KAMAN Rotor Tips

KAMAN AIRCRAFT CORPORATION
PIONEERS IN TURBINE POWERED HELICOPTERS

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KAMAN Rotor Tips

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Vice President—Test Operations / Customer Service
WILLIAM R. MURRAY

Director of Customer Service
WILLIAM E. ZINS

Customer Service Manager
ROBERT J. MYER

Editor
EVERETT F. HOFFMAN

THE COVER

Artist's portrayal of the twin-engine UH-2 "on duty" with the Fleet. Cover by Donald Tisdale, Service Publications.

ADDRESS ALL INQUIRIES TO:
Kaman Rotor Tips
Customer Service Dept.
Kaman Aircraft Corp.
Old Windsor Road
Bloomfield, Conn. 06002

In This Issue

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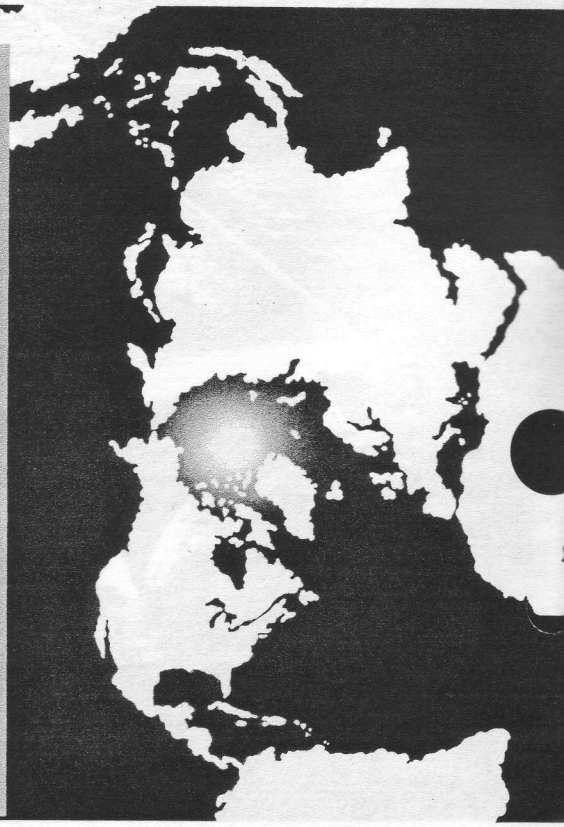


THE TWIN ENGINE UH-2

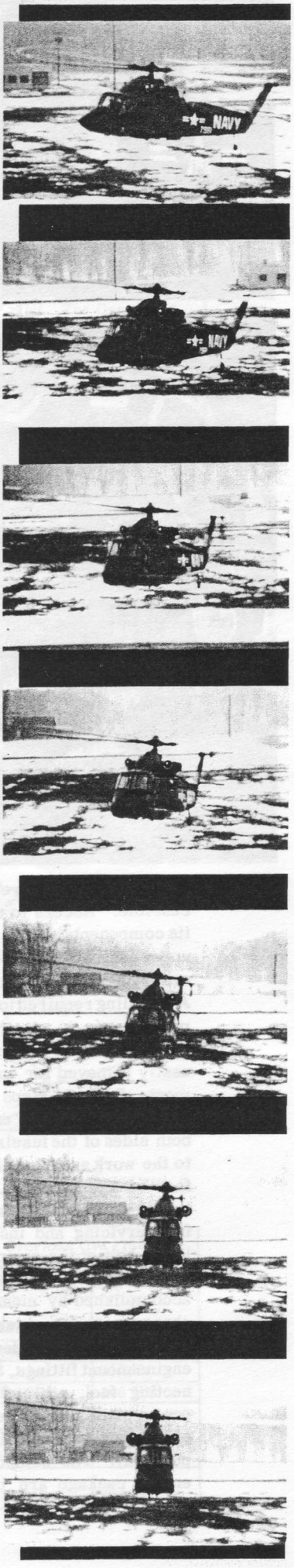
by Aubrey H. Hancock
Project Engineer

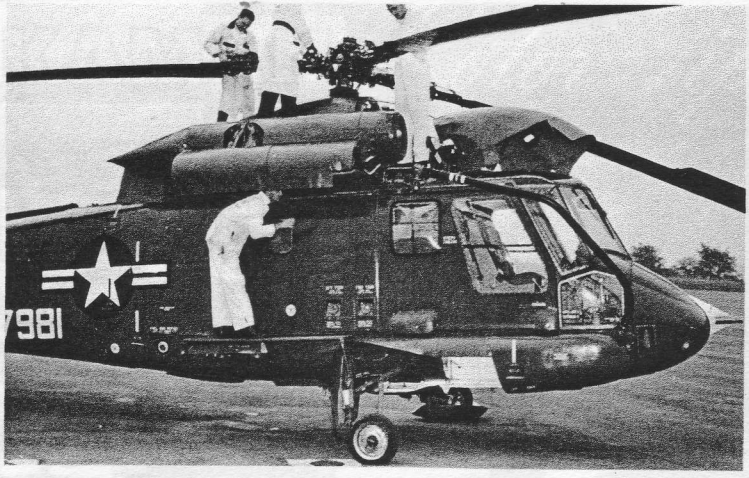
The feasibility of retrofitting the UH-2 SEASPRITE with twin engines was demonstrated recently by Kaman Aircraft during a preliminary flight and ground test evaluation conducted under a U. S. Navy contract. The configuration is designed to provide twin-engine reliability so that, in the event one engine fails, the helicopter will be able to complete its task or return to base with only one engine operating. Related studies indicate that more than 30 percent of past UH-2A/B helicopter losses would probably have been averted if the airframe had been provided with twin-engine power. This UH-2 helicopter incorporates two General Electric T-58-8B engines with a military rating of 1250 SHP each. These engines provide excellent rescue capability and add in several other ways to the mission accomplishment of the helicopter. The outstanding feature provided by this twin configuration is that standard day, sea level performance can be sustained as altitudes and/or temperatures increase. The stringent military requirement for hover OGE at 95°F at 6000 ft can be exceeded at any overload gross weight up to 11,000 lbs. A further advantage will be achieved since each engine will be operating at below continuous power rating. This will result in improved engine life with logistic economy.

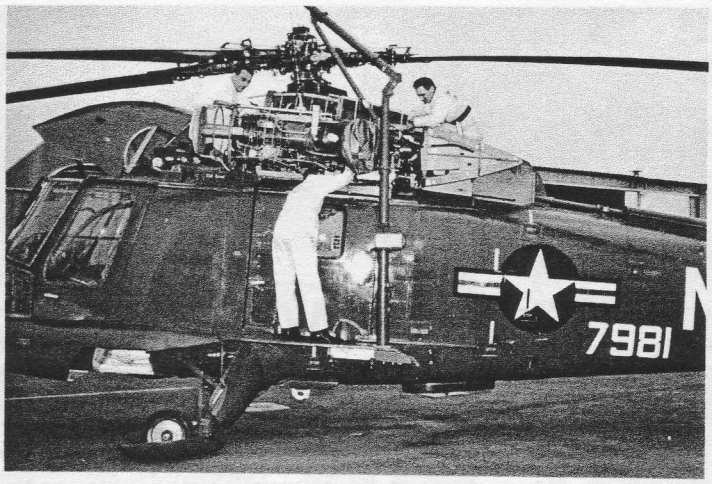
A UH-2 similar to those now in service with the Navy was used during the evaluation. The dynamic hardware such as the rotor systems, main transmission, rotor drive systems, etc., was retained as in the original configuration. The general overall dimensions of the twin-engined helicopter are also unchanged from the present UH-2. The changes made were either necessary to accommodate the conversion from a single-engine helicopter; to improve maintainability; or to minimize the danger of ingestion of foreign objects into the engine. Certain cockpit changes are required by the retrofitted UH-2, of course, but every effort has been made to retain the original configuration as much as possible in order to preserve the UH-2 cockpit familiarity which Fleet pilots have already acquired.

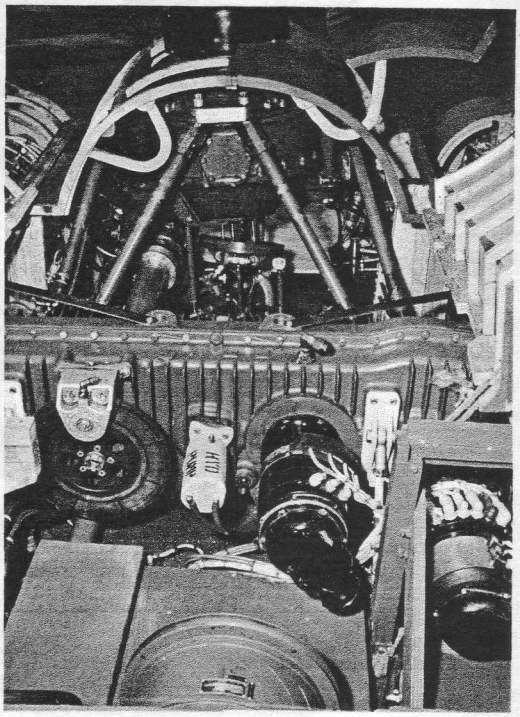
The engines are mounted in semi-pods abreast of the main transmission. They drive aft through standard GE torque-sensing speed decreasing gearboxes into a combining gearbox located to the rear of the main transmission. The output of the combining box drives forward into the presently used input to the main transmission. The combining box incorporates free-wheeling units to declutch the output of a non-operating engine. In addition, all accessories are mounted on the combining box thereby eliminating the accessory gearbox used on the single-engine UH-2. Elimination of the accessory gearbox and accessory gearbox mount improves the accessibility to the forward upper deck area.

The engine air inlets are now moved away from airframe structure thus significantly reducing exposure to foreign object damage. Both engines are widely separated with sufficient clearance between each engine and the fuse-









TWIN MOCKUP-For preliminary Navy evaluation, wood and fabric cowlings or fairings were attached to the UH-2 used in twin-engine testing. In the top photo, left, maintenance personnel utilize upper walkways to work in the rotor area. The track-mounted, forward fairing has been moved to the open position. Another mechanic stands on one of the hinged platforms incorporated in the design to allow easy access to the lower half of the engine. The top right photo shows the helicopter with fairings removed and the davit in position for engine removal. The "bear paw" on the left landing gear was installed as part of a separate KAC evaluation project. In the third photo the top of the twin UH-2 is shown with the fairings wide open to allow easy access to electrical, hydraulic, upper rotor control and drive systems.

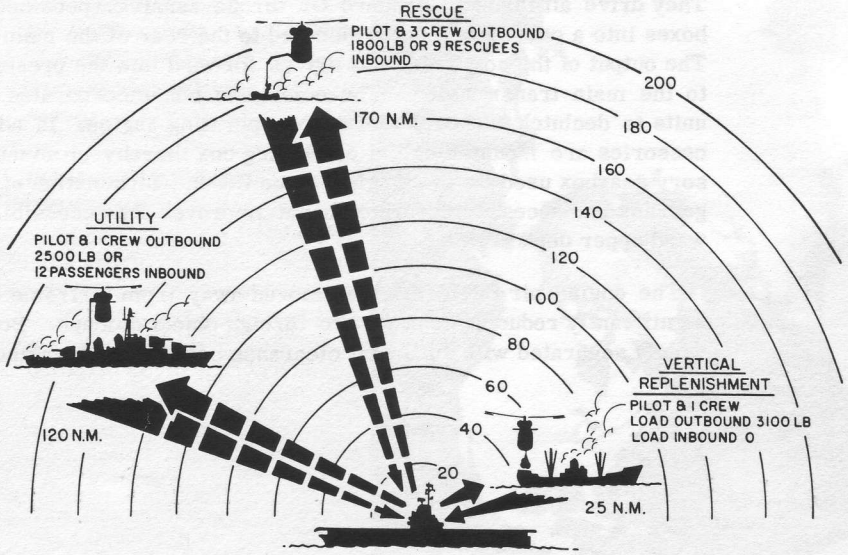
lage to make the area readily accessible. Access to the engine and its components, as well as the rotor upper controls, is provided by hinged or sliding sections of cowl paneling. All cowling required to be opened for maintenance is attached by hinges or tracks to the aircraft and can be easily removed for engine replacement. Built-in steps are provided fore and aft of the engine pods on both sides of the fuselage for access to the work areas on the upper surface of the fuselage. Hinged, integral work platforms are provided for servicing and inspection of the lower half of the engines.

The installation of each engine is accomplished by means of a quick-change package which includes the engine with speed decreaser gear, engine mount fittings, air inlet, connecting fuel, oil and drain lines, power plant controls and the sleeve of the gear-type coupling on the output shaft. The components of each engine package are bench assembled for ease of handling and all major adjustments are made prior to installation.

The airframe fuel system is the same as that found in the present UH-2 except for one modification — the engine fuel feed system. The present emergency pump concept remains unchanged but higher capacity AC and DC booster pumps are used for the "twin." The feed line from the fuel tank feeds into separate lines with plans for incorporation of a Navy developed high capacity fuel filter for each engine to preclude fuel contamination.

Each engine and its speed decreaser gear is provided with an independent lubrication system. Engine oil cooling requirements are satisfied by the engine-supplied fuel-oil heat exchanger. The speed decreaser gear lubrication system is on the airframe side of each firewall and consists of the airframe-mounted oil tank, lines, fittings and oil cooler. Appropriate firewall shutoff valves are provided to achieve fire safety. Self-sealing disconnects are provided for the speed decreaser, the engine feed, and scavenge lines to facilitate engine removal and installation. Identical tanks are used for each engine speed decreaser gear oil system to simplify logistics. The transmission oil system has been simplified by elimination of the accessory gearbox and by relocating the combining gearbox oil cooler away from the engine compartment. This reduces the number of transmission plumb-

TWIN ENGINE UH-2 — hot day(90°F at SL) mission performance



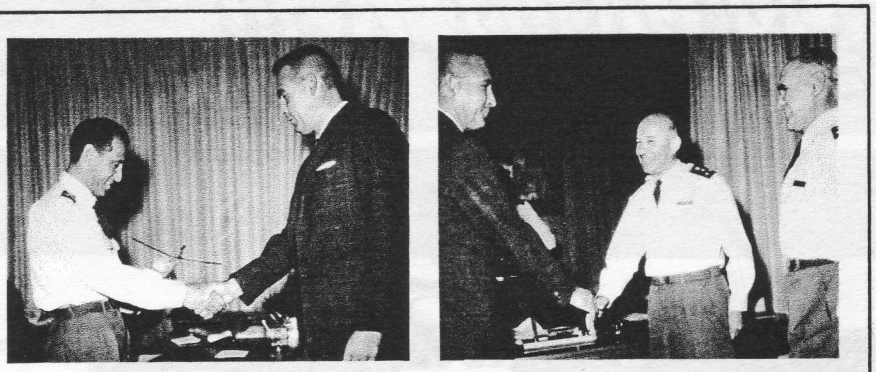
ing connections and eliminates the need for firewall shutoff valves and by-pass systems.

Existing UH-2 oil coolers are used for cooling the combining gearbox and the speed decreaser gear oil. The present UH-2 blower, with an improved and reliable drive, provides sufficient air to keep oil temperatures below red line limits on a 104°F day. The elevated location of the engines and the separation between the air inlets and the fuselage are design features providing for maximum engine efficiency. Each engine front frame, inlet guide vane assembly, starter cover and bell-mouth are anti-iced by a bleed air system.

Exhaust gases are deflected away from the aircraft by short ducts and the direction of the discharge eliminates the possibility of reingestion by the engine. The engine compartments are isolated from the airframe by vertical firewalls on the inboard sides of both engines thus confining each engine to its respective pod. An extension of the firewall also isolates the speed decreaser gear. Sliding panel access openings are incorporated in the firewalls to provide access to the inboard sides of the engines.

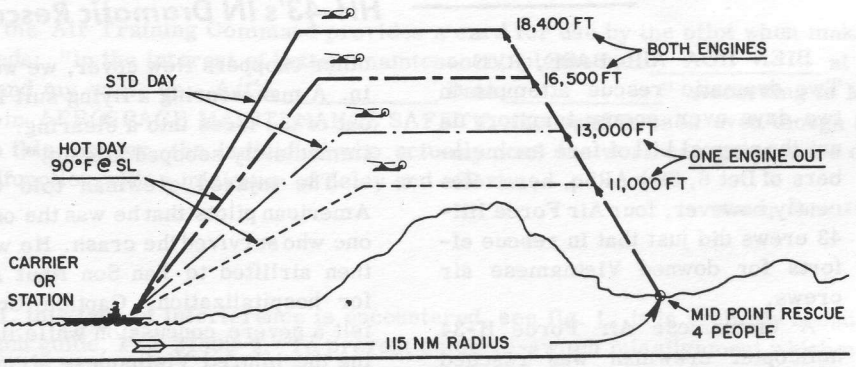
In the cockpit, the collective pitch control sticks remain as in the present aircraft except for one deletion and one addition. The twist-grip function is deleted, being replaced by twin-engine control handles located on the console between the pilot and copilot. These control handles are used for individual engine starting and for initial settings. Each of the handles has three detented positions, corresponding to the detented positions of the twist-grip control on the present aircraft. The handle knobs are provided with a two-position starter push button comparable to the starter trigger on the collective stick of the present UH-2. With this arrangement, single-pilot air restarts will be possible without releasing the cyclic control. Engine RPM synchronization control switches have been added to the collective pitch control, and the overall cockpit design maintains the single pilot operation.

The major improvement in performance of the twin engine aircraft, as compared to the single engine aircraft, is obviously due to the increased power available. This power increases the maximum hovering gross weight and rate-of-climb, especially during hot-day conditions. The present high speed stall margins at the various increased operational gross weights have been retained with a slight increase in rotor speed. The currently qualified transmission torque level limit of 15,200 inch-pounds provides ample performance margin for the increase in operational gross weights. The engine output torque meter is provided with two separate red lines, one for hovering and the other for forward flight operations. In this manner, the twin SEASPRITE will always provide its maximum performance capability for hover rescue and/or cargo pickup. At normal RPM the maximum allowable power to the drive system is 1685 SHP and since 2500 SHP is available, this twin installation is a "flat rated" propulsion system with more than 800 SHP reserve thus providing an unequaled power safety margin; an outstanding twin-engine reliability; and a superior hot day/altitude performance.



IIAF HEAD CHECKS OUT IN HUSKIE—LtGen Mohammad Khatami, commander of the Imperial Iranian Air Force, has qualified as an HH-43F pilot. The General is believed to be the first commander of any foreign air force to check out in the HUSKIE. In first photo, General Khatami receives a special model of the HH-43F from KAC service representative Clinton G. Hargrove to commemorate the historic event. In other photo, Mr. Hargrove is introduced to LtGen S. Ezazi, deputy commander of the IIAF, left, and MajGen F. Tadayon, chief of staff.

TWIN ENGINE UH-2 —SAR mission normal gross weight



RETURN LEG PROFILE SHOWING MOUNTAIN CLEARING CAPABILITY

The following table summarizes the performance of the twin-engine UH-2 configuration at the normal and overload takeoff gross weights.

PERFORMANCE DATA	Normal GW 9843 lbs		Overload GW 11500 lbs	
	STD DAY 59°F @ SL	Hot Day 90°F @ SL	STD Day 59°F @ SL	Hot Day 90°F @ SL
Sea Level				
Max. Continuous Speed	140K	145K	137K	142K
Max. Rate of Climb	1900 fpm	1900 fpm	1450 fpm	1450 fpm
Endurance	2.4 hr	2.4 hr	3.1 hr	3.0 hr
Range	221 NM	227 NM	300 NM	306 NM
Altitude				
OGE Hovering Ceiling	16000 ft	13600 ft	5400 ft	3400 ft
Service Ceiling	18400 ft	16500 ft	14000 ft	12300 ft
One Engine Out				
Service Ceiling	12600 ft	10800 ft	7800 ft	4000 ft

Southeast Asia

READY FOR RESCUE—HH-43B and HH-43F from ARS Det 7, 38th ARSq, PARC(MATS), on flight line at Da Nang AB. (USAF photo)

HH-43 crews from ARS Det 7, 38th ARSq, PARC(MATS), have rescued more than 20 downed American pilots from North Vietnam during the last few months. All told, the detachment has plucked some 40 pilots from the jaws of the Viet Cong plus many others downed in combat over South Vietnam.

The rescue unit, stationed at Da Nang Air Base, includes two HH-43F HUSKIE helicopters and one HH-43B, as well as four amphibious fixed wing aircraft. The HH-43F's are powered by Lycoming 1100 shaft horsepower T53-L-11 engines while the "B" model is powered by a T53-L-1 engine rated at 860 shaft horsepower. The unit's nine officers and 27 enlisted men have been on duty at Da Nang since October 1964.

The 7th Detachment reached its peak activity on March 2, 1965 when it earned eight Silver Star medals for actions in rescuing pilots downed in North Vietnam. On that day, six aircraft were lost and the 38th ARSq recovered five of the six pilots. Two of these were picked up by HH-43 helicopters.

In addition to recovering downed pilots in North Vietnam, the unit also recovers downed pilots in South Vietnam and orbits Da Nang Air Base during all emergency and VIP landings. Da Nang is the largest tactical Air Base in South Vietnam and is used by Army and Marine air groups. In its pilot-saving missions in Vietnam, the helicopters have flown as far as 130 miles north of the 17th parallel into North Vietnam. On duty around-the-clock, the unit averages five scrambles a day for emergencies in South Vietnam and is on special alert whenever air strikes in the North are planned.

About 90 per cent of all American or Vietnamese pilots forced down in North Vietnam have been rescued by this or other units. The rescues aid greatly in maintaining morale of the jet pilots flying in strikes against North Vietnam.

"The HH-43 has served us well," Capt Jim E. Hartley, operations officer, said. Capt Floyd Lockhart added that the big engine is a great help, "especially in some of the terrain we have to fly in."

The HH-43's have taken several hits from ground fire and one was shot down near Da Nang. The crew was rescued, soon afterward.

HH-43's IN Dramatic Rescues

by 1stLt Jess E. Maxwell
USAF Combat News

BIEN HOA AIR BASE, RVN — Two dramatic rescue attempts in two days over enemy territory is not the normal bill of fare for members of Det 6, 38th ARSq, here. Recently, however, four Air Force HH-43 crews did just that in rescue efforts for downed Vietnamese air crews.

A Vietnamese Air Force H-34 helicopter crewman was rescued from a crash site during one of the recoveries, but a VNAF A-1H pilot was found dead in the other attempt. The rescued helicopter crewman was found near Ben Cat, 18 miles north of Saigon, in the famous "D" Zone area. Five American aircraft responded to the distress call, including two armed UH-1B "Hueys," a C-123 flareship, and the two ARS helicopters. Capt Darvin E. Cook piloted the lead USAF helicopter which pulled the Vietnamese crewman to safety.

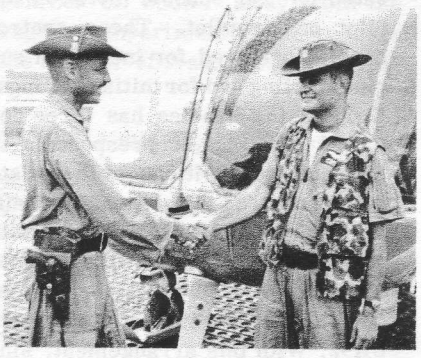
"Viet Cong ground fire was heavy in the area," he said. "While the other choppers flew cover, we went in. A man wearing a flying suit ran out of the trees into a clearing. We immediately scooped him up."

The injured crewman told the American pilots that he was the only one who survived the crash. He was then airlifted to Tan Son Nhut AB for hospitalization. Captain Cook felt a severe concussion while lifting the injured Vietnamese airman to safety. "I thought we were hit," he said. "No bullet holes were found during later inspection, however."

One of the other helicopters flying cover for the mission was damaged by a VC bullet, but returned to base safely. Other crew members on the successful HH-43 rescue were Capt Donald E. Stranahan, copilot; TSgt Domenick J. Cocuzzi, crew chief; and A2c William H. Pitsenbarger, para-rescue technician.

The unsuccessful rescue attempt occurred near Moc Hoa, about 50 miles northwest of Bien Hoa. Air

(continued on page 12)



1000 HH-43 HOURS—Capt Donald E. Stranahan, left, and Capt Darvan E. Cook of ARS Det 6, 38th ARSq(MATS), Bien Hoa AB, RVN; congratulate one another on completing 1000 hours in the HUSKIE. They have been flying as a crew since arriving in Vietnam a year ago and have logged over 350 combat missions together in the HH-43. Captain Stranahan, who passed the 1000-hour mark on July 4th, has been assigned to Det 11, CARC, Laughlin AFB, Texas. Captain Cook passed the milestone on August 5th and has been assigned to Det 14, CARC, Vance AFB, Okla. (USAF photo)

Timely Tips

Rigging Pins (UH-2)

To prevent rigging pins from being overlooked and left in the controls after maintenance work, attach red streamers to the pins.

P. M. Cummings, Service Engineer

FSK Heater (HH-43B)

If the Fire Suppression Kit heater has a tendency to go out, set the flow regulator to 10 psi and maintain 10-12 psi air pressure. Reports indicate that with this setting, and once the heater is warmed up, even hovering over the trailer will not put the heater flame out.

W. C. Barr, Field Service Representative

Cutter Cartridges (UH-2, HH-43B, HH-43F)

Maintenance personnel should periodically check the expiration date of all hoist cable cutter cartridges to make sure that they have not passed the age limits set by Navy and Air Force directives. NAVWEPS OP 2606 specifies a service life of 3 years from date of manufacture or 1 year from the date the hermetically sealed container is opened. TO 1H43(H)B-6 directs that the cartridges be replaced every 2 years from the date of installation or 5 years from the date of manufacture, whichever occurs first.

G. M. Legault, Service Engineer

Fuel Quantity System Wiring (UH-2)

Prior to assembly of the fuel quantity harness, the following etching procedure should be followed to ensure proper adhesion of the potting compound to wire (P/N SA-KF728A). Etch approximately 1.5 inches of wire insulation by dipping this portion of the wire into Tetra-Etch solution (manufactured by W. L. Gore Co., Newark, Del.). After removing the dipped portion of the wire from the solution, wait until the dark color of the residue disappears then wipe or wash off the residue with a rag dipped in fresh water. The etched area should be light brown in color.

J. J. McMahon, Service Engineer

Pilot-Mechanic Cooperation (UH-2, HH-43B, HH-43F)

To further pilot-mechanic cooperation, the Air Training Command provides a card for use by the pilot when making a write-up on an aircraft. The card reads: "In the interest of better maintenance, please call _____ at tel ext _____ if you do not understand my write up. A/C# _____ Date _____" According to Maj Arthur P. Young, HQ, ATC, reporting in AEROSPACE MAINTENANCE SAFETY, the card is used even though the pilot may have briefed the lineman. In this manner, the individual who actually does the work can get a more detailed, first-hand explanation of the malfunction with a minimum of delay and effort.

Kaman Rotor Tips

Hoist Control Grip (UH-2)

If on the hoist control grip, P/N 21490-1, this type of interference is encountered, see fig. 1, it is probably because this, see fig. 2, has happened to the switch guide, P/N 21399-1. To prevent guide-to-switch misalignment which can cause binding of the hoist switch, make sure the guide tab looks like this, see fig. 3, so that the adjacent guide and switch surfaces remain parallel, see fig. 4.

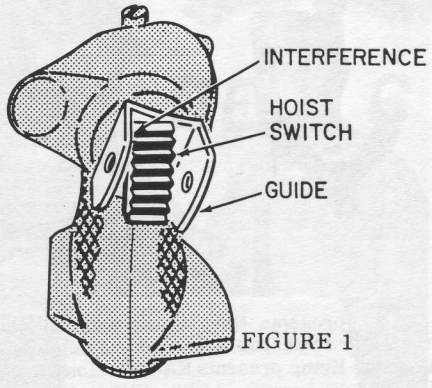


FIGURE 1

FIGURE 2

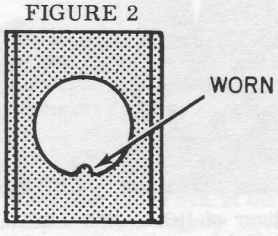
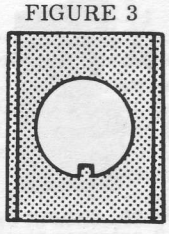


FIGURE 3



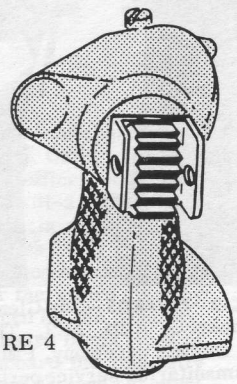
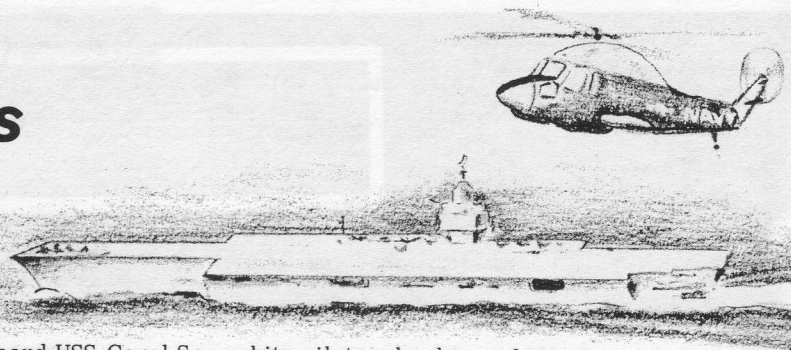


FIGURE 4

J. J. McMahon, Service Engineer

SEASPRITE ACTIVITIES



...UH-2 crew from HC-1's Det Delta aboard USS Coral Sea orbits pilot as he descends in chute after ejecting from crippled plane. Helicopter crewman M. J. Austin, ADJ3, goes into water with extra rescue collar and rescuee is hoisted aboard in less than 50 seconds. Piloting SEASPRITE is Lt(jg) Barry G. Brandow; Lt(jg) John E. Linquist, copilot; and J. J. Ferlick, AM3, other crewman.

...Sailor, seriously injured when leg caught in catapault retraction gear, taken to Guantanamo Bay Hospital by UH-2 crew from HC-2's Det 65 aboard USS Enterprise. Time saved by landing helicopter on small grassy area adjacent to hospital. Pilot aboard SEASPRITE is Lt(jg) Jack Beaver. Aircraft commander is Lt Jon Walker and N. D. Dettloff, ADJ1, crewman.

...SEASPRITE crew from NAS Cubi Pt., P. I., makes 130-mile trip to Island of Marinduque to deliver medical supplies. Mission flown in cooperation with Fil-Am Benefit Committee of Subic Bay Naval Base. UH-2 greeted on arrival at Marinduque by townsfolk and government officials. Lt Julian Hammond is pilot of helicopter; Lt Meryl Belto, copilot; and Ken Myhre, AMS2, crewman.

...Pilot from plane which lost engine and ditched within 100 yards of ramp rescued from South China Sea by UH-2 plane guard and back on deck within five minutes. Manning rescue helo from HC-1's Det Alfa aboard USS Midway are LCdr Weslie W. Wetzel, pilot; Lt James A. Speight, copilot; and J. E. Hale, ADJ3, crewman.

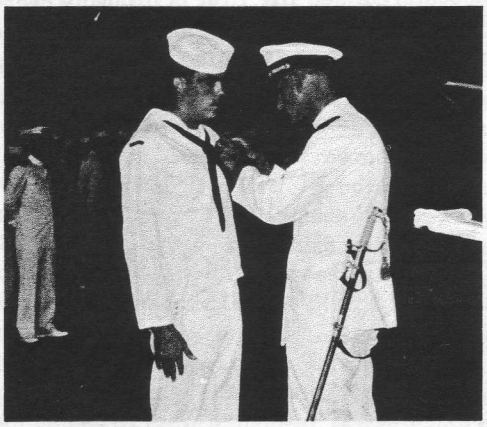
...UH-2 crew at NAS Atsugi, Japan, scrambles when A4 goes off runway and crashes in field. SEASPRITE crewman, T. W. Reiff, ADJ3, goes down in hoist and pulls seriously injured pilot from aircraft. UH-2 pilot is LCdr G. E. Ready and B. A. Anderson, AN, is other crewman.

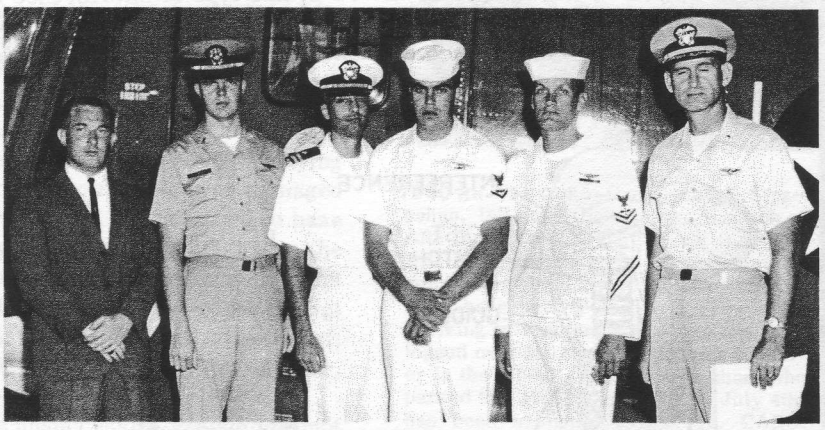
...Eighteen-year-old seaman apprentice rescued from South China Sea after he falls overboard while USS Midway is off coast of Vietnam. SEASPRITE crew from HC-1's Det Alfa locates sailor and crewman John E. Hale, ADJ3, leaps into the rough seas to assist the tiring swimmer into rescue harness. Rescuee hoisted aboard by Lt(jg) Kent M. Vafdervelde, copilot. UH-2 pilot is Lt James A. Speight. Rescue is eighth by Det Alfa since ship deployed from Western Pacific last March.

...In night operation, SEASPRITE from HC-2's Det 42 aboard USS F. D. Roosevelt rescues crew of helo which had engine failure and autorotated to water. Crew of downed helicopter hoisted to safety from rafts and back aboard carrier in less than 10 minutes. Pilot of rescue helicopter is Lt(jg) Paul W. Kayle; copilot, Lt Merill A. Delange; aircrewmen, James F. Walton, AMH1, and George R. Bohlinger, ADJAN.

...HC-1 Det Golf SEASPRITE from USS Oriskany leaves carrier while at NAS Barber's Point, Hawaii, to pick up Navy Seabee injured in construction accident on island of Kahoolawe. Injured man taken to Tripler Army Hospital and helo returns to ship. UH-2 crew includes Lt(jg) Frank C. Koch, pilot; Ens Gary L. French, copilot; and Carl Hankins, AT2, crewmember.

...Sailor who fell from deck of USS Midway at 1 a. m. rescued by SEASPRITE crew from HC-1's Det Alfa. Landing and flood lights as well as radar utilized during search. Swimmer, without flotation gear, flare or light, spotted by UH-2 copilot and helicopter hovers five feet off water while crewman goes to rescuee's aid. Lt H. Edmond Logan is UH-2 pilot; Lt(jg) Benjamin W. Curford, copilot; Percy H. Dave, AMH3 and Terry V. Garner, AA, crewmen.





HC-2 AWARDS—Cdr Glenn E. Kemp, commanding officer of HC-2, NAS Lakehurst, N.J., presents Navy Commendation Medal to Robert Q. Aliff, AE3. The UH-2 crewman plunged 40 feet from the helicopter into the water to rescue a downed and helpless pilot. In another ceremony, Paul Whitten, KAC service representative, left, watches as Commander Kemp presents KAC Mission Awards for humanitarian service performed in a UH-2 to Lt(jg) P. G. Carroll, Lt P. J. Foster, Aliff, and W. V. Larmie, ADR2. (Official USN photos)

1000th Rescue

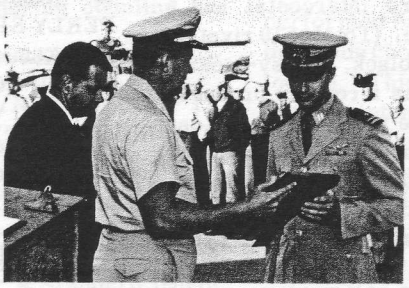
Two UH-2 crews recently shared the honor of completing the 1000th rescue carried out by Helicopter Combat Support Squadron One, NAAS Ream Field, Calif. Both crews were attached to Det Charlie deployed aboard the USS Kitty Hawk when the incident occurred after two A-6's collided in mid-air.

The first SEASPRITE participating in the historic rescue was manned by LCdr Ben A. Lehman, Lt(jg) Harry M. Borders, William E. Rousch, AMSC, and Peter A. Taylor, ADJ3. Aboard the other UH-2 were Lt Robert T. Balzer, Lt(jg) Robert E. Sloan, John T. Litziger, ADR3, and Larry G. Jarrett, AMSAN.

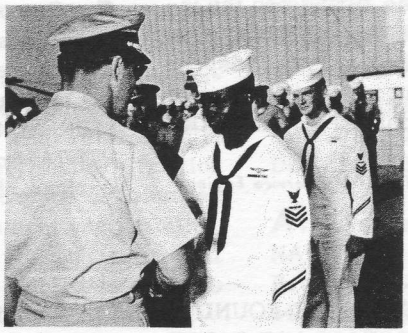
During the period leading up to this 1000th rescue, the squadron has piled up an enviable record of achievement which can best be realized by noting the decorations earned. One man received the Medal of Honor, three more have earned the Navy Cross, five wear the Silver Star, two the Legion of Merit, 38 the Distinguished Flying Cross, two the Bronze Star, 160 the Air Medal, and three the Purple Heart. And, for "extraordinary heroism in action against enemy aggressor forces in Korea from July 3, 1950 to July 27, 1953," the squadron received the Presidential Unit Citation.

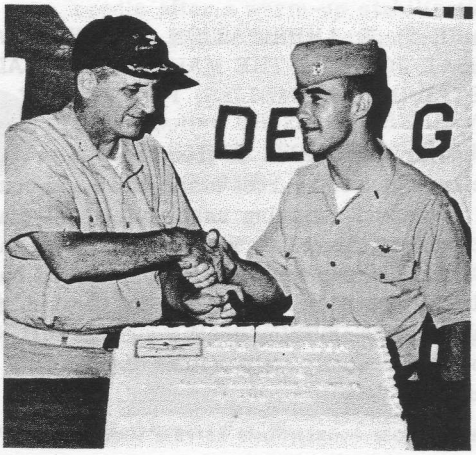
SEAFARER'S GREETING—Det Charlie personnel were met with this sign when returning to Ream Field after their long cruise.

HOW IT'S DONE—At the end of a three-week indoctrination period, midshipmen visiting NAS Corpus Christi, Texas, were treated to a show of U.S. Naval air power. The gates of the air station were also opened to the public. Included in the program was this simulated rescue. SEASPRITE pilot was Lt R. F. Frontz and crewmen were C.E. Harris, AMH2, and D. S. Mitchell, HM3. (USN photo)



HC-1 AWARDS—Top left, Cdr D. A. Wente, commanding officer of HC-1, presents KAC Scroll of Honor to Lt H.W. Gregory, UH-2 pilot, as Don Alexander, KAC service representative, watches. Other recipients from Det Lima aboard the USS Hancock were Lt(jg) C. R. Trail; E. J. Dachtler, ADR1; and D. A. Clark, AMH2. Top right, Commander Wente presents KAC Mission Awards to Lt(jg) C.B. Kaul, Lt J.W. Walker and W.F. Carlson, ADJAN from Det Bravo, USS Ticonderoga. In bottom photos Mission Awards are presented by Cdr W.F. Quarg, HC-1 executive officer to, left, J.E. Patton, AMH1, Det Echo, USS Bon Homme Richard; right, R. A. Kedzierski, ADJ2, Det Lima, USS Hancock. (Official USN photos)





SECOND TO HIT 1000 IN UH-2—Standing before traditional cake baked in his honor, Lt(jg) Woodrow W. Beck of HC-1, NAAS Ream Field, Calif., receives congratulations from Capt B. J. Connolly, commanding officer of the USS Oriskany, after passing the 1000-hour flight mark in a UH-2. Lieutenant Beck, serving with HC-1's Det Golf aboard the Oriskany, is reported to be the second Navy pilot to pass the milestone — the first was Lt(jg) Larry W. Beguin, also attached to HC-1. Lieutenant Beck was flying plane guard in the South China Sea at the time he became eligible for the award given by KAC to those logging 1000 hours in helicopters produced by the company. The Lieutenant has flown a total of 1300 accident-free hours in six types of helicopters. He served with a detachment deployed aboard the USS Kitty Hawk as well as the Oriskany and has participated in five day and one night rescues. (Official USN photo)

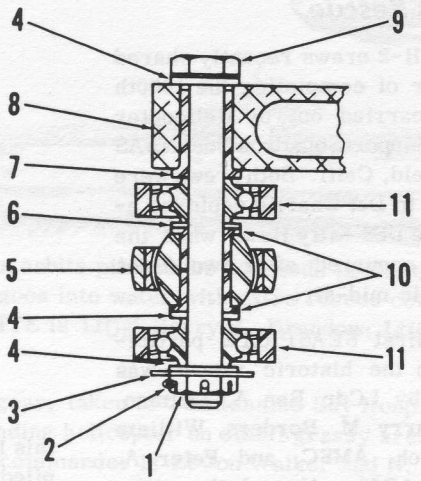
Q's AND A's

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

Q. (Applies UH-2) WHAT PROCEDURE SHOULD BE USED IN THE EVENT AN INBOARD FORWARD ENGINE MOUNT FITTING IS FOUND TO BE LOOSE?

A. Access to the fitting is gained by removing the sound insulation blanket on the cabin ceiling to expose the two intercostals, P/N K631138-11 and -13, to which the fitting is riveted. These intercostals are located at right butt line 7.5, station 197.0. The engine mount fitting is riveted to the two intercostals with a vertical row of 5 rivets (MS20470AD5) on the forward intercostal and 5 similar rivets on the aft intercostal. (Total of 10 rivets.) Loose rivets will be noticeable by a black, greasy-looking ring around each rivet head, which is a residue produced by aluminum fretting motion. Loose rivets, in turn, can cause cracks in the intercostals and in the immediate adjacent support structure. (1) If loose rivets are found, closely inspect the fitting, intercostals and the immediate adjacent support structure for cracks. Doubtful areas should be cleaned and dye-checked. Replace all 10 rivets, if any are found loose, with rivets P/N MS20470B6. (2) Repair cracked intercostals in accordance with the Handbook of Structural Repair. If the crack is so located that replacement of a rivet (fitting-to-intercostal) is required, the patch should be large enough to pick up all 5 rivets. (3) If only one intercostal is cracked and repaired, apply a similar patch to the other intercostal in order to maintain the load path symmetry. (4) If the fitting is found cracked, replace the fitting and the intercostals. NOTE: Inspection of the engine mount support structure should be accomplished at major inspection, using a mirror and a flashlight. A revision to this effect has been submitted for inclusion in the HIR-NAVWEPS 01-260HCA-7.

H. Zubkoff, Service Engineer



1. Castle shear nut
2. Cotter pin
3. Fail-safe washer
4. Flat washer
5. Main rotor control rod
6. Thin washer
7. Bushing
8. Idler arm
9. Shear bolt
10. Bushing
11. Main rotor control link

Q. (Applies UH-2) WHY IS IT IMPORTANT TO PROPERLY SPACE THE FIXED LINK (P/N K659050 ON -109 AND K659457 ON -209 BLADES) WHEN INSTALLING THE ROTOR CONTROLS?

A. Proper spacing is important to ensure that the fail-safe washer (3), P/N KS1411-C1-04-14, will not rub the underside of the link (11). The resultant bind could cause an out-of-track condition. See NAVWEPS 01-260HCA-2-5, Installation of main rotor controls, for proper spacing.

W. J. Wagemaker, Service Engineer

Q. (Applies UH-2) WHAT PART NUMBERS SHOULD BE USED WHEN ORDERING O-RINGS FOR THE CONNECTORS ON THE #1 AND #2 GENERATOR PROTECTION PANELS?

A. One of the connectors, P/N PTO7A22-21P on the #1 panel uses O-ring P/N 10-10-1937-22 manufactured by Bendix (Vendor code 77820). No Federal Stock Number has been assigned. The other connector, P/N PTO7A18-11P, on the #1 panel and the single connector, P/N PTO7A18-32P, on the #2 panel both use the same type O-rings, P/N MS29513-28 — FSN 53330-265-1093KZ.

J. J. McMahon, Service Engineer

Q. (Applies UH-2) K618540-11 SEALS ARE FOUND IN SOME IAC #84 KITS AND K618540-17 SEALS ARE FOUND IN OTHER IAC #84 KITS. ARE THE SEALS INTERCHANGEABLE?

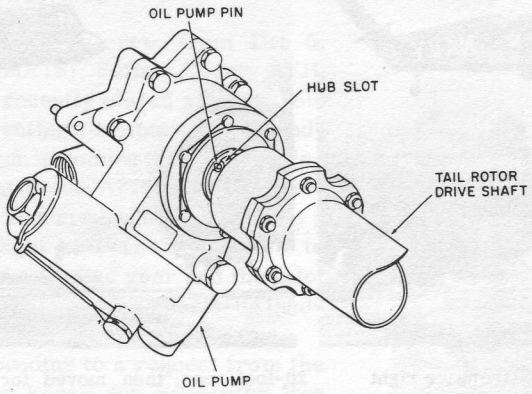
A. The seals are interchangeable. The early kits had -11's, the later kits contained -17's. The -11 seal is made from special synthetic material available from only one vendor, the -17 is made from MIL-spec material available from several sources. Both seals will do the job. The -17 is not mentioned in IAC 84 or the supplemental instructions because it did not exist at the time the IAC and instructions were written.

W. J. Wagemaker, Service Engineer

Q. (Applies UH-2) IS LUBRICATION REQUIRED AT THE UNIVERSAL JOINT ON THE MAIN ROTOR BLADE FOLDING RETAINING ASSEMBLIES, P/N K604011?

A. Yes. Regular lubrication is required to prevent binding or seizure caused by rust in the universal bearings. Bound or seized retaining assemblies will make blade folding more difficult. A lube reservoir on each universal is filled by depressing a spring-loaded ball. Frequency of lube should be determined by local conditions. Any good rust inhibiting grease such as MIL-G-25537 can be applied easily with a flush type nozzle on the grease gun.

W. J. Wagemaker, Service Engineer



Q. (Applies UH-2) WHAT IS THE PURPOSE OF THE SMALL PIN THAT PROTRUDES FROM THE AFT END OF THE TRANSMISSION OIL PUMP?

A. The pin, see drawing, was incorporated in the oil pump design to guarantee installation of the proper coupling at this location. Of the two types of couplings used in the tail rotor drive, only the PD854-2 has an accommodating slot milled in its hub. All pumps have these pins — be conscious of them and prevent damage by properly aligning slot with pin during coupling installation.

F. E. Starses, Service Engineer

Q. (Applies Fire Suppression Kit P/N K786050) IF IT IS FOUND THAT THE REEL LOCK WILL NOT ENGAGE ONE OF THE EXISTING LOCK HOLES IN THE HOSE REEL, MAY NEW HOLES BE ADDED?

A. Yes. New holes may be added when required. The existing hole pattern is adequate for a standard length hose. If the hose length is altered, however, it may be necessary to add more holes. Use the same spacing and add 9/16-inch diameter holes as required.

W. J. Wagemaker, Service Engineer

Q. (Applies HH-43B/F) ARE THERE ANY ALLOWABLE FLUCTUATION LIMITATIONS ON THE ENGINE AND TRANSMISSION INSTRUMENT READINGS FOR THE HH-43?

A. KAC is unaware of any allowable instrument fluctuation limitations on the HH-43. The governing specification, MIL-I-5949, "Functional Tests and Tolerances of Aircraft Instruments," does, however, discuss friction and scale error measurements that can be of some use in determining these aspects of instrument acceptability. Generally speaking, any fluctuation of an instrument needle after a warm-up stabilization period is cause to suspect a malfunction within the functioning system.

J. J. McMahon, Service Engineer

Q. (Applies UH-2) IS THERE A SPECIAL TORQUE REQUIREMENT FOR THE BLOWER DRIVE SHAFT ATTACH BOLTS?

A. Yes there is. The six hex bolts, P/N AN103730, which attach the blower drive shaft, P/N K674414-11 or -13, must be torqued to 20-30 pound-inches. The next issue of NAVWEPS 01-260HCA-2-3 will contain this torque information.

F. E. Starses, Service Engineer

Q. (Applies UH-2) WHAT IS USUALLY THE CAUSE IF A PILOT COMPLAINS OF A LATERAL ONE-PER-REV IN FLIGHT AND EXCESSIVE HELICOPTER GROUND WALLOW DURING RUNUP (BETWEEN 20 AND 30 PERCENT ROTOR SPEED)?

A. This usually indicates the presence of a defective lag damper. If ground wallow and vertical bounce (at 80 percent rotor speed) are noted without the lateral one-per-rev in flight, improper liquid spring servicing is a probable cause. If a defective lag damper is suspected, check first for improper servicing, leakage, a loose rod-end, or some other obvious visual discrepancy. KAC flight test experience has shown that, occasionally, dampers on opposite sides of the rotor can produce problems if one is serviced to the high limit and the other is at the low limit.

The method of determining damping characteristics by noting the time it takes for the blade to swing from full lead to full lag has been found to be completely unreliable. Some blades swing through in 10 seconds and some take two minutes, yet their dampers check out perfectly on functional test rigs and no flight discrepancies are noted. One method that has been used with some success is performed by grasping the blade tip and rapidly moving the blade chordwise, back and forth, with the rotor brake locked. This can be easily done while standing on a light maintenance workstand positioned to the left of the aircraft where the blade is lowest. Move the blade about one foot in one second, or faster, to generate noticeable damping action. Similar procedures on all four blades, from the same position on the left side of the aircraft, will provide a "feel" for the relative damping characteristics of the installed dampers. Note that this test serves only to compare the dampers, it does not attempt to qualify them as good or bad; therefore, it should be used only as a troubleshooting aid rather than an inspection criterion.

If one damper feels appreciably stiffer (or softer) than the others, it should be replaced and the helicopter flown to check for improvement. The removed damper should be functionally tested to determine whether it is actually defective.

W. J. Wagemaker, Service Engineer

Q. (Applies UH-2) WHAT IS THE PART NUMBER OF THE "COVER" FOR THE TRUE AIRSPEED TRANSDUCER'S TEMPERATURE PROBE?

A. The temperature probe "cover" is described in the NAVWEPS 05-70H-11 — Handbook, Illustrated Parts Breakdown — as a Shield, Sun, P/N 724B47, FSN 2R6610-349-6507-WKOI.

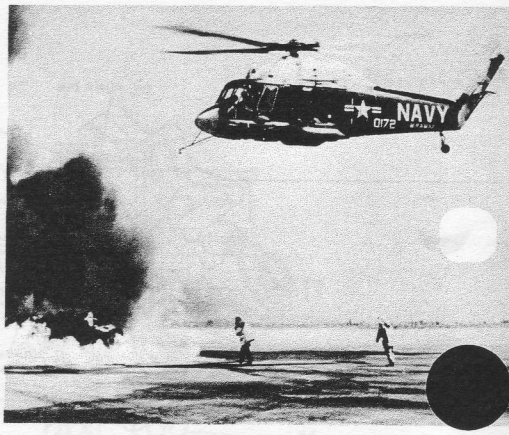
J. J. McMahon, Service Engineer

Q. (Applies UH-2, HH-43B/F) WHY IS IT IMPORTANT TO ENSURE THAT CONTROL RODS HAVE ROD ROLL?

A. By ensuring rod roll, the mechanic eliminates a possible cause of control binding. When making the check for rod roll, loose or tight rodend bearings also become evident. It is important when making this check to actuate the control rod through its full travel to make sure that no binding exists in any position.

W. J. Wagemaker, Service Engineer

KAMAN SERVICE ENGINEERING SECTION—*E. J. Polaski, Supervisor, Service Engineering, G. M. Legault, G. S. Garte, Asst. Supervisors.*



A UH-2 SEASPRITE was utilized by the Navy recently during preliminary experiments at NAS Miramar, Calif., to determine the effectiveness of new equipment and "light water" in aerial firefighting and crash rescue work. The UH-2 was equipped with a cylinder of compressed nitrogen, a 60-gallon tank to hold the "light water" and a pressure regulator to limit nitrogen pressure to the sphere. A pilot-controlled electric solenoid valve regulated liquid flow to the spray nozzle extended from the right side of the helicopter. Developed by the Naval Research Laboratory, "light water" is a chemical solution which generates a floating film on burning gasoline or jet fuel.

The UH-2 extinguished JP-4 fires 30-feet in diameter in 8-10 seconds during the tests. As the fuel-fed flames soared from the fuselage used for training firefighters, the helicopter first hovered nearby to let two crewmen slide down a 20-foot rope, then moved forward and sprayed the fire-fighting agent with a motion that opened a wide path in the flames. The crewmen rushed in, lifted a dummy from the cockpit and carried it to safety. LCdr A. L. Stingl from the Bureau of Naval Weapons and J. L. Culbert, ADC(AP), from NAS Miramar were the pilots for these tests. Additional evaluation tests are now being conducted by Kaman Aircraft at the Company's Bloomfield, Conn., facility.

continued from page 6

Force helicopter personnel here received word that a VNAF A-1H had crashed off the end of the Moc Hoa runway. Two HH-43 helicopters responded, but found that the pilot had been killed and assistance was not required.

In another incident, a downed pilot was on the ground less than five minutes before a HH-43 assigned to Det 6, pulled him to safety.

Capt Carl G. Layman and his helicopter crew were already in the air after responding to another emergency call when the crew heard an F-100 pilot inform the tower he had a flame-out and was ejecting. The HH-43 immediately flew to the crash scene about five miles east of the base. They were in time to see the crippled F-100 crash into the thick jungle.

"We spotted the downed pilot's chute immediately," said Capt Dale L. Potter, copilot. "He was still trying to crawl out of his parachute harness."

The rescue site was covered with 20-foot-high brush and small trees. "We had to haul the jet pilot out with a special forest penetrating hoist," said Captain Potter.

Crew members on the helicopter besides Captain Layman and Potter were TSgt Joseph W. Blaquiere and Airman Pitsenbarger.

Det Provisional Second

Air Rescue crews based at Nakhon Phanom AB, Thailand, recently were awarded Kaman Scrolls of Honor for the rescue of two USAF pilots downed in hostile territory.

During one mission, at night, the HUSKIE crew flew through haze and smoke to land in a jungle clearing near a village where the downed pilot was lodged with friendly natives. Crew members, temporarily attached to Det Provisional Second at the time, were Capt Israel Freedman, RCC; Capt James O. Rodenberg, copilot; A3c Frank P. Hanutke, helicopter mechanic; A1c Herbert H. Romisch, paramedic. The cover HH-43 was piloted by Capt Warren K. Davis with TSgt John J. Kelly, helicopter mechanic; and SSgt Enson J. Farmer, paramedic.

The second mission was a day pickup over dense hostile jungle. There were several search aircraft in the area when the HH-43B's arrived. The pickup crew spotted the downed flyer in the midst of heavy jungle in a small open area. Capt Jay M. Strayer, RCC, hovered 100 feet overhead while Sergeant Farmer was lowered to help the injured pilot into the hoist collar. Others aboard the Huskie were Captain Rodenberg, A1c Cecil A. Boothby and Airman Romisch. The cover HH-43B was manned by Captain Freedman, Captain Davis, Airman Hanutke, SSgt Harold G. Stroud and A2c Eric A. Anderson, Jr.

In another incident, a Navy pilot bailed out of his damaged aircraft near the base and an HH-43B flown by Captain Rodenberg, RCC, followed the chute as it drifted earthward. Others aboard the HUSKIE were Captain Strayer, copilot; Airman Boothby, helicopter mechanic; and A2c Henebry, paramedic. K

CURRENT CHANGES

		Issue Date
AFC No. 43	- Electrical System; Addition of ROTOR OVERSPEED RECORDER	9/30/65
AFC No. 65	- Incorporation of SELECTOR SWITCH, VERTICAL GYRO	8/31/65
AFC No. 80	- Drive System; improved ZURN COUPLING NUTS	9/30/65
AFC No. 83 AMEND. 2	- Increased capacity of STARTER RELAY	8/31/65
AFC No. 105	- Hydraulic System; Addition of CHECK VALVE TO ASE HYDRAULIC RETURN LINE	9/30/65
T. O. 1H-43(H)B-571	- Installation of AN/ARC-73A (VHF-101) RADIO SYSTEMS HH-43B HELICOPTERS	9/30/65

A. J. Leonaitis, Service Publications

Slide For Life

An HH-43B crew from Det 5, EARC(MATS), Suffolk County AFB, N.Y., recently played a major role in preventing a dramatic crash landing from becoming a possible disaster at Pease AFB, N.H. The incident occurred when a B-47 on a local flight at Pease was unable to lower the landing gear and the pilot elected to attempt a wheels-up landing.

Responding to a request from the 8th Air Force for helicopter fire suppression coverage for the pending emergency, the HUSKIE crew took off from Suffolk in the early morning hours and completed the 200-mile trip at 6 a.m. Aboard were Capt Charles A. Morrill, pilot; 1stLt Douglas A. Brosveen, copilot; A3c Gary Bullard, crew chief; A1c Luther W. Forehand and A1c Rhys Jones, firefighters. After refueling, the HH-43B began orbiting the base, waiting for the bomber to land.

The B-47 pilot set his aircraft down on a narrow strip of fire preventive foam on the center of the runway. The huge bomber slid a 1,000 feet on the foam and then trailing flames and sparks, off to the side of the runway. The HH-43B immediately discharged the airborne firemen and the FSK at the nose of the bomber. The helicopter then used the blast of air from its twin rotors to cool the aircraft. As the B-47 crew evacuated the crippled bomber, the firemen from the HUSKIE extinguished the flames on the right side of the aircraft and then moved to the other side to continue spraying the cooling foam on the smouldering skin of the B-47. Ground crash vehicles then arrived to assist in the operation.

1000-Hour Pilot Awards

In top photo, left, Capt Arthur W. McCants logs his 1000th hour in the HUSKIE as Capt Robert H. Busch, commander of Det 1, 54th ARSq, Thule AB, Greenland, watches. In second photo, Capt Harold D. Salem of ARS Det 15, WARC(MATS), Luke AFB, Ariz., is congratulated by Capt Dale L. Potter, right, after logging his 1000th hour in an HH-43B. In third photo, Capt Keith H. Ricks, left, of the 54th Air Recovery Sqdn., Goose AB, Labrador, is shown after passing the historic mark. Joining him in forming the "1000-hour sign" are Col Arthur W. Beall, second left, ARS Headquarters, and the HUSKIE crew on the flight, Capt Franklin A. Lamb, Headquarters, and A1c Charles L. Hill. Others wno recently logged 1000 hours in the HUSKIE were Capt Walter A. Malkiewicz, ARS Det 6, EARC(MATS), Andrews AFB, Md.; Capt Clarence C. Campbell, ARS Det 16, WARC(MATS), Williams AFB, Ariz.; Capt Robert E. Lee, Headquarters, EARC(MATS), Robins AFB, Ga.; Capt Alex P. Lupenski, and Capt Louis D. Durham, ARS Det 19. EARC(MATS), Ernest Harmon AFB, Newfoundland: Capt William F. Glover, Jr., ARS Det 3, AARC(MATS), Toul AB, France; and Capt John S. Wille, Det 84, TUSLOG, Incirlik AB, Turkey. (Captain Wille, recently promoted to his present rank, is believed to have been the first lieutenant in the Air Force to log 1000 hours in the HH-43B.) All will receive the awards presented by Kaman Aircraft to those passing the 1000-hour mark in helicopters produced by the company. (USAF photos)

OPERATION OF THE T-58 FUEL CONTROL

by Herman Zubkoff, Service Engineer and Al Ashley, Test Pilot

This article, which should be of particular interest to pilots, includes a comprehensive description of how the fuel control unit operates. The subject was dealt with briefly in a maintenance series on the UH-2 fuel system which ended in the August-September issue of Rotor Tips.

The fuel control unit utilized on the T-58 engine is categorized as a hydro-mechanical control manufactured by the Hamilton Standard Division of United Aircraft Corp. It accurately governs the steady-state selected speed of the power turbine, prevents overspeeds, overtemps, compressor stalls, and provides optimum airflow efficiency by controlling the pitch of the variable inlet guide and stator vanes. Basically, for the purpose of this article, the control unit includes a fuel metering system and a computing system. The metering system selects the rate of fuel flow (Wf) through the main throttle valve as required to maintain the amount of power called for by the pilot. Wf, however, is subject to engine operating limitations as scheduled by the computing system which monitors the various operating parameters. In effect, the computing system provides the metering system with information in order to obtain the most efficient engine performance available, in every regime of aircraft operation, without exceeding operating limits of the engine.

In NORMAL operation, fuel flow (Wf) is metered according to a schedule which varies as a function of: (1) Control shaft position (RPM range control). (2) Power turbine speed (Free turbine or Nf). (3) Gas generator speed (Ng). (4) Compressor discharge pressure (CDP or P3). (5) Compressor inlet temperature (CIT or T2).

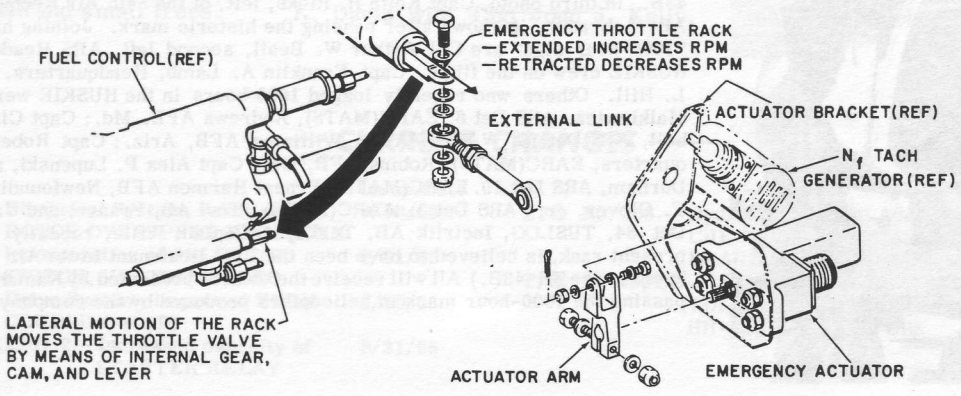
These 5 operating parameters are integrated by the fuel control computing system into a single output signal which is transmitted to the metering system and establishes Wf, or fuel flow, through the main throttle valve. In NORMAL (or automatic) operation, the main throttle valve opening is related to, and a function of, the output signal of the computing system.

If the computing system fails to sense one or more of the input signals, or should the metering system fail to react to the computing system output signal, improper Wf to maintain the desired torque will follow and possible loss of power may occur. For this reason an emergency (or manual) method for providing fuel flow has been incorporated. Proper operation in EMERGENCY will permit continued flight under circumstances which might otherwise necessitate a forced landing.

Essentially, the emergency throttle control (see drawing) consists of an electrical actuator which is connected to the main throttle by external linkage. The actuator, controlled by the pilot, manually moves the throttle valve to provide fuel flow to maintain the desired power. In NORMAL, since opening the throttle valve is a function of the computing output signal, automatic protection against exceeding the engine limitations is provided. In EMERGENCY, the throttle valve opening is manually accomplished by the pilot, thus overriding the input signals to the computing system. The gas producer (Ng) RPM and the turbine inlet temperature (T5) are now controlled manually by the pilot by means of the emergency actuator.

The automatic protection provided by the computing system when operating in NORMAL is non-existent when operating in EMERGENCY; therefore, extreme caution must be observed by the pilot to prevent overspeed and overtemperature. The emergency actuator assists the pilot in controlling Ng RPM and T5 since it limits the rate of movement of the throttle valve. The actuator operates at a fixed, pre-determined rate to prevent excessively rapid throttle valve movements which could allow too much fuel to flow into the combustor. The pilot must exercise caution to prevent opening the throttle valve too far, since this can also permit excessive fuel flow into the combustor and result in overspeed and overtemperature.

Before expanding upon the numerous CAUTION NOTES which appear in various publications relative to operation in EMERGENCY, an understanding of the main throttle valve is required. Essentially, it is a metering valve consisting of a piston within a matched outer sleeve. The function of the valve is to permit a specific fuel flow for each axial position of the piston. Fuel flow is proportional to the effective area of the valve opening. The axial position of the piston is a function of the output signal of the computing system of the fuel control unit.



In EMERGENCY, the throttle valve piston is manually positioned by the emergency actuator. This manual operation overrides the computing system, but since the piston is already positioned by the computing system, farther opening in manual is possible only from this previously established point. Conversely, decrease of the throttle valve piston in manual is possible only back to the same throttle valve position which existed prior to selecting EMERGENCY.

When the overhead fuel control selector switch is in NORMAL, the electrical circuitry is such that the EMERGENCY actuator is in full decrease position. For this reason, after switching to emergency and beeping up, there is a very noticeable lack of response for several seconds during which time the emergency actuator is "catching up" to the throttle valve piston as positioned by the computing system (Normal Operation). For example, if switchover is made at 93% Ng there will be a delay of approximately 7 to 8 seconds before the throttle valve opens sufficiently to increase fuel flow. The crucial point at which the pilot's undivided attention is required in monitoring Ng RPM and T5 occurs when the emergency actuator moves the valve beyond the NORMAL operation position. Simply stated, the EMERGENCY operation overrides the NORMAL operation in the increase fuel flow direction only. In EMERGENCY, fuel flow can be decreased only to the setting at which the switchover was made. Further decrease must be accomplished by retarding the RPM Range Control. It can also be said that the NORMAL operation (RPM Range Control and beeper RPM control) establishes the bottom stop or "min" fuel flow for the EMERGENCY(manual) operation.

From the foregoing description it can be seen that the higher the RPM is at time of switching to EMERGENCY, the longer the time delay will be before RPM will increase, and the less margin there will be for preventing overtemp and overspeed. Conversely, the lower the RPM is at the time of switchover (such as in checking operation of the EMERGENCY system) the greater the margin will be for preventing overtemp and overspeed.

It is also now apparent, that after increasing RPM in EMERGENCY, when the overhead RPM control switch is returned to NORMAL, no further down beep is required on the part of the pilot. The EMERGENCY actuator will automatically return to full decrease and the engine RPM should stabilize at the setting which existed prior to the switchover, providing the RPM range control remains in FLY.

In analyzing the operation of the EMERGENCY throttle operation and applying its use to an actual emergency situation, it can be seen that the procedure for switchover will vary with the nature of the malfunction. For example, if the malfunction causes an overspeed, it would obviously be unrealistic to switch to EMERGENCY and start beeping up without first taking action to get the overspeed under control. In this instance, action should immediately consist of loading up the rotors (increase collective pitch) to absorb the excess power. When the overspeed is under control, switch to EMERGENCY and then reduce the RPM range control to IDLE while beeping up the emergency throttle to regain power. This would necessarily have to be a coordinated maneuver since the objective is to reduce the RPM range control to IDLE to get the Nf governor out of the picture while maintaining rotor RPM by lowering collective toward autorotation, concurrent with the power reduction. Powered flight can be resumed as the emergency throttle takes over. As a matter of technique, an alternate method would be to absorb the excess power in a relatively slow A/S climb (60-80 kts), rather than high-speed level flight, since entry into autorotation would be easier at the lower speed. (See NAVWEPS 01-260HCA-1 Sect V. Power Surge and Overspeed.)

Naturally, if the malfunction results in a loss of power or inability to increase power, immediately switch to EMERGENCY and beep up to the desired power setting. In such an instance, it might also be desirable to reduce rotor pitch in order to maintain rotor RPM until power in EMERGENCY begins to increase. This same procedure would also apply to an unstable or RPM hunting situation.

Generally speaking, most types of fuel control malfunctions which require use of the EMERGENCY throttle operation, can be handled by one of the above basic procedures.

Experience has shown that the fuel control unit now in use is very reliable and valid failures have been infrequent. In most cases, when it became necessary to switch to EMERGENCY, subsequent investigation revealed that fuel contamination was the cause of the malfunction.

Normally, the airframe-mounted fuel filter, together with the engine-driven centrifugal purifier and the fuel control integral filter are adequate to prevent entry of a nominal amount of foreign matter into the fuel control. However, heavily contaminated fuel can block the screen in the airframe filter, allowing fuel to bypass the screen. Contaminants then accumulate in the centrifugal purifier and are eventually washed into the 40-micron filter in the fuel control. This filter, in turn, becomes obstructed and allows the fuel to bypass. The foreign matter, in suspension in the fuel, then passes directly into the fuel control and ultimately causes malfunction due to restrictions of the many close-tolerance servos, moving parts and passages.

To combat this situation, the Navy has implemented vigorous action relative to fuel handling equipment and procedures. Improved filtration devices have also been developed by both KAC and GE and submitted to the Navy for consideration. At present the Navy is studying the proposals submitted by the various helicopter contractors and, ultimately, it is anticipated that a standardized filtration system, with an impending bypass warning, will be adopted.

FUEL
Contamination
FUNDAMENTALS

DO YOU KNOW THAT—Water remains in suspension in JP fuel longer than it does in gasoline. This "dissolved" water, except when present in large quantities, does not materially affect engine performance. Micro-organisms, however, grow rapidly in water (especially in warm climates) which is why fuel may look clean one day yet show evidences of contamination the next. Such microbial growth developes into a slimy, fibrous, jelly-like substance which clogs filters and the fine fuel control passages.

ARS Rescues Italian Flood Victims

Almost 50 villagers stranded by raging flood waters were evacuated recently by two HH-43B's from Det 10, AARC (MATS) at Aviano AB, Italy. Despite the poor weather conditions which hampered the operation, the Airescuemen spent over 15 flying hours in evacuation work during a two-day period.

The most dramatic rescue during this period occurred when a villager was discovered desperately hanging onto the branches of a tree to keep from being swept away by the strong current. Capt James A. Darden, copilot in a HUSKIE piloted by Capt Philip S. Prince, detachment commander, had himself lowered into the river to help. Since the man was too weak to climb into the sling, Captain Darden wrapped his arms and legs around him and the helicopter lifted the pair 60 yards to dry ground. In another incident, SSgt James Tyler, a fireman, was lowered into the second floor of a building surrounded by water and on the verge of collapsing. The Sergeant found that the rescuee, an old man, was too feeble to hold onto the sling so a rescue basket was lowered. He was taken to safety and then the helicopter returned for Sergeant Tyler. Captain Darden was piloting the HUSKIE at the time. In the meantime, Captain Prince in the other helicopter plucked five persons from a rooftop and took them to safety. During one of the sorties, LtCol Aldo Dominutti, Italian base commander, flew in one of the helicopters to observe the flooded areas and the work of the rescue teams.

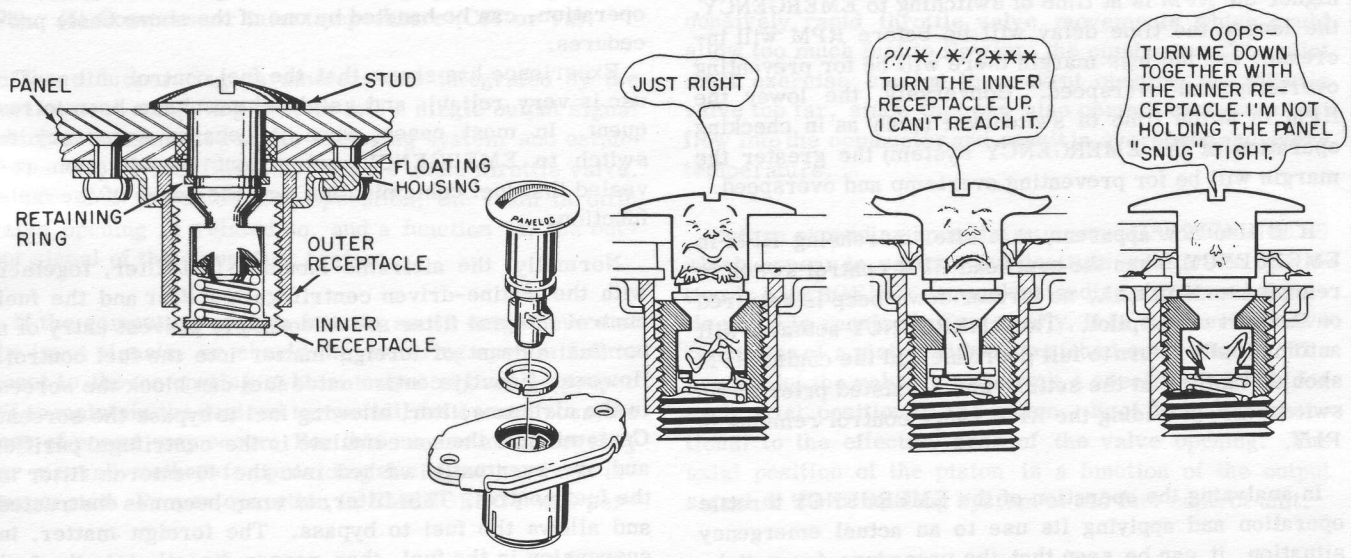
The following pilots or pilot/copilot combinations were credited with rescuing the following number of people: Capt Robert S. Henderson - 16; Captain Prince - 6; Captain Darden - 4; Captain Darden/ Captain Henderson - 10; and Captain Prince/Captain Henderson - 8. Sharing in the hazardous rescue work were TSgt James W. Watson, Sergeant Tyler, SSgt's Jerome Casey and Richard R. Schrock; A1c's Jackie L. Stamper, Trillis E. Hollyfield and Charles W. Nagy; A2c Dennis O'Dell.

Cherry Point Rescues

A pilot who ejected from an F-8 when the engine caught fire was hoisted from a heavily wooded area soon after landing by a UH-2 crew from the SAR unit at MCAS, Cherry Pt., N.C. Capt Gerald E. Harbison was pilot of the SEASPRITE and Cpl Edward R. O'Connor and Sgt Kenneth M. Oliver, crewmen.

The unit was called a few days later, at 1:30 a.m., to evacuate an automobile accident victim to the hospital. Piloting the UH-2 on the 30-mile flight was Capt John L. Pipa. Crewmen aboard were GySgt Roy D. Logan, SSgt Jimmie Anding and James Hummel, HN3. The Marines also rushed a drowning victim to the hospital in a vain attempt to save his life. Captain Pipa was pilot on the mercy flight. Crewmen were Sergeants Logan and Anding, Lt John Lazarus, MC, USNR, and Irwin A. Bock, HN3.

Paneloc Fasteners

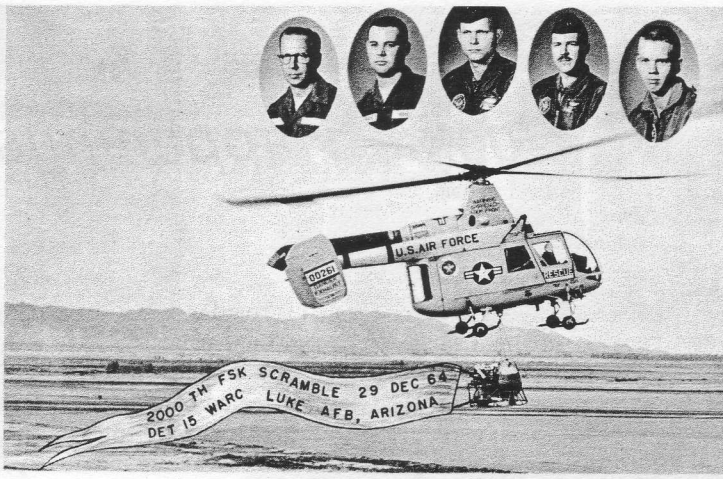


Adjustment, not removal or repair, is usually the answer if the Paneloc 1/4-turn fasteners fail to engage and achieve the proper degree of snugness. These fasteners are used on the cockpit floor panels and the access cover over the shackle release on the auxiliary tank support. If the stud turns freely and won't engage when securing a panel or cover, it is an indication that the threaded inner receptacle (see drawings) is too far down. In this case, turn the stud to the left several times. This will raise the inner receptacle and bring it within reach of the engaging end of the stud. Next, turn the stud to the right to engage and lock it in the inner receptacle. Continue turning to the right to turn the inner receptacle down lower, thus tightening the fastener. (This part of the procedure should be used, of course, if it is found that the stud will engage when turned with a screwdriver but fails to snug the panel or cover down properly.) To avoid damaging the tangs on the shank of the stud, turn to the right only enough to seat the stud properly; do not overtorque. When engaged and snugged down, the fastener will neither loosen nor inadvertently open. Using the proper size screwdriver on these fasteners is a MUST if damage, and consequent difficulty in turning, is to be avoided.

H. Zubkoff, Service Engineer

Proud Record

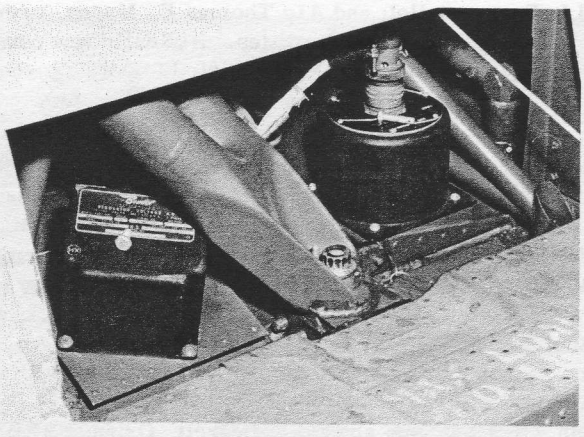
ARS Det 15, WARC(MATS), came up with the unusual photo at right early this year when the detachment flew the 2000th FSK scramble since the arrival of the HH-43B's at Luke AFB, Ariz. The detachment is now looking forward to reaching the 3,000 mark. The past year has also seen Det 15 reach an all-time high in search and rescue work. Thirteen pilot bailout recoveries were made and 51 rescue missions flown involving the evacuation of 99 civilians — eight of them seriously ill. Many of the missions were flown to the bottom of the Grand Canyon or to equally hazardous locations. Since Det 15 now finds itself flying hundreds of miles from Luke, JP4 refueling points have been established throughout Arizona to permit missions both within and outside of the State. (USAF photos)



MILESTONE CREW–Manning the HH-43B on the 2000th FSK scramble were, left to right, SSgt Glenn Weibusch and A1c Robert Taylor, firemen; Capt Charles R. Kay, RCC; Capt Dale L. Potter, copilot; and A2c William E. Van Asdlan, crew chief. (USAF photo)

MOUNTAINSIDE RESCUE–Shown is the HH-43B crew which carried out one of the most perilous rescues recorded by Det 15. Left to right are Capt Dale L. Potter, copilot; A1c Ronald E. Levi, crew chief; and Capt Fredrik M. Bergold, RCC. The fourth member was Capt Larry Bassinger, MC, flight surgeon. The mission involved the dusk-rescue of a 14-year-old boy who had suffered multiple injuries, including two broken legs, in a mountainside fall. He was lying on a ledge at the base of a jagged cliff. Captain Bergold hovered at 40 feet as nearly over the boy as possible while Airman Levi swung the litter to the ground party at the almost inaccessible spot. With the rotor blades clearing the cliff walls side and rear by a scant 18 inches, the pilot held the position for eight "long" minutes while the lad was carefully moved to the litter. As the litter started its upward trip, the Captain pulled away from the cliff and then, with the boy safely aboard, headed for the hospital. In a letter to Captain Bergold afterward, one of the ground party said, "Those rotor blades were coming so close to the rock cliff, I was very much concerned.... I know you risked your lives." (USAF photo)

RECENT AWARDS–In first photo, Capt Maurice E. O'Connor, MC, flight surgeon from the 4510th USAF Hospital, is presented two KAC Scrolls of Honor in recognition of his outstanding performance while flying in Det 15 HH-43B's on hazardous missions. Making the presentation is Col Augustus M. Hendry, Jr., commander of the 4510th Combat Crew Trng Wing. In second and third photos, Capt Harold D. Salem, Det 15 commander, right, presents KAC Mission Awards to Capt Dale L. Potter and A1c Gerald M. Rouff. (USAF photos)

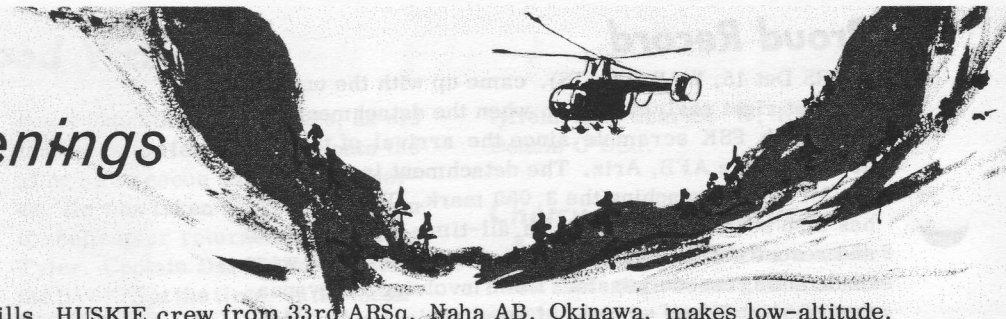


FOD FACTS

Finding the four loose objects which could cause foreign object damage to the engine (or possibly lodge in the controls) should be "duck soup" for most experienced FOD hunters. To check yourself, study the photograph and then see the inverted answer.

The loose bolts on top of the voltage regulator and the generator protection device are easy to spot; so is the piece of safety wire near the base of the transmission mount. Part of the other loose bolt is also in plain sight but in case you didn't find the "sneaky devil," it's standing on end behind the transmission mount bolt.

Huskie Happenings



...Flying over rough and irregular hills, HUSKIE crew from 33rd ARSq, Naha AB, Okinawa, makes low-altitude, night flight through fog and light rain to bring urgently needed anti-venom serum for enlisted man bitten by snake. Arriving in area, HH-43B pilot cautiously flies at low airspeeds up narrow valley to small clearing where poison victim waits. Navigation carried out with aid of aldis lamp, helicopter lights and flashlights. Hoist pickup necessary because of small size of clearing; first aid given on way to hospital. Pilot on hazardous 80-mile mercy mission is Capt Robert W. Davis, 1stLt Michael C. Tennery, copilot; SSgt Charles D. Severns, helicopter mechanic; SSgt David H. Blouin, medical technician.

...Crew of HUSKIE from 3638th Flying Training Squadron (Heli), Stead AFB, Nev., lowers flight surgeon and medical assistant by hoist to top of mountain in order to bring aid to woman injured in plane crash. Landing at site impossible due to terrain and turbulence so Capt J. A. Link, HH-43B pilot, lands half-mile down canyon and survivor is brought to spot for evacuation. 1stLt C. W. Oliver is copilot; Capt C. Filippini, MC, medical officer; A1c B. R. Moten and TSgt C. S. Hawthorn, medical technicians.

...Youth lost overnight in wilderness at foot of Cascade Mountains spotted by sharp-eyed HH-43B crewman from ARS Det 5, WARC(MATS), McChord AFB, Wash., and hoisted to safety. Search made over heavily forested area and beneath 4000-foot ceiling obscuring tops of mountains. A1c Roger W. McDonald, fire-fighter, sees youth waving jacket in small clearing and Capt Paul R. Schildgen, pilot, hovers just over 80-foot trees to make pickup. Others aboard HUSKIE are Capt Thomas D. Precious, copilot; TSgt Eddie Hagerman, helicopter mechanic; and A1c William J. Emery, medical technician....In another mission, Captain Schildgen lowers two mountain rescue men to aid of climber who broke leg in fall. Landing impossible due to terrain and 150-foot trees. Later, HH-43B returns to area to make hoist pickup after injured man is moved to more suitable spot. Survivor is taken to NAS Seattle for treatment. With Captain Schildgen on mercy mission are TSgt John F. Glenn, helicopter mechanic; and A1c Andrew J. Ogrin, medical technician.

...Woman hiker, missing overnight, located and rescued by HH-43B crew from ARS Det 17, WARC(MATS), Davis-Monthan AFB, Ariz. Capt Peter J. Kerrigan is RCC; 1stLt Fred T. Dykes, copilot; and SSgt John V. Sells, crewman....Det 17 HUSKIE piloted by Capt Jerome R. Luttinger aids civilian firefighters in putting out forest fire. With Captain Luttinger are Lieutenant Dykes and SSgt Johnny McDuffie.

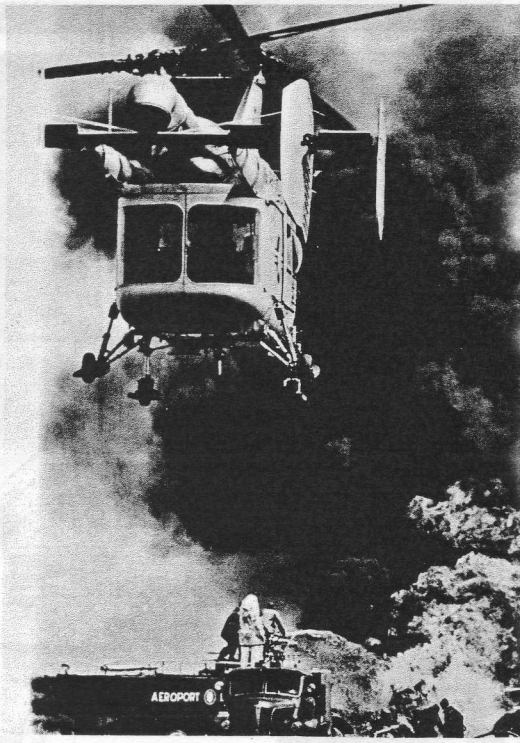
...HUSKIE crew from ARS Det 4, AARC(MATS), Ramstein AB, Germany, flies 25 miles to crash site, conducts search over mountainous terrain and then, 27 minutes after takeoff, plucks Canadian pilot from 150-foot-high tree where he landed after bailing out of crippled aircraft. To make rescue, Capt Clarence G. Lunt hovers helicopter close to steep mountainside with rotor blades and tail section in close proximity to tree tops. Downed pilot treated by Dr Thomas J. Nassif, flight surgeon. Others aboard HH-43B are A1c Lewis G. O'Doherty, hoist operator; TSgt John T. Brown, scanner; and SSgt Larry Rafferty, fireman.

...Seriously ill man on isolated ranch evacuated by HH-43B piloted by 1stLt Arthur F. Machado from ARS Det 11, CARC(MATS), Laughlin AFB, Texas. Patient treated aboard mercy helicopter by Capt Harvey L. Turner, Jr., MC, doctor from 3646th USAF Hospital. HH-43B crewmen are MSgt Robert W. Bradfield, A2c Eugene S. Salzwedel and A2c Bruce C. Metzgar....HH-43B crew from Det 11 picks up three Navy men after their twin-engine aircraft makes crash landing in open field. Downed airmen taken to base hospital for observation and then released. Manning HUSKIE are Capt David B. Hightower, pilot; 1stLt Lew E. Phillips, copilot; Dr William Warden and A3c Walter R. Perkins from hospital.

...HH-43B crew from TUSLOG Det 153, Cigli AB, Turkey, makes long-night flight to pick up and carry seriously ill Peace Corps worker to hospital. Extra fuel drums carried in cargo net to extend range of chopper and make mission possible. Capt Pasco Parker, pilot; 1stLt Ronald I. Pass, copilot; and A1c Thomas E. Mason, crew chief....Det 153 crew transports seriously-ill Turkish civilian to adequate medical facilities. HUSKIE crew consists of 1stLt Bobby L. Meadows, pilot; Lieutenant Pass, copilot; TSgt Joseph R. Johnson, crew chief; Lt Sadi Erguvenc, Turkish Air Force, interpreter.

...Three HH-43B's from Det Provisional First(SAR), U.S. Mapping Mission, Ethiopia, join in widespread search for two U.S. Army men and Ethiopia interpreter captured by bandits. Captives later returned unharmed. During SAR mission, from 14 July to 1 August, HUSKIE crews fly total of 163 hours. Total hours flown during July hits 194 mark. Manning HH-43B's during search are: Capts J.B. Green, commander, Cannon AFB, N.M.; D.F. Donk, G.E. Robertson, Williams AFB, Ariz; C.D. Hayden, Myrtle Beach AFB, S.C; M.E. James, Bitburg AB, Germany; H.A. Jones, Aviano AB, Italy; V.M. Liebernecht, Torrejon AB, Spain; Lts G.N. Beson, Seymour-Johnson AFB, N.C.; R.I. Pass, Cigli AB, Turkey; Sgts D.C. Helwig, Bitburg AB; W.E. Lee, Incirlik AB, Turkey; T.E. Goodwin, Selfridge AB, Mich.; J.A. Harris, Spangdahlem AB, Germany; J.W. Watson, Aviano AB; F.H. Goodman, McConnell AFB, Kansas; W. Johnson, Seymour-Johnson AFB; R.A. Long, Duluth Int'l Aprt, Minn.; W.H. May, Maxwell AFB, Ala.; G. Patrone, Loring AFB, Maine; Airmen L.E. Brown, J.S. Kirby, Ramstein AB, Germany; and A.O. Leggett, Orlando AFB, Fla.

TWICE RESCUED—Capt L. C. Evans, copilot, and SSgt D. J. Glassford, medical technician, assist Lt Carlos Santos, Philippine AF, aboard an HH-43B after he bailed out of an F-86 and landed in a cane field. A few weeks later Capt J. L. Wissert, the rescue crew commander, again led a HUSKIE crew to pick up the Lieutenant who had bailed out of a second F-86. Others in the helo this time were Capt M. L. Palmer, CP; A1c C. A. Sullivan, Jr., MT; SSgt F. D. Hill and A1c H. O. Sanders, firefighters. In other 31st ARSq missions: A seriously-ill Filipino was airlifted 80 miles over rugged mountain terrain to the hospital by an HH-43B crew consisting of Captain Palmer, RCC; Capt Raymond Albee, CP; Capt T. E. Tobias, flight surgeon; and TSgt D. D. Dere, crew chief. A Filipino with a ruptured appendix was airlifted 20 miles in 16 minutes by Captain Evans, RCC; Captain Palmer, CP; Sergeant Glassford, MT; and A1c J. W. Burns. An injured Navy man was taken to the hospital in a HUSKIE manned by Captain Palmer, RCC; Captain Evans, CP; TSgt F. W. Farley, CC; and Airman Sullivan, MT. An airliner was diverted to Manila and a seriously ill passenger, a Peace Corps worker, taken aboard an HH-43B and rushed to the hospital. Capt D. J. Wege, RCC; Captain Evans, CP; TSgt D. F. Larsen, CC; Sergeant Glassford, MT. An HH-43B crew touched down simultaneously as an F-105 pilot landed in a rice paddy after bailing out. The downed pilot was given first aid and taken to the hospital. Captain Evans, RCC; Captain Palmer, CP; Airman Sullivan, MT; A1c J. S. Thrasher and L. C. Walker, firefighters. (USAF photo)

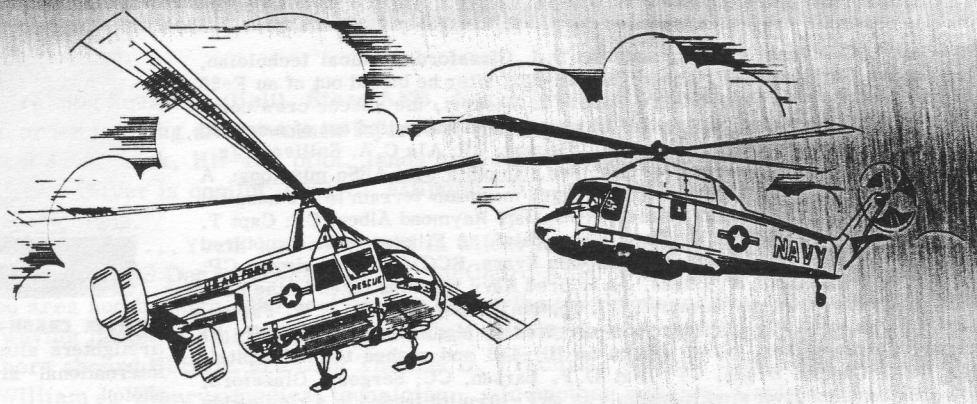


BOMBER CRASH—HH-43B aids ground firefighters after crash of B58 at Paris international air show. (Wide World photo)

MISSION AWARDS-Capt Arthur W. McCants, Jr., RCC; is congratulated by Capt Robert H. Busch, commander of Det 1, 54th ARSq, Thule AB, Greenland, after presentation of Kaman Mission Award Certificates and Pins to HUSKIE crew which evacuated an ill Eskimo woman from a remote village to the Danish hospital at Kanak. Other recipients are, left to right, A1c Thomas McKiddie, crew chief; SSgt Lyle Noah, medical technician; and Capt Clarence C. Campbell, copilot. Maj Bealer Rogers, doctor on the flight, also received an award. (USAF photo)

HEADQUARTERS CEREMONY—In recognition of the important role being played by Air Rescue Service personnel serving in Vietnam, Kaman Aircraft recently presented ARS Headquarters, Orlando AFB, Fla., with the original used in preparation of the April/May 1965 cover of Kaman Rotor Tips. Portrayed is an HH-43B crew rescuing a downed pilot in that war-torn country. Shown during the presentation are Col Allison C. Brooks, ARS commander, and William E. Zins, KAC director of customer service. (USAF photo)

KAC REP HONORED—John D. Elliott, Kaman service representative, recently received a Certificate of Achievement from Col Allison C. Brooks, commanding officer of Air Rescue Service, for outstanding performance during a two-year period in support of ARS activities in Vietnam. Shown congratulating Elliott are William R. Murray, vice president - flight test operations, left, and Robert J. Myer, customer service manager. The certificate said, in part, that Elliott "on many occasions willingly accepted short notice to travel into hostile areas of Southeast Asia to render technical assistance and instructions. His professional knowledge of the HH-43B enabled the Command to maintain the highest commission rate of all aircraft in the ARS Service and his procedure for care and maintenance of rotor blades has been adopted by LBR units within ARS... Mr Elliott, on many occasions, sustained aircraft in ready status that would have been grounded for extended periods. This service was of the utmost importance to ARS in view of its mission in Southeast Asia."



IN RECOGNITION OF
1000 HOURS AS PILOT IN
KAMAN HELICOPTERS

Charles H. Kaman

CHARLES H. KAMAN
PRESIDENT
KAMAN AIRCRAFT CORPORATION

AWARD PRESENTED BY KAMAN AIRCRAFT CORPORATION TO HONOR PILOTS WHO HAVE LOGGED 1000 HOURS IN HELICOPTERS PRODUCED BY THE COMPANY.