KAMAN Rotor Tips

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Rotor Tips

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Volume VIII No. 6

On The Cover

A new concept in forward area reconnaissance, Kaman's Remotely Piloted Vehicle (RPV). For details, see page 4. Cover by R.L. Allen, KAC Service Publications.

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COMMANDER STOKER NEW HSL-33 COMMANDING OFFICER

Making it official. Cdr Belto, left, assists Cdr Stoker in the "Official" cake-cutting ceremony.

Helicopter Anti-Submarine Squadron Light Thirty-Three (HSL-33), the "Snakes," has reached another milestone in its first year of operations. In Change of Command ceremonies held on 12 July 1974 at NAS Imperial Beach, the Snakes said farewell to their first Commanding Officer, Cdr M. A. Belto. Cdr Belto, who was relieved by Cdr L. "L" Stoker, has served as CO since the squadron's establishment on 31 July 1973. He will report to Commander, Cruiser-Destroyer Group Three.

The new CO, Cdr Stoker, is not new to the LAMPS community. He has been involved with the Light Airborne Multi-Purpose System since 1968, when he reported to Helicopter Combat Support Squadron Five (HC-5). While serving with HC-5 (redesignated Helicopter Anti-Submarine Squadron Light Thirty-one (HSL-31) he was Officer in Charge of deployed LAMPS detachments from 1970 to 1972, during the formative stages of the LAMPS program. Upon HS-5's redesignation, Cdr Stoker became its Director of Operations and Training. On 31 July 1973, HSL-33 was established, and he became its first Executive Officer.

Cdr Stoker's Executive Officer is Cdr D. Huff. Although new to the LAMPS community, Cdr Huff brings with him a wealth of ASW experience. From February 1969 through March 1971, he served with Helicopter Anti-Submarine Squadron Six. Cdr Huff then served as Operations Officer, Carrier Anti-Submarine Air Group Reserve Eight-zero from April 1971 to March 1974. In March, he reported to HSL-31 for LAMPS familiarization.

Cdr D. Huff

WELCOME HOME LAMPS DET SEVEN

Recently, HSL-33 LAMPS Detachment Seven returned to NALF Imperial Beach after a five and a half month WESTPAC deployment aboard the USS O'Callahan (DE-1051). Led by LCdr J. R. Woods, OINC, Det 7, ably provided the multi-mission helicopter support and extended weapons system capability for which LAMPS was designed and has become noted.

During their deployment, the DE/LAMPS team engaged in several Anti-Submarine Warfare (ASW) and Anti-Ship Missile Defense (ASMD) exercises. These operations utilized the combined capabilities from the LAMPS team, P-3 units and various other surface units of the Seventh Fleet. In addition to its ASW/ASMD operations, Det 7 performed extensive logistics, personnel transfer, naval gunfire support and search and rescue (SAR) missions.

Noteworthy SAR operations included the rescue of two downed pilots after ejection over Subic Bay and a parachutist caught in tall trees inaccessible from the ground, thereby crediting Det 7 with the first rescues in the short history of HSL-33.

In photos below, Det 7 personnel relax and informally discuss the latest cruise. In left photo, LCdr J. R. Woods, his wife Marcy and son Jeremy chat with HSL-33's CO, Cdr M. A. Belto. In photo on right, the Snakes of Det 7 "mingle." (USN photos)

KAMAN AEROSPACE CORPORATION's K-244

A Remotely-Piloted Vehicle for Reconnaissance and Surveillance

By L. H. McNeill,
Director of Systems Engineering

THE NEED

The objective was to provide a simple, low-cost, remotely-controlled system operated with minimum support, capable of real-time forward area reconnaissance and target acquisition. The system had to locate targets with sufficient accuracy for destruction by conventional or guided weapons. Kaman believes the rotary-winged Remotely Piloted Vehicle (RPV) is the optimum method of accomplishing the mission. The cover depicts a deployed system and the accompanying illustration provides a close look at a control station.

The RPV and the ground control station depicted here are part of a system conceived by Kaman Aerospace Corporation as a first step in the development of operational RPV's for reconnaissance surveillance and target acquisition missions. To eliminate development risk, the system utilizes a conventional rotary-wing vehicle powered by an off-the-shelf reciprocating engine. The RPV is designed to carry unsophisticated, unstabilized TV cameras, film cameras, or precision-stabilized imaging sensors with automatic target tracking features, a laser range-finder and a laser designator. The all-up weight of the RPV will vary from 120 to 150 pounds, depending on the mission payloads. A dash speed of 100 knots is provided by the 8-foot rotor and the 18 horsepower engine. Flight endurance at cruise velocity is approximately 2 hours; at optimum endurance speeds, flight time would be greater than 3 hours.

GROUND CONTROL STATION

The ground control is manned by two men. One man handles launch and recovery of the RPV's and monitors cruise flight. The second man operates the sensors in the RPV by remote control and locates targets on his remote displays. Navigation data is combined in a ground computer with airframe attitude and heading data, sensor pointing data, and laser range data telemetered from the RPV. Target coordinates are determined automatically and forwarded to intelligence and fire control centers.

When the mission is completed, the RPV automatically flys to a position and altitude where the remote control flight operator can acquire the vehicle visually and land it on nearby ground. Flight of Kaman's RPV is controlled by an autopilot. The remote operator provides command signals for altitude, heading, and speed, and therefore does not need to be a trained helicopter pilot.

The Kaman RPV system is mobile and can be set up in unprepared areas in a very short time without special equipment or extra men. The operational concept utilizes two RPV's which are towed by the control station vehicle in a simple trailer that doubles as a launch platform. Power and signal cables are connected between the trailer and the ground control station for starting the RPV engine, for system check-out, and for launch control. Immediately upon launch of the first vehicle, the second RPV can be placed in position on the launch platform. The sides of the trailer fold out to provide foreign object protection during launch. When operating in sandy areas, the top of the RPV trailer can be placed on the ground and used as a landing platform.

RATIONALE FOR ROTARY WING RPV

Kaman Aerospace has been a leader in remotely-piloted vehicle technology for more than twenty years and has developed automatic and remote control systems for vehicles operating on land, sea, and in the air. Design studies and mission analysis over the past three years have concentrated on low-cost systems for reconnaisance, surveillance, target acquisition and target designation. This work had led to Kaman's design as described here. The most significant feature of Kaman's system is the utilization of a rotary-winged RPV for the mission. Operational and cost effectiveness benefits to be gained by its selection are as follows:

High Probability Of Target Acquisition

With severe constraints on cost and weight, target detection sensors will have limited range and the flight path of the RPV will have to be carefully controlled to avoid exposure to the enemy when searching for targets. A rotary-winged RPV provides maximum flexibility in target search operations because *no* restraints are placed on the type of flight path flown. For example, the remote operator can hover the RPV in a particular area while scanning the ground with the sensor or he may choose to leave the sensor caged and scan the terrain by slow-speed flight *in any direction.* Unlike fixed wing RPV's, banks, turns and orbiting flight are not needed to remain in the vicinity of the target. The smooth flight of the rotary wing RPV will maintain a steady display of the target area on the ground monitor, thereby improving the probability of detecting and identifying targets at safe ranges.

High Survivability In Hostile Environments

The small size, low horsepower and low noise level of miniature RPV's will minimize visual, aural, or infrared detection and enhance survivability. Low radar cross sections are also feasible in miniature RPV's, but the enemy will detect the RPV by radar if it is exposed at close range. Once again, a rotary-wing RPV has the advantage over a fixed-wing RPV. Its capability for low speed flight allows it to fly within terrain masks and its ability to hover and/or fly at 10 to 20 knots will defeat the Moving Target Indicator (MTI) modes in the enemy's radar. Kaman's K-244 RPV is small, quiet, and has a low IR signature. It utilizes nonmetallic rotor blades and its fuselage is specially shaped to minimize radar detection. These features, combined with the rotary-winged RPV's agility and maneuverability, will provide a high level of survivability.

Uncomplicated Transport, Launch And Recovery Operations

Launch of the rotary wing RPV from its transporter involves very little equipment, no expendables, and offers maximum flexibility in the selection of operating sites. The RPV will be recovered by controlled vertical flight to the ground or to a small landing mat. Recovery at the launch site and controlled soft landings without damage will result in very short turn-around times for the rotary-winged RPV. Therefore, a given sorti rate can be achieved with fewer rotary-winged vehicles than with fixed-wing vehicles.

Simple, Low Cost Operations With Multiple RPV's

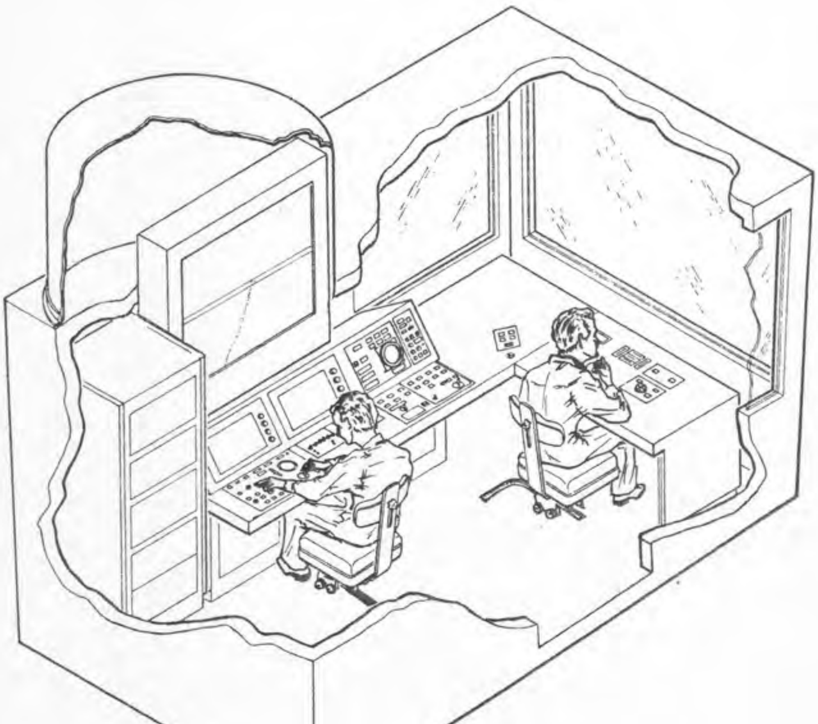
In an engagement against multiple targets, several RPV's controlled from a single control station, must operate in the same target area. Again, in this tight situation, the flight characteristics of the rotary-winged RPV provide benefits over fixed-wing RPV's. Hover and extremely slow-speed flight will allow very closely-spaced flight paths, and allows maximum use of even small terrain features to avoid detection by the enemy. The hover or station-keeping capability will allow surveillance of the target area without continuous control from the ground. It is possible for one operator to control two or three RPV's once the targets have been located.

Low Life Cycle Cost

As described above, a rotary-winged RPV has several advantages over fixed-wing RPV's for surveillance and target acquisition. These advantages will result in reduced cost of acquisition and reduced cost of ownership of operational systems. Production aircraft can be fabricated at a very modest cost. The high availability rate of rotary-winged RPV's will reduce the quantity required for any deployment concept thus reducing the initial investment. The ability of the rotary-winged RPV to operate very close to the enemy allows the use of less costly target detection sensors and laser designators.

The rotary-wing RPV decreases the cost of ownership over fixed-wing concepts by reducing the size of the ground crew and by eliminating the need for complex support equipment for launch and recovery. Controlled vertical flight recovery will eliminate costly repairs and launch delays and thus yield a high availability rate. The high survivability of the RPV will reduce the attrition rate and thus the replenishment costs.

The technology is in hand to produce miniature, low cost target detection sensors, laser rangers, data links, and other critical components. Kaman is ready to put them all together in a miniature rotary-wing RPV to produce an optimum cost-effective system.



HSL-31 INDOCTRINATES "BOSS"

Helicopter Anti-Submarine Squadron (Light) Thirty-One and its CO, Cdr W. E. Walker, were recently honored by an informal visit from Vice Admiral Robert E. Baldwin. VAdm Baldwin, who is Commander Naval Air Forces, U.S. Pacific Fleet, was at the Naval Air Station, Imperial Beach, California on an inspection tour.

Since "The Boss" was on-site, it seemed appropriate that he receive an indoctrination flight in the Light Airborne Multipurpose Systems (LAMPS) newest anti-submarine warfare helicopter, namely, the Kaman Aerospace SH-2F. Naturally, HSL-31, the West Coast's Replacement Air Group (RAG), rose to the occasion to provide the visitor with expert instruction in piloting the sophisticated aircraft.

The forty-five minute operational indoctrination flight was conducted by Lt Gary L. Lee, the squadron's training officer, while AWC Albert H. Blood manned the sensor operator's position. VAdm Baldwin's flight included demonstration of the multi-sensors of LAMPS during which he launched smoke markers and sonobuoys. The VAdm experienced the true flight capabilities when he flew an approach to a landing pad and was initiated into the Rotor-head world with his first autorotation. The flight terminated with AWC Blood directing the "foxtrot" on a radar approach to Naval Air Station North Island.

In photo above, VAdm Baldwin, center, AWC Blood, left, and Lt Gary "Red Dog" Lee, right, pause in front of the SH-2F Seasprite before starting the indoctrination flight. In photo below, AWC Blood assists VAdm Baldwin in strapping into the Copilot/ATO seat. In third photo, below left, the admiral, like any red-blooded American boy, appreciates a pretty face. This time, its HSL-31's prettiest plane captain, ADJAA Nancy Mohle. (USN Photos by PH1 Casimer Markowski, COMNAVAIRPAC.)

1,000-HOUR AWARD

The most recent Imperial Iranian Air Force (IIAF) officer to attain 1000 hours in an HH-43 helicopter was 2nd Warrant Officer M. Ali Shodjaw. WO Shodjaw, shown in photo on left, joins the ranks of many of his fellow officers who have been awarded the Kaman 1000 Hour Plaque.

ARRS CHANGE OF COMMAND

Command of the Aerospace Rescue and Recovery Service (ARRS), a major Air Force organization with headquarters at Scott Air Force Base, passed from Brigadier General Glenn R. Sullivan to Major General Ralph S. Saunders in a colorful ceremony recently. On the reviewing stand (from left) are, General Paul K. Carlton, commander of the Military Airlift Command, parent unit of the ARRS, General Saunders, and General Sullivan. During the ceremony an Oak Leaf Cluster was presented to General Sullivan. (U.S. Air Force photo)

Chief among his many accomplishments was General Sullivan's establishment of the new Rescue Coordination Center at Scott which is now the hub of all inland SAR missions for the 48 contiguous states. This facility monitors and coordinates SAR missions with the Federal Aviation Administration, Civil Air Patrol, Coast Guard, state and local agencies and the rescue unit on the scene. The center, which began operations during June, assumes the function of the three former regional centers, thus enhancing coordination effectiveness.

The retiring General has earned the Distinguished Service Medal, Legion of Merit, Air Medal with Oak Leaf Cluster, and the Air Force Commendation Medal with Oak Leaf Cluster. He and his wife, Nadine, have one son, Glenn R. Jr. General Sullivan, a native of McCaysville, Georgia, plans an extended period of travel following retirement.

General Saunders, who was born and raised in Roanoke, Va., is a veteran of World War II, Korea, and Vietnam. He flew 35 combat missions in World War II B-24 bombers, 70 C-119 combat transport missions in Korea and 278 combat support missions in Vietnam aboard both C-123 and C-130 aircraft.

The 52-year-old general's career has spanned the gamut of staff, command, and flying positions. Most have involved airlift operations, including a previous tour at Scott as assistant deputy chief of staff for operations with MAC headquarters.

General Saunders commanded both the 9th Weather Reconnaissance Wing at McClellan Air Force Base, Calif., and the 60th Military Airlift Wing at Travis Air Force Base prior to his job as 22nd Air Force vice commander.

The National War College graduate's decorations include the Legion of Merit with One Oak Leaf Cluster, the Distinguished Flying Cross, Bronze Star, Air Medal and foreign awards.

Det Cubi

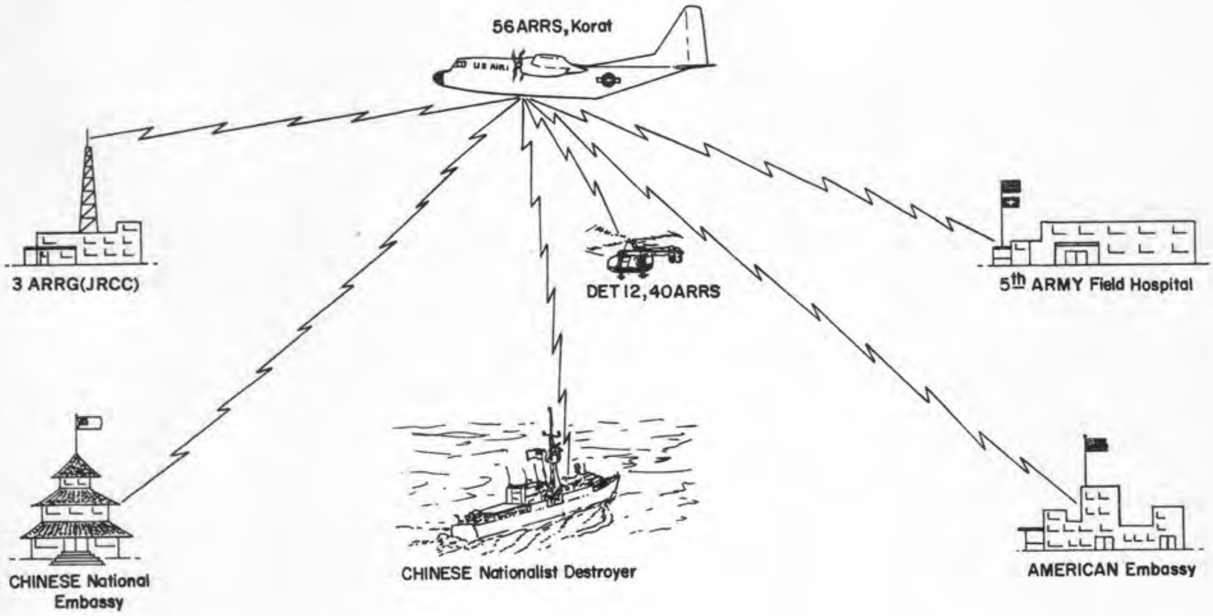
In left photo, Cdr L. Fisler, left, Executive Officer NAESU Headquarters, Lt Bob Doane, OINC Det 10, HSL-33, center, and Lt D. Brumgard, OINC Det Atsugi, pause before boarding. Cdr Fisler was in WestPac inspecting NAESU dets. His inspection completed, Cdr Fisler departed for Guam to inspect the det stationed there. He was accompanied by LCdr N. Howerton and Lt D. Brumgard. LCdr Howerton, also onboard, was not included in the camera's eye.

In center photo, Kaman Service Rep, Don P. Alexander presents Lt Doane with a model of the SH-2F Seasprite helicopter his det flew while on WestPac cruise. The presentation was made in recognition of Lt Doane's selection as "pilot of the year."

In third photo, LCdr V. C. Secades, center, OINC HSL-33, Det Cubi, greets LCdr D. A. Wellmann, on his arrival to take command of the det. Lt Doane is seen in the background. Not shown are LCdr Secades bags which are packed and stowed behind the wall of the building. LCdr Secades wasn't really anxious to leave, although he did try to get the helo that brought LCdr Wellmann over from Clark Airbase to fly him back to catch a quick flight to CONUS.

However, since the helo needed to be refueled, LCdr Secades was convinced that he should stay and provide a checkout for LCdr Wellmann, especially since the det was relocating in new quarters . . . all kidding aside, six months is a long time out here, and we do appreciate having had the opportunity to work with a guy like you, Vince Secades . . . Good Luck.

D. Lockridge,
Kaman Service Rep



LUCKY SEVEN

The seven agencies depicted in the sketch coordinated to save a Chinese National who was injured in an accident aboard a ship off the coast of Thailand. The professional competence shown by Capt Charles T. Gelatka, the HH-43 pilot, as he guided his craft to a landing on the small landing pad aboard a foreign vessel also was a major factor in saving the rescuee. As usual, the brief mission report belies the true nature of the operation by making a severe test of human effort resemble a routine training flight.

The series of events started when Det 12, 40 ARRS, received a call to stand by for a possible medevac mission. A Chinese National seaman had been injured in an accident aboard a Chinese destroyer located in the Gulf of Siam. Forty-five minutes later, "Pedro 36" as the helo was identified, launched with copilot, Capt Hal S. Schwartz, flight surgeon, Capt Adam H. Romeiser, Jr., flight mechanic, SSgt Gary W. Brown, and medical technician, SSgt Gail E. Stokes aboard to aid Capt Gelatka. The Joint Rescue Coordination Center (JRCC), 3ARRG, Nakhon Phanom, Thailand, advised Pedro 36 to rendezvous with King 21, a C-130, which would fly cover and aid during the mission. The C-130 was launched from 56 ARRS, Korat. The larger aircraft was to prove crucial for the safe accomplishment of the mission by providing superior navigation and communication assistance. The two aircraft met at the mouth of the Chao Phya River and started to search. King 21 located the surface vessel about eight miles away and the two rescue aircraft hastened to the site. Pedro 36 made a low pass and positively identified the Chinese Nationalist destroyer.

After carefully considering the numerous conning towers, cables, and other obstructions, Capt Gelatka proceeded to cautiously set the chopper down on the destroyer's aft helipad. In addition to the problems of superstructure and the small landing pad, the Huskie crew were advised of numerous thunderstorms which were making their presence felt around the Bangkok area. Upon landing, the rescuee was brought up on deck to be loaded into the aircraft. It was found he was suffering from severe head and spinal injuries and required immediate hospital attention.

While Pedro 36 was onloading the patient, King 21 was acting as air coordinator between the Nationalist Chinese Embassy, the American Embassy and the Joint Rescue Coordination Center. As soon as the helo took off from the ship, the two aircraft flew to Bangkok where the Huskie was landed in an unlighted soccer field near the 5th Army Field Hospital. King 21 headed for home as the patient was placed into a waiting ambulance which had been sent by the American Embassy.

Its mission of mercy accomplished, Pedro 36 departed for Bangkok International Airport for refueling. During the return trip, those severe thunderstorms and lightning caught up with them. In order to circumvent the storm, the HH-43 returned to U-Tapao Air Base, Thailand, via VFR and, at 2300 hours, the mission was officially closed with another life saved.

4,6,9 = 3 WITHIN 6, A LIFE-SAVING FORMULA!

That is correct! Missions on July 4th, 6th and 9th, resulted in three saves within six days for Det 12, 40 ARRS, Tapai, RTNA, Thailand. The first mission, on July 4th, Independence Day, saw the HH-43 manned by pilot, Capt Hal S. Schwartz, copilot, 1st Lt James W. Bizzell, crewman, SSgt Gary W. Brown, medical technician, SSgt Gail E. Stokes, and a doctor, Capt Tommy L. Hilsman.

A Thai National, hired to conduct the fireworks display for the base 4th of July celebration, was severely burned over 40 percent of her body. Base hospital requested PEDRO (the Kaman HH-43 helicopter) to provide medevac assistance to save her life. The helo quickly onloaded the patient and rushed her to Bangkok where a landing was made in a soccer field near the US Army's Fifth Field Hospital. While the aircraft remained in the landing zone, riots occurred in Bangkok's Chinatown area. The crew reported "some tense moments while sitting in the landing zone." This was the sixth save for Capt Schwartz and the third time in the last two months he teamed-up with SSgt Brown and Dr Hilsman.

SNAPPER BOAT SNATCHED FROM SEA BOTTOM

The 25-foot mast reached out of the dark night as if to impale the H-2 but Lt Robert E. Rew, pilot of the aircraft, managed to elude its grasp. This difficult night mission was soon to end successfully for the Pensacola SAR Det, Sherman Field.

Pilot proficiency, crew ingenuity, coupled with a SAR coordinator, the local Coast Guard, and even a local sheriff, all contributed to deliver a water pump to a sinking snapper fishing boat off the coast of Pensacola, Florida.

In the space of one hour and ten minutes, the following happened. Pensacola SAR coordinator, Capt Mark S. Fowler received a call from the Coast Guard (New Orleans Control): a 50-foot fishing vessel was sinking about 38 miles south of Pensacola. The Coast Guard, aided by the local sheriff, delivered a water pump to a parking lot near Pensacola beach.

Pilot Rew, with copilot, Lt Steven J. Cranney, crewman, ADJ1 Thomas J. Kelley, Jr., and corpsman, HM2 David G. Shackley aboard, landed to onload the device. The pump, which was housed in a canister, presented a problem — there were no attaching points for the hoist cable! A little "Yankee Ingenuity" was applied and the men rigged a makeshift sling using the ropes cut from the blade boots which were stored on board the chopper. At 0235, the Seasprite crew sighted the flares and lights of the stricken craft.

With the small boat being tossed about during the night hoist transfer to a small deck, the 25-foot mast lurching upward, and the normal ship's rigging to contend with, Lt Rew carefully maneuvered the aircraft to lower the pump canister on the helo hoist. At one point in the transfer, the canister got caught in the rigging but was cautiously swung free. Finally, the pump rested safely on the snapper boat's tiny deck and the ship's crew began the job of setting up the pump and saving their craft. Lt Rew hovered the helo in the area a few minutes, then, after checking with the boat's crew via the loud hailer to see if any further assistance was needed, he and his crew headed back to base for a well-earned rest.

ONE SELF-SAVE AND ONE SAR SAVE

In another mission, a Pensacola SAR crew responded to a call for help when a sailboat with a 12-year-old boy on board overturned. Before reaching the scene, however, the helo crew was notified to return home — the boy swam to shore. Prior to landing back at base, the SAR crew was re-vectored to the scene of another boating accident in the Gulf of Mexico.

After only 10 minutes of searching, the pilot, Lt H. Banks Edwards, Jr., brought the Seasprite over the overturned outboard motorboat and observed three men clinging to the craft. Copilot, Lt Allen Petrie assisted the pilot in maintaining position while crewmen, AE2 Bruce Auclair and HM2 Dave Shackley lowered the hoist three times to bring up all three rescuees into the helo's cabin. In Lt Edwards' words, "no difficulties were encountered as the crew was thoroughly trained in SAR Standard Operating Procedures." A "Well Done" to this crew.

CIVILIAN DIVERS RESCUED

During the Oceana Air Show, the SAR H-2 Kaman Seasprite helo, piloted by Lt John E. Ford was launched to aid two civilian scuba divers. The helo crew sighted the divers' small boat about 30 miles east of the base. Although conscious, the two rescuees could not properly engage themselves in the hoist gear so one of the crewmen was lowered to the surface craft.

The crewman assisted the two men "up the wire" to safety and then, as the cable was lowered to retrieve him, the hoist jammed. Lt Ford and copilot, Ltjg John Enderle learned the two rescuees had been diving when one of their air supplies malfunctioned. Fortunately, the malfunction did not occur when the diver was alone, this time, his buddy shared the operable air supply and the two quickly rose to the surface. The pilots decided to leave the crewman in the boat and return. (The crewman was picked up later and returned to base.) Returning to base, the two divers were placed in the nearest decompression chamber aboard a Navy craft. In addition to the pilots, the helo crew consisted of AE2 Ted Wicker, and ADJ2 Steve P. Lomp.

DIRTY SALLY PLAYS FLORENCE NIGHTINGALE

by Lt (jg) M. Muetzel

HSL-32, Det 6, executed their first Mediterranean Medevac before a large audience on Labor Day, 1974. Secured on the deck of the USS Garcia, at anchor in the port of Taormina, Sicily, the SH-2F became a local curiosity. The townspeople, using small boats, crowded around the ship to view the aircraft, which must have looked very strange. To the crew of the Kaman bird, the helo was not at all strange, in fact, they had affectionately nicknamed the aircraft, "Dirty Sally."

It started out as a normal, sleepy afternoon and the crew was looking forward to the holiday routine and liberty. The fun had to wait, though, because word soon spread that one of the ship's company was suffering an apparent heart attack. OINC, LCdr Hank Lewandowski, who was still on board, prepared to pilot the aircraft which would take the man to the hospital. Lt(jg) Mike Muetzel was copilot and crewman was AWAN Wyatte DeLoache.

Flight Quarters was initiated and manned by AX1 Tom Vorndran, AMS3 "Mac" McQueen, and AE3 Lou Harris of the Det 6 Duty Section. ADJ2 Jim Curry, a member of the ship's company also assisted. Soon, the ill man, RMC Melvin Miller, was placed onto the aircraft and it embarked on a speedy dash to NAF Sigonella. HM2 Gary Jackson attended the patient while en route.

Dirty Sally, the teamwork of the crew, and the ship's company are credited with relieving the patient's fears, preventing complications inevitable in the long surface trip which would have been necessary without the SH-2 and making possible the prognosis of a swift recovery. The doctor later reported Chief Miller was suffering from a collapsed lung, rather than the suspected heart attack.

Kaman Aerospace and Societe Nationale Industrielle Aerospatiale Agree To Cooperate

Kaman Aerospace and Societe Nationale Industrielle Aerospatiale (Aerospatiale) of France have agreed to participate cooperatively in a competition for the United States Army's Scout Helicopter program. Announcement of the agreement was made concurrently by William R. Murray, President of Kaman, and Jean Mascard, membre du directoire, Aerospatiale.

Kaman has already participated in the Army's concept formulation efforts and does anticipate making a proposal for the Scout Helicopter. The Kaman concept includes a program of development, fabrication and logistics support for the proposed K750 helicopter. The program will be accomplished by Kaman at its Bloomfield, Connecticut, facilities.

The U. S. Army is currently formulating specifications for its proposed Scout Helicopter. In concept, the Scout is expected to be a light, agile vehicle. Its mission will be to scout the battlefield, flying at low levels to avoid detection, seeking targets and intelligence. It would be equipped with the latest electro-optical sensors, detection and range-finding devices. Upon locating and identifying a target, the helicopter crew would be able to call in an attack helicopter, artillery fire or other friendly forces.

The Kaman-Aerospatiale team brings together the technical disciplines and individual research developed by each firm. The end result of this joint effort will be an operationally effective, total aircraft system. Both firms have had extensive experience in developing and producing helicopter weapons and sensor systems for a wide range of military missions, thus assuring a strong candidate for either of the Army's two options: an off-the-shelf helicopter or, a totally new design.

Wherever possible, Kaman will incorporate Aerospatiale's new technology into the aircraft. For example, the fan-in-fin will be utilized in lieu of the standard tail rotor blade. Also, Aerospatiale's advanced fiberglass-composite main rotor blade will be incorporated into the new aircraft configuration.

Aerospatiale is the second largest helicopter developer and manufacturer in the free world. Kaman Aerospace Corporation is a prime contractor to the United States Government for helicopters and airborne systems, as well as a major supplier of components to other defense contractors.

Bill Murray, Kaman Aerospace Corporation President, (seated) signs agreement as Charles Kaman, President of Kaman Corporation (left), and Pierre Marion (right), President and Chairman of the Board of European Aerospace Corporation, an Aerospatiale subsidiary, observe. (Photos by N. Ruggerio)

Although not the aircraft which will be offered to the Army, the sleek helicopter illustrates the many features which will be incorporated into the new K750.

KAMAN

Rotor Tips

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NOSE DOOR LATCH SECURITY

by H. Zubkoff, Service Engineer

Investigation of recent nose door Hartwell Fastener malfunctions revealed that nose door misalignment results in a preload on the fasteners, causing distortion, premature wear, loss of toggle hook tension and ultimately, fastener dis-engagement. In some instances, the preload has been severe enough to cause material failure. Unless lower door replacement hinges are installed in the EXACT position as the original hinges, door misalignment will occur. Whenever door misalignment is evident and whenever fastener latching integrity is in doubt, the following actions should be accomplished.

1. Inspect the Fasteners. (See Photo 1.) Any discrepancy is cause for fastener replacement.

   A. Toggle hook (1) for wear and distortion.

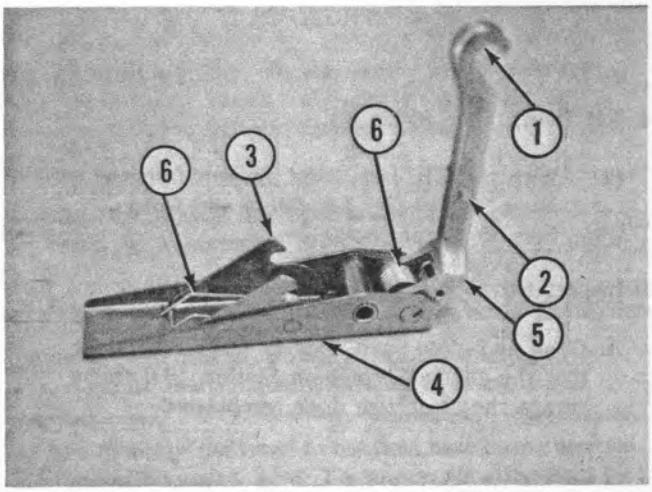
   B. Toggle hook pins (2) for distortion.

   C. Base of toggle hook (5) for distortion and cracks.

   D. Toggle hook detents (3) for wear and distortion.

   E. Handle (4) for cracks and distortion.

   F. Springs (6) for corrosion, distortion, failure and proper seating.



1. Toggle hook
2. Pin
3. Hook detent
4. Handle
5. Base
6. Springs (2)

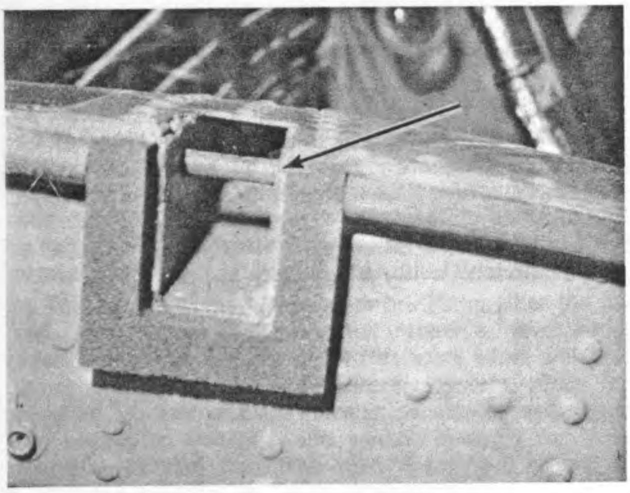
PHOTO 1

2. Inspect the fastener hinge pin, the toggle hook engaging pin and the associated pin support brackets.

A. LH Door. (See Photos 2 and 3.)

(1) Inspect the engaging pin for wear and corrosion.

(2) With the door open, inspect the pin support bracket for pin hole elongation and/ or cracks.



LH Door - toggle hook engaging pin (arrow)

PHOTO 2

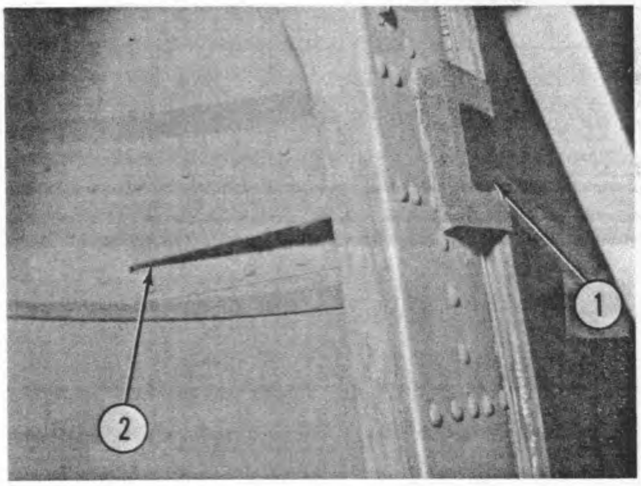
B. RH Door. (See Photo 4.)

(1) With the RH door open, inspect fastener hinge pin bracket for cracks and elongation of the pin holes.

3. Inspect for door alignment.

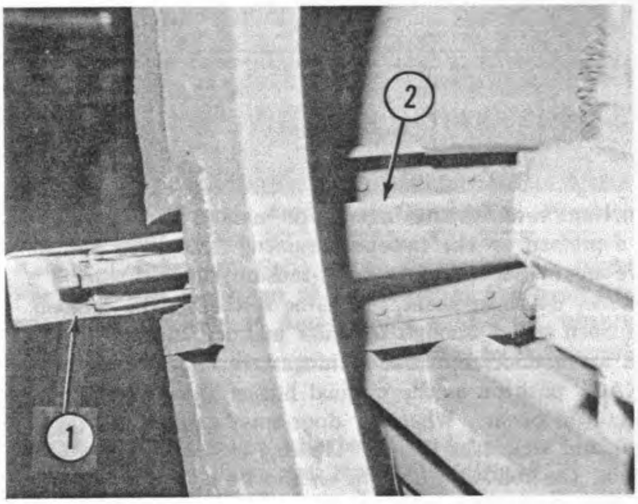
A. Open and close each door in turn and check that the alignment pins on Station 48.0 frame engage the respective door receptacles.

Hold doors in closed position and check for alignment of the fastener cut-outs. If alignment is satisfactory, proceed to Step 5. If fastener cut-outs are misaligned to the extent that one door must be "sprung" in order to engage the alignment pins and to latch the fastener, the "low" door should be shimmed to obtain alignment. (Nose door shimming will be defined as a repair function in the next revision of the Structural Repair Manual, NAVAIR 01-260HCA-3, and is within Organizational Level capability.)



1. Pin support bracket
2. Cutout for engaging pin (Photo 2)

PHOTO 3. Inside LH Door



1. Toggle hook
2. Fastener hinge pin support bracket

PHOTO 4. RH Door (inside)

4. Shimming.

Shimming entails installation of aluminum plates patterned after the hinge under the lower hinge halves. Because of limited access to some of the fuselage hinge screw nuts (Station 48.0), installation of shims under the fuselage half of the hinge assembly is NOT recommended. Instead, install the shims under the nose door half of the hinge assembly (under P/N K633066-1, -2 or QP31138-1 or -2.) LH door hinge screw nuts are accessible inside the nose door frame while on the

RH door, the screws are engaged by anchor nuts. The ratio of shim gage to vertical movement of the forward end of the nose door is approximately 1:2 (a 0.020-inch shim will raise the door at the fastener cut-out area by approximately 0.040-inch). Dissimilar metals precautions per the Structure Repair Manual must be observed. Be sure that the hinge attach-screws are of sufficient length to accommodate the increased material stack-up. Whenever shims are installed to obtain door alignment, be sure to check for sufficient fastener toggle hook tension per paragraph 5.

In addition, with the doors closed and latched, closely inspect the door aft seals for positive contact (and some degree of compression) against the fuselage frame Station 48.00 seals. If necessary an added strip of rubber seal may be bonded to the flat door seal to obtain the desired degree of water tightness. For complete information on nose door seals, refer to the March/April 1974 issue of Kaman Rotor Tips.

5. <u>Inspect for fastener toggle hook tension</u>.

A. Tension is required on the latched fastener toggle hook to insure that it remains engaged despite vibratory and air-buffeting influences. Insufficient tension on the fastener hook could result in the hook disengaging from the pin, even though the handle remained in the down and latched position.

B. Tension on the hook is directly related to the amount of force required to depress and latch the handle flush with the surrounding door surface. Whenever nose doors are latched, the operator should be aware of the amount of force (by feel) necessary to depress and latch the handle. *Visual observation that the handle and the "PUSH" tab are down and flush <u>is not a valid determination of door fastener security!</u>*

C. To determine fastener security, unlatch and raise the handle. Check that the toggle hook is engaged over the engaging pin. With the hook engaged, depress the fastener handle several times (but do not latch), noting the pressure necessary to overcome the toggle-hook spring. Then depress the handle to the flush, latched position, while noting the force required to complete the latching sequence. IN ALL CASES, the force necessary to latch the fastener should be greater than the force needed to overcome the toggle hook spring tension. A fastener which latches with little or no force should be considered unsafe and action to add tension to the toggle hook should be taken.

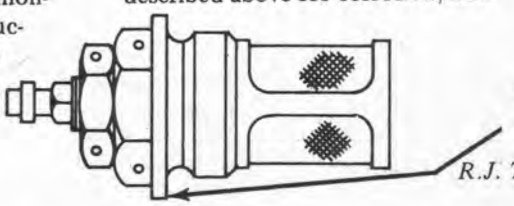
D. Toggle hook tension is dependent upon the condition of: the fastener, the toggle hook engaging pin, the associated support brackets and the condition of the B.L. 0.0 nose door seals. (There are no provisions for repositioning the fasteners to increase the toggle hook tension.) Sufficient tension to insure hook engagement is built into the installation and can only change as a function of hardware wear or seal deterioration. If the hardware is in satisfactory condition, inspect the seal, especially around a fastener which appears to require considerably less force to latch. If the seal is cracked, torn, or has taken a set to the point where little or no compression is provided, the seal should be replaced. In an emergency, an additional strip of rubber, thickness as required, may be bonded directly to the existing flat seal as a <u>temporary</u> measure to increase toggle hook tension. In this event, proper seal replacement to insure water-tightness, should be accomplished as soon as practicable.

Remember, when latched, the handle and the "PUSH" release tab must always be flush with the surrounding door skin.

Q. WHAT COULD CAUSE A MAIN GEARBOX OIL MONITOR ASSEMBLY, P/N K678770-1 or K678769-3 TO BE INOPERATIVE?

A. A main gearbox oil monitor could fail to operate when dirt or corrosion builds up on the surface which mates with the grounding tab, P/N K678773-11. The foreign material would inhibit continuity between the center post of the monitor and ground, rendering the monitor electrically inoperative. To assure electrical conductivity, the dirt or corrosion must be removed from the surface as shown in the illustration. To remove the material, remove the monitor from the aircraft and use aluminum oxide cloth, Specification PC451, fine grit, or an equivalent. After cleaning, apply alodine solution liberally on the abraded surfaces and let stand for five minutes, rinse with fresh water and air-dry.

A few monitors delivered to the field have been anodized in the mating surface area. The anodize coating must be removed in order to provide proper electrical ground. Remove the anodize coating in the same manner as described above for corrosion/dirt.



R.J. Trella, Service Engineer

PILOT AND CO-PILOT CYCLIC STICK AND SOCKET ASSEMBLY CONNECTOR INSTALLATION AND REMOVAL.

Investigation of a recent U.R. revealed that more detailed information was needed for removing and installing the subject connectors.

A. Removal of pilot or copilot adapter assembly, P/N K651061-1, from the socket assembly, P/N K651015-5 or -6. Refer to Figures 1 and 2.

1. Remove the cyclic stick from socket assembly.

2. Remove seat and flooring to gain access to wiring.

3. Open wire bundle and locate area where the adapter assembly wiring splices with aircraft wiring. Cut adapter wires at splices.

4. Remove the AN3H5A bolt which secures the adapter assembly into the socket assembly.

5. Push the adapter assembly up through the socket assembly using the wiring as an aid until wiring is clear of the socket.

B. Installation of pilot or copilot adapter assembly, P/N K651061-1, into the socket assembly, P/N K651015-5 or -6. Refer to Figures 1, 2 and 5.

NOTE

The adapter is procured as an assembly as shown in Figure 2 with 45 inches of wire on each pin of the connector.

1. Install vinyl tubing over the wires of the adapter assembly.

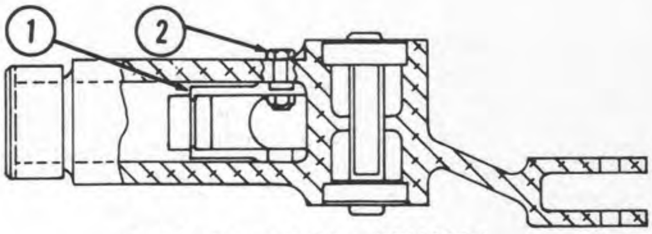
2. Thread the wiring from the adapter down thru the socket until the adapter bottoms in the socket.

3. Align the bolt hole of the adapter with the socket and install the AN3H5A bolt.

4. Splice the wiring from the adapter assembly into the aircraft wiring (see Fig. 5). Re-tie wire bundle in accordance with NAVAIR 01-1A-505.

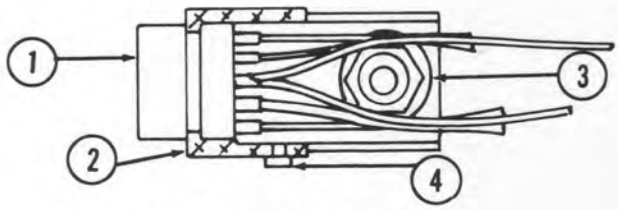
C. Removal of pilot or copilot cyclic stick adapter assembly, P/N K651062-1, refer to Figure 3.

1. Remove the retaining ring, P/N 5008-100.



1. Adapter assembly, K651061-1
2. Nut, AN345A
   Washer, AN960D

FIGURE No. 1



1. Connector, M8600-19B132
2. Adapter, K651063-11
3. Nut, 22NDS-02
4. Locator pin, K651065-15

FIGURE No. 2

2. Using duck-bill pliers to grasp connector pin, pull the adapter assembly from the cyclic stick tube.

NOTE

The adapter assembly, Figure 4, can be very difficult to remove due to close tolerances and/or corrosion. If the adapter assembly cannot be eased from the cyclic stick, the connector will most likely be damaged and a new one will be required.

3. If necessary, break the bond between the adapter/connector by pushing the connector up into the stick. Remove the adapter ring with a small gear puller. If the connector is to be replaced, cut the wiring as close to connector pins as possible.

D. Installation of the pilot or copilot cyclic stick adapter assembly, P/N K651062-1. Refer to Figures 3, 4 and 5.

NOTE

The adapter assembly is procured as two pieces, the connector, P/N M8601-19/32, and the adapter ring, P/N K651064-11, which, when bonded together is identified as the adapter assembly, P/N K651062-1. Refer to Figure 4.

1. Solder cyclic stick wiring to the connector pins as shown in Figure 5.

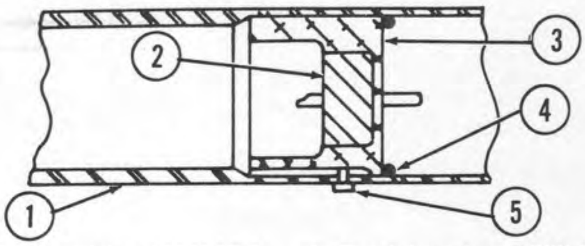
2. Bond the connector into the adapter ring using EC 2216, a two-part epoxy cement. Insure that the Number 8 pin on the connector is aligned within $1/2^{o}$ to the centerline of the groove in the adapter ring and also that the connector is flush with the flange of the adapter ring. Refer to Figure 4.

NOTE

Allow cement to dry before proceeding.

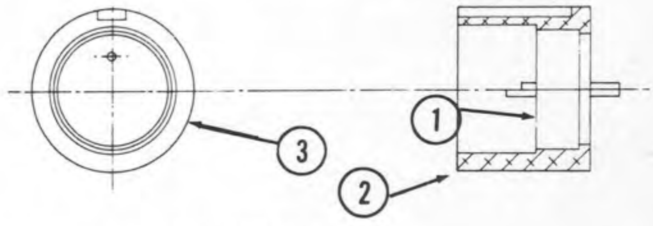
3. Insure the inside of the cyclic stick tube and the adapter assembly is free of corrosion. Coat both surfaces with a light coating of Dow Corning, P/N DC-33 medium, to prevent corrosion and to aid in installing the adapter assembly.

4. Insert the adapter assembly into the cyclic stick by aligning the groove in the adapter with the locator pin, then, push it into the stick. Lock in place with the 5008-100 retaining ring. Refer to Figure 3.



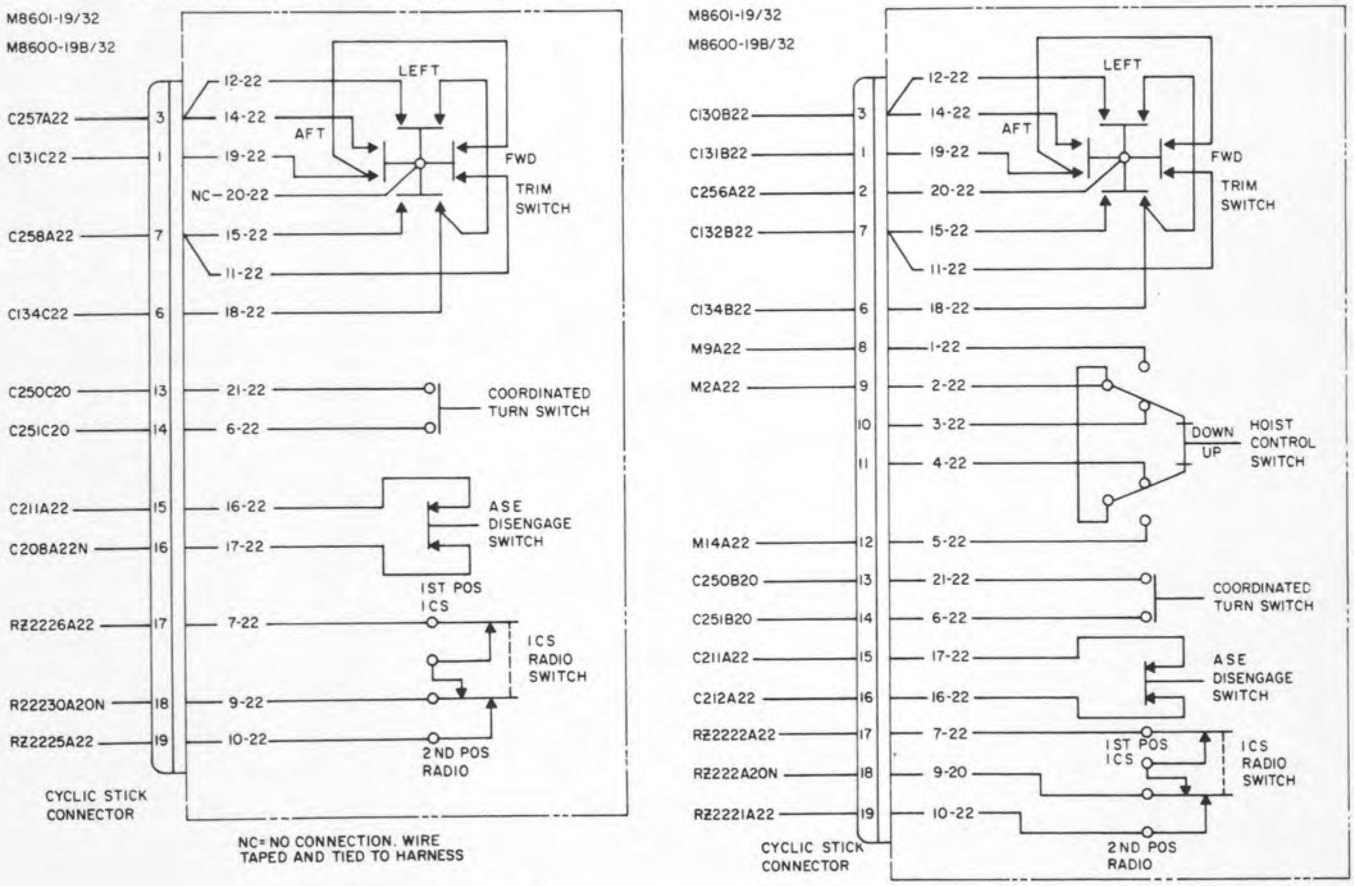
1. Cyclic stick, K651035-1
2. Connector, M8601-19/32
3. Adapter, K651064-11
4. Retaining ring, 5008-100
5. Locator pin, K651065-13

FIGURE No. 3



1. Connector, M8601-19/32
2. Adapter, K651064-1
3. NOTE: Number 8 pin on M8601-19/32 must be located on centerline of groove within 1/2 degree. Bond M8601-19/32 in place.

FIGURE No. 4



COPILOT'S CYCLIC CONTROL STICK GRIP SCHEMATIC

PILOT'S CYCLIC CONTROL STICK GRIP SCHEMATIC

FIGURE No. 5

N. Hankins, Service Engineer

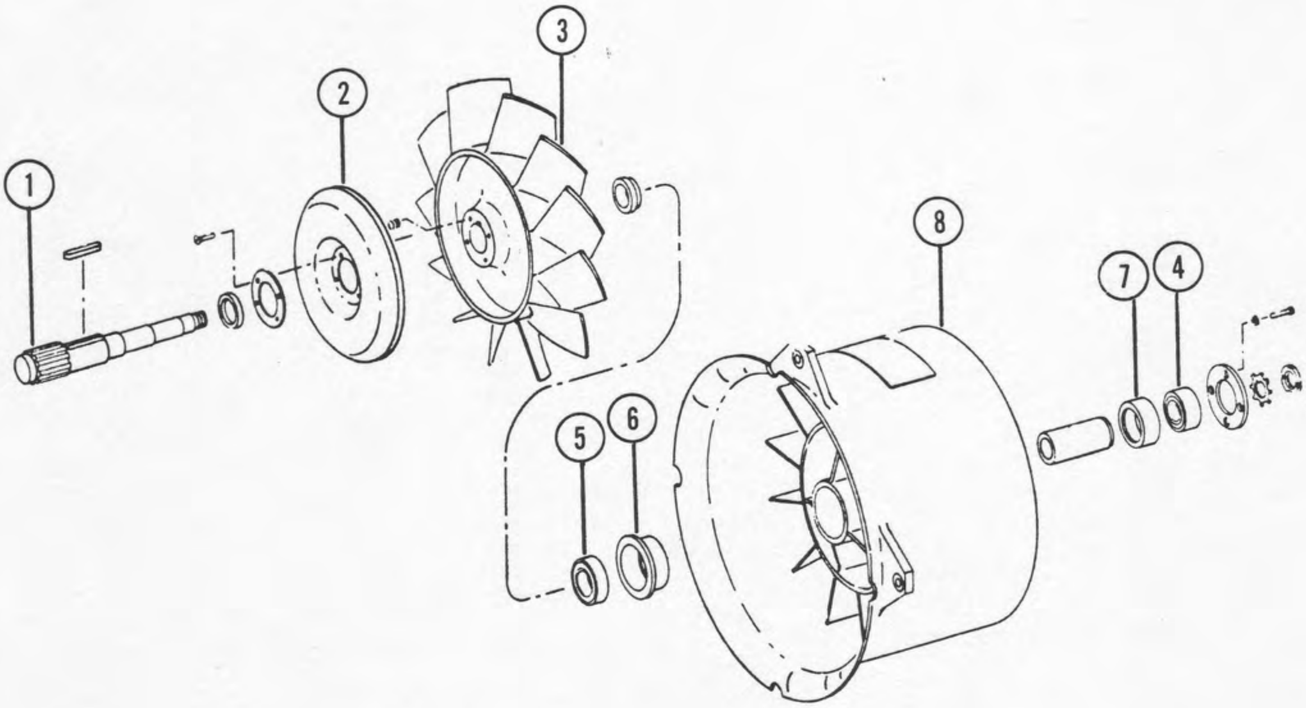
TROUBLE SHOOTING/INSPECTING OIL COOLER BLOWER, P/N K677707-1.

by R.J. Trella, Service Engineer

The following represents the latest maintenance instructions for the blower assembly, P/N K677707-1, FSN RH4140-128-8072BH, installed on HH-2D, SH-2D and SH-2F aircraft. The information presented here will be incorporated into applicable manuals.

TABLE 1. TROUBLESHOOTING

Trouble	Probable Cause	Remedy
Scraping noise.	Fan rotor blades contacting casing inlet bore.	Remove fan rotor and inspect, repair, or replace in accordance with Table 2 and the accompanying illustration.
Vibration or noisy operation.	Bent shaft.	Replace blower assembly.
	Defective bearings.	Replace bearings.
	Rotor out of balance.	Replace blower assembly.



1. Shaft
2. Nose,spun
3. Rotor
4. Bearing,ball
5. Bearing, ball
6. Retainer, bearing
7. Insert, bearing
8. Casing

OIL COOLER BLOWER ASSEMBLY - EXPLODED VIEW
HH-2D, SH-2D/F

TABLE 2. INSPECTION AND REPAIR

Component	Inspection	Repair Action
Shaft, item 1	Inspect spline stub for wear. Dimension over 0.1200-inch diameter inspection pins shall not be less than 1.6801 inch.	Replace blower assembly.
	Inspect keyway for wear. Width shall not exceed 0.252-inch.	
	Inspect bearing journals for evidence of bearing slippage and scoring.	
	Inspect threads for cross-threading and stripping.	
Spun nose, item 2	Inspect for cracks and breaks.	Replace blower assembly.
Rotor, item 3	Inspect rotor blades for nicks, burrs, cracks and breaks.	Remove nicks and burrs from blades max depth 0.050-inch.
	Inspect hub bore and keyway for damage. Bore shall not exceed 1.189 inches. Keyway shall not exceed 0.252-inch width.	Replace blower assembly.
Bearings, items 4 and 5	Conditional/Visual	Replace as required.
Casing assembly, items 6, 7 and 8	Inspect inlet bore of casing (8) for evidence of rotor contact, nicks and burrs.	Remove nicks and burrs max depth 0.080-inch.
	Inspect bearing retainer (6) and bearing insert (7) for evidence of bearing slippage and scoring.	Replace blower assembly.
	Inspect casing (8) for any physical damage, such as cracks and breaks.	Any physical damage is cause for replacement of blower assembly.
Bearing retainer, item 6	I.D. bore shall not exceed 2.027-inch.	Replace blower assembly.
Bearing insert, item 7	I.D. bore shall not exceed 1.830-inch.	Replace blower assembly.

MAIN ROTOR BLADE DAMPER LEAKAGE

Hydraulic fluid leakage is not cause for replacement of a main rotor blade damper assembly unless the leakage becomes excessive or creates a hazard. Damper leakage limit is determined by the indicator on the damper. If fluid leaks to such a degree that daily servicing is required, then damper replacement should be considered.

The following information is extracted from NARF NORIS Local Engineering Specification, 43-387:

> "Allowable leakage: When the fluid escaping is an insignificant quantity and will have no detrimental effect on aircraft operation and the correction of this slight leakage does not warrant the maintenance time involved, this leakage shall be termed allowable."

W. Wagemaker, Service Engineer

SUPPLY INFORMATION

H-2 WINDOW SEALS

by E.J. Cunningham, Spares Manager

Window seals are not supply items and must be fabricated as required. The following list provides the information needed to fabricate the desired seals.

As directed by the April 1974 Integrated Logistic Support Management Team conference, Kaman has submitted a proposal to provide seals with all delivered spare windows. Pending outcome of the proposal, dets may use the accompanying list. Note the seals are listed in groups under the window with which they are used.

Qty	P/N	Vendor P/N and Length	Materials
K633010-17, Pilot Door - AFT			
1	K633010-65	34465R x 75.12	Inland Mfg. Co., Dayton, Ohio
1	K633010-67	33197R x 75.12	Inland Mfg. Co., Dayton, Ohio

Qty	P/N	Size	Materials	
K633010-101, Pilot Door - FWD				
1	K633010-75	0.12 x 0.84 x 9.39	AMS3198	12 Durometer
1	K633010-77	0.12 x 1.73 x 5.43	AMS3198	12 Durometer
1	K633010-79	0.12 x .84 x 20.46	AMS3198	12 Durometer
1	K633010-81	0.12 x 1.48 x 4.75	AMS3198	12 Durometer
1	K633010-83	0.12 x .84 x 27.57	AMS3198	12 Durometer
1	K633010-85	0.12 x 2.00 x 6.06	AMS3198	12 Durometer
1	K633010-87	0.12 x .84 x 16.13	AMS3198	12 Durometer
1	K633010-89	0.12 x 1.48 x 4.50	AMS3198	12 Durometer
1	K633010-91	0.12 x .84 x 23.47	AMS3198	12 Durometer
K633010-5, Copilot Door				
1	K633020-39	0.12 x .84 x 10.97	AMS3198	12 Durometer
1	K633020-41	0.12 x 2.41 x 16.75	AMS3198	12 Durometer
1	K633020-43	0.12 x .84 x 28.75	AMS3198	12 Durometer
1	K633020-45	0.12 x 1.75 x 5.41	AMS3198	12 Durometer
1	K633020-47	0.12 x .84 x 15.25	AMS3198	12 Durometer
1	K633010-75	0.12 x .84 x 9.39	AMS3198	12 Durometer
1	K633010-77	0.12 x 1.73 x 5.43	AMS3198	12 Durometer
1	K633010-89	0.12 x 1.48 x 4.50	AMS3198	12 Durometer
1	K633010-91	0.12 x .84 x 23.47	AMS3198	12 Durometer
K633033-107, Corner — R.H.				
1	K633033-35	0.125 x .85 x 38.13	AMS3198	12 Durometer
1	K633033-37	0.125 x .90 x 12.75	AMS3198	12 Durometer
2	K633033-39	0.125 x .40 x 33.30	AMS3198	12 Durometer
1	K633033-41	0.125 x 1.00 x 17.10	AMS3198	12 Durometer

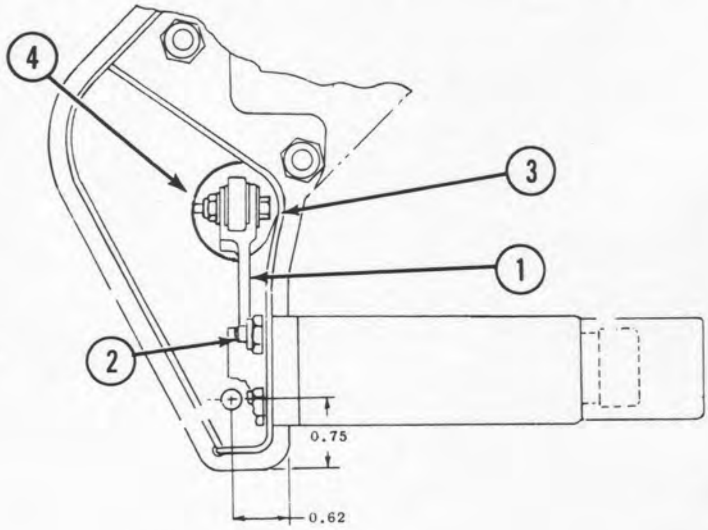
Qty	P/N	Size	Materials	
K633033-3, Corner — L.H.				
1	K633033-35	0.125 x .85 x 38.13	AMS3198	12 Durometer
1	K633033-37	0.125 x .90 x 12.75	AMS3198	12 Durometer
2	K633033-39	0.125 x .40 x 33.30	AMS3198	12 Durometer
1	K633033-41	0.125 x 1.00 x 17.10	AMS3198	12 Durometer
K633034-205, Copilot Roof				
2	K633034-183	0.125 x .83 x 26.00	AMS3198	12 Durometer
1	K633034-185	0.125 x .83 x 31.00	AMS3198	12 Durometer
1	K633034-187	0.125 x .83 x 30.00	AMS3198	12 Durometer
1	K633034-215	0.125 x .83 x 26.00	AMS3198	12 Durometer
K633034-207, Pilot Roof				
2	K633034-183	0.125 x .83 x 26.00	AMS3198	12 Durometer
1	K633034-185	0.125 x .83 x 31.00	AMS3198	12 Durometer
1	K633034-187	0.125 x 1.40 x 30.00	AMS3198	12 Durometer
1	K633034-217	0.125 x .83 x 24.00	AMS3198	12 Durometer
K633035-85, Windshield - L.H.				
1	K633035-111	0.125 x .38 x 29.20	MIL-C-3133 Type 5B41LFF	
1	K633035-91	0.125 x .65 x 32.37	MIL-C-3133 Type 5B41LFF	
2	K633035-93	0.125 x .46 x 32.07	MIL-C-3133 Type 5B41LFF	
2	K633035-95	0.125 x .62 x 25.05	MIL-C-3133 Type 5B41LFF	
1	K633035-97	0.125 x .92 x 32.37	MIL-C-3133 Type 5B41LFF	
2	K633035-99	0.125 x .50 x 29.20	MIL-C-3133 Type 5B41LFF	
K633035-86, Windshield — L.H.				
1	K633035-111	0.125 x .38 x 29.20	MIL-C-3133 Type 5B41LFF	
1	K633035-91	0.125 x .65 x 32.37	MIL-C-3133 Type 5B41LFF	
2	K633035-93	0.125 x .46 x 32.07	MIL-C-3133 Type 5B41LFF	
2	K633035-95	0.125 x .62 x 25.05	MIL-C-3133 Type 5B41LFF	
1	K633035-97	0.125 x .92 x 32.37	MIL-C-3133 Type 5B41LFF	
2	K633035-99	0.125 x .50 x 29.20	MIL-C-3133 Type 5B41LFF	
K633036-101, Side — L.H.				
1	K633036-19	0.120 x .93 x 16.48	AMS3198	12 Durometer
1	K633036-37	0.120 x .88 x 24.42	AMS3198	12 Durometer
1	K633036-39	0.120 x .88 x 17.60	AMS3198	12 Durometer
1	K633036-41	0.120 x 1.88 x 22.25	AMS3198	12 Durometer
K633036-105, Side — R.H.				
1	K633036-19	0.120 x .93 x 16.48	AMS3198	12 Durometer
1	K633036-37	0.120 x .88 x 24.41	AMS3198	12 Durometer
1	K633036-65	0.120 x 1.11 x 19.75	AMS3198	12 Durometer
1	K633036-69	0.120 x .88 x 16.10	AMS3198	12 Durometer
1	K633036-73	0.120 x 2.29 x 4.48	AMS3198	12 Durometer

EMERGENCY THROTTLE ACTUATOR LINKAGE INSTALLATION

H-2

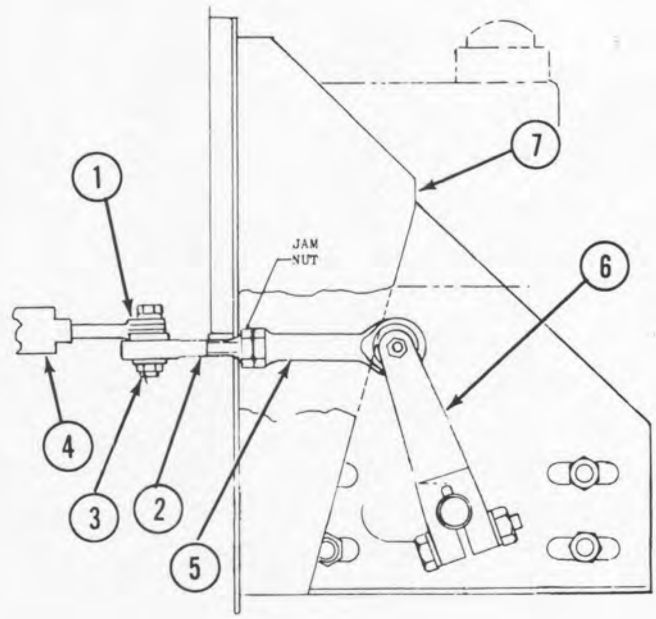
Whenever an emergency throttle actuator, P/N R4152-11 is installed, care should be taken while connecting the linkage between the actuator and the fuel control rack. There are two major concerns when connecting this linkage. The first is to ensure that 3 AN960C6 (or 3 AN960C6L) washers are placed between the fuel control rack (1) and the link assembly rodend (2) as seen in the accompanying Diagram A. There should also be one of these washers placed under the 79NM50 nut (3). After the desired washer stack-up has been achieved, fingertighten the bolt and install the cotter pin. Proper placement of these washers will ensure that the link assembly rodend (2) will not contact the emergency throttle housing (4) before the emergency throttle rack is in the full off position.

The second area of concern involves proper positioning of the link assy (5) and the actuator arm (6) to be sure that neither will experience any interference from either the support bracket (7) or the support bracket hole. First make sure that the actuator arm, K673066-11, (1), as seen in Diagram B, is positioned with the offset side of the arm facing away from the actuator, and flush with the end of the spline shaft (2). This will prevent the link assy from rubbing against the support bracket assembly at position 3, Diagram B, and will center the link assembly so that it will pass through the support bracket linkage passage hole.



1. Actuator arm
2. Spline shaft
3. Support bracket
4. See text

DIAGRAM B



1. Fuel Control rack
2. Link assembly
3. Nut
4. Emergency throttle housing
5. Link assembly
6. Actuator arm
7. Support bracket

DIAGRAM A

In certain instances, the support bracket linkage hole may prove to be too small to allow adequate clearance for both the link assy and the link assy rodend bolt-stackup as shown by items 1, 2 and 3 of Diagram A. This is caused by variations in the amount of travel of the fuel control rack. If interference is encountered, it is permissable to enlarge the hole as necessary to provide adequate clearance in area shown by Arrow Number 4, Diagram B.

The support bracket, P/N K673059-3, can also be rotated a small degree in order to provide adequate clearance for the link assy, K673068-3. To ensure clearance, loosen the attaching bolts, rotate the support away from the interference, and re-tighten the bolts.

H. Zubkoff, Service Engineer

TAIL ROTOR BLADE FOLD CHANGES

The March/April 1972 issue of Rotor Tips introduced the quick-fold tail rotor blade system on SH-2D aircraft. Changes in the quick-fold system have been made and incorporated on all LAMPS aircraft, SH-2F and SH-2D. The latest folding procedures are presented here to aid dets operating from small ships where tail blade folding is required.

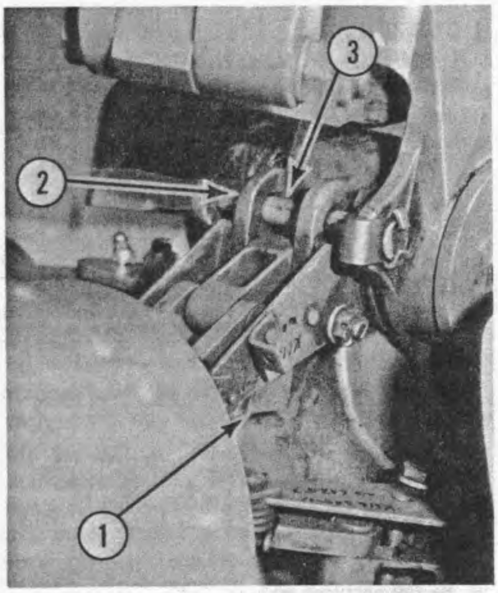
Photo A shows the component parts of the latest Quick-Fold installation. To fold a blade, item 1 is actuated, thus moving item 2 away from item 3. The blade is then moved away from the aircraft towards the folded position. These procedures may be accomplished while standing on the horizontal stabilizers.

CAUTION

Before folding one or more tail rotor blades, it is necessary to place the rudder pedals in neutral.

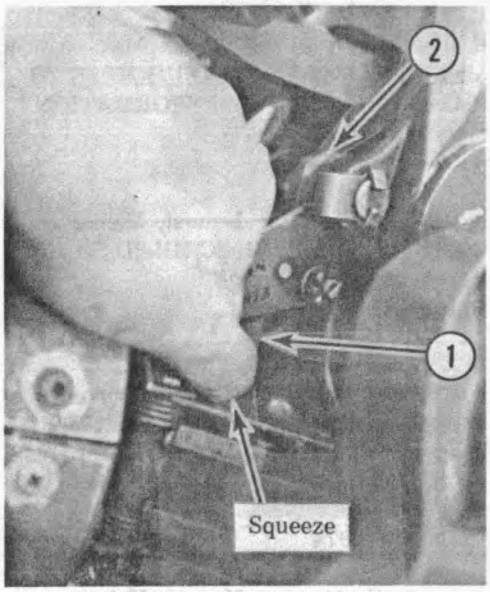
A. With the left hand, grasp the folding hardware as shown in Photo B. Note the thumb engages one corner of the flyweight assembly (1). When in this position, squeeze the thumb toward the palm (in the direction of the arrow) and the latch (2) will withdraw from the pin (3).

B. With the right hand at the blade trailing edge, move the blade away from the aircraft while twisting to position the leading edge toward the pylon. (It may be necessary to pull on the crank flyweight while twisting.) The blade/folding hardware relationship at this point is as shown in Photo C. Further movement of the blade away from the aircraft will provide the view shown by Photo D with blade in fully folded position.



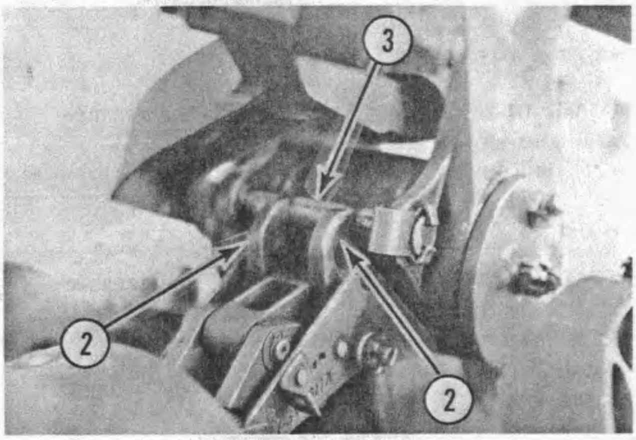
1. Flyweight assembly 2. Latch assembly 3. Pin

PHOTO A



1. Flyweight assembly
2. Latch assembly

PHOTO B



2. Latch assembly
3. Pin

PHOTO C

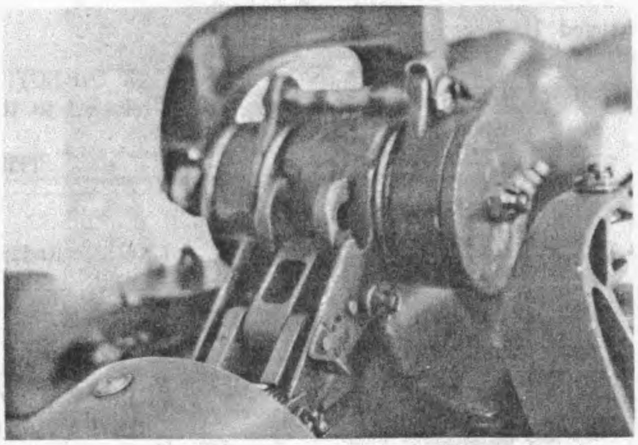


PHOTO D

W. Wagemaker, Service Engineer

PUBLICATION INFORMATION

This list reflects latest manual changes and technical directives released to the field.

R. H. Chapdelaine, Manager, Service Publications

NAVAIR 01-260HCA-2-1 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, GENERAL INFORMATION
15 February 1972
changed 15 March 1974

NAVAIR 01-260HCA-2-2 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, AIRFRAME
30 November 1971
changed 1 July 1974

NAVAIR 01-260HCA-2-3 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, EQUIPMENT (FURNISHINGS, HYDRAULICS, UTILITIES)
1 March 1972
changed 1 March 1974

NAVAIR 01-260HCA-2-4 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, POWER PLANT AND RELATED SYSTEMS
15 February 1974
changed 1 April 1974

NAVAIR 01-260HCA-2-4.1 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, TRANSMISSION SYSTEM
1 July 1971
changed 15 April 1974

NAVAIR 01-260HCA-2-4.2 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, ROTORS
1 April 1973
changed 1 May 1974

NAVAIR 01-260HCA-2-5.1 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, INSTRUMENTS
1 October 1967
changed 15 March 1974

NAVAIR 01-260HCA-2-7 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, RADIO AND RADAR SYSTEMS
1 October 1967
changed 15 March 1974

NAVAIR 01-260HCA-2-8.1 — Manual, Maintenance Instructions, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters, WIRING DATA
1 October 1967
changed 15 March 1974

NAVAIR 01-260HCB-4-1 — Illustrated Parts Breakdown, NUMERICAL INDEX AND REFERENCE DESIGNATION INDEX, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters
1 April 1973
changed 15 May 1974

NAVAIR 01-260HCB-4-2 — Illustrated Parts Breakdown, AIRFRAME, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters
1 June 1967
changed 15 May 1974

NAVAIR 01-260HCB-4-3 — Illustrated Parts Breakdown, FLIGHT CONTROLS, Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters
1 June 1967
changed 15 May 1974

NAVAIR 01-260HCB-4-4 — Illustrated Parts Breakdown, EQUIPMENT (FURNISHINGS, HYDRAULICS, INSTRUMENTS, UTILITIES) Navy Models UH-2C/HH-2D/SH-2D/SH-2F Helicopters
1 May 1969
changed 15 May 1974

* * * * * * * * TECHNICAL DIRECTIVES RELEASED * * * * * * * * *

This list reflects information released to the customer by KAC for distribution.

SEC/AFC No.	TITLE	RELEASE DATE (KAC)
H-2 Airframe Change 204, Part 2	LN66HP Radar System, INSTALLATION OF PROTECTIVE COVERS FOR WAVEGUIDE	2 July 1974
H-2 Airframe Change 216, Part 1	Landing Gear, INSTALLATION OF HIGH ENERGY ABSORPTION MAIN AND TAIL LANDING GEAR	15 July 1974
Support Equipment Change 1816	Whirl Rig, MODIFICATION OF H-2 ADAPTER SET	3 June 1974

ITALIANS HONOR MERCY MISSIONS

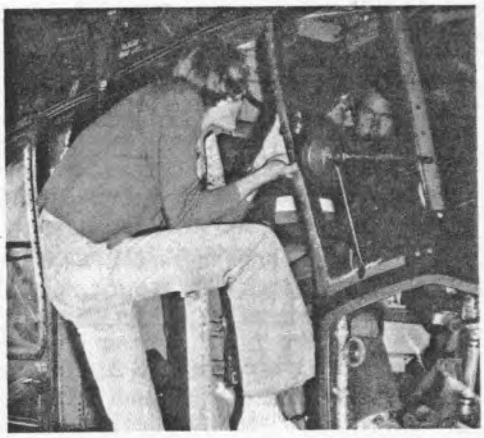
Naples, Italy — Two plaques, representing 59 mercy missions flown by two UH-2C "Seasprite" Helicopter pilots of the Naval Air Facility here, were presented July 25 to Capt Robert S. Stone, left, the Air Facility Commanding Officer. Italian Air Force Major General Umberto Bernardini, the Vice Commanding General of the 2nd Air Region, which encompasses the Naples area, presented the plaques on behalf of the Italian Air Force Chief of Staff.

The plaques represented 28 air rescue missions by Lt Richard G. Stout, the former Air Facility Administrative Officer; and 31 missions flown by Lt(jg) Raymond A. Shirley, the former assistant Security Officer. Both men were released from active duty earlier this year. Lt Stout and Lt(jg) Shirley were recognized for "generous and meritorious efforts in favor of the population" of the Naples, Italy area during their tours of four and three years respectively. (USN photo)

HELICOPTER FAMILIARITY FOR FOREIGN STUDENTS

Recently, HSL-33 served as host to a group of foreign students participating in Student International Service (SIS). The youths were interested in an overview of the helicopter and its mission capabilities. All the students who visited HSL-33 have been staying with Navy families in the San Diego area. Countries represented in the group include Denmark, Germany, Norway, Sweden and Switzerland.

In photo top left, Lt "Mike" Avery leads students in a lively discussion of HSL-33's ASW mission, its LAMPS capabilities and general safety precautions when clambering aboard and around a helo. In photo on left, AW1 "Joe" Rose answers specific questions about the MAD gear and other equipment in the Kaman SH-2F aircraft. Later, the two men demonstrated the use of survival equipment used by aircrews.



In photo above, it looks like three men in the cockpit but no, one is peering in from the aft cabin as the students get that "HANDS-ON" familiarity.

After the LAMPS tour and helo inspection, Lt T. C. Jones and Lt Dan Mahoney of HC-1 completed the overview of helicopter missions by presenting a film on the Apollo 17 recovery.

VIBRATION TROUBLESHOOTING

ON THE H-2 HELICOPTER

by Jack L. King,
Senior Field Service Rep

This article is written in hopes that it will simplify vibration troubleshooting. It is my belief that anyone who reads and understands the material contained here will reach a conclusion that I have had for years: namely, there is no "black magic" involved in finding, identifying, and correcting vibrations which can occur in any machinery. With tongue in cheek, let us say it's simply a matter of "tuning in on the right frequency."

The helicopter has often been described as "agitated palm trees," or "50,000 loose parts flying in formation" and a host of other less than complimentary names, almost all implying that helicopters continually vibrate and shake. The truth of the matter is that the helicopter, when properly rigged and tracked, can fly as smoothly as most fixed-wing aircraft. In fact, some helos fly **smoother** than some fixed-wing aircraft I have been in. It is also true, however, that vibrations can and do pop up now and then. When this occurs, prompt maintenance action should be taken to isolate and correct the cause of the vibration. In every case, it is relatively easy to determine where the problem originates. Show me a vibration and, with the proper tools and a little logic, I can show you what part, or system, is causing it. Narrowing it down to H-2 specifics, let's take a look at what we can expect in the area of possible vibrations.

Any rotating system such as the main rotor, tail rotor, drive shaft, engine, etc., can cause vibrations at one time or another. These parts compose a mass, and when we turn or spin this mass, there is one prerequisite that must be met if we are to have vibration free operation, simply stated: "it must be in balance." This sounds easy enough, but there are two types of balance here: static balance and dynamic balance. For example, assume we could have four main rotor blades of equal weight and four retentions of equal weight. If we suspended this entire system from the center of a precision hub with blades properly aligned, we would probably find that the assembly would balance perfectly. **This is static balance.** Yet, this same assembly, if whirled at a high RPM, might produce some pretty severe vibrations due to a dynamic unbalance generated by factors other than static weight.

To keep this article short and simple, we will not go into the various factors that influence dynamic balance. It is a condition that does occur so let's discuss identification and cure when the "vibe" pops up. For the purpose of this article, we can divide H-2 vibrations into three basic categories; low, medium and high frequency. Let's look at each in order and establish a few rules.

Low Frequency Vibrations

On an H-2, **by our definition,** there is only one low freq vibe: a one-per-rev of the main rotor. The main rotor on an HH/SH-2D rotates at 287 RPM; on the SH-2F, 298 RPM. Therefore, a one-per-rev on the SH-2D would manifest itself as a "BUMP" 287 times per minute. The term "one-per-rev" means just that, "once per revolution."

Just about every H-2 pilot in the world has experienced and can identify a one-per-rev of the main rotor, although some will report it as "A BAD OUT OF TRACK" or "ONE BLADE FLYING HIGH WITH AIRCRAFT VIBRATION." The pilot who reports it as "one-per-rev of the main rotor" is defining the problem in its simplest form. In summing up low freq vibes, let's just say they are easily identifiable with no "confusion factor" involved.

Medium Frequency Vibrations

Let's consider the second in our vibration categories, medium freqs. This is the area where most people become confused and uncertain. There is a tendency to sometimes confuse one medium freq for another and end up troubleshooting the wrong system. The sad part is that there is no reason for this to happen. We have simple checks which will absolutely pinpoint the vibration being experienced. (More on this later.)

When we define medium freq, three vibes are apropos. They are: four-per-rev of the main rotor; one-per-rev of the tail rotor; and, a vibe generated by tail rotor drive shafting.

Since the main rotor on an SH-2D turns at 287 RPM, it is simple arithmetic to arrive at 1148 RPM for four-per-rev of this system. The tail rotor on this same aircraft turns at 1712 RPM. The tail rotor drive shafting spins at 3122 RPM. Since all are spinning at different speeds, we can establish an important rule.

RULE 1 "FREQUENCY IDENTIFICATION IS THE KEY TO ISOLATION AND CURE OF ANY VIBRATION ENCOUNTERED."

High Frequency Vibrations

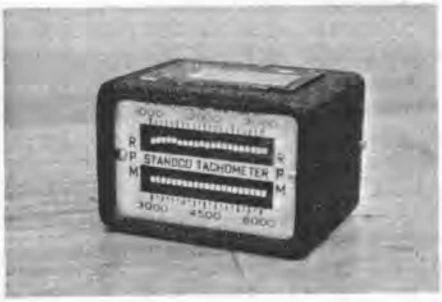
The third category refers to high frequency vibrations. For high freqs, we look at the main drive shaft, engines, and certain transmission gears or shafts. This category is probably the least encountered for several reasons, the primary one being:

RULE 2 "THE HIGHER THE FREQUENCY, THE LESS THE MAGNITUDE AND VICE VERSA."

If Rule 2 sounds a little complex, it really isn't. All it means is that the faster an object rotates, the less force its vibration will exert on the end object (and the reverse is also true). Consider the following: a one-per-rev of the main rotor on an SH-2D feels as if someone were kicking the bottom of the pilot's seat 287 times a minute. A four-per-rev is more of a buzz with a higher frequency but less magnitude. A vibe of the main drive shaft spinning at 5950 RPM has a magnitude so small that it is often reported by the pilot as causing his nose to itch! An engine vibration of 19,500 RPM has a magnitude that is often measured in mils with special sensing equipment. It normally cannot be felt by human senses.

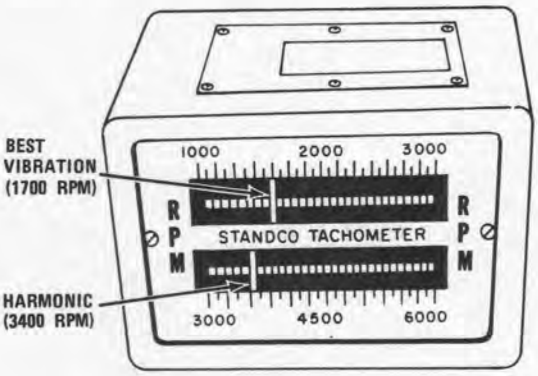
OK, having identified the three major vibratory areas in the H-2, let's talk about how we can positively identify and isolate problems if they occur.

The accompanying photo shows a K604154-1, Vibration Indicator or "Vibratach." The vibratach is a mechanical version of what every sports car owner has and worships, a tachometer. A tachometer indicates RPM. A mechanical tachometer placed on supporting structure of a rotating object, will (unless the body is in absolute perfect dynamic balance) indicate at what RPM the object is rotating. (Are you starting to get the connection?) Let's take a hypothetical example and see how it can be of help.



Suppose a pilot returns from a flight, and reports a medium freq vibration. He does not specify anything else, so the mech now has the problem of determining what is causing the vibe. The best bet is to make a ground turn up. After rotor engagement and max beep is reached, the vibratach should be placed at various points on the aircraft structure, where it will indicate at what frequency the vibe is occurring. In our hypothetical case, assume the reed at 1200 goes to full scale. Since a four-per-rev of the main rotor would fall near the indicated frequency, it is logical to expect the problem is occurring in that system. Because the reed at the 1700 mark is not vibrating, there is no need to suspect a problem in the tail rotor system.

In the example just described, other reeds may also be vibrating. One reed would probably be vibrating at 2400 RPM and another vibrating at 3600 RPM. NAVAIR 01-260HCA-2-4.1. (Changed 15 March 1974) contains a chart on page 11 which lists rotational H-2 components and the speed of their rotation. A check of this list reveals there is nothing on the H-2 which rotates at either 2400 or 3600 RPM's. Actually, these indications would be harmonics of our prime vibe, in multiples of the basic 1200 RPM. Since there is nothing to cause prime excitation at these freqs, they should be disregarded.



Harmonics do not always appear on the vibratach; however, when they do appear, disregard them and concentrate on the prime excitation freq WHICH WILL OCCUR AT 1200; 1700; AND/OR 3100 RPM.

The illustration depicts a vibratach which is indicating a tail rotor vibration. Note that the 1700 reed is displaced full scale. This indicates that we have a one-per-rev of the tail rotor. Note also that the 1200 scale is static. Why check for main rotor four-per-rev, in this case, when the problem is in the tail rotor? Make Sense? Since you now know what to use for troubleshooting, we would be doing half a job if we didn't tell you where it can and cannot be used.

The vibratach provided for use on H-2's (KAC P/N 604154-1), cannot be used to check a one-per-rev of the main rotor because the scale does not indicate that low, and besides, we have already established that everybody can identify a one-per-rev.

To troubleshoot main rotor four-per-rev, the vibratach may be placed on the glare shield, anywhere on the floor, on the aux tank supports or at any **hard point** on the fuselage. **Do not** put it on any soft point which flexes because the flexing of the structure can cause some weird indications.

To troubleshoot for a one-per-rev of the tail rotor, place the vibratach on the rudder pedals, on the support pedestals, anywhere along the tail cone or on the flat tail pylon to tail cone tiedown fitting supports. BE EXTREMELY CAREFUL WHEN WORKING IN THE VICINITY OF THE TAIL ROTOR. No human head has ever won a battle with a tail rotor blade yet!

For tail rotor drive shafting troubleshooting, place the vibratach on the tail cone, 12 to 18 inches below the drive shaft cover. An added advantage here is that by moving the vibratach from each pillow block bearing and shaft center to the next one in line, it can further isolate the particular bearing, coupling or shaft causing the problem.

To troubleshoot a main drive shaft (6000 RPM) vibe, place the vibratach on the upper cabin roof adjacent to the shaft itself, or it can be placed high on the fuselage in line with the shaft itself.

Now to the difficult part: when to use the vibratach. If pilots take one with them on every flight, every aircraft in the squadron would be down for suspected vibrations. This is because every helicopter has some small amount of vibrations which can be seen on a vibratach if it is placed near an object, simply because manufacturing tolerances cannot attain absolute perfect dynamic balance.

The vibratach should only be used when a pilot (flying without it) reports a vibration (usually medium freq) on the yellow sheet. If the vibe is strong enough to be noticed in the cockpit, then it should be looked into.

Use the vibratach only as an aid in troubleshooting. In HSL-30/32, a TIMI calls for its use whenever vibes are reported and QA keeps them locked up otherwise. Remember, the vibratach can be of tremendous value in troubleshooting and a big headache if used indiscriminately.

I have carried a vibratach for 12 years and have used it on numerous occasions to isolate vibrations that were causing problems on H-2's. It has **never** failed to pinpoint the faulty system and unless the laws of physics are repealed, it never will.

The next article will deal with what to look for after we determine what system is causing the vibe.

FROM...

THE READY ROOM

By John Anderson,
Test Pilot

H-2 AUTOROTATION CHARACTERISTICS

Although basic procedures for executing an autorotation are quite similar for any helicopter, each machine has peculiarities which refine those basic procedures into specific techniques, thereby obtaining the maximum efficiency and safety.

Before exploring the specifics of the H-2, let's establish some basic groundwork. Recalling basic airfoil principles, we know that autorotation is made possible by appropriate blade design, which utilizes a component of the lift vector to sustain rotor rpm. The major factors which affect this lift are angle of attack and velocity; both of which are directly dependent upon actions taken in the cockpit. Obviously, pilot inputs through the collective pitch lever change the angle of attack. Also, while changes in airspeed or rotor rpm vary the velocity, other important factors come into the picture when studying pilot techniques for autorotation. Some of the more predominant factors which influence rotor equilibrium are, aircraft attitude, descent angle, cyclic control, gross weight, and maneuvers.

Procedures for executing an autorotation are adequately described in the NATOPS manual, but let's look at a few amplifying items which have specific application to the H-2.

The Entry

When entering on autorotation, the "basic" H-2 (with hydraulic boost OFF), displays a characteristic unique to servo-flap controlled rotors. As the collective is lowered, a longitudinal trim change, requiring application of aft cyclic, becomes evident. The trim change needed is dependent on forward speed and rate of collective change. To relieve the pilot of the task of applying aft cyclic, a "bobweight" has been incorporated into the hydraulic system to sense vertical accelerations, or G's, and put in an appropriate amount of cyclic control. It is because of the bobweight that pilots observe a difference in pitch characteristics between autorotation entries with boost ON and with boost OFF. This is associated, of course, with a difference in roll characteristics in the SH-2F because of the hydraulically-operated lateral coupler. With the ASE on however, the required control motions are automatically made with such finite accuracy, that a "hands-off" auto entry is possible.

The most pertinent part of the H-2 entry, as in any rotorcraft, is pilot response in lowering collective pitch. The servo-flap rotor displays superior characteristics in this area, and the margin of safety from blade stall during high speed entries is large. Accordingly, normal pilot response in lowering collective results in minimum rotor rpm loss and rotor equilibrium is quickly attained.

Rotor RPM

NATOPS states that the recommended rotor rpm for autorotation (SH-2F) is 94% to 104%. It is important to recognize that this is BELOW the normal operating rpm of 106%. In an actual autorotation, it is preferable to select the **lower** end of that range once the entry has been executed and things have settled down. The lower rpm is accompanied by a significantly lower sink rate as shown in the accompanying graph. The lower sink rate gives you longer to look around and plan, extends your glide distance, and most important, makes the flare/landing maneuver considerably less difficult. Another pilot refinement is to allow rotor speed to increase to 104+ rpm after the flare is started, thus providing an extra margin of rotor inertia for the touchdown. (Ample lift will, of course, still be available for the touchdown if the rotor speed is not increased.) There are those who express the opinion that "when the real thing happens, I want all the rpm I can get." These folks are doing themselves and their passengers a disservice when they apply that philosophy in an H-2. We have all been trained to keep rpm up during autorotation, but we must have the professional capacity to take all of the facts into consideration and perform our tasks accordingly. The H-2 is probably the only helicopter flown by Navy pilots where the normal auto rpm is **LOWER** than the normal operating rpm. The 106% rotor rpm is desirable in high-speed powered flight to obtain the superior flying qualities that has been so enthusiastically received by SH-2F pilots, but is not necessary in the autorotation maneuver where airspeed is low and there is no requirement for large tail rotor thrusts.

Airspeed

NATOPS recommends 70-75 knots IAS for minimum rate of descent and 80-85 knots IAS for maximum gliding distance. The selection of airspeed, is of course an option to the pilot, enabling him to tailor his actions to the conditions he is facing. The important point to remember is that 70-75 knots IAS is the "peak" of the curve; lower and higher airspeeds result in less than optimum autorotative performance. Higher airspeeds primarily reduce glide ratio, but lower airspeeds border on the critical area of regaining or sustaining rotor rpm and must be avoided.

A caution area that is noted in the NATOPS handbook regarding low speed auto entries should be given appropriate respect. When the sink speed is high in proportion to the forward speed, such as occurs in an entry at 50 knots or lower, the airspeed system is inaccurate and can lead to a false sense of security. It is possible to indicate an airspeed significantly higher than actual, and when you get to the bottom, there will not be sufficient speed available to execute a flare. Whenever you are forced to enter autorotation at low speeds, hold the nose down until 80-85 knots is indicated, then settle back to the desired auto airspeed.

Maneuvering

We know from experience that application of aft cyclic causes an increase in rotor rpm, such as is seen in a flare. It is just as important to remember however, that the opposite is true, i.e., an abrupt application of **forward** cyclic will cause a significant decrease in rotor rpm.

Applying aft cyclic to initiate a steep turn, will cause an increase in rotor rpm, but it is important to remember that as you roll out of the turn, rotor rpm will tend to decrease. Because of the high inertia rotor, rpm is relatively easy to manage during maneuvers in an H-2, but as in any rotorcraft, pilot attention is required.

The Landing

If you have governed rpm properly and controlled your airspeed, the landing should be readily accomplished. Landing techniques used in the H-2 are essentially similar to those used in other helicopters. Knowing when maximum benefit has been realized from the flare and transitioning to the landing attitude is a matter of sensing all the things that are happening around you. Your eyes are busy outside the cockpit aligning the aircraft for touchdown, and you must depend upon your other senses. Your ears are very valuable here, for as the rotor rpm peaks in the flare and then begins to decay, the associated sound changes provide a valuable cue that the flare is over. Once you have transitioned to the landing attitude, it is merely a task of cushioning the landing and keeping the aircraft level, and from here on, very little that you do, other than the timing of collective application, is going to significantly change the resultant landing.

Practice Autorotations

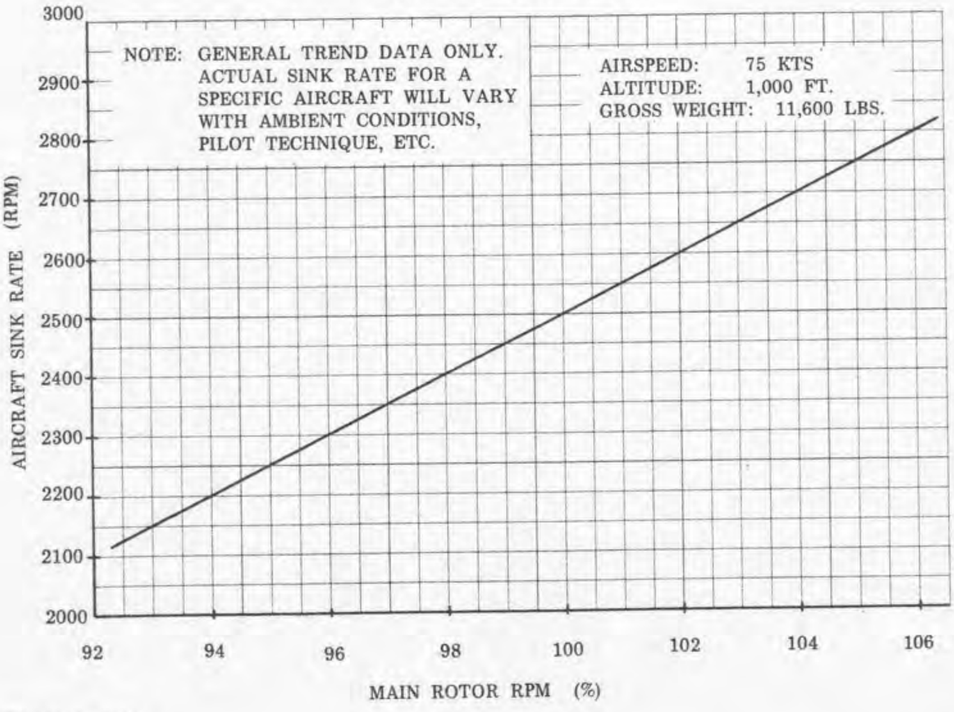
Although this article is a discussion of the actual autorotation maneuver, a few words about Practice Autorotations are appropriate. Over the many years of NATOPS conferences on the H-2, the procedure used to practice autorotations has varied back and forth between a maneuver which permits maximum realism and the other extreme of making it so safe that it has little training value. The present procedure calls for practicing the maneuver with the condition levers in FLY and rotor rpm at 106%, which leads to a potential pitfall when the actual thing happens. Being accustomed to seeing 106% in practice autos, it's a good bet that many pilots are going to strive for that same 106% in an actual emergency, which as we know from previous discussion, is going to significantly increase the aircraft sink rate. Maintenance sets the auto rpm for the existing conditions, which gets the rotor rpm in the ballpark — the fine adjustments in rpm that optimize the maneuver are the **pilot's** responsibility. In conducting practice autorotations in accordance with NATOPS procedures, be very sure to sort out in your head what will be different in the real thing, and conduct your training accordingly.

For example:

1. It is possible that, in the entry, rotor rpm will fall to a point where the generators drop off the line, therefore, practicing autos with the ASE off has value.
2. NATOPS calls for entering the auto (practice) with the landing check list complete, therefore the procedure does not "train-in" a step to lower the landing gear after auto entry. It is likely that the actual requirement for entering auto will occur with the gear up, and unless you have made it part of your planned process, the landing gear may be forgotten in the execution of the maneuver.
3. It is conceivable that a pilot could have done all of his turning-type practice autorotations in the same direction due to local course rules, etc., and he may be surprised when he turns the other way. Due to tail rotor torque requirements, main rotor rpm tends to increase more in a right turn than in a left, and pilot technique is therefore somewhat different.
4. NATOPS directs that the recovery (practice) be made at 10-15 feet of altitude, which is a long way from the deck when you find yourself there in a near hover **with no power** — the resultant landing is going to be **very hard.**

In conclusion, the autorotation maneuver is not an unusually difficult one, but its execution is made considerably easier, and therefore, safer if all of the factors are considered and treated accordingly.

AIRCRAFT SINK RATE VS. MAIN ROTOR RPM
(AUTOROTATIVE STATE)



INTRODUCING . . . THE I. P. B.!

OR

"Can I order this part or should I order the assembly?"

The LAMPS program placed unique responsibilities on detachment maintenance personnel stationed aboard ships. Previously, det supply functions were handled by specialized aviation storekeepers. However, a det operating aboard a DE or a DLG has a limited number of aviation personnel. Since a full-time Supply Specialist is not available, det personnel are cross-trained into other areas. The individual assigned the collateral duty of det storekeeper must have a working knowledge of supply functions as they directly affect the det. This knowledge will insure that deployed det supply requirements will receive the rapid response necessary for the det to maintain the high aircraft availability and low NORS essential to successful mission reliability and performance. A thorough understanding of the Illustrated Parts Breakdown is basic to ordering parts. The following article should prove helpful to all personnel involved with aircraft supply.

By John P. Serignese
Editor — Kaman Rotor Tips

The Illustrated Parts Breakdown (IPB) is one of the most useful compilations of numbers and related information in print. Unfortunately, few people are accustomed to using such a comprehensive listing and often the IPB is only used as a part number-to-illustration reference. Take the time to read and find out how the IPB is designed to aid supply and maintenance personnel, or anyone who takes the time to learn how to fully utilize it. The IPB can and will answer the mechanic's perennial question: "Can I order and install this part or should I order the next higher assembly?" Also, have you ever wondered, "Why are some items indented several columns while other items are not indented at all?"

The Illustrated Parts Breakdown lists all the assemblies, sub-assemblies, support equipment, and other related items used on H-2 aircraft. Volume 1 contains a Numerical Index and a Reference Designation Index. Volumes 2 through 9 contain, by systems, all the components depicted on exploded-view type illustrations along with a listing of part numbers. The part numbers are listed alpha-numerically in Volume 1 along with references to the particular volume, figure, and index number where that item is shown. If a part number is known, it is only necessary to look it up in the numerical index and refer to the volume, figure, and index number shown to determine where the part is installed on the aircraft.

A few words about alpha-numeric listings. The Specification states part numbers will be arranged beginning with the extreme left-hand position and continue from left to right, ONE POSITION AT A TIME, starting with letters A to Z, followed by numbers 0 through 9. All alphabetical O's will be considered numerical zeros. Remember that each position is considered separately. For example, if we had two numbers, 11066 and 51061, most would correctly list them as:

11066
51061

However, consider the numbers 11 and 5 . . . these numbers should be listed as:

11
5 rather than: 5
11

Remember, consider each separately, read the numbers as 1, 1 (not eleven) and 5, - (or 5, blank). The 1 is lower than the 5, consequently, 1 is listed first. If a 190 were added to the list, it would be shown as:

11
190
5

If a part number is not known, it is necessary to find the part on one of the figures and use its index number to determine the part number. The first figure in each volume (2 through 9) provides a systems-to-volume cross reference list as an aid to locating the correct volume and figure.

The Reference Designation Index is provided for use with the electrical/electronic parts where schematics and wiring diagrams are generally used. The reference designation section of Volume 1 is used in the same manner as the numerical index section. References shown on the schematics are listed alpha-numerically in Section 3 of Volume 1.

In each of Volumes 2 through 9, a Group Assembly Parts List (Section II) provides a listing by system, of either the detail parts used in that system or a manual reference where the complete breakdown appears. The parts list utilizes an indention system which enables the user to quickly determine the relationship of components and attaching parts. For example, note the column numbers (1 through 8) in the heading box at the top of the page on illustration 1. (Illustration 1 is a portion of Figure 50, Page 131 of NAVAIR 01-260HCB-4-7, dated 15 April 1974.)

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7 8	UNITS PER ASSY.	USABLE ON CODE
		SLIPRING AND BRUSH BLOCK ASSEMBLY		
50-	W16-8-100	SLIPRING AND BRUSH BLOCK ASSEMBLY (04155; superseded by... W16-12-100, see 2, Figure 49)	Ref	
	W16-12-100	SLIPRING AND BRUSH BLOCK ASSEMBLY (04155; supersedes...... W16-8-100, see 2, Figure 49)	Ref	
-1	W16-152	. CLAMP ASSEMBLY, COVER (04155)........................	1	
-2	AN365D1032	. . NUT, SELF-LOCKING........................	1	
-3	AN501AC10-16	. . SCREW, MACHINE (to be replaced at installation with... AN501AD10-20 screw)	1	
-4	802-762	. . CLAMP, COVER (98625)........................	1	
-5	W16-153	. COVER ASSEMBLY, SPLIT, INSEPARABLE (04155)........	1	
		(ATTACHING PARTS)		
-6	MS35275-29	. SCREW (use MS20995N20 lockwire)................	4	
-7	MS15705-305	. WASHER, FLAT........................	4	
		----*----		
-8	W16-146	. ARM ASSEMBLY, DRIVE (04155)........................	2	
		(ATTACHING PARTS)		
-9	AN500AC8-6	. SCREW, MACHINE (use MS20995N40 lockwire)............	8	
-10	AN960C8	. WASHER, FLAT........................	8	
		----*----		
	3585-06CNX.207	. . INSERT, HELICAL COIL (91767)................	2	
	W16-127	. . ARM, DRIVE (04155)........................	1	
-11	W16-6-110	. BLOCK ASSEMBLY, WIPER (04155)................	1	
	AN500AC8-41	. . SCREW, MACHINE........................	2	
	W16-112	. . BRACKET, BRUSH [illegible] (04155)................		
	[illegible]	. . [illegible] BLOCK (04155)................		
	[illegible]	. . SPACER, BRUSH (04155)................		
	[illegible]	. . SPRING ASSEMBLY, WIPER (04155)......		
		. . SPACER, BRUSH (04155)		
		SPACER, BRUSH [illegible]		

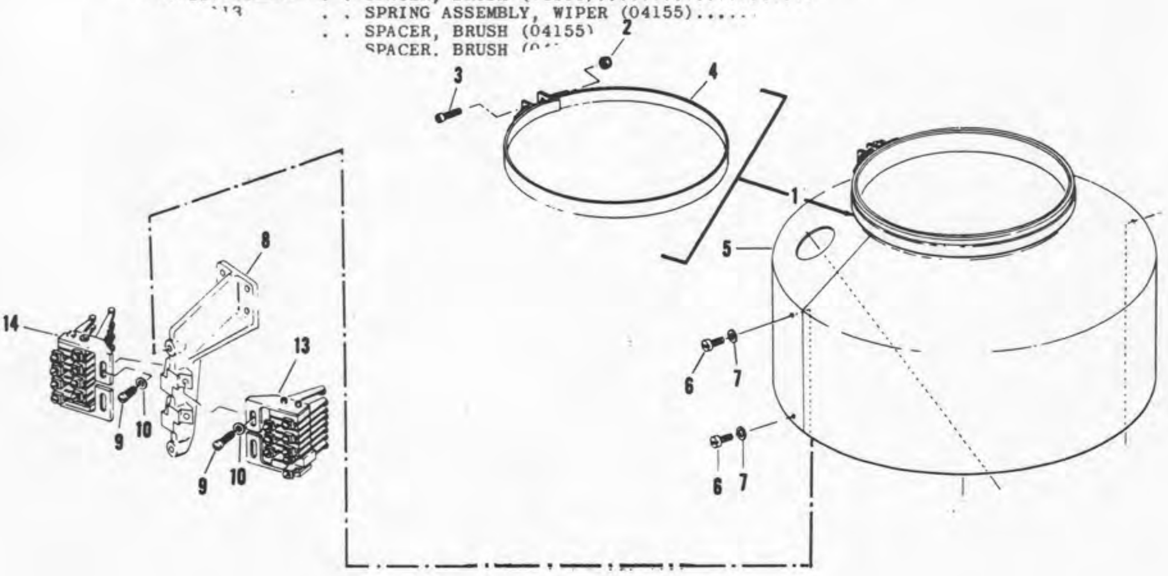


ILLUSTRATION 1

Items listed under column one are considered the "top" assembly for that particular figure. The items which follow are all indented one or more spaces to indicate the relationship of those parts to the top assembly and to each other. Items listed under column two are sub-assemblies or details of the top assembly being depicted. Items listed under column three are sub-assemblies or details of the preceding column two item except for attaching parts. Attaching parts are used to attach the component immediately preceding the words "ATTACHING PARTS."

Note that item 1, the clamp assembly, is indented under column two. The clamp assembly is part of the slipring and brush block assembly. Parts making up the clamp assembly are indented under column three. Thus, items 2, 3, and 4 are assembled to make item 1, the clamp assembly. Item 5, which is indented under column two, is part of the top assembly and is attached with other column two items, 6 and 7. (In fact, items 1, 6, and 7 secure item 5 to the top assembly.) The sign "....*...." indicates the **end** of the parts necessary to attach the preceding assembly (in this example, the split cover assembly, item 5).

Note also in the parts list heading, a column identified as "UNITS PER ASSY." When a quantity is listed with an assembly, it indicates the total items (or units) used at this particular location, regardless of whether it is an installation, assembly or single part. For example: the drive arm assembly, item 8 in illustration 1 is listed as having 2 "UNITS PER ASSY" or, two drive arm assemblies per each slipring and brush block assembly. The attaching parts, 8 machine screws and 8 flat washers, are the quantity necessary to attach BOTH drive arm assemblies to the slipring assembly. (Each arm requires 4 washers and 4 screws as attaching parts.)

Another important and relatively little used section of the IPB is the Source Code list in Volume 1. An understanding of source codes will resolve questions concerning ordering, maintenance levels, and, with the later codes, recoverability levels. While it would probably be easier for the user to have a code along with each part number in each volume of the dash four, Navy Specs dictate all codes will be listed in one volume. Therefore, if a code changes, the Navy need only contract to change one volume rather than 9 or 10. Actually, however, the one-volume idea has been in use for some time with lists such as abbreviations and manufacturer's codes. Once accustomed to the new, Uniform Code of Source, Maintenance, and Recoverability (SM&R codes), users will encounter few problems in ordering.

The latest NAVAIRINST 4423.3 Directive provides for implementation of a 5-character SM&R code which is shown (simplified) in the accompanying table. The H-2 Illustrated Parts Breakdown does incorporate some of the new codes on pages which have recently been changed. As pages are changed or revised, or part numbers are assigned new codes, Kaman will continue to update the dash four manual. Meanwhile, the cross reference list may be utilized to determine old/new source code relationships or explanations. The old source codes indicate method of acquisition and the item's repair or consumable status. The old codes may or may not indicate the maintenance level for recoverability.

When using the new codes, it is imperative the user check out the complete code. Components assigned a "P" code (for Procurable) can be ordered from supply but not all maintenance levels can install all P-coded parts because some parts require special tooling, skills, and instructions.

In the new 5-character code, the position of each letter relates specific information as follows: Notice that the position of the letter indicates the LOWEST level at which the task can be accomplished. This does not limit the task to the lowest level. It is assumed maintenance levels above the one listed can also perform the indicated tasks.

1st and 2nd positions:	Indicates how to get the item to be replaced. (Is it bought, stocked, manufactured, or assembled?)
3rd position:	Indicates lowest maintenance level authorized to remove and replace the item.
4th position:	Indicates lowest maintenance level authorized to repair the item.
5th position:	Indicates lowest maintenance level authorized to condemn the item.

Illustration 2 provides some examples of the source code system. (Illustration 2 is a portion of page 2-241, Section 2, NAVAIR 01-260HCB-4-1, dated 15 December 1973.) The code for part number 19772 is X2. A check of the cross reference reveals X2 = XB. The Table indicates XB is a miscellaneous salvage or one-time buy item. When using the cross reference and table, consider all codes as 5-character codes. Thus, MO (P/N 19927) on the cross reference converts to MD on the table. The first two columns, therefore, convert to "manufacture at depot." The old code was "make at overhaul," actually the same. Code P1 C is read, literally, as P1, blank space, blank space, C. Therefore, P1 converts to PA and the C converts to "Consumable." What is not known is at what level the item is consumed and this is one of the reasons for implementation of the new codes. The new code may indicate a "Z" in lieu of the "C" as the 5th character. "Z" tells the user that the level capable of removal/replacement is also the level authorized to dispose of the consumable item.

The code for part number 2HA1C126 (P1GZG) is read as follows: Procure to replenish by IMA afloat/ashore maintenance level. The item is not repairable and can be condemned at the IMA afloat/ashore level.

To conclude, consider the question, "How to determine if the item can be ordered?" The drive arm assembly, P/N W16-127 (listed under item 10), has a code of X1. X1 converts to XA which means the item is not bought by supply as a separate item. If the user needs the drive arm, he must therefore order the next higher assembly of which the arm is a part. Since the arm is indented under column 3, it is a part of the first preceding item indented under column 2. That assembly is item 8, the drive arm assembly, P/N W16-146. W16-146 has a code of P1 C or "a consumable item which can be ordered."

Spend some time translating source codes into words. The time spent will prove to be an excellent investment towards the overall objective of keeping your bird "mission ready."

PART NUMBER	VOL. FIG. INDEX NO.	CODES	PART NUMBER	VOL. FIG. INDEX NO.	CODES
19772	3- 39 - 9	X2		4- 58 - 56	P1 C
19774	3- 39 - 5	P1 C	2D200A	5- 20A- 44	
19775	3- 39 - 4	P1 C	2D70	8- 86B- 11	P1GZG
19927	3- 42 - 48	MO	2HA1B126	5- 49 - 37	
	3- 45 - 64	MO	2HA1B126D	5- 49	P1 C
1995C	9-108 - 8	P1 C	2HA1C126	8- 78 - 2	P1GZG
19983	3- 39 - 33	MO	2KL4278	4- 69 - 17	P1OZO
19986	3- 42 - 6	P1 C	2K1B126D	8- 53 - 59	
19987	3- 42 - 14	P1 C	2K1C126	8- 86D- 3	P1OZO
19988	3- 42 - 12	MO	2N1358	9-108 - 22	P1 C
19989	3- 42 - 13	P1 C	2N1481	8- 45 - 33	P1 C
19990	3- 42 - 5	P1 C	2N1482	5- 50 - 44	
2	4- 33 - 34		2N1486	5- 50 - 11	
2-0-100	8- 40 - 2	P1 C	2N2102	5- 50 - 34	
2-0-120	2- 54 - 20	P1 C	2N2218A	8- 86 - 6	P1 C
	8- 9A- 24	P1 C	2N2323A	9-108 - 58	P1 C
2-0-140	2-108			9-108 - 87	P1 C
2-0-180	2- 56 - 84	N		9-108 -161	P1 C
2-0-80	2- 42 - 32	N	2N333	8- 46 - 47	P1 C
	2- 50 - 17	N	2N333A	8- 45 - 34	P1 C
	2- 50 - 41	N		8- 46 - 45	P1 [illegible]
	2- 50 - 43	N	2N335/USN	8- 34 - 29	[illegible]
	2- 51 - 10	N		8- 35 - [illegible]	[illegible]
	2- 54 - 21	N		8- [illegible]	[illegible]
	2-121A- 29		2N335A		
	5- 19 - 84F	KC	2N336		
			[illegible]		

ILLUSTRATION 2

SOURCE/MAINTENANCE/RECOVERABILITY CODE

MUST USE 5 CHARACTERS

LEVEL INDICATED IS LOWEST LEVEL AUTHORIZED TO PERFORM TASK

SOURCE				MAINTENANCE LEVEL				RECOVERABILITY LEVEL	
1st Position (Acquisition)		2nd Position (Why/Where)		3rd Position (Lowest Use)		4th Position (Lowest Repair)		5th Position (Disposition)	
P	Procure	A	Replenish	O	Org	O	Org	O	Org
		B	Insurance	F	IMA Afloat	F	IMA Afloat	F	IMA Afloat
		C	Cure-Date	E	IMA Afloat/Ashore	H	IMA Ashore	H	IMA Ashore
		D	Initial			G	IMA Afloat/Ashore	G	IMA Afloat/Ashore
		E	GSE/Stocked	H	IMA Ashore			D	When Beyond lower level, return DEPOT
		F	GSE/Not Stocked	D	Depot	D	Depot		
		G	GSE/Special	L	Specialized Activity	L	Specialized Activity	L	Depot/Specialized Activity only
K	Available in kits only	D	Depot	Z	Support Equipment, not removable	Z	Not repairable		OTHER ITEMS
						B	Recondition	A	Special Handling; Refer to Manuals/Directives.
		F	Org/IMA						
		B	All Levels						
A	Assemble or	O	Org					Z	Nonrepairable; Dispose at Level Indicated by position three of code.
		F	IMA Afloat						
M	Manufacture/Fabricate	H	IMA Ashore						
		G	IMA Afloat/Ashore						
		D	Depot						
X	Not Procured As Separate Part	A	Use Next Higher Assembly						Codes in this column assigned to repairables. When unserviceable, dispose at level indicated.
		B	Salvage/One-time Buy						
		C	Special Dwgs/Inst						

CROSS REFERENCE FROM OLD TO NEW SM&R CODES

(Positions 1 and 2)

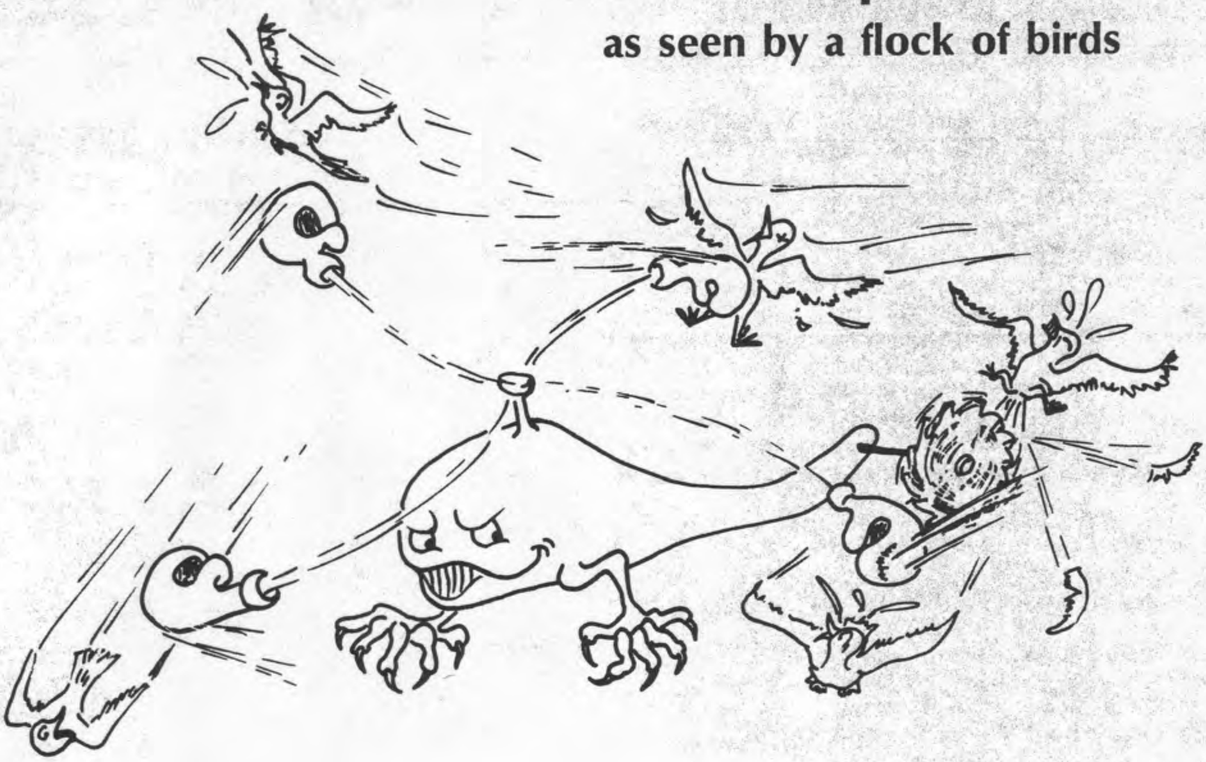
P, P1, P6, PD, PF	PA
P2	PB
PC, P3, KC	PC
P4	PD
P5	PE
P7	PF
(no comparable old code)	PG
KD	KD
KF	KF
KB, KFD	KB
*AF	AF or AO
AH	AH
AG	AG
AO, AOA	AD
*MF	MF or MO
MH	MH
MG	MG
MO, MOA	MD
X, XX, X1	XA
NN, X2, X3	XB
U, UU	XC

*Original "AF" and "MF" codes covered all fleet activities. Later codes defined the fleet activity.

The following cross reference is to be used with the P1 C-type codes, positions 3, 4, and 5.

B	L
C	Consumable
D	D
E	O
F	F
G	E
H	H
L	O
O	O
R	D
Z	Z

The Helicopter
as seen by a flock of birds



Drawing by R. L. Allen

HSL-30 TAKES PART IN AWARD CEREMONY

In photo, on right, Cdr Bilicki joins Mr. King in presenting a 1,000-hour plaque and congratulations to Lt Mariner Cox.

In photo below, Capt S. L. Corner, CO of FASOTRAGRULANT, receives a model of the Kaman SH-2F, LAMPS aircraft from Kaman Senior Representative Jack L. King. The Seasprite presentation was witnessed by Cdr D. R. Bilicki, CO of HSL-30. ASW instructors, AW1 Adams and LCdr Jacobsen also watched the presentation.