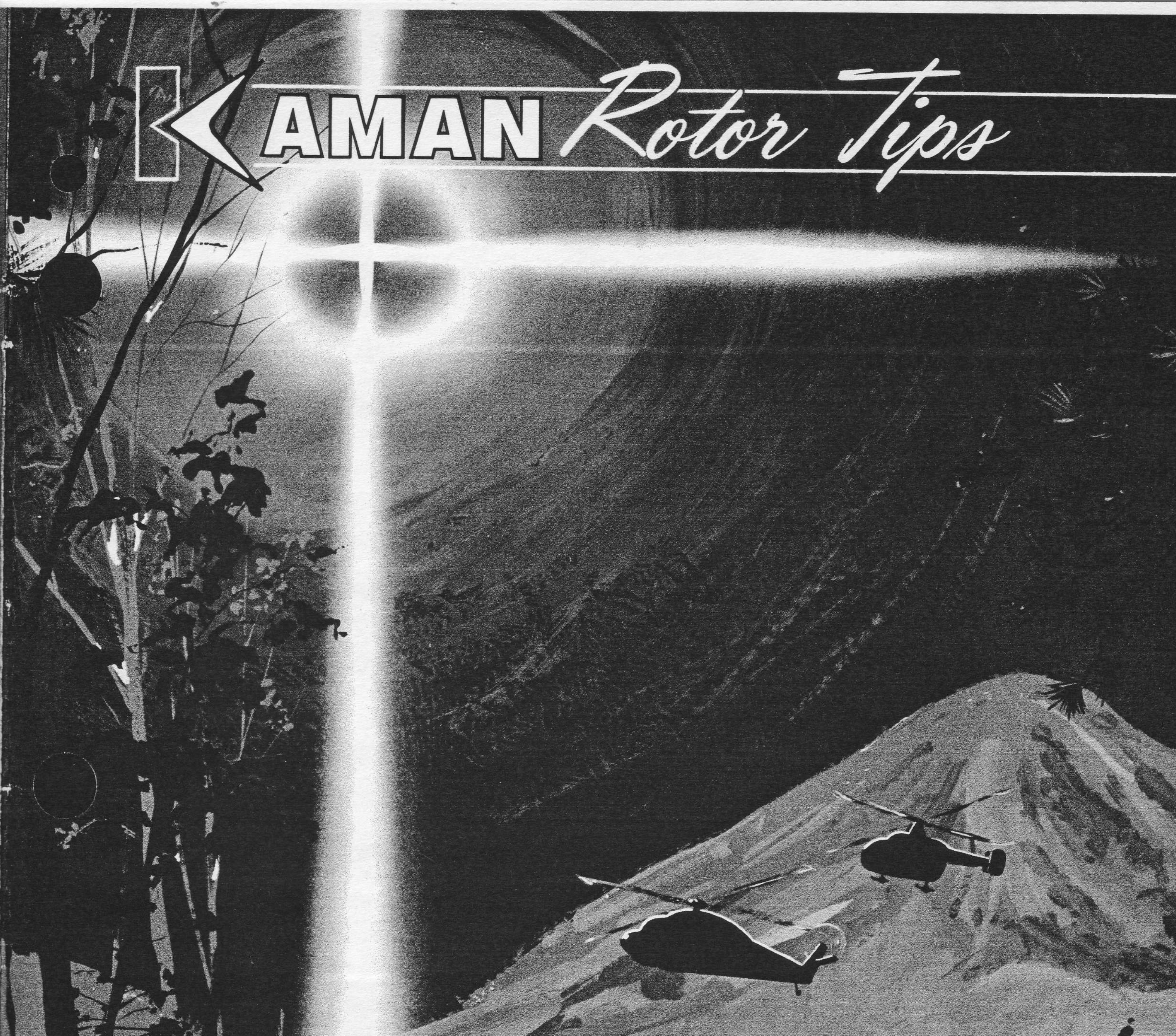
KAMAN Rotor Tips



KAMAN AIRCRAFT CORPORATION

PIONEERS IN TURBINE POWERED HELICOPTERS

DECEMBER-JANUARY,
1964/1965

KAMAN *Rotor Tips*

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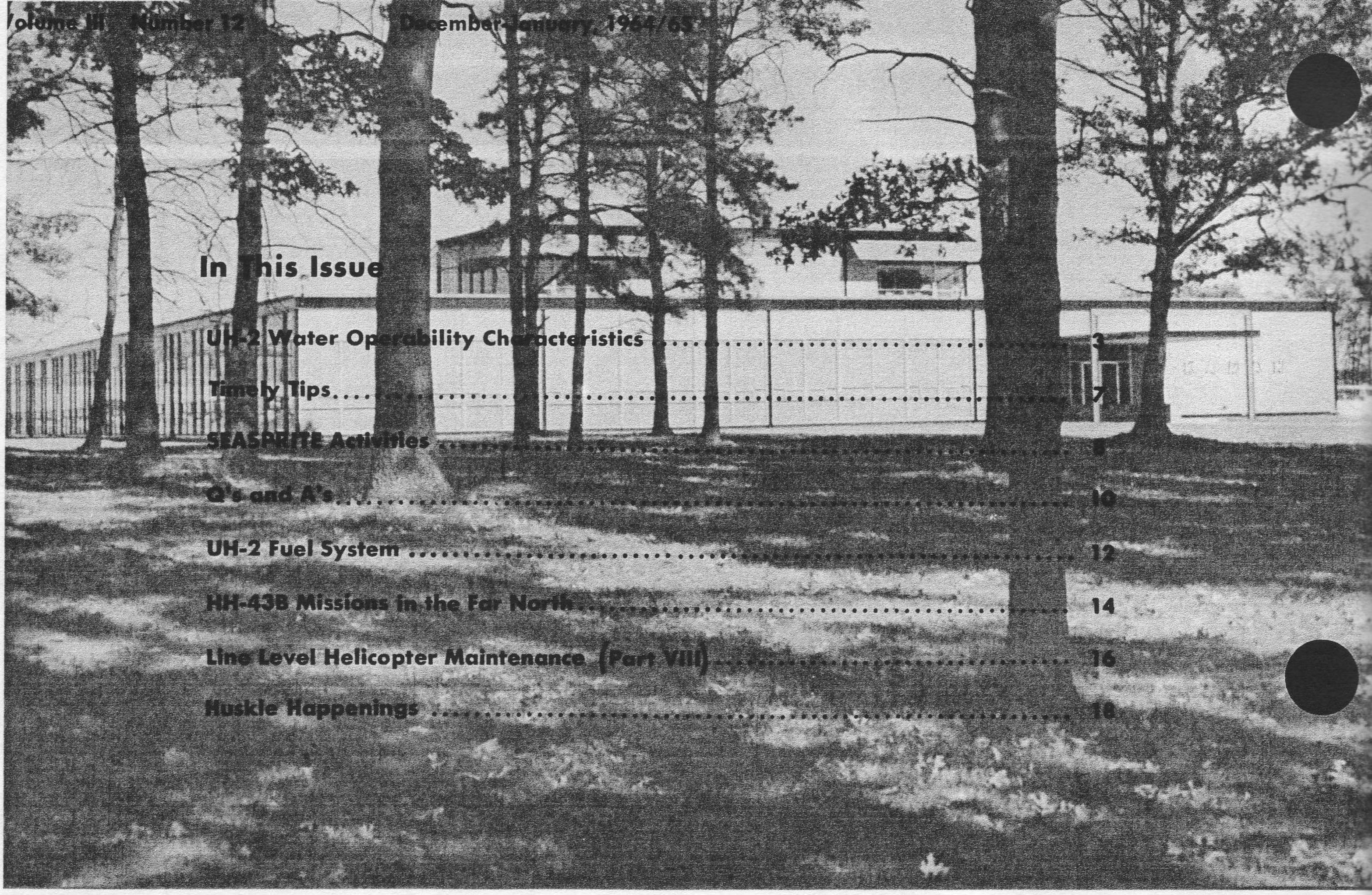

In This Issue

THE COVER

Helicopter crews fly through the lonely coldness of a Christmas Eve while on a typical mission of mercy. To airman and civilian alike, men such as these have brought the most precious gift of all — the gift of life. Cover by Donald D. Tisdale, Service Publications.

ADDRESS ALL INQUIRIES TO:
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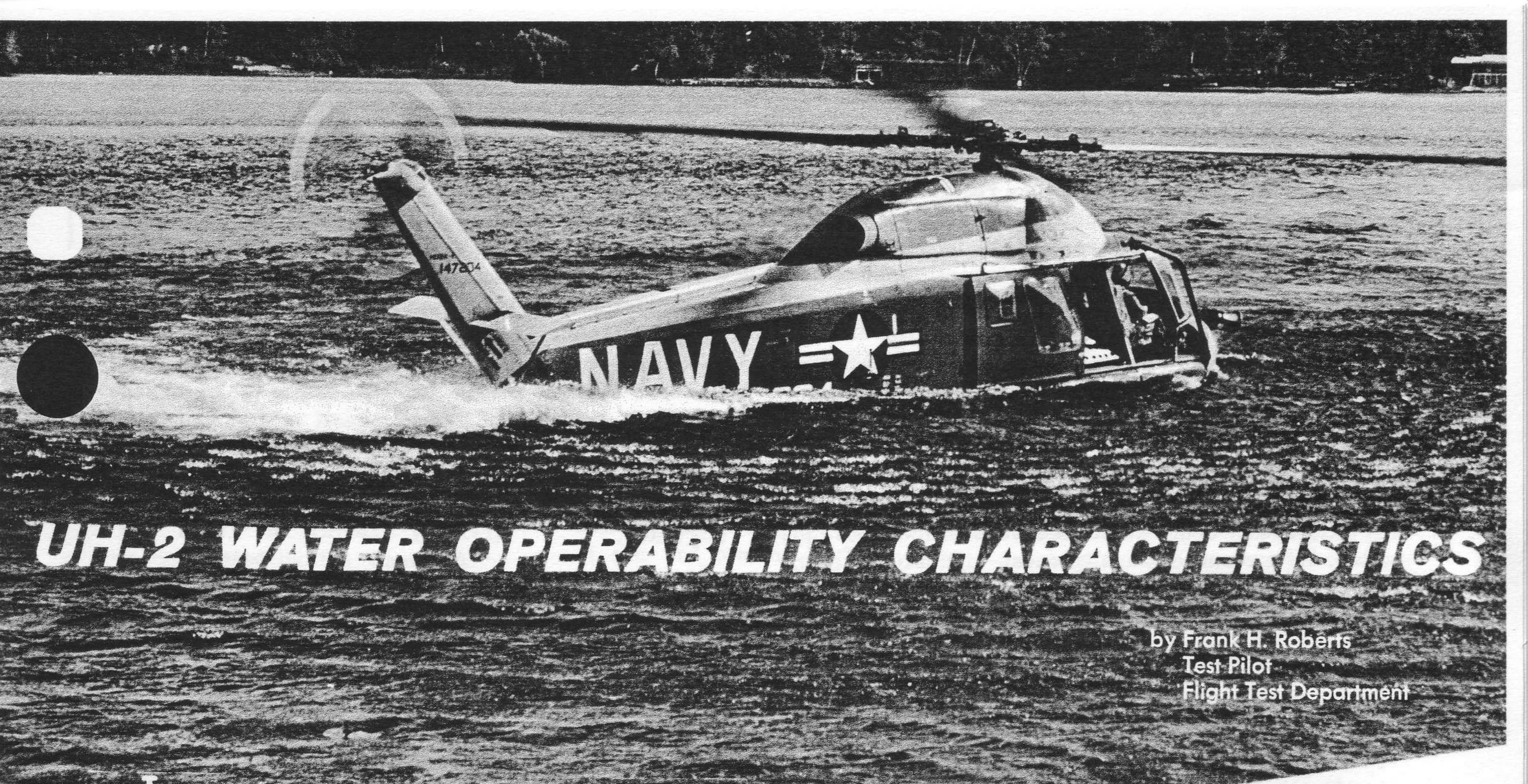
Old Windsor Rd.
Bloomfield, Connecticut

—— PLEASE SHARE THIS COPY ——



UH-2 WATER OPERABILITY CHARACTERISTICS

by Frank H. Roberts
Test Pilot
Flight Test Department

The UH-2 was not designed as an amphibious helicopter, however, under ABSOLUTE EMERGENCY conditions, it may be operated in the water. Situations that may justify such operations are: (1) being unable to complete a rescue operation without entering the water; (2) partial power loss to the degree that flight cannot be maintained; (3) planned ditching; (4) total power loss resulting in an autorotation to the water. Although experience has demonstrated that the reliability of the flotation system is greater during an airborne inflation than a waterborne inflation, the type of emergency will dictate the configuration of the helicopter while water operations are in progress. For example, when water operation is required as a result of partial power loss, the flotation bags should be actuated. However, to perform a rescue, the ditching bags need not be inflated when the time in the water is of minimum duration. The ditching bags will reduce pilot visibility slightly, thereby increasing the possibility of injury to the rescuee and time required for pickup. Inflated ditching bags also reduce the range of the UH-2 and increase the required flight time to the nearest medical facility.

The standard UH-2, when landed on the water, will take on water through various antenna ports and seams. Contamination of fuel in the sump and aft tank through the fuel vents and the fuel dump valve may result after prolonged periods of water operations. The reliability of the ASA-13A, APN-130, and APN-117 may also be affected.

During operations on or near the surface of salt water, the turbine compressor blades will acquire salt incrustation. Sufficient incrustation will reduce power available, and could result in engine compressor stall. The acquisition rate of salt within the engine is proportional to the spray ingested. The rate of such ingestion increases rapidly with increase of power; therefore, hovering close to the water, or holding large amounts of up collective when on the surface, should be kept to a minimum.

Controllability of the helicopter on the water is quite adequate, and easily handled by the pilot. Even though the stability of the UH-2 is improved with aux tanks and inflated bags, the pilot provides the controlling factor through the flight controls. The controllability and stability characteristics of the helicopter are improved by maintaining 20 to 25 psi torque in lieu of full down collective.

During water landings and takeoffs, spray will necessitate the use of windshield wipers to maintain visual reference with the horizon. Whenever possible, a vertical takeoff should be made. In the event engine power is not sufficient to execute a vertical takeoff, a running takeoff can be executed. In moderate to rough sea states the helicopter rides comfortably directly into the existing sea. Prior to attempting a running takeoff, the gross weight should be reduced by discarding extraneous equipment and jettisoning the aux tanks. Do not attempt to jettison fuel from the aft tank while in the water as the external water pressure is greater than the internal pressure in the fuel tank. If neither vertical nor running takeoffs are practical, the helicopter should be taxied to a shore line or salvage area.

If the situation dictates water operation, the water should be entered from a hover whenever possible. During the approach the following items should be checked: (1) Doors open. (2) Flotation equipment as desired. (3) Gear up. From a hover, gently lower the helicopter into the water by reducing collective pitch. A visual reference with any floating object will aid in eliminating sideward or rearward drift while transitioning to the water. Initial contact with the water will be almost unperceptible, and pilots inexperienced in water operations often have difficulty ascertaining when the helicopter is being supported by the water. Continue lowering collective until 20 to 25 psi torque is reached and maintain 100 percent rotor RPM. More collective may be required to obtain optimum controllability in high sea states. Maintaining up collective will have a slight leveling effect on choppy surfaces, but will correspondingly increase spray effect and salt ingestion by the engine. With full down collective the water level will be approximately 5 inches below the cockpit floor and the helicopter is less stable. This may result in a tendency to overcontrol with the cyclic stick. The water level will be approximately 8 inches to 10 inches below the cockpit floor when collective pitch is positioned to hold 25 psi torque. As a result of the tilt in the rotor mast, the helicopter will have a slight tendency to taxi forward and to the left in a calm sea when the controls are neutral. Appropriate cyclic control input will eliminate all drift.

Water landings can be made with ground speeds up to 10 knots by gently lowering the collective after a landing attitude has been established several feet above the water. As a result of the slight nose-high attitude of the helicopter, the tail section will make initial contact with the water. Abrupt flares close to the water must be avoided to prevent the possibility of the tail rotor contacting the water. Rate of descent should be controlled with collective to provide a smooth transition to the water. During running landings, the amount of water spray created is directly proportional to the forward speed of the helicopter at the time of water contact. For this reason water landings should not be made in excess of 10 knots ground speed. Once the helicopter is in the water, forward motion can be rapidly reduced by lowering the collective.

The same basic procedures utilized in ground taxiing can be applied to water taxiing, but water taxiing is best described as air taxiing in the water. Taxiing is initiated by applying up collective (25 psi torque is sufficient). As a result of the forward tilt of the rotor mast, the helicopter will move forward when the cyclic is neutral longitudinally, therefore, very little forward cyclic is required. A small amount of right cyclic is required to prevent the helicopter from drifting to the left. Maximum speed for water taxiing, as a result of dynamic pressures on the hull, is 10 knots ground speed. This is the maximum comfortable speed possible at 25 psi torque with a slight amount of forward cyclic. Fuselage wake in calm water at 10 knots will be medium with a little white water appearing around the pilot's door area. A collective setting of 25 psi torque is about optimum for control, and minimum water spray. When a reduction in taxi speed is desired, merely reducing collective pitch and the increased water drag on the fuselage acts as an effective brake. A small amount of aft cyclic will be required to terminate all forward motion. In high sea states, it may be necessary to reduce taxi speeds in order to minimize wave impact on the front of the fuselage. Turns can be accomplished by utilizing normal rudder pedal inputs. Sideward and rearward taxiing may be accomplished, but is not recommended, if avoidable, for obvious visibility reasons. Crosswind taxiing can be accomplished by compensating for the crosswind with appropriate cyclic and directional control. Running takeoffs into the wind may be executed while taxiing by increasing collective pitch, maintaining RPM, and using forward cyclic to obtain desired takeoff speed. Maintain directional control and, at takeoff speed, move cyclic stick aft to become airborne. An increase in spray may be encountered as the helicopter becomes airborne. Maintain takeoff attitude until well clear of the surface. Premature rotation into a nose-low attitude using forward cyclic and up collective may result in a severe tuck if the helicopter is not clear of the water.

Vertical takeoff from the water is executed in a similar manner as a vertical takeoff from hard surfaces. An increase in spray will be encountered as the helicopter becomes airborne, particularly in low wind conditions. The helicopter should be lifted vertically until well clear of the surface prior to transitioning into forward flight. As in running takeoffs, premature rotation into a nose-low attitude should be avoided.

When circumstances dictate autorotation to the water, a gliding speed of 65-70 knots indicated airspeed into the wind should be established. Open cockpit doors, activate flotation bags and check gear up. At approximately 50 feet, move the cyclic stick aft gradually to reduce airspeed and rate of descent. This will cause an increase in rotor RPM. Gradually increase the flare while descending so that at approximately 10 feet, ground speed will be zero. Move the cyclic stick forward to establish a flat landing attitude, and increase collective pitch as necessary to cushion the touchdown. It can't be overemphasized that all sideward drift must be eliminated and forward ground speed should be zero for best touchdown. The reliability of inflated ditching gear is improved with zero ground speed at the time of touchdown. Immediately after touchdown, decrease collective pitch all the way. During rotor coastdown, lateral cyclic and rudder pedal controls are effective in providing stability and control while the rotor speed is above 30 percent. The rotor system should be secured only if the helicopter is to be abandoned. Lateral cyclic will cause a rolling moment in the direction the cyclic is displaced, whereas the rolling moment generated by the directional controls will be opposite the control input. Right pedal will result in a left rolling moment. At low rotor speeds the helicopter may list approximately 8 degrees to the left. Application of the rotor brake will

VMO-2'S "FLYINGEST HELICOPTER" RETIRES

MCAF FUTEMA, OKINAWA, Office of Information - One of the "flyingest" helicopters west of the International Dateline and east of San Diego set a milestone in Marine Corps helicopter aviation recently at Futema, Okinawa.

On 19 October, 1964, "Old Number Nine," an OH-43D (HOK-1) manufactured by the Kaman Aircraft, Corp., completed 3000 flight hours and nine years of active service with Marine Observation Squadron Two stationed at Futema. It also rounded out 180,000 accident and incident-free air miles in ending its service career. LtCol J. L. Freitas, Jr., commanding officer of VMO-2, was at the controls for the historic flight; Mr. William Murray, KAC vice president, was copilot.

VMO-2, one of the squadrons making up Marine Aircraft Group 16 stationed at Okinawa, accepted Number Nine in April of 1956. Since that time squadron pilots have tested Nine's worth in training missions as a part of the Marine Corps' Force in Readiness in such locations as Formosa, Korea, Japan and the Philippines. Marine observers have used the aircraft to perform land and carrier-based operations involving reconnaissance, naval gunfire spotting, artillery spotting, photo reconnaissance and the direction of close air support attack aircraft. When not flying tactically, the marines have flown Number Nine on routine training flights, search and rescue assignments, and for emergency evacuation of sick, wounded or injured marines of the 3rd Marine Division, also stationed at Okinawa.

The nine years and 180,000 air miles of accident/incident free flying for Number Nine is mute testimony to the outstanding maintenance and repairs Nine has received at the hands of VMO-2 mechanics, electricians, metalsmiths and plane captains. In fact, the mechs and the plane captains have kept the 'chopper' in the same state of combat readiness as when it first joined the Corps. VMO-2 will be receiving a new jet helicopter soon, but 'Old Number Nine' goes into retirement as a tough, dependable, proven veteran, ready for recall should the need arise.

HISTORIC FLIGHT –Shown after OH-43D's 3000th landing are, left to right, Col Robert A. Merchant, commanding officer of MAG-16; LtCol Joseph L. Freitas, Jr., commanding officer of VMO-2; LCpl G. F. Brickey, crew chief; William R. Murray, KAC vice president - Test Operations and Customer Service; Donald R. Tancredi, KAC service representative. (USMC photo)

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produce a right rolling moment. The rolling moment generated by rotor brake application will vary directly with the severity of application. A hard rotor brake application will generate maximum right rolling moment. The rotor brake should be applied only when rotor decay, without braking action, will create a more hazardous condition.

After the rotor has stopped, the helicopter may list slowly to the left as the blades scissor to the low part of the rotor disc. To minimize this scissoring action, the rotor blades should be stopped in line with the longitudinal and lateral axis of the helicopter whenever possible. The left list can also be counteracted by shifting the crew to the extreme right side of the helicopter. Although a left rolling moment is the predominant moment at low rotor RPM, and when the rotor blades are stopped, the helicopter may roll left or right depending on the sea and wind conditions.

When a water landing is necessary to successfully complete a rescue it is recommended that the ditching bags not be actuated. The helicopter should be landed in the water far enough downwind of the rescuee so that he will be outside the rotor wash. Water taxi the helicopter to the rescuee, utilizing 20 to 25 psi torque and a slight amount of forward cyclic. When the rescuee is in the vicinity of the cabin door, reduce collective pitch slightly to stop the forward motion of the helicopter. Hold this position with appropriate cyclic and directional control until the rescue is accomplished.

During a water operability characteristic study and test at Kaman Aircraft, a new ramp device was used to facilitate rescues by actual water landings. The UH-2 used was specially sealed and several waterborne rescues were made. The ramp was lowered into the water by use of the rescue hoist and the rescuee was pulled up the ramp into the back cabin. The ramp was hinged at the sill of the right-hand cabin door. Small rollers located across the ramp aided in the pulling operation to get the rescuee into the cabin. The hoist cable attached to the outboard end of the ramp was also used to tilt the ramp inward so it was easy to slide the rescuee into the cabin. The ramp was found beneficial for the following reasons: (1) It reduces the possibility of additional injury to the rescuee by eliminating the necessity of pulling him over the cabin door edge. (2) Provides the crewman the proper leverage required to complete the rescue without sustaining self injury. (3) Reduces time required to make the rescue. (4) Makes water rescues more practical in high sea states. K

HUSKIES In 2,619-Mile Ferry Flight

by SSgt Eldon R. Kramer
Information Office
Davis-Monthan AFB, Ariz.

FROM HERE TO THERE—HH-43B crews look over one of the maps used in making 2,619-mile ferry flight from Massachusetts to Arizona. Left to right are: Capt Jerome R. Luttinger, 1stLt John K. Forsythe, A3c Kenneth E. Wetzel, MSgt Ambrose H. Morris and 1stLt Israel Freedman. (USAF photo)

DAVIS-MONTHAN AFB, Ariz.—ARS Det 17 of the Western Air Rescue Center (MATS), began operating out of Davis-Monthan recently after moving here from Westover AFB, Mass. The unit's move began when two crews departed Westover in their HH-43B HUSKIE helicopters. They flew 35 hours in eight days and made 20 refueling stops while recording the longest HH-43B ferry flight in history—2,619 miles.

Crews utilized military facilities for maintenance and refueling wherever and whenever possible on the flight. Their route was planned this way since all civil airports do not have jet fuel necessary for the HUSKIE. During the eight days they flew: First - from Westover to Seymour-Johnson AFB, N.C., via McGuire AFB, N. J., Andrews AFB, Md., and Byrd Field, Va. Second - from Seymour-Johnson to Robins AFB, Ga., via Shaw AFB, S.C., and Bush Field, Ga. Third - from Robins to New Orleans, La., via Maxwell AFB and Brookley AFB in Alabama. Fourth - from New Orleans to Barksdale AFB, La., via England AFB, La. Fifth - Barksdale was a one-day maintenance stop—over for the crews. Sixth - to Dyess AFB, Tex., via Gregg County Airport and Carswell AFB, Tex. Seventh - to Biggs AFB, Tex., with stops at Reese AFB, Tex., and Walker AFB, N. M. Eighth - the crew made its first refueling stop at Lordsburg County Airport, Lordsburg, N. M., near the Arizona border. Trucks from Davis-Monthan delivered fuel to them at this point. Shortly after refueling, they departed for D-M. Upon arriving here, they were told to fly on to Williams AFB, near Phoenix for maintenance.

Capt Jerome Luttinger, the detachment commander, 1stLt Jack Forsythe and MSgt Ambrose Morris crewed one HUSKIE, while 1stLt Israel Freedman, A3c Kenneth Wetzel and another officer, no longer with the unit, crewed the other. Leaving from Phoenix in a commercial airliner, the crews returned to Westover and prepared for the long drive back to Arizona with their families.

There are 11 men assigned to the rescue unit at Davis-Monthan. Besides the crews that flew the choppers from Westover, other members are Capt Peter J. Kerrigan, who was the detachment advance man, 1stLt Frederick T. Dykes, SSgt James A. Dundon, A1c James E. Smith, A1c Roland J. Clements and A3c Philip D. Terry. K

BUSIEST DETACHMENT?

Is Det 6, EARC, holder of the LBR record for '63?

The detachment, stationed at Andrews AFB, Washington, D. C., is equipped with two HH-43B's which flew 921 hours during 1963. Of this time, 256 hours were compiled on missions and the unit scrambled for 412 emergencies; 190 missions were also logged as host base support, coverage of Presidential aircraft, etc. In addition, during September 1964, Det 6 had a shortage of pilots (only three) but still accumulated 51 hours of flying time of which 39 were devoted to missions.

1000-Hour Pilot Awards

Three more HH-43B pilots recently received the desk sets awarded by Kaman Aircraft to those logging 1000 hours in helicopters produced by the company. In left photo Capt David M. Randall, ARS Det 7, Torrejon AB, Spain, receives the award from Richard Reynolds, KAC service representative, as Col Donald E. Matthews, commander, Headquarters, AARC, looks on. Second photo shows Capt James W. Langston of Det 2, WARC (MATS), Cannon AFB, N.M., after logging his 1000th hour. Congratulating him is Capt Roy E. Keck, detachment commander. Third recipient of the award is Capt John F. Patterson of the 3638th Flying Training Squadron (Heli) at Stead AFB, Nev. (USAF photos)

Timely Tips

Proper Spindle Seating (UH-2)

Be sure to remove all grease from the spindle and cross on the main rotor retention before installation. Any grease trapped between the mating surfaces of the spindle and cross will prevent proper seating of the spindle and also give a false torque indication on the retaining bolt.

W. J. Wagemaker, Service Engineer

Blade Repair (HH-43B, OH-43D, UH-43C)

On minor blade damage, especially at the tip, an epoxy glue (such as LePage's) makes an excellent patch. The glue, which dries to a clear, extremely hard finish, is also good for repairing the fiberglass tips on the rudder and fins. On a small crack, just let it flow into the crack and dry. Epoxy kits are inexpensive and can usually be purchased at local stores or in the PX.

W. C. Barr, Field Service Representative

Avoid High Strut (UH-2)

Do not attempt to measure or service the tail strut with the main rotor blades in the folded position as the center of gravity of the aircraft is changed and will result in an extremely high strut when the blades are spread.

P. F. Whitten, Field Service Representative

Tail Pipe FOD (UH-2)

One method of combating FOD is to make certain that the tail pipe dust plug is inserted whenever the helicopter is parked. In the past, power turbine blades have been damaged by pebbles thrown into the tail pipe by other aircraft running up in the vicinity or taxiing by. The pebbles lodge against the turbine blades and when the engine is started —FOD!

H. Zubkoff, Service Engineer

Tail Rotor Blade Installation (UH-2)

When installing the tail rotor blades, possible damage to the teflon collar, P/N K616131-3, can be greatly reduced if the teflon surface is coated with grease (MIL-G-21164A) prior to slipping the blade into place. This is, of course, done in addition to using the K604404 retaining assembly and following the installation instructions in the applicable section of the HMI.

P. F. Whitten, Field Service Representative

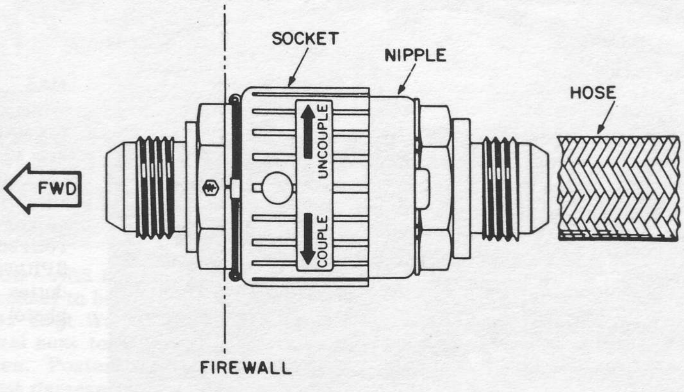
Rods No Hand Hold (UH-2)

When working on the rotor head, maintenance personnel should take care not to use the shoestring rods as hand holds. A recent rise in unscheduled maintenance has been attributed to bent rods which, in turn, caused an out-of-track condition requiring man hours to troubleshoot.

W. J. Wagemaker, Service Engineer

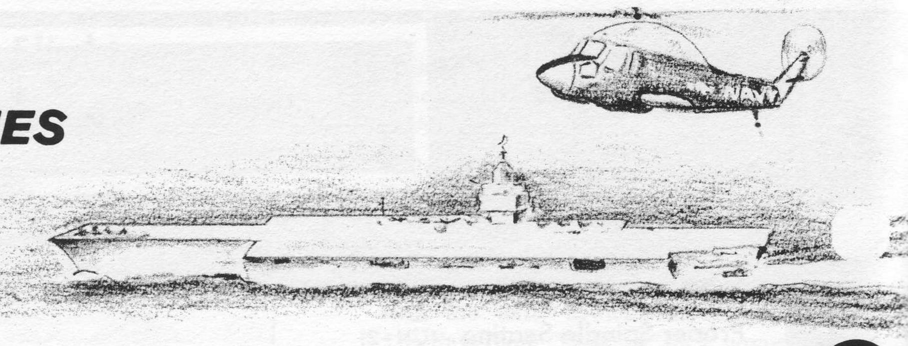
Quick-Disconnect Operation (UH-2)

The Weatherhead quick-disconnect assembly in the speed decreaser gearbox consists of two units—the socket, P/N 20343-1B; and the nipple, P/N 20342-1. Both units must be requisitioned in order to receive the complete assembly. The direction of rotation for this and all Weatherhead quick-disconnects is clearly shown on a data plate riveted to the socket. Since these disconnects are designed for hand operation, a turning force of only 16 inch-pounds torque is required. To uncouple, depress the ball lock and rotate the socket one-eighth of a turn.



H. Zubkoff, Service Engineer

SEASPRITE ACTIVITIES



...Two pilots eject from plane as it makes night landing on USS Saratoga and bursts into flame. UH-2 piloted by Lt A.E. Gover and Lt(jg) F.M. Donica of HU-2's Det 60 speeds to area and begins search. Crewman J.W. Stewart, ADJ1, lowered to water and swims through eight-foot waves in vain effort to rescue injured pilot being dragged through water by chute. D. King, AMS3, other crewman aboard helo. Another HU-2 SEASPRITE launched meanwhile and flown to scene by Lt(jg) J.W. Strickler and Lt(jg) H.T. Brandon. C.C. Fink, AMS1, is crewman. Other pilot, who ejected, sighted below and hoisted aboard on rescue seat.

...Seaman from USS Roosevelt falls overboard during early hours of morning. UH-2 crew from HU-2's Det 42, deployed aboard carrier, takes off and begins search in wake of ship. Minutes later survivor sighted and SEASPRITE crewman J.N. Hudson, AE3, jumps to his aid. Both hoisted to safety by D.L. Seesholtz, ADR2. LCdr W.L. Richards and Lt(jg) A.G. Perry are pilots of rescue helo....SEASPRITE from HU-1 detachment aboard USS Kearsarge rescues fighter pilot whose plane plunges into South China Sea after launch from attack carrier.

...Youth, injured in mountain fall, rescued by Lt John Greenway piloting UH-2 from NAS Whidbey Island, Wash. Pickup made in meadow at 5000-foot level.... Pilot who ejects from disabled plane finds two SEASPRITES from Det 62, HU-2, hovering in formation waiting for him to land in water. As soon as he frees himself from chute, survivor is hoisted to safety of UH-2 piloted by Lt J.E. Roth and Lt J.E. Stophel. C.R. Valentine, ATN3, and A.R. Wells, ADR2, are crewman aboard helicopter which is deployed aboard USS Independence. ...UH-2 crew from NS Adak, Alaska, gives hoist demonstration off local loading docks and UDT men dive from helicopter into freezing water during air show at station open house.

...Fighter aircraft crashes when launched from USS Ticonderoga but, seconds after ejection, pilot rescued by UH-2 flown by Lt Joseph Morse of HU-1, NAAS Ream Field, Calif. Lieutenant Morse, stationed aboard USS Oklahoma, waiting to pick up mail for his ship when accident occurred. ...UH-2 launched at 1400 when inbound aircraft notifies USS Enterprise of emergency. Aboard HU-2 Det 65 SEASPRITE are LCdr J.T. Denny and LCdr G.E. Skinner, pilots; R.A. Schiele, ADR3, and O.B. Lambert, ADJAN, crewmen. Oil slick sighted 12 miles from carrier and search of area begins. Two survivors who had ejected safely, sighted below in life rafts. Pickups made with seat at 1445.

...Three members of downed helicopter crew picked up by SEASPRITE from HU-2's Det 65 deployed aboard USS Enterprise. Pilot of rescue chopper is Lt(jg) C. Kiseljack and Lt(jg) D.C. Shelby is copilot. Fourth rescuee hoisted to safety by UH-2 crew from HU-4's Det 43 aboard Long Beach.... Plane guard SEASPRITE crew from Det Golf, HU-1, hoists fighter pilot to safety after he ejects from plane crash 3/4-mile from USS Oriskany. UH-2 pilot Lt(jg) R.T. Balzer, utilizes rotor downwash to blow pilot away from chute to prevent entanglement. Copilot of rescue helicopter is Lt R.L. Norris; crewmen are R.E. Hall, AE2, and A.P. Berthelot, ADJ3.

...Crew of UH-2 attached to HU-2's Det 59 aboard USS Forrestal makes hoist pickup of pilot after he ejects from disabled plane 38 miles from carrier. SEASPRITE pilot, Lt W.E. Aylward, says hoist operator, L.L. Cota, AN, gave outstanding directions to place helicopter in proper position for lifting rescuee from eight-foot seas below. Lt(jg) L.L. Scott, UH-2 copilot, and R.L. Mullinnix, AN, other crewman during rescue....SEASPRITE crew from NAAS Fallon, Nev., participates in air show at station open house. UH-2 used for rescue demonstration and marine combat team transport. Marines also rappel from hovering helicopter.

NAS CORPUS CHRISTI—LCdr Claude Whittle, helicopter pilot at NAS Corpus Christi, shows his affection for Corpus' new jet helicopter. The station is due to get one more of the Kaman Corporation's UH-2B SEASPRITES to replace the helicopter in the background which is being retired from service. The new SEASPRITES will perform search and rescue duties at Corpus Christi. (Official USN photo)

NAS NORTH ISLAND -Adm Thomas H. Moorer, on his first inspection tour of San Diego area bases as commander-in-chief, Pacific Fleet, is greeted by Capt Robert M. Kercheval, commanding officer of NAS North Island. The UH-2 used by the admiral on his tour was piloted by Cdr D.W. Fisher, commanding officer of HU-1, NAAS Ream Field, Calif., and LCdr J.O. Williams, Jr. (Official U.S. Navy Photo)

MEMORANDUM

To: Home Office

Date: 11/8/64

From: A Service Rep.

My hat is off to the personnel of HU-2 or any other squadron that operates helo's aboard ship. These fellows work under the most adverse conditions possible to maintain their choppers. The helo's are constantly being respotted for various and sundry reasons, working under darkened ship conditions with red overhead lights and a flash light and with the ever present urgency of the famous sound of the Air Boss crying out "EXPEDITE." A job that would normally take an hour on the beach can drag out for many hours aboard ship due to the delays mentioned above. I recall at Lakehurst, waiting a few hours for a test flight—out here it takes days on occasions and the occasion is frequent. I believe these boys should receive lots of "ATTA BOYS" and very few "AW-----."

USS FORRESTAL —Cdr A.H. Oberg, Air Officer of CVA-59, smiles from cockpit after orientation flight in UH-2 piloted by LCdr D.G. Hartman. Commander Hartman is O in C of HU-2's Det 59 aboard the carrier. Detachment personnel said the flight, made during a break in Sunday operations, was in furtherance of the Red Carpet Team's policy of "Better Understanding Through Experience and Demonstration." (Official USN photo)

FOD FACTS

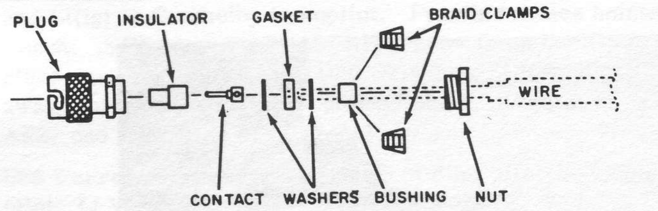
HELP STAMP OUT FOD —ARS Det 13, EARC (MATS), Brookley AFB, Ala., has taken this means of constantly reminding personnel to be on the lookout for foreign objects which could be ingested into the turbine engine on the HH-43B. SSgt Walter Johnson, left, and SSgt Joseph R. Chesson are hanging the multi-colored sign at eye level next to the main entrance of the alert trailer where it will catch the attention of anyone entering the area. Posters such as this are an effective aid in the war on FOD. Another means of combating foreign object damage may be found on page 15. (USAF photo)

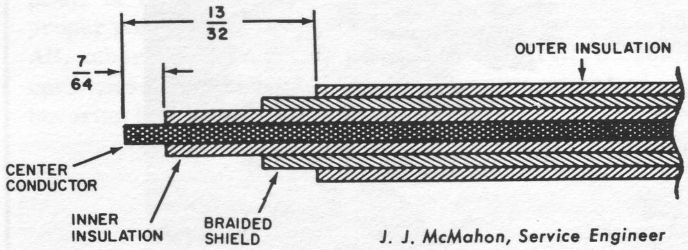
Q's AND A's

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 WHEN ASSEMBLING THE DAGE CO-AX CONNECTORS USED IN THE FUEL QUANTITY SYSTEM?

A. (1) Strip off outer insulation 0.4 (13/32) of an inch from end. Ensure that the cutting instrument does not nick the braided shield. (2) Un-braid the shield back to the outer insulation edge so as to fully expose the inner insulation. (3) Strip off the inner insulation 0.1 (7/64) of an inch from end, ensuring that the center conductor is not nicked by the cutting instrument. (4) Slip the nut back on the outer insulation portion of the wire which is beyond the braid. (5) Slip the bushing on the outer insulation portion of the wire. Bend the braided shield so as to be perpendicular to the wire and against the bushing end. Trim off all braid which extends beyond the O.D. of the bushing. (6) Place a washer, gasket, and washer against the braid. (7) Tin the inner conductor, insert into the contact and solder, ensuring that the solder flows into the contact. (8) Insert the braid clamps snugly into the bushing. (9) Insert and seat the insulator into the plug and slide this assembly onto the wire. (10) Screw the nut into the plug and tighten. (11) Perform continuity and short tests. Tools required for DAGE assembly are: scale, x-acto knife or razor blades, and scissors.





J. J. McMahon, Service Engineer

Q. (Applies UH-2) WHAT ARE THE STOCK NUMBERS FOR THE SPECIAL TOOLS REQUIRED TO REMOVE AND INSERT PINS IN THE BENDIX ELECTRICAL CONNECTORS?

A.

Bendix Part and Number	Stock Number
Extraction Tool - 11-7402-16	5120-021-2050
Extraction Tool - 11-7402-20	5120-021-2049
Insertion Tool - 11-7401-16	5120-022-9803
Insertion Tool - 11-7401-20	5120-021-9802

M. T. Fiaschetti, Service Engineer

Q. (Applies HH-43B) T.O. 1H-43(H)B-1 STATES THAT THE USABLE FUEL IS 1287 POUNDS OR 198 GALLONS AND THAT THE NON-USABLE FUEL IS 13 POUNDS OR TWO GALLONS. T.O. 1H-43(H)B-2 SAYS TO ADJUST FULL POTENTIOMETER SHAFT ON THE FUEL GAUGE, JG130A75, UNTIL THE FULL SCALE READING OF 1400 POUNDS IS OBTAINED. WHAT IS THE ACTUAL FUEL CAPACITY OF THE HH-43B? WHAT IS THE USABLE AMOUNT OF FUEL? WHAT IS THE PROPER READING ON THE FUEL QUANTITY GAUGE FOR A FULL TANK?

A. The actual fuel capacity of the HH-43B is 1287 pounds or 198 gallons as stated in T.O. 1H-43(H)B-1. Non-usable fuel is 13 pounds or 2 gallons. Usable fuel is, therefore, 1274 pounds or 196 gallons. This will vary slightly from aircraft to aircraft. The fuel gauging system used on the HH-43B is one of the most accurate known but, as is true of all man-made units, a tolerance has to be allowed. The allowable tolerance in this particular system is plus or minus 2% of the quantity being measured. As you can see by the following examples, the smaller the quantity of fuel in the tank, the more accurate the reading becomes: (a) plus or minus 2% of 1000 pounds equal 1020 or 980 (A 40-pound difference) (b) plus or minus 2% of 100 pounds equal 102 or 98 (only 4-pound difference). Even though the fuel capacity in the HH-43B is 1287 pounds, T.O. 1H-43(H)B-2 specifies a full adjustment to 1400 pounds on the potentiometer shaft because the indicator, JG130A75, is a stock item also used on other types of aircraft. Some have a greater fuel capacity than the HH-43B. All fuel indicators are calibrated at full scale for accuracy (Ref: MIL-G-7940). The calibration is done with the indicator connected into the MD-1 fuel quantity gauge tester. When the calibration is completed, the test set removed, and the tanks topped off, the indicator reading will not be 1400 pounds but only the amount that actually is in the tank. In the HH-43B system this will be 1287 pounds plus or minus 2%. To summarize, the 1400-pound reading is mentioned only for calibration purposes in conjunction with the MD-1 test set.

R. L. Lambert, Field Service Representative

Q. (Applies UH-2) WHAT CAN CAUSE THE APN-130 DOPPLER MEMORY LIGHT TO FLICKER OR THE INDICATORS TO READ ERRONEOUSLY?

A. Loose antenna crystals and/or microdot cables can cause an increase, decrease or loss of the signal which will result in an erroneous indicator reading or an intermittent memory light.

J. J. McMahon, Service Engineer

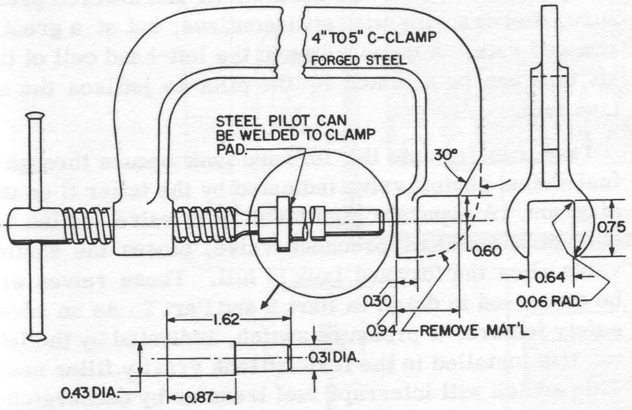
Q. (Applies HH-43B, HH-43F, UH-2) WHY IS THE DATUM LINE LOCATED FORWARD OF THE AIRCRAFT?

A. The reason the datum line is located forward of the aircraft is for weight and balance purposes, to make sure all moments will be on the plus side. The figures used are arbitrary. The HH-43B and HH-43F datum lines are located 13.250 inches forward of the aircraft nose. The datum line on the UH-2 is 20.500 inches forward of the aircraft nose.

R. I. Wilson, Field Service Representative

Q. (Applies UH-2) CAN THE K604712-9 BEARING PULLER BE USED ON THE K611008-209 BLADE DESIGN?

A. No. Although the inboard flap pivot bearing, P/N K615161, is used on both K611008-109 and -209 blade designs, the -209 design is such that the K604712-9 puller cannot be installed. For the purpose of removing the K615161 bearing on -209 blades, a new puller design is available and identified as P/N K604743-1. Design features of this tool allow it to be used on either -109 or -209 blades. If the tool is not available, the following information and sketch is offered so that a simple tool may be fabricated until the K604743 design is available through the Navy supply system.



N. E. Warner, Service Engineer

Q. (Applies HH-43B) TWO FUEL CONTROL EMERGENCY SOLENOIDS WERE DRAWN FROM SUPPLY. THE PART NUMBER OF ONE WAS 47783 AND THE PART NUMBER OF THE OTHER WAS 79249, YET THEY APPEARED TO BE IDENTICAL. WHAT IS THE DIFFERENCE AND WHICH SHOULD BE USED?

A. Basically, they are both the same, except that the solenoid P/N 79249 has improved potting compound and an improved connector. The old solenoids, P/N 47783 or P/N 47783-1, were susceptible to short-circuiting between the pins in the connector which, at times, caused either inadvertent switch-over to emergency or prevented switch-over completely. The new solenoid has eliminated this malfunction. In case the part numbers are not legible the solenoids can be identified as follows: P/N 47783 has a visible white or black gasket installed under the connector base plate and is attached to the solenoid body with 4 drilled head screws and safety wire. P/N 47783-1 has a visible black gasket installed under the connector base plate and is attached to the solenoid body with 4 soldered head screws. P/N 79249, FSN 2915-968-0818, is the solenoid which should be used exclusively. There are no visible gaskets under the connector base plate. The screws and all 4 sides of the base plate are soldered to the solenoid body. This provides a positive moisture seal, which, together with the improved potting compound, has completely eliminated internal connector short-circuiting.

H. Zubkoff, Service Engineer

Q. (Applies UH-2) ONCE THE BAR/ALT CONTROL BUTTON IS ENGAGED, CAN THE SPEED OF THE AIRCRAFT BE CHANGED (WITH PITCH TRIM) WITHOUT DISENGAGING THE COLLECTIVE CONTROL BUTTON? IF NOT, WILL THIS "BEEPING" CAUSE DAMAGE TO THE ASE?

A. During any mode of ASE operation, the speed of the helicopter can be changed by trimming the cyclic stick using the pitch trim switch. It is not necessary to disengage the altitude control button on the collective stick while this speed change is being executed. The ASE system will not be damaged by increasing or decreasing airspeed in this manner. If the speed of the helicopter is changed in small increments, a change in altitude will not be evident as the altitude controller will "hold" the aircraft at the engaged altitude. Because the barometric altitude control system is a relatively low gain system, rapid, large changes in airspeed will cause the helicopter to lose or gain altitude as it loses or gains airspeed. This change in altitude will automatically be corrected and the helicopter will return to the engaged altitude. For more detailed information concerning the UH-2 barometric altitude control system, refer to the article in the August-September, 1964, issue of Kaman Rotor Tips. Reprints of this article are available.

M. T. Fiaschetti, Service Engineer

Q. (Applies UH-2) WHEN MUST THE IN-FLIGHT BLADE TRACKING RESOLVER BE CHECKED FOR PROPER PHASING?

A. The resolver must be checked for proper phasing after replacement of the: (1) phase resolver (2) resolver gearbox (3) accessory gearbox (4) accessory gearbox drive shaft (5) transmission. Instructions for performing the phasing check are found in NavWeps 01-260HCA-2-9.

N. E. Warner, Service Engineer

Q. (Applies UH-2) DURING EXTERNAL POWER STARTS, WHAT CAN CAUSE A LOSS OF POWER TO THE DC BUS IN THE HELICOPTER?

A. If the connection on the aircraft's external DC grounding wire, #P42A2N, is dirty, corroded or loose the high current will cause excessive heat at the connection. This heat may be sufficient to burn a hole in the airframe rib thus allowing the ground wire to drop free and open the circuit. Preventative maintenance should include a periodic inspection of the connection.

J. J. McMahon, Service Engineer

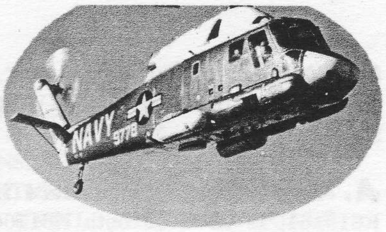
Q. (Applies UH-2) WHAT IS THE PURPOSE OF THE MATCH MARKS ON THE TEETH OF THE DRIVE SHAFT FLEXIBLE COUPLINGS?

A. The sleeve and hub of each coupling are mated and lapped at manufacture. The markings on the sleeve and hub teeth are to preclude mismating, which could upset tooth spacing and possibly result in non-uniform load distribution. This might cause breakdown when under load.

N. E. Warner, Service Engineer

KAMAN SERVICE ENGINEERING SECTION—*E. J. Polaski, Supervisor, Service Engineering, G. M. Legault, G. S. Garte, Asst. Supervisors; N. E. Warner, A. Savard, W. J. Rudershausen, W. A. Saxby, C. W. Spencer, Group Leaders.*

UH-2 FUEL SYSTEM



by Herman Zubkoff
Service Engineer
Field Service Department

This article, the first in a series on the fuel system in the UH-2 SEASPRITE, deals with the internal and auxiliary systems in the helicopter. Subsequent articles will be concerned with the fuel transfer system; pressure fueling, suction defueling and the quantity system; the power plant fuel system; and the fuel control system—normal and emergency. Requests from readers for more detailed information on any of the subjects will be most welcome. Fleet personnel are also invited to contribute to the section on procedures and trouble shooting which will appear at the end of the series. By so doing, they will share the valuable practical knowledge gained during actual operations.

Internal Fuel System: Fuel is contained internally in two bladder-type tanks which are identified as the aft tank and the forward or sump tank. The tanks are installed in the fuselage below the cabin floor with each tank assembly consisting of two separate cells interconnected through the keel structure. The cells are further defined in relation to their location — aft left, aft right, forward left, and forward right — and are secured in the fuselage tub section by means of bulkhead fittings and nylon cord lacing. Each tank assembly has an upper and a lower interconnect fitting between the right and left side cells.

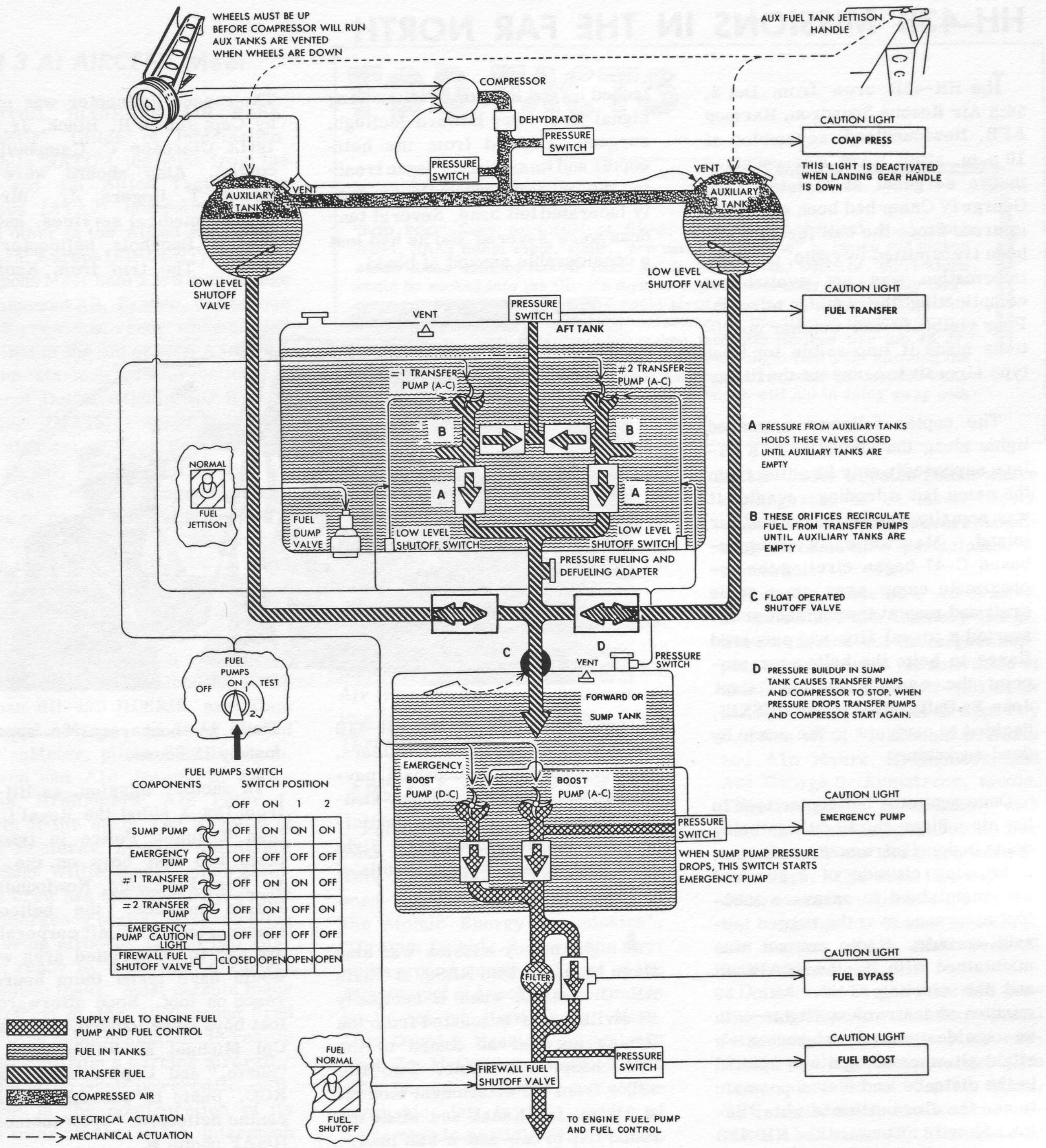
The forward tank has a capacity of 100 gallons and the aft tank, 176 gallons. The fuel, which is fed to the engine from the forward tank, is automatically transferred to this tank as the fuel is consumed. Transfer is made, first from the auxiliary tanks, and then from the aft tank. The tanks are all normally serviced through the single point pressure fueling adapter on the right side of the fuselage. Each tank includes a conventional filler neck and cap in the event that pressure servicing facilities are not available. Each tank also contains four vent valves, two in each cell, for a total of eight vent valves in the internal tanks. The valves are attached to the top of the cells and provide adequate venting for all conditions. The vent valve assemblies include a float-operated shutoff valve to keep fuel from leaking out through the vent outlet and a pressure relief valve which opens when the internal cell pressure exceeds the atmospheric pressure by 1 to 2 psi. This safety feature is provided to prevent overpressurization, which could damage the cells and related plumbing, in the event the vent valve malfunctions.

Aft tank fuel is transferred to the forward tank by means of two submerged boost pumps, also referred to as the transfer pumps. Normally, both pumps operate simultaneously, although either pump alone is capable of completely transferring the fuel. Check valves in the pump outlet lines prevent recirculation between pumps in the event that one pump should become inoperative. The check valves in the aft tank, see diagram, letter A, are called suction check valves. The pressure created by the aux tank fuel against the suction check valves, and the fuel by-pass through the orifices, indicated by the letter B, ensure auxiliary fuel transfer to the forward tank prior to transfer from the aft tank. These units will be further discussed in Part 2 of this series. Two low level shutoff switches in the aft tank deenergize the transfer pumps when the aft tank is empty. A pressure switch at the transfer pump outlets activates a warning light in the cockpit when the transfer pump flow pressure drops 1.25 psi below normal. At this lowered pressure, fuel transfer will still continue, but at a greatly reduced rate. A dump valve in the left-hand cell of the aft tank can be actuated by the pilot to jettison the aft tank fuel.

Fuel transfer into the forward tank occurs through a fuel-defuel shutoff valve indicated by the letter C on the diagram. A separate high level float valve, called the dual pilot solenoid precheck valve, closes the shutoff valve when the forward tank is full. These valves will be discussed in detail in Part 2 and Part 3. As an added safety feature, a pressure switch, indicated by the letter D is installed in the forward tank gravity filler neck. This switch will interrupt fuel transfer by deenergizing the auxiliary fuel air compressor and the aft tank transfer pumps in the event that the fuel quantity and pressure in the forward tank rise above a safe level. As fuel in the forward tank is consumed and the level and pressure drop, the pressure switch energizes the compressor and boost pumps. The transfer of fuel then continues. This sequence of events, controlled by the pressure switch, takes place only if a malfunction occurs in the fuel-defuel shutoff valve or the dual pilot solenoid precheck valve.

Fuel is delivered to the engine from the forward tank by either the primary AC boost pump or the emergency DC boost pump. The AC pump is installed in the right hand forward cell and the DC pump is installed in the left hand forward cell. The AC pump is the normal or primary pump. The DC pump serves a dual purpose. It provides boost pump pressure during starts until the engine is self sustaining and AC power is available from the aircraft generator. It also serves as an emergency pump in case of loss of AC power or failure of the AC pump. In this event it operates directly off the battery DC bus. The DC pump is connected to the AC pump through a pressure switch. After engine start has been obtained, the AC pump output pressure, acting on the pressure switch, interrupts the current to the DC pump and shuts it off. If AC pump failure or loss of AC power occurs, the drop in the AC pump output pressure will cause the pressure switch to actuate the DC pump and the "EMERGENCY PUMP ON" warning light in the cockpit. Check valves in the pump outlet lines prevent recirculation of fuel through the idle or inoperative pump.

Fuel from the forward tank to the engine passes through an airframe filter called the micronic filter. This filter includes a relief by-pass valve in the event the micronic filter element becomes clogged. When



this occurs, a pressure switch in the by-pass passage will actuate a "FUEL BYPASS" caution light in the cockpit. A firewall valve is provided in the fuel boost pump pressure line to the engine to shut off the fuel flow in case of emergency and after engine shutdown. A pressure switch installed in the boost pump fuel pressure line between the micronic filter and the firewall shutoff valve will activate the "FUEL BOOST" caution light in the cockpit when boost pump pressure drops below normal. The boost pumps normally develop a pressure of approximately 10 psi. The "FUEL BOOST" caution light is actuated when boost pump pressure drops to approximately 2.8 psi. A low level resistance type sensor activates a warning light in the cockpit when an approximately 30-minute supply of fuel remains in the forward tank.

Auxiliary Fuel System: Fuel is carried externally in two metal droppable 60-gallon capacity tanks. The tanks are mounted on support assemblies attached to both sides of the fuselage aft of the main landing gear fairings. The tanks are latched to bomb shackles and can be jettisoned by a manual release located in the cockpit. Quick disconnect "SLIP JOINT" type valves are provided in the fuel and air pressure lines between the tanks and the support assemblies. These valves close automatically when the tanks are detached. Transfer of fuel from the auxiliary tanks to the forward tank is accomplished by means of air pressure supplied by a small motor-driven air compressor. The compressor and associated units will be further explained in Part 2 of this series. The auxiliary tanks can be serviced either through the single point pressure fueling adapter or through the individual conventional gravity filler necks and caps.

Each tank includes a solenoid-operated relief valve installed in the air pressure line. Venting of the tanks

HH-43B MISSIONS IN THE FAR NORTH

The HH-43B crew from Det 2, 54th Air Rescue Squadron, Harmon AFB, Newfoundland, scrambled at 10 p.m. after word was received that a sergeant at isolated King George IV Camp had been seriously injured. Since the call for help had been transmitted by radio, detailed information was not available—complicating the 54th's mission. Poor visibility and weather conditions made it impossible for float type aircraft to carry out the flight.

The copter followed scattered lights along the shoreline to a village supposedly only 22 miles from the camp but a landing revealed it was actually almost twice that far inland. Meanwhile, a Harmon-based C-47 began circling the approximate camp area as a guide craft and men at the accident scene started a signal fire and prepared flares to help the helicopter pinpoint the camp's position. Capt John E. Duffy, RCC of the HUSKIE, decided to navigate to the scene by dead reckoning.

Once again the helicopter took to the air. Since the flight was being made under instrument conditions, a cruising altitude of 3,000 feet was maintained to assure a 1000-foot clearance over the rugged terrain enroute. Radio contact was maintained with Harmon RAPCON and the circling C-47. After 30 minutes of instrument flight—with no outside ground references—a slight glimmer of light was spotted in the distance and it was possible to see the dim outline of water below. Shortly afterward the HH-43B landed by the light of the flickering signal fire. Dr. Edward McHugh, surgeon, alighted from the helicopter and immediately began treating the injured sergeant's severely lacerated left hand. Several tendons were severed and he had lost a considerable amount of blood.

Other members of the HH-43B crew were Capt James R. Miears, copilot; Capt Alex P. Lupenski, navigator; and SSgt Robert Rios, medical technician. All who participated in the hazardous night flight have been award Kaman Scrolls of Honor.

A night mercy mission was also flown by Det 1, 54th ARSq, at Thule AB, Greenland, when a seriously ill civilian was evacuated from the Danish hospital at Kanak to the USAF hospital at Thule. Two HH-43B's from the detachment took off at 8 p.m. for Kanak and made the round trip in two-and-a-half hours. The rescue helicopter was piloted by Capt James H. Black, Jr., and 1stLt Clarence C. Campbell was copilot. Also aboard were Maj Bealer T. Rogers, Jr., director of base medical services, and A1c Boyd L. Buchholz, helicopter mechanic. The trip from Kanak to Thule by boat requires approximately 12 hours.

In another mission, an HH-43B from Det 2 aided the Royal Canadian Mounted Police in tracking down two lost boys on the Port au Port Peninsula, Newfoundland. Within minutes, the helicopter transported an RCMP corporal and his dog to an isolated area which would have taken them hours to reach on foot. Soon afterward the lost boys were located. Shown are Cpl Michael E. Wilson, his dog "Susie," and Capt John E. Duffy, RCC. Susie is possibly the first canine helicopter "crew member." (USAF photo) K

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is not required during normal operation since pressurization is necessary for fuel transfer. During refueling and suction defueling, venting is required. This is provided for by the relief valves which are opened by a micro-switch, actuated when the fuel pre-check panel door is opened. This will be discussed further in Part 3, under pressure fueling. The relief valves are also opened, to relieve auxiliary tank pressure, by a micro-switch actuated when the landing gear is down and the aircraft is on the ground. A safety feature is provided in that an auxiliary tank internal pressure of 25 psi will override the solenoid closing force, opening the relief valves to prevent damage to the tanks and plumbing due to excessive pressure buildup.

Each tank contains a fuel shutoff valve actuated by pressure from a high and a low level sensing valve. The sensing valves close the shutoff valves when the auxiliary tanks are full during pressure fueling and when the tanks are empty after fuel transfer to the forward tank has been completed. Each tank also includes an internal strainer and an external drain valve. Two-way check valves are installed in the transfer lines from the auxiliary tanks to the forward tank. These valves serve to prevent circulation between the two tanks during transfer. They open at .25 psi in the transfer direction and 17 psi is required to open them in the opposite direction to permit pressure fueling which takes place through the same plumbing.

This completes Part 1, description of the internal and auxiliary aircraft fuel system. Part 2, which will appear in the next issue will describe the fuel transfer system. K

Det 3 At AIRCENT Meet

TOUL ROSIERES AIR BASE, FRANCE, Office of Information —While NATO's top guns from the 2nd and 4th Allied Tactical Air Forces (ATAF) competed against each other in the Allied Air Forces Central Europe (AIRCENT) Tactical Weapons Meet held a few months ago at Chaumont AB, France, one unique USAF crew was ready when needed to come to the aid of both ATAF's.

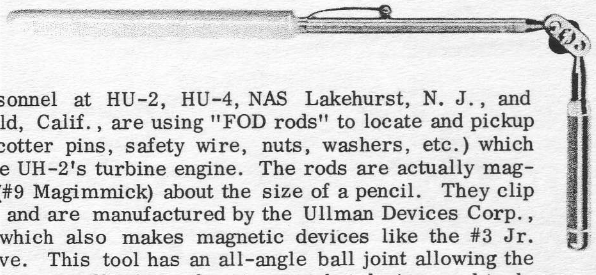
The six-man rescue helicopter crew of Det 3, Atlantic Air Rescue Center (MATS), which normally operates out of Toul Rosieres AB, was on duty each day during the flying phase of the competition and ready to go to work at a moment's notice should any of the 32 aircraft from the seven nations (USA, Britain, Germany, Netherlands, Belgium, France and Canada) have an emergency.

Making up the Det 3 rescue and firefighting crew which flies the Kaman HH-43B HUSKIE are: Capt Robert L. Merna and 1stLt Donald F. VanMeter, pilots; SSgt Bobby L. Hudson and A1c Joseph E. Longworth, firefighters; A1c Peter J. Morin of the 608th Tac Hospital at Toul Rosieres, medical specialist; and SSgt Willie Bostic, crew chief. This crew has the capability, should an emergency occur, of scrambling and being airborne in just two minutes; ready to undertake a variety of rescue tasks, most notable being utilization of the 1000-pound "red ball" fire suppression unit to rescue personnel from a burning aircraft.

The turbo-shaft powered HH-43B, unique in the configuration of its twin rotor blades, which intermesh like an eggbeater unlike the standard three-bladed helicopter, is one of the few aircraft of its type in current operation capable of lifting its own weight again. This ideally suits it to the rescue task. In the fire-rescue role, it proceeds directly over a crashed and burning aircraft, washing out the flames and cooling the area below with its rotor down wash. The firemen, once lowered to the ground, use the water and foam capability of the "red ball" unit to extinguish the blaze.

With this special international assignment of watching over the pilots of seven NATO nations, the Air Rescue Service continues to live up to its motto: "This I do, That Others May Live."

FOD FACTS



"FOD ROD"–Navy personnel at HU-2, HU-4, NAS Lakehurst, N. J., and HU-1, NAAS Ream Field, Calif., are using "FOD rods" to locate and pickup small loose articles (cotter pins, safety wire, nuts, washers, etc.) which could be sucked into the UH-2's turbine engine. The rods are actually magnetic retrieving tools (#9 Magimmick) about the size of a pencil. They clip onto the breast pocket and are manufactured by the Ullman Devices Corp., of Ridgefield, Conn., which also makes magnetic devices like the #3 Jr. Magimmick shown above. This tool has an all-angle ball joint allowing the head to swivel at 360 degrees. Check catalogs to see what devices and tools are available in the military supply system which will aid in doing away with the FOD hazard.

ARS Aids "Project Dribble"

Personnel and two HH-43B's from ARS Det 14, EARC (MATS), MacDill AFB, Fla., were among the men and aircraft participating in the Atomic Energy Commission's "Project Dribble." It was the first underground atomic test east of the Mississippi and took place 30 miles southwest of Hattiesburg, Miss. Capt David J. Frazier, RCC, 1stLt Neil J. McCutchan, copilot, and A2c Ronald G. Koble, helicopter mechanic, left in the middle of September to participate in the test but, because of technical reasons and contrary weather, the shot was postponed until a later date.

The HH-43B's were used to obtain a background level of radiation. This required hovering at 500 feet above the terrain with an instrument package suspended from the hoist. There were 56 points where readings had to be taken. Seven other helicopters and several fixed-wing aircraft also participated in the test.

Recently, after an F-4C crashed at the Avon Park Gunnery Range, Det 14 carried out its largest support mission since its activation at MacDill. The alert HH-43B crew at Avon Park consisted of Capt Guy S. Hahn, RCC; A1c Donald E. Smith and A1c Myers, firefighters, and A2c George S. Armstrong, medic. They responded immediately with the fire suppression kit but the fire was a small one and there were no survivors. The next five days the detachment provided support for the investigating team. A total of 108 sorties and a little over 35 hours were flown.

Detachment 14 also provided rescue coverage for an army special forces night parachute jump conducted at the gunnery range. The crew consisted of Captain Hahn, RCC; Lieutenant McCutchan, copilot, A1c Leonard C. Shea and A1c Edward H. Barry firefighters; A1c Richard C. Rhoades, medic; and Airman Koble. Approximately 120 troops participated in the night jump. One jumper suffered a minor ankle injury and was evacuated to McCoy AFB 40 miles north by Captain Hahn and his crew.

CURRENT CHANGES

			Issue Date
AFC	No. 43	ELECTRICAL SYSTEM; Addition of ROTOR OVERSPEED RECORDER.	2/26/65
AFC	No. 54	Improvement of MAIN LANDING GEAR TIRE.	10/15/64
SEC	No. 147	Modification of ACTUATOR CONTROL UNIT BENCH TEST SET (LBT) P/N K604617-1.	11/30/64
TCTO	1H-43(H)B-563	Modification of CARGO RELEASE SYSTEM.	12/1/64
TCTO	1H-43(H)B-572	Replacement of ROTOR FLAP HORN BEARING AND CHORDWISE ROD END CLEVIS.	11/1/64

A. J. Leonaitis, Service Publications

LINE LEVEL HELICOPTER MAINTENANCE

by Robert J. Myer
Customer Service Manager

Part VIII

With the completion of Non-Routine Maintenance in the October/November issue of Rotor Tips, we now take up the subject of General Maintenance.

GENERAL MAINTENANCE

This category encompasses aspects of maintenance that are not considered "end functions" in themselves but which reflect on practically all maintenance operations. The subjects to be considered in this category are: Cleanliness of Aircraft and Work Area; Torque and Safetying Requirements; Support Equipment; and Pilot-Mechanic Coordination.

Cleanliness of Aircraft and Work Area

This area of concern is becoming so common in all phases of aircraft maintenance and related publications that perhaps only the title is necessary to bring the key points to mind. Why the prevalence in these times when we are all supposed to be better informed? One possibility could be that current equipment is more sophisticated and therefore more vulnerable to problems caused by dirt and debris. Another could be that greater work loads and lack of qualified personnel limit the time that can be spent doing housecleaning chores. Or could it be just old-fashioned neglect and carelessness? You be the judge as to which category best fits your outfit, but for the purposes of this discussion we will assume that they all have a bearing on the problem.

First, let us consider the increased equipment sophistication angle. Although helicopters aren't exactly new, when coupled with recently developed turbine engines they fall into this category nicely; too nicely in fact! The rotor blades do an excellent job of stirring up any loose debris on the ramp or mat and what doesn't cause immediate damage to the blades themselves usually manages to circulate in front of the hungry turbine engine air inlet for immediate digestion. The result—that popular engine disease responsible for more premature removals than most other problems put together —FOD (Foreign Object Damage). Increased equipment complexity causes similar problems in other systems, emphasizing the need for the utmost in care and vigilance, even when the smallest foreign objects are allowed to escape into critical areas. This point is well illustrated by an article in the October '61 issue of Aerospace Accident and Maintenance Review entitled "So Much; So Little." The article covers the emergency landing of a KC-135 tanker whose nose gear would not lower due to a small lock washer becoming wedged between the upper and lower drag brace links. The January '62 issue of this magazine includes an article entitled "F-100 Fatal FOD" which covers the fatal crash of an F-100D as a result of a 1/4-inch nut entering the fuel pump. Stories like these are all too easy to come by.

The second reason advanced for these problems was greater work loads, lack of qualified personnel, etc. This too may have some foundation, but the more you consider it, the more it looks like a combination of inadequate supervision and quality control with a dash of neglect or carelessness thrown in. Take the situation written up in the November '61 NAVWEPS Approach article entitled "Pack Rat." An AD-5 gave indications that the tail gear was not down. Upon investigating the rear end of the fuselage, a 35-pound jack was found to have been inadvertently closed up inside the compartment and taken along for the ride. This one could have obviously ended up much worse than a caution light problem.

The above illustrations deal with maintenance housekeeping malpractices that cause in-flight concerns. Although usually not as dramatic, ground problems caused by similar operational deficiencies can result in equally costly equipment and personnel accidents. To quote excerpts from a related article in the December '61 issue of Aerospace Accident and Maintenance Review—"In the aircraft movement areas, hazards range in size from a small piece of safety wire to a towing vehicle or bulldozer." — "Misplaced or forgotten equipment figures prominently in the airfield accident picture. A power unit, a maintenance stand, or even an occasional vehicle—overlooked after the hustle of getting the mission airborne — can scrub a multi-million-dollar aircraft when the birds come home to roost."

Much attention has been, and is being, focused on these operational housekeeping problems and with continuing pressure on the part of supervisory and quality control personnel, the situation should vastly improve. However, another area of hangar maintenance housekeeping concerns have plagued aircraft operations through the years and requires continuous policing and upgrading of maintenance personnel. Some of these concerns and related recommendations are:

1. Questionable ability of properly and thoroughly inspecting aircraft components covered with oil, grease and dirt. Helicopter rotor blade performance is especially deteriorated by such accumulations.

Aircraft should be washed down and cleaned throughout periodically, preferably during periodic inspections. Helicopter rotor blades should be kept clean continuously and waxed periodically.

2. Small loose objects, oil or grease allowed to remain on hangar floors or work stands are an ever present hazard to maintenance personnel.

Provide and encourage the use of drip pans. Insist on the maintenance of clean work areas with specific time allocated for clean-up after each job or shift.

3. Careless placement of equipment, materials or tools which can easily fall or shift and cause personnel injury or equipment damage.

Prohibit the resting of heavy or cumbersome gear on high work stands, wings, etc. when not in use. Assign specific storage areas for all equipment, etc., and insist that equipment not in use be returned to these areas.

4. Reduced component reliability due to servicing with equipment and materials such as grease guns and grease in bulk containers that have been allowed to lay around exposed gathering dust and dirt which is only superficially removed prior to use.

Establish criteria for the handling and treatment of such equipment and materials to reduce possibility of aircraft system contamination.

5. Fire hazards caused by careless handling of volatile fuels, waste, and soiled rags.

Require general cleanliness of work areas; maintain all electrical cords, fuel hoses and other lines in a serviceable condition; provide suitable containers for the storage of fuels and flammable materials; use only approved solvents for cleaning purposes; provide static ground wires on all metal containers from which flammable substances are drawn; do not allow any flammable material such as fuels, oils, etc. to enter sewer systems.

These problem areas and corresponding corrective actions may seem obvious, but due to personnel turnover and human failings they must be continually monitored and brought to the attention of the troops. The penalty of increased air and ground accidents is too high to allow complacency to set in! K

Men Behind The Mission

IN MANY PLACES—Typical of HUSKIE maintenance operations in many countries and many parts of the world are these photos of Moroccan and Colombian helicopter mechanics at work. In top photo, left, Sgt Kébir Ziat and SgtChef Ahmed Tamir of the Moroccan Air Force pull a post flight inspection on HH-43B's landing gear. In bottom photo, Sgt Mohamed Fathe and Sgt Moussa Houssam change multi-speed switch on engine. In top right photograph, ST2 Inaggio Monsane of the Colombian Air Force gives directions to ST2 Dario Ramirez and ST2 Fernando Plazas during transmission removal. In bottom photo, ST Monsane, ST2 Pearo Rojas, ST Plazas and ST2 Fabio Bedoya install sling on shaft and housing.

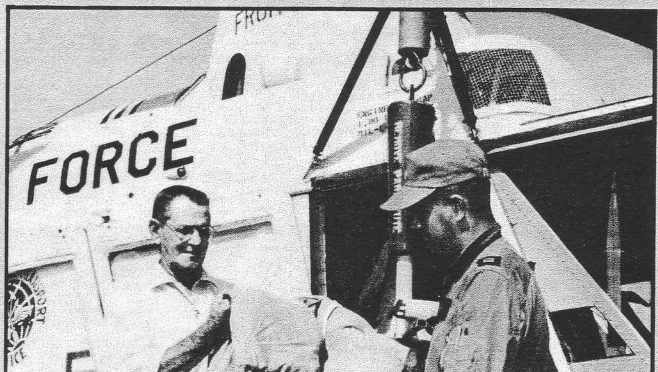
Huskie Happenings

...Det 14, EARC (MATS), MacDill AFB, Fla., called on to make night evacuation of two airmen injured in truck-automobile collision. HH-43B flight made from base to Avon Park Hospital to return airman in critical condition to MacDill hospital. Capt Waino E. Arvo, Jr., lands HUSKIE on four-lane highway to make pickup at Avon Park. Co-pilot is Capt Herbert A. Lee. A2c Elvis W. Eves is medic and TSgt Patrick A. Bowers, helicopter mechanic.

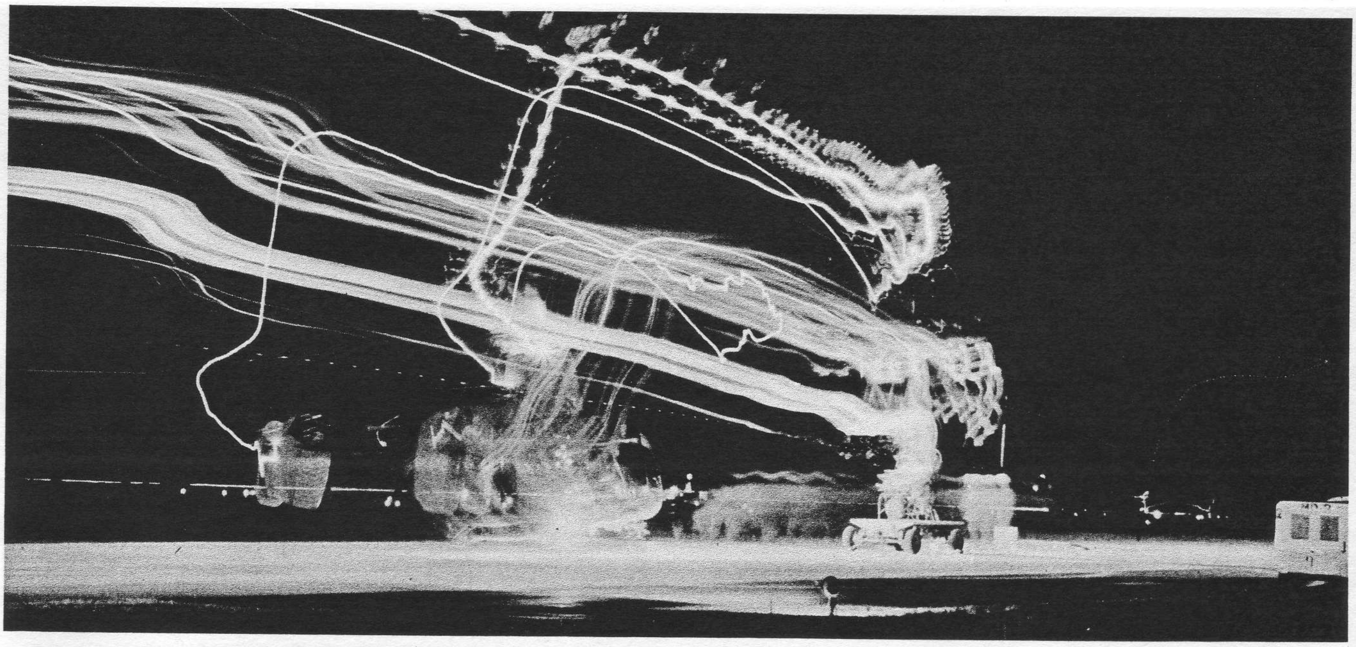
...Crew of HH-43B from Det 5, EARC (MATS), Suffolk County AFB, N.Y., airlifts desperately needed blood from New York City to Suffolk Central Hospital in Riverhead, N.Y. Crew of HUSKIE consists of Capt Charles A. Morrill, pilot; Capt Joseph T. Herr, copilot; MSgt Donald R. Pavel, crew chief; and A1c Luis Carreras.... Two civilians, injured when their light plane crashes in meteor crater, rescued by HH-43B crew from Det 16, WARC, Williams AFB, Ariz. HUSKIE, piloted by Capt Tom Brumfield and Capt Donald Donk, drops into crater, takes survivors aboard and flies to hospital. Others aboard helicopter are Capt William Runkle (MC), SSgt Karl Van Etten and SSgt Robert Myer.

...HH-43B crew from Det 8, EARC (MATS), saves time, labor and money by carrying large television antenna to top of water tower at Myrtle Beach AFB, S.C....HUSKIE crew from Det 5, EARC, Suffolk County AFB, N.Y., flies through 35-knot winds and intermittent rain to rescue two men stranded on barges aground on Gardiner's Island, east of Montauk Point. Capt Franklin L. Chase is HH-43B pilot, Capt Arthur D. Kwiatkowski, copilot; SSgt Joseph L. Forget, medical technician; and A1c Luis Carreras, hoist operator.

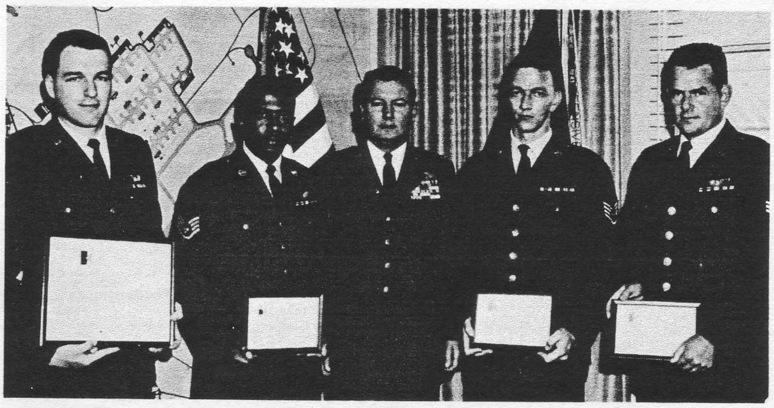
...Pakistan Air Force HH-43B's participate in Peshawar AFB air show and perform varied tasks ranging from ferrying photographers and movie people to standing by on crash-rescue duty.... Army parachutist, injured while participating in army reserve special forces exercises at Avon Park Gunnery Range, evacuated to MacDill hospital by HH-43B from Det 14, EARC, at MacDill AFB. 1stLt Paul D. McComb is pilot of HH-43B, SSgt Louis T. Torok, medic; SSgt Charlie J. Montgomery, Jr., helicopter mechanic; SSgt Charles A. Parker, Jr., and A1c George F. Cook, firemen.... HH-43B from Det 14 participates in search for man reported stranded on dam at Armour Company phosphate plant near Bartow, Fla. Letter of appreciation received from Armour company for the "expeditious manner of response and professionalism of search crew" led by Captain Layman.



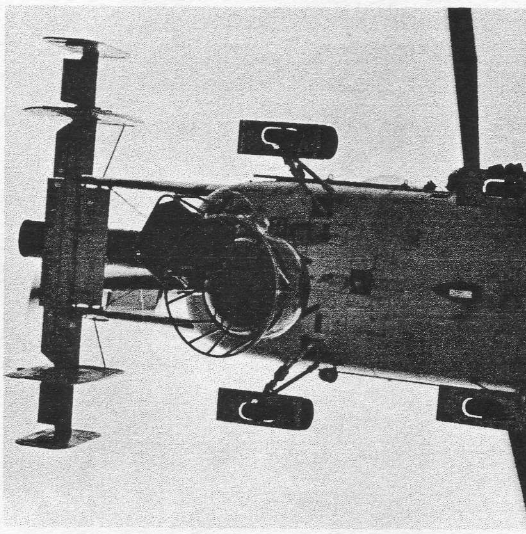
SAILORS' "ANGEL"—Clarence Neece, left, visited Det 13, EARC (MATS), at Brookley AFB, Ala., recently to thank those who saved his life. Neece, a deckhand, fell into Mobile Bay after his ship grounded during tropical storm Hilda. He spent ten hours fighting the wind-whipped waves until spotted and hoisted to safety by an HH-43B crew from the detachment. SSgt Clyde R. Ross, rescue and survival technician, was lowered to aid the exhausted survivor. Capt Herbert Gates, RCC, right, saved the sailor's life jacket and presented it to him during the visit. Other members of the rescue crew were 1stLt Gerald B. Van Grunsven, copilot; SSgt Frank Davis, crew chief; and SSgt Robert Benton, hoist operator. In second photo, an injured seaman is removed from a Det 13 HH-43B after being picked up from a vessel in Mobile Bay. He had fallen 50 feet into the hold. Capt O. D. Stevenson, flight surgeon, and Sergeant Ross were lowered to the deck to prepare the injured man for hoisting aboard the helicopter. Capt Rockwell N. Greene was pilot; Lieutenant Van Grunsven, copilot; and SSgt A. Stanley, airborne firefighter, was hoist operator. Exactly one week later, to the hour, the detachment responded again when another seaman fell aboard a freighter in the Gulf of Mexico. Intercept and pickup were made about 25 miles beyond the mouth of Mobile Bay. Captain Gates was pilot; Lieutenant Van Grunsven, copilot; and Sergeant Davis, flight mechanic and hoist operator. Captain Stevenson and Sergeant Ross were lowered to the deck to prepare the injured man for the flight. (USAF photos)



MORSE CODE ON THE RUN?—This HH-43B at Aviano AB, Italy, was returning from a routine mission at night when the photographer took this unusual time exposure. The chopper is operated by ARS Det 10, AARC. It supports the primary mission of the 7227th Combat Support Group that maintains F-100 Supersabre jet fighters at Aviano. (USAF photo)



SCROLL OF HONOR—HH-43B crew from ARS Det 1, EARC, Loring AFB, Me., proudly show Kaman Scrolls of Honor presented by Col R.J. Nolan, center, commander of the 42d Bomb Wing at Loring. Recipients are, left to right, 1stLt Joseph T. Connell, RCC; SSgt Duncan Calcote, crash fire technician; SSgt James G. Gonyea, aerospace medical technician; and A1c Romuald Suszczewicz, crash fire technician. 1stLt Bruce B. Duffy, copilot, also received a Scroll. The awards were presented for the dramatic rescue of a seriously injured pilot trapped in his crashed and burning F-106. He had attempted to eject but the seat failed to fire. Lieutenant Connell hovered the HH-43B overhead to provide cooling air; Sergeants Calcote and Gonyea cut through the pilot's boot to free his pinned foot from the armed, rocket-type ejection seat while the flames burned around the partially filled fuselage fuel cell; Airman Suszczewicz set up a stretcher and then helped lift the pilot from the cockpit; Lieutenant Duffy dispersed a gathering crowd and then rushed to the aid of the others; Sergeant Gonyea and Airman Suszczewicz administered first aid on the return flight. (USAF photo)



SURVIVOR'S VIEW—Usually a rescuee has other things on his mind besides picture taking so actual rescue shots from his position are few and far between. This photograph of a hovering HH-43B from Det 3, AARC, at Toul-Rosieres AB, France, is an excellent substitute, however. It was entered in the Photo of the Month Contest, Hq., USAFE, by 2ndLt Jon W. Alquist, 7544th Combat Support Group, and received honorable mention. (USAF Photo)

FIRST IN EUROPE—Det 4, AARC, Ramstein AB, Germany, has staked its claim to having the first HH-43B in Europe to accumulate 1000 hours. Shown is LtCol James S. Jones, deputy commander, Hq., AARC, congratulating the pilot, Capt Grant F. Mackie, as KAC Service Representative Richard A. Reynolds watches. Others on the 1000th-hour flight were, left to right, A2c Michael J. Kenpesta and SSgt Harry L. McAllister, firemen; SSgt Wayne W. Martin, medical technician; A1c Lee E. Brown, crew chief; and Capt Richard L. Brubaker, copilot. (USAF photo)

Christmas Angel

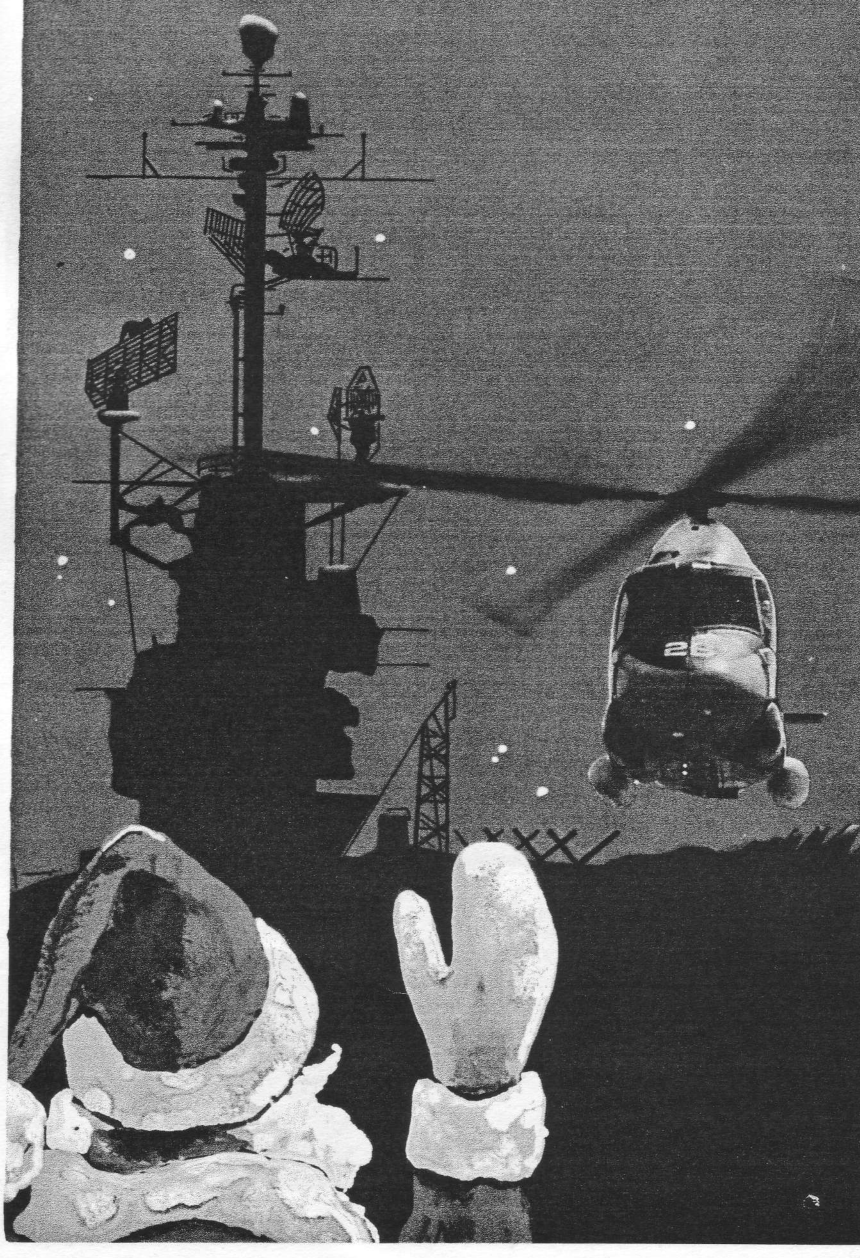
'Twas Christmas eve, and out in WesPac,
A carrier sailed, on a night cold and black;
Part of a task force, on this foreign sea,
All doing their part, to keep the world free,

Most of the crew, were asleep in their beds,
With dreams of home, running through their heads;
Of family, of turkey, of bourbon and scotch,
Except the unlucky — they had the midwatch.

Up in radar, as part of the planning,
Sat a man at the scope, constantly scanning;
He mused on how slowly, the first hour had gone,
Leaned back to stretch, and stifled a yawn,

Suddenly stiffened, for there was a blip!
And with that speed and heading, it'd soon reach the ship.
He grabbed for the phone, called the OD,
Who ordered GQ, just as quick as could be.

They were alert and ready, as the moon came up bright,
Yet amazed when the object, came into sight;
Eight flying reindeer, pulling a sled,
With an old gaffer driving, all dressed up in red,



He passed overhead, then made his break,
Went into the pattern, a landing to make,
The radio crackled, then rang loud and clear,
"Signal Charlie requested, Kris Kringle is here."

As he turned the 90, someone yelled, "Look!
There from the sleigh, he's dropped a tail hook,"
The meatball was right, 'twas a sight to inspire,
He greased it right in — caught number two wire,

He raised his hook, taxied out of the gear,
Got up to the spot, and stopped the reindeer,
Then down from the seat, he came with a groan,
Just dripping fatigue, weary to the bone.

He explained that he'd had, a long hard night,
So many homes to visit, flight after flight,
There was one more remaining, then his work was complete,
But he just couldn't make it, with his reindeer so beat,

His last stop was Japan, (Atsugi the place),
Presents he had, for the town and the base,
Hundreds of children, were expecting their toys,
He couldn't disappoint, these young girls and young boys.

"Don't worry Santa," the Air Boss said with a smile,
"Have some hot coffee, and rest for a while,
We'll call out the crew of the UH-2A,
They'll finish your trip, while we service your sleigh."

So all through the night, toy runs they flew,
Finished the last, as the dawning came due,
As they shut down, old Kris stopped by for a chat,
Said "I haven't much time, I'm due on the cat,

"Sure appreciated the help, you gave with your 'Sprite',"
Then he turned and was gone, prepared for his flight,
They catted him off — he fairly sailed out,
And from the midst of the steam, came this great shout,

"Up Donner! Up Blitzen! We'll be home before day,
Gotta' file our OPNAV and tie down the sleigh,
So 'til it's time to go flying next year,
Merry Christmas to all, and a Happy New Year!!!"

JACK L. KING
Senior Service Representative