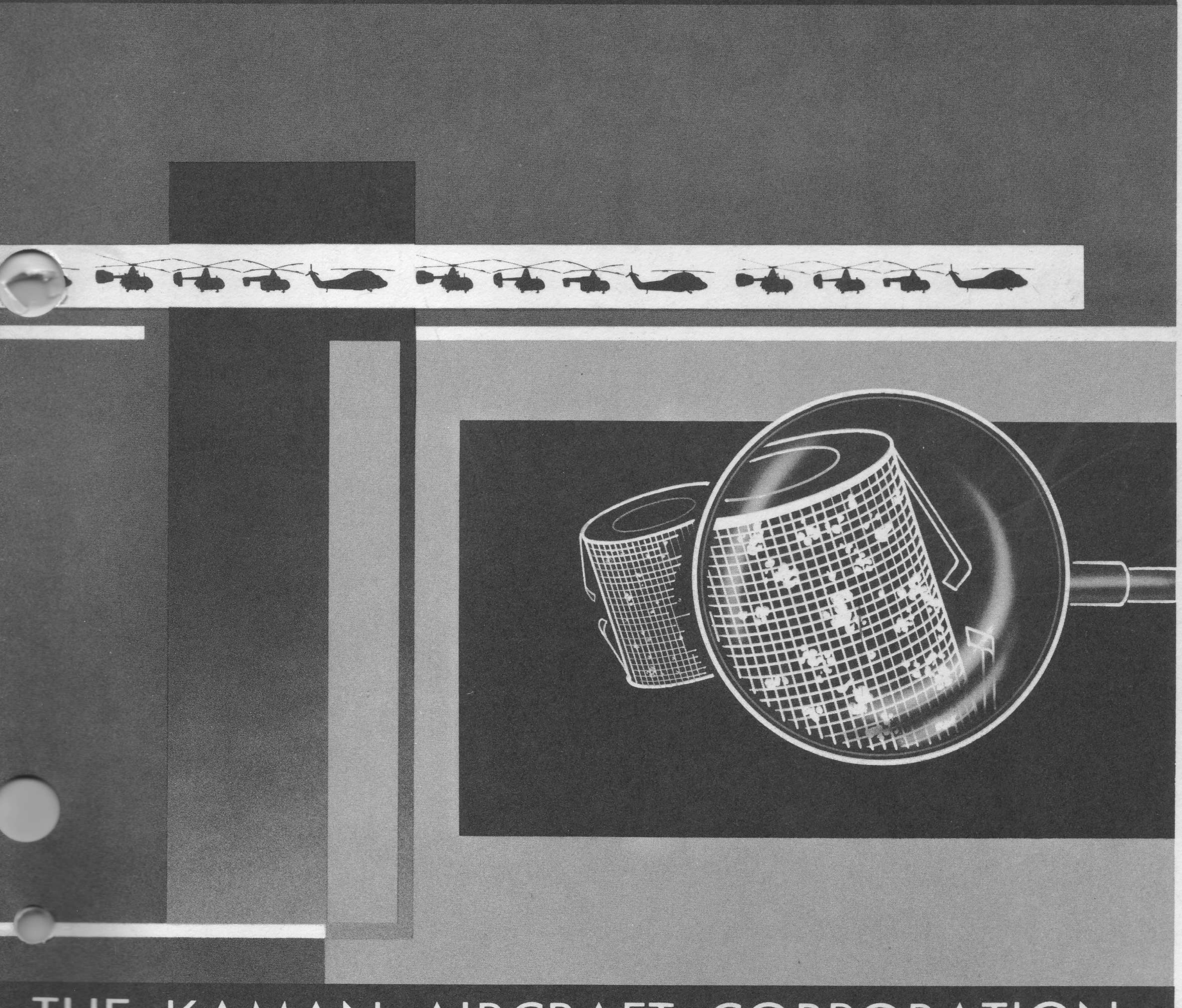
KAMAN

Kaman Rotor Tips

VOL. II No. 8 APRIL 1962



THE KAMAN AIRCRAFT CORPORATION

PIONEERS IN TURBINE POWERED HELICOPTERS

KAMAN

Rotor Tips

APRIL, 1962

ADDRESS ALL INQUIRIES TO:
Kaman Rotor Tips
Field Service Department
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Old Windsor Rd.
Bloomfield, Connecticut

THE COVER

Artist uses filter and magnifying glass to focus attention on the importance of keeping fuel free from all types of contamination.

IN THIS ISSUE

— PLEASE SHARE THIS COPY —

FUEL Contamination

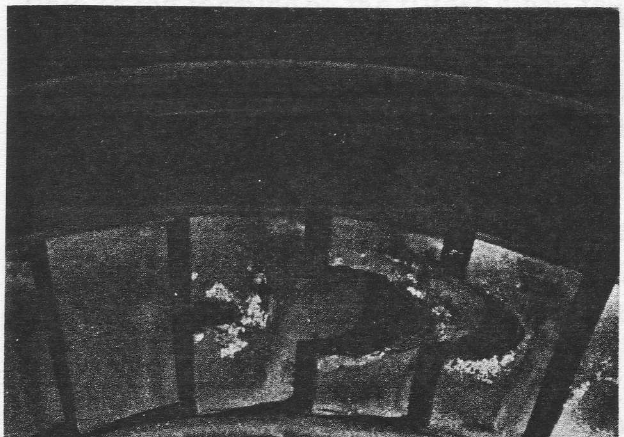
by C. W. Jenkins and
A. A. Werkheiser
Analysts, Dynamics
Field Service Department

While thoughts of aircraft sabotage are undoubtedly pleasant to enemy agents, few are willing to chance a meeting with the armed patrols and other security forces found at military installations. Even the most dedicated would-be saboteur cannot outrun a bullet! There is another type of "saboteur," however, who often endangers lives and aircraft, thereby accomplishing what his human counterpart hesitates to even attempt. The name of this "enemy agent" is FUEL CONTAMINATION, and he is doubly dangerous because of the numerous shapes and forms he can assume.

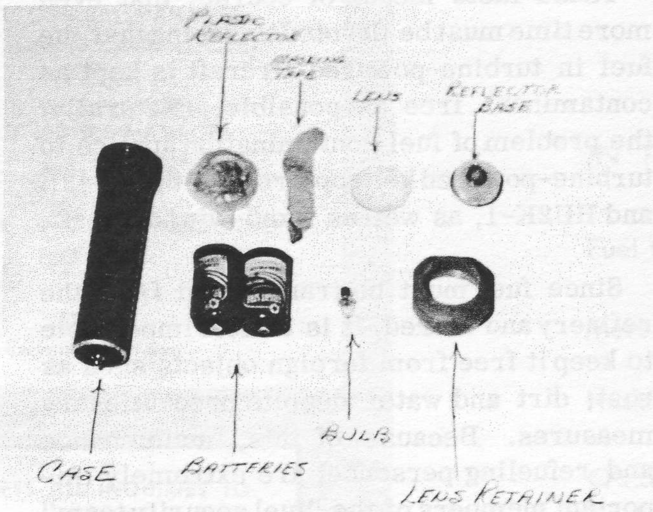
The problems caused by the contamination of aviation gas have been known for many years by those who maintain or refuel aircraft, and numerous preventative precautions have been instituted during this time. With the advent of gas turbine and turboprop engines, however, the need for even cleaner aviation fuels has been generated. Where reciprocating engines, their carburetors and related components have been able to handle a considerable amount of sediment and water, the aviation gas turbine cannot; it is comparatively easy for foreign material to clog the small clearances found in the fuel control on a jet engine. In addition, since a turbine engine may use five times as much fuel in an hour, it can be called upon to cope with a proportionately greater amount of contamination. It must also be considered that jet fuels tend to absorb water more readily from the atmosphere than aviation gasoline and it takes contaminated material four times as long to "settle" in JP-4 and other jet fuels than in Avgas.

These facts mean, of course, that even more time must be devoted to seeing that the fuel in turbine-powered aircraft is kept as contaminant free as possible. Naturally, the problem of fuel contamination applies to turbine-powered helicopters like the H-43B and HU2K-1, as well as fixed-wing aircraft.

Since fuel must be transported from the refinery and stored, it is almost impossible to keep it free from foreign objects such as rust, dirt and water despite precautionary measures. Because of this, maintenance and refueling personnel are extremely important members of the "fuel security team" since they are not only the last checkpoints before fuel is introduced into the aircraft system, but also "police" the fuel for impurities after it is in the cell. To do a thorough job, however, they must be able to detect the forms which this "foreign agent" assumes and know what action should be taken. <u>REMEMBER, contaminated fuel can cause as much damage as a human saboteur with a blowtorch!</u>

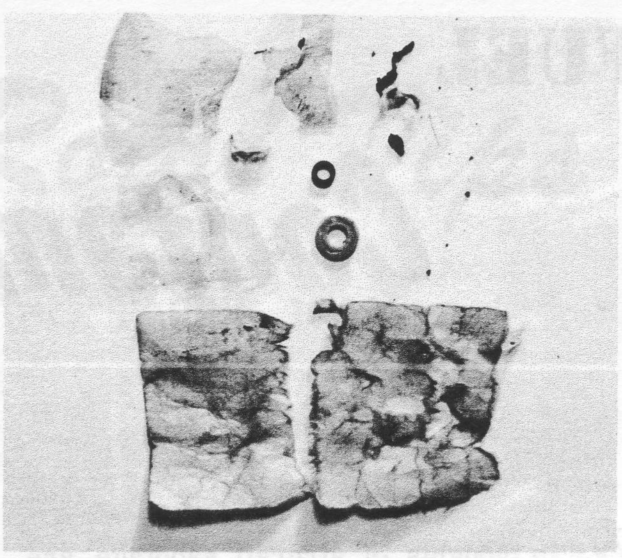


Fuel contamination by fairly large objects is the exception rather than the rule, but recently an H-43B mission was aborted because of a flashlight which had, somehow, found its way into the fuel cell. Fuel contamination by flashlight is, of course, the exception. There are many less conspicious "saboteur types" at work which are more common causes for flameouts and engine damage. Dirt and the most common contaminant, water, are two of these and will be discussed later. For the present, however, let's follow through on what happened to that flashlight rolling around on the bottom of the fuel cell.

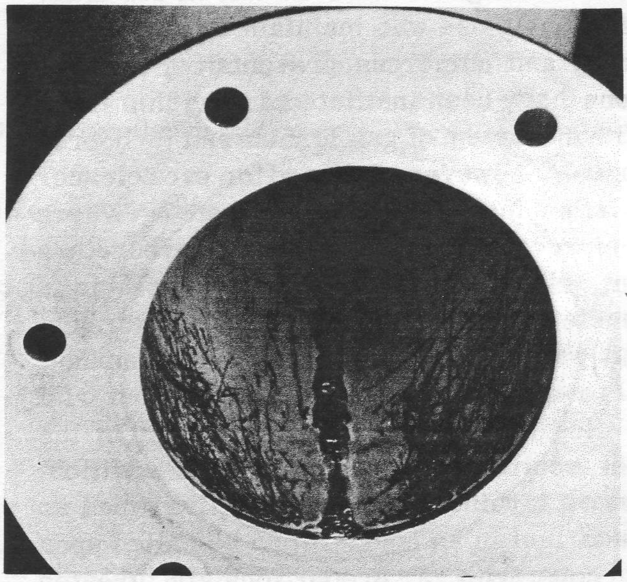


After a thorough soaking in JP-4, some parts of the flashlight began to disintegrate as the fuel reacted on the plastic, batteries and seals. The accompanying photograph shows what happened. The plastic reflector was pretty much of a "blob" when found and portions of one battery had been eaten away. While this was occurring, tiny particles were finding their way into the fuel system. The bulb was not broken, but it could have been if it had entered the booster pump, as has happened. When this did occur, the pieces went up the fuel line; most were trapped in the filter but fragments managed to find their way through the filter to the fuel control. Result — FLAMEOUT!

Among the items which have been found in fuel tanks recently are paper, cellophane, O-rings and washers. Like the flashlight, these are more or less an exception, but they do emphasize the need for using due caution when working in the fuel cell or when the filler neck is uncapped.

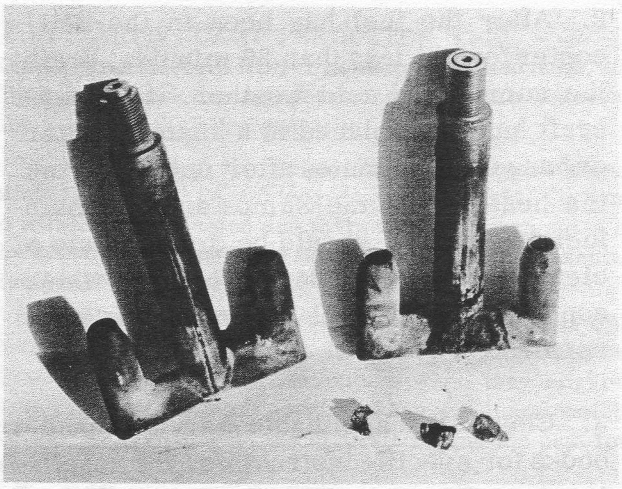


More common contaminants are particles of corrosion and metal which cause problems with filters, valves and seals rather than the engine itself. During refueling, if the hose nozzle is jammed into the filler neck on the aircraft, fuel contamination is probably taking place since tiny particles of brass and aluminum are usually chipped or "skinned" from the nozzle and filler pipe and drop into the cell. Only a few particles, but if this rough handling is repeated day after day, quite an accumulation could build up. Remember also, these particles may be minute, but this doesn't make them any less dangerous since the clearances in the fuel control are also very small.



Corrosion or metal particles may be introduced into fuel in other ways. For example, draining the last of the JP-4 from a container into the tank may cause contamination. Working inside a cell tightening bolts or replacing threaded items can also result in tiny metal shavings being left behind when the job is done. Once such foreign elements are introduced into the fuel cell, they can be carried along until they jam a valve or plug a screen. If this does not occur, the particles will end up in the burning area of the engine with possible serious damage resulting.

The word "dirt" as used in this article applies to small particles of earth and non-metallic materials. These "foreign agents" were not in the fuel when it left the refinery, they were induced by improper handling and/or storage in contaminated containers. The problem with contaminants of this type is similar to that found with corrosion or metal particles. The flow of fuel from the cell to the engine can drag or push them along until they lodge in a valve, are forced under a seal or carried into the burning area. If a valve gives trouble and dirt is discovered, naturally the valve is removed, cleaned and then reinstalled. If, however, the dirt finds its way past the valve and into the burning area it becomes a burning particle. If enough particles collect on the fuel nozzles (T canes), inner liner, turbine nozzles or wheels, they form a "hot patch" which leads to rapid deterioration of the



area. This type of problem usually goes undetected until serious damage results.

Using synthetic or 7808 engine oil to preserve the fuel control will also contaminate the burner area. This causes the inner seals and nonmetallic washers to deteriorate and the fuel pressure carries the resulting gum and minute particles into the T canes. A carbon and gum buildup on these nozzles

CORRECTION

In the article entitled "Watch Those Droop Stops" which appeared in the February, 1962 issue of Rotor Tips the following paragraph appeared. "For those not familiar with the affected components and related geometry, the HOK, HUK and H-43 rotors are semi-articulating. This means that the blades lead and lag about horizontal pivots instead of flapping on hinges at the inner ends of the blades. The preceding underlined information is erroneous.

The statement, as originally written by the author, read: "This means that the blades lead and lag about vertical pivots; however, the hubs 'teeter' within a predetermined arc about horizontal pivots instead of flapping on hinges at the inner ends of the blades." - Ed.

then causes a malfunction of the fuel-air mixture, uneven burning and hot spots. Since the fuel is not mixed properly, it is blown against the N_1 nozzle where it burns holes in the turbine blades and warps the nozzle. Using a blow torch would have the same result.

The "sneakiest" of all the fuel contaminants is WATER. This unflattering term is used because water may be present in JP-4 and other fuels and not cause any engine difficulties unless found in large quantities; in fact, a SMALL amount of water mixed with the fuel under nozzle pressure even helps the burning process. However, when water is subjected to a temperature of 32°F or below it starts to show its true nature. Ice begins to form which can clog filters, nozzles and fittings or it can stick and clog valves. Since any restriction to the fuel flow may cause engine flameout, this can present a formidable problem. Fortunately, Kaman helicopters are not readily susceptible to ice forming on the filters since they are located in or near the cabin area where icing conditions would be improbable except under extreme conditions.

Water is found in fuel in three forms: free water, suspended or entrained water, and dissolved water. Free water is the type most maintenance personnel are familiar with. This is water which can be seen and eliminated by draining or filtering. Entrained or suspended water will cause the fuel to appear milky in extreme cases but is hardly discernible to the eye otherwise.

By allowing the fuel to remain undisturbed for a period of time this water will "settle out" as free water and can thus be drained from the fuel. The hardest type water to discover or eliminate is dissolved water, which is similar to the humidity in the atmosphere. It is held in solution in a percentage which varies with temperature and pressure. "Cold soaking" is the most readily available means of dealing with this situation since the refrigeration action forces the fuel to rid itself of the water. This water is then precipitated like rain, thus becoming free water which eventually sinks to the bottom of the tank and can be removed by draining.

"How does water get into the aircraft fuel system?" It may be pumped in with the fuel, be absorbed from the atmosphere while in flight, come from condensation and several other ways. An article dealing with this aspect and other facts pertinent to fuels will appear in a future issue of Rotor Tips.

Remember, from the time fuel is refined until the time it ignites in the engine it is vulnerable to contamination. While visual inspection for cleanliness has been a standard refinery practice for a great number of years and each shipment of fuel is sampled and inspected prior to shipment, there is certainly no guarantee that the fuel will arrive in an uncontaminated condition at the base. This is due to the fact that the transportation system, pipe lines, tankers, tank cars and tank trucks are not antiseptically clean or dry nor can they be maintained in such a condition. Temperature fluctuations of the fuel, exposure to water bottoms in storage tanks, contact with scale and rust in pipelines and tankage occur during transit and storage. In addition, many ground filter separators satisfactory for aviation gasoline are unsuitable for gas turbine fuels but may inadvertantly be used, or the correct filter may be used but fail to perform its job for some reason.

Because of the numerous ways in which fuel may become contaminated, refueling should never be regarded as "strictly routine." Neither should the day-to-day act of draining the sumps. A suitable transparent container should always be used so that the sample can be examined carefully, for it is at this time the mechanic has the opportunity to discover and remove contaminants. If these remain undetected, their presence may later endanger the aircraft or, at the very least, cause unnecessary work for maintenance personnel who must replace damaged components.

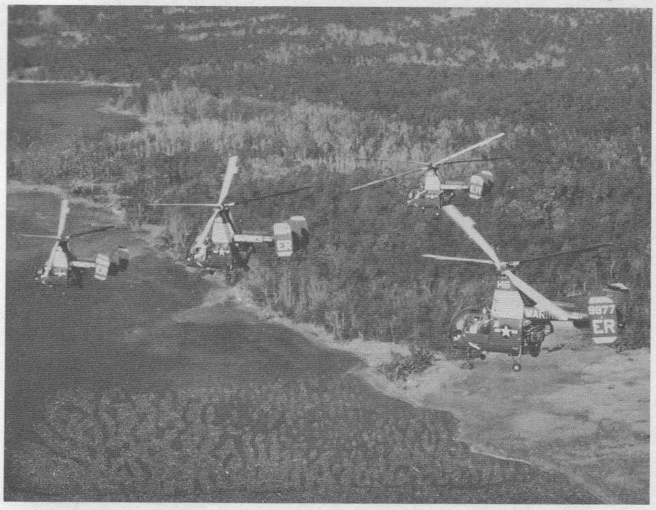
The following information is presented to help maintenance and refueling personnel in their war against — FUEL CONTAMINATION.

1. If servicing from a trailer or truck - (a) Check the inspection date record for latest inspection date of the dispensing equipment. (b) Check the nozzle for dirt and other foreign material. (c) Discover if you can, when the trailer was last serviced. This will give an idea as to the necessity for draining sumps on the aircraft after it has remained static for 30 minutes or longer. Time in the trailer in cold weather will help with the ice problem as the longer the time, the colder the fuel (cold soak).

2. After the fuel has been in the helicopter for not less than 30 minutes, drain the sumps. In cold weather, if the aircraft has been placed in a heated shelter or hangar, 30 minutes after removal from the heated area the sumps and the main fuel line filters should be drained into a clear container in order to check for water content. Drain until all water has been removed.

3. Check the applicable service handbooks for specific instructions for specific aircraft, areas and dispensing units. Here are a few Air Force Technical Orders that pertain: 42B-1-1, Quality Control of Fuels and Lubricants; 42B1-1-1, Use and Disposition of Fuels; 42B1-1-9, Handling and Service Procedures for Elimination of Water and Ice From Aviation Fuels. Many more are indicated in Section VII of T. O. 42B-1-1. K

VMO-1 HOKS QUALIFY FOR CARRIERS



(Official USMC Photo)

On The Way

(Official USMC Photo)

Coming Aboard

A whole squadron of HOK's flew out to the carrier USS Thetis Bay off the coast of North Carolina recently for a period of carrier qualification and shipboard indoctrination for 10 pilots attached to VMO-1, MAG-26, MCAF New River, N.C. It was a joint educational effort for both the pilots and the crew of the ship and was the first time this squadron of HOK's has been given the opportunity to carrier qualify. The 10 pilots, including the Squadron Commander, Lt. Col. Earl W. Cassidy, made a total of 84 landings that afternoon, each making at least eight.

VMO-1 is called upon from time to time to send a couple of HOK's with other squadron detachments from MAG-26 when they go aboard carrier for cruises, and therefore, their combat readiness was elevated considerably by all of the available squadron pilots being able to carrier-qualify at one time. Under normal operations, the pilots of VMO-1 are under the operational control of the Second Marine Division at Camp Lejeune, and fly missions in support of ground forces in maneuvers at the Marine Corps Base, and at Vieques where they have one HOK in support of the battalion there.

VMO-6 HOK-1 Logs 2,000 Hours

1ST MARDIV, CAMP PENDLETON, Calif. - - - - A Kaman Aircraft-built HOK-1 helicopter passed the 2,000 flight-hour mark during operations at Marine Observation Squadron Six here recently.

Lt. Col. Henry K. Bruce, Squadron commander; piloted the "helo" on its record breaking flight. On hand to witness the occasion and to fly the last few minutes of the 2,000 hours was John LaCouture, local representative for Kaman Aircraft.

S/Sgt David C. Tunmire, crew chief; and L/Cpl. Joseph P. Sheehan, plane captain; were on hand to greet Colonel Bruce and Mr. LaCouture when they alighted from the craft. Tunmire and Sheehan were responsible for the maintenance of the aircraft during the past few months.

The HOK-1 was accepted from the manufacturer at Bloomfield, Conn., in July 1956. During the past five and one-half years it has twice seen service with VMO-6 at Camp Pendleton and with HMR-363, Santa Anna.

The HOK-1, used for reconnaissance and observation missions, will soon retrace the route it took in February, 1959 —— to the Navy's Overhaul and Repair Facility, at Naval Air Station, Jacksonville, Fla.

Mr. LaCouture, standing, is shown congratulating Colonel Bruce and Sergeant Tunmire. Corporal Sheehan is atop helo. (Official USMC Photo.)

More From Les . . .

Why do helicopter pilots fly the aircraft from the right side? Why does the helicopter's throttle grip turn in the direction it does and why is a twist-type throttle widely used? Charles "Les" Morris, Assistant Vice President-Field Service Manager, supplies the answers in this article.

RIGHT-SIDE PILOTS

Many explanations have been offered as to why a helicopter pilot sits in the right-hand seat instead of on the left, as in conventional airplanes. Some explanations may have an element of logic, if not perhaps of truth. But the underlying reason behind it all is the fact that in those early developmental years of the helicopter, I had trouble being ambidextrous.

The first military helicopter manufactured by Sikorsky was the XR-4 — a two-place, side-by-side machine. It had a single collective stick and motorcycle-type throttle grip, located between the two seats. This is a most important point; because if the pilot tried to change from one seat to the other, he had to change hands on the collective stick and throttle grip.

For many months, I had been flying the experimental VS-300 single-place helicopter with the collective and throttle on my left hand, and the cyclic in my right. However, I was such a slave to custom that, when a side-by-side aircraft like the new XR-4 was to be flown, I felt that the pilot should be in the left seat. Therefore, in preparation for the XR-4's first flights, I sat at my desk by the hour with a ruler in each hand, getting myself oriented to the idea of controlling the cyclic with my left hand and the collective with my right.

The photograph of the XR-4's first flight amply demonstrates how awkward this was, but once I became accustomed to it, I was not about to change seats, for this would have meant swapping hands and learning all over again. When it came time to check out my first Air Force students, I still had only a total of 50 helicopter flight hours with 35 of these in this type aircraft and wanted to keep the uncertainties to a minimum. So I put the students in the right-hand seat, and stayed in the left one myself, where I felt quite at home.

When those same students began to perform helicopter missions, they naturally continued to fly from the side where they had been trained. So the right-hand seat became the pilot's seat!

OPEN THROTTLE

Another question that has often been asked is why the helicopter's throttle grip turns in the direction it does. To quote from the Air Force's first helicopter pilot's handbook which I wrote in 1942: "Throttle is 'open' when grip is turned clockwise, as viewed from the top end of the pitch control lever." This still holds true 20 years later.

How was the decision made? Frankly, it wasn't a decision; it was an accident.

As I have said earlier in this article, I flew the XR-4 with my right hand on the collective stick, and therefore, the motorcycle-type throttle grip was also in my right hand. Experience with the experimental VS-300 helicopter had shown that, when we pulled in collective, we generally had to add some throttle even though we had partial synchronization between the two. Now, if you hold the collective stick (or a reasonable facsimile thereof, such as a ruler or a broomstick) in your right hand, it is a very natural motion to turn the grip counterclockwise (as viewed from the top) while you pull up on the stick. It becomes quite awkward, however, to turn it clockwise when pulling up.

So, when Bill Hunt, who was the project engineer on the XR-4 at that time, asked me which way the grip should turn to open the throttle, I told him it should turn counterclockwise. He assured me this would be done. But about a week later he reported that the engineers had found it necessary to put an extra linkage in the throttle control, with the result that the grip would now turn clockwise for open throttle.

He asked if this would be a serious drawback. I reflected for a minute on all of the guesses which had gone

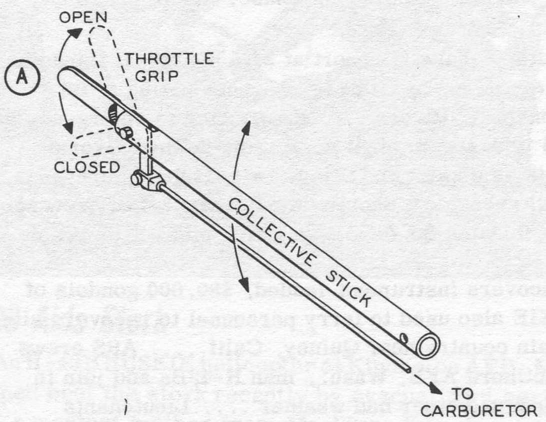
Mr. Morris, shown flying the XR-4, has been actively associated with helicopters since their pioneering days and, starting in 1941, served as Chief Test Pilot during the early development of Sikorsky helicopters. Included in the "firsts" to Mr. Morris' credit are the first helicopter flight to exceed 100 miles an hour, the first helicopter flight in America to exceed 5,000 feet in altitude, the first helicopter night flights, the first true backyard landings, the first helicopter roof-top landings, the first actual landings of a helicopter without the use of engine power, the first in the world to hold a commercial helicopter pilot's license. He also initiated the first pilot and mechanic courses for helicopters and is the author of several books on helicopters—Ed.

into the unknown factors in the XR's radical design, and decided that a matter as relatively minor as which way the throttle grip should turn was insignificant in relation to the others. I simply modified my armchair practicing so that my mind was re-tuned to this new and rather awkward method of opening the throttle.

As so often happens, it all worked out for the best: When the standard pilot's position shifted to the right seat in the XR-4 so that the throttle grip was in his left hand, the awkwardness was automatically eliminated!

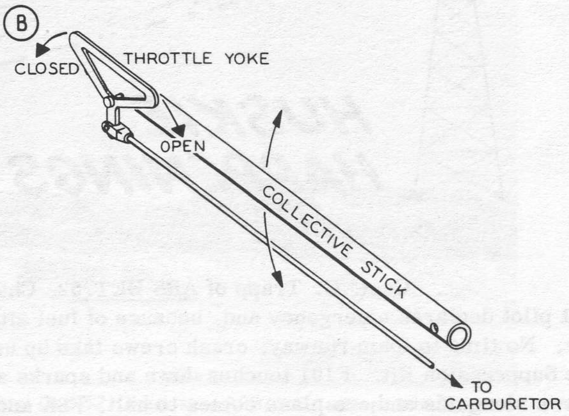
THE TWIST-TYPE THROTTLE

I don't recall who actually made the decision to design the XR-4 with a motorcycle-type twist grip for throttle control. Regardless of who made the decision, or why, experience has proved that it has at least one major drawback — there is no quick and positive way to "feel" whether the throttle is open or closed, except by relying on the pilot's habit patterns; nor is there a really good way to tell by feel how close you are to the full-open throttle position until you actually hit the stop. This drawback has been responsible for burning up innumerable engines due to starting with open throttle; and it has been a contributing factor to many accidents in which the pilot ran out of throttle at a crucial point without any advance warning that he was so close to the stop.

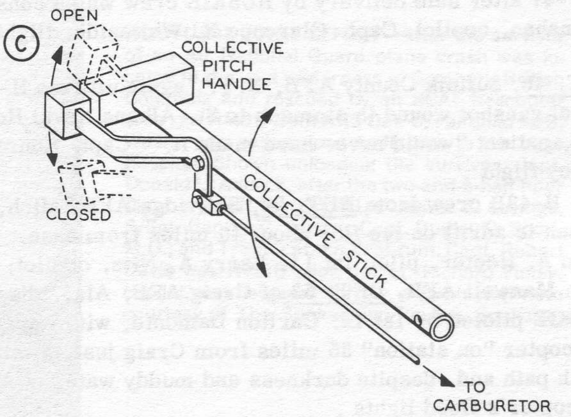


Early in the game, we experimented at Sikorsky with another type of throttle grip (Sketch A) which gave very satisfactory results as long as the loads on the collective pitch stick were fairly light. If the collective stick was pushed down and the throttle grip pivoted down, everything was set for starting the engine, and for ground idling — low collective and closed throttle. For take-off, the throttle grip was pivoted to a position just about in line with the axis of the stick, and this was the normal cruising position also. However, when high power was required, the grip was pivoted farther upward, and the pilot thus received an immediate "feel" that he was approaching the extreme throttle position.

This device had a couple of obvious drawbacks, one of which was quickly remedied by putting a flexible sleeve over the joint between the grip and the stick to prevent pinched fingers and hands. The other was the fact that, when pulling up on collective, the load had to be applied mostly with the little finger because it was closest to the pivot point; otherwise, the throttle grip had a tendency to pivot.



To overcome this latter problem, serious consideration was given to a design such as portrayed in Sketch B. I don't recall that this was ever tested, but it would obviously introduce another problem in that the throttle would be closed in the forward position and open in the rearward position — quite the opposite of conventional aircraft practice. Yet to reverse this design would introduce techniques that would be awkward to a helicopter pilot.

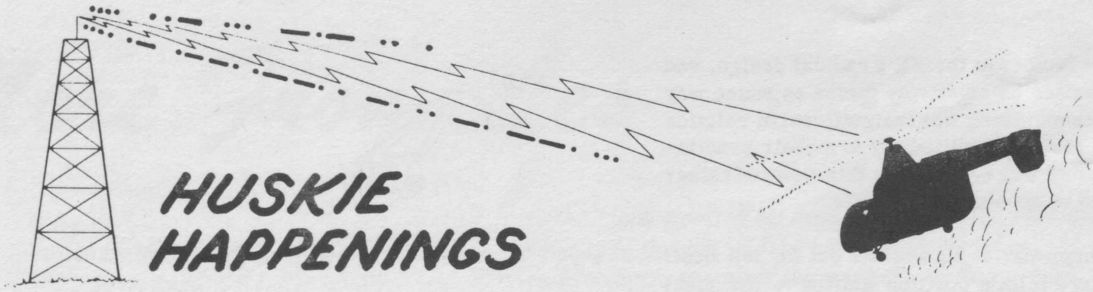


A third type of throttle which had much merit was introduced in the commercial Hiller 360, about 1949. It is shown in Sketch C. There was a comfortable square handle rigidly attached to the end of the collective stick, so that it resembled the letter "T." To the left of this was a smaller knob, with an arm going back to a pivot point on the collective stick.

As with "device A," throttle was closed when the small knob was in the down position. When the small knob was just about even with the large handle, the pilot was in normal cruise position. When he began to approach maximum power, he would have to move the small knob upward relative to the handle, and the pilot thus received the "feel" warning that is so helpful in marginal operations. The small knob was operated by a kind of rolling motion of the pilot's hand, whereby his ring finger and little finger applied the light throttle control while his stronger fingers were reserved for the heavier loads of the collective pitch stick.

I flew many hundreds of hours with this arrangement, and found it to be quite effective. I even flew 400 miles cross-country one time with the airspeed indicator and the manifold pressure gage inoperative, simply using throttle position as my guide.

The design was discontinued in the interest of standardization, but I have always been sorry that a constructive forward step had to suffer this fate. K



HUSKIE HAPPENINGS

... Capt. C. Trapp of ARS DET. 52, Charleston AFB, S.C., preparing for local training flight when F101 pilot declares emergency and, because of fuel situation, elects to land immediately although unable to lower nose gear. No time to foam runway, crash crews take up usual positions and Captain Trapp and crew launch in H-43B with Fire Suppression Kit. F101 touches down and sparks and fire shoot out as nose settles and scrapes runway. HUSKIE follows alongside and, as plane comes to halt, FSK and firemen are landed and foam discharged on F101 nose section. Helicopter meanwhile assumes hovering position over fighter to aid pilot's escape if necessary. Fire danger averted.

H-43B crew from ARS DET. 58, Brookley AFB, Ala., called on for assistance after search in Mobile Bay area fails to find missing fisherman. Takeoff at 1130, missing man located at 1245 stranded on peninsular cut off from mainland by dense swamp. Survivor, suffering from shock, exposure and hunger flown to safety. Aboard HUSKIE were Capt. Floyd Lockhart, pilot; Capt. John Allison, I. P.; A1/C Wayne Miller and A1/C Robert Logan, observers; S/Sgt. Thomas Nesco, medic .... Ill Coastguardsman evacuated by H-43B from DET. 42, Dow AFB, Maine; from Mount Desert Rock Lighthouse 23 miles offshore. Heavy seas prevent transfer from being made by boat. Coast Guard launch stationed midway between light house and coast to provide cover for operation. Coastguardsman flown to Dow by C-47 after safe delivery by HUSKIE crew which consisted of 1st Lt. Walter J. Zimmerman, pilot; 1st Lt. Donald E. Stranahan, copilot; Capt. Clarence K. Whiteside, flight surgeon; and S/Sgt. Ruben Garza, medical technician .

DET. 46, Suffolk County AFB, N.Y., again utilizes H-43B for ambulance service, flying airman suffering from accidental gunshot wound in stomach to St. Albans Naval Hospital 50 miles away. Hospital doctors say that without ARS help, patient "would never have made it." Capt. Konrad J. Schiessl and Lt. Franklin L. Chase, H-43B pilots on mercy flight .

.... H-43B crew from DET. 26, Selfridge AFB, Mich., scramble after receiving report at 2:15 p.m. that Canadian citizen is adrift on ice floe about 40 miles from base. Pickup made at 3 p.m. by HUSKIE crew consisting of 1st Lt. Owen A. Heeter, pilot; 1st Lt. Larry A. Nitz, copilot; and S/Sgt. Donald N. Rivers .... Responding to emergency call from Maxwell AFB, DET. 53 of Craig AFB, Ala., dispatches H-43B to assist in night search for downed aircraft. HUSKIE piloted by 1st Lt. Carlton Damonte, with Capt. Richard Smith as copilot and S/Sgt. Otis Graham, crewman. Helicopter "on station" 35 miles from Craig just 45 minutes after call received. Shortly afterward, H-43B crew spots crash path and, despite darkness and muddy water in Alabama River, locates fuselage of missing plane with aid of helicopter's flood lights .

... H-43B crew from Stead AFB, Nev., recovers instrument-loaded, $80,000 gondola of giant research balloon from deep snow on steep mountainside. HUSKIE also used to ferry personnel to recovery site. The balloon, part of Project Stargazer, exploded over rugged mountain country near Quincy, Calif..... ARS crews from DET. 9, Portland International Airport, Ore., and DET. 5, McChord AFB, Wash., man H-43Bs and join in widespread search for missing Navy P2V conducted despite snow storm and other bad weather .... Lieutenants McKibben and Robertson from DET. 52, Charleston AFB, S.C., scramble in HUSKIE after civilian aircraft crashes five miles from base. Suffering from minor injuries and shock, pilot of downed plane returned to base for medical attention within 15 minutes.

1,000 Hours .

H-43B's attached to ARS Detachment 24, CARC, at Kincheloe AFB, Mich., passed the 1,000 mark in accumulated flying hours on Feb. 28. According to the Information Center at Kincheloe, the detachment was the first of the approximately 51 local base rescue units in the continental United States to fly this number of hours in the HUSKIE. Both helicopters involved have the original engines and the accumulated hours were accident and incident free. The 1,000 hours were made up of 204 operational missions which included providing rescue support for Kincheloe and answering occasional calls for help from the civilian population in the surrounding area. Pictured after the March 12th flight are, left to right, SMSgt. John L. Anderson, NCOIC of the detachment; A1/C Kenneth B. Thompson, crew member; Capt. Paul J. Darghty, pilot; and Capt. James V. Berryhill, unit pilot. (USAF photo)

AIR-SEA SEARCH—H-43B's from ARS Det. 51, Myrtle Beach AFB; and Det. 52, Charleston AFB, S.C.; a Marine helicopter, Navy frogmen and the Coast Guard all took part in an intensive search after an F100 crashed in the heavy surf near Myrtle Beach. An H-43B from Det. 51 located the site two miles from the reported point after a 30-minute search. Captain Lee in a HUSKIE from Det. 52 flew four Navy divers and their gear to the scene and afterward, Captain Fiola from Det. 51 utilized the H-43B to tow the divers in a rubber boat. The effort was discontinued, however, because of the heavy surf. The H-43's were then used to transport equipment as the divers operated from a Coast Guard boat. (Photo courtesy of Charleston, S.C., Evening Post)

RCAF-USAF JOINT EFFORT—After the survivor of an Air National Guard plane crash was located in the vast wilderness of Southern British Columbia and rescued by an RCAF helicopter crew, an H-43B from ARS Det. 6, Fairchild AFB, Wash., was called upon to fly him to the base hospital. Shown unloading the survivor, Capt. Donald L. Adcock, after the two-and-a-half hour flight are, left to right, A1/C James E. Levings, S/Sgt. George C. Sorrow, Capt. Dudley O. Scott, M.O.; and T/Sgt. Lathan T. Shrum. Capt. Robert Davis was H-43B pilot, 1st Lt. Richard Finley, copilot, and Sergeant Sorrow, crew chief. (Photo courtesy of The Spokesman-Review, Spokane)

ARS Aids Stork

An H-43B HUSKIE helicopter at Kincheloe AFB, Mich., helped beat the stork recently by evacuating a seriously ill, expectant mother from Mackinac Island.

When Mrs. Ronald Cowell of Mackinac Island near St. Ignace, Mich., became seriously ill, her physician telephoned Kincheloe for help. Ice in the lake prevented boats from reaching the island. Capt. Wallace A. Landholm, medical officer on duty, received the call at 10:55 p. m. and immediately informed Det. 24, Air Rescue Service, at Kincheloe. The HUSKIE was airborne at 11 p. m., piloted by 1st Lt. John F. Patterson. Other crew members were Capt. Chester R. Ratcliffe, copilot; and S/Sgt. Travis Lee, engineer.

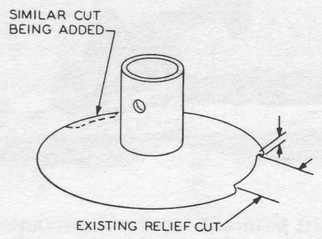
Because of heavy snow conditions and 0-0 visibility, however, the HUSKIE was forced to return to Kincheloe AFB after fighting its way through the storm for 20 minutes. The next morning, with weather conditions somewhat better, the H-43B took off to make the evacuation. Captain Ratcliffe was pilot, Capt. James V. Berryhill, copilot; and Sergeant Lee, engineer. Also aboard was Dr. Landholm. After 40 minutes flight time, the helicopter was set down in a small open area next to the fire station on Mackinac Island. The patient to be evacuated was placed aboard the H-43 on a stretcher and airlifted to St. Ignace, arriving at the airport at 11:20 a. m. A waiting ambulance immediately took the patient to the hospital. Later in the day she gave birth to a baby boy.

Both mother and son were reported "doing fine."

MISSION COMPLETED—Patient is lifted into waiting ambulance. Left to right are Captain Berryhill, Sergeant Lee, Captain Landholm, Mr. Cowell and ambulance driver. Captain Ratcliffe is in H-43B.

Q's AND A's

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



Q. (Applies H-43B) WHAT PROCEDURE SHOULD BE USED IN CHECKING THE BOOST PUMP CHECK VALVES FOR PROPER OPERATION?

A. The following steps should be taken after the engine has been operating for a period of two minutes or longer.
(1) Place the twist grip control in the "ground idle" position. (2) With the boost pump switch "on," eliminate all but one of the four booster pumps by pulling three of the four circuit breakers. (3) Check the fuel pressure gage. It should read approximately one pound less than when all four pumps were in operation. There should be no fluctuation in the gage, it should remain steady. (4) If the reading in step three is as it should be, repeat steps two and three with the remaining boost pumps until all four have been checked individually. (5) If any one pump does not give the required fuel pressure (7-11 psi) or the reading fluctuates, identify the pump position and proceed with the next pump. If the next pump reads correctly and is steady, the preceding pump is defective. If, however, it also fluctuates or does not give the required fuel pressure, one or more of the check valves is at fault. (6) Upon completion of the individual check out, reset all of the circuit breakers and check the fuel pressure. It should be "in the green" or approximately one-pound higher (7-12 psi). A general indication that the check valves may not be functioning properly is a flameout, caused when power to the boost pumps is momentarily interrupted. There are other causes for a flameout beside sticking check valves, of course. In all cases when a pump is removed, the check valve should be inspected and cleaned prior to installation. - A. A. W.

Q. (Applies HOK-1, HUK-1, H-43A, H-43B) CAN THE BELL PORTION OF THE CYCLIC STICK STEM ASSEMBLIES, P/N K351038 AND K351044, BE REINSTALLED INCORRECTLY?

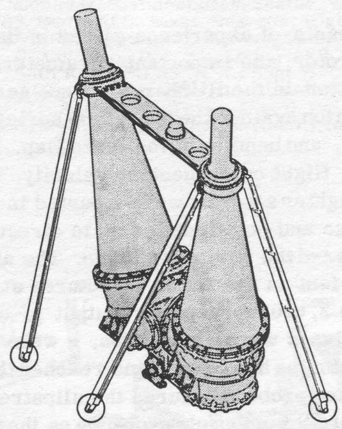
A. Yes, this is possible. Improper installation of either the pilot's or copilot's cyclic stick stem assembly results in a restriction of full lateral cyclic movement since the relief cut in the bell component is then 180° out of position. When properly installed, the relief cut in the bell part of the stem allows clearance between the stem assembly and screws in the adjacent structure. To eliminate this possible "Murphy," the contractor has prepared a design change which adds an identical relief cut opposite the existing cut. - W. J. W.

Q. (Applies H-43B) SHOULD THE ROTOR TACHOMETER ANGLE DRIVE ADAPTER P/NZZ319 BE LOOSE AND FREE TO TURN?

A. This is not a desirable condition although it should not be cause for grounding the aircraft. A small amount of looseness can be tolerated as long as the adapter is functioning normally. It is advisable, however, to order a replacement as soon as this condition is found for once such looseness has developed, it will in all likelihood increase over a period of time. This will probably show up first as fluctuation in the tachometer and eventually the hex end of the drive pin will round off the corners and slip. Loosening of the adapter can be caused by personnel who use the generator and/or adapter as a handhold. - R. A. B.

Q. (Applies H-43B) WHAT IS THE PURPOSE OF THE FOUR BOLTS WHICH PROTRUDE FROM THE LEFT MAIN LANDING GEAR WELL?

A. These bolts have been provided so that the floodlight may be easily relocated when the flotation equipment is installed at a later date. - W.J.R.



Q. (Applies H-43B) WHY IS IT MANDATORY THAT THE PYLON STRUTS BE REMOVED FROM THE AIRCRAFT WHEN THE ROTOR SHAFT AND PYLON OR THE TRANSMISSION ASSEMBLY IS TO BE REMOVED?

A. A recent check of operating activities revealed that when shaft and pylon and/or transmissions were to be removed from an aircraft, that maintenance personnel were not removing the pylon strut assemblies but only detaching them at the upper end and laying the strut back down on the upper fuselage structure still attached at the bottom fuselage fitting. While apparently this procedure is a time saver, actually it can be detrimental. Moving the strut assembly up and down while it is still attached at the bottom fitting causes wear and/or scoring of the bushings and taper pins. This, of course, results in looseness of the strut-to-fitting connection. On one helicopter which exhibited extremely loose strut connections, the pilot had previously reported a mysterious fore and aft beat. Replacing the worn bushings and taper pins eliminated the reported condition. - R.A.B.

Q. (Applies HOK-1, HUK-1) WHAT IS THE PURPOSE OF THE "FREE GYRO" POSITION IN THE REMOTE COMPASS SYSTEM?

A. To provide a stable heading reference when the magnetic heading reference becomes unreliable. The MA-1 compass is a gyro-stabilized compass system used to present a visual indication of aircraft heading.

The system may be used as a magnetically slaved instrument, or as an unslaved gyro with correction for the effect of the earth's rotation. The normal slaving circuits of the MA-1 compass system become unstable above 60^{o} latitude due to the declination of the magnetic lines of force at the earth's magnetic poles. Large quanties of iron or steel, such as an aircraft carrier, battleship and deposits in the earth produce the same effect. Under these conditions the compass system is put into a free gyro state by setting the "slaved-free" switch on the control panel to the "free" position.

In the free gyro state, the gyro is no longer controlled by the earth's magnetic line of force and errors will be introduced into the system due to the earth's rotation, which is 15^{o} per hour. The latitude control dial on the control panel is adjusted to compensate the gyro for this error. The dial is marked o to 90^{o}s. If an aircraft is flying at 40^{o} latitude in the Northern Hemisphere, the latitude control dial would be set to 40N. At this dial position, a predetermined voltage is fed to the gyro slaving circuits causing the spin axis of the gyro to rotate at the correct rate to exactly counteract the earth rate motion. If the aircraft's latitude position changes, the latitude control dial must be adjusted for each 5^{o} of change in latitude. By operating in the free gyro state and properly adjusting the latitude control dial, the gyro spin axis stays fixed relative to the earth and remains a precise and stable directional reference. - M.W.

KAMAN SERVICE ENGINEERING SECTION—*G. D. Eveland, Supervisor, Service Engineering; E. J. Polaski, G. S. Garte, Asst. Supervisors; E. L. White, A. Savard, G. M. Legault, Group Leaders.*

ANALYSTS—*R. A. Berg, P. M. Cummings, A. D. Cutter, P. A. Greco, E. Hermann, C. W. Jenkins, D. W. MacDonald, J. McMahon, W. J. Rudershausen, W. J. Wagemaker, N. E. Warner, A. A. Werkheiser, M. Whitmore, W. H. Zarling, R. W. Olsen.*

ENGINEERING

FLUTTER TESTING THE HU2K-1 MAIN ROTOR

by Herbert Gewehr
Group Leader
Rotor Test

No matter how good a theoretical flutter analysis is, there are always some basic assumptions that must be made before the theory can be applied to a physical problem. The validity of the assumptions is more or less subject to question, depending upon the experience and judgment of the analyst, and the complexity of the basic problem. For this reason, almost all new aerodynamic structures must be tested in a manner that will reveal rigid body or flexible body dynamic instabilities, particularly flutter and divergence.

In the case of high-speed aircraft, flight flutter test programs are conducted after extensive wind-tunnel tests on dynamically scaled models have indicated that the design is free from flutter. Scale models of helicopter rotors are wind-tunnel tested if the design is a departure from established state-of-the art techniques. Full-scale rotors are usually whirled on a test stand to substantiate their structural integrity and basic rigid body dynamic stability, but the demonstration of freedom from flutter is usually left to a carefully executed flight test program.

Flutter is a phenomenon involving the exchange of energy between the mass forces and the elastic forces of a structure while the aerodynamic forces continue to feed energy into the system. This exchange of energy occurs at a critical airspeed below which flutter will not occur.

In forward flight the helicopter rotor blade is influenced by a different relative wind at each azimuth position, which means that flutter will occur in that small sector of the rotor disc where the blade is immersed in wind of the critical velocity. The flutter sector will gradually expand over a larger portion of the disc as the forward flight speed is increased. Since each blade flutters over a limited part of the disc, the onset of flutter should be detected long before a large portion of the disc becomes unstable, causing a catastrophic failure of a structural member.

Experience has shown that flutter usually occurs at conditions of low thrust, where blade damping is a minimum. Therefore, the critical speed can be exceeded without exciting the flutter mode by flying at moderate thrust levels. The danger in flying faster than the critical flutter speed lies in the violence with which flutter can occur if the thrust level is lowered. The application of additional collective (thrust) can sometimes be used to stop flutter if it occurs in flight.

Although a well planned flight test program will usually reveal a flutter problem if one exists, the possibility of passing the critical speed makes the program hazardous. For this reason, Kaman investigated means of simulating forward flight conditions on the rotor test stand.

On the basis of experience gained in flutter testing the H-43B rotor, the important parameters that could produce flutter in the HU2K rotor were servo-flap angular deflection against the (effective) spring of the control system, and bending of the servo flap. To simulate the forward flight component of velocity, two surplus Navy F8F fighter aircraft were mounted in the plane of the rotor disc and positioned so as to direct their slipstreams toward the advancing blade. The aircraft were mounted 18 feet in the air on structures strong enough to react the 2,000 horsepower output of each engine. After the planes were in position, a wake survey was made to determine how much wind reached the advancing blade. A pitot probe measured the slipstream and this was related to the manifold pressure on the two engines (for example: 30 in. Hg gave 40 knots at the flap). At full throttle on both engines, a turbulent 90 knots of simulated forward flight airspeed was obtained. An additional one knot per RPM was obtained by overspeeding the rotor. The highest rotor speed reached in the flutter tests was 380 RPM, a 36 percent overspeed. The combination of slipstream and overspeed produced dynamic pressure equivalent to 175 knots dive speed at 278 RPM rotor speed, on a day in which the outside air temperature is - 35° Fahrenheit.

Rotor thrust was varied in each run to insure complete coverage, with particular emphasis on the low thrust range. No instabilities of any type were observed during the entire program, which cleared the HU2K to the limits of the flight envelope. K

TEST RIG—Aerial view shows mounted surplus fighter aircraft and rotor blades ready for test.

GRADUATION

H-43B TRAINING SHEPPARD AIR FORCE BASE

3750TH TECHNICAL SCHOOL, USAF (ATC)

FEBRUARY 27, 1962—Front row, l to r, Mr. R. Maxwell (Instr.), Sheppard AFB; SSgt J. Booth, 4411 CAMS Shaw AFB, S. C.; A2C C. Brand, 56 CAMRON, K. I. Sawyer AFB, Mich.; SSgt R. Smola, Paine Field, Wash.; SSgt E. J. Erickson, 343 CAMRON Duluth AFB, Minn.; Mr. B. Hinnebusch, Seattle, Wash.; SSgt G. Setzer, Det. 33, Perrin AFB, Texas. Rear row, TSgt J. Blaquiere, Det. 54, Moody AFB, Ga.; SSgt A. Krumm, Det. 34, Biggs AFB, Texas; TSgt W. Coffman, Det. 41, Loring AFB, Me.; SSgt L. Gray, Det. 1, 54th ARS APO 23, N. Y.; SSgt W. Cobb, Det. 42, Dow AFB, Me.; TSgt D. Waters, Det. 45, Otis AFB, Mass; TSgt C. Whitney, Det. 31, Reese AFB, Texas; TSgt C. Cambio, Det. 30, Cannon AFB, N. Mex.; SSgt L. Nicholson (Instr.), Sheppard AFB.

MARCH 13, 1962—Front row, l to r, SSgt G. J. Johnson, Det. 8, Glasgow AFB, Mont.; A1C T. E. McDowell, Det. 7, Malmstrom AFB, Mont.; SSgt C. F. Kirner, Det. 27, Traux Field, Wisc.; SSgt H. D. Longmire, Det. 47, Langley AFB, Va.; A1C J. V. Sells, WARC Helicopter Sect. Hamilton AFB, Calif.; TSgt W. D. Atwell, Det. 36, Laredo AFB, Texas. Rear row, TSgt M. R. Panther (Instr.), Sheppard AFB; GS-7 A. C. Fulton (Instr.), Sheppard AFB; A2C L. R. Phillips, Det. 30, Cannon AFB, N. Mex.; SSgt J. T. Brown, Det. 16, Williams AFB, Ariz.; SSgt J. R. Haddox, Det. 38, James Connally AFB, Texas; A1C R. D. Hill, Det. 55, Eglin AFB, Fla.; A1C T. E. Stevens, Det. 17, Davis-Monthan AFB, Ariz.; MSgt V. L. Thompson, WARC Helicopter Sect. Hamilton AFB, Calif.; GS-7 F. Morrison (Instr.), Sheppard AFB.

MARCH 20, 1962—Front row, l to r, SSgt C. Wilder (Instr.), Sheppard AFB, Texas; SSgt R. E. Singel, Det. 37, England AFB, La.; SSgt A. R. Maines, Minot AFB, N.D.; A2C J. E. Rickman, K. I. Sawyer AFB, Mich.; SSgt V. E. Wells, Grandforks AFB, N. D.; SSgt A. C. Kendall, Kincheloe AFB, Mich.; SSgt M. C. Messer, Shaw AFB, S. C.; SSgt A. Benton (Instr.), Sheppard AFB. Rear row, SSgt H. R. Schrader, Det. 45, Pease AFB, N. H.; TSgt C. L. Eby, Det. 44, Westover AFB, Mass.; SSgt D. N. Rivers, Det. 26, Selfridge AFB, Mich.; SSgt R. N. Propst, Det. 50, Shaw AFB, S. C.; A3C J. C. Mathews, Det. 1, 54th ARS APO 23, N. Y. A1C R. H. Syverson, Det. 49, Seymour Johnson AFB., N. C.; A1C D. M. Roberts, Det. 29, Vance AFB, Okla.; TSgt L. N. Cowles, Det. 23, K. I. Sawyer AFB, Mich.; SSgt R. Chambers, Jr., Det. 35, Matagorda Is. AFB, Texas; Mr. R. Maxwell (Instr.), Sheppard AFB, Texas.

MAY 1, 1962—Front row, l to r, TSgt H. O. Woolley, Det. 35, Matagordo Is., Texas; SSgt D. F. Walker, Det. 38, James Connally AFB, Texas; TSgt J. J. Kelly, Det. 39, Laughlin AFB, Texas; TSgt T. L. Gunter, APO 23, New York, N. Y.; TSgt B. W. Bryant, Hq. EARC, Robins AFB, Ga.; SSgt H. J. Murdock, Det. 25, Wurtsmith AFB, Mich. Rear row, Mr. A. C. Fulton, (Instr.), Sheppard AFB; A2C E. N. Kendrick, Det. 24, Kincheloe AFB, Mich.; TSgt D. J. Cocuzzi, Det. 49, Seymour Johnson AFB, N. C.; A1C J. F. Dorgan, Det. 45, Pease AFB, N. H.; SSgt C. R. Barnett, Det. 33, Perrin AFB, Texas; Mr. C. R. Vann, 3555 CAMRON, Perrin AFB, Texas; SSgt W. D. Jenkins, Det. 7, Malmstrom AFB, Mont.; MSgt C. C. Smith, Det. 52, Charleston AFB, S. C.; SSgt J. M. Sams, Det. 6, Fairchild AFB, Wash.; Mr. F. Morrison, (Instr.) Sheppard AFB.

PARACHUTING From The HUSKIE

by SMSgt. Sam Neira and
SSgt. Wayne Timbrook
Robins Air Force Base

Working with the 2853rd ABW, Helicopter Rescue Section, here at Robins AFB, Sen. M/Sgt. Sam Neira and I were once again being utilized as paramedics, thus able to use all the background and training we had received while in Air Rescue Service. This meant working with and jumping from the H-19B, the helicopter used throughout Air Rescue Service Land Base Rescue programs with such a commendable record. So far, our duties had entailed standing alert and being available in case we should be needed for rescue assistance, but now helicopter rescue was taking on a new look. The H-19B was being phased out of the rescue program and a new helicopter taking its place. The turbine-powered H-43B "Huskie" built by The Kaman Aircraft Corp., had been accepted for this replacement and Robins was to receive two in the near future. Knowing only what we had heard and read about this machine, Sam and I started a little preplanning for the day we would be pulling our duty on a helicopter neither one of us had ever flown in and, to our knowledge, one which had never dropped para-rescue personnel into a crash scene.

In order to avoid confusion by attempting to describe both their reactions and thoughts during these tests, the authors elected to describe the mission as seen through the eyes of Sergeant Timbrook alone—Ed.

Capt. John M. Slattery, and 2nd Lt. Larry L. Knowles, both helicopter pilots of the Robins Rescue Section, knew that even with the almost unlimited capabilities of the H-43B, in a rescue emergency it was always good to have an added "ace in the hole," so we decided to test jump the new "birds" as soon as they arrived and we could get a look at them.

Needless to say, when they did arrive and we got our first walk-around inspection, I was just a little skeptical. The door on the right side for passenger entrance is small and compact, and where we would have to jump out looked no bigger than a mouse hole.

This wasn't too bad, but then it was brought to our attention that the rotor shafts are at a slight angle, making it appear that if a jumper were to leap out using a strong exit maneuver, he might come close to striking the blades. We also had to rule out the thought of making a "lazy" exit by just sliding clear of the body, since the right rear wheel comes equipped with a wide metal ski or "Bear Paw" extending forward and rearward. Faced now with the possibility of being stopped with the rotors by jumping out too far or being spiked by the ski if we slid out easy, we set about checking the passenger compartment. Comparing the passenger compartment to the H-19B, we realized standing was out of the question and all our work would have to be done from the squatting position. Later we were to find that coordination and established procedures cut down our movements to a minimum and provided no real problem. Installation of a parachute static line cable, as in the H-19B, would not be necessary since two cargo tiedown rings are located just inside the passenger door on the floor, one on each side, and would be adequate for "hooking up." After looking at the rear doors, which are very much like C-119 "clam shells," we decided to have these removed prior to the flight thus providing us with a large exit area for use while the "dropping from the rear" evaluation was made. Static line "hook up" using the tiedown rings at the rear of the aircraft was out, the static lines would extend out too far and possibly become entangled in the tail surface controls and create a hazardous flying condition.

Deciding to use the forward tiedown rings for the rear-exit jump as well, we considered our pre-jump inspection as complete as we could make it and adjourned to the helicopter Rescue Section to hash out any problems and to schedule a day for the jump.

We decided on the 9th of January, 1961, to be the test day if the weather would permit, and the photo aircraft, one of the H-19's still on hand at the Rescue Section, was available.

Taking motion pictures was an afterthought, but a good one, since if anything did happen we would have a visual record of everything during the drop. With all the ground work layed we had nothing to do but wait and hope we had figured on everything that might possibly go wrong. Finally, the big day arrived, and Sam and I checked in at the Rescue Section.

Feeling a little apprehensive on a "first" like this is natural, so I imagine Sam felt the same way I did, excited and hoping all would go well. We decided on 1400 hours as take-off time and drop time as soon as possible. At 1300 hours Sam and I took our gear out to the chopper. We had a few minutes, so I walked off the hard stand on to the grass area to have a cigarette before the pilots "shoved."

The pilots arrived and we gathered around the aircraft for the drop brief. Bob Lambert, Tech. Rep. for Kaman Aircraft and representative for this area, was with them. He had been on the ground floor in the planning of this deal and I know he felt anxious since he considered the H-43 his own personal baby and wanted everything to go just right.

We had decided on three jumps, one from the side door and a double exit from the rear. I would make the one out the side, have the chopper pick me up on the drop zone, go back to altitude and double up with Sam and go out the rear. Jump altitude was set at 1500 feet, actual airspeed 60 knots and two spotter or drift chutes were to be used to determine wind direction and velocity at upper levels. With the briefing accomplished we climbed aboard. Just sitting in this aircraft during the starting is a strange sensation since there are none of the starting sounds associated with the H-19, just a low hum overhead which grows louder until the engine starts. The odor of JP-4 fuel adds to the strangeness since I, for one, still couldn't connect jet turbines with rotary-wing aircraft.

We lifted off, hovering about 5 feet above the ground, did a 360° turn to the right and then started forward, climbing out like an express elevator. I was on the intercom in the rear and T/Sgt. Virgil W. McCord, helicopter flight chief who was acting as safety man, was getting some last minute instruction from Sam regarding the procedures we would want for safetying the static lines on this particular bird.

After reaching jump altitude, we flew out away from the field so we could run some last minute checks on the static lines from the rear exit.

Having brought along an extra static line from a Mt-1 parachute, we fed this out into the slip stream from both the side door and rear exit. If it was going to give us any trouble, we wanted to know it now, not later! The tests out the side door worked beautifully, the line conformed to the aircraft's body and lay along side with a minimum of movement. When tried out the rear, the up wash of the rotors had a tendency to draw the line and bag up into the tail rigging. By moving back into the aircraft and hooking the lines as planned onto the forward tiedowns, enough of the line extended for clear parachute deployment, but not enough to become entangled with the tail. This completed, I asked the pilot to fly us over the "drop zone" for the first spotter chute drop. Visibility is excellent looking forward, since all you have to do is look over the pilot's right shoulder as you approach the target and ask for any flight corrections needed prior to the jump. Later we worked out a system where the jumpmaster needn't talk to the pilot on final at all, just reach over and touch the right shoulder for a right correction, the left one for a left correction and a tap on his helmet for a "steady as you go." As the panel slipped by, I dropped the first spotter chute. We watched it drift down and the pilot made his corrections to bring us around into the wind and over the chute in track with the target. Making the count in approximate seconds from the chute to the target, I counted back down as we passed over the target, "five, four, three, two, one — DROP!" The second spotter chute was away. It landed far to one side of the target. Crosswinds!! We had crosswinds upstairs and hardly any wind on the ground. Making a correction as we came around, it was decided to split the difference and have the pilot fly between the two spotter chutes, hoping to compensate for the crosswinds and bring us down near the target. Checking the static line once again for clearance and to be sure it was anchored securely, I got positioned in the door.

Once again as the target slipped by I started my countdown, rocking back on my haunches to get a better position to spring out — "three, two, one, GO!" I was out! clear so far, and in my fall. I'd seen the wheel and the ski go by but was well away from it, the rotors churned on undisturbed so I guess I hadn't ever cóme close. As my head came down I watched the parachute deployment bag being dropped out by the pilot chute go rocketing by and got set for the opening shock to come. It came!

A smooth jerk and clean opening. Then I was floating down to the target area and to the pickup by the chopper. He was already letting down for a landing.

LAST MINUTE CHECK—Sergeant Timbrook inspects chute straps before leap.

READY TO GO—Sergeant Neira, poised and ready, waits for signal to jump.

After a normal landing I stripped off my parachute harness and, leaving the chute where it had collapsed, ran for the helicopter which was waiting nearby.

Once again aboard the "Huskie" and into another parachute, we took off and flew again the same pattern as the first drop. Hooking up on the forward tiedowns, Sam and I moved to the rear of the aircraft ready for the drop. Not being able to touch the pilot for corrections from the rear, I transferred this duty to Sergeant McCord who was on intercom, and started relaying corrections by hand signals and he, in turn, passed them on to the pilot. Having to jumpmaster from the rear provided some problems, since looking around the rear entrance along the body of the aircraft involved almost standing on my head to keep the target in view.

As we came around on final, Sam checked his static line hook-up and I checked mine. Due to difference in deployment of the MT-1 and E-1 parachutes, we agreed that I would go first and Sam would start moving out right behind me, as soon as he was sure my static line wasn't going to cross over into his path. This precaution was to insure that even with my static line hooked on the left side opposite from his, Sam wouldn't become entangled. The final results were to show that there was plenty of clearance between the two jumpers but it was necessary for me to stand in a half crouch, hands on the ceiling with my head out. Sam had taken up a similar position and had nodded he was ready to go. Five seconds after passing over the target, I brought my feet forward in a little hop and snapped my head forward over my reserve chute. Again the slow easy opening, and this time I had company. Sam was just above me and staying real close as we moved in on the target. With our landings all over, questions had been answered. This helicopter could be jumped without complications and a beauty she was at that. All that remained now would be a few more jumps to confirm our findings and a preview of the film so we could see the parachute deployment and actual clearance of the jumper from the aircraft. K

THIS ARTICLE WAS FURNISHED BY THE EASTERN AIR RESCUE CENTER FOR INFORMATION PURPOSES ONLY, IT IS NOT AUTHORITY TO JUMP. SUCH PERMISSION MUST COME FROM HIGHER HEADQUARTERS.

SCROLL OF HONOR

A Scroll of Honor was awarded by Kaman Aircraft recently to 1st Lt. Glyneth M. Gordon, H-43A pilot from the Helicopter Unit at James Connally AFB, Tex. His quick action and proficiency in using the helicopter's rotor downwash to beat back the flames from a crashed aircraft allowed the plane's occupants time in which to escape.

The incident occurred at Connally. An F-89 was preparing to land when there was an explosion in the right engine and flames, four times as large as the aircraft, blossomed forth. Despite the fire, the pilot successfully completed his landing. Meanwhile, Lieutenant Gordon on a night transition flight, had been alerted and followed the F-89 down the runway. As the plane came to a stop, the helicopter hovered overhead so that the flames were blown away from the cockpit, aiding the pilot and radar observer in evacuating successfully.

HUK Saves Pilot

Despite a heavy fog, the crew of an HUK-1 managed to quickly locate and rescue the pilot of a civilian aircraft which recently crashed into the St. Johns River near the Jacksonville, Fla., Naval Air Station. Manning the helicopter, which is attached to Station Operations, were Lt. R. J. Shanley, pilot; and H. W. Parker, AM1/C, crewman.

The incident occurred when the civilian pilot attempted to land at a nearby airport since his Beachcraft was running low on fuel. The civilian airport has only surveillance radar, so they directed him to the Naval Air Station. He reached there with only eight minutes of fuel left, tried unsuccessfully to land twice on GCA, and ended up in the river on the third try. With the help of the HUK, the uninjured pilot was quickly returned to the shore and safety.

HUK-1's from NAS Jacksonville, NAS Cecil Field and N. S. Mayport all had a role in the festivities at Cape Canaveral after Lt. Col. Glenn's orbital ride. They acted as "spotters" for the parade in which President Kennedy and other dignitaries participated.

Helpful Info From DET. 52

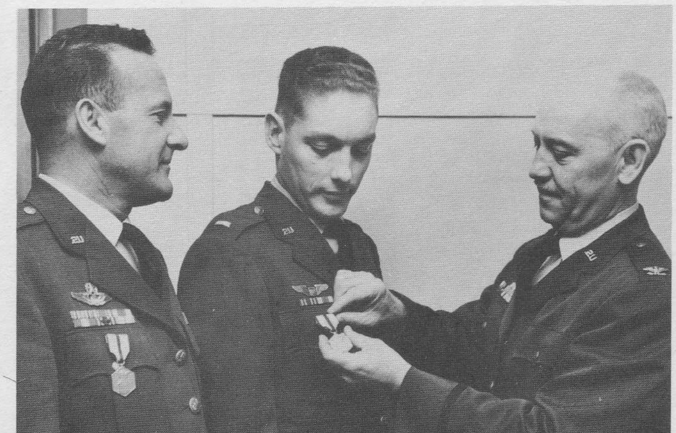
Numbers corresponding to those on the sides have been painted on the tops of the fire trucks at Charleston AFB, S.C., as an aid to helicopter-ground equipment coordination while crash-fire fighting. The idea was submitted to Mr. Landon M. Louthian Sr., 1608th Air Transport Wing fire chief, by Capt. Herbert A. Lee, commander of Det. 52, EARC, at the base. The helicopter pilots now refer to the numbers while hovering over the tops of the trucks and the fire chief, who is directing the crash fire fighting, may request the helicopter to take up a new position if necessary. Since he always refers to his equipment by number, the pilot can now tell exactly what each individual piece of equipment is going to do. In addition, from his vantage point, the helicopter pilot can advise the fire chief of any new developments which cannot be seen from the ground. Shown are left to right, A1/C George R. Goretzke, 1608th Civil Engineering Squadron; Chief Louthian and Captain Lee. (USAF Photo).

Charles H. Kaman, president of Kaman Aircraft Corp., presents oil painting to Brig. Gen. Joseph A. Cunningham, Commander, Air Rescue Service (MATS), Orlando Air Force Base, Fla.

The painting depicts the crash-fire rescue of a fighter pilot at Seymour-Johnson AFB, N.C., 27 Oct., 1961. An H-43B crew from ARS Det. 49 at the base had been alerted that a fighter plane was experiencing an engine oil pressure malfunction and flew to an orbiting point adjacent to the runway as a precautionary measure. When the fighter touched down, there was an explosion which separated the fuselage into two sections. The wings attached to the larger portion slid to a halt just off the runway while the rest, also burning, tumbled and rolled down the runway. The ARS helicopter quickly flew to the cockpit section, the fire suppression kit was set on the ground and the three crash-fire rescue technicians disembarked. Within two minutes after the touchdown impact explosion, the fighter pilot had been removed from the flaming death-trap with nothing more than minor burns. (USAF photo)

Two Air Medals and the Air Force Commendation Medal were awarded recently to the crew of an H-43B from McChord AFB, Wash., for the rescue of a seriously injured woman mountain climber last summer. 1st Lt. William A. Luther, in left photo, was awarded the Air Medal by Col. Donavon F. Smith, 325th Fighter Wing Commander; 1st Lt. Robert S. Michelsen, center, received the Air Force Commendation Medal, and MSgt. Lawrence G. Seckley, right photo, was presented the Air Medal by Col. G. W. Milholland, Deputy Commander for Operations, 325th Fighter Wing. Lieutenants Luther and Michelsen are attached to ARS Det. 5, WARC; Sergeant Seckley is a member of the 325th Operations Squadron. Lieutenant Luther was pilot on the hazardous flight which involved flying the H-43B below a two-inch wire cable to rescue the woman on the side of a 60-degree slope in a shallow crevasse. Lieutenant Michelsen was copilot and Sergeant Seckley, rescue technician, during the mission. A full account appears in the August, 1961 issue of Rotor Tips. (USAF Photos)

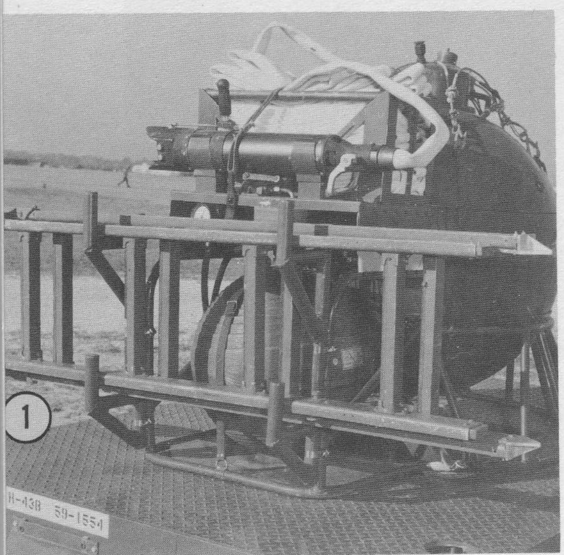
Col. Grover J. Dunkleberg, EARC commander, pins Commendation Medal on 1st Lt. Donald E. Stranahan, maintenance officer of Det. 42, Dow AFB, after presenting a similar medal to Capt. Harlan H. Davis, 42d commander, right. Captain Davis was cited for meritorious service as chief of the Helicopter Branch at Plattsburgh AFB, N.Y., from Nov. 15, 1959 to Sept. 15, 1961. As the only instructor standardization crew member during a period of extensive training of pilots for helicopter support of the missile agency and local base rescue, Captain Davis made an "outstanding contribution to the success of this training program." The citation accompanying Lieutenant Stranahan's medal lauded him for the outstanding job he did as aircraft scheduling officer and helicopter pilot from April 27, 1958 to Sept. 15, 1961 at Plattsburgh. Colonel Dunkleberg, whose headquarters is at Robins AFB, Ga., made a special trip to Dow to personally present the awards. (USAF Photo)

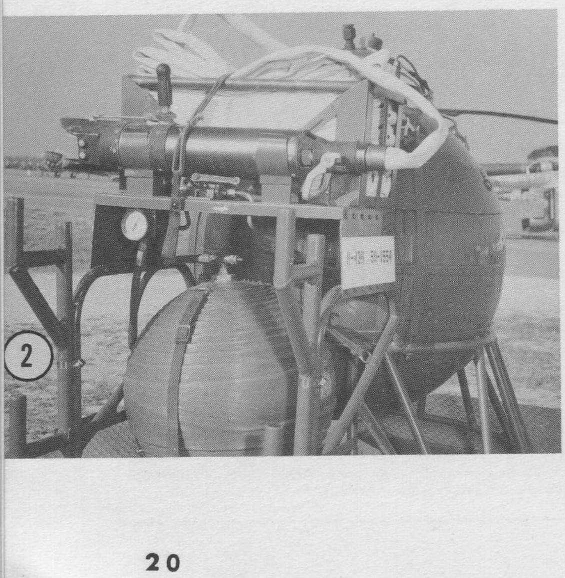


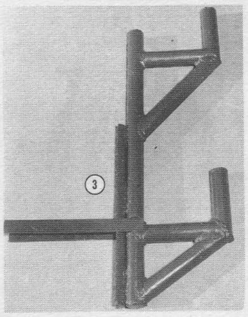
A description of a boarding ladder developed by the Helicopter Unit at Perrin AFB appeared in the February, 1962 issue of Kaman Rotor Tips. Photographs on this page were submitted since then by two other ARS detachments. The ladder appearing in the top three photos was developed by S/Sgt. Michael P. Bocchicchia, a firefighter from Det. 46, Suffolk County AFB, N.Y. It is collapsible for easy stowage, can be opened in about five seconds, and may be used with all fighter-type aircraft.

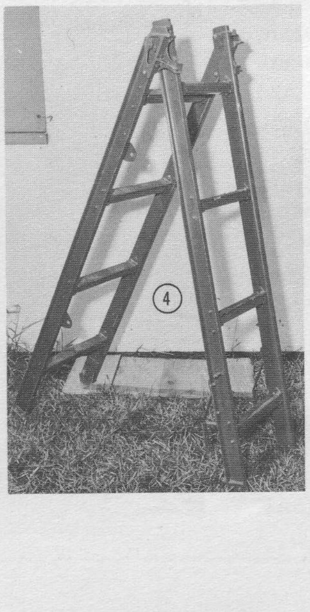
The ladder in the bottom photos was designed by T/Sgt. Eugene Hughs and constructed by the firemen attached to Det. 58, Brookley AFB, Ala. Photo 1 shows ladder in carrying position; 2, fire bottle with ladder-carrying brackets; 3, bracket; 4, in stepladder position; 5, extended; 6, stowed. Plans and photographs of another ladder developed by ARS Det. 5, McChord AFB, Wash., will appear in the next issue of Rotor Tips. Such material and suggestions are always welcome.

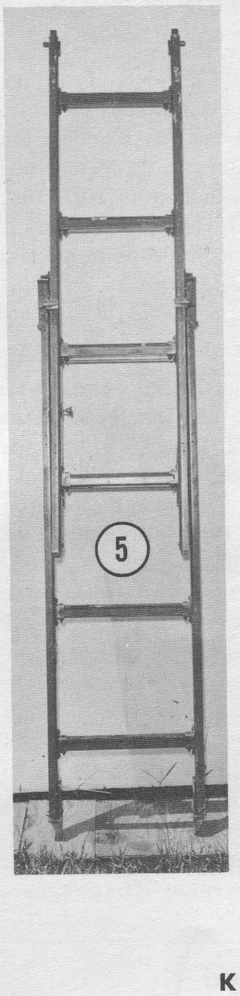
LADDERS

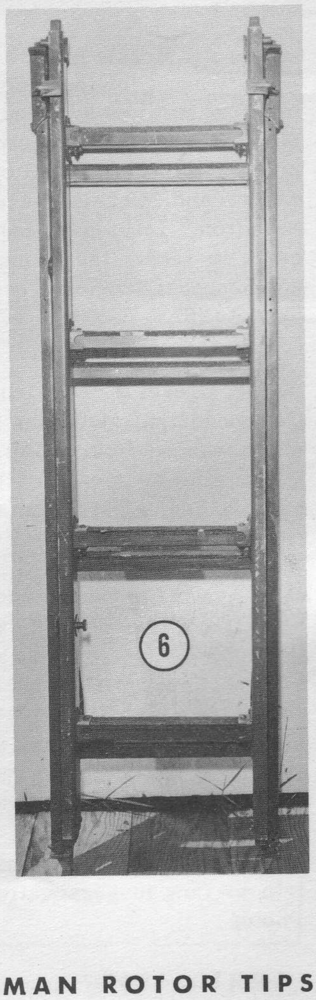












PLANNING FOR *AVAILABILITY!*

The Evolution of the HU2K-1 Fleet Support Program

There is a revolution brewing in the Naval aircraft support planning agencies — and Kaman Aircraft is pleased that its HU2K-Seasprite program is benefiting by it!

In the not-too-distant past, aircraft procurement was based primarily on the ability of a design to perform the specified mission with little emphasis on the extent to which it would be available to perform that mission. As increased performance and resultant increased aircraft system sophistication evolved, to meet ever-expanding mission requirements, the lack of adequate support considerations began to take its toll. Availability fell off and more aircraft were required to do the job, or the job didn't get done!

Needless to say, this situation wasn't permitted to continue long before the importance of supportability became evident. During the past few years, increased attention has been focused on the following support considerations that exert a major influence on aircraft availability:

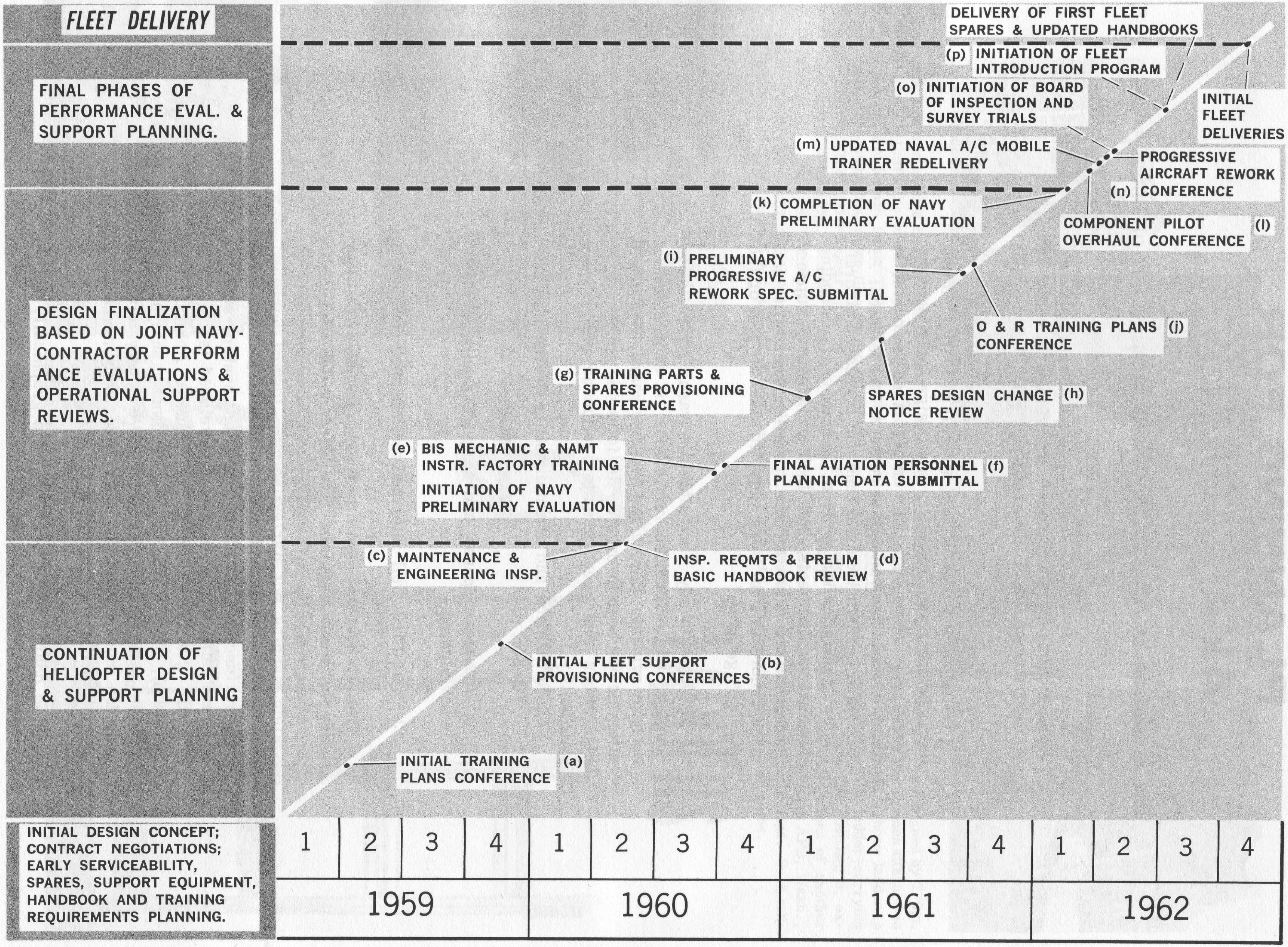
1. Reliability and Maintainability design requirements.

2. Adequate Spares and Support Equipment provisioning.

3. Qualified, well-informed maintenance personnel.

The HU2K-1 was one of the first helicopters procured under the "weapon system" concept which not only placed more responsibility on the prime contractor for complete system planning, but started the move toward increased emphasis on and logical integration of these significant support functions. Although further system support planning refinements are being developed (such as the recently conceived Weapons Readiness Achievement Program), we believe that the coordinated analysis and planning generated by the HU2K-1 Weapon System Plan provides most of the essentials required to insure successful operational support.

The chart on the following page graphically illustrates significant HU2K-1 support planning milestones:


FLEET DELIVERY
FINAL PHASES OF PERFORMANCE EVAL. & SUPPORT PLANNING.
DESIGN FINALIZATION BASED ON JOINT NAVY-CONTRACTOR PERFORMANCE EVALUATIONS & OPERATIONAL SUPPORT REVIEWS.
CONTINUATION OF HELICOPTER DESIGN & SUPPORT PLANNING
INITIAL DESIGN CONCEPT; CONTRACT NEGOTIATIONS; EARLY SERVICEABILITY, SPARES, SUPPORT EQUIPMENT, HANDBOOK AND TRAINING REQUIREMENTS PLANNING.
(a) INITIAL TRAINING PLANS CONFERENCE
(b) INITIAL FLEET SUPPORT PROVISIONING CONFERENCES
(c) MAINTENANCE & ENGINEERING INSP.
(d) INSP. REQMTS & PRELIM BASIC HANDBOOK REVIEW
(e) BIS MECHANIC & NAMT INSTR. FACTORY TRAINING
INITIATION OF NAVY PRELIMINARY EVALUATION
(f) FINAL AVIATION PERSONNEL PLANNING DATA SUBMITTAL
(g) TRAINING PARTS & SPARES PROVISIONING CONFERENCE
(h) SPARES DESIGN CHANGE NOTICE REVIEW
(i) PRELIMINARY PROGRESSIVE A/C REWORK SPEC. SUBMITTAL
(j) O & R TRAINING PLANS CONFERENCE
(k) COMPLETION OF NAVY PRELIMINARY EVALUATION
(l) COMPONENT PILOT OVERHAUL CONFERENCE
(m) UPDATED NAVAL A/C MOBILE TRAINER REDELIVERY
(n) PROGRESSIVE AIRCRAFT REWORK CONFERENCE
(o) INITIATION OF BOARD OF INSPECTION AND SURVEY TRIALS
(p) INITIATION OF FLEET INTRODUCTION PROGRAM
DELIVERY OF FIRST FLEET SPARES & UPDATED HANDBOOKS
INITIAL FLEET DELIVERIES
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
1959
1960
1961
1962

(a) INITIAL TRAINING PLANS CONFERENCE - Conducted at KAC on Feb. 23, 1959 between Navy and Contractor personnel to establish long range HU2K-1 training and trainer requirements.

(b) INITIAL FLEET SUPPORT PROVISIONING CONFERENCES - Conducted at KAC during Oct. and Nov. 1959 to review and establish Fleet spares and support equipment requirements for Contractor-furnished equipment in the aircraft and training programs. Reference Special Aeronautical Requirement 400 (superseded by Weapons Requirements 1, and 5).

(c) MAINTENANCE AND ENGINEERING INSPECTION - Conducted at KAC during May, 1960 to determine servicing and maintenance suitability, compliance with the A/C Detail Specification and other contractural requirements as related to safety, installation of equipment, interchangeability, replaceability, accessibility and adequacy of ground support equipment. Reference Military Specifications MIL-A-19531B and BuAer Instruction NAVAER 00.80B.

(d) INSPECTION REQUIREMENTS AND PRELIMINARY BASIC HANDBOOK REVIEW - Conducted at KAC during item (c) MEI. The Inspection Requirements Handbooks were reviewed in detail by NATC Patuxent River IRB personnel. The preliminary basic handbooks were used and reviewed in conjunction with the MEI.

(e) BIS MECHANIC AND NAVAL AIR MOBILE TRAINER INSTRUCTOR FACTORY TRAINING - Implementation of training programs established during item (a) in Sept., and Oct., 1960 at KAC. The Naval Air Mobile Trainer was employed in the class room.

(f) FINAL AVIATION PERSONNEL PLANNING DATA SUBMITTAL - October 19, 1960 submittal was the last in a series of studies conducted by KAC, with guidance from the Personnel Requirements Branch, NATC, Patuxent River. In this study, which paralleled design development, all anticipated HU2K-1 maintenance requirements were evaluated to establish the numbers and skill levels of various NEC Ratings needed to support the aircraft and the training courses necessary for these ratings. Reference Special Aeronautical Requirement 372 (superseded by Weapon Requirement 6).

(g) TRAINING PARTS AND SPARES PROVISIONING CONFERENCE - Conducted at KAC during March, 1961 to establish bench training components and related spare parts. Reference Special Aeronautical Requirement 303.

(h) SPARES DESIGN CHANGE NOTICE REVIEW - Conducted at KAC during May, 1961 with ASO personnel to review and update all spares provisioning documentation affected by past end item design changes.

(i) PRELIMINARY PROGRESSIVE AIRCRAFT REWORK SPECIFICATION - Sept. 28, 1961 submittal of the Preliminary PAR Specification, prepared by KAC, for review by cognizant O&R, Fleet Readiness and BuWeps personnel. This specification establishes the detailed examination and rework requirements for the HU2K-1 at PAR. Reference BuWeps Instruction 4710.1A and Special Aeronautical Requirement 402.

(j) O&R TRAINING PLANS CONFERENCE - Conducted at KAC on Sept. 8, 1961 with BuWeps Training Division Personnel to establish overhaul level training requirements.

(k) COMPLETION OF NAVY PRELIMINARY EVALUATION - The NPE is primarily a preliminary examination of aircraft flying qualities, performance and major systems (such as electronics) conducted by NATC personnel. Inasmuch as the Service Test Division is involved, the more significant support and serviceability requirements were also reviewed during these evaluations. Final evaluations conducted at KAC during March, 1962 to establish that the HU2K-1 was ready for BIS* trials at NATC Patuxent River.

*Refer to item (n)

(l) COMPONENT PILOT OVERHAUL CONFERENCE - Conducted at KAC during March, 1962. A review of all "Repairable" coded HU2K-1 components was made with O&R, Fleet Readiness and BuWeps personnel to determine which CPO would be conducted where and when to insure adequate fleet support. The prime considerations were availability of the end item, related overhaul part kits, handbooks and support equipment. Reference BUWEPSFLEREADREPLANT Instruction 4710.1A.

(m) UPDATED NAVAL AIRCRAFT MOBILE TRAINER REDELIVERY - Redelivery of NAS Lakehurst trainer took place March 30, 1962. Modifications include all changes incorporated into the HU2K-1 as a result of NPE requirements.

(n) PROGRESSIVE AIRCRAFT REWORK CONFERENCE - Conducted at BuWeps 10-12 April, 1962 with KAC and O&R, Fleet Readiness and BuWeps personnel to review and finalize the Preliminary PAR Specification (Ref. item i). Required spares availability was reviewed and the schedule for induction of the first HU2K-1 into PAR was tentatively determined.

(o) INITIATION OF BOARD OF INSPECTION AND SURVEY TRIALS - Starting date pending. These trials are to be conducted at NATC, Patuxent River. They are very detailed examinations by three divisions — Service Test, Flight Test and Weapons Test, to determine if the helicopter meets specifications and guarantees. During the BIS trials, initial logistic support data will be developed under a contractor support plan.

(p) INITIATION OF FLEET INTRODUCTION PROGRAM - Scheduled for July, 1962. This is a program for high utilization of a relatively low number of aircraft for Fleet familiarization and "wringing out" of maintenance problems on a Fleet capability level.

As indicated in the foregoing chart, much consideration has been given to these important support factors at logical points during the HU2K-1 development program. In each conference review, the Navy was represented by personnel from the most appropriate affected agencies -- i.e., Naval Air Test Center, Scheduled Operating Activities, Fleet Commands, Fleet Readiness Atlantic, CNO, Overhaul Facilities, Aviation Supply Office, Naval Air Technical Services Facility, etc. — all working with the Contractor to insure the delivery of an aircraft that will not only have the "ability" to perform the mission but will be "available" when required.

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