until the information is formally released, it is recommended that hoist cycles be restricted to not more than five starts and stops during lowering of the hoist cable, and five starts and stops during raising of the hoist cable, with a 20-second "rest" period at each extreme of travel. This is based on an 80°F. day. In cooler weather, overheating would be less of a problem.

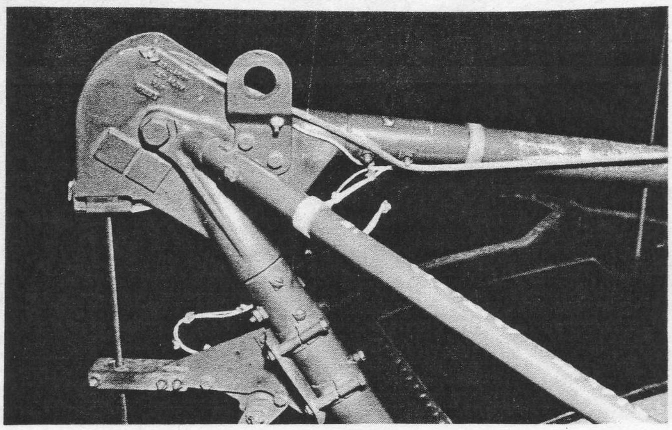
Because the slower 75-foot-per-minute hoist on the HOK-1 has not experienced overheating of the motor due to cycling, consideration is being given to converting the 100-fpm hoists on the HUK-1 and H-43A back to the 75-fpm rate. In the meantime, an understanding of proper hoist cycling, as outlined above, will materially help solve this problem.

UNEVEN WIND

We have had recent reports that the cable in some instances has been winding unevenly on the drum. Investigation as to the cause of this is currently being carried on by both Kaman Aircraft and Western Gear. Improper rigging of the level-wind would cause the winding to get out of phase, of course. The handbook should be checked to be sure this rigging is done properly. Tests conducted to date strongly indicate that cables with a diameter greater than 0.192 inch are the cause of uneven wind, however, further tests will be conducted to confirm these findings. Should such investigation reveal that other factors are involved, information will be forwarded promptly to using organizations through standard channels.

CABLE HANG-UP ON BOLTS

Recent experience has indicated that, if excessive slack is allowed to develop in the cable, it can hang up on a pair of bolts on one leg of the hoist tripod. Action has been initiated to reverse these bolts so there will not be sufficient protrusion to snag the cable. Until this change is incorporated, crewmen should use caution not to restrain the cable when paying it out.



OPERATING UNITS PLEASE POST

Kaman Aircraft Corp.
Field Service Dept.
January, 1961

LIFELINE!

THE HOK-1 RESCUE HOIST

The basic article in this month's issue of Rotor Tips discusses factors of a general nature, common to the rescue hoists on all Kaman synchropters. The comments on this page are directed specifically to the HOK-1 hoist. If you do not operate HOK-1s at your base, it is suggested that you DISCARD THIS INSERT TO AVOID CONFUSION.

MOTOR OVERHEATING

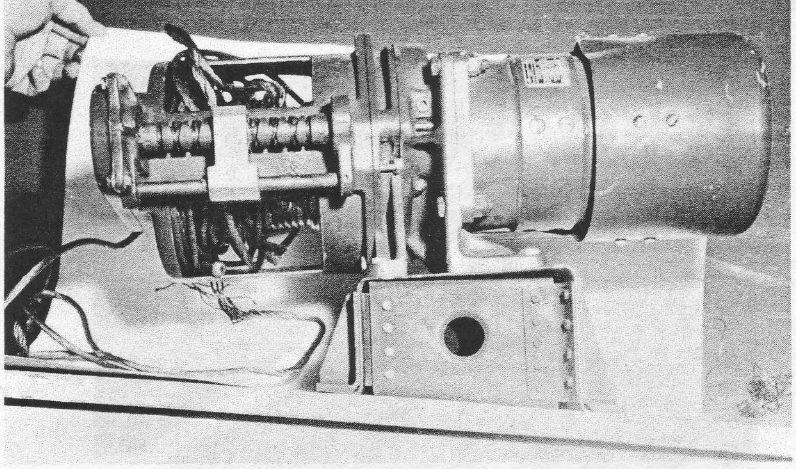
We have not received any reports of HOK-1 rescue hoist motors overheating due to excessive cycling (starting and stopping at too-frequent intervals). The HOK-1 hoist operates at 75-fpm and therefore would not be as subject to overheating as the 100-fpm hoists on other models. However, as a precaution, it is recommended that start-and-stop cycles be kept to the minimum necessary for the requirements of the mission - preferably not more frequent than five times during lowering the cable, and not more than five times during raising of the cable, with a 20-second "rest" period at each extreme of hoist travel. This is based on an 80°F. day. In cooler weather, overheating would be less of a problem.

CABLE-TENSIONING DEVICE

HOK/HUK Aircraft Service Change No. 82 (Routine Action) issued November 2, 1960, provides for retrofit of a cable-tensioning device on HOK-1 rescue hoists, similar to the device which is now standard on later models. The modification is done by the hoist manufacturer and the modified hoist carries a new part number. The new device, mounted on the level-wind, is comprised of a powered pulley and a spring-loaded idler pulley, between which the rescue cable passes. When there is no load on the end of the cable, the spring-loaded pulley presses the cable against the powered pulley which is driven at a rate such as to keep the cable always under slight tension between the level-wind and the drum. Until this service change is incorporated on HOK-1 hoists, it is recommended that the hoist operator maintain a slight tension on the unloaded cable when reeling it in. Also, he should watch for evidence of hang-up when reeling out an unloaded cable. If he is manually guiding the cable as it pays out, he should be careful to avoid restricting it in its descent. If the hoist is to be operated on the ground for maintenance purposes, it is important to maintain steady tension on the cable to avoid fouling or uneven winding.

CABLE WEAR

Assuming that all parts of the hoist are operating properly, there still remains one point where cable wear may occur under certain circumstances. This point is in the fairlead or cable guide below the pulley at the end of the tripod. If the hook sways excessively in flight, the cable can chafe in the guide. The guide edges should be smooth and flared to minimize the wear. Also, many operating units that use the hoist infrequently have rigged up a shockcord device on the tripod to which the hoist hook can be quickly attached or detached by the operator in the cabin, thus keeping it from swaying when it is in the stowed position.



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LIFELINE!

THE H-43B RESCUE HOIST

The basic article in this month's issue of Rotor Tips discusses factors of a general nature, common to the rescue hoists on all Kaman synchropters. The comments on this page are directed specifically to the H-43B hoist. If you do not operate H-43Bs at your base, it is suggested you DISCARD THIS INSERT TO AVOID CONFUSION.

MOTOR OVERHEATING

Although there have been no problems reported so far on overheating of the H-43B rescue hoist motor, there are two common sources of this difficulty which should be understood by the rescue crew. One cause is the potential dragging of the brake as described in the basic article in this month's issue of Rotor Tips. The other is excessive cycling of the hoist motor. These hoists reel in 100 feet of cable per minute (instead of 75 fpm as on the HOK-1). Thus, the starting loads are greater. It is recognized that when a true rescue mission is being performed, the hoist will be started and stopped as necessary to accomplish the job. However, specific safe cycles are being developed and will be incorporated in future handbook revisions. Until the information is formally released, it is recommended that hoist cycles be restricted to not more than five starts and stops during raising of the hoist cable, and five starts and stops during lowering of the hoist cable, with a 20-second "rest" period at each extreme of travel. This is based on an 80°F. day. In cooler weather, overheating would be less of a problem.

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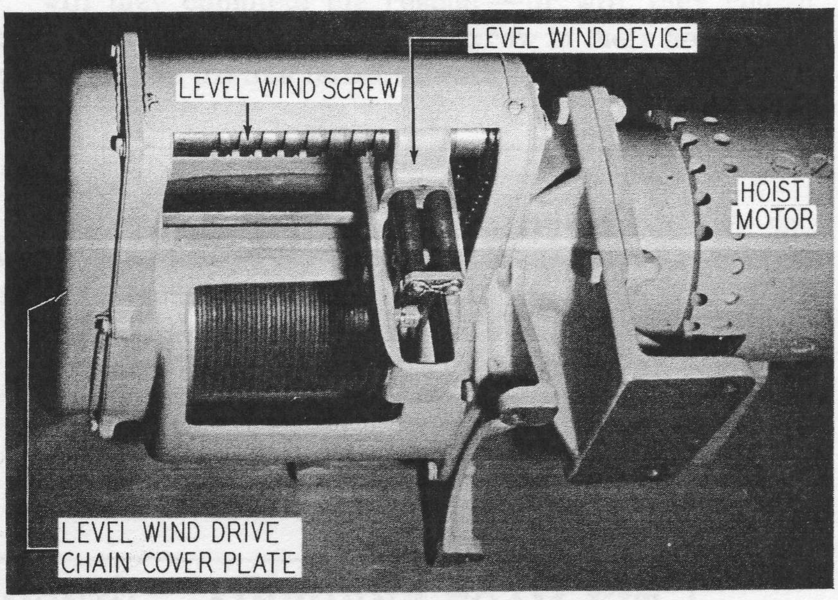

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