file Cy - Angie Holley

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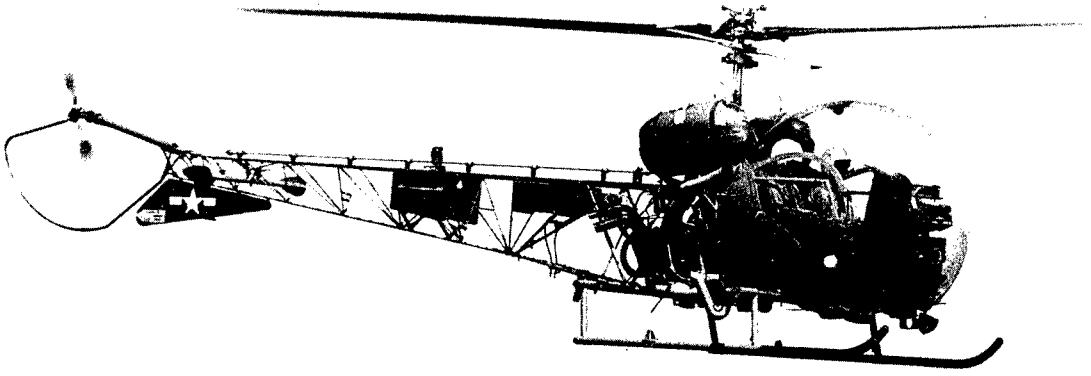
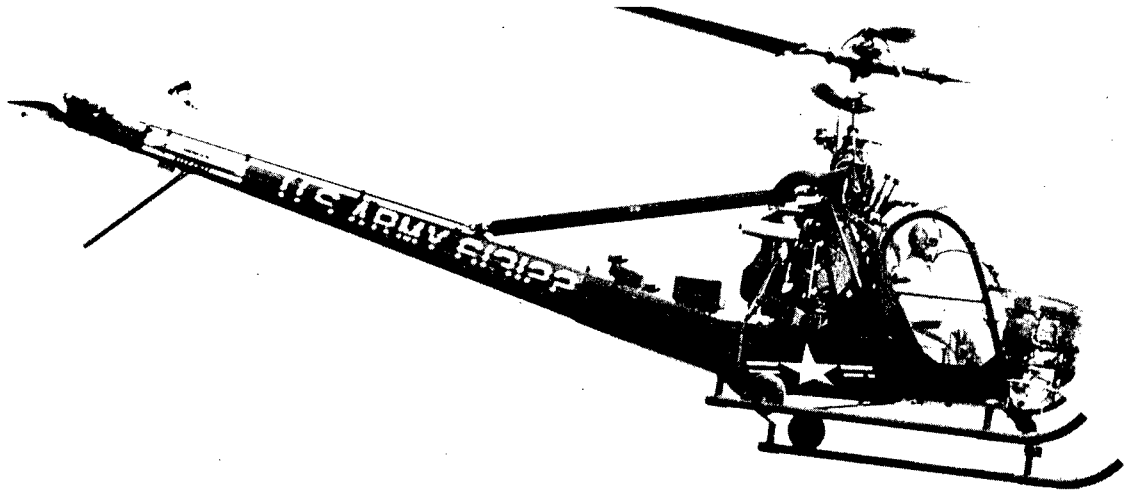
OH-13 and OH-23



accident summary



OH-13 AND OH-23 ACCIDENT SUMMARY

1 July 1966 through 30 June 1967

by
P. R. Thompson

Education Department
Publications and Graphics Division

COLONEL RUSSELL P. BONASSO
Director

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OH-13 and OH-23 Accident Summary

1 JULY 1966 THROUGH 30 JUNE 1967

INTRODUCTION

This summary was prepared to help commanders at all levels, aviation safety officers, maintenance officers, aviators, and related aviation personnel prevent future accidents and preserve combat resources through a review of OH-13 and OH-23 mishaps and their cause factors. The term "mishap," as used in this summary, includes accidents, incidents, forced landings, and precautionary landings, as defined by paragraph 7, AR 385-40. Aircraft losses or damages which were the direct result of hostile action in RVN are not included. Information presented in this summary was taken from accident and other mishap reports submitted from all Army commands, as required by section IV, AR 385-40.

STATISTICS

Table 1 shows total OH-13 and OH-23 mishaps for FY 1967. OH-13 major accidents were up eight (14%) and minor accidents were up two (50%) since FY 1966. Major accidents for the OH-23 were up five (8%) and minor accidents were up five (8%) for the same period.

Total flying hours for FY 1967, shown in table 2, decreased 60,006 (24%) for the OH-13 and increased 77,943 (17%) for the OH-23 since FY 1966. The FY 1967 accident rates per 100,000 flying hours are shown in table 2. The OH-13 accident rate increased from 21.6 (FY 1966) to 34.1 during FY 1967 and the OH-23 accident rate decreased from 17.8 (FY 1966) to 14.7.

The costs of accidents and incidents for FY 1967 are shown in table 3. Mishap costs increased $569,248 (27%) for the OH-13 and $90,135 (7%) for the OH-23, compared with mishap costs for FY 1966. OH-13 mishaps accounted for about 2 percent and OH-23 mishaps for about 1 percent of the total cost of all Army aircraft mishaps during FY 1967.

The number of occupants aboard during all accidents and the number sustaining fatal and nonfatal injuries are presented in table 4. Of the 63 OH-13 accidents, 60 (95%) were survivable; of the 67 OH-23 accidents, 63 (94%) were survivable.

TABLE 1
Mishap Classification

	OH-13			OH-23		
	Worldwide Less RVN	RVN	Total	Worldwide Less RVN	RVN	Total
MAJOR	8	51	59	40	21	61
MINOR	2	2	4	3	3	6
INCD	25	45	70	173	39	212
F/L	29	17	46	34	7	41
P/L	103	20	123	185	6	191
TOTAL	167	135	302	435	76	511

CAUSE FACTORS

FY 1967 mishap briefs presented in this summary were selected to illustrate representative samples of the most frequently recurring types and their cause factors. Cause factors included crew error, inadequate and improper maintenance, inadequate operational facilities, weather, inadequate unit training, and materiel failure and malfunction. Supervisory factors were frequently apparent for all of these, including:

Assignment of missions incompatible with available equipment or with the training and experience level of aviators.

Failure to schedule unit training to build and maintain required proficiency levels.

Inadequate crew rest and exceeding recommended flying hour limitations.

Failure to comply with TBs and MWOs.

Inadequate maintenance and maintenance supervision.

Cause factors for many mishaps were reported as

TABLE 2
Accident Rates Per 100,000 Flying Hours

	OH-13			OH-23		
	Worldwide Less RVN	RVN	Total	Worldwide Less RVN	RVN	Total
NO. OF ACDT.	10	53	63	43	24	67
HOURS FLOWN	81,295	103,692	184,987	392,546	61,653	454,199
OVERALL RATE	12.3	51.1	34.1	11.0	38.9	14.7

"suspected" or "unknown." This was particularly true for incidents, forced landings, and precautionary landings. For an effective safety program, specific cause factors must be known and reported. Insufficient information or lack of supplemental information about specific cause factors results in wasted effort, time, and resources.

The chance to gain preventive information from forced and precautionary landings is much greater than that for other mishaps because the crews involved in these were able to cope successfully with inflight emergencies and land without damage. If the full circumstances that brought about the emergencies and the techniques used to cope with them could be shared and learned by all, Army aviators would be in a far better position to prevent accidents from similar factors.

CONCLUSIONS

A concerted effort on the part of commanders and supervisors at all levels is needed to achieve a more effective safety program. This can best be accomplished through:

Knowledge of past mishap experience and cause factors, available through aircraft accident summaries such as this, weekly and monthly mishap summaries, and the Crash Sense Department of the U.S. ARMY AVIATION DIGEST. Distribution of weekly and monthly summaries may be obtained by writing to: Director, USABAAR, ATTN: P&G, Fort Rucker, Alabama 36360. Distribution of the U.S. ARMY AVIATION DIGEST may be obtained by submitting DA Form 12-4 in accordance with instructions on the back of the form.

Prevention surveys conducted on a revolving basis to isolate potential hazards in facilities, equipment, and personnel. Copies of the *Aircraft Accident Prevention Survey* prepared by USABAAR may be obtained by writing to: Director, USABAAR, ATTN: P&G, Fort Rucker, Alabama 36360.

Effective prevention planning, as outlined in part 1, AR 95-5.

Implementation of unit safety programs, as outlined in appendix VI, AR 95-5.

Increased command emphasis on investigation and reporting of incidents, forced landings, and precautionary landings, to include *all* information required by paragraph 23e, AR 385-40.

TABLE 3
Approximate Mishap Dollar Costs

	OH-13	OH-23
Worldwide Less RVN	$ 166,500	$ 820,000
RVN	1,927,000	470,000
Total	$2,093,500	$1,290,000

OH-13
Selected Major Accident Briefs

F567–RPM was lost during landing approach. Full throttle was added, collective pitch pulled, and aircraft flared, but rpm could not be regained. Aircraft entered high sink rate and full collective pitch was pulled at 10 feet to cushion landing. Aircraft hit on heels of skids, tail guard, and ventral fin, and bounced forward, with a main rotor blade flexing and severing tail boom. It then skidded left and settled to ground, damaging cross tubes, skid tubes, center frame, cabin, and tail rotor. Caused by allowing rpm to dissipate because of slow cross check, using improper technique for correcting low rotor rpm, and placing aircraft in high sink rate by flaring without completely lowering collective pitch.

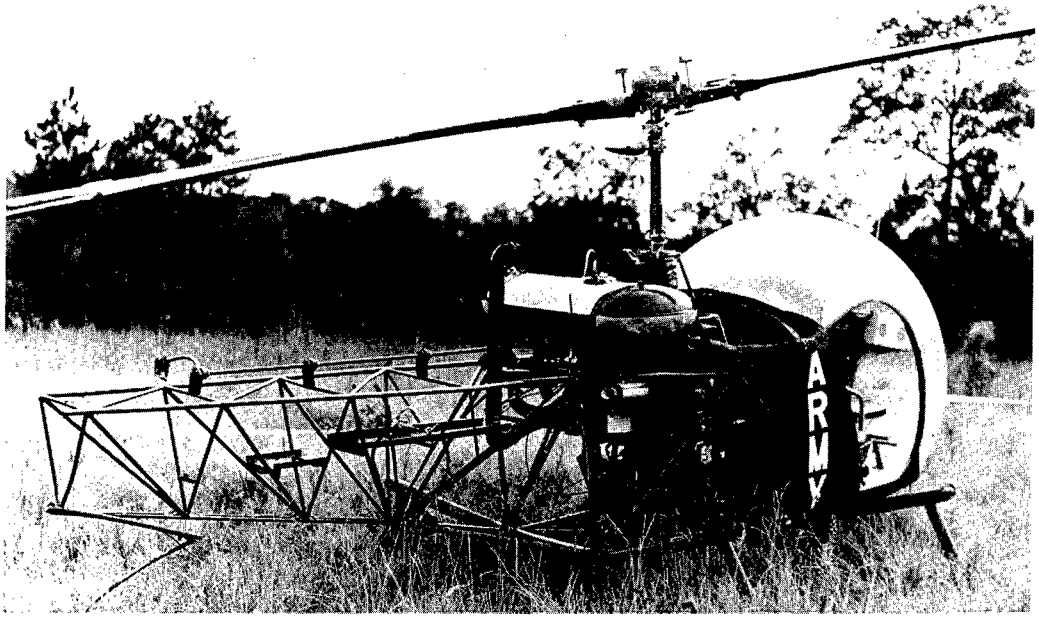
F835–Aircraft pulled sharply down and left during takeoff from refueling point. The situation was momentarily corrected, but aircraft pulled down and left again. Main rotor blade, skid, and bubble struck ground, destroying aircraft. Pilot and gunner sustained minor injuries. Caused by entanglement of fuel hose with aircraft.

G006–Tail rotor of No. 1 aircraft was struck from below by main rotor of ascending No. 2 aircraft. Tail rotor of No. 1 came off and aircraft entered uncontrollable right spin, crashed, and burned. SP sustained major injuries and IP sustained minor injuries. No. 2 aircraft, which had gone into an evasive steep diving right turn before the collision, landed hard, damaging main rotor blades, skids, cross tubes, tail boom assembly, tail rotor hub and

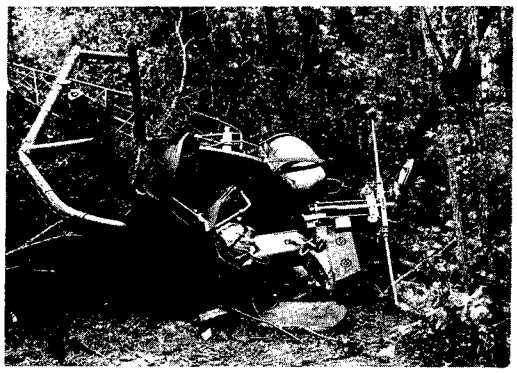
TABLE 4
OH-13 And OH-23 Occupant Injuries

	Acdts.		Occupants				
			Injury Classification			Total on Board	
			Fatal		Nonfatal	None	Survivable Accidents	Non-survivable Accidents
	S	NS	S	NS				
OH-13	60	3	0	4	27	77	104	4
OH-23	63	4	0	8	21	50	69	10

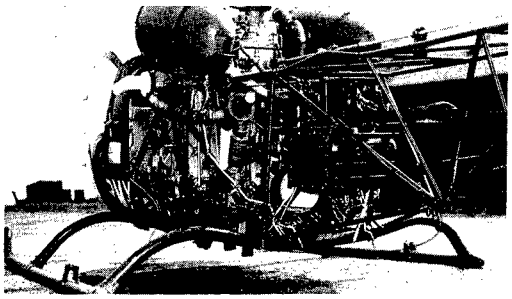
S-Survivable
NS-Nonsurvivable



F567 RPM was lost and aircraft entered high sink rate. Improper technique was used for correcting low rotor rpm.



G791 Aircraft settled and struck trees due to loss of translational lift. Poor quality control and inadequate maintenance supervision were factors.



G266 Improper removal and installation of tail rotor gearboxes due to poor supervision.

blade assembly, tail rotor gearbox, and drive shafting. Caused by failure of IP in No. 2 aircraft to clear before climbing and by diverting attention inside cockpit.

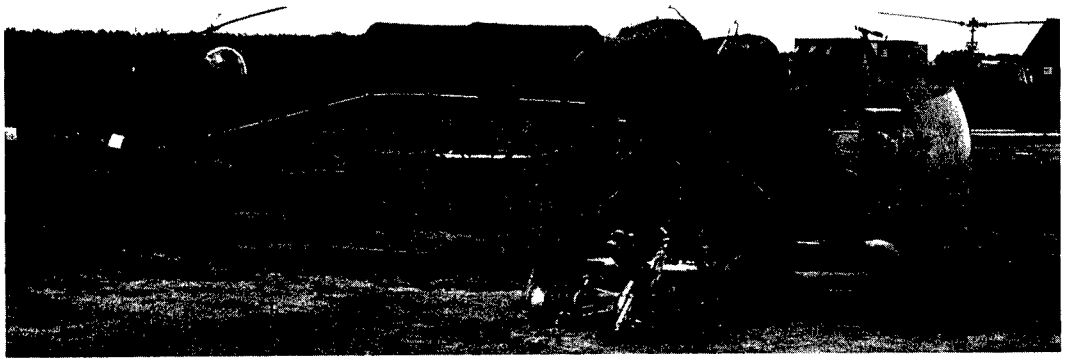
G018–Right pedal turn was made at hover and transmission dipped left and separated from lower case. Aircraft hit ground upright, tail low, and rear of skids sank about 1 foot into soft ground, causing tail rotor to hit ground. Cause unknown pending teardown analysis. Suspect nuts on transmission case attaching bolts were improperly torqued.

G266–Loud pop was heard during hover, left pedal hit stops, and aircraft turned right. Pitch was reduced to full "down" position and aircraft struck ground, damaging cross tubes. A whip action of the tail boom caused tail boom assembly to bend at upper left attaching point. Caused by improper removal and installation of tail rotor gearboxes.

G297–Aircraft was picked up to hover and left pedal turn was made. Aircraft, which had been parked downwind, was blown forward by gusting winds. Pilot ran out of aft cyclic and made right pedal turn to land. Aircraft hit post, turned on side, and was destroyed. Pilot and passenger sustained minor injuries. Caused by overloaded aircraft and downwind takeoff.

G664–Two aircraft were making downwind approach to dustoff pad. No. 1 landed between a UH-1D and trees, facing approaching No. 2 aircraft. No. 2 pilot attempted to land short, but terminated at 25 feet. Right turn was made and throttle was increased to compensate for low rpm. Aircraft went into an uncontrollable descent at 12 feet and fell to ground, bounced, and turned left, damaging main rotor blades, skid gear, and radios. Control was regained and aircraft was landed. Caused by (1) attempt to land too close to No. 1 aircraft, (2) terminating downwind approach at high hover, (3) insufficient rpm during approach, and (4) excessive play in throttle linkage.

G957–Aircraft struck powerlines at attaching point of skids and cross tubes, severing skids, hit ground on right front in nose low attitude, bounced, came to rest upright, caught fire, and burned. Pilot and passenger killed. Caused by failure to maintain altitude to clear powerlines and difficulty in seeing



H147
Tail rotor failed due to failure of alignment bearing in quill assembly. Improper emergency procedures for antitorque failure were used.

powerlines because of setting sun and decreasing light. Powerlines were not marked.

G791–Downwind takeoff was made from confined area. Aircraft settled after clearing trees, struck trees, and crashed. Pilot was killed and aircraft destroyed. Caused by (1) loss of translational lift, (2) lack of quality control, and (3) inadequate maintenance supervision. Maintenance records for the 6-month period preceding the accident revealed that numerous partial and ineffective corrective maintenance actions had been taken without apparently correcting (1) continual magneto troubles due to improper timing, which caused a rough running engine, possible preignition and/or detonation; excessive cylinder head and oil temperatures; and lack of power; (2) continual trouble with No. 2 cylinder, ranging from bent push rods to "O" compression; (3) excessive oil consumption (No. 4 piston was changed because of engine throwing oil); (4) excessive smoke from right exhaust after starting; (5) fluctuating oil pressure; and (6) high cylinder head and oil temperatures. Engine teardown analysis revealed that engine was incapable of producing maximum power for high performance takeoff. Analysis also revealed loss of compression in three cylinders, magnetos out of time, loose spark plugs, and burnt piston rings. Iron content in engine oil had risen from 23 to 75 parts per million during 12-hour period before accident.

H147–Tail rotor failed during cruise flight and steep descent was made in spiraling right turn. Power was not reduced and aircraft spun until it hit ground in a slight nose low attitude on right side, flipped on left side, and was destroyed. Tail rotor failure was caused by failure of alignment bearing in quill assembly. Improper emergency procedures were used for antitorque failure.

H829–Pilot landed in area covered with debris to drop packages. Aircraft was then picked up to hover and dipped to right rear. Main rotor blades struck ground and aircraft crashed and burned. Caused by (1) an object becoming attached to skid, (2) failure to clear aircraft from all objects prior to takeoff, and (3) poor selection of landing site.

H339–Loud banging noise was heard in engine, followed by engine failure. Pilot made right turn and autorotated. Main rotor blades hit treetops and aircraft struck tree, turned left, and rolled on right side. Tail boom was severed and aircraft destroyed. Engine failure caused by failure of connecting rod bolt heads in No. 5 cylinder. Pilot had limited experience in rotary wing aircraft.

010902–Aircraft touched down on skid toes on uphill slope. Pilot lowered collective and applied forward cyclic for landing. Aircraft settled and slight jarring was felt when collective was in full down position with pilot preparing to check stability with rotary motion of cyclic. Pilot thought tail rotor guard had hit ground, but it had caught concertina wire, causing loss of tail rotor. Collective was placed in up position and forward cyclic was applied to move aircraft forward to clear tail guard. Aircraft became airborne in nose high attitude because of concertina wire. It spun right and main rotor blade struck ground, causing separation of transmission and main rotor. Observer sustained major injuries. Caused by (1) failure to make low reconnaissance of approach path and landing site, (2) failure to see wire, (3) failure of supported unit to clear LZ and mark unremovable obstacles, and (4) lack of ground guides.

013005–IP initiated simulated forced landing from 4-foot forward hover. SP lowered collective and aircraft landed hard, damaging cross tubes,

skids, tail rotor drive shaft, tail boom, and landing light. IP had minor injuries. Caused by (1) failure of inexperienced IP to recover in time, (2) failure of SP to maintain collective pitch during autorotation, and (3) insufficient experience for SP to have fully developed required reflex action.

020404–Engine sputtered and quit during low level reconnaissance. Aircraft was leveled and attempt was made to reach a clearing, but altitude was insufficient to clear trees. Pitch was applied to stretch glide, causing rpm to bleed. Aircraft landed hard, damaging tail boom, skids, main rotor blades, lord mounts, and engine. Pilot had minor injuries. Suspect carburetor failure or fouling. Turbocharger shaft bearings were badly worn, allowing both the impeller and turbine to scrape housing.

020501–Approach was made to hover and observer cleared tail rotor. Left skid was placed on ground and, as right skid was lowered, aircraft tipped right. Full left cyclic was applied, but aircraft continued to tip until main rotor struck ground. Pilot and observer escaped through broken bubble. Aircraft caught fire and burned. Caused by (1) allowing aircraft to tip too far for recovery, (2) landing on rough slope, (3) unimproved LZ, and (4) lack of provisions for ground guides.

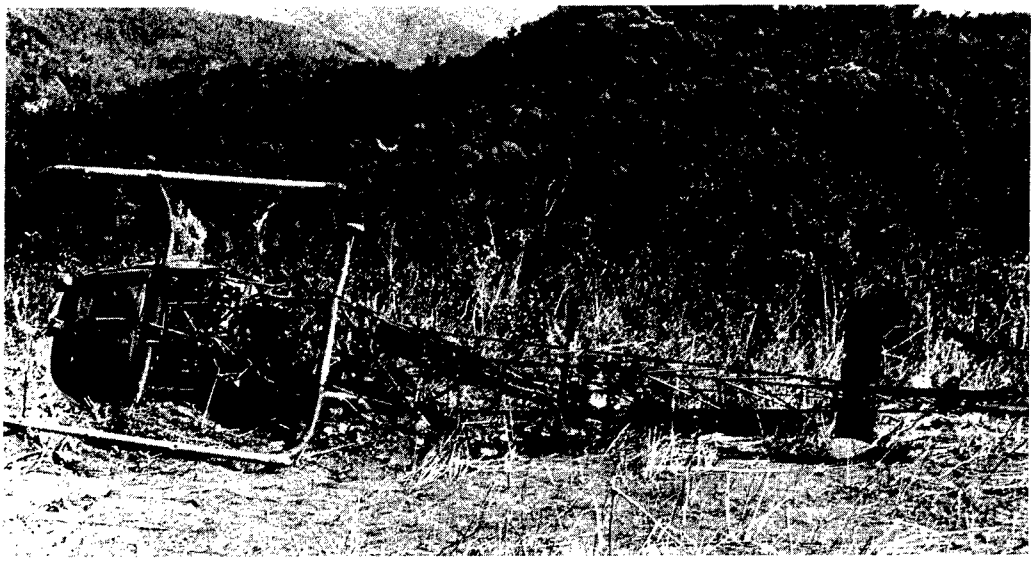
020910–Engine stopped and pilot autorotated. Aircraft landed hard on rear of skids, causing main rotor to flex and cut off tail boom. Aircraft rocked forward and settled upright on skids. Bubble shattered and broke away. Caused by fuel exhaustion due to excessive flight time.

030214–Engine ran rough during climbout and altitude was lost. Attempt was made to increase power, but rpm could not be maintained. Aircraft was landed on clear slope, rolled over, and caught fire, damaging all major components before fire could be extinguished. Pilot and observer sustained major injuries. Caused by flying at low airspeed (30-40 knots) and operating over unsuitable recovery terrain. Cause of engine malfunction unknown.

030710–Rear of right skid caught on sandbags during hover. Pilot pulled power and applied forward left cyclic and right pedal. Aircraft assumed tail low attitude and tipped right. Severe lateral vibration was felt and aircraft came loose from sandbags, turning rapidly to right. It rotated in flat turns, struck ground, and turned right, bending rear half of tail boom. Engine basket and cross tubes were broken from mounts and moved to left rear. Main rotor blades picked up and scattered rolls of stacked barbed wire. Engine continued to run and main rotor flailed until magnetos were shut off. Fuel tanks were torn loose during violent maneuver and fuel spilled on hot manifold and stack. Aircraft caught fire and burned. Pilot wore gloves and had only minor burns. Caused by (1) inexperienced pilot assigned to maneuver from difficult area in adverse winds, (2) taking off from an area with confining bunker, and (3) failure of supporting arm at attaching point on forkweld assembly of tail rotor guard.

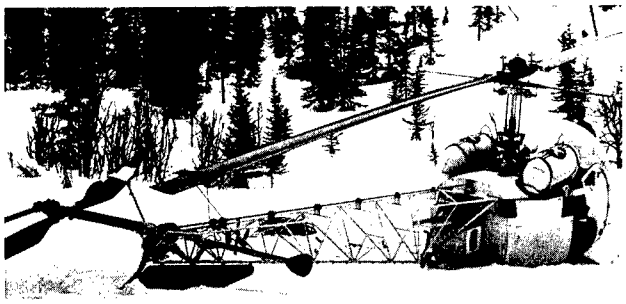
031104–Pilot felt a fishtail vibration and autorotated. Pitch was pulled to extend glide over houses and concertina wire, and rpm dropped. Aircraft was flared to regain rpm, but yawed left, with full right pedal. Zero groundspeed autorotation was made to avoid rolling over on touchdown. Aircraft landed hard and main rotor flexed into tail boom. Major damage to all components. Engine vibration caused by burned plugs in right bank. Rotor head found dirty. Damage caused by improper autorotative technique. Pilot had not been given autorotative training for previous 6 months. Maintenance supervision was factor.

031709–Aircraft was landed light on skids in



020501
Attitude got beyond recovery and aircraft was landed on rough slope. Pilot was relatively inexperienced and there was no improved LZ's or provisions for ground guides.

031709 Tail rotor struck tree. Suspect blowing snow prevented accurate judgment of hover height and hovering turn allowed tail rotor to swing upslope.



deep snow while passenger got out to remove flagpole. Takeoff was made and area orbited until flagpole was removed. Aircraft was then landed to pick up passenger. As aircraft was brought to hover during takeoff, left turn was made and tail swung into upslope, striking tree, damaging tail rotor blade, and severing tail rotor drive shaft. Aircraft began uncontrollable right turn, throttle was closed, and hovering autorotation was made. Caused by allowing tail rotor to strike tree. Suspect blowing snow prevented accurate judgment of hover height and turn allowed tail rotor to swing upslope.

031724–Main rotor blade struck trees during night takeoff. RPM was lost and aircraft flared. Aircraft started to fall tail low, but rpm built up and aircraft was brought to almost level position. Tail struck ground and left skid hit fuel drum. Aircraft came to rest on right side, damaged beyond repair. Passenger sustained minor injuries. Caused by downwind takeoff, loss of rpm, and incorrect climb attitude.

031801–Pilot lost ground reference in darkness, haze, and mist while flying through pass. Left turn was made, rotor blades hit tree limb, and bubble and skids hit lower branches, shattering bubble. Aircraft continued left and rotor head and transmission separated. It crashed nose first and came to rest inverted. Skids were torn off at impact and aircraft caught fire and burned. Pilot killed. Caused by flying through marginal conditions in aircraft not equipped for instrument flying. Supervision was factor.

041107–OH-13 main rotor blades struck approaching UH-1 at 50-75 feet, severing left rear cross tube and slicing bottom rear of right skid of UH-1. OH-13 hit ground in nose high attitude, bounced, and settled on right side, damaging rotor blades. Fuel cells ruptured and OH-13 was destroyed by fire. OH-13 observer sustained major injuries. UH-1 landed without further damage. Caused by (1) OH-13 pilot failing to make sufficient clearing turn and by UH-1 pilot making landing approach over a running aircraft, (2) neither pilot being aware of the other's clearance, (3) confusion on the part of the tower operator, possibly causing him to clear both aircraft simultaneously, and (4) close proximity of helipads.

OH-13 Selected Minor Accident Briefs

F672–Tail rotor control was lost during left downwind approach. Right pedal was applied to stop left turn, with no response. Power was added to make a go-around. Full left pedal was applied and aircraft vibrated severely and continued left turn. Pilot autorotated when aircraft was aligned into wind. Aircraft continued to turn, and was flared to slow forward motion. Skid-level touchdown was made and aircraft bounced, pivoted left, and hit ground with right skid lodged against tree stump, damaging right skid, cross tubes, landing light frame, and Grimes light. Loss of tail rotor control caused by loss of nut on tail rotor pitch change rod. Cotter pin was not installed.

H259–Tail rotor blade separated during hover, resulting in an out-of-balance condition and causing remaining blade and tail rotor gearbox to separate. Aircraft landed hard, damaging cross tubes. Caused by failure of tail rotor hub assembly due to (1) fatigue failure of tail rotor yoke at spindle base on red blade side, due to corrosion pits in radius area of yoke spindle, and (2) insufficient torque between gear and bearing to lock inner race on pinion shaft.

050209–Pilot applied power at 2,000 feet to gain altitude, but could not obtain more than 22.5 inches of manifold pressure. Pilot lowered pitch to regain a minor rpm loss and applied power again. Engine failed and aircraft was autorotated to narrow paved road surrounded by high brush and trees. Pilot zeroed airspeed at 8 feet and autorotated straight down to miss tree. Aircraft landed hard and bounced to right, bending cross tubes and hitting thick brush with main rotor blades, causing numerous dents to underside of blades. Cause factors were electrical failure of leads to No. 2 and 3 cylinder lower plugs and deteriorated harness (internal). The deteriorated condition of the ignition harness and malfunction of right magneto were attributed to maintenance. Engine failure caused by seizure of No. 5 cylinder and partial seizure of No. 6 cylinder, probably due to inadequate lubrication, and overheating due to improper mixture setting.

OH-13 Selected Incident Briefs

F488–Tail rotor struck bush during clearing turn in confined area, damaging tail rotor blade.

F978–Aircraft hit runway light, damaging cross tubes, skid, and skin.

G014–Main rotor blade flexed and struck tail boom, damaging tail boom and short shaft. Caused by rotorwash from another aircraft. Surface wind considered factor.

G328–Tiedown straps wrapped around tail rotor drive shaft after aircraft was airborne, causing a high frequency vibration and damaging tail rotor drive. Main rotor tiedown block was left on radio equipment box on tail boom during preflight.

G498–Engine lost power during takeoff. Aircraft climbed about 15 feet, lost rpm, and landed hard, damaging cross tubes. Density altitude was 3,800 feet.

G545–Aircraft struck telephone wire during road landing, damaging main and tail rotors.

G591–Pedals shuddered and FM antenna was severed during runup. Wind from 260 degrees at 6 knots, with gusts to 10 knots, quartering from left rear was factor.

G829–Pilot dropped collective and aircraft hit on right skid, damaging skid legs.

H021–Aircraft landed hard, damaging cross tube. Caused by high deceleration and fast sink rate.

H217–Aircraft landed hard during practice hovering autorotation, damaging cross tubes, landing light, and antenna. Caused by lowering pitch.

011003–Tail rotor struck log after wooden helipad collapsed, damaging tail rotor and transmission short shaft.

012101–Approach was terminated at hover. Pilot made right pedal turn and dynamic stop cables broke. Tail rotor struck ground and aircraft landed hard, damaging dynamic stop cables, tail rotor, tail rotor guard, and front cross tube.

020106–Engine made loud popping noise and ran rough. RPM was lost and aircraft settled in rice paddy, damaging tail rotor. Caused by valve failure, No. 3 cylinder.

020205–Jeep drove under main rotor, and main rotor blades struck vehicle antenna, damaging blades.

022321–Aircraft was making approach to resupply pallet when a parachute billowed behind it and entangled tail rotor. Incident damage to tail rotor drive assembly, short shaft, and synchronized elevator.

031809–Aircraft settled on snow and rear of skis broke through. Tail rotor lowered into bush and was damaged.

040415–Pilot lost control while picking up to hover in crosswind. Tail rotor hit ground, engine oversped, and aircraft landed hard, damaging tail rotor, engine, and dynamic stop cable.

042206–Tail rotor blades struck main rotor blades of parked aircraft, damaging tail rotor blades of hovering aircraft and main rotor blades of parked aircraft.

051702–Binding occurred in left pedal on short final. RPM was lost and aircraft descended in right turn. Tail rotor struck ground and aircraft landed hard, damaging cross tubes, tail rotor, and tail rotor guide.

OH-13 Selected Forced Landing Briefs

F497–Engine failed and aircraft was autorotated. Caused by No. 2 cylinder separating one-half inch above base mount.

F544–Aircraft vibrated. Caused by out-of-track main rotor blades.

F545–Engine failed. Idle mixture was out of adjustment.

F667–Both pedals and airframe vibrated severely and pedals became extremely tight. Yoke assembly of tail rotor drive shaft was sheared at bolt attaching points, retained to airframe by only the tail rotor drive shaft and tail rotor control cables. Caused by fatigue failure of tail rotor drive yoke assembly.

F765–Engine stopped. Caused by fuel exhaustion.

F935–Engine ran rough. Caused by disconnected mixture control cable at carburetor. Pin that holds clevis rod end on carburetor was missing.

G021–Engine lost power. Caused by fouled plugs.

G124–Engine ran rough and emitted smoke. Caused by bent No. 6 cylinder push rod.

G382–Aircraft vibrated at 3-foot hover. Caused by section of tail rotor drive shaft separating.

G416–Engine lost power. Caused by failure of turbocharger.

H178–Loud snap was heard and aircraft surged

to right. Caused by failure of tail rotor bearing.

H221–Engine rpm dropped. Water and sand found in fuel tanks.

H326–Engine failed, then surged to 3000 rpm at touchdown. Caused by disintegration of No. 2 cylinder exhaust valve.

H451–Throttle control was lost. Caused by throttle linkage becoming detached from carburetor. Throttle linkage was safetied. However, linkage was not safetied to carburetor stop and pulled away from carburetor.

031603–Oil temperature rose. Caused by failure of two fan belts.

041111–Antitorque pedal vibrated excessively and directional control was lost on base leg for landing. Caused by failure of tail rotor control bearing.

OH-13 Selected Precautionary Landing Briefs

F462–Cylinder head temperature rose. Caused by sheared teeth on fan drive quill assembly.

F463–Servo failed during landing approach. Caused by failure of hose from hydraulic pump to filter.

F485–Generator failed. Caused by failure of generator drive stub shaft.

F487–Smoke entered cockpit. Caused by short in fuel quantity gauge.

F529–Chip detector warning light came on. Caused by fuzz on plug.

F530–Chip detector warning light came on. Caused by carbon on plug.

F561–Oil temperature indicated high. Caused by defective temperature bulb.

F632–Electrical system failed. Caused by failure of generator drive cone.

F703–Pilot heard loud noise. Dzus fastener in inspection plate under cockpit vibrated loose.

F772–High frequency vibration occurred in tail rotor. Caused by malfunction of tail rotor gearbox.

F806–Engine lost power. Throttle control was out of adjustment.

F907–Engine oil temperature rose. Caused by failure of engine oil scavenger pump.

F909–Engine lost power. Caused by malfunction of waste gate valve.

G012–Engine ran rough. Caused by defective plugs.

G098–Fuel pressure warning light came on. Electrical driven fuel pump failed.

G144–Smoke entered cockpit. Caused by failure of flange weld on exhaust stack.

G158–Engine ran rough and oil pressure dropped. Caused by failure of No. 6 cylinder push rod.

G159–Engine oil pressure dropped. Caused by broken air damper line in oil pump outlet.

G401–Pilot reported high carburetor air temperature. Caused by maladjusted carburetor air temperature gauge.

G446–Engine ran rough and oil and cylinder head temperatures rose. Aircraft was landed and engine began smoking. Caused by broken cooling fan drive quill.

G493–Fan belt broke. Caused by failure of engine cooling fan pulley.

G523–Aircraft vibrated. Caused by maladjusted trim tab.

G549–Unusual noise heard from engine compartment. Caused by failure of annular ball bearing.

G737– Pilot smelled oil and saw trail of smoke. Caused by failure of cast aluminum fitting of transmission lubrication system housing. Failed part showed evidence of fatigue. Suspect line was installed incorrectly, placing tension on housing, and subsequent flight vibrations caused failure.

G909–Pilot reported high cylinder head temperature. Caused by loose fan belts.

G911–Engine lost power. Caused by failure of right magneto.

G936–Pilot reported excessive vertical play in collective. Caused by defective short link bearing.

G965–Power was lost during hover. Caused by failure of No. 1 cylinder.

H054–Oil pressure dropped. Caused by ruptured line to pressure gauge.

H126–Generator failed. Caused by sheared generator cone.

H132–IP experienced cyclic difficulty. Caused by failure of lateral servo.

H181–Engine tachometer failed. Caused by malfunction of tachometer generator.

H375–High frequency vibration occurred. Tail rotor blades were out of track.

H430–Lateral vibration occurred. Main rotor blades were out of track.

010409–Hydraulic system failed. Caused by failure of hydraulic pump.

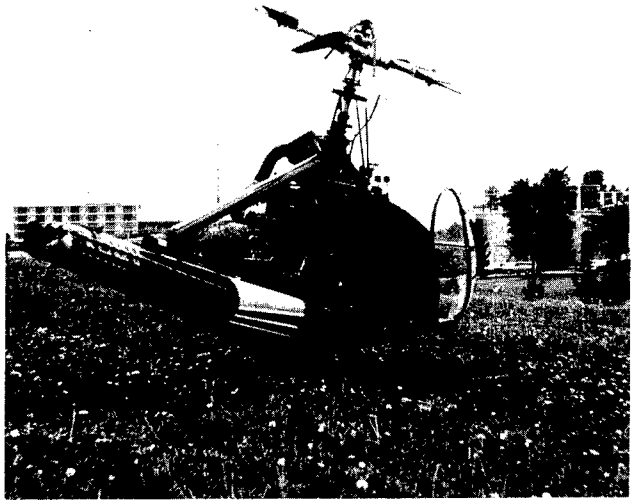
012305–Pilot reported fore and aft cyclic binding. Caused by failure of fore and aft servos.

021616–Electrical system failed. Caused by sheared generator Woodruff key.

040510–Loud banging noise was heard. Caused by cracked door frame assembly.

052912–Aircraft vibrated intermittently. Caused by abnormal wear in sprag plate assembly.

OH-23 Selected Major Accident Briefs



F480 Application of excessive pitch during takeoff over low wires.

F480–RPM dropped rapidly during takeoff and aircraft settled, struck sloping area on right skid, and tilted left. Skids folded under and main rotor blade warped downward, cutting away 4 feet of tail boom. Pilot sustained minor injuries. Caused by application of excessive pitch.

F658–Aircraft was leveled at 300 feet during climb and collective rose to full up position. Maximum throttle was applied and engine rpm dropped to 2500 and stabilized. Collective stuck, requiring pilot and copilot to push control down. This did not remove excessive pitch from rotor blades and pilot had to nose aircraft downward to avoid climbing. Aircraft wallowed at 70 knots. A 90-degree right turn was made to land and most of the altitude was lost. As aircraft was leveled, throttle was reduced to decrease speed, and aircraft pitched up to an almost vertical attitude, then to right in 180-degree turn, falling into vertical dive. Aft cyclic was applied to bring aircraft through level flight into a tail low attitude. Master switch and fuel shutoff lever were turned off and aircraft hit ground, damaging all components. Pilot and crewchief, who were not wearing gloves, sustained minor hand lacerations. Caused by (1) main rotor ballast arm locking in full up position because pin failed to reach up stop limit, (2) misunderstanding between supervisory and maintenance personnel, resulting in failure to adjust incidence arms to compensate for added up stop shim washer, (3) forces on the blade following climbout resulted in higher pitch angle, forcing ballast higher, and (4) retreating blade stall.

F699–Two hard, sharp lurches were felt in cyclic and aircraft pitched left. Bank could not be corrected with right cyclic. Collective pitch and throttle were reduced and right pedal was applied, but aircraft assumed a slight nose low attitude. Gust pitched aircraft to left and it descended in left spiral. There was no response to right cyclic movements and little response to left or fore and aft cyclic movements during descent. Left cyclic control was lost at 200 feet, and attempt to flare aircraft at 20 feet was only partially successful. Aircraft hit in tail low left bank and swung violently to right, damaging main rotor and tail rotor blades, tail rotor drive shaft, tail boom, battery and box, engine and mast, and transmission. Pilot and passenger had minor injuries. Caused by failure of cyclic control support pylon due to improper metal processing (it was not stress-relieved after welding) during manufacture.

F927–Aircraft landed hard from practice autorotation, damaging main rotor and tail rotor blades, tail boom, 1-inch drive shaft, tail rotor gearbox, and horizontal stabilizer. Caused by insufficient initial pitch pull by SP. IP was late with corrective action.

G131–A shallow approach to hilltop was terminated at hover, about 40 feet short and slightly below top of hill. Aircraft was hovered forward to top of hill and engine and rotor rpm dropped. Collective was lowered to regain rpm and aircraft settled and drifted backwards. Right pedal turn was made downslope for a running takeoff to regain rpm. Left skid struck ground and aircraft bounced. Left skid hit again and aircraft came to rest on left side, damaged beyond repair. Caused by (1) selection of unsuitable landing area, (2) termination of approach short of intended touchdown spot, (3) selection of approach path over deep ravines, and (4) acception of mission for which pilot was not qualified. Pilot was assigned mission in aircraft in which he (1) had not completed transition training in accordance with

G290
SP bottomed collective and IP failed to recover. IP was relatively inexperienced and violated training directive.

paragraph 11d, AR 95-4; (2) lacked rotary wing experience; (3) was not given area orientation; (4) had not demonstrated proficiency to IP; and (5) did not know c.g. and cockpit limitations.

G175–Oil pressure dropped to lower red line and stabilized. Pilot descended to 300 feet and engine failed. Aircraft was autorotated to cornfield and slid, tipping forward. Main rotor blades struck ground and tail swung left. Aircraft rocked back, bending pogo stick, then rocked forward. Caused by (1) lack of proficiency in emergency procedures. After detecting oil pressure drop, he should have maintained altitude or climbed to a higher altitude to allow more time for reacting to emergency and to select better forced landing area. He should have zeroed airspeed during autorotation. (2) Lack of prescribed training program for pilots. Unit pilots accumulated flying time at their own discretion and there were no supervised flights for demonstrating proficiency in emergency procedures or other techniques. Engine failure was caused by failure of crankshaft.

G271–Pilot had trouble attaining 40-knot airspeed during climb, but continued climb to clear powerlines. Engine backfired and failed at 150 feet. Pilot autorotated straight ahead, with full flare to reduce forward speed. Aircraft touched down level in loose soil and slid 10 feet. Left skid hit cross furrow, veering aircraft sharply to left and damaging right skid, tail rotor blades, front cross tube, and lower bubble section. Main rotor blades flexed and severed tail boom. Fire near exhaust and intake manifold was extinguished by pilot. Caused by failure to land when engine would not develop full power. Engine failure caused by burned piston top, No. 5 cylinder, and preignition. Minute particles of piston top were found fused to spark plug electrodes.

G290–SP was hovering through parking area to takeoff panel. IP cut throttle for simulated forced landing and SP bottomed collective. IP was unable to recover and aircraft landed hard, damaging tail boom, cross tubes, airframe, lower beacon, stabilizer, 1-inch drive shaft, and hanger bearing. Caused by (1) bottoming collective, (2) inability of IP to recover, and (3) violation of training directive.

G339–RPM fluctuated at 50 feet and 30 knots during maximum performance takeoff. A tower prevented straight-ahead autorotation and 45° left turn was made. Rotor rpm dropped and aircraft hit hard in tail low attitude, damaging all components. Pilot had minor injuries to left knee. Caused by (1) failure of mercury clutch at critical altitude and airspeed, (2) failure to autorotate immediately, and (3) attempting flight in aircraft with clutch deficiency which had not been signed off by inspector.

G371–Engine failed and pilot autorotated. Forward speed was slowed too rapidly and, when pitch was pulled, prior to touchdown, nose came up and aircraft landed hard, damaging spring tubes, engine snubbers and mounts, 1-inch and 4-inch drives, tail skid strut, tail rotor blades, and tail boom. Caused by inadvertently moving mixture control to idle cutoff while adjusting fuel-air mixture, failure to maintain forward airspeed, and nose high attitude which caused aircraft to land backwards.

G452–Loud noise was heard behind engine compartment and aircraft rolled right in tail low attitude. Left forward cyclic was applied, with no response. RPM dropped, needles were rejoined with power, and collective was applied. Aircraft hit tail low with skids level. Major damage to landing gear, tail rotor blades, and aft tail boom section.

Caused by loss of tail rotor during takeoff. Unidentified object was flung into tail rotor.

G610–Approach was terminated at 3-foot hover into wind, and aircraft was hovered forward to practice area. IP decelerated and tail rotor blades hit ground. Aircraft pitched forward in right nose low attitude. Collective was lowered and right front skid dug into ground. Aircraft turned on right side, damaging main rotor blades, tail boom, cooling fan, 1-inch drive, cross tubes, stabilizer, vertical struts, and bubble. Caused by (1) excessive deceleration at hover, (2) using excessive forward speed, and (3) failure to use correct procedure for antitorque failure.

G658–Aircraft flew into updraft at 300-400 feet. Pressure on collective due to updraft delayed reduction of pitch and power. When pitch and power were reduced, aircraft was in downdraft at rapid rate of descent. Increased pitch and power failed to slow rate of descent. Pilot autorotated at 100 feet, while in left turn to avoid wooded area, and made steep flare due to rapid closure rate. Aircraft was in right skid. Pilot applied pitch, full left forward cyclic, and ran out of right pedal trying to correct yaw while leveling aircraft. Aircraft hit ground, damaging tail rotor, tail boom, rear cross tube, engine mounts, main rotor blade, and main body. Pilot's inertia reel locked on impact. Caused by (1) inadequate supervision of new pilot with minimum experience, (2) lack of experience in recognizing updrafts and downdrafts, and (3) choice of autorotation as corrective action for recovery from downdraft, when power and control were available.

H797–Tail rotor struck concertina wire during LZ landing approach. Severe vibration was experienced immediately after touchdown and engine was shut off. Vibration became violent while main rotor blades were slowing down, and tail boom buckled slightly, bending drive shaft, breaking speed reducer loose from mountings, and shattering canopy. Caused by failure to plan and execute approach to miss wire, and failure to eliminate or mark LZ hazards.

G881–RPM dropped while OH-23C was hovering downwind to parking area. Full throttle was applied and aircraft continued forward with partial control. Full right cyclic was applied in an attempt to miss parked aircraft. Aircraft was in nose low attitude and main rotor blades hit main rotor blades of parked aircraft. Aircraft hit ground, rolled on right side, and was destroyed. Caused by (1) hovering downwind in close proximity to parked aircraft, (2) failure to allow for power difference between OH-23C and OH-23D (OH-23D was flown more frequently by pilot), and (3) attempt to remain in hover rather than land when rpm was lost.

H082–Engine failed and aircraft yawed left. Right pedal was applied, partially correcting yaw. Aircraft hit in level attitude with 30° left crab and bounced, damaging landing gear, instrument pedestal, and lower windshield. Caused by failure to fully correct yaw and apply available collective to cushion landing. Engine failure caused by carburetor malfunction due to high float level of float valve, resulting in rich mixture.

H188–Power was reduced during steep approach. Pilot thought he was going to land short and attempted to add power at 300 feet. Engine failed to respond because throttle grip locked. Pilot autorotated and aircraft hit in tail low attitude, damaging tail rotor strut, tail rotor blades, 1-inch drive shaft, and tail boom. Loss of power caused by failure of throttle control due to scoring and jamming of inner cable with outer housing. Throttle locked in closed position. Analysis of residue flushed from inside housing revealed presence of sand, carbon, and metal particles.

H252–Aircraft became airborne for about 300 feet while ground taxiing downwind. It struck ground, bounced, and came to rest on left side, damaging main rotor blades, engine mount, landing skids and mounts, transmission, 1-inch and 4-inch drive shafts, cooling fan, left door, tail boom assembly, and airframe. Caused by operating in strong tailwind beyond capabilities of pilot and aircraft.

H341–OH-23 and another light helicopter collided in air while both pilots were practicing autorotations. Both aircraft were destroyed by ground impact. Both occupants of OH-23 sustained major injuries. One occupant of other helicopter sustained major injuries. Caused by failure to clear area prior to autorotating, density of aircraft operating in close proximity, and possible sunglare.

H396–Pilot heard thumping noise from engine and felt vibration in controls. Power approach was made and vibration continued. Engine ran rough and failed at 30-40 feet. Aircraft hit hard, damaging

H396 Engine failed due to broken piston rings and damaged piston and a downwind landing was unsuccessful.

013001
Engine failed due to failure of No. 6 connecting rod assembly. An extensive maneuver was performed during approach due to powerlines and touchdown groundspeed was excessive.

main rotor blades, 1-inch drive shaft, tail rotor blades, cross tubes, and tail boom. It came to rest upright. Engine failure caused by broken piston rings and damaged piston. Aircraft damage caused by downwind approach.

010406–Tail skid strut and tail rotor blade struck ground during practice autorotation flare. Tail rotor blades and tail boom were damaged extensively and 1-inch drive shaft was sheared, causing antitorque failure. Caused by excessive flare during attempt to make zero groundspeed touchdown.

011213–Aircraft was on test flight after replacement of engine and transmission seals. Loud pop was heard at 200-300 feet during climb. Nose pitched up and aircraft spiraled left, crashed, burst into flames, and burned. Both occupants killed. Internal push rod nut which attaches push rod to ballast cross arm was not torqued and safetied. This allowed ballast cross arm to rise excessively and lock in high pitch position. Locking was caused by ballast hinges going over center, preventing pilot from lowering collective to decrease blade pitch. Maximum allowable pitch of main rotor blades is 11 degrees. During inspection, it was found that blade was locked in 18-degree pitch position. Engine is not capable of driving main rotor with pitch in excess of 11 degrees. Disassembly of ballast assembly was not entered on DA Form 2408-13 or DA Form 2404. Additional factors were inadequate technical inspection and preflight.

012702–Engine stopped and pilot autorotated. Aircraft touched down hard in crab and main rotor blades hit power pole, damaging all components. Caused by (1) fuel exhaustion due to exceeding maximum prescribed operating time, (2) hard landing with crab, and (3) inoperative fuel gauge.

013001–Engine failed and aircraft with floats was autorotated. Pilot intended to make a right turn, but landing area was obstructed by powerlines, so he selected an area to his front. Collective pitch was increased slightly and aircraft was turned sharply to right and flared to avoid more powerlines and terminate autorotation. Tail rotor blades struck ground during flare, bending tail skid strut and breaking off tail rotor blades. Aircraft touched down level on slope with 15-knot forward speed. Forward portion of right float struck ground first and aircraft slid 3 feet. Section of float collapsed and aircraft pitched forward and to right. Full aft cyclic was applied and main rotor blade severed tail boom. Aircraft continued rolling forward and to right, coming to rest on right forward portion of cabin compartment and right float. Caused by excessive groundspeed for float gear touchdown and inability to see powerlines during level flight, requiring pilot to change landing area and maneuver sharply while terminating approach. Failure of No. 6 connecting rod assembly caused engine seizure. No. 6 rod failure caused by fatigue failure of one connecting rod bolt, resulting in overstress and ultimate failure of opposite bolt.

022806–Aircraft was decelerated for touchdown and entered high sink rate. Pitch was applied, but had little effect in slowing rate of descent. Aircraft yawed left and full right pedal and remaining pitch were applied to straighten aircraft and cushion landing. Aircraft hit on right skid and main rotor blade. Skid collapsed and aircraft rolled on right side, damaging main rotor, tail rotor, canopy, cross tube, and skid legs. Caused by excessive flare.

030402–Pilot applied pitch and pulled power for go-around to avoid wires during landing approach.

Aircraft struck wires and fell 15 feet to ground, damaging tail rotor and main rotor blades, gearbox, tail boom, skids, chin bubble, rotor head, and engine mount. Caused by (1) landing approach to unauthorized area, (2) release of aircraft in which pilot was not qualified, and (3) lack of knowledge of local flying regulations. Aircraft was released for flight by unauthorized personnel.

030701–Aircraft vibrated, pitched up, and airspeed decreased. It entered steep right bank and pilot applied cyclic and autorotated. Downwind descent was rapid in nose low attitude, with high sink rate. Needles were joined prior to reaching landing site, and power was applied to clear telephone wire. Pilot autorotated again and flared, but flare was unsuccessful and aircraft continued downward at high rate of speed. Partial pitch was applied at 10-15 feet and remaining pitch applied as aircraft hit ground in near level attitude. Skids collapsed, nose pivoted right, and aircraft slid on underframe, coming to rest on right side. Main rotor blades hit tree branches during slide, shearing blades and severing main rotor head, tail boom, and tail rotor assembly. Pilot had minor injuries. No failure or malfunction found. Suspect pilot was inexperienced in recognizing effect of turbulence.

030805–Throttle froze and collective was reduced, causing rpm to increase. Pilot autorotated, flared, and aircraft began to balloon. Aircraft was leveled and flared again. Tail rotor hit ground and directional control was lost. Left skid hit ground with aircraft in right turn. Aircraft bounced, hit ground again, and continued turning with right skid digging into ground. Major damage to main rotor, tail rotor, tail boom, and drag struts. Caused by excessive flare and inoperative throttle due to frozen moisture in throttle cable housing. Suspect 21° F temperature caused trapped moisture in throttle cable to freeze.

042803–Needles split, engine rpm rose, and rotor rpm dropped. Pilot made left turn, lowered collective, and made steep flare. Rear of both skids struck ground and aircraft skidded, damaging all components. Caused by clutch failure or slippage due to excessively worn clutch shoes. Nine of 12 clutch shoes and clutch drum were cracked. All showed evidence of excessive heat.

051910–Pilot autorotated into wind at 1,400 feet and lowered collective and closed throttle to check for needles splitting. Slow flare was made to check for increase in rotor rpm and aircraft hit ground tail low with high sink rate. Tail rotor blades struck ground and severed. Main rotor blades flexed, severing tail boom. Aircraft bounced, turned left, and hit ground, collapsing right skid. Caused by (1) failure to apply sufficient pitch and level aircraft, (2) failure to add throttle to maintain rotor rpm while applying pitch, (3) failure to divide attention while monitoring rotor tachometer, and (4) failure to comply with SOP for recovery from practice autorotation at 100 feet or above.

060106–Main rotor control paddle tubes broke away, damaging tail rotor drive shaft, main rotor blade, and 90-degree gearbox. Tail boom and shafting were sheared at station 210, and aircraft fell at steep angle in uncontrollable spiral, impacting in slight nose high attitude. Aircraft caught fire and burned. Pilot, passenger, and bystander killed. Caused by failure of spar tube inside of cuff assembly at outboard attaching bolt. Suspect there was no established inspection criteria for spar tube and cuff assembly. Aircraft history showed extensive corrosion damage in the past. As a result of this accident, TB 55-1520-206-30/2 (Urgent), requiring inspection of the spar tube and cuff assembly on all OH-23D, F, and G aircraft, was published. In addition, a change to TM 55-1520-206-20, requiring inspection every 300 hours, was published.

061304–Aircraft was being hovered from fueling area to takeoff site. After crossing traffic lane, SP stopped forward movement to check traffic on next lane. An aircraft was hovering up the next lane. SP thought he had sufficient time and distance and started crossing. About midway between lanes, SP changed his mind and abruptly applied excessive aft cyclic, causing tail rotor to strike ground. Both blades broke away, causing loss of antitorque control. Aircraft turned right and IP took control, closed throttle, and autorotated. Cross tubes, tail rotor yokes, tail boom, and 1-inch drive shaft were damaged. Caused by excessive cyclic control movement.

061407–Aircraft spun violently during landing approach and pilot autorotated. Aircraft hit hard, damaging skids, cross tubes, airframe, and tail boom. Caused by failure to apply collective rapidly enough to cushion landing and by failure to detect and correct chafing of tail rotor cable against throttle control cable during scheduled maintenance.

062005–Engine misfired twice and stopped. Pilot autorotated and tail skid struck ground, causing main rotor blades to sever tail boom. Aircraft bounced, struck tree branches, turned right, and came to rest upright, with major damage. Caused by excessive flare. Engine stoppage caused by fuel exhaustion.

OH-23 Selected Minor Accident Briefs

F855–SP bottomed collective during practice hovering autorotation and aircraft hit hard, damaging skid gear, airframe, and tail boom. Caused by bottoming collective and lack of communication between IP and SP. SP did not hear instructions for hovering autorotation.

G874–Aircraft was flared during practice touchdown autorotation and tail skid strut and tail rotor blade struck ground. Caused by delayed pitch application. IP was late with corrective action.

G971–Pilot felt increasingly intensive vibration and autorotated. Loud noise was heard from tail section during landing. Aft end of tail boom, rotor blades, and tail rotor gearbox damaged. Caused by failure of tail rotor hub due to excessive fretting, corrosion, and abrasive wear resulting from tail rotor hub operating loose on pinion shaft. Inadequate maintenance was factor.

OH-23 Selected Incident Briefs

F460–Tail rotor struck ground during demonstration autorotation, damaging blades and yoke. Caused by tail low attitude and late pitch application.

F478–Aircraft landed hard, damaging cross tubes. Caused by high pitch application and loss of rotor rpm.

F484–Aircraft struck wire, damaging bubble.

F515–Main rotor blade struck tree limb during approach to confined area, damaging blade. Caused by failure to decelerate.

F540–Tail rotor struck ground during demonstration power recovery from autorotation, damaging tail rotor blades and 1-inch drive shaft. Caused by holding flare too long.

F601–Aircraft landed hard, damaging vertical strut, fore and aft spring tubes, tail skid, centering bracket, and basic body. Caused by increasing sink rate due to making S turns to lose excessive altitude.

F763–Pilot attempted to stop 5-inch drive shaft with hand. Rotor tiedown strings entangled drive shaft, damaging shaft and tail boom.

F795–Aircraft landed hard tail low, damaging cross beams, tail rotor gearbox, tail rotor blades, and tail boom. Caused by insufficient pitch application and failure to level aircraft.

G020–Tail rotor blades hit ground during attempted power recovery to hover from demonstration autorotation, damaging blades. Caused by delayed pitch application.

G292–Tail skid strut hit ground during power recovery from practice autorotation and main rotor tip cap contacted 1-inch drive, damaging tail boom, 1-inch drive, gearbox housing, two tail rotor cables, and two hanger bearings. Caused by excessive aft cyclic.

G687–Directional control was lost during hover. Pilot cut throttle and made late pitch application. Aircraft turned 180 degrees and landed hard, damaging vertical strut, drag strut, skid gear, skin, tail boom, and centering bracket. Caused by overcontrolling pedals.

G697–Aircraft began to settle and additional pitch and power were applied. RPM was lost, aircraft settled, and tail rotor struck bush, damaging tail rotor. Density altitude of 7,200 feet considered factor.

G867–While hovering in parking area, main rotor blade hit main rotor blade tip cap and bracket of parked aircraft. Incident damage to main rotor blade of hovering aircraft and main rotor tip cap and bracket of parked aircraft.

G927–Tail rotor blades hit trees, resulting in antitorque failure and hard landing. Incident damage to tail rotor gearbox, blades, 1-inch drive, tail boom, cross tubes, and tail skid. Caused by landing in unauthorized area.

G991–Tail rotor blades hit tree while aircraft was being hovered to takeoff position in confined area, damaging blades. Caused by failure to follow hovering markers.

H073–Quick release pin on bottom of right door hinge disengaged and bottom of door rose and hit top of bubble, damaging door and bubble. Caused by failure to properly check quick release pins during preflight.

H256–Aircraft turned 360 degrees during approach and landed hard, damaging skid leg, cross tube, and drag strut. Wind, gusting 17-20 knots, considered factor.

H330–Right door vibrated and plexiglas broke during recovery from steep descent, damaging door. Caused by lower hinge coming loose. Suspect hinge was improperly secured.

H588–Tail rotor blade hit ground during hover, damaging blade, gearbox housing, 1-inch drive, and skin bracket. Caused by overcontrolling cyclic.

010905–Aircraft was started with main rotor blades tied down, damaging mercury clutch. Caused by inadequate preflight.

011907–Aircraft landed hard, damaging skid leg. Caused by late pitch application. IP was late with corrective action.

021007–Aircraft landed short of landing area, dragging tail skid and tail rotor blade in loose ground. Incident damage to tail rotor blade.

031202–Tail rotor struck barrier wire during landing, damaging blades. Caused by loss of visual contact in dust.

032609–Aircraft struck buzzard, damaging lower windshield.

033018–Engine misfired during hovering approach. Pitch was applied to cushion landing and engine misfired again. Aircraft rose about 10 feet and engine stopped. Aircraft landed hard, damaging cross tubes and basic body. Caused by input oil line coming loose at cooler.

033118–Engine stopped and aircraft was autorotated. Skids dug in loose soil and tail rotor blades hit ground, damaging blades and 1-inch drive. Caused by electrical short in magneto condenser P lead.

041004–Needlenose pliers fell off tail boom and struck tail rotor. Severe vibration damaged tail rotor gearbox. Caused by leaving pliers on aircraft and inadequate preflight.

OH-23 Selected Forced Landing Briefs

F641–Smoke entered cockpit. Aircraft was landed, switches turned off, and smoke subsided. Caused by starter switch remaining engaged.

F648–Engine ran rough and failed at hover. Caused by carburetor failure.

H179–Pilot heard unusual noise and engine failed. Caused by broken connecting rod bolt in No. 6 cylinder.

H672–Engine failed. Caused by failure of right magneto impulse flyweight arm.

013011–Engine surged, backfired, and lost power. Hole found in lower crankcase section. Suspect connecting rod bolt failure.

020920–Aircraft vibrated and yawed right with loss of pedal control. Caused by failure of tail rotor drive quill.

021907–Engine failed. Caused by failure of No. 4 connecting rod.

022316–Engine failed. Caused by valve lifter in No. 1 cylinder freezing to exhaust valve.

040904–Engine lost power and ran rough. Caused by failure of oil cooler return line.

041011–Engine ran rough and rpm could not be maintained. Caused by broken exhaust valve in No. 6 cylinder.

OH-23 Selected Precautionary Landing Briefs

F446–Pilot heard unusual noise. Aircraft vibrated and oil and cylinder head temperatures increased. Caused by failure of lower cooling fan drive coupling.

F475–Transmission oil pressure warning light came on. Caused by malfunction of transmitter.

F563–Excessive smoke was noted coming from exhaust with oil blowing by. Caused by failure of piston ring.

F598–Oil pressure dropped. Caused by metal particles in cuno filter.

F721–Cylinder head temperature rose and pilot smelled burning odor. Caused by stripped cooling fan spline drive.

F761–Oil temperature warning light came on. Caused by failure of temperature switch.

G065–Engine ran rough and lost power. Caused by valve rocker shaft cover coming off, allowing rocker arm pin to No. 1 cylinder intake to fall out.

G239–Pilot felt sudden and continous vibration. Caused by vibrator damper arm breaking at lower end next to mounting bracket.

G287–Engine ran rough and vibrated. Caused by failure of helicoil and blown plug, No. 6 cylinder.

G451–Transmission oil temperature light came on. Caused by partial blockage of oil cooler due to grass taken in through cooling fan.

G514–Pilot heard loud noise. Caused by failure of cooling fan blade.

G609–Engine ran rough. Caused by failure of

compressor rings in No. 2, 3, and 4 cylinders.

G743–Chip detector warning light came on. Caused by metal filings in transmission oil sump.

G915–Engine ran rough. Caused by crack in fuel pressure tube.

H186–Clutch slipped. Caused by failure of mercury clutch bladder.

H527–Pilot smelled smoke. Caused by short in junction box.

013009–Excessive oil noted on bubble. Caused by chip detector plug working loose, resulting in oil leak.

020116–Tachometer fluctuated. Caused by worn clutch shoes.

020810–Engine tachometer failed. Caused by failure of tachometer generator.

021506–Aircraft vibrated severely and engine lost power. Caused by failure of rod bolts in No. 3 and 4 cylinders.

021511–Fuel pressure indication was erratic and engine lost power. Caused by malfunction of main fuel shutoff valve.

022412–Chip detector warning light came on. Caused by loose chip detector probe. Probe grounded out against engine.

030711–Engine ran rough. Caused by fouled plugs due to worn ring lands in No. 2, 4, 5, and 6 cylinders.

031807–Pilot noted severe-to-medium high frequency vibrations. Caused by complete break in smallest portion of one tail rotor yoke close to where it connects to one end of tail rotor hub.

040322–Transmission warning light came on. Caused by failure of transmission pressure switch.

040618–Engine stopped. Caused by inoperative engine driven fuel pump.

060604–Aircraft vibrated severely. Caused by worn main rotor hub bearing.

062007–Engine ran rough and lost power. Caused by failure of push rod due to reverse installation of rocker arm.

Active MWO's

OH-13

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change		Record on 2408-5	
				Yes	No	Yes	No
55-1520-204-20/4	24 Apr 64	Installation of safety washers to lateral torque tube	All OH-13 aircraft		x	x	
-20/6	26 Apr 66	Removal of idle cutoff from MA4-5AA type carburetors	OH-13E 51-13742 thru 51-14108 51-14119 thru 51-14138 51-14150 thru 51-14231 51-17669 OH-13G 51-14232 thru 51-14241 52-7790 thru 52-7993 53-3654 thru 53-3814 OH-13H 55-3355 thru 55-4633 56-2161 thru 56-2244 57-1792 thru 57-6244 58-1497 thru 58-1552 58-5304 thru 58-5395 58-6984 thru 58-6998 59-4913 thru 59-4970		x	x	
-20/7	18 Jan 68	Installation of safety cover over ignition switch	OH-13E 51-13742 thru 51-14108 51-14119 thru 51-14138 51-14150 thru 51-14231 OH-13G 51-14232 thru 51-14241 52-7790 thru 52-7993 53-3654 thru 53-3674 OH-13H 55-4613 thru 55-4633 56-2161 thru 56-2244 57-1792 thru 57-1875 57-6203 thru 57-6244 58-1497 thru 58-1552 58-5304 thru 58-5395 58-6984 thru 58-6998 59-4913 thru 59-4972 OH-13S 63-9072 thru 63-9131 63-9150 thru 63-9221 63-13668 thru 63-13685 64-15318 thru 64-15432		x	x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change		Record on 2408-5	
				Yes	No	Yes	No
55-1520-204-20/8	10 Apr 67	Replacement of pipe plug with magnetic plug in tail rotor gearbox	OH-13E 51-17669 and 51-13742 thru 51-14231 OH-13G 51-14232 thru 51-14241 52-7790 thru 52-7993 53-3654 thru 53-3674 53-3785 thru 53-3814 OH-13H 55-3355 and 55-3356 55-4613 thru 55-4633 56-2161 thru 56-2244 57-1792 thru 57-1875 57-6203 thru 57-6244 58-1497 thru 58-1552 58-5304 thru 58-5395 59-4913 thru 59-4970 OH-13S 63-9072 thru 63-9131 63-9150 thru 63-9221 63-13668 thru 63-13685 64-15318 thru 64-15432 TH-13T 64-17845 thru 64-17904 65-8038 thru 65-8080 66-4273 thru 66-4298 66-8040 thru 66-8130		x	x	
-20/9	26 Mar 68	Installation of thermometer in cabin bubble	OH-13E 51-17669 and 51-13742 thru 51-14231 OH-13G 51-14232 thru 51-14241 52-7790 thru 52-7993 53-3654 thru 53-3814 OH-13H 55-3355 and 55-3356 55-4613 thru 55-4633 56-2161 thru 56-2244 57-1792 thru 57-6244 58-1497 thru 58-5395 59-4913 thru 59-4970 OH-13K 59-4971 and 59-4972 OH-13S 63-9072 thru 63-9131 63-9150 thru 63-13685 64-15318 thru 64-15432 TH-13T 64-17845 thru 64-17904 65-8038 thru 65-8080 66-4273 thru 66-8130		x	x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change		Record on 2408-5	
				Yes	No	Yes	No
55-1520-204-20/10	14 Apr 68	Installation of starter switch cap	OH-13H 55-3355 thru 55-4633 56-2161 thru 56-2244 57-1792 thru 57-6244 58-1497 thru 58-5395 59-4913 thru 59-4970 OH-13S 63-9072 thru 63-13685 64-15318 thru 64-15432 TH-13T 64-17845 thru 64-17904 65-8038 thru 65-8080 66-4273 thru 66-8130		x	x	
-30/1	26 Jul 65	Modification of main rotor counterweight and elimination of self-locking nuts	OH-13E 51-13742 thru 51-14231 and 51-17669 OH-13G 51-14232 thru 51-14241 52-7790 thru 52-7993 53-3654 thru 53-3674 53-3785 thru 53-3814 OH-13H 55-4613 thru 55-4633 56-2162 thru 56-2244 57-1792 thru 57-1875 57-6203 thru 57-6244 58-1497 thru 58-1552 58-5304 thru 58-5395 59-4913 thru 59-4970		x	x	
-30/3 Change 1	17 May 66 2 Aug 66	Removal of vibration isolators	OH-13E 51-17669 and 51-13742 thru 51-14231 OH-13G 51-14232 thru 51-14241 52-7790 thru 52-7993 53-3654 thru 53-3814 OH-13H 55-3355 thru 55-4633 56-2161 thru 56-2244 57-1792 thru 57-6244 58-1497 thru 58-5395 59-4913 thru 59-4970	x		x	
-30/4	27 Feb 68	Installation of additional diode (P11134) in voltage regulator (CSV1238-1)	OH-13S 64-15318 thru 64-15432 TH-13T 64-17845 thru 64-17904 65-8038 thru 65-8080 66-4273 thru 66-4298 66-8040 thru 66-8130		x	x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change		Record on 2408-5	
				Yes	No	Yes	No
55-1520-204-34/1 Change 1 (Supersedes TM 1-1H-13G-1004, 24 Dec 1959, and TM 1-1H-13G-1004, C1, 18 Mar 1960)	15 Sep 60 9 Mar 61	Kit provision for installation of AN/ARC-60 radio set, AN/ARC-44 radio set, and AN/ARA-31 antenna group	All OH-13G aircraft, except with Kit A installed and one prototype Kit A delivered	x			x
-34/4 Change 1 (Rescinds TMC message TCMAC-EP1-06-02042, 18 June 1960)	14 Mar 61 3 Jul 61	Installation of monobromotrifluoromethane CF_3 BR type fire extinguishers and relocation of first aid kits	All OH-13 aircraft		x		x
-34/7 (Supersedes TM 1-1H-13-512, 15 Sep 1959, with change 1)	22 Sep 61	Instructions for installation of dual controls	All OH-13H aircraft	x			x
-34/8 Change 2	11 Jul 63 20 Apr 64	Helicopter modification for installation of M1E1 or M2 machinegun	OH-13E, G, and H aircraft required in support of authorized TOE and TA as directed by CONARC or theater commander	x		x	
-34/11 Change 2	1 Jul 64 31 Aug 65	Instructions for installation of AN/ARC-60 radio set, AN/ARC-44 radio set, AN/ARA-31 antenna group, and MX-1646/AIC emergency system	All OH-13E aircraft	x		x	
-34/12 Change 1	29 Sep 64 15 Jan 65	Instructions for replacement and installation of moisture-proof battery relay	OH-13E 51-13742 thru 51-14231 OH-13G 51-14232 thru 53-3814		x	x	
-34/14	3 Jun 63	Installation of bolt, internally relieved body in 47-620-600 series transmissions	All OH-13H aircraft		x	x	
-34/15	25 Oct 63	Modification of center frame to permit installation of engine mount (47-612-171-101 or -115)	OH-13H 55-4613 thru 59-4912		x	x	
-34/16	1 Nov 63	Modification of hydraulic cylinder support bracket (47-725-104-1)	All OH-13E and G aircraft		x	x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change Yes	Wt & Bal Change No	Record on 2408-5 Yes	Record on 2408-5 No
55-1520-204-34/17 Change 1	24 Apr 64 8 Jun 65	Installation of air damper in engine oil pump outlet line	All OH-13E and G aircraft		x	x	
-34/18	30 Sep 64	Removal of forward battery installation provisions	All OH-13E aircraft	x			x
-34/19 Change 3	8 May 64 10 May 66	Modification of engine transmission adapter assemblies (47-612-800-3 and -23)	All OH-13H aircraft with 47-612-800-3 or -23 adapter assembly installed		x	x	
-34/20 Change 1 Change 2	8 May 64 29 Mar 65 23 Apr 65	Modification of engine transmission adapter assembly (47-612-004-1, -2, -3, -4, -6, -7, -8, -9, -11, and -13)	All OH-13E and G with adapter assembly (47-612-004-15) installed		x	x	
-34/22	19 Jan 65	Helicopter modification installation of M2 machinegun	OH-13E, G, H, and S aircraft 63-9073 thru 63-9185	x		x	
-34/23	18 Aug 64	Relocation and installation of tail light	All OH-13E aircraft		x	x	
-34/24	24 Feb 65	Installation of dual control kit	OH-13S 63-9072 and subsequent	x		x	
-34/25 Change 2	21 Apr 64 29 Mar 66	Modification of lateral support assembly (47-725-866-1)	All OH-13 aircraft, except those having cyclic support assembly (47-725-866-5) installed		x	x	
-34/26	18 Aug 64	Helicopter modification of lower transmission case assembly to allow oil flow for cooling fan drive gear	All OH-13E, G, and H aircraft		x	x	
-34/27 Change 1	6 Dec 65 2 Aug 66	Installation of increased strength fuel tanks	OH-13G 51-14232 thru 51-14241 52-7790 thru 52-7993 53-3654 thru 53-3674 53-3785 thru 53-3814 OH-13H 55-3355 thru 55-3356 55-4613 thru 55-4633 56-2161 thru 56-2244 57-1792 thru 57-1875 57-6203 thru 57-6244 58-1497 thru 58-1552 58-5304 thru 58-5395 59-4913 thru 59-4970 OH-13K 59-4971 and 59-4972	x		x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change Yes	Wt & Bal Change No	Record on 2408-5 Yes	Record on 2408-5 No
55-1520-204-34/29 Change 1	14 Jan 65 7 Jun 65	Installation of increased capacity high penetration resistant fuel cells	OH-13S 63-9072 thru 63-9131 63-9150 thru 63-9221 63-13668 thru 63-13685	x		x	
-34/30 Change 2	9 Jul 65 7 Apr 66	Installation of engine chip detector warning light	OH-13E - Kit B (47-1671-2) 51-13742 thru 51-17669 OH-13G - Kit B (47-1671-2) 51-14232 thru 53-3814 OH-13H - Kit A (47-1671-1) 55-4613 thru 58-5395 59-4913 thru 59-4972 OH-13S - Kit A (47-1671-1) 63-9072 thru 63-9221 63-13668 thru 63-13685		x	x	
-34/31 Change 1	16 Nov 64 15 Sep 66	Installation of improved armed/safe light indicators	All OH-13E, G, and H aircraft OH-13S 63-9073 thru 63-9185 (Does not apply to aircraft that have complied with MWO 55-1520-204-34/22)		x	x	
-34/32 Change 2	5 Apr 65 1 Nov 65	Modification of OH-13E aircraft to accept tail rotor gearbox (47-640-044-17)	All OH-13E aircraft 51-13742 thru 51-14231		x	x	
-40/1	10 May 67	Installation of anticollision rotating beacon light and related night flying equipment	OH-13E 51-13742 thru 51-14231 OH-13G 51-14232 thru 51-14242 52-7790 thru 52-7993 53-3654 thru 53-3674 53-3785 thru 53-3814 OH-13H 55-4613 thru 55-4633 55-3355 and 55-3356 56-2161 thru 56-2244 57-1792 thru 57-1875 57-6203 thru 57-6244 58-1497 thru 58-1552 58-5304 thru 58-5395	x		x	
-40/2 Change 2	13 Mar 67 17 Nov 67	Provisions for and installation of AN/ARC-54 or AN/ARC-131 radio set; as 1703 FM antenna and C-1611( )/AIC intercommunication control	OH-13S - Kit A 63-9072 thru 63-13685 OH-13S - Kit B 63-9072 thru 63-13685 64-15318 thru 64-15432	x		x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change Yes	Wt & Bal Change No	Record on 2408-5 Yes	Record on 2408-5 No
55-2810-204-20/1 Change 1	13 Apr 64 28 Aug 64	Replacement of manifold equalizer pipes and elbows (0-335 series engines)	All aircraft with 0-335 engines		x	x	
-30/1	10 Feb 64	Modification of valve covers (18373), (18374), and (18375) (0-335 series engine)	All 0-335 series aircraft engines having interconnecting oil drains between valve covers		x	x	
		OH-23					
55-1500-208-30/1	17 Apr 67	Installation of engine oil chip detector and cockpit warning light	OH-23B 51-16142 thru 54-4034 OH-23C 55-4060 thru 57-6521 OH-23D 57-2982 thru 59-2786 61-3085 thru 62-3790 OH-23F 59-2787 thru 62-12512 OH-23G 62-3791 thru 62-12873		x	x	
55-1520-206-20/1	29 Nov 67	Installation of transmission vent filter system	OH-23D 57-2982 thru 57-3077 58-5398 thru 58-5505 59-2675 thru 59-2786 61-3085 thru 61-3217 62-3756 thru 62-3790 OH-23F 59-2787 thru 59-2790 61-3218 thru 61-3234 62-12507 thru 62-12512 OH-23G 62-3791 thru 62-3831 63-12765 thru 63-12901 64-15108 thru 64-15317		x	x	
-30/4	27 Jan 67	Installation of a modified armament switch box	OH-23D 57-2982 thru 62-3790 OH-23G 62-3791 thru 62-3831 63-12765 thru 63-12901 64-15108 thru 64-15313		x	x	
-30/5	28 Nov 67	Installation of antenna support adapter	OH-23G 64-15108 thru 64-15317		x	x	
-30/6	31 Nov 67	Provisions for installation of AN/PRC-25 radio set	OH-23G 62-3791 thru 62-3831 63-12765 thru 63-12901 64-15108 thru 64-15317		x	x	
-34/1	1 Nov 63	Installation of separated oil system	All OH-23D aircraft	x		x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change Yes	Wt & Bal Change No	Record on 2408-5 Yes	Record on 2408-5 No
55-1520-206-34/2 Change 1	26 Mar 63 1 Nov 63	Installation of engine shroud cooling fan baffles	All OH-23D aircraft		x	x	
-34/3	26 Mar 63	Removal of control rotor blade fairing	OH-23D 57-2982 thru 59-2762		x	x	
-34/4 Change 3 Change 5	27 Apr 64 4 Mar 66 30 Nov 66	Modification of OH-23D and OH-23G aircraft for installation of machine-gun (M2)	OH-23D and G as required in support of authorized TOE and TA as directed by CONARC theater commander	x		x	
-34/5	22 Mar 63	Rework of main rotor hub assembly (51437-9)	All OH-23D aircraft equipped with 51439-7 main rotor head assembly		x	x	
-34/7 Change 2	3 Jun 63 22 Mar 65	Relocation of transmission oil temperature indicator	OH-23D 57-2982 thru 59-2786 61-3085 thru 62-3790 OH-23G 62-3791 thru 62-3831 63-12765 thru 63-12873		x	x	
-34/8 Change 3	11 Jul 63 22 Dec 64	Modification of OH-23D and OH-23G aircraft for installation of machine-gun (M1E1)	OH-23D and G aircraft as required in support of authorized TOE and TA as directed by CONARC theater commander	x		x	
-34/10 Change 1	22 Jun 63 10 May 66	Shoulder harness installation	OH-23B - Kit A 51-16142 and subsequent OH-23C - Kit A 55-4060 thru 57-6521 OH-23D - Kit B 57-2982 thru 58-5451	x		x	
-34/11 Change 1	2 Sep 64 19 Mar 65	Engine breather installation	All OH-23D aircraft		x	x	
-34/12 Change 3	11 Dec 63 3 Nov 65	Relocation of generator	All OH-23D and F aircraft	x		x	
-34/13	8 Jan 64	Modification of tail rotor yoke cover, oil filler plug	All OH-23D and F aircraft OH-23G 62-3791 thru 62-3831		x	x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change Yes	Wt & Bal Change No	Record on 2408-5 Yes	Record on 2408-5 No
55-1520-206-34/16	23 Jun 65	Increase in mercury content of mercury clutch	OH-23D 57-2982 thru 57-3077 58-5398 thru 58-5505 59-2675 thru 59-2786 61-3085 thru 61-3217 62-3756 thru 62-3790 OH-23F 59-2787 thru 59-2790 61-2318 thru 61-3234 62-12507 thru 62-12512 OH-23G 62-3791 thru 62-3831; 63-12765 and subsequent are modified during production		x	x	
-34/17 Change 1	13 Aug 64 14 Apr 65	Installation of arm-safe light assembly in machinegun (M1E1) equipped aircraft	OH-23D and G as required in support of authorized TOE and TA as directed by CONARC theater commander		x	x	
-34/18	1 Dec 65	Installation of transmission chip detector	OH-23D, F, and G 57-2982 thru 57-3077 58-5398 thru 58-5505 59-2675 thru 59-2786 61-3085 thru 61-3217 62-3756 thru 62-3790 59-2787 thru 59-2790 61-3218 thru 61-3234 62-12507 thru 62-12512 62-3791 thru 62-3831 63-12765 thru 63-12901 64-15108 thru 64-15275		x	x	
-34/19	10 Dec 64	Relocation of transmission oil pressure warning light	OH-23D 57-2982 thru 62-3790 OH-23G 62-3791 thru 62-3831 63-12765 thru 63-12873		x	x	
-40/1 Change 1	27 Jan 66 10 May 66	Installation of torsional coupling assembly and spring coupled accessory drive	OH-23D 58-5398 thru 58-5505 59-2675 thru 59-2747 59-2758 thru 59-2786 61-3085 thru 61-3217	x		x	
-40/2 Change 1	22 May 67 27 Jul 67	Installation of C-1611( )/AIC interphone system and AN/ARC-54 or ARC-31 radio set in OH-23G model helicopters	OH-23G 62-3791 thru 62-3831 63-12765 thru 63-12901	x		x	

MWO No.	Date	Title	Aircraft or Comp Affected	Wt & Bal Change		Record on 2408-5	
				Yes	No	Yes	No
55-1680-200-20/1 Change 2	7 Jun 65 6 Jun 66	Modification of safety lap belts (54H19650) type MD-1 and (54H19651) type MD-2 incorporate spring, lap belt webbing retarder (62B4407)	All belts, aircraft safety lap, type MD-1 (54H19650), type MD-2 (54H19651), type B-18 (51H3977), part numbers 85073, 205-070-749-1, and 134F10247-1 to be installed or currently installed on aircraft		x		x
55-2810-204-20/1 Change 1	13 Apr 64 28 Aug 64	Replacement of manifold equalizer pipes and elbows (0-335 series engines)	All aircraft with 0-335 engines		x	x	
55-2810-207-34/1	28 Jun 65	Replacement of connecting rods (0-540-9 engines)	0-540-9 engines in OH-23F and G		x	x	
55-2900-200-40/1	12 Jun 64	Rework of distributor block on type S6/LN and S6/RN series magnetos to incorporate an oil-impregnated bushing and a dry felt strip	All type S6/LN and S6/RN series magnetos below serial number 63-5578 in stock and/or currently installed		x	x	
55-2925-200-30/25	3 Dec 65	Replacement of shaft in 100 ampere generator	OH-23G 63-12874 thru 63-12901 64-15108 thru 64-15317		x	x	

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