W. J. FITZGERALD.

TM 55-1520-210-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S

MANUAL

ARMY MODEL UH-1D H HELICOPTER

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1969

WARNING

Personnel performing instructions involving operations, procedures, and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury, death, or an aborted mission.

DANGER AREAS AROUND TURBINE ENGINES

The area around the helicopter must be cleared of personnel, other aircraft, and all vehicles before the engine is started because of the high exhaust temperatures and velocities.

DAMGER OF HIGH VOLTAGE CREATED BY STATIC ELECTRICITY IN EXTERNAL CARGO HOOK

A crew member must inform all ground handling personnel of high voltage harzards when making external cargo hookups.

DANGER OF EXPOSURE TO FIRE EXTINGUISHING AGENTS

Exposure to high concentrations of fire extinguishing agents and their decomposition products can cause severe irritation to eyes and nose.

DANGER OF OPERATING ARMAMENT

Do not retract bolt on the M60D machine gun when a hangfire or cook-off is suspected.

DANGER OF VERTIGO FROM LIGHT REFLECTION

Be sure external cargo hook-up mirror is removed and stowed or mirror cover is on before all instrument and night operations. Reflected light from the mirror could cause vertigo.

*TM 55-1520-210-10

TECHNICAL MANUAL
No. 55-1520-210-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *7 May 1969*

Operator's Manual

ARMY MODEL UH-1D/H HELICOPTER

W. J. FITZGERALD

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* This manual supersedes TM 55-1520-210-10, 20 November 1967, including all changes.

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CHAPTER I

INTRODUCTION

SECTION I SCOPE

IMPORTANT

In order to obtain complete information and derive maximum benefits from this manual it is necessary to read this chapter carefully and thoroughly.

1-1. This manual, issued expressly for operators, is an official document for Army Models YUH-1D and UH-1D/H helicopters. Serial numbers of the applicable helicopters are as follows:

ARMY MODEL	SERIAL NO.
YUH-1D	60-6028 thru 60-6034
UH-1D/H	62-2106 thru 62-2113
	62-12351 thru 62-12372
	63-8739 thru 63-8859
	63-12956 thru 63-13002
	64-13492 thru 64-13901
	65-9565 thru 65-9767
	65-9770 thru 65-10113
	65-10117 thru 65-10135
	65-12773 thru 65-12776
	65-12847 thru 65-12852
	65-12857 thru 65-12895
	66-746 thru 66-1210
	66-16000 thru 66-17144
	66-8574 thru 66-8577
	67-17145 thru 67-17312
	67-17313 thru 67-17622
	67-17623 thru 67-17777
	67-17778 thru 67-17859
	67-18411 thru 67-18413
	67-18558 thru 67-18577
	67-19475 thru 67-19537
	68-15214 thru 68-15778
	68-16050 thru 68-16628

The purpose of this manual is to supply you with the latest information and performance data derived from flight test programs and operation experience. The study and use of this manual will enable you to perform and assigned duties and missions with maximum efficiency and safety.

1-2. Your ability and experience are recognized. It is not the function of this manual to teach the pilot how to fly; basic flight principles and elementary instructions are not included. The contents of this manual will provide you with a general knowledge of Army Models YUH-1D and UH-1D/H helicopters, their flight characteristics and specific normal and emergency operating procedures.

1-3. Reports necessary to comply with the Army Safety Program are described in detail in AR 385-40.

1-4. DA Forms and procedures used for equipment maintenance will be only those prescribed by TM 38-750.

1-5. Equipment serviceability criteria applicable to Army Models YUH-1D and UH-1D/H helicopters are presented in TM 55-1520-210-ESC.

SECTION II GENERAL

1-6. Notes, Cautions, and Warnings shall be used to emphasize important and critical instructions and shall be used for the following conditions:

Note

An operating procedure, condition, etc., which it is essential to highlight.

Caution

An operating procedure, practice, etc., which, if not strictly observed, will result in damage to or destruction of equipment.

Warning

An operating procedure, practice, etc., which, if not correctly followed, will result in personnel injury or loss of life.

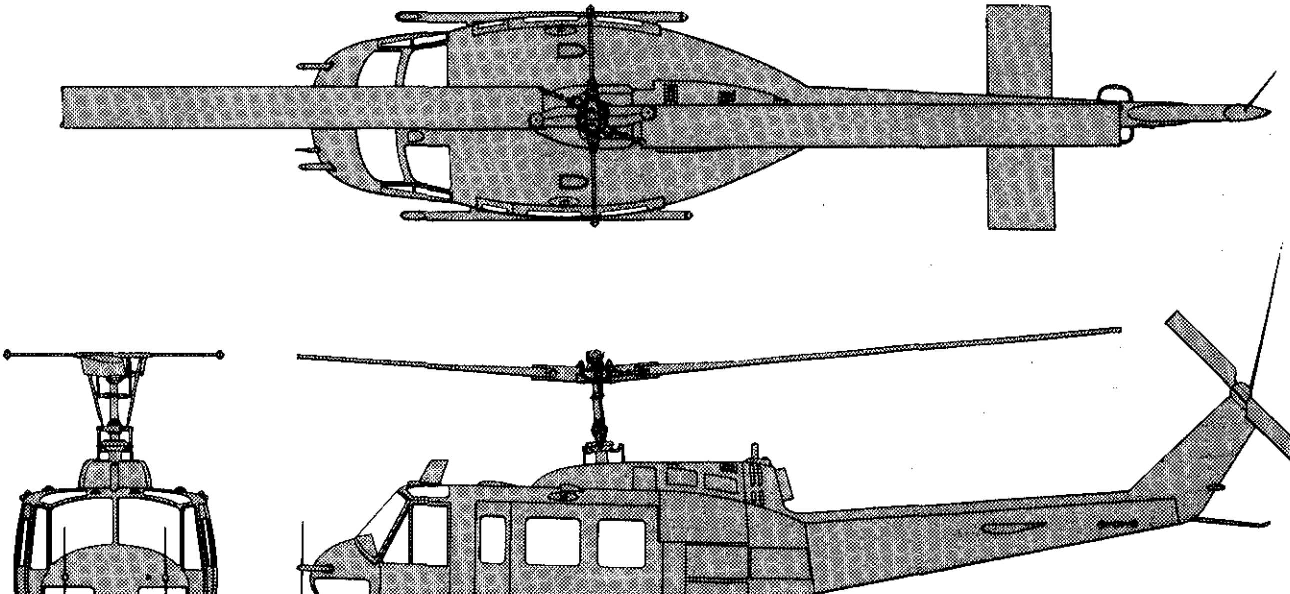
1-7. Report of errors, omissions, and recommendations improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to: Commanding General, U.S. Army Aviation Systems Command, ATTN: AMSAV-R-M, Box 209, St. Louis, Missouri 63166".

1-8. When information applies to a specific model, a code system has been used and is as follows:

D	UH-1D only	(T53-L-9, T53-L-9A or T53-L-11 series engine)
H	UH-1H only	(T53-L-13 engine)

No code applies to YUH-1D, UH-1D and UH-1H.

S	L-11S	(L-11 series engine)



The Helicopter

CHAPTER 2

DESCRIPTION

SECTION I SCOPE

2-1. SCOPE.

2-2. The function of Chapter 2 is to describe the helicopter and all its systems and controls which contribute to the physical act of flying the helicopter.

2-3. Includes in this chapter is all the emergency equipment that is not part of the auxiliary system. This chapter contains description only. The procedures are covered elsewhere in this manual.

SECTION II AIRCRAFT SYSTEMS AND CONTROLS DESCRIPTION

2-4. THE AIRCRAFT.

2-5. The YUH-1D, UH-1D and UH-1H helicopters, manufactured by Bell Helicopter Company, are military type aircraft of a compact design, featuring a low silhouette and low vulnerability in order to meet combat requirements. A wide cargo-passenger compartment, with large cubic foot volume, permits the helicopter to be used in a variety of services: for transport of personnel, special teams or crews, and equipment and supplies; for medical evacuation and emergency ambulance service and as an instrument trainer. This helicopter is capable of operating from unprepared take-off landing areas, under instrument (IFR) conditions (including light icing), day or night. It can be navigated by dead reckoning or by using radio aids to navigation. Maximum visibility is afforded the pilot and crew by use of transparent plastic panels at the top, front, bottom, and sides of the cabin. The gross weight of the aircraft for take-off on a NASA standard day from a firm dry surface at sea level is 9500 pounds.

2-6. CABIN CONFIGURATION AND ACCESS.

2-7. Entrance is accomplished by means of four doors. Crew entrance is through the two swing-hinged doors located in the forward cabin next to the pilot's and copilot's stations. Entrance to the cargo-passenger area aft of the pilot's and copilot's stations is accomplished by means of two large sliding doors, one on each side of the aft cabin area. The cargo-passenger area provides seating for a maximum of eleven passengers or troops. Removing the passenger seats and the copilot's seat provides an unrestricted loading space for cargo or equipment transportation. For medical evacuation and ambulance service, the area aft of the crew may be utilized to accommodate six litter patients and a medical attendant.

2-8. PROPULSION.

2-9. The propulsion system consists of the engine and drive system and is located aft of the cabin and mounted above the fuselage on a platform which provides footing for maintenance personnel while servicing the helicopter. The engine and drive system are enclosed by cowling that can be quickly opened or removed for easy access. This drive system with its independently mounted units and quick disconnect couplings, allows rapid servicing, and repair or replacement under combat conditions without the use of special tools or ground equipment.

2-10. AIRFRAME.

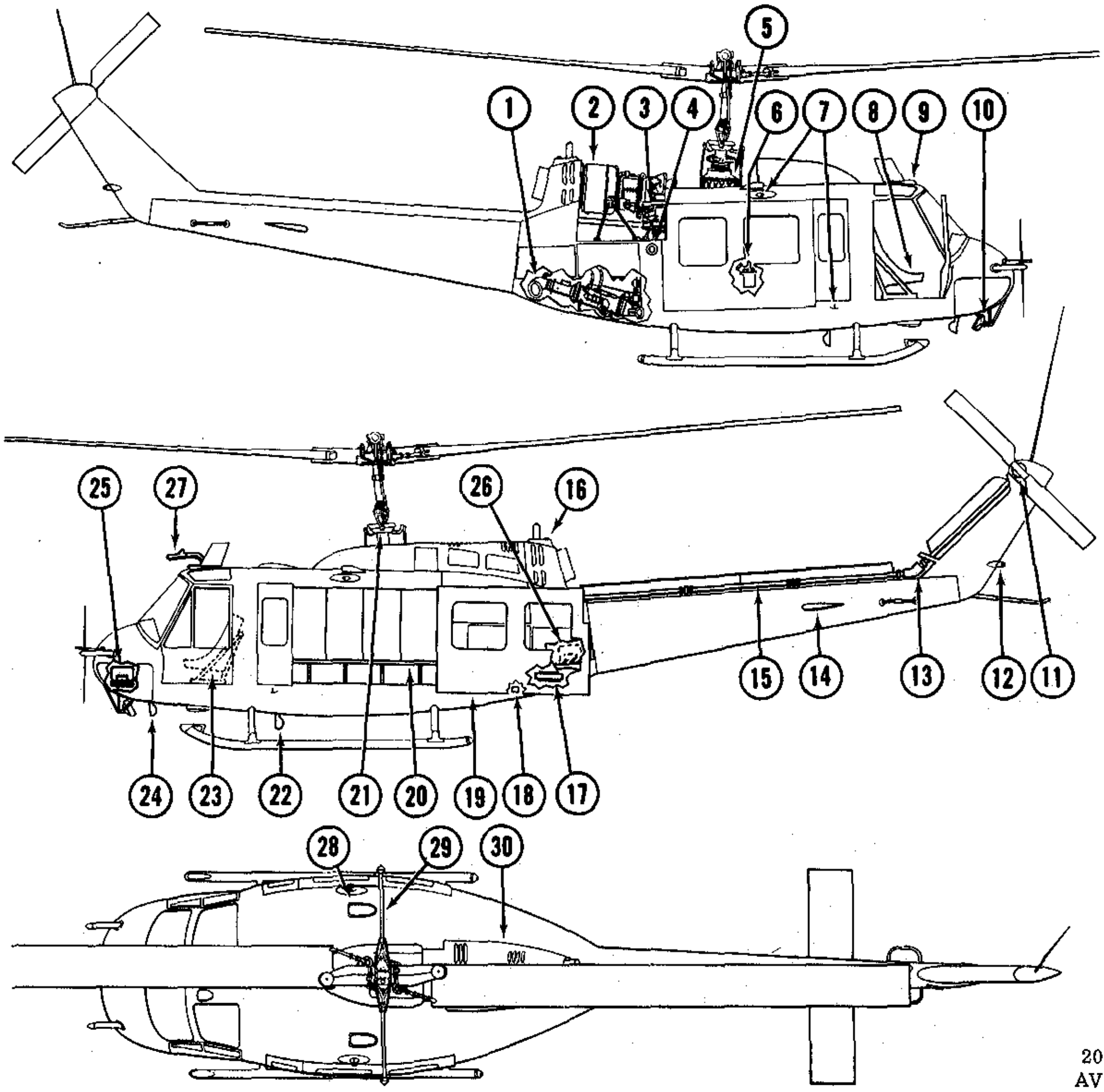
2-11. The fuselage consists of two main sections, the forward (cabin) section, and the aft (tail boom) section. The forward fuselage section consists primarily of two longitudinal beams with transverse bulkheads and metal covering. The beams provide the supporting structure for the cabin sections, landing gear, fuel tanks, transmission, engine, and tail boom and are attaching points for the external cargo suspension unit. The aft (tail boom) section is a semimonocoque structure with metal covering and attaches to the forward fuselage section with bolts to allow easy removal for repair or replacement. The rear of the tail boom supports the tail rotor, vertical fin, and synchronized elevator. The landing gear is of the skid type, attached to the fuselage at four points. Ground handling wheels are provided in the loose equipment and are quickly installed for moving the helicopter on the ground or removed to present a clean configuration for flight.

2-12. CREW CONFIGURATION.

2-13. The crew required for operation of the helicopter consists of the pilot alone, pilot and rescue hoist operator, pilot and medical attendant, or pilot and copilot, depending on the mission assigned.

2-14. PRINCIPAL DIMENSIONS - MAXIMUM.

2-15. Maximum dimensions of the helicopter are as specified in table 2-1.



205900-15C
AV 054501

1. Heating Burner and Blower Unit
2. Engine
3. Oil Tank Filler
4. Fuel Tank Filler
5. Transmission
6. Hydraulic Reservoir
7. Forward Navigation Lights (4)
8. Pilot's Station
9. Forward Cabin Ventilator (2)
10. Cargo Suspension Mirror
11. Tail Rotor (90°) Gear Box
12. Aft Navigation Light
13. Tail Rotor Intermediate (45°) Gear Box
14. Synchronized Elevator
15. Tail Rotor Drive Shaft
16. Anti-Collision Light
17. Oil Cooler
18. External Power Receptacle
19. Cargo-Passenger Door
20. Passenger Seats Installed
21. Swashplate Assembly
22. Landing Light
23. Copilot's Station
24. Search Light
25. Battery
26. Alternate Battery Location (Armor Protection Kit)
27. Pitot Tube
28. Aft Cabin Ventilators (2)
29. Stabilizer Bar
30. Engine Cowling

Figure 2-1. General arrangement diagram

TABLE 2-1. PRINCIPAL DIMENSIONS

LENGTH	
Overall (main rotor fore and aft and tail rotor horizontal)	57 ft. 0.67 in.
Overall (main rotor fore and aft and tail rotor vertical) to aft end of tail skid	54 ft. 1.67 in.
Nose of cabin to aft end of vertical fin (tail rotor vertical)	41 ft. 5.0 in.
Nose of cabin to aft end of tail rotor (tail rotor horizontal)	44 ft. 10.0 in.
Nose of cabin to center line of main rotor	11 ft. 8.65 in.
Skid Gear	12 ft. 2.0 in.
WIDTH	
Synchronized Elevator	9 ft. 4.3 in.
Skid Gear	8 ft. 6.6 in.
Stabilizer Bar	9 ft. 0.5 in.
HEIGHT (to static ground line)	
Tip of main rotor forward blade	
Secured aft	17 ft. 1.49 in.
Pressed down forward	7 ft. 9.19 in.
Top tip of tail rotor vertical	14 ft. 8.20 in.
Top of stabilizer bar	13 ft. 7.40 in.
Top of cabin	6 ft. 8.13 in.
Bottom of cabin	1 ft. 3.48 in.
Tail rotor clearance (ground to tip, rotor turning)	6 ft. 3.0 in.
Tail skid to ground	4 ft. 9.0 in.
DIAMETER (swept circle)	
Main rotor	48 ft. 3.2 in.
Tail rotor	8 ft. 6.0 in.
Stabilizer bar	9 ft. 0.5 in.
Turning radius	34 ft. 0.4 in.

2-16. WEIGHTS.

2-17. Refer to Chapter 12, Weight and Balance Computation.

2-18. ENGINE.

2-19. The helicopter is equipped with one of the following engines: T53-L-9, -9A, -11. -11B, or -13. The engines are similar in design and, except for stated differences (table 2-2), will be treated as one engine in the description. The turbine engine and its accessories are located aft of the cabin and mounted on a platform deck to provide maximum accessibility for servicing and maintenance (figure 2-2). This engine is a free turbine type designed for low fuel consumption, minimum size and weight, and maximum performance.

2-20. The free-power part of the engine eliminates the need for a clutch and provides free, smooth and trouble-free engagement of the helicopter's rotor. The T53-L-9, -9A, and -11 series engines are rated at 900 hp at 6600 rpm for maximum continuous power minus installation losses. The T53-L-13 engine is rated at 1250 hp; however, the engine is torque limited by the pilot to 1100 hp for military and normal power.

2-21. SAND AND DUST SEPARATOR.

2-22. The T53-L-9, -9A, -11 series, and -13 engines are equipped with a unit, mounted on the inlet housing, to separate sand and dust particles from the air entering the engine. This reduces erosion of engine parts. Particles removed from inlet air are held in box assemblies containing porous plastic foam inserts. The box assemblies can be easily removed for inspection and cleaning. Other components used with the sand and dust separator are ENG AIR FILTER CONT circuit breaker on overhead console, an engine air differential pressure switch, and an ENGINE INLET AIR warning light in the instrument panel.

Note

The ice detector system is not applicable on helicopters equipped with the sand and dust separator unit.

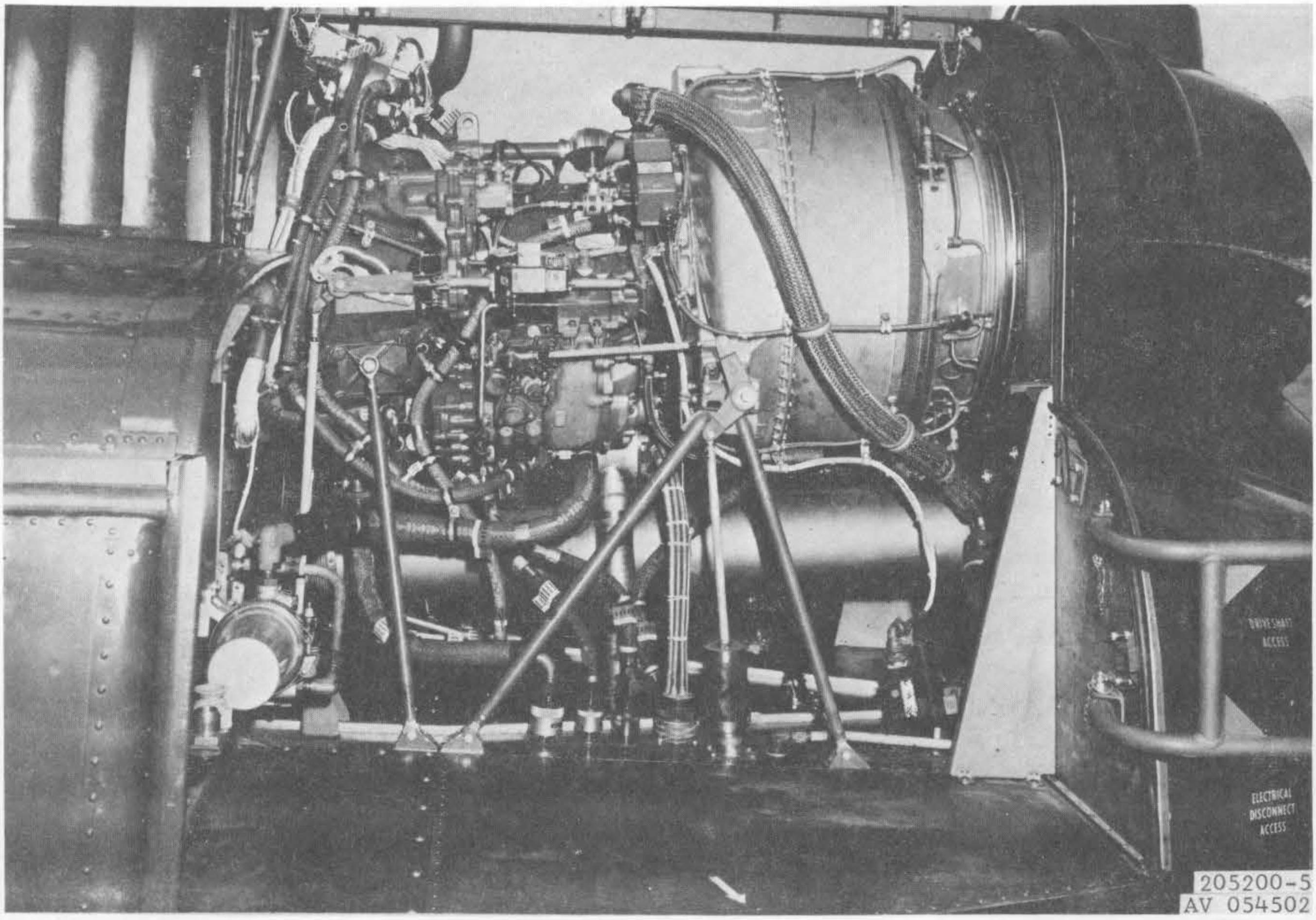


Figure 2-2. Engine Installation

TABLE 2-2. COMPARISON OF T53-L-9, -9A, -11 SERIES AND -13 ENGINES

	T53-L-9	T53-L-9A	T53-L-11/-11B	T53-L-13
*Power Rating in Shaft hp (min)				
Take-off	1100	1100	1100	N/A
Military	1000	1000	1000	1400****
Normal	900	900	900	1250****
75% Normal	675	675	675	938
*Fuel Consumption in lbs/hr				
Take-off	750.2	750.2	750.2	
Military	690	690	690	812
Normal	631.8	631.8	631.8	750
75% Normal	514.4	514.4	514.4	622
JP-5 Fuel Use	***Emergency	***Emergency	Alternate	Alternate
Dry Weight	485 lbs	490 lbs	505 lbs	535 lbs
Ignition Nozzles	5	5	2	4
Combustor	Scoops Coated	Scoops Coated	Scoopless Uncoated	Scoopless Uncoated
Bleed Air Extraction Point	Compressor	Diffuser	Diffuser	Diffuser
Fuel Control Assembly (connection to interstage airbleed assembly)	No	No	Yes	Yes
Interstage Airbleed Systes (Acceleration	Yes	Yes	**Yes	**Yes
Acceleration - Flight Idle to Military	4.5 sec (max)	4.5 sec (max)	3.5 sec (max)	3.5 sec (max)

*Horsepower and Fuel Consumption ratings are based on sea level standard day conditions (plus 59°F, 29.92 inches Hg).

**Also responds to transient speed changes in operating range.

***Grade JP-5 as alternate only after incorporation of the Scoopless Combustor.

****This transmission is limited to 1100 hp.

Caution

> When operating at outside air temperatures of 40°F or below, icing of the engine air inlet screens can be expected. Ice accumulation on the inlet screens can be detected by illumination of the "Engine Inlet Air" warning light. Continued accumulation of ice will result in partial or complete power loss. It should be noted that illumination of the "Engine Inlet Air" warning light indicates blockage at the inlet screen only and does not reveal icing conditions in the sand and dust separator or on the FOD screen.

2-23. DIFFERENCES.

2-24. The T53-L-9A engine is the same as the T53-L-9, except for relocation of the bleed air take-off point. On the T53-L-9 engine, the bleed air is taken from the inlet side of the impeller and delivered through a port on the top of the compressor housing. On the T53-L-9A, -11 series, and -13 engines, bleed air for driving the oil cooling fan and for heating purposes is taken from the outlet side of the impeller. T53-L-11 engines with serial numbers ending with A, T53-L-11B, and T53-L-13 engines have an improved output reduction gear and gear assembly and are identical except for the power output shaft. The T53-L-11 whose serial numbers end in A have a shaft with 24 teeth while the T53-L-11B and T53-L-13 shafts have 26 teeth.

2-25. ENGINE FUEL CONTROL SYSTEM.

2-26. The engine fuel control system consists of the engine fuel regulator and engine overspeed governor, solenoid valve, starting fuel and main fuel manifolds, igniter nozzles, fuel vaporizers, and igniter plugs. The electrical cable assembly is connected to the fuel system at two points: at the solenoid valve and at the main fuel control assembly. The coil and lead assembly connects to the igniter plugs. From the helicopter fuel tanks, fuel enters and passes through the fuel regulator assembly to the starting and main discharge ports. The starting fuel flows to a solenoid valve which is wired in with the ignition system. Energizing the ignition system actuates the solenoid valve, which allows starting fuel to enter the starting fuel manifold and combustion chamber through igniter nozzle assemblies. The igniter plugs initiate the flame. After combustion occurs and the ignition system is de-energized, the solenoid valve shuts off the starting fuel flow. Main fuel is delivered to the main fuel system when the engine rpm is great enough to deliver minimum fuel pressure. Main fuel flow is maintained as the engine flame is propagated. After an engine shutdown, a pressure-actuated valve automatically drains any remaining unburned fuel from the combustion chamber. Engine fuel control is accomplished by a hydro-mechanical type fuel control system consisting of a fuel regulator assembly and an overspeed governor assembly. An emergency fuel metering system is also provided as an integral part of the fuel control system. The fuel control regulator assembly supplies metered fuel to the solenoid valve and to the engine starting and main fuel manifolds by means of a fuel metering pump. A main governor, incorporated in the regulator assembly, determines the rate at which metered fuel is supplied to the engine in relation to the gas producer turbine speed (nI), altitude, compressor, inlet temperature, and manual throttle selection. The regulator assembly limits engine fuel flow to the maximum permissible rate under all operating conditions. The overspeed governor assembly is mounted on the fuel control regulator assembly and functions to reduce the fuel flow when power turbine speed (nII) exceeds the selected rpm.

2-27. FUEL CONTROL SYSTEM OPERATION. Fuel flow control is accomplished by operation of switches located on the pedestal-mounted ENGINE control panel (figure 2-3). The panel contains two FUEL switches (MAIN ON/OFF and *START ON/OFF), two INT FUEL TRANS PUMP switches (LEFT/OFF and RIGHT/OFF), and a GOV AUTO/EMER switch. The engine fuel and power control system permits the pilot to obtain maximum performance from the engine with a minimum of attention.

***Note**

> FUEL START switch not applicable on helicopters serial Nos. 66-8574 through 66-8577, 66-16034 and subsequent, and earlier models so modified.

2-28. EMERGENCY FUEL FLOW. The switchover to emergency fuel flow is accomplished by retarding the power control (throttle), moving the GOV AUTO/EMER switch on the ENGINE panel to EMER. The emergency control manually meters fuel to the engine without the incorporation of any automatic features. It is possible to fly the helicopter by utilizing smooth, coordinated use of the rotating power control.

H Note

> During extended operation in the EMERGENCY mode, set the governor INCREASE-DECREASE switch to the minimum position to preclude the possibility of bleed band popping (opening and closing).

2-29. POWER CONTROL (THROTTLE).

2-30. The rotating grip-type power controls (28, figure 2-4) are located on the collective pitch control levers (pilot and copilot). The power control is a simple single throttle grip which is used for starting engine, adjusting to flight idle and full open, autorotational landings, and in full decrease serves as idle cutoff.

The throttle grip is rotated to the left to increase or to the right to decrease power. Friction can be induced into the throttle grip by rotating the ring at the upper end of the throttle grip. Rotating the ring to the left increases friction in the system and prevents grip slippage. A 28-volt DC powered solenoid-operated idle detent is incorporated in the throttle to prevent inadvertent closing of the throttle during flight or ground run. To bypass the idle detent, depress and hold the engine idle release switch and close throttle. The idle detent limits only the decrease rotation of the rotating grip. The gas producer speed governor safeguards the engine against overloading; and on acceleration and deceleration, the control prevent engine damage or combustion blowout due to sudden changes in power selection made at any rate and in any sequence.

2-31. STARTER-IGNITION SYSTEM.

2-32. Combination starter-ignition trigger-actuated snap switches (31, figure 2-4) (pilot and copilot) are mounted on the undersides of the collective pitch control lever switch boxes. Both the starter and ignition unit circuits are wired to these trigger switches, as the engine ignition will only be required while accomplishing engine starts.

2-33. POWER SUPPLY.

2-34. The circuits are supplied power from the 28-volt DC essential bus. The starter circuit is actuated with the STARTER/GEN switch is in START position and the trigger switch (31, figure 2-4) is pulled. The ignition circuit is actuated when the FUEL MAIN ON/OFF switch on the ENGINE control panel is ON and the trigger switch is pulled.

2-35. GOVERNOR RPM SWITCH.

2-36. The GOV RPM INCR/DECR switch is mounted in a switch box attached to the end of the collective pitch control lever (figure 2-4). The switch (30) is a three-position momentary type and is held up in INCR position to increase the power turbine (nII) speed or down to DECR position to decrease the power turbine (nII) speed. Electrical power for circuit operation is supplied by the 28-volt DC essential bus.

2-37. DROOP COMPENSATOR.

2-38. A droop compensator is installed on the governor control to maintain (nII) speed, as power is increased, to the rpm value selected by the pilot. Governor droop should not be confused with rpm variations due to the acceleration-deceleration limiters (transient droop), or exceeding maximum power limits. Rapid movements of the collective control stick may require power changes at a rate in excess of the capabilities of the engine.

2-39. ENGINE IDLE RELEASE SWITCH.

2-40. The ENGINE IDLE REL switch (26, figure 2-4) is a pushbutton momentary-on type switch mounted in a switch box attached to the end of the collective pitch control lever. The pushbutton switch operates an electrical solenoid with a retractable plunger. The solenoid is mounted so that the plunger acts as a stop in the power control system linkage. The stop prevents the pilot from accidentally retarding the power control beyond the flight idle position. This acts as a safety feature by preventing inadvertent engine shutdown. The switch need not be depressed when opening the throttle; however, the switch must be depressed when it is desired to retard the power control below the flight idle position. Electrical power for circuit operation is supplied by the 28-volt DC essential bus. Circuit protection is provided by IDLE STOP REL circuit breaker on the DC circuit breaker panel (figure 2-11).

2-41. ENGINE INSTRUMENTS AND INDICATORS.

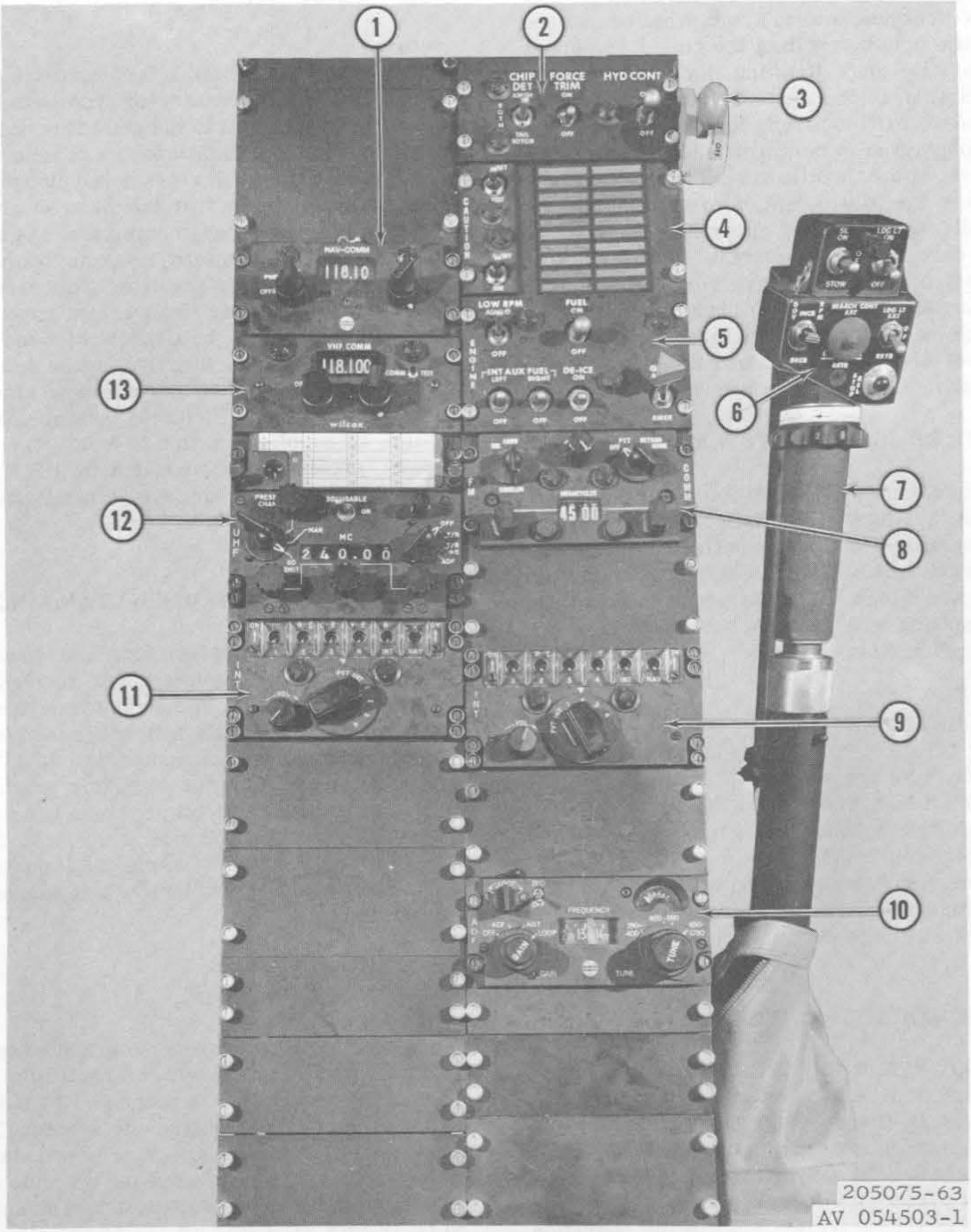
2-42. All engine instruments and indicators are mounted in the instrument panel (figure 2-5) and the pedestal (figure 2-3). The engine instruments and indicators consist of the following: torquemeter, exhaust gas temperature indicator, dual tachometer, gas producer tachometer indicator, engine oil pressure indicator, engine oil pressure low caution light, engine oil temperature indicator, fuel quantity indicator, fuel gage test switch, fuel quantity caution light, fuel pressure indicator, and engine fuel pump caution light.

2-43. TORQUEMETER.

2-44. The pressure torquemeter indicator (24, figure 2-5) is located in the center area of the instrument panel. This indicator is connected to a transmitter which is part of the engine oil system. The torquemeter indicates torque pressure in pounds per square inch readings of torque imposed upon the engine output shaft. The torquemeter electrical circuit is powered by 28-volt AC and is protected by a circuit breaker labeled TORQUE in the AC circuit breaker panel on the right side of the pedestal (figure 2-12).

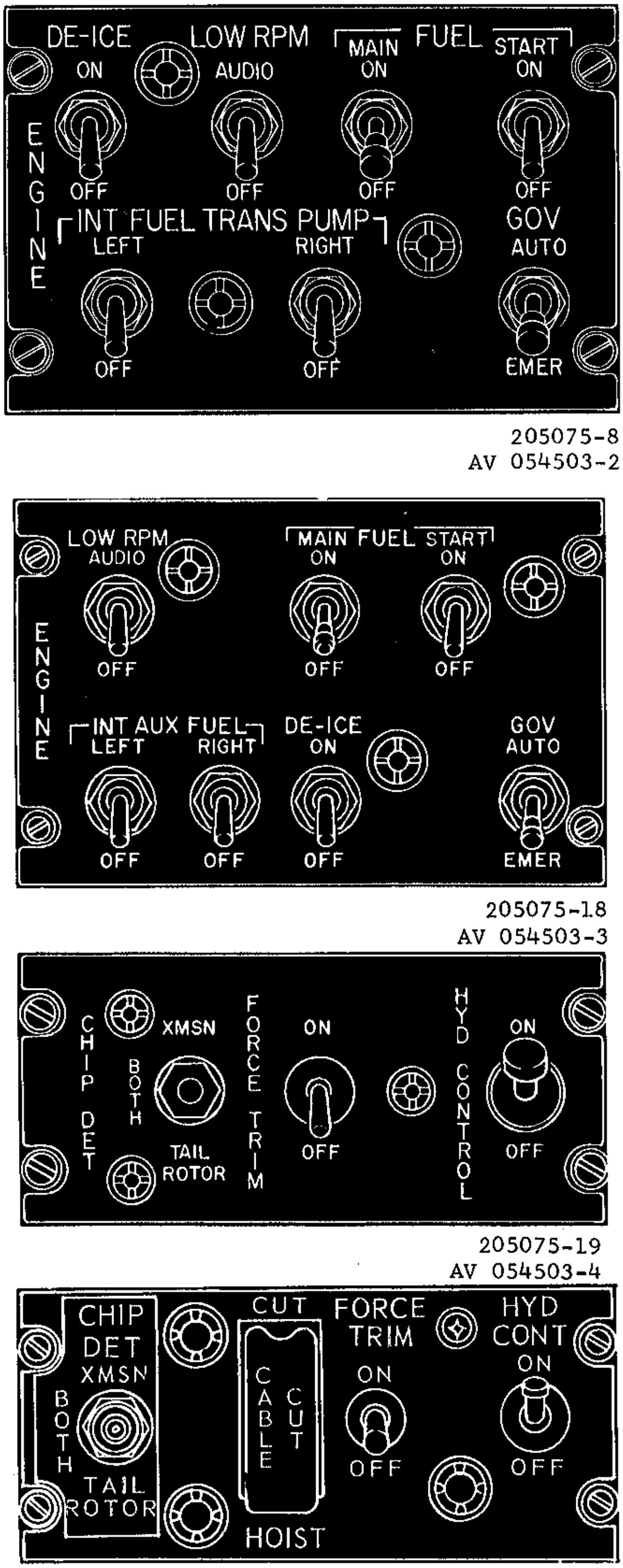
2-45. EXHAUST GAS TEMPERATURE INDICATOR.

2-46. The exhaust gas temperature indicator (see 38, figure 2-5) is located in the center area of the instrument panel. The indicator receives temperature indications from the bayonet-type thermocouples mounted in the engine exhaust diffuser section forward of the tailpipe. The temperature indications are in degrees centigrade multiplied by 100. Electrical power is not required as the system is self-generating.



1. Navigation Control Panel C-6873/ARN-82
2. Hydraulic Control Panel
3. Heating Air Directing Lever
4. Caution Panel
5. Engine Control Panel
6. Switch Box - Collective Pitch Control Lever (Ref)
7. Collective Pitch Control Lever (Ref)
8. FM Control Panel C-3835/ARC-54
9. Signal Distribution Panel C-1611A/AIC
10. Direction Finder Control Panel - C6899/ARN-83
11. Signal Distribution Panel C-1611A/AIC
12. UHF Control Panel C-6287/ARC-51BX
13. VHF Control Panel C-7197/ARC-134

Figure 2-3. Pedestal panel installation - typical (Sheet 1 of 2)



205075-8
AV 054503-2

205075-18
AV 054503-3

205075-19
AV 054503-4

205075-22
AV 054503-5

Figure 2-3. Pedestal panel installation - typical (Sheet 2 of 2)

2-47. DUAL TACHOMETER.

2-48. The dual tachometer is located in the center area of the instrument panel and indicates both the engine and main rotor rpm (figure 2-5). The outer scale of the indicator is for power turbine (engine) rpm. The smaller inner scale is for the main rotor rpm. Power for operation of the indicators is provided by tachometer generators mounted on the engine and transmission. These systems are self-generating; therefore, an electrical connection to the helicopter's electrical system is not required. Normal operation of the helicopter is evident when the power turbine (engine) and rotor rpm indicator needles are in synchronization.

2-49. GAS PRODUCER TACHOMETER INDICATOR.

2-50. The gas producer tachometer indicator is located on the instrument panel in front of the pilot (31, figure 2-5). This indicator registers the rpm of the gas producer turbine and is powered by a tachometer generator which is geared to the engine rotor shaft therefore, a connection to the helicopter's electrical system is not required. The indicator readings are in percent rpm of gas producer turbine speed. The gas producer tachometer, when used in conjunction with the exhaust gas temperature indicator, permits engine power to be accurately set without exceeding engine limitations.

2-51. ENGINE OIL PRESSURE INDICATOR.

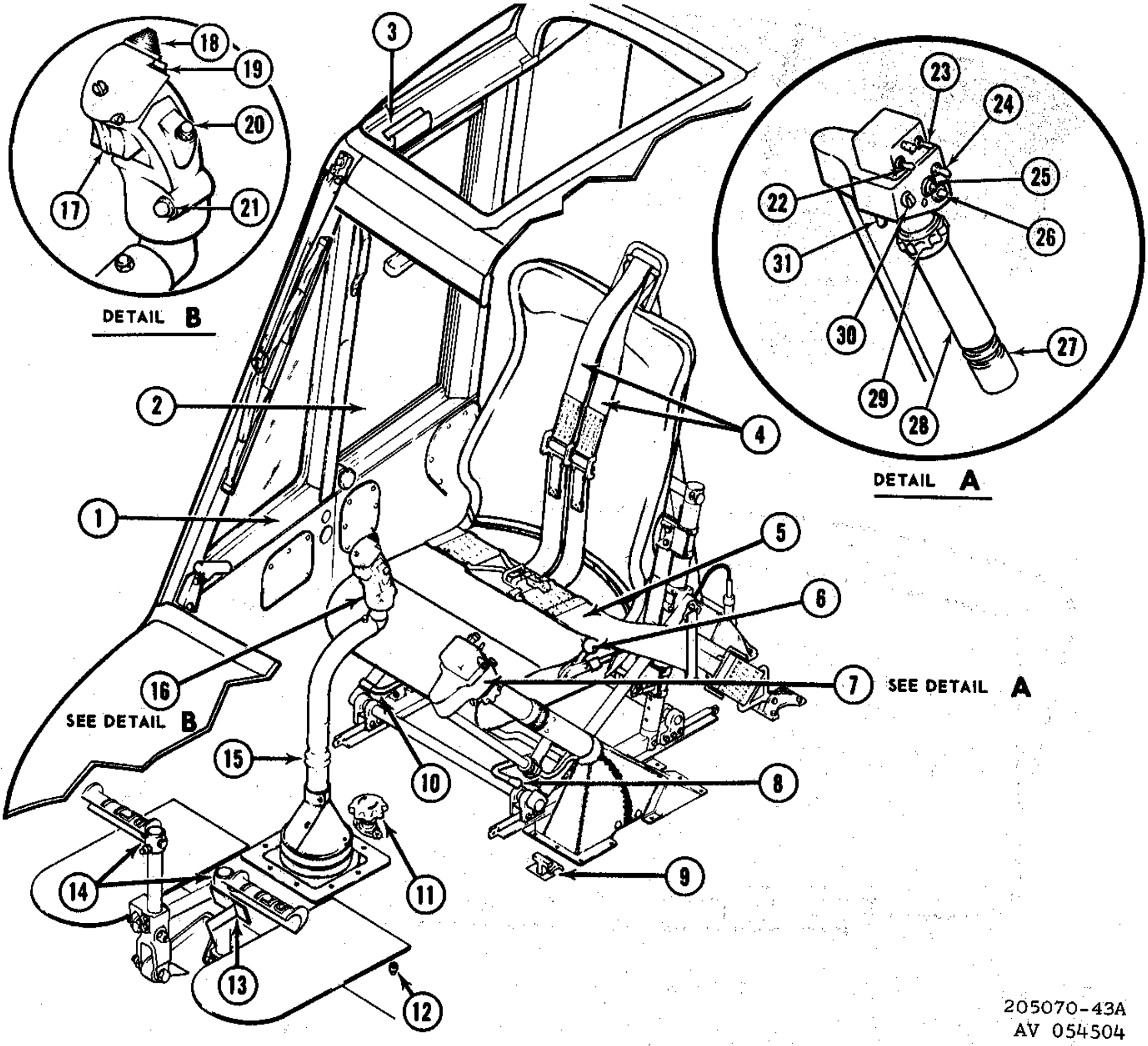
2-52. The engine oil pressure indicator is located in the center area of the instrument panel (16, figure 2-5). The indicator receives pressure indications from the engine oil pressure transmitter and provides readings in pounds per square inch (psi). Electrical power for oil pressure indicator and transmitter operation is supplied by the 28-volt AC system. Circuit protection is provided by the ENG circuit breaker on the AC circuit breaker panel (figure 2-12).

2-53. ENGINE OIL PRESSURE LOW CAUTION LIGHT.

2-54. The ENGINE OIL PRESS caution light is located on the pedestal-mounted CAUTION panel (figure 2-14). The light is connected to a low pressure switch which, when pressure drops below a safe limit, closes an electrical circuit, causing the caution light to illuminate. The circuit is supplied power by the 28-volt DC essential bus.

2-55. ENGINE OIL TEMPERATURE INDICATOR.

2-56. The engine oil temperature indicator is located in the center area of the instrument panel (17, figure 2-5). This indicator is connected to an electrical resistance-type thermocouple and indicates the temperature of the engine oil at the engine oil inlet. Electrical power to operate this circuit is supplied by



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1. Pilot's Entrance Door
2. Sliding Window Panel
3. Hand Hold
4. Shoulder Harness
5. Safety Belt
6. Shoulder Harness Lock-Unlock Control
7. Collective Pitch Control Lever
8. Seat Adjustment Fore and Aft
9. Collective Pitch Down Lock
10. Seat Adjustment Vertical
11. Directional control Pedal Adjuster
12. Radio Transmit Foot Switch
13. External Cargo Mechanical Release
14. Directional Control Pedals
15. Cyclic Control Friction Adjuster
16. Cyclic Control Stick
17. Radio Transmit, ICS Trigger Switch
18. ASW-12 Directional Switch
19. Force Trim Switch
20. Armament Fire Control Switch
21. External Cargo Electrical Release Switch
22. Search Light ON-OFF Stow Switch
23. Landing Light ON-OFF Switch
24. Landing Light EXTEND-RETRACT Switch
25. Search Light EXTEND-RETRACT LEFT-RIGHT Control Switch
26. Engine Idle Release Switch
27. Collective Pitch Control Friction Adjuster
28. Throttle Twist Grip
29. Throttle Friction Adjuster
30. Governor RPM INCREASE-DECREASE Switch
31. Starter Ignition Trigger Switch

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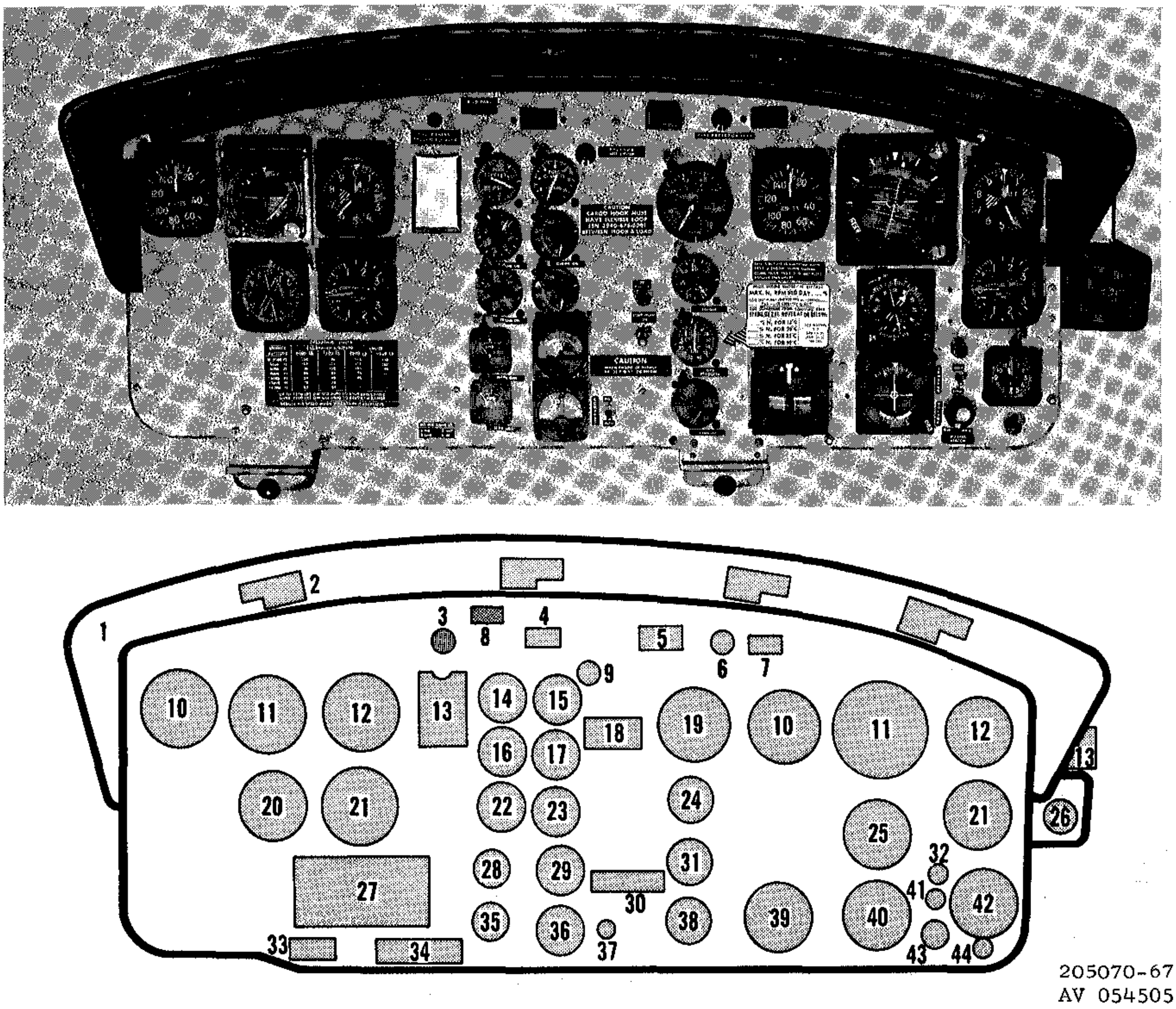
Figure 2-4. Pilot's station - typical



1. Glare Shield
2. Secondary Lights
3. Engine Air Filter Light
4. Master Caution
5. RPM Warning Light
6. Fire Detector Test Switch
7. Fire Warning Indicator Light
8. Radio Call Designator
9. Fuel Gage Test Switch
10. Airspeed Indicator
11. Attitude Indicator
12. Altimeter Indicator
13. Compass Correction Card Holder
14. Fuel Pressure Indicator
15. Fuel Quantity Indicator
16. Engine Oil Pressure Indicator
17. Engine Oil Temperature Indicator
18. Cargo Caution Decal
19. Dual Tachometer
20. Radio Compass Indicator
21. Vertical Velocity Indicator
22. Transmission Oil Pressure Indicator
23. Transmission Oil Temperature Indicator
24. Torquemeter Indicator
25. Radio Compass Indicator
26. Standby Compass
27. Operating Limits Decal
28. Main Generator Loadmeter
29. DC Voltmeter
30. Engine Caution Decal
31. Gas Producer Tachometer Indicator
32. Marker Beacon Light
33. Engine Installation Decal
34. Transmitter Selector Decal
35. Standby Generator Loadmeter
36. AC Voltmeter
37. Compass Slaving Switch
38. Exhaust Gas Temperature Indicator
39. Turn and Slip Indicator
40. Omni Indicator
41. Marker Beacon Sensing Switch
42. Clock
43. Marker Beacon Volume Control
44. Cargo Release Armed Light

Figure 2-5. Instrument panel - typical

the 28-volt DC essential bus. Circuit protection is provided by the TEMP IND ENG & XMSN circuit breaker on the DC circuit breaker panel (figure 2-11).

2-57. FUEL QUANTITY INDICATOR.

2-58. The fuel quantity indicator is located in the upper center area of the instrument panel (15, figure 2-5). This instrument is a transistorized electrical receiver which continuously indicates the quantity of fuel in pounds. The fuel quantity indicator is connected to two capacitor-type fuel transmitters mounted in the interconnected fuel cells (one in the right-hand forward cell and one in the center aft cell). The advantage of this indicator system is that quantity volumes are more correctly indicated and not materially affected by varying temperatures. The indicator readings shall be multiplied by 100 to obtain fuel quantity in pounds. Electrical power for operation is supplied by the 115-volt AC system. Circuit protection is provided by the FUEL QTY circuit breaker on the AC circuit breaker panel (figure 2-12).

2-59. FUEL GAGE TEST SWITCH.

2-60. The fuel gage test switch is located above the fuel quantity indicator on the instrument panel. This switch is a pushbutton momentary-on type and functions to provide a means of testing the indicator and circuit for operation. When the switch is depressed and held in, the fuel quantity indicator pointer moves from the actual quantity reading towards a lesser quantity reading. Upon release of the test switch, the indicator needle will return to the actual fuel reading.

2-61. FUEL QUANTITY CAUTION LIGHT.

2-62. The 20 MINUTE FUEL caution light is located on the pedestal mounted CAUTION panel (figure 2-14). The light switch assembly is a float switch tupe and is located in the left-hand fuel cell. The switch functions to close the circuit and illuminates the light when there is approximately enough fuel remaining for 20 minutes flight time at cruise power. Electrical power for circuit operation is supplied by the 28-volt DC essential bus.

2-63. FUEL PRESSURE INDICATOR.

2-64. The fuel pressure indicator (14, figure 2-5) is located in the upper center area of the instrument panel. This indicator provides pounds per square inch (psi) readings of the fuel as delivered from the tank-mounted fuel boost pumps to the engine driven pump. The fuel pressure indicator is connected to a pressure transmitter, powered by 28-volt AC, which electrically transmits the actual psi fuel pressure reading to the fuel pressure indicator.

2-65. ENGINE FUEL PUMP CAUTION LIGHT.

2-66. The engine fuel pump caution light is located on the pedestal-mounted CAUTION panel (figure 2-14). The light is connected electrically to a fuel differential pressure switch at the engine driven dual element fuel pump. (See the fuel system schematic diagram, figure 2-8). A failure of either fuel pump element will cause a differential fuel pressure which is at once sensed by the differential pressure switch thus closing the electrical circuit and illuminating the caution light. When illuminated, the caution light segment wording will read ENGINE FUEL PUMP, providing visual indication of an engine driven fuel pump failure. The caution light and pressure switch are supplied power by the 28-volt DC essential bus.

2-67. EMERGENCY FUEL CONTROL CAUTION LIGHT.

2-68. The emergency fuel control caution light is located on the pedestal mounted caution panel (figure 2-14). The worded segment (GOV EMER) when illuminated provides the pilot with a reminder that the engine fuel is being metered by means of the emergency fuel system.

2-69. ENGINE CHIP DETECTOR WARNING LIGHT.

2-70. A magnetic insert is installed in the engine to provide a means for detecting metal particles. Indication of particles present is given by the illumination of the ENGINE CHIP DET caution light.

2-71. SAND AND DUST SEPARATOR FILTER WARNING LIGHT.

2-72. The ENGINE INLET AIR warning light is mounted on the upper area of the instrument panel (figure 2-5). When the filter becomes clogged, a differential pressure switch senses this condition and closes contacts to energize the filter warning light. The ENGINE INLET AIR, warning light illuminates, alterting the pilot to a clogged filter. As conditions permit the pilot shall proceed to the nearest authorized landing area for cleaning of sand and dust separator filters.

2-73. TRANSMISSION SYSTEM.

2-74. The transmission (5, figure 2-1) is mounted forward of the engine and coupled to the power turbine shaft at the cool end of the engine by means of a short drive shaft. The transmission is basically a reduction gearbox functioning to transmit engine power at a reduced rpm to the main rotor and tail rotor. The transmission incorporates a freewheeling unit at the input drive and two-stage plangtary gear train. This freewheeling unit provides a quick-disconnect from the engine if a power failure occurs, and permits the main rotor and tail rotor to rotate in order to accomplish safe autorotational landings. The tail rotor is powered by a take-off on the lower aft section of the transmission. Accessory mounting pads and drives are included on the transmission for the rotor tachometer generator, hydraulic pump, and the electrical system direct current generator. Quick-disconnect couplings are used on the drive shaft and electrical connections which permit rapid removal or replacement of the transmission as an assembly.

2-75. CHIP DETECTOR WARNING LIGHT - TRANSMISSION/GEAR BOX.

2-76. Magnetic inserts are installed in the drain plugs of the transmission sump, the intermediate (42°) tail rotor gearbox and the tail rotor (90°) gearbox. These plugs provide a means of inspection for metal particles. Indication of particles present is given by the illumination of the CHIP DETECTOR caution light. These plugs can be removed without loss of oil by means of a self-closing spring loaded valve in the drain plug which seats when magnetic insert is removed. The CHIP DETECTOR switch on the pedestal mounted hydraulic control panel is labeled BOTH, XMSN and TAIL ROTOR. The switch is normally in BOTH position, if the CHIP DETECTOR caution light illuminates RESET to extinguish and move switch to XMSN and TAIL ROTOR to determine the trouble area.

2-77. TRANSMISSION INDICATORS.

2-78. The transmission indicators provided consist of a transmission oil pressure, transmission oil temperature indicator, and caution light-transmission oil temperature.

2-79. TRANSMISSION OIL PRESSURE INDICATOR.

2-80. The TRANS OIL pressure indicator (22, figure 2-5) is located in the center area of the instrument panel. This instrument receives pressure indications from the transmission oil pressure transmitter. Readings on the indicator are provided in pounds per square inch (psi). Electrical power for the TRANS OIL pressure indicator and transmission oil pressure transmitter operation is supplied by the 28-volt AC circuit, and circuit protection is provided by the XMSN circuit breaker on the AC circuit breaker panel (figure 2-12).

2-81. CAUTION LIGHT - TRANSMISSION OIL PRESSURE.

2-82. A caution light marked XMSN OIL PRESS is located on the pedestal-mounted CAUTION panel (figure 2-14). This caution light is electrically connected to a transmission-mounted pressure switch which is actuated by a drop in the transmission oil pressure. The drop in oil pressure, when below safe operating limits, closes the electrical circuit and illuminates the caution light. The circuit is supplied power by the 28-volt DC essential bus.

2-83. TRANSMISSION OIL TEMPERATURE INDICATOR.

2-84. The transmission oil temperature indicator is located in the center of the instrument panel (23, figure 2-5). This indicator is connected to an electrical resistance-type thermobulb which electrically transmits the oil temperature reading to the indicator. The transmission oil temperature indicator circuit is supplied power by the 28-volt DC essential bus. Circuit protection is provided by the TEMP IND ENG & XMSN circuit breaker on the DC circuit breaker panel (figure 2-11).

2-85. CAUTION LIGHT - TRANSMISSION OIL TEMPERATURE.

2-86. A transmission oil temperature caution light is provided on the pedestal-mounted CAUTION panel (figure 2-14). The light is connected to a transmission-mounted thermoswitch which, when heated by transmission oil to a temperature above safe operating limits, closes an electrical circuit and illuminates the caution light which reads XMSN OIL HOT. The caution light circuit is supplied power by the 28-volt DC essential bus.

2-87. ROTOR SYSTEM.

2-88. The rotor system consist of a main rotor, anti-torque tail rotor and a rotor system indicator.

2-89. MAIN ROTOR.

2-90. The main rotor is a two-blades, semi-rigid see-saw type employing preconing and underslinging to insure smooth operation. The assemblies consist of two all-metal bonded blades with corrosion and scuff resistant leading edges, blade grips, yoke, mast, stabilizer bar, and rotating controls. Each blade is connected to a common yoke by means of blade grip and pitch change bearings with tension straps to carry centrifugal forces. The rotor assembly is attached to the mast with a cardan type universal joint and secured to the mast with a cap fitting which incorporates provisions for attaching a cable hoist to the helicopter. A stabilizer bar, mounted on the mast in a parallel plane above and at 90 degrees to the main rotor blades, provides the helicopter with an additional amount of stability (29, figure 2-1). The stabilizer bar is partially restrained in its movement by hydraulic-type dampers. Blade pitch change is accomplished by movements of the collective pitch control lever (7, figure 2-4) and a series of mixing levers terminating at the blade grip. Movement of the collective control lever UP increases the angle of attack of the rotor blades and causes the helicopter to ascend, and movement of the control lever DOWN decreases the angle of attack of the rotor blades, allowing the helicopter to descend. Tilting of the rotor is accomplished by movement of the cyclic control stick (16, figure 2-4) which, when moved, results in a corresponding change in the plane of rotation of the rotor. Power to drive the rotor is from the two-stage planetary transmission into which the main rotor is mounted.

2-91. TAIL ROTOR.

2-92. The tail rotor is a two-bladed, semi-rigid delta hinged type employing preconing and underslinging. Each blade is connected to a common yoke by means of a grip and pitch change bearing. The blade and yoke assembly is mounted on the tail rotor shaft by means of a delta hinge trunnion to minimize rotor flapping. Blade pitch change is accomplished by movement of the pilot's or copilot's directional control pedals which are connected to apitch control assembly in the tail rotor (90 degree) gearbox. This blade pitch change provides control of torque and change of directional heading. Power to drive the tail rotor is from a take-off on the lower end of the main rotor transmission.

2-93. OIL SUPPLY SYSTEMS.

2-94. ENGINE OIL SUPPLY SYSTEM.

2-95. The dry sump pressure type oil system is entirely automatic in its operation. The system consists of an engine oil tank with de-aeration provisions, thermostatically controlled oil cooler with by-pass valve, pressure transmitter and pressure indicator, low pressure warning switch and indicator, sight gages, and oil supply return vent, and breather lines. (See figure 2-6.)

2-96. The oil system connecting lines include quick-disconnect fittings to allow rapid removal of the engine or other defective items that require checking or replacement.

2-97. Drain valves have been provided for draining the oil tank and cooler. Pressure for engine lubrication and scavenging of return oil are provided by the engine-mounted and engine-driven oil pump. The tank capacity, oil specification and grade are specified in the servicing diagram (figure 2-16).

2-98. OIL COOLER. Engine oil cooling is accomplished by an oil cooler with thermostatic valves and bypass provisions. The cooler is housed within the fuselage area under the deck. Air circulation for oil cooling is supplied by a turbine fan which operates from turbine bleed air. The fan is powered at all times when the engine is operating and no control is required or provided.

2-99. OIL SYSTEM CONTROLS. The oil system is operative whenever the helicopter's engine is in operation.

2-100. TRANSMISSION OIL SYSTEM.

2-101. Transmission lubrication is accomplished by means of a self-contained pressure oil system, with the oil pump immersed in the wet sump located at the lower end of the transmission unit. Oil specification, grade, and capacity for the transmission are specified in the servicing diagram (figure 2-16).

2-102. TRANSMISSION OIL COOLER. A transmission oil cooler is incorporated in the transmission oil system. The transmission oil cooler is attached to the lower end of the engine oil cooler; and the same turbine fan that cools engine oil also functions to cool the transmission oil. Independent thermostatic valves and bypass provisions are a part of the transmission oil cooling system. (See figure 2-7.)

2-103. TAIL ROTOR INTERMEDIATE GEARBOX OIL SYSTEM.

2-104. The tail rotor intermediate gearbox lubrication is accomplished by a self contained wet sump in the lower area of the gearbox assembly. A visual sight gage is provided on the right side of the gearbox to permit checking oil level. Oil specification, grade and capacity are specified in the servicing diagram (figure 2-16).

2-105. TAIL ROTOR (90°) GEARBOX OIL SYSTEM.

2-106. The tail rotor (90°) gearbox lubrication is accomplished by a self contained wet sump. A visual sight glass gage is provided on the right side of the gearbox to permit checking oil level. Oil specification, grade and capacity are specified in the servicing diagram (figure 2-16).

2-107. FUEL SUPPLY SYSTEM.

2-108. The fuel supply system (figure 2-8) consists of five inter-connected rubber fuel cells with submerged fuel pumps in the forward cells, a bleed air-driven fuel boost pump in the left-hand forward cell and an electrically powered fuel boost pump in the right-hand forward cell; a fuel filter, fuel pressure switches, a fuel quantity system, a notor-operated shutoff valve, pressure transmitter and gage; a fuel low level warning switch, caution lights (ENGINE FUEL PUMP, 20 MINUTE FUEL, LEFT FUEL BOOST and RIGHT FUEL BOOST), drain valves and defuel valves. Provisions for an auxiliary fuel tank installation include permanently installed fuel flow lines, vent lines, drain lines, and electrical connections which terminate beneath the cabin floor and are accessible through a removable panel. A check valve incorporated in the auxiliary fuel tank flow line prevents fuel flow from the main fuel cells to the auxiliary tank and also prevents the fuel from the auxiliary tank overfilling the main fuel cells when transfer pump switch is in the OFF position. The auxiliary fuel equipment kit description and operating procedure

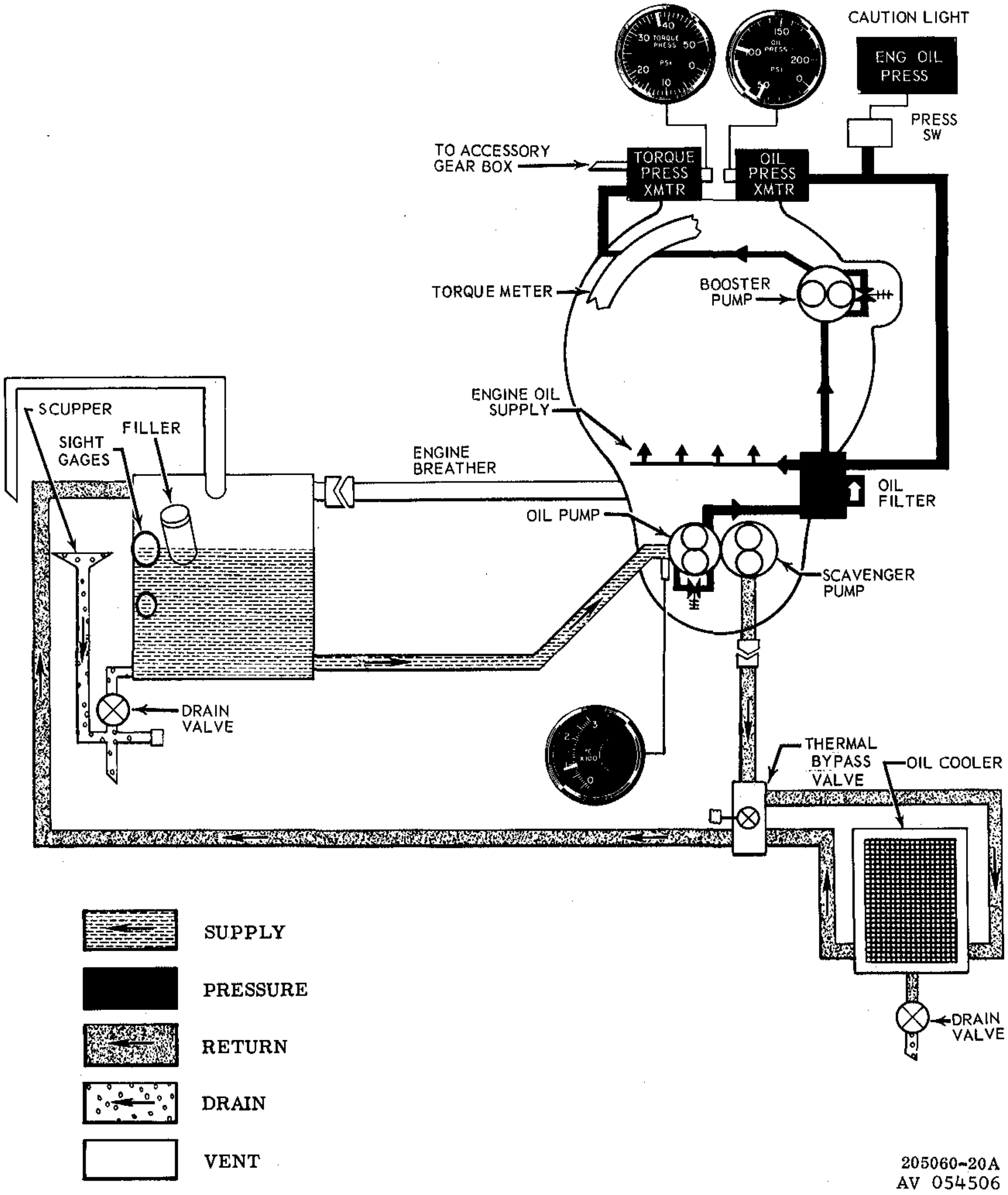


Figure 2-6. Engine oil system schematic diagram

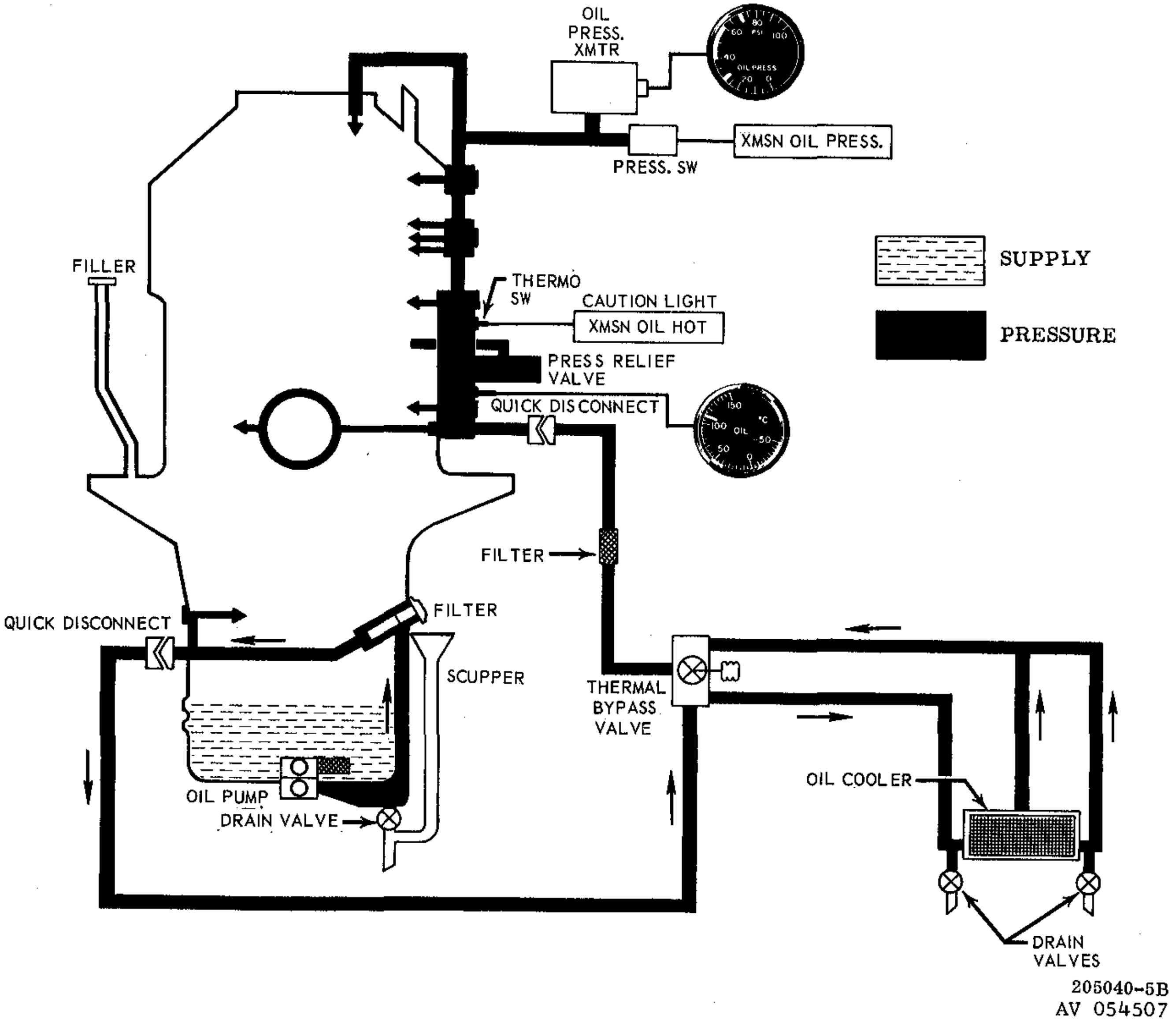


Figure 2-7. Transmission oil system schematic diagram

is set forth in Chapter 6, Auxiliary Equipment. Fuel specification, grade, and capacity are specified in the servicing diagram (figure 2-16, table 2-4, and table 2-5).

Note

> On the YUH-1D helicopter, the boost pumps and sumps are located near the front of the forward fuel cells. A fuel quantity gage sensing unit is located in each of the forward cells and in the aft center cell. On the UH-1D/H helicopter, each forward cell is divided into two compartments by a lateral baffle fitted with a flapper valve to allow fuel flow from front to rear. A boost pump is mounted on a sump assembly near the aft end of each forward cell and is connected by a hose to the pressure line outlet. Part of the pump output is diverted forward through a flow switch and hose to an ejector pump at front of cell. Induced flow of ejector pump sends fuel through a hose over a baffle into the rear part of the cell, so that no significant quantity of fuell will be unusable in any flight attitude. Two fuel quantity gage sensing units are located in right-hand forward cell and one sensing unit is located in the aft center cell.

2-109. FUEL SYSTEM CONTROLS.

2-110. The fuel system controls consist of a fuel main ON/OFF switch, fuel start ON/OFF switch (not applicable on helicopters serial Nos. 66-8674 through 66-8577, 66-16034 and subsequent, and earlier models so modified) and fuel transfer pump switches (figures 2-3 and 2-8).

2-111. FUEL MAIN SWITCH. The FUEL MAIN ON/OFF switch is located on the pedestal-mounted ENGINE panel (figure 2-3). This switch is a two-position multiple-contact toggle type, ON in the up position and OFF in the down position. The switch is protected from accidental operation by a spring-loaded toggle head that must be pulled up before switch movement can be accomplished. Positioning of the MAIN ON/OFF switch to ON allows fuel to flow to the engine pump from the fuel cells, completes the circuit to the right-hand fuel cell boost pump, putting the pump into operation; and, when the starter-ignition trigger switch (figure 2-4) is pulled, energizes the ignition circuit. When the toggle head is lifted and the MAIN ON/OFF switch is positioned to OFF, fuel flow stops and the right-hand fuel cell boost pump ceases operation. Electrical power for circuit operation is supplied by the 28-volt DC essential bus. Circuit protection is provided by the FUEL VALVE, FUEL BOOST RIGHT and IGNITION SYSTEM-IGNITER SOL circuit breaker on the DC circuit breaker panel. (See figure 2-11.)

Note

> The bleed air fuel pump in the left-hand forward cell operates only when the engine is in operation.

2-112. FUEL START SWITCH. The FUEL START ON/OFF switch is located on the pedestal-mounted ENGINE panel (figure 2-3). With this switch positioned to ON, the starting fuel igniter solenoid valve will be energized when the starter-ignition switch is pulled. When the FUEL START switch is positioned to OFF, the igniter solenoid valve circuit is de-energized. Electrical power for circuit operation is supplied by the 28-volt DC essential bus. Circuit protection is provided by the IGNITION SYSTEM-IGNITER SOL circuit breaker on the DC circuit breaker panel (figure 2-11).

Note

> FUEL START switch not applicable on helicopter serial Nos. 66-8574 through 66-8577, 66-16034 and subsequent, and earlier models so modified.

2-113. FUEL TRANSFER PUMP SWITCHES. The INT FUEL TRANS PUMP LEFT/OFF and RIGHT/OFF switches are located on the pedestal-mounted engine panel (figure 2-3). These switches are used only when the auxiliary fuel equipment has been installed and cables for the two electrically operated transfer pump and ferry tank fuel level switches are connected.

2-114. CAUTION LIGHT-RIGHT-AND LEFT-HAND FUEL BOOST PUMP. The right- and left-hand fuel boost pump caution lights are located on the pedestal-mounted CAUTION panel (figure 2-14). These caution lights monitor the operation of their respective pumps. A fuel boost pump failure is sensed by a pressure switch which closes, energizing the caution light circuit for the malfunctioning boost pump. The respective caution lights will illuminate and read LEFT FUEL BOOST or RIGHT FUEL BOOST. The caution lights and pressure switches receive power from the 28-volt DC essential bus.

2-115. FUEL FILTER CAUTION LIGHT. The FUEL FILTER caution light (UH-1D serial No. 63-8739, and subsequent) is located on the pedestal-mounted CAUTION panel (figure 2-14). A differential pressure switch is mounted in the fuel line across the filter. When the filter becomes clogged, the pressure switch senses this and closes contacts to energize the caution light circuit. The FUEL FILTER caution light illuminates, alerting the pilot to a clogged fuel filter and fuel contamination. If clogging continues, the fuel bypass line opens to allow fuel to flow around the filter.

2-116. After the FUEL FILTER caution light illuminates, the pilot has approximately 30 minutes to return to base or locate a substitute landing area. The helicopter shall not be flown until the reason for illumination of the FUEL FILTER caution light has been determined and corrected.

2-117. ELECTRICAL POWER SUPPLY SYSTEMS.

2-118. The electrical power supply systems provide 28-volt direct current, 115-volt alternating current, and 28-volt alternating current as applicable for the electrical equipment installed in the aircraft. See the electrical system schematic diagram, figure 2-9.

2-119. DC POWER SUPPLY.

2-120. The direct current power supply system is a 28-volt, single-conductor system with the negative leads of the generators grounded in the helicopter fuselage structure. Direct current power is supplied by either the main generator, standby generator (starter-generator), battery, or an external power supply. The system consists of the following: primary bus, essential bus, non-essential bus, auxiliary circuit breaker bus, main generator voltage regulator, stand-by generator voltage regulator, main generator over-voltage relay, main generator field relay, main generator reverse current relay, standby generator reverse current relay, bus control relay, battery relay, nonessential bus relay, starter relay, external power relay, and control panel and circuit breakers to furnish protection for the system and equipment operating from the system. In the event of a main generator failure, the nonessential bus is automatically de-energized when circuit is opened by contacts of the bus control relay and the nonessential

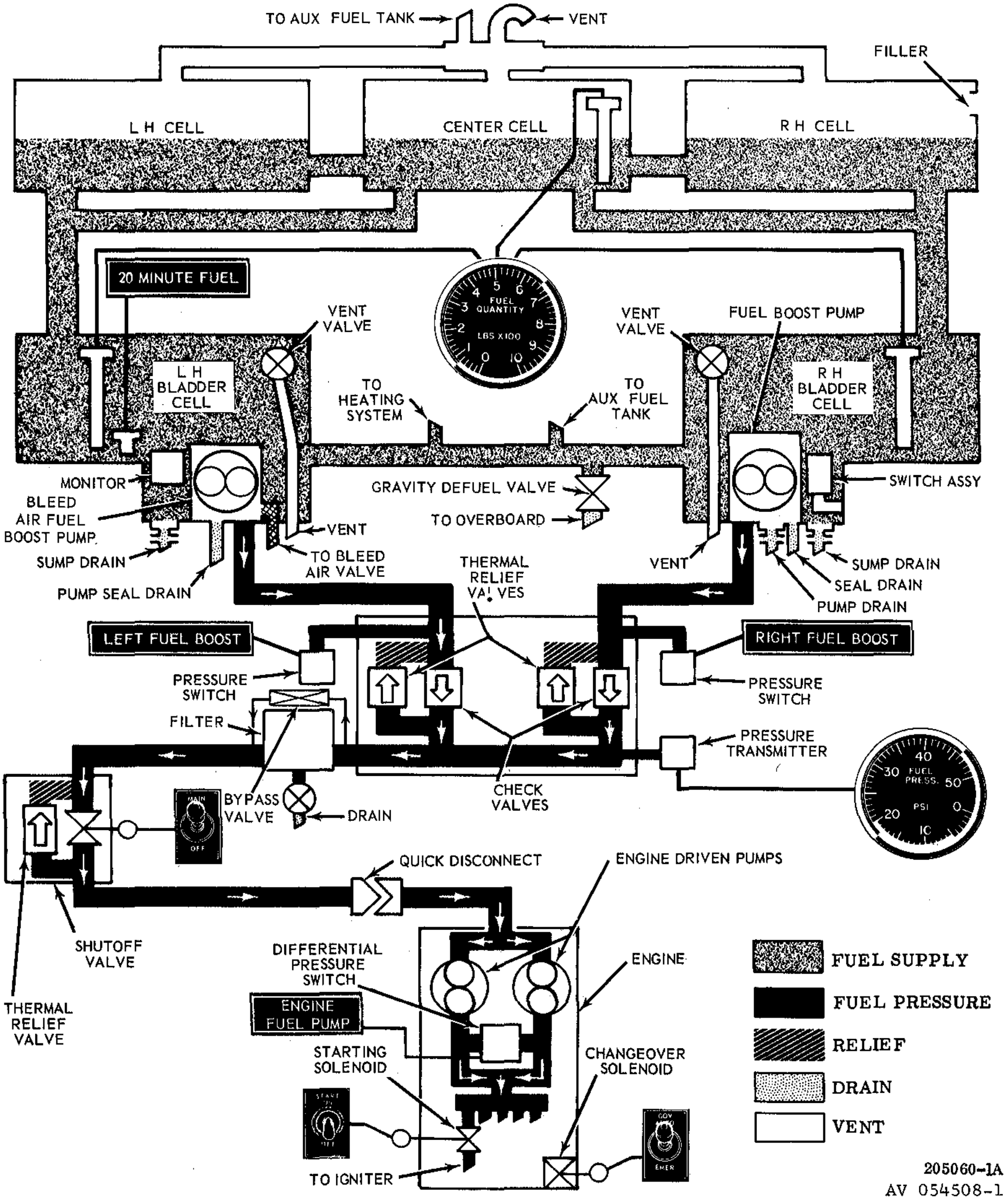


Figure 2-8. Fuel system schematic diagram - YUH-1D (Sheet 1 of 2)

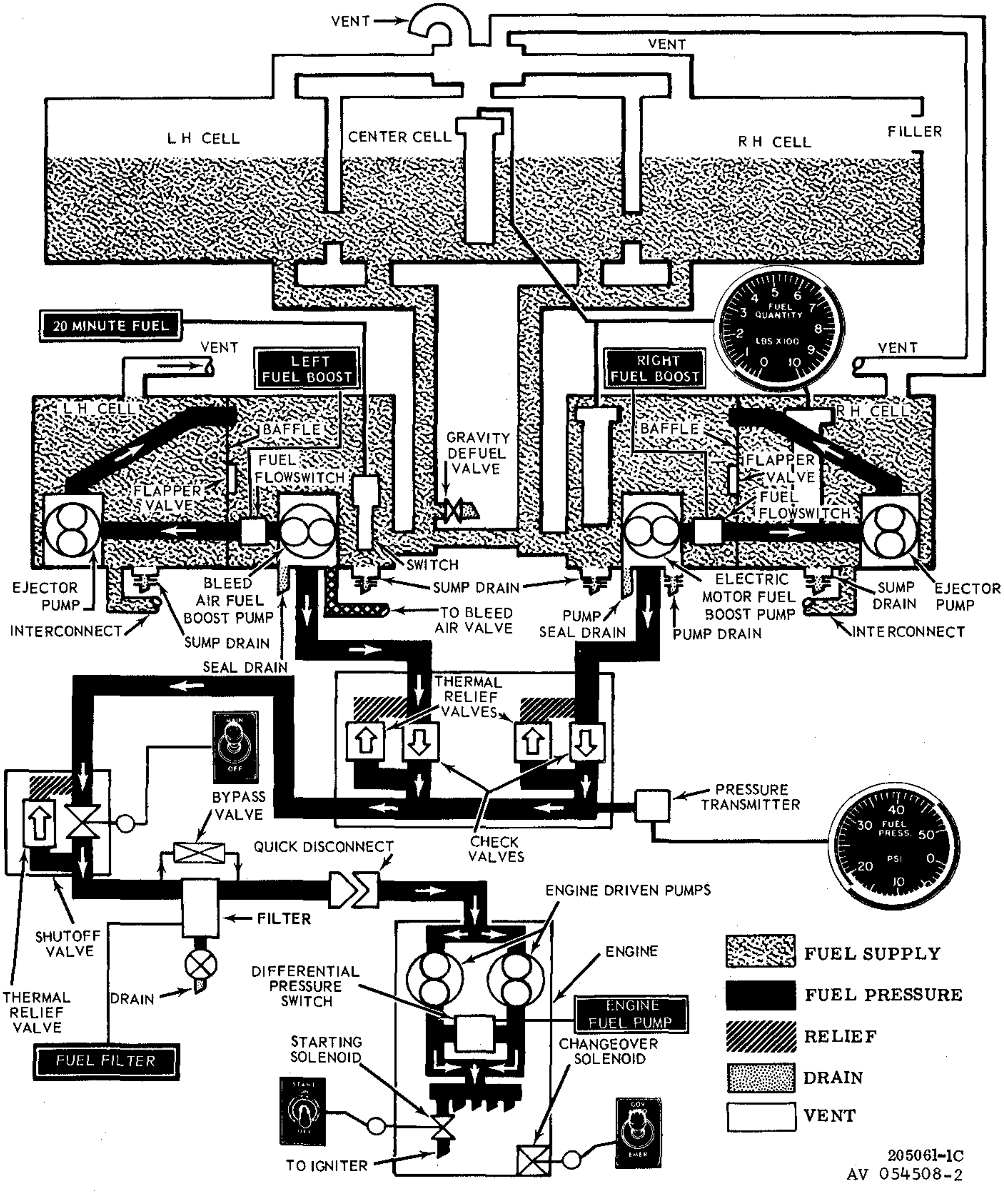


Figure 2-8. Fuel system schematic diagram - UH-1D/H (Sheet 2 of 2)

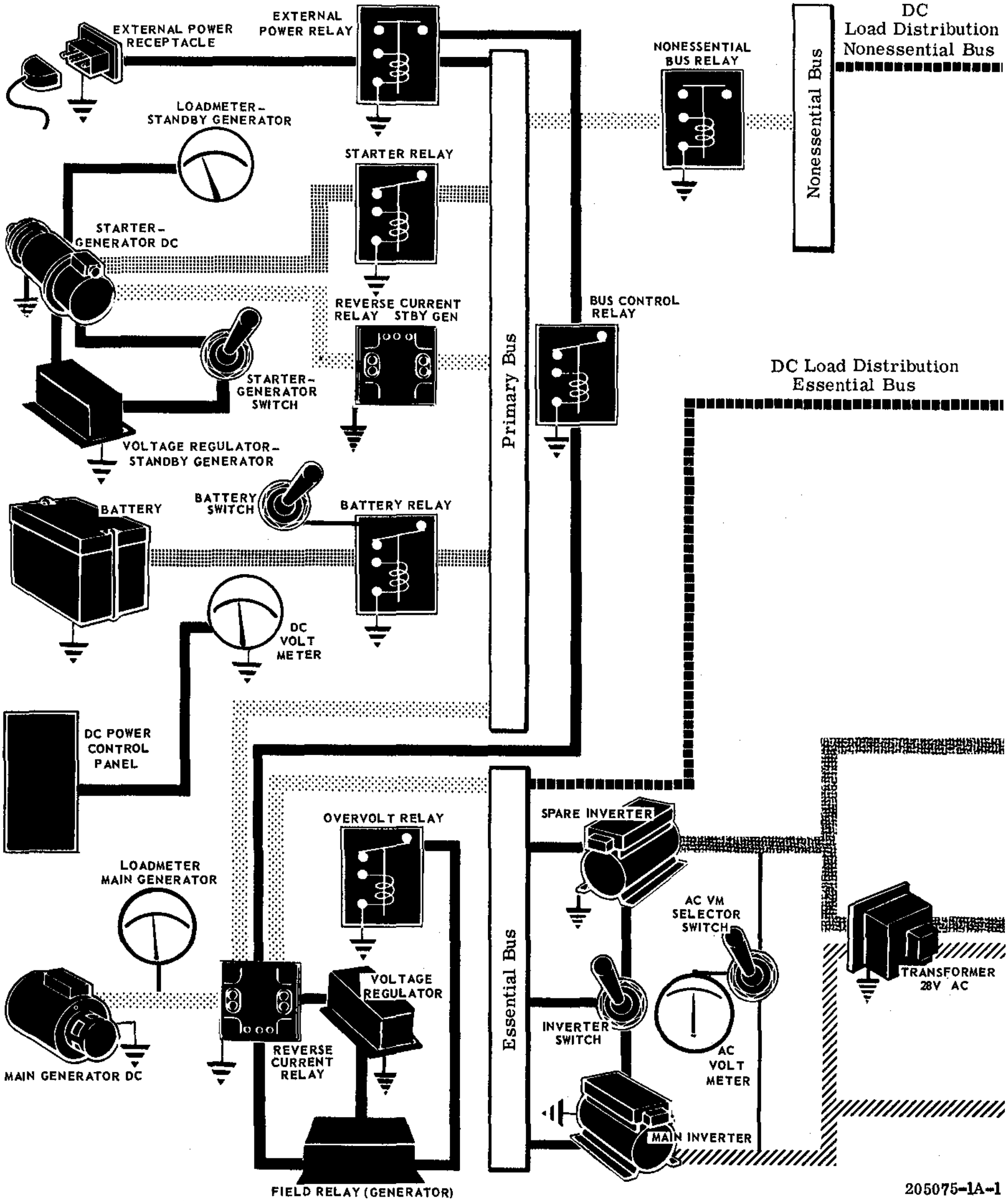


Figure 2-9. Electrical system schematic diagram (Sheet 1 of 2)

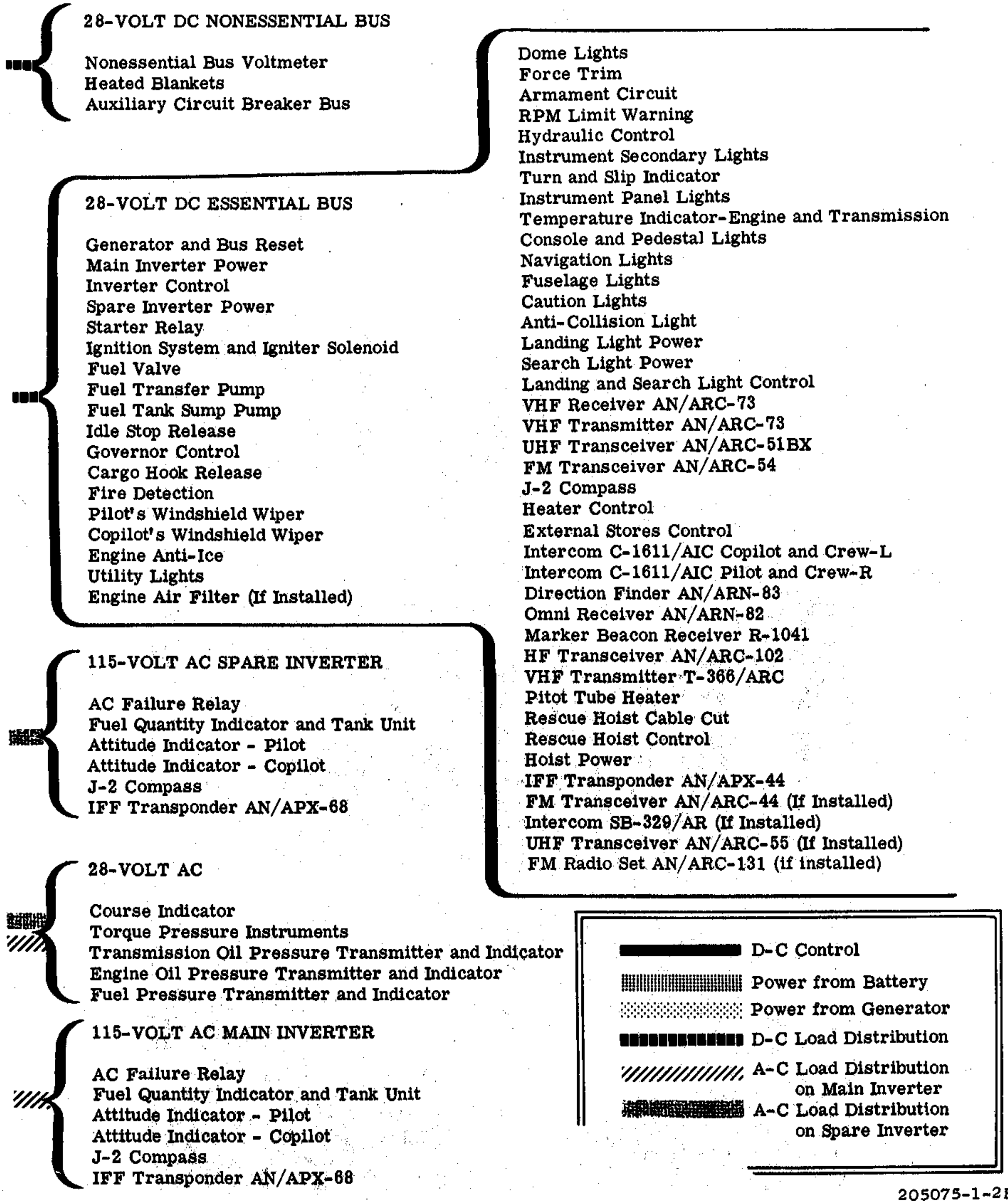


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Figure 2-9. Electrical system schematic diagram (Sheet 2 of 2) bus relay actions. The pilot may override the automatic action by positioning the NON-ESS BUS switch on the DC POWER control panel (figure 2-10) to MANUAL ON.

2-121. MAIN AND STANDBY GENERATORS. The 28-volt main generator is rated at 300 ampere output and is mounted on and driven by the transmission gearing; therefore, generator power is provided and battery drain prevented when autorotational landings are being performed. A standby starter-generator, rated at 200 ampere output and mounted on the helicopter's engine accessory drive section, is provided to furnish 28-volt DC power in the event of a main generator failure.

2-122. BATTERY. The battery (figure 2-1) is located in the nose electrical compartment. The battery is a nickle-cadmium 22 ampere hour, 24-volt and has a high discharge rate for starting turbine engines.

2-123. DIRECT CURRENT POWER CONTROL. Direct current power control is accomplished from the DC POWER control panel on the overhead console (figure 2-10).

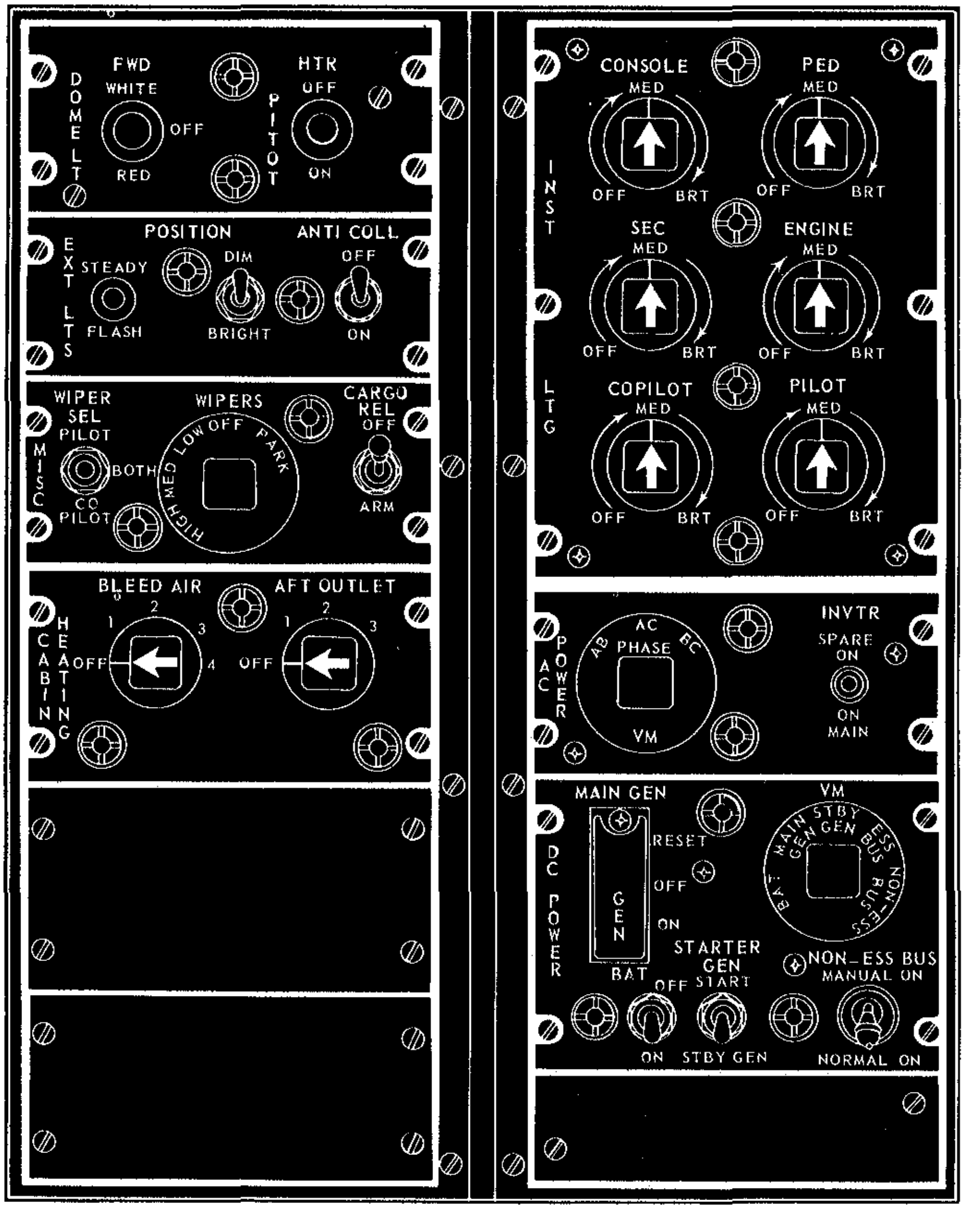

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Figure 2-10. Overhead console typical

2-124. DC POWER CONTROL PANEL. The DC POWER control panel (8, figure 2-10) is located on the overhead console. The DC POWER control panel consists of the MAIN GEN RESET/OFF/ON switch, BAT ON/OFF switch, STARTER GEN START/STBY GEN switch, DC VM (voltmeter) selector switch, and a NON-ESS BUS MANUAL ON/NORMAL ON switch. Panel illumination is provided by three lights controlled by a switch on the instrument lights control panel (figure 2-10).

TABLE 2-3. ENGINE OIL QUANTITY TABLE

U. S. GALLONS			
NO. OF TANKS	TOTAL VOLUME	EXPANSION SPACE	NORMAL USEFUL CAPACITY
1	4.4	1.4	3.0

2-125. MAIN GENERATOR SWITCH. The main generator switch is a three-position type equipped with a guard and is located on the left area of the DC POWER control panel (figure 2-10). This switch is labeled MAIN GEN, RESET in the aft position, OFF in the center position, and ON in the forward position. The RESET position is spring-loaded to return to OFF position when released; therefore, to reset the generator the switch must be held in RESET position momentarily and then moved to the ON position.

2-126. BATTERY SWITCH. The battery switch is located on the lower left area of the DC POWER control panel below the main generator switch. This is a two-position switch labeled BAT OFF in the aft position and ON in the forward position. When the switch is placed in ON position, it closes the circuit to the actuating coil of the battery relay and 24-volt DC is then being delivered from the battery to the primary bus. When the switch is placed in OFF position, it opens the circuit to the actuating coil of the battery relay and no current is delivered from the battery.

2-127. STARTER-GENERATOR SWITCH. The starter-generator switch is located in the center area of the DC POWER control panel. This switch is a two-position type, and is labeled STARTER GEN START in the aft position, and STBY (standby) GEN in the forward position. The START position of the switch actuates the electrical circuits for starter functions of the starter-generator. The STBY GEN position actuates the generator unit of the starter-generator, and 28-volt DC is supplied to the primary bus of the helicopter's electrical system in the event of a main generator failure.

2-128. NONESSENTIAL BUS CONTROL SWITCH. The nonessential bus control switch is located in the lower area of the DC POWER control panel. This is a two-position switch labeled NON-ESS BUS, MANUAL ON in the aft position and NORMAL ON in the forward position. The function of the switch is to permit the pilot, in the event of a generator failure, to override the automatic action when the nonessential bus is dropped by the electrical system's bus control relay and nonessential bus relay. Moving switch to MANUAL ON overrides the action of the bus control relay and nonessential bus. Normally the switch will be positioned forward to NORMAL ON.

2-129. DIRECT CURRENT VOLTMETER SELECTOR SWITCH. The direct current voltmeter selector switch is located in the upper right-hand area of the DC POWER control panel. The switch can be easily identified by the VM label on panel face. This switch functions to monitor voltage being delivered from any

TABLE 2-4. FUEL QUANTITY TABLE

U.S. GALLONS AND POUNDS		
NO. OF TANKS	NORMAL SERVICING	MAXIMUM CAPACITY AND/OR SPILL OVER LEVEL
5	220 Gallons 1430 Pounds	224 Gallons 1455 Pounds

NOTES:

1. To convert gallons of fuel to pounds, multiply gallons by 6.5 (For JP-5, multiply by 6.76)
2. JP-4 fuel density 6.5 pounds/one gallon (JP-5 fuel, 6.76) based on standard day conditions: 59°C (15°C), 29.92 inches Hg, dry air.
3. Gasoline density is 6.0 pounds/one gallon.

of the following: BAT, MAIN GEN, STBY GEN, ESS BUS, and NON-ESS BUS. The switch is actuated by means of a knob permitting the selection of any one of the five positions. Voltage will be indicated on the DC voltmeter.

2-130. DIRECT CURRENT VOLTMETER. The direct current voltmeter (29, figure 2-5) is mounted in the center area of the instrument panel and is labeled VOLT DC. Generator voltage output is indicated by this instrument. Voltage indications will not be shown when the generator is not furnishing electrical power because the direct current voltmeter is connected to the generator side of the reverse current relay.

2-131. DIRECT CURRENT LOADMETERS - MAIN AND STANDBY. Two direct current loadmeters are mounted in the lower center area of the instrument panel (28 and 35, figure 2-5). One is labeled MAIN GEN and indicates the percentage of total electrical system amperage being used by the helicopter's electrical system when main generator is operating The other loadmeter is labeled STBY GEN and indicates the percentage of total electrical system amperage being used by the helicopter's electrical system when standby generator is operating. Loadmeters will not indicate this percentage when the generators are inoperative.

2-132. ALTERNATING CURRENT POWER SUPPLY SYSTEM.

2-133. The alternating current is supplied by two 250 volt-ampere, three-phase inverters (main and spare) which convert the 28-volt DC to 115-volt AC. The main and spare inverters are interchangeable in power output. Selection control, MAIN ON/OFF and SPARE ON, is accomplished from the AC POWER control panel (figure 2-10). Either inverter (at pilot's option) will supply 115-volt AC to attitude indicator system, AC failure relay, fuel quantity indicator and tank units, gyro magnetic compass system, and the 28-volt AC transfomer. The 28-volt AC transformer, in turn, supplied 28-volt AC to the following: torque pressure transmitter and torquemeter, transmission oil pressure transmitter and indicator, engine oil pressure transmitter and indicator, and fuel pressure transmitter and indicator, and the course indicator.

2-134. ALTERNATING CURRENT POWER CONTROL. Alternating current power control is accomplished from the AC POWER control panel (figure 2-10).

2-135. AC POWER CONTROL PANEL. The AC POWER control panel (figure 2-10) is located on the overhead console. This panel is labeled AC POWER and contains the inverter (INVTR MAIN ON/SPARE ON) switch, the AC voltmeter (AC VM) selector switch, and two panel lights.

2-136. INVERTER SWITCH - MAIN AND SPARE. The inverter switch, labeled INVTR, is located on the AC POWER control panel (figure 2-10). This is a three-position switch labeled SPARE ON/OFF/MAIN ON. For normal flight the inverter switch is in the MAIN ON position. The SPARE ON position is used to put the spare inverter into operation in the event of a main inverter failure. Inverter switch is supplied power by the 28-volt DC essential bus. Circuit protection is provided by the INVTR CONT circuit breaker (figure 2-11).

2-137. AC VOLTMETER SELECTOR SWITCH. The AC VM voltmeter selector switch is located on the left half of the AC POWER control panel (figure 2-10). The rotatable switch can easily be identified by the VM label on the round switch dial. The switch is used to monitor voltage between any of the three phases of the 115-volt alternating current electrical system. Actuation of switch is accomplished by a knob which has three (phase monitoring) positions labeled: AB, AC, and BC. When the selector switch is in AB position, the voltage indicated on instrument panel-mounted AC voltmeter is the voltage between phases A and B. In like manner with selector switch in AC position, the voltage indicated on voltmeter is the voltage between phases A and C; with selector switch in BC position, the voltage indicated on voltmeter is the voltage between phases B and C.

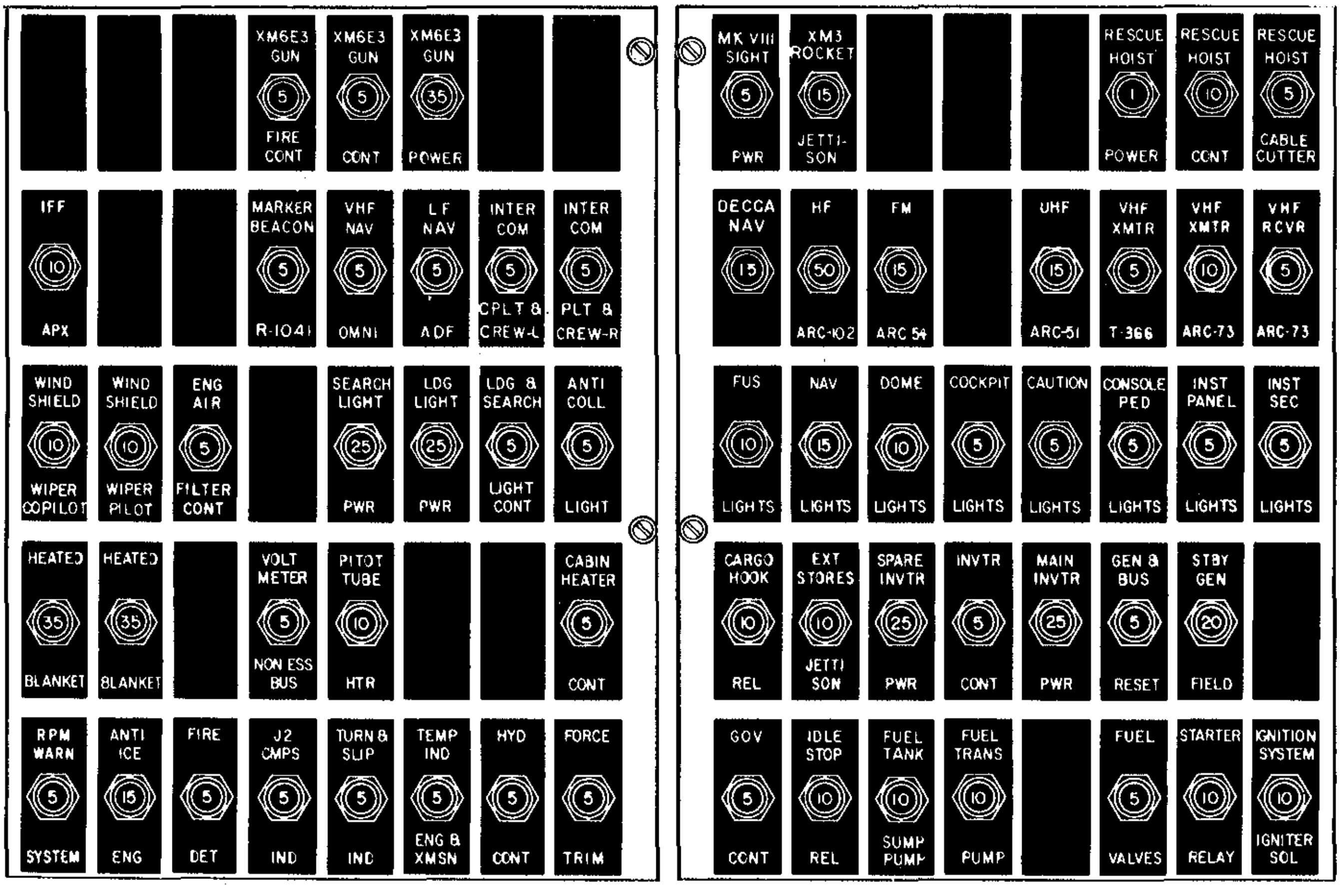
2-138. ALTERNATING CURRENT VOLTMETER. The AC voltmeter is mounted in the central area of the instrument panel directly under the DC voltmeter (36, figure 2-5). The alternating current voltage output from the inverter (main or spare) is indicated on this instrument. The voltage indicated between any two of the three selected positions (phases) should be 115 (plus or minus 3.0) volts AC.

2-139. CIRCUIT BREAKER PANELS.

2-140. Two circuit breaker panels are provided consisting of a direct current circuit breaker panel and an alternating current circuit breaker panel.

2-141. DC CIRCUIT BREAKER PANEL. The direct current circuit breaker panel is located on the overhead console within easy reach of the pilot's and copilot's positions (figure 2-11). Each individual breaker is clearly labeled for the particular electrical circuit protected. In the event a circuit is overloaded, the circuit breaker protecting that circuit will pop out, de-energizing the circuit. The circuit is reset or actuated by pushing the circuit breaker in.

2-142. AC CIRCUIT BREAKER PANEL. The alternating current circuit breaker panel is located on the right-hand side of the pedestal base, visible and within easy reach of the pilot (figure 2-12). The upper and center panel plate, labeled AC 115V contains the circuit breakers which provide the circuit protection for the 115-volt AC electrical circuits. The lower panel plate, labeled AC 28V, contains the circuit breakers which provide circuit protection for the 28-volt AC



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AV 054511

Figure 2-11. DC circuit breaker panel - typical

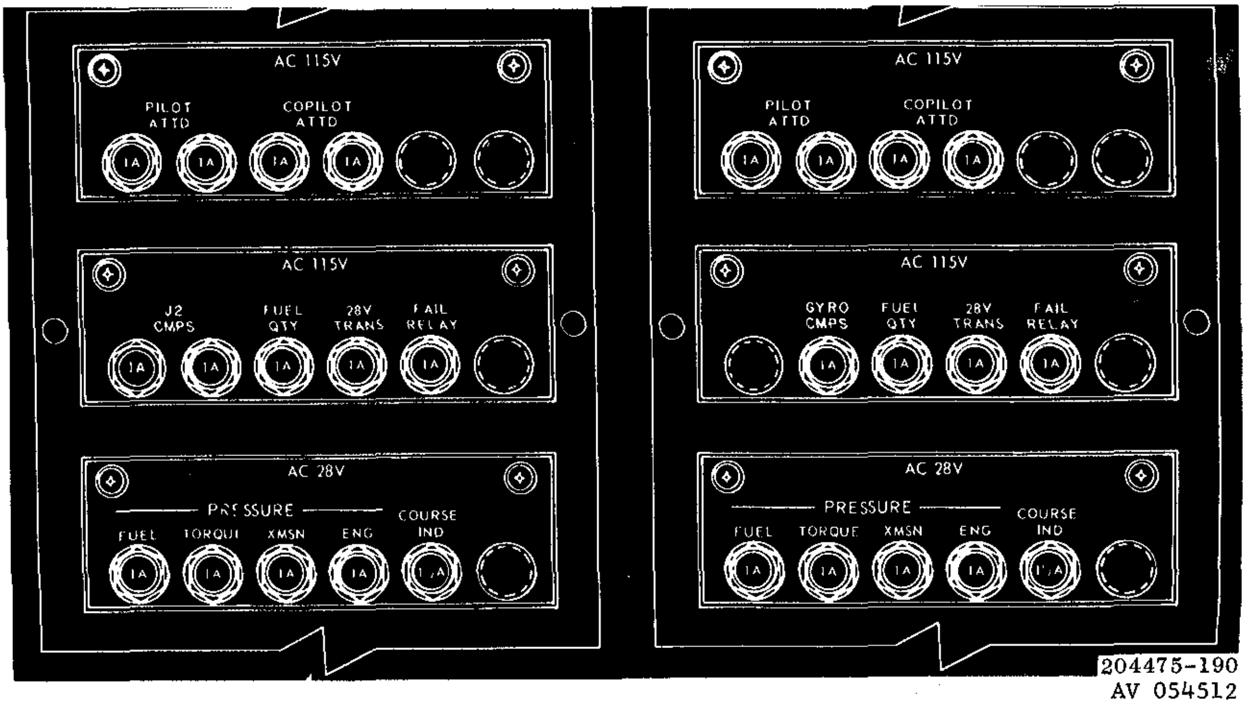

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Figure 2-12. AC circuit breaker panel - typical

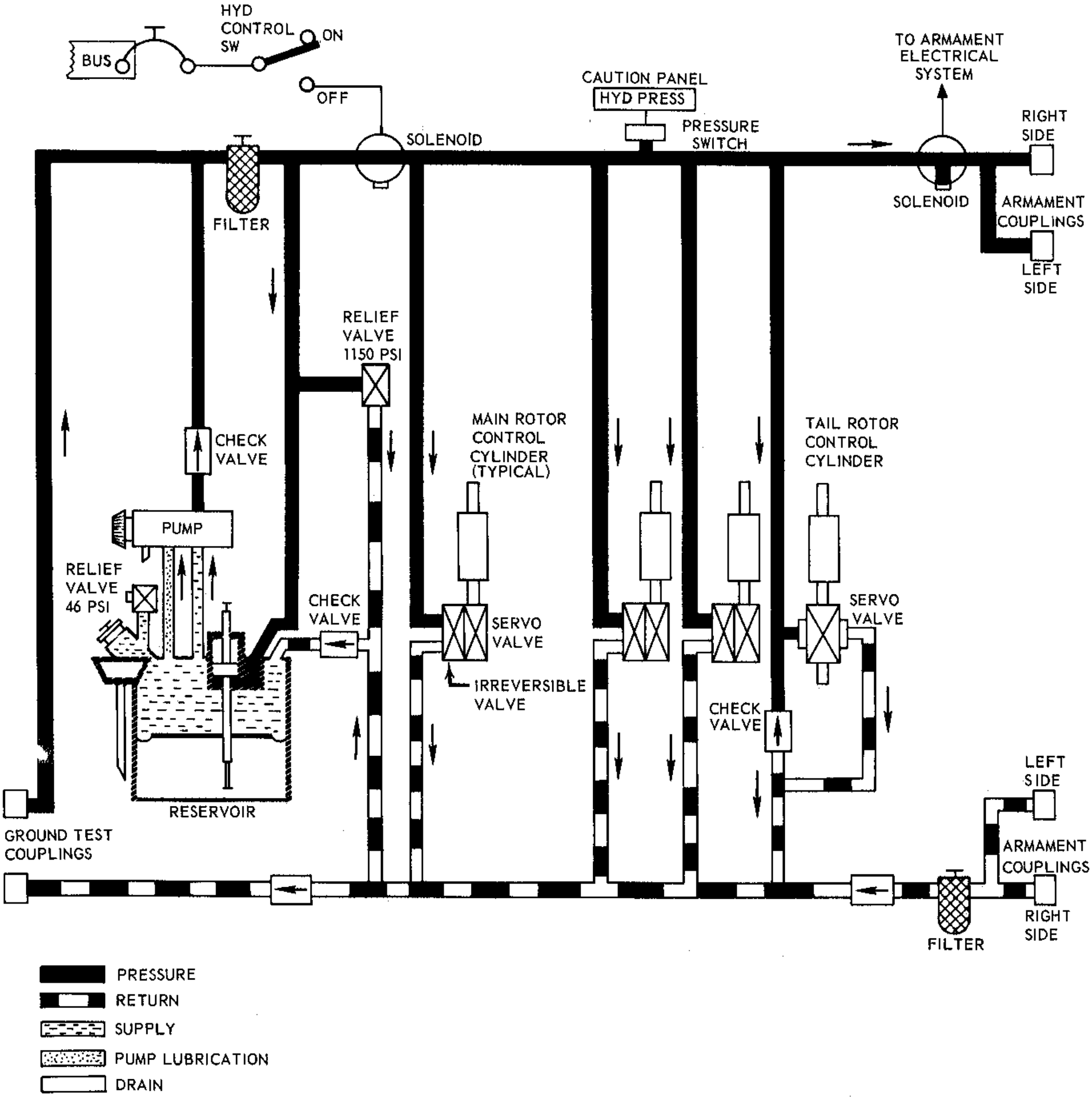

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Figure 2-13. Hydraulic system schematic (Sheet 1 of 2)

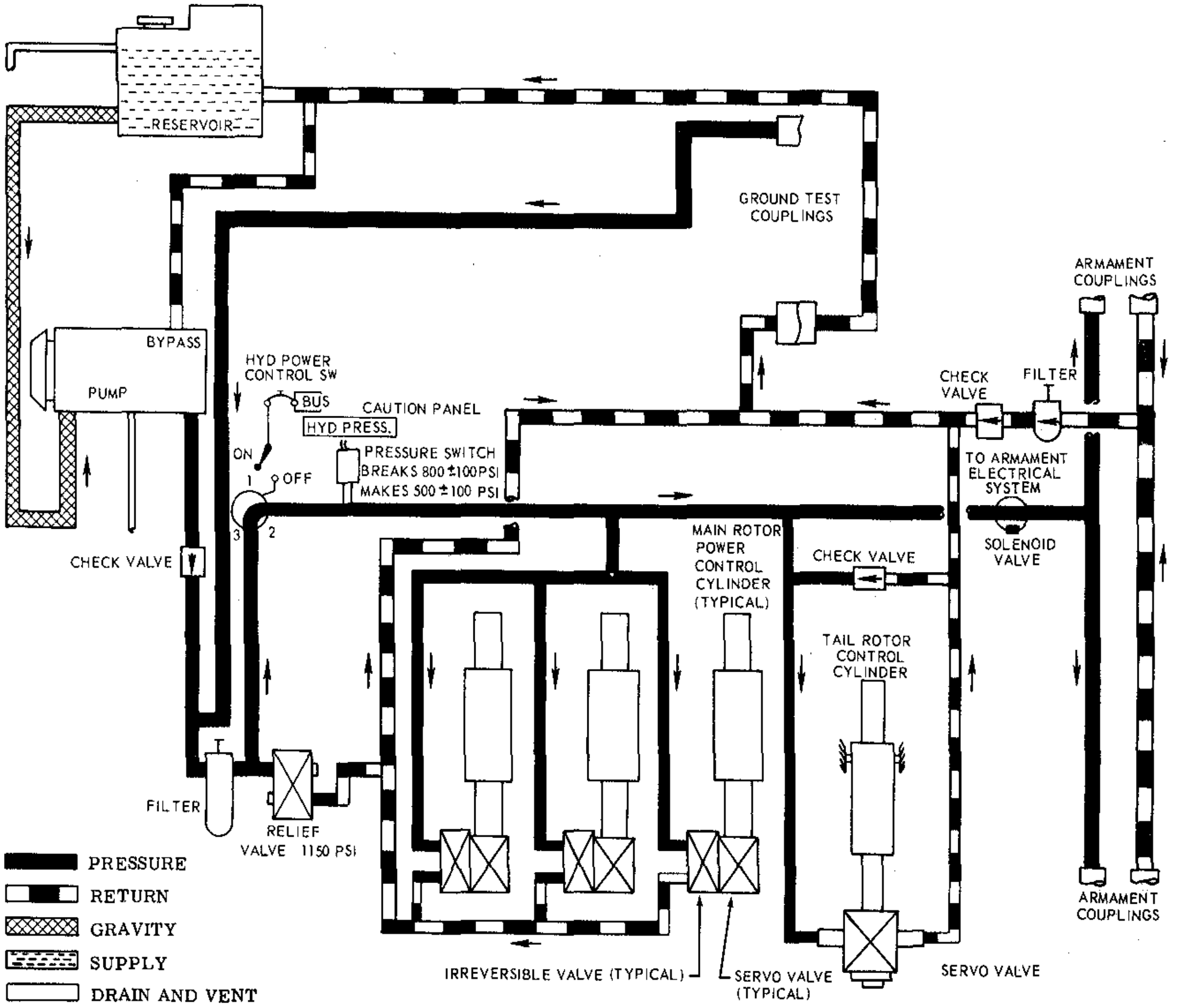

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Figure 2-13. Hydraulic system schematic (Sheet 2 of 2)

electrical circuits. In the event a circuit is overloaded, the circuit breaker protecting that particular circuit will pop out, de-energizing the circuit. The circuit is reset or actuated by pushing the circuit breaker in.

2-143. EXTERNAL POWER RECEPTACLE.

2-144. The external power receptacle is located on the left side of the helicopter's fuselage, aft of cabin bulkhead (18, figure 2-1). When the 28-volt DC auxiliary power unit plug is securely inserted in the receptacle, the external power relay in the helicopter's electrical system is energized and 28-volt DC electrical power is supplied to the primary bus for distribution. When external power is connected or the receptacle door is left open, the EXTERNAL POWER caution light on the CAUTION panel will illuminate.

Note

> The battery switch shall be in OFF position when APU is being used. Reverse polarity between helicopter's electrical system and APU can occur.

2-145. HYDRAULIC POWER SUPPLY SYSTEM.

2-146. The hydraulic power supply system (figure 2-13) consists of the variable output hydraulic pump, power cylinders, irreversible valves, relief and check valves, a solenoid valve, a system filter, a vent filter, "boot strap" reservoir, bleed air valve, pressure switch, ground test couplings and connecting hardware. The hydraulic pump is mounted on and driven by the transmission and supplies pressure to the power cylinders and to the boot strap reservoir when this type reservoir is installed.

Note

> Helicopters with serial Nos. 65-9565 and subsequent have a gravity feed reservoir which is not under pressure and feeds the hydraulic fluid to pump by gravity.

2-147. The power cylinders in turn are connected into the mechanical linkage of the helicopter's flight control system. The irreversible valves are installed on the cyclic and collective power cylinders to prevent main rotor feedback in the event of a hydraulic system malfunction. The pressure required for system operation is preset to supply demand. This system, for all practical purposes is considered to be a closed type; therefore, a pressure gage is not provided or required. Low hydraulic system pressure will be indicated by the illumination of HYD PRESSURE light on the CAUTION panel (figure 2-14), and moderate feedback forces will be noticed by the pilot as soon as the servo valve is moved off center by the controls.

2-148. HYDRAULIC RESERVOIR.

2-149. The hydraulic reservoir in this installation is a rolling diaphragm type. This reservoir is under pressure when the hydraulic pump is in operation and acts as an accumulator to maintain a constant system pressure to give immediate response to slight control movements. The reservoir is visible for inspection and accessible for refilling by removing a plastic window mounted in the cabin wall (4, figure 2-16).

Note

> The hydraulic reservoir installed in helicopters serial Nos. 65-9565 and subsequent is a gravity feed type. The reservoir is located at the right aft edge of the cabin roof. A sight gage on the reservoir can be seen through an opening (indicates "Full and Refill" requirements) in the transmission fairing.

2-150. FLIGHT CONTROL SERVO UNITS.

2-151. The hydraulic servo system reduces the operational loads of the helicopter's cyclic, collective and directional control system (figure 2-13). Movement of the controls in any direction causes a power cylinder valve, in appropriate system, to open and admit hydraulic pressure which actuates the cylinder, thereby reducing the force-load required for control movement.

2-152. HYDRAULIC SYSTEM CONTROL SWITCH.

2-153. The hydraulic control switch is located on a pedestal-mounted panel (figure 2-3). This switch is a two-position toggle type labeled HYD CONTROL ON/OFF. When the switch is in the ON position, the solenoid valve opens and pressure is supplied to the servo system. When switch is in the OFF position, the solenoid valve is closed and hydraulic fluid is circulated between the pump and reservoir; thus no pressure is supplied to the servo system. Electrical power for hydraulic system control is supplied by the 28-volt DC essential bus, and circuit is protected by HYD CONT circuit breaker on the DC circuit breaker panel (figure 2-11).

2-154. HYDRAULIC SYSTEM - INDICATORS.

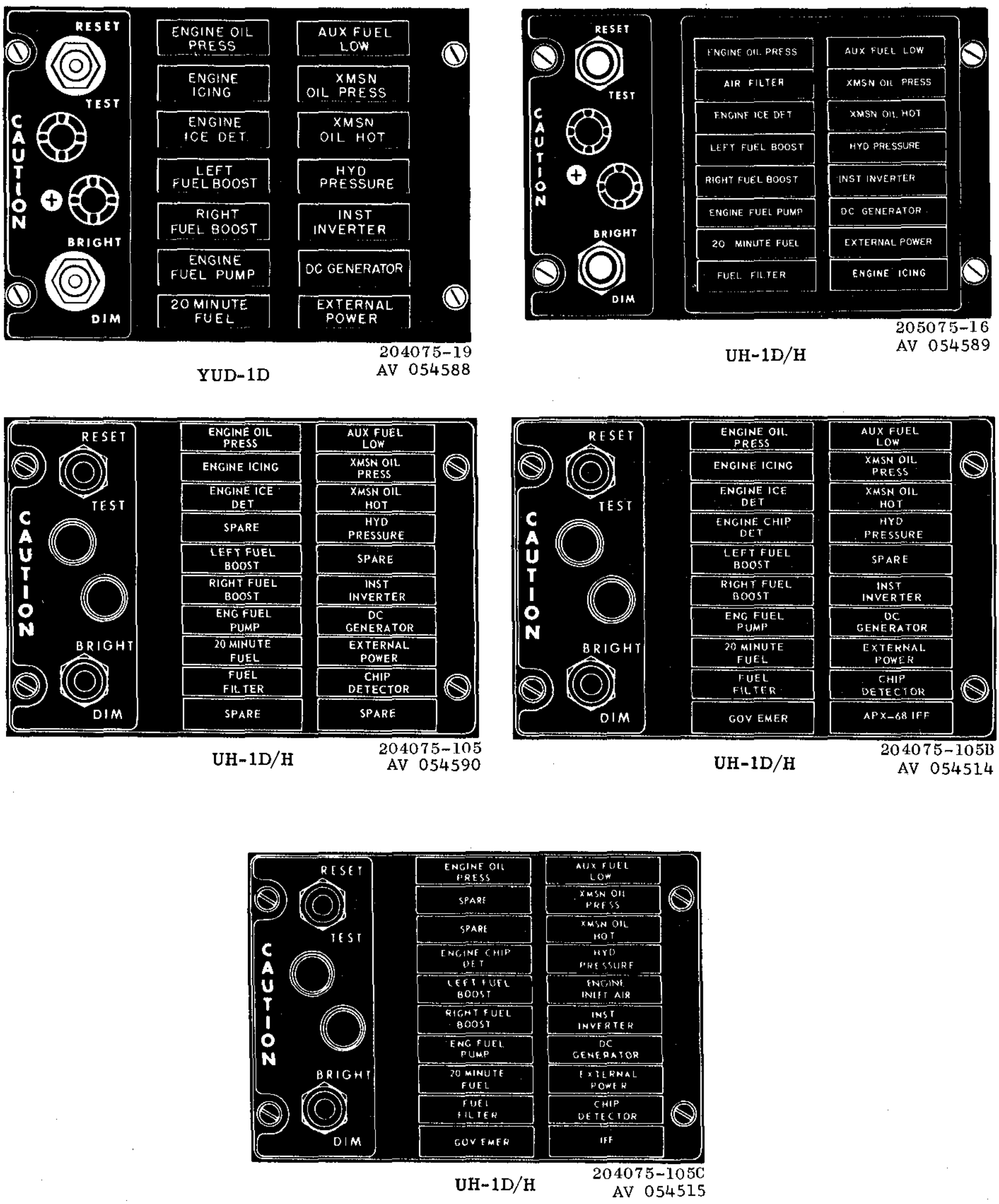
2-155. The hydraulic power supply system is provided with a hydraulic fluid level indicator and a low hydraulic pressure warning light.

2-156. HYDRAULIC FLUID LEVEL INDICATOR. The hydraulic reservoir contains a fluid level indicator rod, easily seen from inside the cabin. The rod is marked REFILL at the point when fluid is low, indicating that the hydraulic reservoir needs refilling.

2-157. LOW HYDRAULIC PRESSURE WARNING LIGHT. The low hydraulic pressure warning light is located on the pedestal-mounted CAUTION panel (figure 2-14). When illuminated, the segment wording reads HYD PRESSURE to provide the pilot with visual indication of a low hydraulic pressure condition. The light is wired in conjunction with the master caution indicator light located on the upper center area of the instrument panel (figure 2-5). Electrical power for the low hydraulic pressure warning light and master caution indicator light is supplied by the 28-volt DC essential bus. Circuit protection is provided by the CAUTION LIGHTS circuit breaker on the DC circuit breaker panel (figure 2-11).

2-158. IMPROVED HYDRAULIC OIL FILTERING SYSTEM - RETROFIT KIT.

2-159. The improved hydraulic oil filtering system eliminates the problem of system contamination once the element becomes clogged. However, the filter assembly incorporates an integral non-electrical device that will give visual warning by raising a red indicator when the differential pressure across the element exceeds 70 plus or minus 10 psi. Once actuated, the indicator will remain extended until reset manually. When the indicator is in reset position, it will be hidden from view. The indicator will not actuate below 35° plus or minus 15°F fluid temperature. An inspection window is provided to permit ready visual access to the filter indicator. The transparent window is located in the sheet metal structure above the access door on forward face of the cabin island.


YUD-1D 204075-19 AV 054588

UH-1D/H 205075-16 AV 054589

UH-1D/H 204075-105 AV 054590

UH-1D/H 204075-105B AV 054514

UH-1D/H 204075-105C AV 054515

Figure 2-14. Caution panel - typical

2-160. FLIGHT CONTROL SYSTEM.

2-161. The flight control system is a positive mechanical type, actuated by conventional helicopter controls which, when moved, direct the helicopter in various modes of flight. The system includes a cyclic control stick, used for fore and aft and lateral control; the collective pitch (main rotor) control lever, used for vertical control; tail rotor (directional) control pedals, used for heading control; and a synchronized elevator connected mechanically to the fore and aft cyclic control system to increase controlability and extend cg range.

2-162. The control forces of the flight control system are reduced to a near-zero-pounds force, to lessen pilot fatigue, by hydraulic servo cylinders which are connected to the control system mechanical linkage and powered by the transmission driven hydraulic pump. Force trims (force gradient) connected to the cyclic and directional controls are electrically operated mechanical units used to induce artificial control feeling into cyclic and directional controls and to prevent cyclic stick from moving of its own accord.

Note

> Provisions are made for a full dual flight control installation for training missions.

2-163. FORCE TRIMS (FORCE GRADIENT).

2-164. Force centering devices are incorporated in the cyclic controls and directional pedal controls. These devices are installed between the cyclic stick and the hydraulic servo cylinders, and between the directional control pedals and the hydraulic servo cylinder. The devices act to furnish a force gradient or "feel" to the cyclic control stick and directional control pedals; however, these forces can be reduced to zero by depressing and releasing force trim pushbutton switch (19, figure 2-4) on top of the cyclic control stick. This gradient is accomplished by means of springs and magnetic brake release assemblies which enable the pilot to trim the controls as desired, for any condition of flight. A FORCE TRIM ON/OFF switch is installed on the hydraulic control panel (12, figure 2-3) to deactuate the force trim, if so desired.

2-165. STABILIZER BAR.

2-166. The stabilizer bar is mounted on the main rotor mast in a parallel plane above and at 90 degrees to the main rotor blades (29, figure 2-1). The bar is connected into the main rotor system in such a manner that the inherent inertia and gyroscopic action of the bar is induced into the rotor system and produces a measure of stability for all flight conditions. If while hovering in a level attitude, the helicopter attitude is disturbed, the bar, due to its gyroscopic action tends to remain in its present plane. The relative movement between the bar and mast causes the hub and blade assembly to feather and return the main rotor to its original plane of rotation. Due to a restraining and damping action, the bar posses a mast-following characteristic. The following time is regulated by two hydraulic dampers connected to the bar in such a manner that a movement of the mast is transmitted to the bar through dampers at a rate determined by the adjustment of the dampers. A compromise is met in which the bar provides the desired amount of stabilility and still allows the pilot complete responsive control of the helicopter. The dampers are cam-actuated to increase damping as the stabilizer bar becomes displaced.

2-167. CYCLIC PITCH CONTROL STICK.

2-168. The cyclic pitch control stick is similar in appearance to the control stick of fixed-wing aircraft (16, figure 2-4). Movement of the stick operates the fore and aft and lateral control systems; therefore, when moved in any direction, will produce a corresponding directional movement of the helicopter which is the result of a change in the plane of rotation of the main rotor. Cyclic stick fore and aft movement changes the synchronized elevator attitude by means of mechanical linkage and connecting control tubes. The pilot's cyclic stick grip contains the cargo release switch, a trigger-type two-position radio transmitter switch, armament fire control switch, and the force trim release switch. The force trim switch is located in the left top-side of the stick grip. Desired operating friction can be induced into the control stick by hand tightening the friction adjuster. The copilot's cyclic control stick, when installed, is the same as the pilot's cyclic control stick.

2-169. COLLECTIVE PITCH CONTROL LEVER.

2-170. The collective pitch control lever (see 7, figure 2-4) is located to the left of the pilot's position and controls the vertical mode of flight. When the lever is in full down position, the main rotor is in minimum pitch. When the lever is in full up position, the main rotor is in maximum pitch. The amount of lever movement determines the angle of attack and lift developed by the main rotor, and results in ascent or descent of the helicopter. Desired operating friction can be induced into the control lever by hand tightening the friction adjuster (see 27, figure 2-4). A rotating grip-type throttle and a switch box assembly are located on the upper end of the collective pitch control lever. The switch box assembly contains the starter switch, governor rpm increase-decrease switch, engine idle stop release switch, and landing light and searchlight switches. A springloaded pitch lever down lock (see 9, figure 2-4) is located on the floor at the approximate center and inboard of the pitch control lever. The copilot's collective pitch control lever, when installed, contains only the rotating grip-type throttle, starter switch, and governor rpm increase-decrease switch.

Note

The copilot's collective pitch control lever installed in helicopters serial Nos. 68-15214 through 68-15766 have not been provided with a starter switch.

Note

The collective pitch control system has a built-in breakaway force to move the stick up from the neutral (center of travel) position of eight to ten pounds with boost ON.

2-171. TAIL ROTOR PITCH CONTROL PEDALS.

2-172. The directional (tail rotor pitch) control pedals (see 14, figure 2-4) are similar to and react in the same manner as fixed-wing aircraft rudder pedals. The pedals (through push-pull tubes, bellcranks, quadrant, cables and pulleys, and chain and sprocket) alter the pitch of the tail rotor blades; and thereby provide the means of directional control. This literally allows the helicopter to be pivoted about its own vertical axis at slow or zero airspeeds. Pedal adjusters are located below the floor aft of the cyclic control sticks and forward of the pilot and copilot positions. Adjuster knobs (see 11, figure 2-4) extend above the floor to enable adjustment of pedal distance for individual comfort. The force trim system is connected to the directional controls and is operated by the force trim switch on the cyclic control stick grip. The copilot's directional control pedals, when installed, are identical to the pilot's pedals.

2-173. SYNCHRONIZED ELEVATOR.

2-174. The synchronized elevator (see 14, figure 2-1) is located near the aft end of the tail boom and is connected by control tubes and mechanical linkage to the fore and aft cyclic control system. Fore and aft movement of the cyclic control stick produces a change in the synchronized elevator attitude, thus increasing controllability and lengthening cg range.

2-175. LANDING GEAR SYSTEM.

2-176. The helicopter's landing gear system is a skid type consisting of two laterally mounted arched crosstubes attached to two formed longitudinal skid tubes. The landing gear structure members are made from formed aluminum alloy tubing with full length steel skid shoes to minimize skid wear. The gear assembly is attached with clamps at four points of the fuselage structure; therefore, gear removal for maintenance can be easily accomplished. Two manually retractable and quickly removable wheel assemblies have been provided to facilitate helicopter ground handling operations.

2-177. TAIL SKID.

2-178. A tubular steel tail skid is attached to the lower aft section of the tail boom assembly and acts as a warning to the pilot upon an inadvertent tail-low landing.

2-179. FLIGHT INSTRUMENTS.

2-180. The flight instruments installed in the helicopter consist of the pilot's and copilot's airspeed indicators, turn and slip indicator, vertical velocity indicator, altimeter, and the pilot's and copilot's attitude indicators.

2-181. AIRSPEED INDICATORS.

2-182. Two airspeed indicators (10, figure 2-5) have been provided; one is mounted on the pilot's section of the instrument panel and the other is mounted on the copilot's section of the instrument panel. The single-scale indicators are calibrated in knots and provide an indicated airspeed of the helicopter at any time during flight, by measuring the difference between impact air pressure from the pilot tube and the static vent. The pitot tube is mounted on the left metal nose section of the cabin. Static air pressure for instrument operation is derived from the two static vents located in the side cabin skins near the forward edges of the crew doors.

2-183. TURN AND SLIP INDICATOR.

2-184. The turn and slip indicator (4 MIN TURN) (39, figure 2-5) is controlled by an electrically actuated gyro. The instrument has a needle (turn indicator) and a ball (slip indicator). Although the needle and ball are combined in one instrument and are normally read and interpreted together, each has its own specific function and operates independently of the other. The ball indicates when the helicopter is in directional balance, either in a turn or in straight and level flight. In the event of yawing or slipping by the helicopter, the ball will be off center. The needle indicates in which direction and at what rate the helicopter is turning. The electrical circuit is supplied power by the 28-volt DC essential bus and is protected by TURN & SLIP IND circuit breaker on the DC circuit breaker panel (figure 2-11).

2-185. VERTICAL VELOCITY INDICATOR.

2-186. Two vertical velocity (rate of climb) indicators (21, figure 2-5) (one for pilot and one for copilot) are front-mounted on the instrument panel. These indicators register ascent and descent of the helicopter in feet per minute. The instruments are actuated by the rate of atmospheric pressure change and are vented to the static air system.

2-187. ALTIMETER.

2-188. The altimeter (ALT) furnishes direct readings of height above sea level and is actuated by the pitot static system. Two altimeters are provided, one for the pilot and one for the copilot. Integral lighting, operated by 28-volt DC from the essential bus, is incorporated in the indicator.

2-189. PILOT'S ATTITUDE INDICATOR.

2-190. The pilot's attitude indicator is located on the pilot's section of the instrument panel (see 11, figure 2-5). This indicator provides the pilot with a visual indication of the pitch and roll attitude of the helicopter in relation to the earth's horizontal plane. The attitude indicator system is operated by three-phase 115-volt AC electrical power, supplied by the inverter, and is protected by PILOT ATTD circuit breakers on the AC circuit breaker panel (figure 2-12). Integral lighting, operated by 28-volt DC from the essential bus, is incorporated in the indicator. An OFF warning flag in the indicator is exposed with electrical power is removed from the system; however, the OFF flag will not indicate internal system failure which may occur in the control or indicator. The flag disappears approximately two minutes after electrical power is supplied to the control.

2-191. The attitude indicator has been specifically designed for the flight characteristics of helicopters by incorporating an electrical trim in the roll axis in addition to the standard pitch trim. Degrees of pitch and roll are indicated by a universally mounted sphere. The horizon is represented as a white bar on the sphere; horizontal markings indicate the degree of dive or climb; while bank (roll) angles are read from the semicircular scale located on the upper half of the indicator face.

2-192. The pitch trim knob, located on the lower right corner of the indicator, is adjusted to center the horizon on the indicator sphere with the minature airplane with regard to the normal flight attitude of the helicopter. The roll trim knob, on the indicator case, is adjusted to align the vertical axis of the sphere with the center mark on the roll (bank) indicator in regard to normal flight attitude of the helicopter.

2-193. COPILOT'S ATTITUDE INDICATOR.

2-194. The copilot's attitude indicator (11, figure 2-5) is located on the copilot's section of the instrument panel, and is operated by three-phase 115-volt AC electrical power supplied by the inverter. The gyro is enclosed in a sphere, a portion of which is visible through the opening in the face of the instrument. The indicator provides the copilot with a visual indicator of the pitch and roll flight attitude of the helicopter in relation to the earth's horizontal plane. Relative motion of the helicopter is indicated on the face of the instrument by movement of the horizon bar with relation to the adjustable miniature airplane in the center of the dial. In a climb or dive exceeding 27 degrees of pitch the horizontal bar will stop at the top or bottom of the case and the sphere then becomes the reference. The copilot's attitude indicator may be caged manually by pulling the PULL TO CAGE knob smoothly away from the face of the instrument to the limit of its travel and then releasing quickly.

Caution

> Caging of the copilot's (J-8) gyro attitude indicator should be kept to a minimum, and shall never be accomplished in flight, except when the helicopter is in straight and level flight by visual reference to a true horizon. The caging knob shall never be pulled violently.

2-195. STANDBY COMPASS.

2-196. A standard magnetic type compass is mounted in a bracket at the center right-hand edge of the instrument panel (26, figure 2-5). A compass correction card, located in a card holder above the compass, is provided for the pilot's use in conjunction with the magnetic compass (13, figure 2-5).

2-197. MISCELLANEOUS INSTRUMENTS AND INDICATORS.

2-198. Instruments and indicators that are independent or linked with more than one system consist of the freeair temperature indicator, master caution system and rpm high-low limit warning system.

2-199. FREE-AIR TEMPERATURE INDICATOR.

2-200. The bi-metal free-air temperature indicator is located above the instrument panel and in the approximate upper center area of the windshield. The indicator provides a direct reading of the outside air temperature.

2-201. MASTER CAUTION SYSTEM.

2-202. The master caution system consists of a remote master caution indicator light and a warning caution panel. The caution panel, located on the pilot's side of the pedestal, displays condition-indicating lights which caution the pilot of system malfunctions or conditions which require mandatory action. The panel includes the lights and circuits necessary to test, reset, and dim the lamp circuits. The test switch does not test the condition-indicating circuits. When the test switch is held in the TEST position, all lamps should be illuminated, including the master caution light. The panel test switch verifies that the panel lamps are not burned out. The test switch also has a momentary RESET position. This position is used to extinguish the master caution light after a single fault condition (such as AUX FUEL LOW) is noted and the necessary action is taken. Each additional fault or condition will again illuminate the master caution light, and each time the light may be extinguished or reset to indicate the next condition should another one occur. The reset function does not extinguish the individual caution panel lights. The lights, and the master caution light, may be dimmed, however, by momentarily moving the BRIGHT/DIM switch on the caution panel to DIM. This momentary action energizes a holding relay and dims all lights until one of three actions occurs: The dimming relay will drop out only if (1) the BRIGHT/DIM switch is moved momentarily to BRIGHT (2) the pilot's instrument lights are extinguished by rotating the rheostat to OFF, or (3) a loss of power from the essential DC power bus occurs. The dimming circuit is disabled when the pilot's instrument lights are OFF; however, if all other circuits are in and connected, the caution panel will function normally.

2-203. MASTER CAUTION INDICATOR LIGHT. The master caution indicator light is located at the top center of the instrument panel (4, figure 2-5). When this light illuminates, the pilot is alerted to check the CAUTION panel (figure 2-14) for the fault condition or conditions that have occurred.

2-204. CAUTION PANEL. The CAUTION panel(figure 2-14) is mounted in the instrument pedestal. When illuminated, the worded segment lettering in the panel will be aviation yellow; however, when not illuminated, segment lettering will not be visible. This panel functions to provide the pilot visual indications (day or night) of the fault conditions as follows:

FAULT CONDITION	CAUTION PANEL SEGMENT
Engine Oil Pressure Low	ENGINE OIL PRESS
Metal Particles Present in Engine	ENGINE CHIP DET
Engine Icing Detected	ENGINE ICING
Engine Ice Detector Disarmed	ENGINE ICE DET.
Left Fuel Boost Pump Inoperative	LEFT FUEL BOOST
Right Fuel Boost Pump OFF	RIGHT FUEL BOOST
Engine Fuel Pump Inoperative	ENGINE FUEL PUMP
Fuel Quantity Low	20 MINUTE FUEL
Auxiliary Fuel Tank Empty	AUX FUEL LOW
Transmission Oil Pressure Low	XMSN OIL PRESS
Transmission Oil Temperature High	XMSN OIL HOT
Hydraulic Pressure Low	HYD PRESSURE
AC Bus Failure (Inverter Failure)	INST INVERTER
DC Generator Failure	DC GENERATOR
External Power Connected or Receptical Door Open	EXTERNAL POWER
Fuel Filter Clogged	FUEL FILTER
Engine air Filter Clogged	AIR FILTER
Metal Particles Present in 42° or 90° Gearbox or Main Transmission	CHIP DETECTOR
Emergency Fuel Control	GOV EMER
IFF System Inoperative	AN/APX-68

Note

IFF panel segment is only for the AN/APX-68. Failure of AN/APX-44 system, when installed, will not actuate the light.

2-205. RPM HIGH-LOW LIMIT WARNING SYSTEM.

2-206. The rpm high-low limit warning system provides the pilot with an immediate warning of high or low rotor rpm or low engine rpm. Main components of the system are a detector unit, warning light and audio signal circuit, low RPM AUDIO/OFF switch, and electrical wiring and connectors. The warning light and audio warning signal function when the following rpm conditions exist:

Warning light only	For rotor rpm of 335 (plus or minus 5). (High Warning)
Warning light and audio warning signal in combination	For rotor rpm of 295 (plus or minus 5) or engine rpm of 6000 (plus or minus 100) or both. (Low Warning)

Note

> The audio warning signal will be heard in the headsets. The signal is a varying oscillating frequency, starting low and building up to a high pitch. Signal alternates on for 0.85 second, then off for one second.

The rotor tachometer generator and power turbine tachometer both send signals to the high-low rpm warning light and audio warning circuits. When the combination warning light and audio signals are energized, determine the cause of indication by checking the torquemeter and cross referencing other engine instruments. A normal indication signifies that the engine is functioning properly, and that there is a tachometer generator failure or an open circuit to the warning system rather than an actual engine failure. Electrical power for system operation is supplied by the 28-volt DC essential bus. Circuit protection is provided by a circuit breaker on the auxiliary circuit breaker panel.

2-207. LIGHT - HIGH-LOW LIMIT RPM WARNING. The high-low warning light is located on the upper left-hand area of the instrument panel. This light illuminates to provide a visual warning of low rotor rpm, low engine rpm, or high rotor rpm.

2-208. SWITCH - LOW RPM AUDIO/OFF. The LOW RPM AUDIO/OFF switch is on the engine control panel (5, figure 2-3). When the OFF position, the switch prevents audio warning signal from functioning during engine starting. This eliminates use of the circuit breaker as a switch, and increases safety by having warning light working at all times. Current production helicopters (and those so modified) use a spring-loaded switch. When the switch has been manually turned off for engine starting, it will automatically return to the AUTIO position when normal operating range is reached.

2-209. EMERGENCY EQUIPMENT.

2-210. The emergency equipment consists of the fire extinguisher, first aid kits, and fire detector warning system.

2-211. FIRE EXTINGUISHER.

2-212. A portable hand-operated fire extinguisher (Federal Supply Classification No. 4210) is carried in a bracket located at the right side of the pilot's seat. (See figure 4-3.)

2-213. FIRST AID KITS.

2-214. Four aeronautical type first aid kits(Federal Supply Classification No. 6545) have been provided in the cabin area. Two kits are secured to the lower area of the right-hand center door post and the other two kits are secured to the lower area of the left-hand door post. (See figure 4-3.) The first aid kit can be easily removed for immediate use.

2-215. FIRE DETECTOR WARNING SYSTEM.

2-216. The fire detector warning system consists of a right-hand engine cowl fire detection element, a left-hand engine cowl fire detection element, a fire detection control unit, a fire detector test switch, and a fire warning light. The fire detector elements are strategically placed around the engine and attached to the engine cowling. Excessive heat from the engine compartment causes illumination of the FIRE light located on the upper right section of the instrument panel (1, figure 4-3). This light and the other fire detector warning system units are supplied power by the 28-volt DC essential bus. The press-to-test (FIRE DETECTOR TEST) test switch is located to the left of the fire warning light (1, figure 4-3). When the test switch is depressed, the fire detector elements are connected in series and the far end is grounded, causing the fire light to illuminate.

2-217. PILOT'S AND COPILOT'S DOORS.

2-218. The pilot's and copilot's entrance doors (1, figure 2-4) are formed aluminum frames with transparent plastic windows in the upper section. Ventilation is supplied by sliding panels in the windows.Cam-type door latches are used and doors are equipped with jettisonable door releases to allow release in flight.

2-219. CARGO-PASSENGER DOORS.

2-220. The two cargo-passenger doors are formed aluminum frames with transparent plastic windows in the upper section (19, figure 2-1). These doors are on rollers and slide aft to the open position allowing access to the cargo area.

2-221. HINGE DOOR POST PANELS.

2-222. The door post panels forward of the cargo door are hinged to provide a larger entrance to the cargo-passenger area. These panels are formed aluminum frames with transparent plastic windows in the upper panel area. The panels may be quickly removed by removing the special hinge pins.

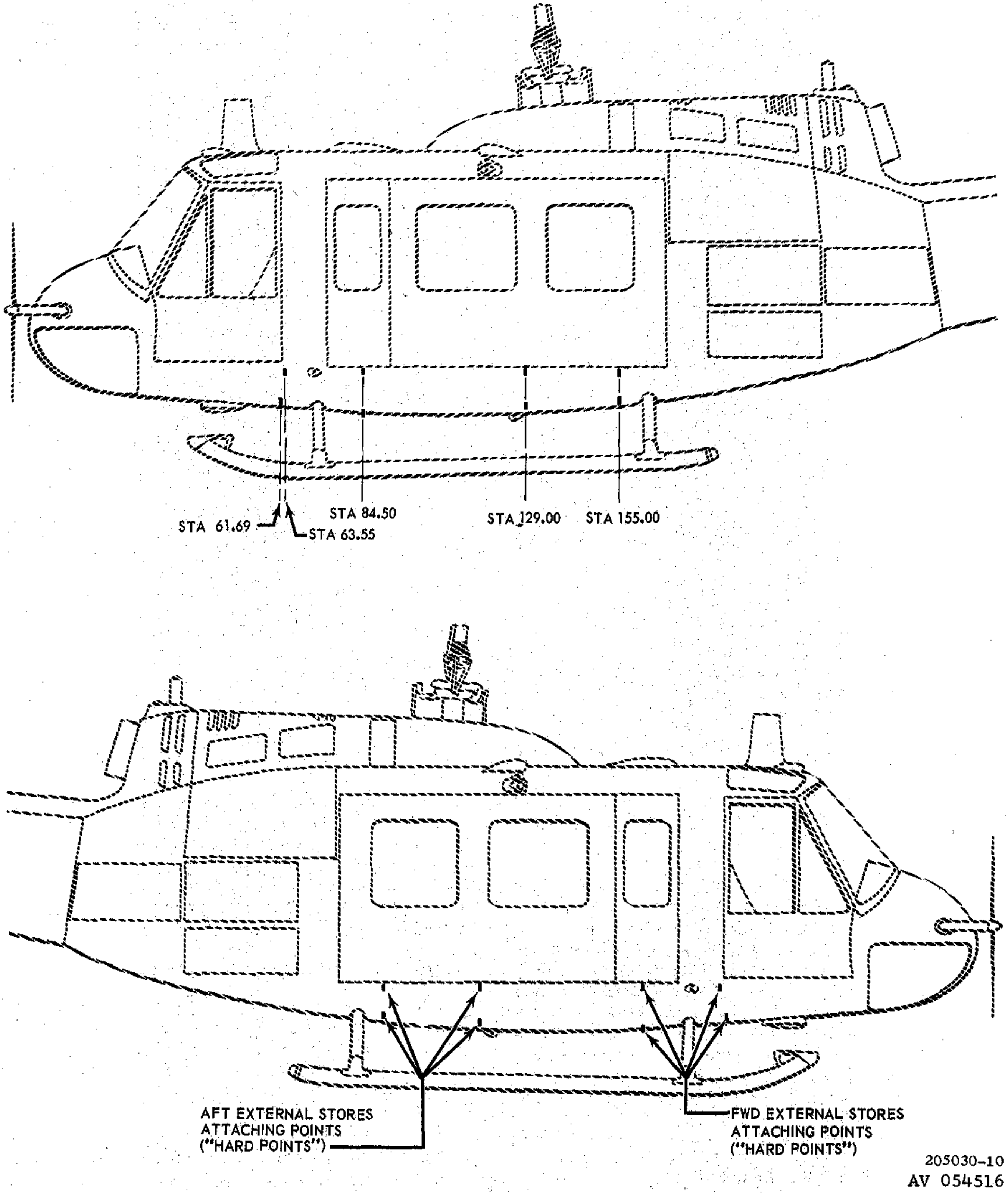
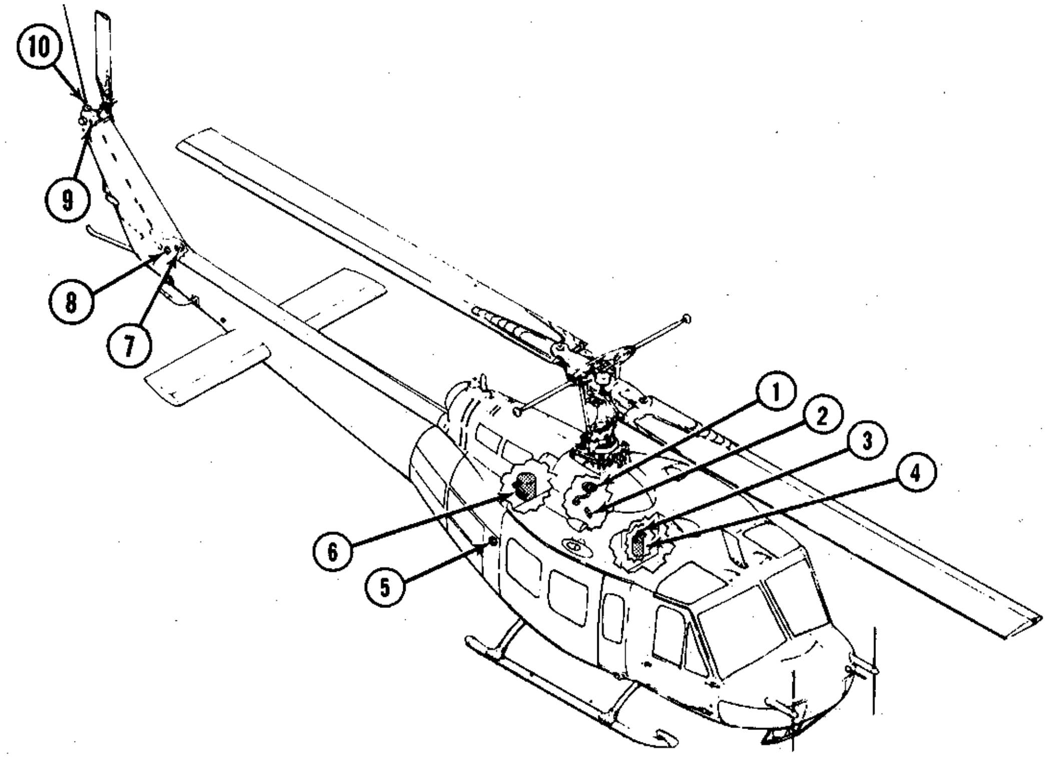


Figure 2-15. Hard point location



1. Transmission Oil Filler
2. Transmission Oil Level Sight Gage
3. Hydraulic Fluid Level Sight Gage
4. Hydraulic Fluid Reservoir
5. Fuel Filler
6. Engine Oil Tank
7. Tail Rotor Intermediate Gear Box Oil Filler
8. Tail Rotor Intermediate Gear Box Oil Level Sight Gage
9. Tail Rotor Gear Box Oil Level Sight Gage
10. Tail Rotor Gear Box Oil Filler

NOTE: Maximum oil consumption for the T53-L-9, -9A, -11 series, -13 engines is 0.3 gallon per hour (2.4 pints).

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Figure 2-16. Servicing diagram (Sheet 1 of 2)

SPECIFICATIONS AND CAPACITIES

ENGINE FUEL -- MIL-J-5624 Grade JP-4
ALTERNATE – Grade JP-5
(T53-L-11 series engines)
Capacity 220 U.S. Gals.

ENGINE OIL – MIL-L-7808 or MIL-L-23699*
Capacity 3.0 U.S. Gals.

The following EMERGENCY fuels may be used in accordance with TB 55-9150-200-25.

(a) Unleaded Gasoline (white gasoline)
(b) MIL-G-5572, Aviation Gasoline
(Use lowest grade available)
(c) MIL-G- 3056, Automotive Gasoline
(Use lowest grade available)
(d) MIL-J-5624, Grade JP-5 (T53-L-9A)

NOTE: T53-L-13 only

ARMY STANDARD FUEL –
MIL-J-5624 Grade JP-4

ALTERNATE FUEL –
MIL-J-5624 Grade JP-5 and
MIL-F-46005 (CITE)

EMERGENCY FUEL – Gasoline, all types
(limited to 10 hours accumulated time
between internal inspections)

An entry shall be made in DA Form 2408-13 after use of ALTERNATE or EMERGENCY fuels.

TRANSMISSION – MIL-L-7808 or MIL-L-23699*
Capacity 2.25 U.S. Gals.

TAIL ROTOR INTERMEDIATE GEAR OIL
MIL-L-7808, or MIL-L-23699*
Capacity 0.375 U.S. Pint

TAIL ROTOR GEAR BOX OIL -- MIL-L-7808
or MIL-L-23699*
Capacity 0.50 U.S. Pint

HYDRAULIC FLUID – MIL-H-5606
System Capacity 7.3 U.S. Pints
Reservoir Capacity 1.5 U.S. Pints
Refill Reservoir Capacity 1 U.S. Pint

CAUTION:

Before using anti-icing additive refer to Caution Note in TB 55-9150-200-25

*Note
It is not advisable to mix MIL-L-23699 oil with MIL-L-7808 oil except in cases of emergency. If it becomes necessary to mix the oils it is recommended that the system be flushed within 6 hours.

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Figure 2-16. Servicing diagram (Sheet 2 of 2)

2-223. PILOT'S AND COPILOT'S SEATS.

2-224. The pilot's and copilot's seats (figure 2-4) are the adjustable non-reclining type, and each seat is mounted on two fixed tracks. A lever for vertical adjustment is on the right side of each seat and the fore and aft lock is on the left side of each seat. Each seat is equipped with a lap safety belt and inertia-reel shoulder harness. Webbing on the back of the seat can be removed to accept use of a back-pack parachute.

Caution

> Upward force of springs located on seats may cause rapid vertical movement.

2-225. SHOULDER HARNESS.

2-226. An inertia-reel and shoulder harness is incorporated in the pilot's and copilot's seat with manual lock-unlock handle (figure 2-4). The control handle may be moved freely from one position to the other. With the control in the unlocked position, the reel cable will extend to allow the pilot to lean forward; however, the reel will automatically lock when helicopter encounters an impact force of 2 or 3 "G" deceleration. Locking of the reel can be accomplished from any position and the reel will automatically take up the slack in the harness. To release the lock, it is necessary to lean back slightly to release tension on the lock and move the control handle to the unlock position. It is possible to have pressure against the seat back whereby no additional movement can be accomplished and the lock cannot be released; if this condition occurs, it will be necessary to loosen shoulder harness. Manual locking of the reel should be accomplished for emergency landing.

2-227. AUXILIARY EQUIPMENT.

2-228. The following systems and equipment are covered in Chapter 6:

Ventilating System
Heating and Defrosting System
Engine Anti-Icing System
Pitot Heater
Navigation Lights
Anti-Collision Light
Landing Light
Search Light
Dome Lights
Cockpit Lights
Transmission Oil Level Light
Instrument Lights
Armament System Provisions
Windshield Wiper
Casualty Carrying Equipment
Heated Blanket Receptacle
Check List Holder
Data Case
Mooring Fittings
Tow Rings
Ground Handling Wheels
Blackout Curtains
Blood Bottle Hangers
Main and Tail Rotor Tie Downs
Cargo Tie Down Fittings
External Cargo Rear View Mirror
Paratroop Static Line
Electrical Provisions for Engine Vibration Check Equipment
Auxiliary Fuel Equipment
Internal Rescue Hoist

TABLE 2-5. APPROVED SUBSTITUTE FUELS

NOTE: Wide Cut Type Fuels (JP-4 Type). Any of these may be used as Army Standard Fuel when JP-4 is not available.

MILITARY FUELS

NATO	F-40
Canada	3-GP-22e Amdt 3
Italy	AM-C-142
Belgium	BA-PF-2A Amdt 1
US	MIL-J-5161 Grade 1 (JP-4 Referee)
Britain	D. Eng. R.D. 2486 Iss. 4
Norway	MIL-J-5624F, Am2, GR JP-4
Denmark	MIL-J-5624, Am2, GR JP-4

TABLE 2-5. APPROVED SUBSTITUTE FUELS (CONT)

COMMERCIAL FUELS	
Atlantic	Arcojet-B
B.P. Trading	BP A.T.G.
British American	B-A Jet Fuel JP-4
California Texas	Caltex Jet B
Continental	Conoco JP-4
Esso International	Esso Turbo Fuel B
Gulf	Gulf Jet B
Humble	Esso Turbo Fuel B Enco Turbo Fuel B
Phillips	Philjet JP-4
Shell	Aeroshell Turbine Fuel JP-4
Standard of Calif.	Chevron Turbine Fuel B
Standard of Texas	Standard Turbine Fuel B
Standard Oil Co.	Standard Jet B
Texaco	Texaco Avjet B
Union	Union JP-4

NOTE: Kerosene Type Fuels (JP-5 Type). Any of these fuels may be used when JP-5 is not available.

MILITARY FUELS (Freezing Point - 40°F)	
NATO	F-42
France	AIR 3404A Amdt 1
US	MIL-J-5161, Grade II (JP-5 Referee)
(Freezing Point - 55°F)	
NATO	F-34, F-44
Canada	3-CP-23e, Am. 3
Britain	D. Eng. R.D. 2494, Iss 3
Canada	3-GP-24d, Am. 3
West Germany	VTL-9130/007. Am. 1 VTL-9130/010
Italy	AM-C-143
US	MIL-F-25524 MIL-J-25655, JP-6
COMMERCIAL FUELS (Freezing Point - 40°F)	
American	American Jet Fuel Type A
Atlantic	Arcojet-A
British American	B-A Jet Fuel JP-1
Cities Service	Turbine Type A
Continental	Conoco Jet-40 Conoco Jet-50
Gulf	Gulf Jet A
Humble	Esso Turbo Fuel A Enco Turbo Fuel A
Mobil	Mobil Jet A
Phillips	Philjet A-50
Pure	Purejet Turbine Fuel Type A
Richfield	Richfield Turbine Fuel A
Shell	Aeroshell Turbine Fuel 640
Sinclair	Sinclair Superjet Fuel
Standard Oil Co	Standard Jet A
Standard (Ohio)	Jet A Kerosene
Texaco	Texaco Avjet A

TABLE 2-5. APPROVED SUBSTITUTE FUELS (CONT)

(Freezing Point - 55°F)

American	American Jet Fuel Type A-1
Atlantic	Arcojet A-1
BP Trading	BP A.T.K.
California-Texas	Caltex Jet A-1
Continental	Conoco Jet 60
Esso International	Esso Turbo Fuel A-1
Gulf	Gulf Jet A-1
Humble	Esso Turbo Fuel A-1 Enco Turbo Fuel A-1
Mobil	Mobil Jet A-1
Pure	Purejet Turbine Fuel Type A-1
Richfield	Richfield Turbine Fuel A-1
Shell	Aeroshell Turbine Fuel 650
Sinclair	Sinclair Super Jet Fuel
Standard of Calif.	Chevron Jet Fuel A-1
Standard of Texas	Standard Turbine Fuel A-1
Standard (Ohio)	Jet A-1 Kerosene
Texaco	Texaco Avjet A-1
Union	76 Turbine Fuel

CHAPTER 3

NORMAL PROCEDURES

SECTION I SCOPE

3-1. PURPOSE.

3-2. Chapter 3 contains instructions and procedures covering flight of the helicopter from the planning stage, through actual flight conditions, to securing the helicopter after landing. Normal and standard conditions are assumed in these procedures. Pertinent data in other chapters is referenced when applicable.

3-3. Normal procedures are given in checklist form when applicable. A condensed version of these procedures is contained in the condensed checklist. Technical Manual TM 55-1520-210-10CL.

3-4. The instructions and procedures contained herein are written for the purpose of standardization and are not applicable to all field situations.

SECTION II FLIGHT PROCEDURES

3-5. PREPARATION FOR FLIGHT.

3-6. This period should be devoted to matters of general mission planning and to a study of special problems involved in operating the helicopter for mission completion.

3-7. FLIGHT RESTRICTIONS.

3-8. The minimum, normal, maximum, and cautionary operation range for the helicopter and the engine are indicated by instrument markings and placards. These instrument markings and placards represent careful aerodynamic calculations, substantiated by flight test data. Refer to Chapter 7, Operating Limitations, for a detailed description of helicopter and engine restrictions.

3-9. FLIGHT PLANNING.

3-10. The safe and efficient planning of the mission to be accomplished will provide the pilot with the data to be used during flight. The information to be used can be compiled from the following sources.

1. Check type of mission to be performed, and destination.

2. Select performance charts to be used from Chapter 14.

3. Record for in-flight use, the information concerning fuel quantity required, airspeed, power settings, take-off, climb, cruise or hovering conditions, landing and fuel consumption for operating gross weight and climatic condition.

3-11. TAKE-OFF AND LANDING DATA.

3-12. Consult chapter 14, Performance Data, for detailed operating information when planning various types of missions that require use of the data.

3-13. WEIGHT AND BALANCE.

3-14. Ascertain proper weight and balance of the helicopter as follows:

1. Consult applicable weight and balance instructions given in Chapter 12, and ascertain that DD Form 365F has been completed properly.

2. Compute take-off and anticipated landing gross weight, checking helicopter CG and location and ascertaining weight of fuel, oil, payload, etc.

3. Check that loading limitations, described in Chapter 7, have not been exceeded.

3-15. PRE-FLIGHT CHECK.

3-16. The amplified preflight check includes the exterior and interior checks as outlined.

Note

(I) Indicates check required for instrument Flight ONLY.

(N) Indicates checks required for Night Flights ONLY.

(O) Indicates checks required if item is installed.

When the aircraft is flown by the same flight crew during tactical or administrative missions requiring intermediate stops, the flight crew need not perform all the pre-flight checks required by the amplified or condensed checklists for beginning flights. Under these conditions, only the starred (*) items in these lists are required checks to assure safe operation.

3-17. BEFORE EXTERIOR CHECK - AREA 1.

1. Publications - Check DA Form 2408-12, 13, and -14, DD Form 365F, locally required forms and publications and availability of Operator's Manual (-10).

2. Battery Switch - OFF.

(N) 3. Searchlight, Landing Light, and Mav Lights - Battery Switch ON, Check lights; Battery switch OFF.

4. Fuel - Check and secure cap.

3-18. EXTERIOR CHECK - FUSELAGE FRONT AREA 2.

1. Rotor Blade - Visually check condition.

2. Cabin Top - Check ventilators and condition.

3. Radio Compartment - Check security of all equipment. (Check battery if armor seats not installed.)

4. Radio Compartment Door - Condition and Secured.

(O) 5. FM Antenna - Check Security and condition.

6. Pitot Tube - Remove cover and check free of obstructions and security.

7. Cabin Lower Area - Check all glass.

(O) 8. Cargo Suspension Mirror - Covered and seccured. Uncovered and adjusted if cargo operations are anticipated.

9. Landing and Searchlight - Stowed.

3-19. FUSELAGE - LEFT SIDE AREA 3.

(O) 1. Pitot-Static Port - Free of obstructions.

2. Navigation light - Condition and security.

3. Entrance Doors - Condition and operation.

4. Landing Gear and Skid Shoes - Condition, handling wheels removed.

5. Cargo Suspension Cable - Check centering cables and springs. Check hook if use is anticipated.

3-20. FUSELAGE - AFT CABIN LEFT SIDE AREA 4.

Warning

Visually check security of quick-disconnect fittings by noting lock-pin indications.

1. Engine and Transmission Deck - Check for fuel and oil leaks; secure cowling.

2. Electrical compartment - Check condition, circuit breakers in, and battery connected.

Note

Turn battery and main fuel ON before accomplishing checks 3 through 6, then OFF before continuing checks.

3. Fuel Filter - Drain and check.

4. Right and Left Pumps and Sumps - Drain.

(O) 5. Aux Fuel Tank Filter and Sump - Drain.

6. Access Doors - Secure for flight.

3-21. AFT FUSELAGE (TAIL BOOM) - LEFT SIDE AREA 5.

1. Tail Rotor Drive Shaft Coupling - Check position, security, shut access door.

2. Aft Fuselage - Check general condition.

3. Synchronized Elevator - Condition.

4. Antenna - Condition and security.

5. Main Rotor Blade - Untie, check and ROTATE 90° TO FUSELAGE.

3-22. FUSELAGE - FULL AFT AREA 6.

1. Aft fuselage extension covers - Condition - Secure.

2. Tail Rotor - Check condition and free movement on flapping axis. Visually inspect tail rotor crosshead retaining nut and bolt for installation of cotter pin.

3. Tail Skid - Condition and security.

4. Navigation Lights - Condition and Security.

5. FM Antenna - Condition and security.

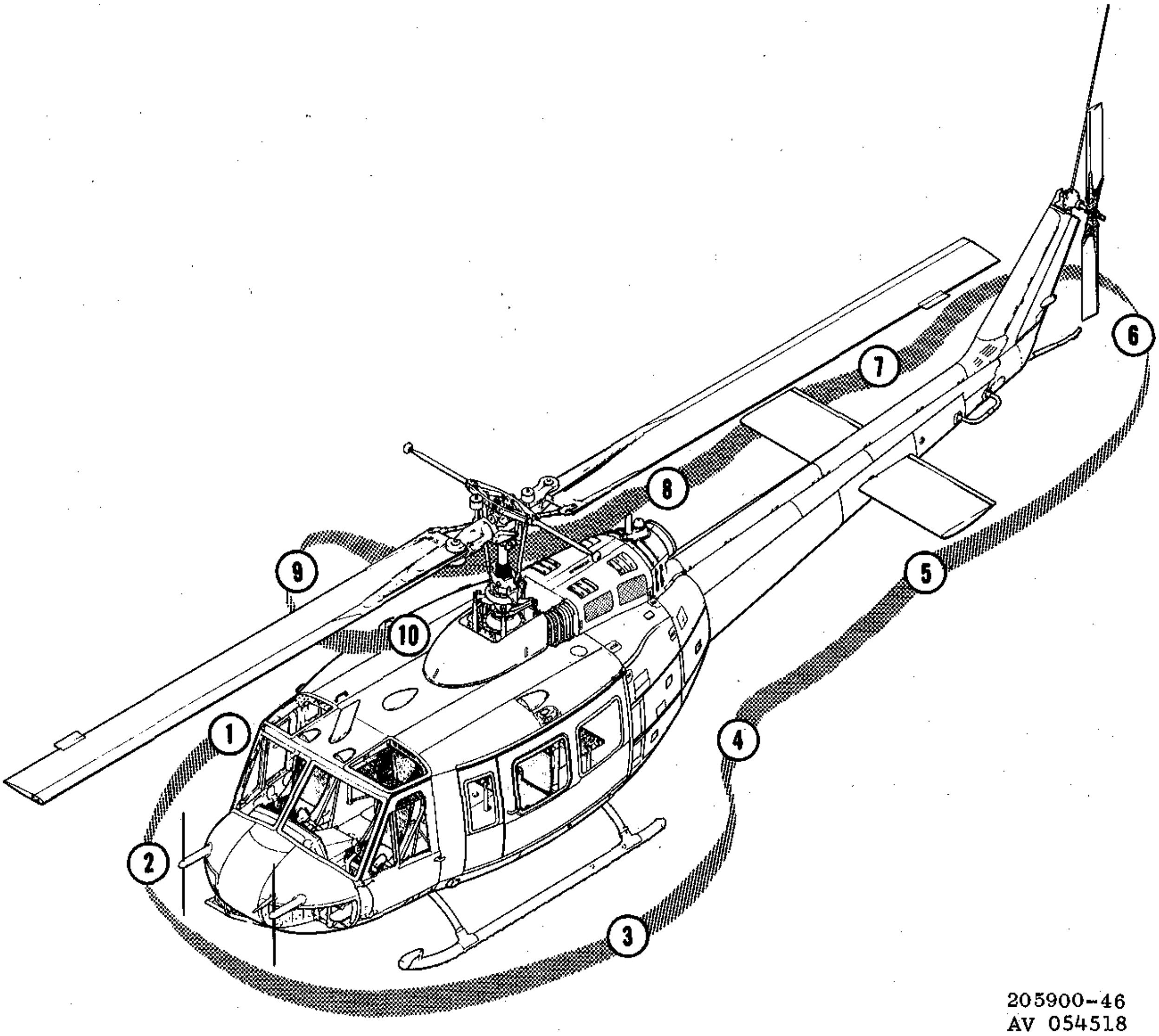

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Figure 3-1. Exterior check diagram

3-23. AFT FUSELAGE (TAIL BOOM - RIGHT SIDE AREA 7.

1. Tail Rotor Gearbox (90° and 42°) - Condition and oil levels.

2. Antenna - Condition and security.

3. Synchronized Elevator - Condition.

4. Aft Fuselage - Check general condition.

3-24. FUSELAGE - AFT CABIN RIGHT SIDE AREA 8.

1. Oil Cooling Fan Compartment - Check.

2. Baggage Compartment - Check.

3. Engine and Transmission Deck - Check for fuel and oil leaks; secure cowling.

4. Oil Level - Check and cap secure.

(O) 5. Hydraulic Fluid - Check level.

6. Access Doors - Secured for flight.

3-25. FUSELAGE - CABIN RIGHT SIDE AREA 9.

1. Navigation Lights - Condition and security.

(O) 2. Hydraulic Fluid - Check level.

3. Entrance Doors - Condition and security.

4. Landing Gear and Skid Shoes - Condition ground-handling wheels removed.

(O) 5. Pitot-Static Port - Foree of obstruction.

3-26. CABIN TOP - AREA 10.

1. Main Rotor System - Check condition, cleanliness, and security; visually check level of damper fluid, blade grip, and pillow block.

2. Transmission and Hydraulic Filler cap - Secure.

3. Engine Short Shaft - Condition and security.

4. Engine Air Intake - Clean and free from obstruction.

5. Antennas - Condition and Security.

6. Anticollision Light - Security and condition.

7. Engine and Transmission Cowling - Secured.

8. Cabin Top Ventilators - Unobstructed.

3-27. INTERIOR CHECK - CARGO COMPARTMENT.

(N) 1. Battery Switch - ON.

(N) 2. Dome Lights - Check operation.

3. Fire Extinguisher - Check for charge and security.

4. Cargo - Check for proper loading and tiedown.

5. Passenger Seats - Check security.

6. First Aid Kits - Condition and secure.

7. Transmission Sight Gage - Check.

8. Electrical Outlets - Check condition.

10. Rotor Blade Tiedown, Pitot tube cover, and Tailpipe Cover - Stowed.

(N) 11. Dome Lights - OFF.

(N) 12. Battery Switch - OFF.

3-28. BEFORE STARTING ENGINE.

1. Entrance Doors - Secured for flight.

Caution

Cargo doors may be secured in full open position only if appropriate modifications have been made to the doors and airframe. If a cargo door comes open while in flight reduce forward speed below 60 knots and secure door.

2. Seat and Pedals - Adjust.

3. Seat Belt and Shoulder Harness - Fasten and tighten.

4. Shoulder Harness Lock - Check operation and leave unlocked.

5. Cyclic, Collective, and Throttle Friction - OFF.

6. Cyclic, Collective Pitch, and Pedals - Check travel, center cyclic, and pedals. Place collective pitch full down.

7. Landing light and Searchlight - OFF.

8. AC Circuit Breakers - In.

9. All Radio Equipment - OFF; Set on desired frequencies.

10. GOVernor - GOV AUTO.

11. DE-ICE - OFF.

12. INT AUX FUEL boost pump - OFF.

13. LOW RPM AUDIO - OFF or check, spring loaded.

14. MAIN FUEL - OFF.

(O) 15. START FUEL - OFF.

16. HYDraulic CONTROL switch - ON.

17. FORCE TRIM - ON.

18. CHIP DETector Switch - Spring loaded to BOTH.

19. Compass Slaving - IN (MAG HDG if applicable).

20. Instruments - Check static indications, slippage marks, and operating range limit markings.

21. Turn and Slip Indicator - Check race full of fluid.

22. Marker Beacon - OFF.

23. Clock - Wound and running.

24. Magnetic Compass - Check full of fluid and deviation card.

25. VSI's - Note indication.

26. Heading Indicators - Check RNI selector switch in ADF position, calibration card posted.

27. Altimeters - Set to field elevation.

28. Airspeed Indicators - Note Indication.

29. Free-Air Temp Gage - Check reading and condition.

30. STARTER GENerator switch - START.

31. NON-ESSential BUS - NORMAL ON.

32. VM Selector switch - BAT (check 24 volts on DC voltmeter), then to MAIN GEN if APU start.

33. MAIN GENerator switch - ON and cover down.

34. AC PHASE selector - AC phase.

35. INVTR switch - Off.

36. Instrument Lights - OFF (Set as desired for night flights).

37. DC Circuit Breakers - IN, except for armament and special equipment.

38. PITOT HTR - OFF.

39. DOME LT - OFF (except for night flight).

40. EXTernal LTS - off (FLASH for night flights as desired).

41. ANTI COLLision Light - OFF.

42. WIPERS - OFF.

Note

WIPERS must not be operated on dry windshield.

43. CARGO RELease switch - OFF.

44. Cabin Heating switches - OFF.

3-29. STARTING ENGINE.

1. BATtery switch - OFF. (ON for battery start).

2. Copilot's Attitude Indicator - Cage (for APU start only).

3. INVTR switch - SPARE. (OFF for battery start).

4. FIRE DETECTOR Light - TEST (15 seconds maximum).

5. RPM Warning Light - ON.

6. Fuel Filter and Cargo Release Lights - Press to test.

7. Fuel Gage Test Switch - If APU start, depress until fuel quantity drops approximately 200 pounds, then release and check that gage returns to original indication.

8. Caution Panel Warning Lights - TEST and RESET master caution light.

9. MAIN FUEL switch - ON. (Check fuel pressure (APU START).

(O) 10. START FUEL - ON.

11. GOVernor RPM INC-DEC Switch - DEC for 10 seconds.

12. Throttle - Check Full Travel and return to flight idle; check operation of engine idle stop, then move throttle to full closed; position the throttle as near as possible (on decrease side) of the flight idle stop.

(N) 13. DOME LT - OFF.

14. Fireguard - Posted.

15. Rotor Blades - Clear and untied - verbally announce "CLEAR".

16. Start Switch (Trigger) - and Hold; start time; use installed timing device.

Note

During a battery start a minimum of 24 volts should be indicated on the DC voltmeter before attempting start. However, a battery start can be made when voltages less than 24 volts are indicated, provided the indicated battery voltage does not drop below 14 volts with the starter energized.

Caution

Limit starter energize time to 40 seconds. If engine does not start, a 3-minute cooling period is required before beginning another starting cycle. Only three 40-second starting attempts are permissible in any 1-hour period.

(O) 17. Start Fuel - OFF at 400°C.

18. Release starter switch at 40% gas producer rpm or after 40 seconds, whichever occurs first.

Caution

During starting or acceleration, the maximum allowable EGT is 760°C. If EGT exceeds 760°C for any period of time, or 650°C (L-13-675°C) for more than 5 seconds, an entry in the 2408-13 is required. If during starting or acceleration it becomes apparent that EGT will exceed 650°C (L-13-675°) ABORT THE START as follows: throttle full off, fuel system off and continue to motor the starter until EGT decreases.

19. Copilot's Attitude Indicator (Battery Start)-Cage.

20. INVTR Switch (Battery start) - To SPARE.

21. Throttle - Slowly advance past engine idle stop to flight idle position. Manually check flight idle stop by attempting to roll throttle off.

22. Gas Producer - 56% to 58% (70% to 72% -L13).

Note

A slight rise in N_1 may be anticipated after releasing pressure on twist grip.

23. Engine oil pressure - 25 psi minimum.

24. Transmission Oil Pressure - Check normal.

Caution

If no oil pressure is evident at this time, shut engine down immediately and investigate the cause.

(N) 25. All Interior Lights - As desired.

26. Auxiliary Power Unit (APU start) - Disconnect.

Caution

Check external power disconnected prior to turning battery switch on.

27. Batter Switch (APU start) - ON.

28. Fuel Gage Test Switch (Battery Start) - Depress until fuel quantity gage drops approximately 200 pounds, then release and check that gage returns to original indication.

3-30. ENGINE RUNUP.

Caution

Full forward movement of cyclic may result in damage to short shaft.

1. FORCE TRIM switch - Check in ON position; press release button on cyclic stick to insure proper function; place switch in OFF position and check cyclic and anti-torque controls for freedom of movement and tippath plane for correlation with cyclic movement.

2. HYDraulic CONTrol Switch - Place in OFF position. Check controls for freedom of movement, insure that the collective pitch control is FULL DOWN; then place the switch in the ON position and position the FORCE TRIM switch ON.

3. ICS and Radios - ON as desired.

4. Helmet - ON.

5. FUEL SYSTEM AND DE-ICE - CHECK - FUEL TANK SUMP PUMP circuit breaker out; set CABIN HEAT bleed air selector to position No. 2 (ON if appl.). DE-ICE - ON, Note EGT increase, FUEL TANK SUMP PUMP circuit breaker in, air selector off, DE-ICE OFF. Note fuel pressure returns to normal and EGT decreases.

(I) 6. PITOT HTR switch - ON. Note loadmeter increase - then OFF.

7. AC PHASE selector - Check all phases for reading of 115 plus or minus 3V. Leave in BC.

8. INVTR Switch - To OFF position check for caution light indication. Switch to MAIN ON check caution light OFF.

9. AC PHASE SELECTOR - Check all phases for reading of 115 plus or minus 3; leave in the AC position.

10. Voltmeter Selector Switch. Check all positions for indication of 28 to 28.5 volts; (27 to 27.5 volts on standby position); leave in NON-ESSential BUS position.

11. Main Generator - To OFF Position; check caution light indication.

12. STARTER GENerator - To STBY-GEN position. Main generator loadmeter should indicate "zero" and standby generator loadmeter should indicate a load.

13. NON-ESS Bus Switch - Check voltmeter indication of "zero" with nonessential bus switch in NORMAL ON position; NON-ESS BUS switch to MANUAL ON, recheck 27 to 27.5 voltmeter reading; switch to NORMAL ON position.

14. VM selector switch - Check remaining positions for indication of 27 to 27.5 volts (28 to 28.5 on Main Gen); leave in MAIN GEN position.

15. MAIN GENerator - ON and guard closed.

16. Throttle - Slowly increase to full open. Engine rpm (N_2) should stabilize at 6000 plus or minum 50 rpm. Throttle friction as desired.

17. All engine and Transmission Instruments - Check for proper indication.

18. LOW RPM switch - AUDIO.

19. Governor RPM INC - DEC Switch - Actuate through full range 6000 to 6700 plus or minus 50 rpm. Set rpm at 6600. During governor INC-DEC check, observe low rpm audio and warning light OFF at 295 rotor rpm plus or minus 10 rpm.

(I) 20. Communication and Navigation Radios - Perform operational check of all radios and position to ON, as desired; set course selectors as desired.

21. Clock - Set.

(I) 22. Heading Indicator - Indicates plus and 0.

Note

Refer to Chapter 5 for preflight checks and free gyro mode operations.

(I) 23. MAG Compass - Corresponds with heading indicator.

(I) 24. Altimeter - Determine K-factor.

(I) 25. Attitude Indicator - Set as desired.

26. ANTICOLLision Light - As desired.

27. FORCED TRIM Switch - As desired for flight.

28. Collective Pitch Friction - Check; set as desired.

3-31. PRIOR TO INSTRUMENT TAKEOFF.

(I) 1. VSI, Altimeter - Indicates climb, descent.

(I) 2. Turn needles, heading indicator, and magnetic compass indicates a Turn to Right - Left.

(I) 3. Slip Indicator - Ball free in race.

(I) 4. Attitude Indicator - Indicates nose high, nose low, bank left, right.

(I) 5. Airspeed Indicator - Note indicator.

(I) 6. ENGine and TRANSmission Instruments - In green.

(I) 7. ENGine RPM - As desired.

(I) 8. Torque - Note Psi for hover.

(I) 9. Index over takeoff heading - Set heading.

(I) 10. PITOT HEAT - ON, if necessary.

3-32. BEFORE TAKEOFF.

3-33. Immediately prior to takeoff, the following checks will be accomplished and announced orally.

1. Rpm.
2. Fuel Quantity.
3. Instruments.
4. Caution Lights.
5. Low rpm audio warning Switch - AUDIO.

Warning

Suspend operations immediately if engine or transmission oil pressure and temperature are not within operating limits.

6. Bleed air switch - OFF.

Caution

The bleed air heater should be in the OFF position during takeoff and landing and other flight conditions requiring maximum engine power available.

3-34. BEFORE LANDING.

3-35. On downwind or prior to landing if no downwind is established, the following pre-landing checks will be accomplished and announced orally:

1. Rpm.

2. Fuel Quantity.

3. Instruments.

4. Caution lights.

5. Low rpm audio warning switch - AUDIO.

3-36. ENGINE SHUTDOWN.

1. Collective pitch - FULL DOWN.

2. GOVernor RPM - INC-DEC Switch - Decrease to lowest rpm.

3. Throttle - Reduce to Flight Idle. Check N_1 speed 56% to 58%. (70% to 72%, L-13).

4. LOW RPM audio - OFF after checking operation.

5. FORCE TRIM - ON.

6. STARTER-GENerator Switch - START position.

(N) 7. EXTernal Lights - FLASHING.

8. ANTICOLLision Light - OFF.

9. Exhaust Gas Temp - Allow to stabilize (minimum of 2 minutes).

Caution

If a rapid rise in EGT is noted, motor the engine (throttle closed) to allow temperature to stabilize within limits.

10. Throttle - Full Off.

11. Main Fuel Switch - OFF.

12. Radios and ICS - OFF.

13. All Electrical Switches - OFF except main generator and battery.

(N) 14. Navigation Lights - OFF, after rotor is tied down.

15. Battery - OFF, after engine tachometer reads "zero". (Night, after NAV lights are turned OFF.)

16. Main Rotor Blades - Tie down.

17. Conduct a thorough walk around inspection of the aircraft. (Check oil levels and check for visible leaks.)

18. Complete DA form 2408-12 and -13.

3-37. TAKE-OFF AND CLIMB PROCEDURES UH-1D ONLY.

Note

Pre-takeoff check will include determining if power is available for takeoff by utilizing the GO-NO-GO takeoff data placard. (Figure 3-2, and checking the area for other aircraft.)

Note

The basic power instrument is the N_1 tachometer. In addition to the power required to hover at two feet, at 3 percent reserve N_1 is required to climb out of a confined area. Therefore, if the engine maximum is 96.5 percent, takeoff from a confined area should not be attempted when the two-foot hover power requirement is more than 93.5 percent. Maximum N_1 decrease substantially as ambient temperature increases (temperature bias effect).

1. Takeoff From a Confined Area. To determine if sufficient power is available to safely execute a takeoff from a confined area, the following procedures apply:

(a) Check the percent of N_1 required to maintain a stabilized two foot hover.

(b) Check the outside air temperature (OAT)

(c) Relate hover power and OAT to the GO-NO-GO placard.

(d) If the percent N_1 required to hover at two feet does not exceed that listed on the placard for that OAT, the aircraft has sufficient power for exiting a confined area. (NOTE below applies.)

2. Normal Takeoff. To determine if sufficient power is available for a normal takeoff, the procedures are as follows:

(a) Check the percent N_1 required to maintain a stabilized two foot hover.

(b) Check the outside air temperature (OAT).

(c) Relate hover power and OAT to the GO-NO-GO placard.

(d) If the percent N_1 required to hover does not exceed that listed on the placard for the appropriate OAT by more than 1 percent the aircraft has sufficient power to execute a normal takeoff (NOTE below applies).

Note

> If the OAT falls between the OAT's listed on the GO-NO-GO placard, read the percent N_1 corresponding to the next higher temperature. DO NOT INTERPOLATE. If the percent N_1 required to hover at two feet does not meet the criteria established in paragraphs 1d and 2d above, the load must be reduced (0.25 percent N_1 equals 100 pounds).

3-38. NORMAL TAKE-OFF TO HOVER.

3-39. The normal vertical take-off is the most common type of take-off, and should be used whenever possible. Normal vertical take-off can be accomplished at moderate altitude and with normal gross weights as shown in the Take-Off Distance Chart, Chapter 14. In this type take-off, the safety factor is high as the helicopter is lifted from ground vertically to a height of approximately three feet where the flight controls and engine may be checked for normal operation before continuing to climb. A normal vertical take-off is made in the following manner. Increase throttle to full open with the collective pitch full down. Select desired rpm with INCrease-DECRease switch. Place cyclic control in the neutral position. Increase collective pitch control slowly and smoothly until hovering altitude of approximately three feet is reached. Apply antitorque pedal to maintain heading as collective is increased. As the helicopter breaks ground, make minor corrections with cyclic control to insure vertical ascent, and apply tail rotor pedals to maintain heading.

3-40. NORMAL TAKE-OFF FROM HOVER.

3-41. Hover briefly to determine if engine and flight controls are operating properly. From a normal hover at approximately three feet altitude, apply forward cyclic pressure to accelerate smooth into effective translational lift; maintain hovering altitude with collective pitch and maintain heading with tail rotor control pedals, until effective translational lift has been obtained and the ascent has begun. Smoothly apply cyclic to attain an attitude that will result in an increase of airspeed to climb speed (60 knots). Adjust power as required to establish the desired rate of climb. Stabilize airspeed and torque pressure as soon as a smooth rate of acceleration will permit.

3-42. NORMAL TAKE-OFF FROM THE GROUND.

3-43. Place cyclic control slightly forward of neutral. Simultaneously increase collective pitch, maintaining directional control with anti-torque pedals. As the aircraft leaves the ground, accelerate forward at the minimum altitude commensurate with terrain and obstacles until effective translational lift is attained. Smoothly apply cyclic to attain an attitude that will result in an increase of airspeed to 60 knots. Adjust power as required to establish the desired rate of climb. Stabilize airspeed and torque pressure as quickly as the smooth rate of acceleration will permit. On the takeoff leg below 50 feet, wind drift correction will be made by slipping the helicopter into the wind; above 50 feet, wind drift correction will be accomplished by crabbing the helicopter into the wind.

3-44. MAXIMUM PERFORMANCE TAKE-OFF.

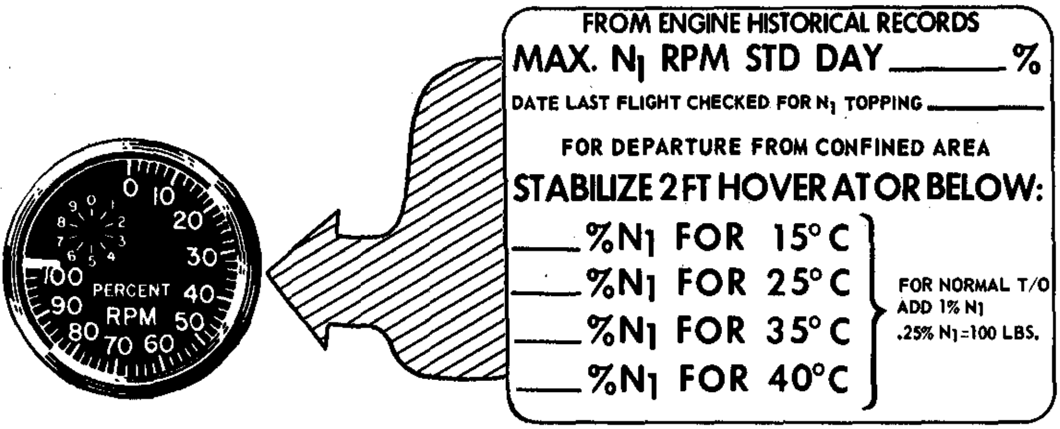
3-45. Place cyclic-control in neutral position. With throttle full open, increase collective pitch smoothly. As the helicopter leaves the ground, continue increasing power to maximum available torque pressure (not to exceed red line) and assume at least a 40 knot airspeed attitude. As power is increased, maintain heading by smoothly coordinating directional pedals. When sufficient altitude for obstacle clearance is obtained, smoothly increase airspeed and reduce power to establish a normal climb.

3-46. CROSSWIND TAKE-OFF.

3-47. In the event a crosswind take-off is required, normal take-off procedures are used. As the helicopter leaves the ground, there will be a definite tendency to drift downwind. This tendency can be corrected by holding cyclic into the wind to prevent downwind drift. When a crosswind take-off is accomplished, turn the helicopter into the wind for climb as soon as obstacles are cleared and terrain permits, if possible.

3-48. AFTER TAKE-OFF.

3-49. As the helicopter accelerates from hovering flight to flight in any direction, it passes through a transitional period. If engine power, rpm, and collective pitch are held constant in calm air, a momentary settling will be noted when the cyclic control stick is moved forward to obtain forward speed. This momentary settling condition is a result of the helicopter's moving from the ground cushion and the tilting of the tip-path plane of rotation of the main rotor blades to obtain forward airspeed. Wind velocity at the time of take-off will partially eliminate this settling due to the increased airflow over the main rotor blades. As wind velocity increases, this settling will be less pronounced. After the helicopter accelerates forward to 10 to 15 knots airspeed, less power is required to sustain flight due to an increase in aerodynamic efficiency as airspeed is increased to best climbing speed. Take-off power should be maintained until a safe autorotative airspeed is attained, then power may be adjusted to establish the desired rate of climb.



FROM ENGINE HISTORICAL RECORDS
MAX. N1 RPM STD DAY ______ %
DATE LAST FLIGHT CHECKED FOR N1 TOPPING ______
FOR DEPARTURE FROM CONFINED AREA
STABILIZE 2 FT HOVER AT OR BELOW:
____ %N1 FOR 15°C
____ %N1 FOR 25°C
____ %N1 FOR 35°C
____ %N1 FOR 40°C
FOR NORMAL T/O ADD 1% N1
.25% N1 = 100 LBS.

Figure 3-2. Go-No-Go take-off data placard - UH-1D only

3-50. CLIMB.

3-51. During climbs at low altitude, a safe autorotative speed should be maintained so that in event of engine failure, sufficient but not excessive speed is available to accomplish a safe autorotative landing. Airspeeds to avoid at low altitudes are shown in figure 7-4. If necessary to clear ground obstructions after take-off, vertical climb can be accomplished; however, operation within red area of figure 7-4 should be held to a minimum. Airspeed and attitude are controlled with the cyclic. Collective pitch is used to adjust torque pressure to establish the desired rate of climb. Anti-torque pedals are coordinated with power changes to maintain constant heading.

3-52. CRUISE CHECKS.

3-53. Instruments should be monitored constantly, in order to be cognizant of any change in performance or conditions. Normal engine operating range is 6400-6600 rpm.

3-54. FLIGHT CHARACTERISTICS.

3-55. The helicopter is capable of delivering a maximum thrust commensurate with rotor-engine limitations and the density altitude in which it is operating. Maximum thrust can be utilized to obtain maximum airspeed, optimum rate of climb or, at some reduced airspeed, the maximum maneuver potentiality. The capabilities of the helicopter may be employed within maximum limitations and in accordance with the environment under which operated. The capabilities of the helicopter in stabilized flight conditions are clearly and accurately defined in Chapter 8 and Chapter 14.

3-56. APPROACH AND LANDING PROCEDURES.

3-57. Before approach and landing are accomplished, the pilot should evaluate the landing site for suitability of usable area. Evaluate terrain, check wind direction, velocity and consistency. The gross weight of the helicopter must be considered; and the final step in evaluation of a landing is the anticipated helicopter performance during landing and subsequent take-off.

3-57. NORMAL APPROACH.

3-58. Entry airspeed is normally 60 knots. When an 8 to 10 degree approach angle is intercepted, decrease collective pitch as required to establish and maintain the desired angle of descent. Maintain entry airspeed until such time as apparent groundspeed and rate of closure appear to be increasing. From this point, progressively decrease the rate of descent and forward speed to stop both descent and forward movement at a 3-foot hover over the intended landing spot. As forward speed is gradually reduced, apply additional power to compensate for the decrease in translational lift and to maintain the proper angle of descent. To continue to the ground, proceed as above, except that the descent is continued to the ground. Make the touchdown with zero groundspeed. Avoid either hard or excessively tail low touchdown. Smoothly reduce collective pitch to minimum setting. Apply cyclic as necessary to level the rotor system.

3-59. STEEP APPROACH.

3-60. Entry airspeed is normally 60 knots. Initiate the steep approach as in the normal approach, maintaining a 12 to 15 degree angle of descent. (To initiate the descent, a greater reduction of collective pitch is usually required at the beginning of the approach.)

Correct for deviations from the desired line of descent by proper application of collective pitch. Maintain the entry airspeed until such time as apparent groundspeed and rate of closure appear to be increasing. From this point, progressively decrease the rate of descent and forward speed to stop both descent and forward movement at the intended landing spot. As forward speed is gradually reduced, apply additional power to compensate for the decrease in translational lift and to maintain the proper angle of descent. Terminate the steep approach at a hover or to the ground in the same manner as the normal approach.

Note

> Due to the time interval between instant when power is requested and when power is available (lag) in turbine engines, acceleration from flight idle to normal operating rpm requires approximately eight to ten seconds. Of the eight to ten seconds, four to five seconds are allowed to compensate for pilot reaction time and effects due to altitude and temperature. The other four to five seconds are due to the inherent turbine engine lag. The total lag could possibly be in excess of ten seconds, depending on how far the pilot as allowed nI and nII speeds to drop.

3-61. NORMAL LANDING FROM A HOVER. (Figure 3-3.)

3-62. With the engine rpm at 6600, decrease collective pitch to effect a constant, smooth rate of descent until touchdown, making necessary corrections with pedals and cyclic control to maintain level attitude and constant heading and to prevent movement over the ground. Upon contact with the ground, continue to decrease collective pitch smoothly and steadily until the entire weight of the helicopter is resting on the ground.

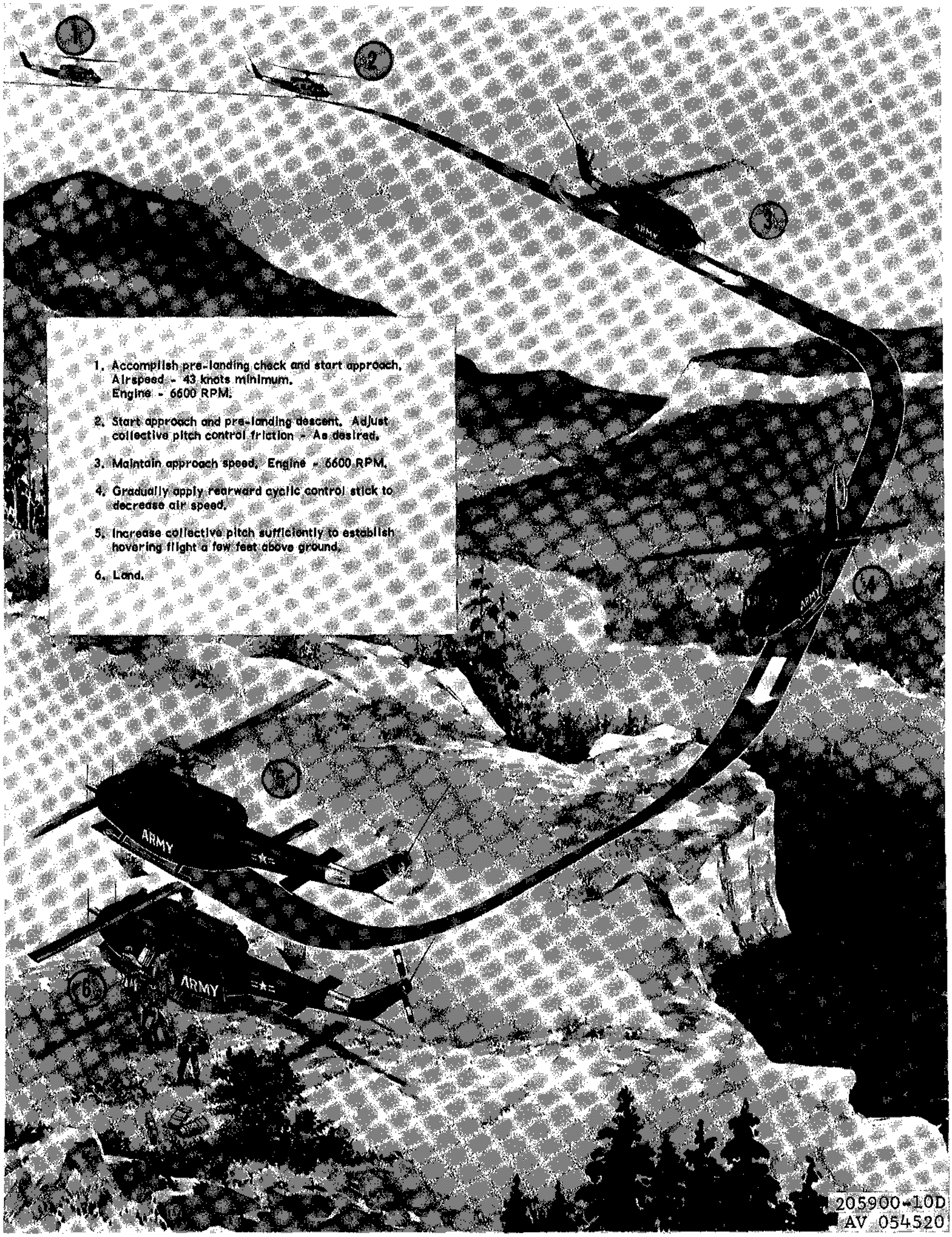
3-63. SLOPE OPERATIONS.

3-64. Make the slope landing by heading the helicopter generally cross-slope. Descend slowly, placing the unslope skid on the ground first. Coordinate reduction of collective pitch with lateral cyclic (into the slope) until the downslope skid touches the ground. Continue coordinating reduction of the collective pitch and application of cyclic into the slope until all the weight of the aircraft is resting firmly on the slope, If the cyclic control contacts the stop before the downslope skid is resting firmly on the ground, return to a hover and select a position where the degree of slope is not so great. After completion of a slope landing and after determining that the aircraft will maintain its position on the slope, place the cyclic in the neutral position.

Note

> The cyclic is placed in the neutral position after landing to allow safe "head clearance" on the unslope side of the helicopter.

3-65. The takeoff technique is the reverse of the landing technique. Apply lateral cyclic control into the slope. Apply collective pitch to raise the downslope skid first. Coordinate lateral cyclic control and collective pitch to bring the helicopter to a level attitude with the upslope skid still on the ground. After attaining a level attitude, continue increasing collective pitch to bring the aircraft to a hover. Maintain directional control throughout the maneuver with anti-torque pedals.



1. Accomplish pre-landing check and start approach. Airspeed - 43 knots minimum. Engine - 6600 RPM.
2. Start approach and pre-landing descent. Adjust collective pitch control friction - As desired.
3. Maintain approach speed. Engine - 6600 RPM.
4. Gradually apply rearward cyclic control stick to decrease air speed.
5. Increase collective pitch sufficiently to establish hovering flight a few feet above ground.
6. Land.

Figure 3-3. Normal approach and landing - power on

CHAPTER 4

EMERGENCY PROCEDURES

SECTION I SCOPE

4-1. GENERAL.

4-2. This chapter sets forth the procedure to be followed in meeting any emergency (except those concerning avionics and auxiliary equipment) that may reasonably be expected to occur.

4-3. Emergency operation of auxiliary equipment is contained in the chapter insofar as its use affects safety of flight. Detailed descriptions of this equipment are given in Chapter 6.

4-4. Emergency procedures are given in checklist form when applicable. A condensed version of these procedures is contained in the condensed checklist Technical Manual TM 55-1520-210CL.

SECTION II ENGINE

4-5. ENGINE FAILURE.

4-6. The two conditions most likely to affect successful autorotational landings in the event of power loss or engine failure are the altitude and airspeed at which the helicopter is operating at the time of failure. The main symptoms of either a partial power loss or complete engine failure are a sudden reduction in engine noise, a sudden drop in engine and rotor rpm, a left yaw resulting from the reduction in engine torque and the total or partial lack of response to throttle movements. When a loss of engine power is detected, it is necessary to decrease the collective pitch and apply right rudder pedal immediately in order to avoid a reduction in rotor rpm and to maintain a constant heading. Under partial power conditions the engine may operate relatively smoothly at reduced power or it may operate roughly and erratically with intermittent surges of power. In instances where a power loss is experienced without accompanying engine roughness or surging, the helicopter may sometimes be flown in a gradual descent at reduced power to a favorable landing area; however, under these conditions the pilot should always be prepared for a complete power failure and an immediate autorotative landing. In the event that a partial power condition is accompanied by engine roughness, erratic operation or power surging, take immediate action by closing the throttle completely and perform an autorotational landing to the nearest possible landing area.

Warning

To prevent a sudden and hazardous yaw in case the engine should recover power, maintain throttle in the fully closed position during the autorotational landing. If conditions permit, the master switch and fuel shut-off valve should be turned OFF prior to the final stages of the autorotative landing.

Warning

Lag in acceleration may cause pilot to overestimate immediate power available for accomplishing a change from one phase to another phase during flight.

Note

Due to the time interval when power is requested and when power is available (lag) in turbine engines, acceleration from flight idle to normal operating rpm requires approximately eight to ten seconds. Of the eight to ten seconds, four to five seconds are allowed to compensate for pilot reaction time and effects due to altitude and temperature. The other four to five seconds are due to the inherent turbine engine lag. The total lag could possibly be in excess of ten seconds, depending on how far the pilot has allowed nI and nII speed to drop.

4-7. ENGINE FAILURE DURING TAKE-OFF.

4-8. The energy stored within the rotor system at normal operating rpm is sufficient to prevent a hard landing and can be utilized by use of the following procedure:

Warning

Reduced engine noise levels in turbine powered helicopter delays detection of, and corrective action for, an engine failure. This results in rapid decay of rotor rpm.

Warning

If collective pitch is increased prematurely when the engine fails, a loss in altitude will be delayed and result in insufficient rotor rpm and control. Without adequate rpm and control, it will be impossible to cushion the landing.

1. Maintain collective pitch as helicopter settles.

2. Adjust cyclic for a vertical descent to the landing point.

3. Maintain heading with anti-torque pedals.

4. Prior to ground contact INCREASE collective pitch to cushion landing.

5. BAT switch - OFF.

6. Main fuel - OFF.

Caution

Do not restart engine until cause of engine failure has been determined and corrected.

4-9. ENGINE FAILURE AT LOW ALTITUDE - LOW AIRSPEED.

Warning

Do not attempt to lower the nose or gain airspeed for reduced rate of descent if failure occurs at low altitude.

1. Reduce collective pitch sufficiently to maintain rotor rpm and establish autorotation.

2. Maintain directional control and desired heading to best available area with cyclic and anti-torque pedals.

3. If altitude permits, turn off switches and fuel.

Note

If airspeed is 45 knots or below at time of engine failure, it will probably be best to maintain the pitch attitude present at the time of failure in order to execute timely deceleration prior to touchdown. If airspeed is above 45 knots, a slightly higher attitude may be used to facilitate deceleration and/or decrease glide distance. It will also assist in maintaining main rotor rpm. If altitude permits, the same procedures outlined in paragraph 4-10 with regard to airspeed ranges and changes are applicable.

4. Allow helicopter to settle to appoximately 10 to 15 feet, then apply sufficient initial pitch to break the descent and further assist in decelerating forward speed.

5. As the helicopter settles, use remaining pitch to cushion touchdown in a level attitude.

6. Battery switch - OFF.

7. Main fuel - OFF.

4-10. ENGINE FAILURE DURING FLIGHT. (See figure 4-1.)

4-11. If engine failure occurs in flight, proceed as follows:

Warning

When high-low warning light illuminates and audio signal buzzes, execute engine failure procedure; cross reference engine instruments. If engine instruments show normal indications, a malfunction other than engine failure is apparent.

Note

Rotor rpm will tend to overspeed in autorotation at high gross weights or when maneuvering. High rotor rpm may be kept within limits by judicial use of collective control.

1. Collective pitch - Reduce as required to maintain rotor rpm within limits.

2. Establish autorotational glide with airspeed 60 knots or as required to make forced landing area.

3. Select forced landing area.

4. If time permits, make radio call. Turn OFF switches and fuel.

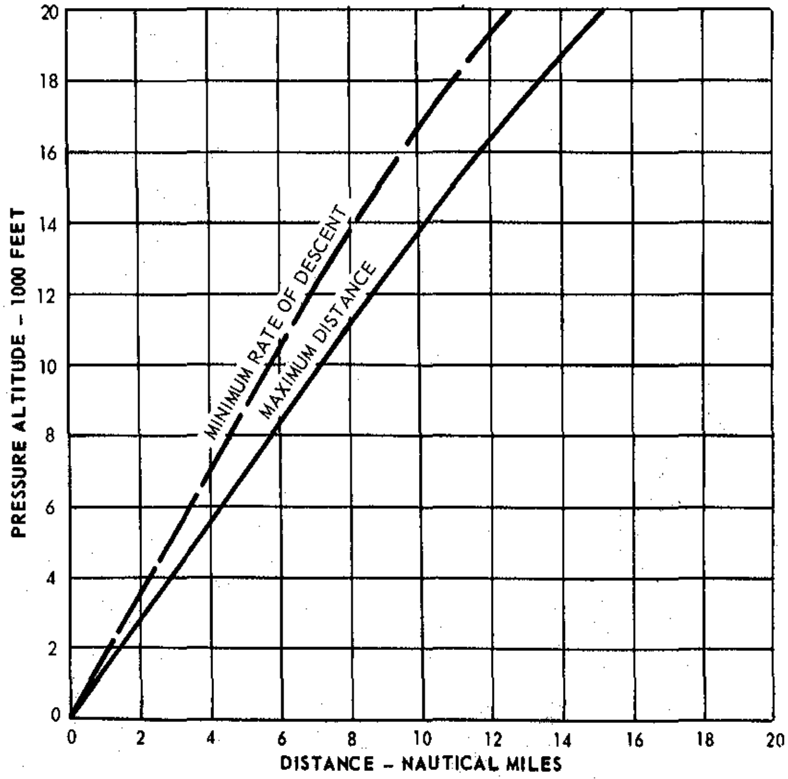
5. Shoulder Harness - Lock.

6. Decelerating attitude - As required to make area and slow rate of descent and forward speed.

7. Collective pitch - Cushion landing.

Caution

After landing, do not restart engine until cause of failure has been determined and corrected.



UH-1D
MAXIMUM GLIDE DISTANCE, POWER OFF

AVERAGE G.W. = 7100 LB.

ROTOR RPM 294

REFERENCE: FTC-TDR-64-27

NOTE

(1.) Autorotational descent performance is a function of airspeed and essentially unaffected by density altitude and gross weight.

(2.) The speed for best glide distance is R-99, N-84 knots IAS.

(3.) The speed for minimum rate of descent is R-64, N-53 knots IAS.

R — Roof-mounted pitot tube
N — Nose-mounted pitot tube

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Figure 4-1. Maximum glide distance - power off

4-12. MINIMUM RATE OF DESCENT.

4-13. The power-off minimum rate of descent is obtained by maintaining an indicated airspeed of approximately 64 (roof-mounted pitot) or 53 (nose-mounted pitot) knots, and rotor rpm of approximately 300.

4-14. MAXIMUM GLIDE.

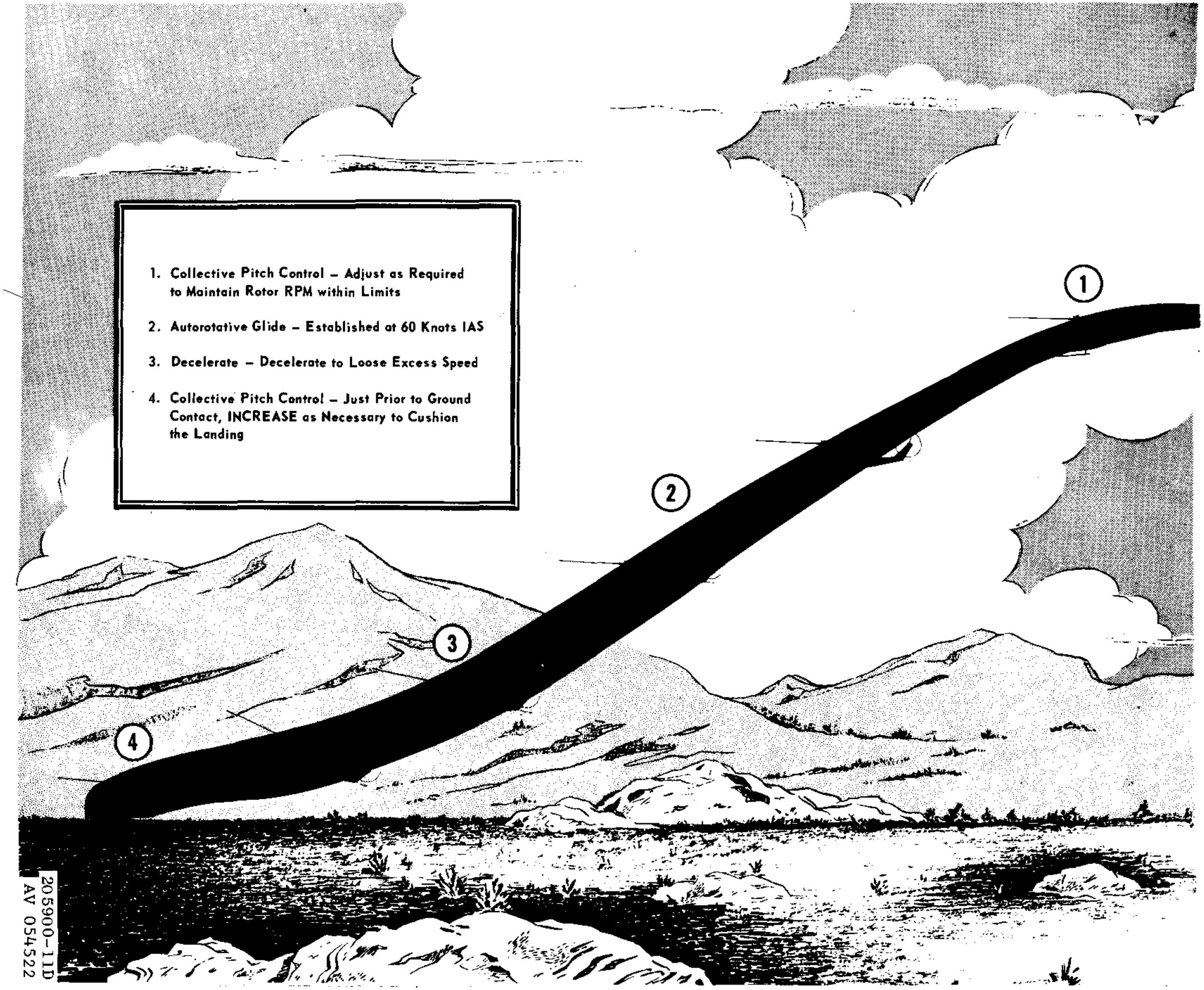
4-15. Maximum gliding distance is obtained by an indicated airspeed of 99 (roof-mounted) or 84 (nose-mounted pitot) knots and rotor rpm of approximately 300.

4-16. ENGINE RESTART DURING FLIGHT.

4-17. The condition which would warrant an attempt to restart the engine would probably be an engine flame-out caused by a malfunction of the fuel control unit or failure of the boost pump(s). The decision to attempt an engine restart during flight is the pilot's responsibility and is dependent upon pilot's experience and the operating altitude. If an engine restart is to be attempted, proceed as follows:

Caution

When cause of engine failure is obviously mechanical DO NOT attempt an engine restart.



1. Collective Pitch Control – Adjust as Required to Maintain Rotor RPM within Limits
2. Autorotative Glide – Established at 60 Knots IAS
3. Decelerate – Decelerate to Loose Excess Speed
4. Collective Pitch Control – Just Prior to Ground Contact, INCREASE as Necessary to Cushion the Landing

Figure 4-2. Approach and landing - power off

1. Establish autorotational glide.

2. Select forced landing area.

3. Governor switch - EMERGENCY.

4. Attempt start.

5. Throttle - Open slowly to maintain desired rpm.

4-18. EMERGENCY STARTING PROCEDURE.

Caution

> If normal starting procedures result in an aborted start due to it becoming apparent that EGT will exceed 650°C (L-13, 675°C), proceed as for a normal start except as follows:

1. Throttle Closed.

2. Engine Fuel Control/Governor switch-EMERgency.

3. Energize starter, start clock (start-fuel flow and ignition occur similtaneously).

Note

> Check D.C. voltmeter; if voltage drops below 14 volts, abort start. (Battery start only.)

4. When N_1 speed passes through 8 percent, open throttle slowly and advance to FLIGHT IDLE position as start progresses.

Note

> Monitor EGT to avoid exceeding maximum allowable limits.

5. Release starter switch at 40 percent N_1 or after 40 seconds, whichever occurs first.

Note

> When operating in emergency fuel control mode, always advance and retard throttle slowly and monitor EGT in order to avoid overtemp or flameout.

6. Engine Fuel Control/Governor Switch - AUTOmatic when N_1 speed is stabilized.

SECTION III ROTORS, TRANSMISSIONS, AND DRIVE SYSTEMS

4-19. TAIL ROTOR MALFUNCTION IN FLIGHT.

Warning

> The key to a pilot's successful handling of a tail rotor emergency lies in his ability to quickly analyze and determine the type malfunction that has occurred and to select the proper emergency procedure. Following is a discussion of some types of tail rotor malfunction and their probable effects.

1. General Discussion. A common tendency amoung helicopter pilots is to attempt to lump all types of tail rotor malfunction, and the corrective actions therefor, into a single category with a single solution. This is definitely not correct and any attempt to propose a single solution (emergency procedure) for all types of anti-torque malfunction could prove disastrous.

(a) COMPLETE LOSS OF TAIL ROTOR THRUST. This is a situation involving a break in the drive system, such as severed drive shaft, wherein the tail rotor stops turning and no thrust whatsoever is delivered by the tail rotor. A failure of this type will always result in the nose of the helicopter swinging to the right (left sideslip) and a left roll of the fuselage along the horizontal axis. It is likely that powered flight to a suitable area and execution of an autorotative approach is the proper emergency procedure.

(1) IN POWERED FLIGHT the degree of sideslip and the degree of roll may be varied by changing airspeed and by varying power (throttle or pitch), but neither can be eliminated. Below an airspeed of approximately 30 to 40 knots, the sideslip angle may become uncontrollable and the tail or the aircraft begins to revolve on its vertical axis.

(2) IN POWER-OFF FLIGHT (AUTOROTATION), the sideslip angle and the roll angle can be almost completely eliminated by maintaining an airspeed of 40 to 70 knots. When airspeed is decreased through approximately 20 to 30 knots, streamlining effect is greatly reduced and the sideslip angle may become uncontrollable. Upon pitch application at touchdown, the fuselage will tend to turn in the same direction the main rotor is turning (nose of helicopter swings left, opposite torque effect) due to an increase of friction in the transmission system.

(b) FIXED PITCH SETTING. This is a malfunction involving a loss of control resulting in a fixed pitch setting, such as a severed control cable. Normally under these circumstances the directional pitch setting that is in the tail rotor at the time the cable is severed will, to some degree, remain in the tail rotor system. Whether the nose of helicopter yaws left or right is dependent upon the amount of pedal (which is related to power) applied at the time the cable is severed. Regardless of pedal setting at the time of malfunction, a varying amount of tail rotor thrust will be delivered at all times during flight.

(1) IF THE TAIL ROTOR PITCH BECOMES FIXED DURING AN APPROACH OR OTHER REDUCED POWER STITUATION (RIGHT PEDAL APPLIED), the nose of helicopter will swing right when power is applied, possibly to an even greater degree than would be experienced with complete loss of tail rotor thrust, and the overall situation may be even more hazardous. The best solution may not be to autorotate immediately. Whether a successful autorotation could be accomplished is not certain, and is dependent upon the amount of pitch applied at the time of malfunction.

(2) IF THE TAIL ROTOR PITCH BECOMES FIXED DURING A TAKEOFF OR OTHER INCREASED POWER SITUATION (LEFT PEDAL APPLIED), the nose of helicopter will swing left when power is reduced (as in leveling off with cruise power). This switch to the left upon power reduction will probably be to a greater degree than the left swing encountered in a lower powered situation. Under these circumstances, it appears that powered flight to an airfield and powered landing could be accomplished with little difficulty since the sideslip angle will probably be corrected when power is applied for touchdown. However, upon decreasing power to initiate the approach at destination the sideslip angle will increase and remain so increased during the approach, but should be corrected when touchdown power is applied. Due to sideslip increase upon reduction of power to initiate the approach, a higher than normal approach speed may be beneficial. In this instance, powered landing may be the best solution; it is likely that autorotation could not be accomplished at all.

(3) IF THE TAIL ROTOR PITCH BECOMES FIXED DURING NORMAL CRUISE POWER SETTINGS, the helicopter reaction should not be so violent as in the previously described situations and, at speeds from 40 to 70 knots, the tail pylon should streamline with very little, if any, sideslip or roll angle. In this instance, autorotation may aggravate the situation because a reduction of power (torque) may then result in a right sideslip. It must be considered, however, that an increase in power at touchdown will result in a left sideslip if powered approach is used, although this sideslip should not be of a hazardous magnitude for touchdown.

(c) Loss of the tail boom or portion thereof. The gravity of this situation is dependent upon the amount of weight lost. If the loss is small, such as "aft of the 90 degree gear box", the situation should be quite similar to "complete loss of tail rotor thrust." If more than that is lost, immediate autorotation may be the only solution of possible value.

2. Emergency Procedure For In-Flight Antitorque Malfunction.

(a) The pilot should immediately analyze the existing emergency to best of his ability before taking further action.

(b) If the situation (altitude) permits, a change in collective pitch (power) may be attempted as an aid in gaining maximum possible control (trim) of the helicopter under existing circumstances. Rolling off power (throttle) may not be necessary at this time. The courses of action available will normally be:

(1) Autorotate immediately to a secure and improved landing area, if such area is available. This should be accomplished where possible under most circumstances, except as described in paragraph 2(b) (3) below. The autorotative technique to be used is described in paragraph 2 b (2) below.

(2) If a safe landing area is not immediately available, continue powered flight to a suitable landing are by gradually applying power to assume a level powered flight attitude with an airspeed dictated by the limitations of the emergency condition. This airspeed should be that which is most comfortable to the pilot (between 40 and 70 knots) indicated. When the landing area is reached, make a full autorotative landing, securing the engine (SWITCHES OFF) when the landing area is assured. During the descent, an indicated 70 knots airspeed should be maintained and turns kept to an absolute minimum. If the landing area is a level, paved surface, a run-on landing with a touchdown airspeed between 15 and 25 knots should be accomplished. If the field is unprepared, start to flare from about 75 feet altitude, holding so that forward groundspeed is at a minimum when the helicopter reaches 10 to 20 feet; execute the touchdown with a rapid collective pull just prior to touchdown in a level attitude with minimum ground roll (zero, is possible).

(3) If the pilot has destermined that the tail rotor pitch is fixed in a "left pedal applied" position (tail rotor delivering thrust to the left) autorotative landing should not be attempted. The pilot should return to powered level flight at a comfortable airspeed which will be dictated by the degree of sideslip and roll; continue powered flight to the nearest improved landing area, and execute a running landing with power and a touchdown speed between 20 and 30 knots. In this approach, the sideslip angle will be corrected, to some degree, when power is applied to cushion the touchdown. However, upon decreasing power to initiate the approach to the landing area, the sideslip angle will increase for the duration of

the approach, but should be corrected when touchdown power is applied. "Left pedal applied", while at a hover, gradually reduce pitch to accomplish a powered touchdown.

4-20. TAIL ROTOR FAILURE DURING TAKE-OFF.

4-21. Close throttle immediately and accomplish an autorotational landing.

4-22. TAIL ROTOR FAILURE WHILE HOVERING BELOW 10 FEET.

4-23. Close throttle immediately and accomplish an autorotational landing.

4-24. LOSS OF ENGINE/TRANSMISSION OIL PRESSURE OR EXCESSIVE ENGINE/TRANSMISSION OIL TEMPERATURE.

4-25. The loss of engine/transmission oil pressure will be indicated by a drop or loss of pressure on the engine or transmission oil gage and/or the illumination of the caution panel light marked "XMSN OIL PRESS" and/or "ENG OIL PRESS". Excessive transmission oil temperature will be indicated on the transmission oil temperature gage and/or the illumination of the caution panel light marked "XMSN OIL HOT". Excessive engine oil temperature will be indicated on the engine oil temperature gage. Should any of these indications occur, proceed as follows:

1. Accomplish a normal landing at the nearest safe landing area (open field, etc.).

2. Do not continue until the cause has been determined and corrective action taken.

SECTION IV FIRE

4-26. ENGINE FIRE DURING STARTING - INTERNAL.

4-27. Internal fire (hot start), may be caused by overloading of fuel in the combustion chamber. It may be detected by flames emitting from the tailpipe or by excessive EGT readings. To extinguish the fire-proceed as follows:

1. Continue to depress starter switch and roll throttle closed.

2. Throttle - Close.

3. Start fuel - Off.

4. Main fuel - Off.

5. As EGT decreases to normal, complete shutdown and record limit and duration of hot start on DA Form 2408-13.

4-28. ENGINE FIRE DURING STARTING - EXTERNAL.

4-29. External fire can be detected by the fireguard and/or the illumination of the fire detection system. Proceed as follows:

1. Close throttle.

2. Complete shutdown.

3. Exit the aircraft.

4. Use fire extinguisher.

4-30. ENGINE FIRE DURING FLIGHT.

4-31. Immediately on discovery of an engine fire during flight prepare for a power-off landing and accomplish the following:

1. Select forced landing area.

2. Autorotative Glide - ESTABLISH and prepare for a power-off landing. (Make normal landing if possible.)

3. Throttle - Full off.

4. Main fuel - OFF.

5. Battery switch - OFF.

6. Generator switch - OFF, except when power is required to operate lights or avionic equipment.

7. Shoulder harness - LOCK.

8. Landing - Accomplish.

Caution

After landing do not attempt to restart engine until cause of fire has been determined and corrected.

4-32. FUSELAGE FIRE.

1. Airspeed - REDUCE to minimum to lessen possibility of spreading fire.

2. Pilot's sliding windows, cabin, ventilators, and cargo doors - OPEN, if smoke enters cabin.

3. Battery switch - OFF.

4. Generator switch - OFF (ON if lighting or avionic equipment is to be used).

Warning

Fire extinguisher fluid vapors are toxic and its use should be limited to well ventilated areas.

5. Landing - ACCOMPLISH at the nearest available, safe landing area (open field, etc.).

4-33. ELECTRICAL FIRE.

4-34. The electrical circuits are individually protected by circuit breakers which will automatically interrupt power to aid in the prevention of fire when a short circuit or malfunction accurs.

Warning

In the event of any electrical fire or of smoke in the cockpit that cannot be quickly and positively ascertained and eliminated, the pilot should land as soon as possible.

1. Instruments - CHECK for correct reading.

2. Battery and Generator Switches - OFF.

3. Circuit breakers - OUT.

4. Landing - ACCOMPLISH at nearest available, safe landing area.

Note

Flight operation can be maintained without battery and generators; however, most instruments will not function, as they are electrically powered.

4-35. SMOKE AND FUME ELIMINATION.

4-36. Smoke or toxic fumes entering the cabin can be exhausted by the following procedure:

1. Pilot's and copilot's window - Slide OPEN.

2. Cabin ventilators - OPEN.

3. Cargo doors - OPEN.

Note

If smoke or fumes are caused by an electrical fire, isolate the defective circuit as outlined under ELECTRICAL FIRE.

4. Aircraft controls - Sideslip if practical.

SECTION V FUEL SYSTEM

4-37. FUEL BOOST PUMP FAILURE.

4-38. In the event of total helicopter fuel system failure, proceed as follows:

Note

If fuel pressure drops and engine is operating normally, continue flight to the nearest available area and land immediately to determine cause of indication and/or malfunction.

1. If altitude permits, descend to pressure altitude of 4600 feet or less.

Note

The engine fuel pump is capable of supplying engine fuel requirements at pressure altitude of less than 4600 feet.

2. Main Fuel - ON.

3. Main Fuel and Fuel Boost Pump Circuit Breakers - IN.

4-39. ENGINE FUEL CONTROL MALFUNCTION.

4-40. Malfunction or failure of the engine fuel control unit or nII governor will be evidenced by overspeeding nII rpm, compressor stall or flameout.

4-41. OVERSPEEDING NII GOVERNOR (HIGH RPM).

1. Simultaneously increase collective pitch while rolling off twist grip throttle until desired engine operating rpm is established.

2. Maintain desired operating rpm by coordinating throttle and collective.

3. Normal landing at nearest available safe landing area.

4-42. UNDERSPEEDING NII GOVERNOR (LOSS OF RPM).

Warning

When operating on EMERGENCY fuel system, the throttle must be manually adjusted to maintain engine rpm. Throttle movement shall be performed at a slow rate to minimize the possibility of compressor stall or flameout.

1. Collective pitch - DOWN to maintain rotor rpm.

2. Throttle - Retard throttle.

3. Governor Switch - EMERGENCY position.

Caution

When operating on emergency control, it is possible to overspeed the gas producer turbine and the power turbine, and to exceed redline tailpipe temperature.

4. Throttle - Advance slowly and firmly to obtain engine operating rpm.

Note

During extended operation in the EMERGENCY mode, set the Governor INCREASE-DECREASE switch to the minimum position to preclude the possibility of bleed band popping (opening and closing).

4-43. COMPRESSOR STALL.

1. Reduce Power.

2. De-Ice Switch - OFF.

3. Bleed Air - OFF.

4. Normal landing - Accomplish at the nearest available safe area (open field, etc.).

4-44. ENGINE FUEL PUMP.

4-45. The engine fuel system is designed for safety of helicopter operation. The fuel pump is a dual-element unit and either element is capable of supplying engine fuel requirements. Failure of either pump element will cause the MASTER CAUTION light and ENG FUEL PUMP caution light to illuminate. The ENG FUEL PUMP light will remain illuminated until the cause of the malfunction is corrected. Proceed as follows:

1. Land at the nearest available safe landing area (open field, etc.).

2. Do not continue until defect is corrected.

4-46. **H** INLET GUIDE VANE ACTUATOR FAILURE.

4-47. If failure of the inlet Guide Actuator occurs, the pilot will notice an instantaneous rise in EGT. By reducing collective pitch, the EGT can be maintained in the green arc; however, this will result in the engine producing a MAXIMUM of 500 (SHP) shaft horsepower (approximately 20 to 25 pounds torque).

4-48. CHIP DETECTOR WARNING LIGHT ILLUMINATION.

4-49. Illumination of either the XMSN or TAIL ROTOR warning lights indicates metal particles in the transmission or tail rotor gear boxes. If either warning light illuminates, accomplish a landing at nearest available safe landing area.

SECTION VI ELECTRICAL SYSTEM

4-50. ENGINE SHUTDOWN WITH COMPLETE ELECTRICAL FAILURE.

4-51. In the event of a complete electrical failure, accomplish engine shutdown as follows.

1. Disconnect main fuel quick-disconnect at engine fuel filter.

SECTION VII HYDRAULIC SYSTEM

4-52. HYDRAULIC SYSTEM FAILURE.

4-53. Hydraulic power failure will not be evident in the control system until control movements are executed. When the controls are moved, it will be evident that the forces required for control movement is increased, and moderate feedback forces will be felt. Control motions will result in normal flight reactions in all respects except for the increased force required for control movements. In the event of a hydraulic power failure, proceed as follows:

1. Airspeed - ADJUST as desired to obtain most comfortable control movement level.

2. Hydraulic control circuit breaker - OUT, check for electrical failure of hydraulic control switch.

3. Hydraulic Control Circuit Breaker - IN, if electrical failure of hydraulic control switch has been eliminated and actual hydraulic control failure has been confirmed.

4. Hydraulic Control Switch - Recycle, ON (OFF if power is not restored). Reset MASTER CAUTION LIGHT.

5. Landing - ACCOMPLISH landing at nearest available safe landing area (open field, etc.).

Warning

"Under certain conditions, rapid operation of the cyclic controls can cause a check valve in the irreversible valve to become unseated, allowing fluid to bypass the actuating cylinder. This simulates a boost-off condition. Should this occur, immediately place the hydraulic switch in the Off position and then back to the On position. This will allow the check valve to reseat."

SECTION VIII LANDING AND DITCHING

4-54. EMERGENCY LANDING

4-55. Emergency landings can be performed without undue difficulty, as they are accomplished in nearly the same manner as power-on landings. During final touchdown, reduce forward speed to desired touchdown speed for existing conditions.

4-56. LANDING IN TREES.

4-57. The following described emergency procedures are oriented toward maneuvering the helicopter into the best possible position for effecting a forced landing into trees prior to main rotor blade contact with the trees. A decision to fully apply collective pitch before making contact with the trees or to retain some collective pitch for later application during the descent through the trees will be dependent on an evaluation of the situation under the existing circumstances. Proceed as follows:

1. Enter normal autorotation from altitude or low level.

2. Select the forced landing area which contains the least number of trees of minimum height.

3. If time permits, lock shoulder harness, turn off switches and fuel valve.

4. Execute a deceleration sufficient to attain ZERO ground speed at tree top level, and allow the helicopter to descend vertically.

5. Prior to main rotor blade contact with the trees, apply sufficient collective pitch to attain the minimum rate of descent.

6. As helicopter settles into the trees, continue to increase collective pitch to maximum.

4-58. EMERGENCY ENTRANCE.

4-59. To gain entrance to the cabin in the event of an emergency, slide open or break the pilot's or copilot's movable windows; reach forward and PULL the jettisonable door release; if door will not jettison or cargo door will not open, break door windows or windshield to gain entrance.

4-60. DITCHING - POWER ON

1. Execute a normal descent and pre-landing to hovering altitude over water.

2. Passengers - ALERTED.

3. Helicopter Position - RADIO position to aid in search and rescue.

4. Pilot's and copilot's door - JETTISON while hovering a few feet above the water; slide cargo doors full open.

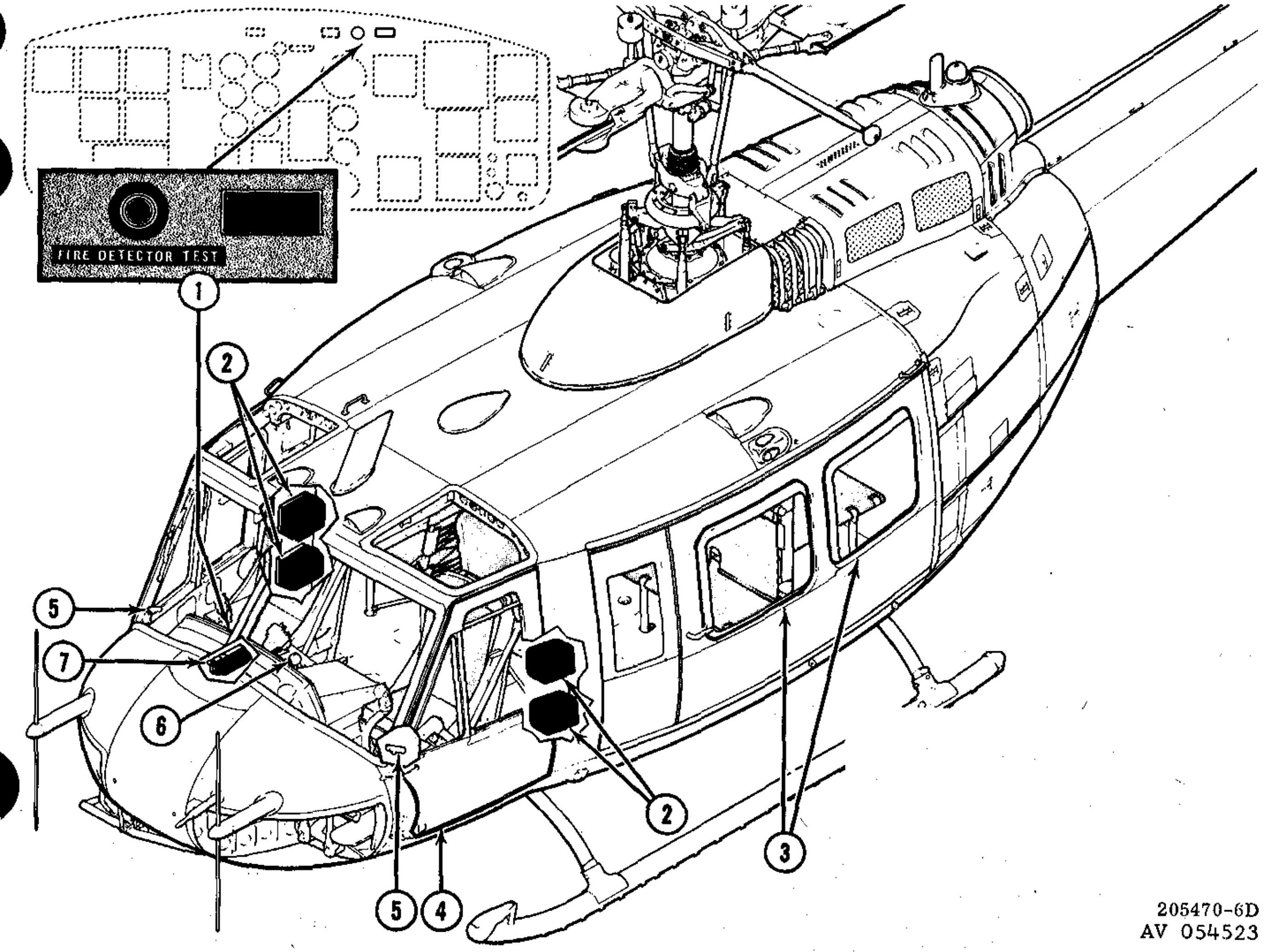
5. Instruct passengers and copilot to exit helicopter.

6. Fly a Safe Distance - AVOID possible passenger injury.

7. Battery Switch - OFF.

8. Main fuel switch - OFF. Close throttle. Allow aircraft to settle in a level attitude, apply full collective, when aircraft begins to roll apply full cyclic in the direction of roll.

9. Shoulder Harness and Safety Belt - RELEASE and CLEAR helicopter when main rotor has stopped.



1. Fire Detector Test Switch and Indicator Light	3. Passenger Exit (4)	6. External Stores Jettison Release Lever
2. First Aid Kit (4)	4. Crew Exit (2)	7. Fire Extinguisher
	5. Jettisonable Door Release (2)	

Figure 4-3. Emergency exits and equipment

Note

Applying full right lateral cyclic control will cause the helicopter to slip sidways into the water, using resistance to stop the main rotor blade. Rolling the helicopter on the right side with right-hand doors and windows closed will provide the maximum floatation and escape period.

4-61. DITCHING - POWER OFF.

1. Collective Pitch - ADJUST as required to maintain rotor rpm within limits.

2. Autorotative Glide - ESTABLISH an autorotative glide into the wind at minimum airspeed of 55 knots for less than 7500 pounds gross weight, or to 60 knots for gross weight exceeding 7500 pounds.

3. Passengers - ALERTED.

4. Helicopter Position - RADIO position to aid in search and rescue.

5. Battery Switch and Main Fuel Switch - OFF.

6. Pilot's and Copilot's Doors - JETTISON, at low altitude slide both cargo doors full open.

7. Shoulder Harness - LOCK.

8. Execute deceleration sufficient to attain ZERO ground speed near water surface.

9. Apply collective pitch sufficient to attain minimum rate of descent.

10. Allow aircraft to settle in a level attitude, apply full collective when aircraft begins to roll, apply full cyclic in the direction of roll.

11. Shoulder Harness and Safety Belt - RELEASE and CLEAR helicopter when main rotor blades have stopped.

SECTION IX FLIGHT CONTROLS

4-62. FLIGHT CONTROL SYSTEM FAILURE

4-63. The flight control system is a mechanical type with hydraulic servo cylinders connected into the fore and aft and lateral cyclic controls, and into the collective control and the directional control systems. The servo cylinders are installed solely to reduce control forces and lessen pilot fatigue. The design of the control system mechanical linkage is sturdy; control movements are positive and the possibility of failure is remote; therefore, an emergency system has not been provided.

4-64. SIMULATED SERVO FAILURE.

4-65. A safety of flight condition could exist if the servo valve malfunctions during a "Surprised" or "Unannounced" simulated servo failure. If the servo is turned off and the irreversible valve becomes lodged in the open position the cyclic control may move abruptly to the rear either left or right depending on which servo failed with a force greater than 30 pounds. This force if suddenly applied without warning is likely to render the aircraft uncontrollable. When a simulated servo failure is to be practiced, the pilot turning off the servo should not remove his hand from the servo switch until he is sure the servo is functioning properly. If there is any abrupt movement of the cylic experienced, he should immediately turn the servo switch back on "Surprise" or "Unannounced" simulated servo failures in the UH-1D/H aircraft should not be conducted.

4-66. MAST BUMPING.

4-67. This condition occurs when the main rotor static stops contact the mast. It is most likely to occur when conducting slope operations and on rotor coast down in high wind conditions (natural or induced by other aircraft). It may be encountered in flight only if the aircraft flight envelope is exceeded.

4-68. COLLECTIVE BOUNCE.

4-69. Collective bounce is a pilot induced vertical oscillation of the collective control system when an absolute friction (either pilot applied or control rigged) is less than seven pounds. Collective bounce may be encountered in any flight condition by a rapid buildup of vertical bounce at approximately three cycles per second. The severity of the oscillation is such that effective control of the aircraft may become difficult to maintain. The pilot should insure that adequate collective friction is applied, and maintained in all flight conditions. Should collective bounce be encountered accomplish the following:

1. Relax pressure on collective pitch control. (Do not "stiff arm" the collective.)

2. Hydraulic control switch - OFF.

3. Collective friction - Increase.

4. Collective pitch - Positive application either up or down.

5. Hydraulic control switch - ON after oscillation has subsided.

Note

Record duration and severity of collective bounce on 2408-13.

SECTION X BAIL OUT

4-70. BAIL OUT

4-71. Helicopter design, flight characteristics and autorotation qualities virtually eliminate the necessity for leaving the helicopter in flight (bail-out); however, if a decision is made to bail-out, accomplish as follows:

1. Passengers - ALERTED.
2. Helicopter position - RADIO position.
3. Doors - RELEASE jettisonable doors. OPEN cargo doors as required.
4. Controls - SET to establish CRUISE forward speed with flight attitude slightly nose down.
5. When Ready - BAIL OUT through nearest exit.

CHAPTER 5

AVIONICS

Section I - General

5-1. SCOPE.

5-2. This chapter covers the electronic equipment configuration in Army Models YUH-1D and UH-1D/H helicopters. It includes a brief description of the electronic equipments, their technical characteristics, capabilities, and location. The chapter also contains complete operating instructions for all signal equipment installed in the helicopter.

5-3. NOMENCLATURE AND COMMON NAMES.

5-4. A list of the avionic equipment installed in the helicopter, with a common name assignment for each piece of equipment, is presented in table 5-1.

5-5. DESCRIPTION OF CONFIGURATION.

5-6. The avionic configuration consists of the following installed communications equipment: An FM radio set including the FM homing facility, a signal distribution and interphone system, a UHF command set, with complete provisions for installing a VHF radio set as an alternate. Complete provisions are made for installing an HF radio set and a VHF emergency transmitter. Complete provisions are also provided for installing an IFF transponder set.

TABLE 5-1. NOMENCLATURE AND COMMON NAMES

NOMENCLATURE	COMMON NAME
Radio Signal Distribution Panel SB-329-AR	Signal distribution panel
Control Intercommunications Set C-1611/AIC	Signal distribution panel
*Radio Set AN/ARC-44	FM Liaison set
Receiver-Transmitter RT-294/ARC-44	FM receiver-transmitter
Control Panel SB-327/ARC-44	FM control panel
Antenna AT-454/ARC	FM antenna
Antenna Group AN/ARA-31	FM homing antenna
*Radio Set AN/ARC-54	FM Liaison Set
Receiver-Transmission RT-348/ARC-54	Receiver-transmitter
Control Radio Set C-3835/ARC-54	Control panel
Antenna AT-765/ARC-54	FM antenna
Coupler, Antenna CU-943/ARC-54	Coupler
Antenna Assembly 637A-2	FM homing antenna
Course Indicator ID-453/ARN-30	Course indicator
*Radio Set AN/ARC-55	UHF command set
Receiver-Transmitter RT-349/ARC-55	UHF receiver-transmitter
Control Radio Set C-1827/ARC-55	UHF control panel
Antenna AT-1108/ARC	UHF/VHF antenna
*Radio Set AN/ARC-51X	UHF radio set
Receiver-Transmitter RT-702/ARC-51X	Receiver-transmitter
Control Radio Set C-4677/ARC-51X	Control panel
*Radio Set AN/ARC-51BX	UHF radio set
Receiver-Transmitter RT-742/ARC-51BX	Receiver-transmitter
Control Radio Set C-6287/ARC-51BX	Control panel

TABLE 5-1. NOMENCLATURE AND COMMON NAMES (CONT)

NOMENCLATURE	COMMON NAME
Radio Set AN/ARC-73	VHF command set
Radio Receiver R-1123( )/ARC-73	VHF receiver
Radio Transmitter T-879( )/ARC-73	VHF transmitter
Remote Control Unit 614U-6	VHF control panel
Radio Set AN/ARC-134	VHF command set
Receiver-Transmitter RT-857/ARC-134	Receiver-transmitter
Control Panel C-7197/ARC-134	VHF control panel
Transmitter T-366( )/ARC	Emergency VHF transmitter
Control Panel ARC Type C-80B	Emergency VHF control panel
Radio Set AN/ARC-102	HF ssb/am set
Receiver-Transmitter RT-698/ARC-102	HF receiver-transmitter
Control Radio Set C-3940/ARC-94	HF control panel
Network Impedance Matching CU-991/AR	Antenna coupler
Antenna 204-079-609 or 205-706-027	HF longwire antenna
Receiving Set AN/ARN-30E	VHF navigation set
Receiver R-1021/ARN-30D	VHF receiver
Signal Data Converter CV-265A/ARN-30A	Converter
Antenna AS-1304/ARN-30	Omni antenna
Control Panel C-3436/ARN-30D Radio Set	VHF navigation control panel
Indicator, Course ID-453/ARN-30	Course indicator
Direction Finder Set AN/ARN-59	Direction finder set
Radio Receiver R-836/ARN	ADF receiver
Receiver Control C-2275/ARN-59	ADF control panel
Indicator ID-998/ASN	Radio magnetic indicator (RMI)
Antenna AT-780/ARN	Loop antenna
Antenna 205-075-325	Sense antenna
Aircraft Magnetic Compass Type J-2	Gyro magnetic compass
Induction Compass Transmitter T-611/ASN	Flux valve
Electronic Control Amplifier Type A-2	Amplifier
Magnetic Flux Compensator CN-405/ASN	Compensator
Electrically Driven Gyro Control Type S-3A	Gyro
Radio Magnetic Compass Indicator ID-998/ASN	Radio magnetic indicator (RMI)
Gyromagnetic Compass Set AN/ASN-43	Gyro magnetic compass
Induction Compass Transmitter T-611/ASN	Flux valve
Electronic Control Amplifier AM3209/ASN	Amplifier
Magnetic Flux Compensator CN-405/ASN	Compensator
Directional Gyro CN-988/ASN-43	Directional gyro
Radio Magnetic Compass Indicator ID-998/ASN	Radio magnetic indicator (RMI)
Transponder Set AN/APX-44	Transponder set
Receiver-Transmitter, Radar RT-494/APX-44	Receiver-transmitter
Transponder Set Control C-2714/APX-44	Control panel
Antenna AT-884/APX-44	Antenna
Radio Receiver R-1041( )/ARN	Marker beacon receiver

TABLE 5-1. NOMENCLATURE AND COMMON NAMES (CONT)

NOMENCLATURE	COMMON NAME
Navigation Set, Position Fixing AN/ASN-72	Navigation set
Amplifier, Radio Frequency AM-4740/ASN-72	Preamplifier
Receiver, Position Fixing R-1453/ASN-72	Receiver
Control, Receiver C-7152/ASN-72	Receiver control box
Indicator, Hyperbolic Grid Lane, Red ID-1426/ASN-72	Red decometer
Indicator, Hyperbolic Grid Lane, Green ID-1425/ASN-72	Green decometer
Indicator, Hyperbolic Grid Lane, Purple ID-1424/ASN-72	Purple decometer
Indicator, Lane Identification ID-1427/ASN-72	Lane identification meter
Computer, Flight Log CP-880/ASN-72	Computer
Control Programmer C-7153/ASN-72	Flight log control
Recorder - Viewer, Flight Log RO-323/ASN-72	Flight log display
Radio Receiving Set AN/ARN-82	VHF navigation set
Radio Receiver R1388/ARN-82	VHF receiver
DMN 4-4 Antenna	Omni antenna
Control Radio Set C-6873/ARN-82	NAV-COMM control panel
Course Indicator ID-1347/ARN-82	Course indicator
Direction Finder Set AN/ARN-83	Direction finder set
Radio Receiver R-1391/ARN-83	ADF receiver
Control Direction Finder C6899/ARN-83	ADF control panel
Indicator ID-998/ASN	Radio Magnetic Indicator (RMI)
Antenna AS-1863/ARN-83	Loop antenna
Antenna 205-075-325	Sense antenna
Transponder Set AN/APX-72	Transponder set
Receiver-Transmitter RT-859/APX-72	Receiver-transmitter
Transponder Set Control C-6280/APX-72	Control panel
Antenna AT-884( )/APX	Antenna
Radio Set AN/ARC-131	Radio Set
Receiver-Transmitter RT-823/ARC-131	Receiver-transmitter
Control, Radio Set C-7088/ARC-131	Control panel unit
AS-1703/AR	FM antenna
AS-1922/ARC	Homing antenna

*Only one FM and one UHF radio set will be installed in each helicopter.

5-7. The installed navigation equipment consists of: a direction finder set, a marker beacon receiver, a VHF navigation receiver, and a gyro magnetic compass system.

5-8. The avionic equipment installed may vary with respect to model of equipment installed. Also equipment for which provisions are made may or may not be installed. Therefore, no attempt is made to specify the exact combinations of equipment installed in any particular helicopter. All equipment installed or equipment for which provisions are made for installing, has been described and operating procedures are outlined.

Section II - Description

5-9. PURPOSE AND USE.

5-10. The purpose and use of the communication and navigation equipment installed in the UH-1D/H helicopter is described in the following paragraphs:

5-11. FM LIAISON SET AN/ARC-44.

5-12. The FM Liaison Radio Set provides two-way communication within the frequency range of 24 to 51.9 megahertz (mhz) on 280 preset channels. The distance range is limited to line of sight up to distances of approximately 50 miles.

5-13. When used with Antenna Group AN/ARA-31, Radio Set ARC-44 provides a homing facility which allows the pilot to home on any keyed unmodulated signal transmitted within the frequency range of 24 to 49 mhz.

5-14. SIGNAL DISTRIBUTION PANEL - SB-329/AR.

5-15. Signal Distribution Panel SB-329/AR amplifies and controls the distribution of audio signals applied to or from each headset-microphone, to or from communication receivers and transmitters and from navigation receivers. The SB-329/AR Panel is used for intercommunication between crew members and is also used for monitoring the communication and navigation receivers singly or in combination.

5-16. SIGNAL DISTRIBUTION PANEL C-1611A/AIC.

5-17. Signal Distribution Panel C-1611/AIC is a transistorized unit which provides the same functions that are provided by the SB-329/AR Panel. (Refer to paragraph 5-15.) In addition the C-1611A/AIC panel permits the operator to control four receiver-transmitters. A private interphone line is also provided. When the selector switch is in the PVT position it provides a hot line (no external switch is used) to any station in the helicopter. A HOT MIC switch is also provided on the C-1611A/AIC control panel at the medical attendant's station.

5-18. Beginning with ship No. 64-13662 and subsequent helicopters, four C-1611A/AIC units are installed. One each of the units are installed for the pilot and copilot, and two are installed in the crew/passenger compartment for the crew. All four of the C-1611A/AIC units are wired to provide interphone operations for the crew, and full transmit and receive facilities for all communication and navigation equipment. Refer to paragraph 5-117 for description of the operating controls on the panel and paragraph 5-176 for operation.

5-19. UHF COMMAND SET AN/ARC-55B.

5-20. The ARC-55B Command Set provides two-way amplitude-modulated communication on any one of 1750 channels, in the band of 225.0 to 399.9 megahertz. Channel selection is manual and the guard frequency may be monitored.

5-21. UHF COMMAND SET AN/ARC-51( )X.

5-22. Radio Sets AN/ARC-51X and AN/ARC-51BX both serve the same purpose and both operate within the ultra high frequency (UHF) band of 225.0 to 399.9 megahertz (mhz). The ARC-51X provides 1750 channels and tunes in 0.9 mhz increments. The ARC-51BX tunes in 0.05 mhz increments and provides 3500 channels. The ARC-51BX also permits selection of 20 preset channels. Both radio sets permit monitoring of the guard channel and provide two-way radio communications. Transmission and reception are conducted on the same frequency with the use of a common antenna.

5-23. FM RADIO AN/ARC-54.

5-24. Radio Set AN/ARC-54 is an FM radio that provides the aircraft crew with two-way voice communications within the frequency range of 30 to 69.9 megahertz. In addition to voice communication the ARC-54 permits selective calling (TONE) operation and when used with the homing antenna group and course indicator the pilot is provided with a homing facility.

5-25. VHF COMMAND SET.

5-26. The VHF Command Set AN/ARC-73 is an alternate set for the UHF radio. The set provides transmission and reception of AM radio signals in the VHF range. The receiver may be tuned within its frequency range of 116.00 to 151.95 mhz in 50 khz increments to any one of the 720 available channels. The transmitter may be tuned within its frequency range of 116.00 to 149.95 mhz in 50 khz increments to any one of its 680 available channels. The distance range is limited to line of sight or a distance of approximately 50 miles.

5-27. VHF COMMAND SET AN/ARC-134.

5-28. The VHF Command Set AN/ARC-134 is installed in helicopters Serial Nos. 66-8574 through 66-8577 and 66-16307 and subsequent. The set provides voice communications in a very high-frequency (VHF) range of 116.000 through 149.975 megahertz. This provides 1360 channels spaced 25 khz apart. The set transmits and receives amplitude modulated signals on the same frequency with the use of a common antenna.

5-29. EMERGENCY VHF TRANSMITTER.

5-30. The emergency VHF transmitter provides emergency VHF transmission on five crystal controlled channels. The equipment can also provide emergency two-way voice communication when used in conjunction with the VHF navigation receiver.

5-31. HF AM/SSB RADIO SET.

5-32. The AN/ARC-102 is a long range High Frequency (HF) Single Side Band (SSB) transceiver which transmits and receives in the 20 to 30 megahertz frequency range. The set tunes in one khz stops to any one of 28,000 manually selected frequencies. The primary mode of operation is SSB, however the ARC-102 can also transmit and receive a compatible AM signal.

5-33. VHF NAVIGATION RECEIVER.

5-34. The VHF navigation receiver provides for reception of 190 VHF channels whose frequencies are all the 0.1 mhz steps between 108.00 mhz and 129.90 mhz. This permits reception and interpretation of VHF omni-directional radio range (VOR) signals and of localizer signals broadcasted by ground station. The line-of-sight distance range for the navigation set varies from 12 nautical miles at 100 feet altitude to 160 nautical miles at 20,000 feet altitude. This navigational data permits the operator to perform the following:

a. Fly a desired course to or from a VOR station.

b. Fly to an objective other than a VOR station.

c. Make approximate ground speed checks.

d. Fly to the intersection of a localizer and VOR signal.

e. Approach a runway associated with either a VOR or a localizer station.

f. Determine the bearing of the aircraft with respect to a VOR station.

5-35. NAVIGATION RECEIVER - AN/ARN-82.

5-36. The AN/ARN-82 Navigation Receiver is installed in helicopter Serial No. 66-746 and subsequent helicopters. The receiver provides for reception of 200 channels with 50 khz spacing. This permits reception and interpretation of VMF omnidirectional radio range (VOR) signals, localizer signals and standard broadcast AM signals. Localizer frequencies are all the odd tenth - mhz frequencies between 108.00 mhz and 112.0 mhz. The localizer function is energized when these frequencies are selected. Localizer, VOR and standard broadcast signals are presented aurally through the intercom system. Localizer signals are also presented visually via the vertical needle or CDI of the course indicator, and VOR signals are presented visually via the course indicator and the No. 2 pointer of the bearing heading indicator. Navigational data provided by this system permits the operator to perform the same functions provided by the AN/ARN-30E as listed in steps a. through f. of paragraph 5-34. (refer to paragraph 5-34).

5-37. DIRECTION FINDER SET - AN/ARN-59.

5-38. The direction finder set is a radio compass system designed to provide automatically, a visual indication of the direction from which an incoming radio-freqeuncy (RF) signal is received. It provides for aural reception of AM signals in the 190 to 1,750 khz frequency range. It may also be used for homing and position fixing or as a manually operated direction finder.

5-39. DIRECTION FINDER SET - AN/ARN-83.

5-40. The AN/ARN-83 Direction Finder System is installed in helicopter No. 66-746 and subsequent helicopters. The system provides radio aid to navigation and operates in the frequency range of 190 to 1750 khz.

5-41. When operating as an automatic direction finder, the ARN-83 system presents a continuous indication of the bearing to any selected radio station and simultaneously provides aural reception of audio transmission from the station. When the manual mode of operation is selected the system enables the operator to find the bearing to any selected radio station by manually controlling the null direction of directional antenna. The system also operates as a radio range receiver and a conventional low-frequency aural receiver to receive voice and unmodulated transmission.

5-42. GYRO MAGNETIC COMPASS.

5-43. The gyro magnetic compass is a direction sensing system which provides a visual indication of the magnetic heading of an aircraft. The system may also be used as a free gyro in areas where the magnetic reference is unreliable.

5-44. GYRO MAGNETIC COMPASS AN/ASN-43.

5-45. The Gyro Magnetic Compass AN/ASN-43 is installed in helicopters Serial Nos. 66-8574 through 66-8577 and 66-16449 through 66-17144. This system provides navigational data and permits the pilot to perform the same functions provided by the J-2 Gyro Magnetic Compass System. (Refer to paragraph 5-42.)

5-46. MARKER BEACON RECEIVER.

5-47. The marker beacon receiver is a radio navigational aid for receiving marker beacon signals from a ground transmitter. The pilot is provided with aural and visual presentations of the received marker beacon signals. This aids in determining the exact location of the aircraft for navigational and instrument landing purposes.

5-48. TRANSPONDER SET.

5-49. Transponder Set AN/APX-44 receives, decodes and responds to interrogations of the Mark X Identification Friend or Foe (IFF) System, to the exterrogations of Mark X (IFF) system supplemented by Selected Identification Features (SIF) and to the interrogation of civil secondary ground radar systems. The transponder set can also be used to transmit specially coded emergency signals or position-identifying signals, even though the set is not being interrogated by a ground based IFF system.

5-50. Interrogating signals, consisting of pairs of pulses spaced to form a code, are transmitted to the AN/APX-44, which decodes the interrogation and transmits a coded reply to the question source. The form of coded reply, which can be preset by the transponder set controls, presents positive identification of the nationality and position of the helicopter.

5-51. The operational facilities of the transponder set are divided into five categories, each of which may be selected by the pilot. These categories are as follows:

Normal Operation
Modified (SIF) Operation
Civil Operation
Position Identification
Emergency Operation

5-52. Three independent coding modes, or combinations of the three, are available to the pilot. Mode 1 provides 32 possible code combinations, any one of which may be selected while in flight. Mode 2 provides one code combination which is preset prior to flight and may consist of any one of 4,096 possible code combinations. Mode 3 provides 64 additional code combinations, any one of which may be selected by the pilot while in flight.

5-53. NAVIGATION SET AN/ASN-72.

5-54. The Navigation Set, Position Fixing AN/ASN-72 is installed in helicopters Serial No. 64-13492 and subsequent. The navigation set receives low-frequency, unmodulated, continuous-wave signals from four ground stations and provides the pilot with helicopter present-position data. The navigation set provides the following visual displays of present position.

a. Three decometers designated as red, green, and purple, are calibrated in the lane and zone units into which the area covered by the ground stations is divided by the hyperbolic system of grids. The readings obtained from any two of the decomenters are referenced to maps of charts on which are imprinted the lane and zone units. When plotted on the chart, the point at which the readings intersect will indicate helicopter present position.

b. A flight log map display with moving chart and pen that provide continuous indication of present position of helicopter.

5-55. TRANSPONDER SET AN/APX-72.

5-56. Transponder set AN/APX-72 provides automatic radar identification of aircraft or surface vessel, to all suitably equipped challenging aircraft, and ground facilities within the operational range of the system. The set receives, decodes, and responds to the characteristic interrogations of operational modes 1, 2, 3A, C and 4. The receiver section operates on a frequency of 1030 megacycles and the transmitter section operates on a frequency of 1090 megacycles. Specially codes identification of position (IP) and emergency signals may be transmitted to interrogating stations when conditions warrant.

5-57. INTERROGATION SIGNALS.

5-58. Interrogation signals consisting of pairs of pulses spaced to form a code, are transmitted to the APX-72 which receives the coded signal and transfers it to the decoder. The decoder checks the incoming signal for valid code and proper mode (except for mode 4 interrogations which are sent directly to mode 4 board). If valid the decoder signal is sent to the decoder board which prepares the coded reply. The coder reply is sent through the transmitter and antenna to interrogating source.

5-59. OPERATIONAL FACILITIES.

5-60. The operational facilities of the APX-72 set are divided into four categories, each of which may be selected by the pilot. These categories are as follows:

a. Low (sensitivity) operation.

b. Normal (sensitivity) operation.

c. Identification of position (IDENT-MIC).

d. Emergency.

5-61. Five independent coding modes are available to the pilot. The first three modes may be used independently or in combination. Mode 1 provides 32 possible code combinations, any one of which may be selected in flight. Mode 2 provides 4096 possible code combinations but only one is available since the selection dial is not available in flight and must be preset before flight. Mode 3/A provides 4096 possible codes, any one of which may be selected in flight. Mode C in this installation is not utilized. Mode 4, which is connected to an external computer, can be selected to display any one of many classified operational codes for security identification.

5-62. The range of the APX-72 is limited to line-of-sight transmission since its frequency of operation is in the UHF band making range dependent on altitude of aircraft.

5-63. RADIO SET AN/ARC-131.

5-64. The radio set AN/ARC-131 consists of a receiver-transmitter, control panel unit, mounting, and a connector plate. The set is a FM communications set that provides 920 channels spaced at 50 kc (50 khz) intervals in the frequency range of 30 to 75.95 mc (mhz). Circuits are included in the design of this set to provide sidetone monitoring of the transmitter output. Power to operate the receiver-transmitter is from the helicopter 28-volt DC electrical power supply system.

5-65. DESCRIPTION OF COMPONENTS.

5-66. The components of the radio sets and electronic equipment installed in the helicopter are described in the following paragraphs:

5-67. FM LIAISON SET AN/ARC-44.

5-68. The FM liaison set includes an FM receiver-transmitter and mounting, three INT signal distribution panels, an FM control panel, a dynamotor and mounting, a switch panel, an antenna system and interconnecting cabling.

a. The FM receiver-transmitter is mounted in the nose radio rack and is controlled from the pedestal mounted remote control panel. For a description of the control panels refer to paragraphs 5-111 and 5-115.

b. The dynamotor is mounted in the nose radio rack adjacent to the receiver-transmitter. Primary power from the helicopter power supply is applied to the dynamotor, which transforms the primary power into operating voltages for operation of the FM liaison set.

c. The FM antenna consists of a whip, a base and coupler. The whip and base are mounted on the aft tail boom section and are connected to the coupler by coaxial cable.

d. The following are provided for the homing operation of the FM liaison set: Four antenna elements and two impedance matching networks, installed forward of the nose section, a keyer installed in the nose radio compartment, and a switch panel installed in the pedestal. For description of the switch panel refer to paragraph 5-115 and see figure 5-4.

5-69. FM LIAISON SET AN/ARC-54.

5-70. The ARC-54 Radio Set Includes an FM receiver-transmitter, FM control panel, FM communications antenna, a homing antenna system and a homing indicator.

a. The FM receiver-transmitter is installed in the nose radio compartment and is controlled from the pedestal mounted remote control panel, for description of the control panel refer to paragraph 5-121 and see figure 5-7. Primary power to the receiver-transmitter is supplied from the helicopter 28-volt power supply system. A transistorized power supply is contained within the receiver-transmitter.

b. The communications antenna consists of a whip mounted base, and 40-position antenna coupler, which are mounted on the aft tail boom section. The antenna coupler is positioned automatically from the control panel when the frequency channel is selected.

c. The homing antenna (3, figure 5-1) is a one-piece unit resembling a towel rack and is installed on the roof of the helicopter. Data provided by the homing facility is displayed visually on the course indicator, which is mounted on the instrument panel.

5-71. UHF COMMAND SET AN/ARC-55B.

5-72. UHF Command Set ARC-55B consists of a receiver-transmitter and mount, a pedestal mounted remote control unit, and a UHF antenna mounted on the cabin roof.

a. The receiver-transmitter consists of ten separate subassemblies and a dynamotor mounted on a main chassis. The complete unit is installed in the nose radio compartment. Primary power is supplied from the helicopter 38-volt DC power supply system. The receiver-transmitter is controlled from the UHF control panel mounted on the pedestal, for description of the panel refer to paragraph 5-119 and see figure 5-6.

b. The UHF antenna (see 1, figure 5-1) is an airfoil shaped antenna. It is used for both reception and transmission. The antenna has a VHF connector and element which permits it to be used for both UHF and VHF radio sets.

TABLE 5-2. COMMUNICATIONS AND ASSOCIATED ELECTRONIC EQUIPMENT

FACILITY	NOMENCLATURE	USE	RANGE	LOCATION OF CONTROLS	REMARKS
UHF command communications	Radio Set AN/ARC-55B AN/ARC-51X or AN/ARC-51BX	Two-way voice communications in the frequency range of 225 to 399.9 mhz	*Line of sight	Pedestal	
FM liaison communications	Radio Set AN/ARC-44 or AN/ARC-54	Two-way voice communications in the frequency range of 24.0 to 51.9 mhz	*Line of sight or 50 miles average conditions	Pedestal	AN/ARC-44 dynamotor supplies power for operation of signal distribution panel SB-329-AR
Intercommunication	Radio Set SB-329/AR or C-1611A/AIC	Intercommunication between crew members	Stations with helicopter	Pedestal and cabin overhead	Press-to-talk switches located on cyclic sticks, foot switch on floor in cockpit area, and crew members control panel
VHF command communications	Radio Set AN/ARC-73	Two-way voice communications in the frequency range of 116.00 to 149.95 mhz	*Line of sight or 50 miles average conditions	Pedestal	The AN/ARC-73 is used as an alternate for the UHF Command Set
VHF command communications	Radio Set AN/ARC-134	Two-way voice communications in the frequency range of 116.000 mhz	*Line of sight or 50 miles average conditions	Pedestal	The AN/ARC-134 is used as a alternate for the UHF Command Set
HF SSB/AM communications	Radio Set AN/ARC-102	Two-way voice communications in the frequency range of 2.0 to 29.999 mhz	*Up to 2000 miles	Pedestal	Minimum pilot weight is 260 pounds with AN/ARC-102 installed
VHF emergency transmitter	Transmitter T-366/ARC	VHF emergency transmitter	*Line of sight	Pedestal	The VHF navigation receiver used in conjunction with T-366/ARC standby transmitter
FM homing	Antenna Group AN/ARA-31 used with AN/ARC-44 or Antenna 637A-2 used with AN/ARC-54	Homing on FM transmission within frequency range of 24 to 49 mhz	*Line of sight or 50 miles average conditions	Pedestal	The FM liaison set must be operated while homing

TABLE 5-2. COMMUNICATIONS AND ASSOCIATED ELECTRONIC EQUIPMENT (CONT)

FACILITY	NOMENCLATURE	USE	RANGE	LOCATION OF CONTROLS	REMARKS
VHF navigation (VOR, VAR, LOCALIZER)	Radio Receiving Set AN/ARN-30E or AN/ARN-82	VHF navigational aid and VHF audio reception in the frequency range of 108 to 126 mhz	*Line of sight	Pedestal	Information is presented aurally in headset, and visually on course indicator and bearing-heading indicators
Automatic direction finding	Direction Finder Set AN/ARN-59 or AN/ARN-83	Radio range and broadcast reception; automatic direction finding and homing in the frequency range of 190 to 1750 khz	*50 to 100 miles range signals 100 to 150 miles broadcase	Pedestal	
Magnetic heading indications	Gyro Magnetic Compass J-2 or AN/ASN-43	Navigational Aid		Instrument Panel	
Marker beacon reception	MB Receiver R-1041/ARN	Navigational Aid	Vertical to 50,000 feet	Instrument Panel	
Identification	Transponder Set AN/APX-44	Transmits a specially coded reply to a ground-based IFF radar interrogator system	*Line of sight	Pedestal	
Position fixing	Navigation Set AN/ASN-72	Receives low frequency (cw) signals 70-135 khz from ground station displaying helicopter present position	*250 miles	Pedestal	Displays present position on four display meters and flight log display head
FM liaison communications	Radio Set AN/ARC-131	Two-way voice communications and FM and continuous-wave homing	*Line of sight or 50 miles average conditions	Pedestal	

*Range of transmission and reception is dependent upon a number of variables including weather conditions, time of day, operating frequency, power of transmitter, and altitude of helicopter.

5-73. RADIO SET AN/ARC-51X.

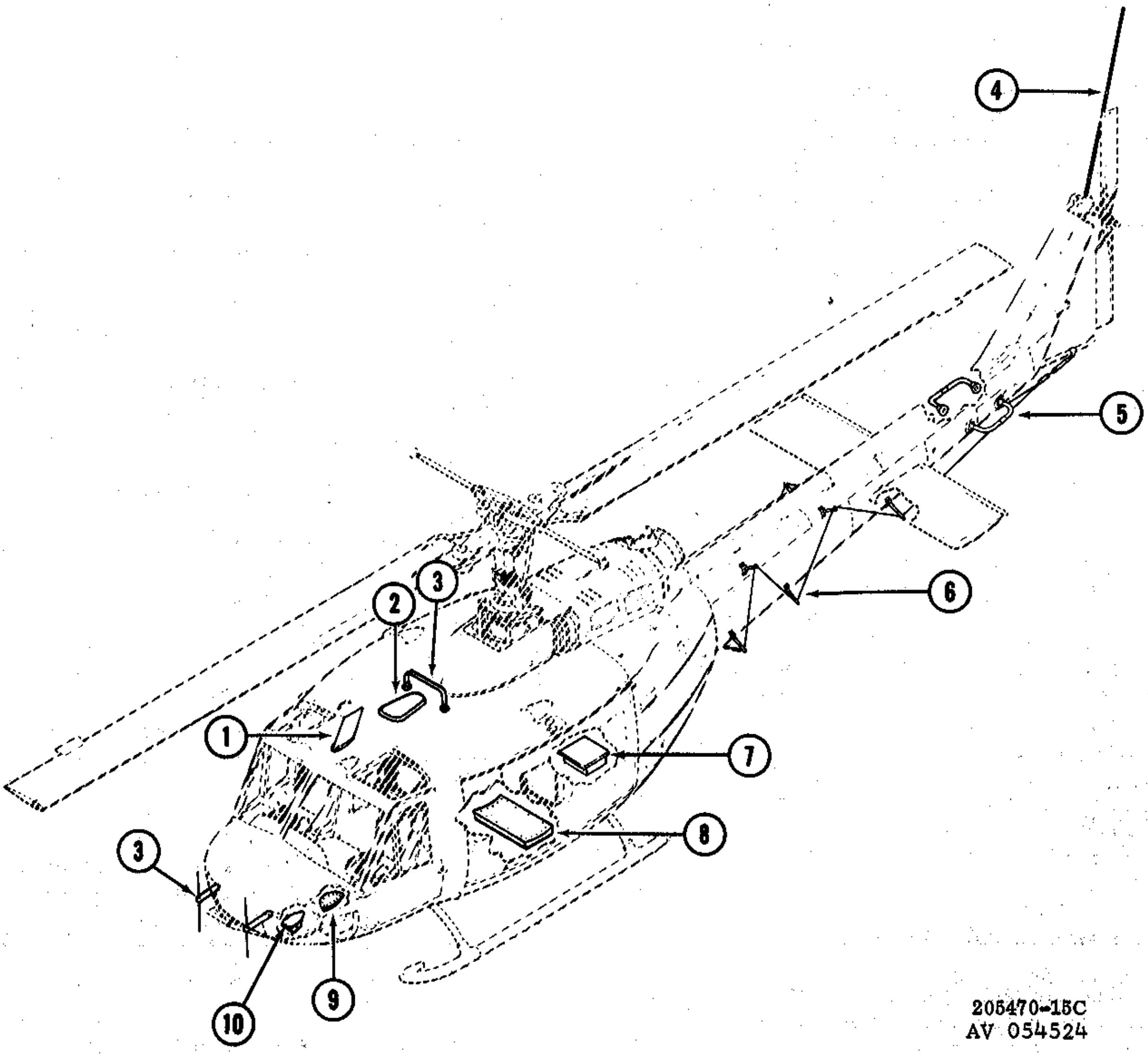
5-74. The ARC-51X Radio Set includes a receiver-transmitter and mount installed in the nose, a remote control panel installed on the pedestal and the UHF antenna installed on the cabin roof.

a. The receiver-transmitter is a pressurized unit. The internal air is cooled by heat exchangers and an externally mounted blower. The blower operates only when the internal temperature of the receiver-transmitter exceeds 95°F. Primary power to operate the ARC-51X equipment is supplied from the helicopter 28-volt DC power supply. The receiver-transmitter is controlled from the UHF remote control panel installed in the pedestal. For description of the control panel refer to paragraph 5-123 and see figure 5-8.

b. The UHF antenna used with the ARC-51X for reception and transmission is installed on the cabin roof, refer to paragraph 5-71 for description.

5-75. RADIO SET AN/ARC-51BX.

5-76. The ARC-51BX is similar to the ARC-51X (refer to paragraph 5-73) in purpose, operation and appearance. The receiver-transmitters differ in internal electrical circuitry only. The control panels differ as follows:



1. VHF/UHF Antenna
2. Loop (ADF) Antenna System
3. FM Homing Antenna
4. FM Radio Set Antenna
5. Omni Antenna System
6. HF Radio Set Antenna
7. Decca Antenna
8. Sense (ADF) Antenna
9. Marker Beacon Antenna
10. IFF Antenna

Figure 5-1. Antenna Installation - typical

a. Control Panel C-4677/ARC-51X tunes in 0.1 mc increments has a four-numbered frequency indicator, and contains a SENS control.

b. Control Panel C-6287/ARC-51BX tunes in 0.05 mc increments, has a five numbered frequency indicator, and does not have a sens control. The C-6287/ARC-51BX permits selection of 20 perset channels, and has a mode selector which permits preset channel selection, manual channel selection, and automatic switching of RT-742/ARC-51BX to the guard channel frequency. Refer to paragraphs 5-123 and 5-125 for description of the panels also see figures 5-8 and 5-9.

5-77. RADIO SET AN/ARC-73.

5-78. The VHF Radio Set AN/ARC-73 consists of a receiver-transmitter, dual mount, remote control panel, VHF antenna, and inter-connecting cable assemblies. The receiver and transmitter are contained in separate metal cases and mounted on a dual shock mount. The ARC-73 is an alternate for the UHF command set and when installed is mounted in the nose radio compartment where the UHF command set is normally installed. The receiver and transmitter are controlled from a single control panel mounted in the pedestal, for a description of the panel, refer to paragraph 5-127 and see figure 5-10. The VHF antenna and UHF antenna are contained in the same housing.

5-79. RADIO SET AN/ARC-134.

5-80. The VHF Radio Set AN/ARC-134 consists of a receiver-transmitter, mount, remote control panel, VHF antenna, and interconnecting cable assemblies. The AN/ARC-134 is an alternate for the UHF command set and when installed, the receiver-transmitter is mounted in the heater compartment. The receiver-transmitter is controlled from a remote control panel mounted in the pedestal. For a description of the panel, refer to paragraph 5-129 and see figure 5-11. The VHF antenna and UHF antenna are contained in the same housing. (Refer to paragraph 5-71.) Primary power to operate the receiver-transmitter is from the helicopter 28-volt DC power supply system.

5-81. RADIO SET AN/ARC-102.

5-82. The AN/ARC-102 Radio Set consists of a receiver-transmitter installed in the aft radio compartment; an antenna coupler and impedance matching network installed in the forward section of the tail boom; a long wire type antenna installed on each side of the tail boom; remote control panel installed in the pedestal; and interconnecting cable assemblies. Complete provisions are provided for installation of the ARC-102.

a. The receiver-transmitter is composed of eleven plug-in modules, which includes an interchangeable internal power supply. The complete unit is contained in a metal case and weighs 50 pounds. The receiver-transmitter is controlled from the control panel installed in the pedestal. For description of the panel refer to paragraph 5-135; also see figure 5-14. Primary power to operate the receiver-transmitter is supplied from the helicopter 28-volt DC power supply.

b. The ARC-102 antenna coupler is mounted in the forward section of the tail boom. The coupler automatically matches the impedance of the long wire antenna (see 6, figure 5-1) to the channel frequency selected on the remote control unit. Power to operate the antenna coupler is supplied from the receiver-transmitter.

5-83. VHF NAVIGATION RECEIVER - AN/ARN-30.

5-84. The VHF navigation set consists of a receiver and converter, which are contained in separate metal housings and installed on a dual mount in the aft radio compartment; a power supply unit is mounted externally on the receiver housing. Other equipment includes: an omni antenna with one element mounted on each side of the aft section of the tail boom; (see 5, figure 5-1) and remote control panel mounted in the pedestal, (refer to paragraph 5-137) and see figure 5-15) and a course indicator mounted on the instrument panel (refer to paragraph 5-141 and see figure 5-17).

5-85. NAVIGATION RECEIVER - AN/APN-82 VHF.

5-86. The AN/ARN-82 navigation system consists of a receiver and mount, a remote control panel, an omni antenna, course indicator and interconnecting cable assemblies. The receiver is a transistorized unit and is mounted in the nose section of the helicopter. Primary power to operate the set is supplied from the helicopter electrical system. The essential bus supplies 28-volts DC and the 28-volt transformer supplies 400 cycle 28-volt AC. Operating voltages are supplied by a transistorized power unit within the receiver housing. The antenna used with the system is the DMS4-4 antenna installed on the aft tail boom. (See 5, figure 5-1.)

a. The navigation receiver is controlled by the use of remote control panel C-6873/ARN-82. For a description of the control panel and the functions of the individual controls refer to paragraph 5-139, and see figure 5-16.

b. Navigational data received via the ARN-82 navigation receiver is presented aurally through the intercom system and visually on the ID-1347/ARN-82 Course Indicator, and the bearing-heading indicators. For description of the ID-1347/ARN-82 course indicator refer to paragraph 5-143. For description of the bearing-heading indicators refer to paragraph 5-149, and see figure 5-21.

5-87. DIRECTION FINDER SET.

5-88. The direction finder set consists of a receiver, a control unit, a power unit, loop and sense antennas and two indicators.

a. The receiver is a three-band unit mounted in the nose radio compartment. Frequency band selection is accomplished from the remote control panel, by a band switching DC motor and a 4000-to-1 speed reduction gear train. Turning the receiver is accomplished through a flexible mechanical linkage that connects the receiver and remote control unit. For a description of the control unit, refer to paragraph 5-145 and see figure 5-19.

b. The power unit consists of a dynamotor and alternator. Primary power from the helicopter 28-volt DC system is supplied to the power unit. The power unit then supplies the operating voltages for the direction finder equipment. The power unit is mounted in the nose radio compartment.

c. The loop antenna (see 2, figure 5-1) is enclosed in a streamlined housing and is installed on top of the cabin roof. The sense antenna (8, figure 5-1) is also part of the direction finder equipment. It is installed beneath the cargo area.

d. Information received via the direction finder set is presented on the pilot's bearing-heading indicator (figure 5-21) and the copilot's bearing-heading indicator. For further description of the bearing-heading indicators refer to paragraph 5-149.

5-89. DIRECTION FINDER SET - AN/ARC-83.

5-90. The AN/ARN-83 Direction Finder Set consists of a receiver, a control unit, a loop antenna, a sense antenna, and two indicators.

a. The receiver is a three-band transistorized unit, mounted in the aft radio compartment. Primary power to operate the receiver is supplied from the 28-volt DC essential bus. The receiver is controlled by the use of a remote control unit mounted in the pedestal. For description of the control unit refer to paragraph 5-147 and see figure 5-20.

b. The loop antenna and sense antenna are used with the ARN-83 direction finder system. The loop antenna (see 2, figure 5-1) is installed on top of the cabin roof. The sense antenna (see 8, figure 5-1) is installed on the fuselage beneath the cargo area.

c. Information received via the direction finder set is presented visually on the pilot's and copilot's radio magnetic indicators and aurally through the intercom system.

5-91. TRANSPONDER SET AN/APX-44.

5-92. Transponder Set AN/APX-44 consists of a receiver-transmitter and mounting, a remote control panel, antenna and interconnecting cable assemblies.

a. The receiver-transmitter when installed is located on a mounting in the aft radio compartment. The equipment is controlled from the pedestal mounted control panel. For description of the control panel refer to paragraph 5-153 and see figure 5-22. Power to operate the transponder set is supplied from the helicopter 28-volt DC power supply system.

b. The antenna (10, figure 5-1) used with the transponder set is a lightweight blade type. It is installed beneath the nose section of the helicopter.

5-93. MARKER BEACON RECEIVER.

5-94. The marker beacon equipment consists of a receiver and mount, indicator lamp, remote volume control, sensitivity switch and antenna.

a. The marker beacon receiver is contained in a metal case and mounted on a bracket in the nose radio compartment. Power to operate the receiver is supplied from the helicopter 28-volt DC power supply system.

b. The indicator light, sensitivity switch, and combination on-off switch and volume control are mounted on the lower right corner of the instrument panel. The volume-control-on-off switch applied power to the receiver and adjusts the audio level. The sensitivity switch control internal circuits in the receiver to increase the gain for weak signals. The indicator light illuminates when the aircraft is over a marker beacon transmitter.

c. The marker beacon antenna (9, figure 5-1) is installed on the fuselage below the cabin area. The antenna is a 50-ohm impedance antenna, which is used to receive the 75-megacycle signal transmitter by ground transmitter.

5-95. GYRO MAGNETIC COMPASS.

5-96. The J-2 Gyro Magnetic Compass System consists of a remote compass transmitter, directional gyro control, slaved gyro magnetic compass amplifier, two heading indicators, slaving switch and interconnecting cable assemblies.

a. The compass transmitter is installed in the tail boom. It is the direction sensing unit of the gyro magnetic compass system. The compass transmitter consists of a hemispherical bowl, which houses the functioning assemblies, and is attached to a mounting flange and compensator.

b. The directional gyro control is installed in the aft radio compartment. The gyro is slaved to the earth's magnetic meridian by the compass transmitter (in the free mode of operation the gyro operates as a free gyro). The heading of the aircraft is indicated on the pilot's and copilot's heading indicators, when the system is operating in the slaved mode. For description of the heading indicator refer to paragraph 5-149, and see figure 5-21.

c. The compass amplifier is installed in the aft radio compartment near the directional gyro. The amplifier controls and amplifies voltages from the transmitter to the directional gyro. Operating voltages for the gyro magnetic compass system are supplied from the 28-volt DC bus, the 26-volt AC bus and the 115 volt AC bus. An AC-DC Interlock Relay insures that AC and DC operating voltages are applied simultaneously to prevent damage to the system.

5-97. GYRO MAGNETIC COMPASS SET AN/ASN-43.

5-98. The gyro magnetic compass set consists of a remote compass transmitter, directional gyro, magnetic flux compensator, electronic control amplifier, COMPASS SLAVING switch, and two bearing-heading indicators.

a. The remote compass transmitter is installed in the tail boom. It is the direction sensing unit of the compass set. The unit consists of a hemispherical bowl, which houses the functioning assemblies, and is attached to a mounting flange and to the magnetic flux compensator.

b. A sealed directional gyroscope and electronic amplifier are mounted on the same base and installed in the aft radio compartment. The gyro contains automatic leveling circuits and precission coils for slaving the gyro to the magnetic reference in the slaved mode. The precession coils are used in the free gyro mode to provide latitude corrected drift. Primary power 115-volt AC power is supplied from the AC circuit breaker panel to a power supply in the base of the directional gyro. This power supply furnishes voltage to operate the gyro and amplifier and to excite the remote compass transmitter. The base also contains a relay operated by the COMPASS SLAVING switch to change operation from the free gyro mode by the slaved mode.

c. The electronic control amplifier is required to amplify error signals for the radio magnetic indicator and to supply power to drive a heading card in the radio magnetic indicator. It is mounted on a bracket in the nose radio compartment. For description of the bearing heading indicator, refer to paragraph 5-149 and figure 5-21.

d. The compass controls, except the COMPASS SLAVING switch. are incorporated in the radio magnetic indicator. (Refer to paragraph 5-149.) The COMPASS SLAVING switch (figure 2-5) is located in the center of the instrument panel. When the switch is in the MAG HDG position, the set is operating in the slaved gyro mode. When the switch is in the GYRO HDG position the set is operating in the free gyro mode.

5-99. EMERGENCY VHF TRANSMITTER.

5-100. The T-366 Emergency Transmitter is installed on a mount in the nose radio compartment. The transmitter is controlled from a control panel mounted in the pedestal, for description of the panel refer to paragraph 5-131, and see figure 5-12. Power to operate the transmitter is supplied from the helicopter 28-volt DC system.

5-101. RADIO TRANSMIT, ICS TRIGGER SWITCH.

5-102. The pilot and copilot are each provided with a trigger switch for keying intercom and transmitting circuits. The switch is located on the forward section of the cyclic stick grip (see 17, figure 2-4). The switches are two position switches, depressing the switch to the first detent keys the intercom circuit; depressing the switch to the second detent keys the transmitting circuit.

5-103. RADIO TRANSMIT FOOT OPERATED SWITCH.

5-104. A foot operated switch (12, figure 2-4) is also provided for the pilot and copilot. The switches are located on the floor just forward of the pilot's and copilot's station. The switches have only one position; when pressed they key the transmitter or (INT) interphone, whichever is selected with the transmit-interphone selector switch on the singla distribution panel.

5-105. NAVIGATION SET AN/ASN-72.

5-106. The Navigation Set AN/ASN-72 consists of a receiver, computer, antenna, preamplifier, two control panels, flight log display, decometer box with three decometers, and a lane identification meter.

a. The receiver and computer are mounted in the tail boom. Primary power to operate the navigation set is supplied from the helicopter 28-volt DC power supply system. The receiver is controlled by a remote control panel mounted in the pedestal. For description of the control panel, refer to paragraph 5-155 and figure 5-23. The computer is controlled by a remote control panel mounted in the pedestal. For description of the control panel, refer to paragraph 5-157 and figure 5-24.

b. The antenna for the navigation set is installed on the fuselage beneath the aft access door. (See 7, figure 5-1.) The preamplifier is mounted on top of the antenna.

c. Navigational data received via the navigation set is displayed on a flight log display and three decometers and lane identification meter. The three decometers and lane identification meter are mounted in a box on the left side of the pedestal.

5-107. TRANSPONDER SET - AN/APX-72.

5-108. The transponder set consists of a receiver-transmitter and mounting, remote control panel and antenna.

a. The receiver-transmitter is installed in the tail boom. The set is controlled from the AN/APX-72 control panel which is mounted in the pedestal. For description of the control refer to Section III, Operating Controls. Primary power to operate the set is supplied from the helicopter 28-volt DC electrical system.

b. The set is encased in a two-sectional housing suitable for pressurizing. A silicon rubber packing serves as a pressure seal between the two sections which are joined together by an encircling flange coupler with clamp. The upper section of the housing contains a chassis with compartments for seven digital circuitry printed circuit board and a plug-in power supply. A frontal panel, containing these fuse holders, an elapsed time meter, a MODE 2 switch assembly, the power control connector and a folding handle, is fastened to the upper section of the case. The lower section of the housing contains the rf and video circuit components, the antenna connector and pressurization valve.

5-109. RADIO SET - AN/ARC-131.

5-110. Radio Set AN/ARC-131 consists of a receiver-transmitter, remote control panel unit, communication antenna and a homing antenna.

a. The receiver-transmitter is installed in the nose radio compartment and secured to the mounting by a locking handle. The receiver-transmitter contains the receive and transmit circuits of the radio set. Three coaxial connectors and a multiple-pin connector, at the rear of the receiver-transmitter, mates with connectors on the connector plate for required antenna and electrical connections. Power to the receiver-transmitter is supplied from the helicopter 28-volt DC electrical system.

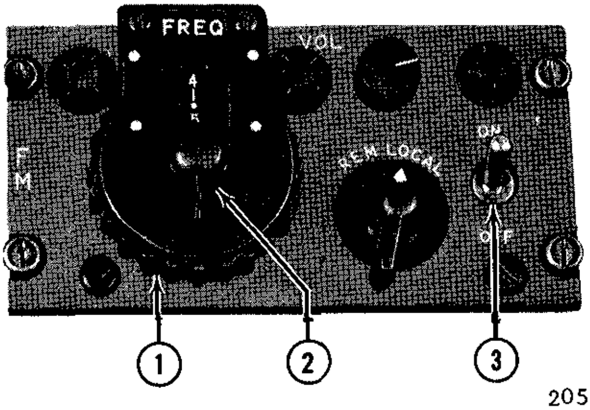
b. The communications antenna is a whip type mounted on the helicopters aft tail boom section.

c. The homing antenna is a one-piece unit installed on the forward area of the helicopter roof. Data provided by the homing facility is displayed visually on the course indicator which is mounted on the instrument panel.

Section III - Operating Controls

5-111. FM CONTROL PANEL SB-327/ARC-44.

5-112. Control Panel SB-327/ARC-44 (see figure 5-2) is marked FM. The panel is mounted on the pedestal and is used to control the FM receiver-transmitter. The controls located on the panel and their functions are as follows:



205475-36
AV 054525

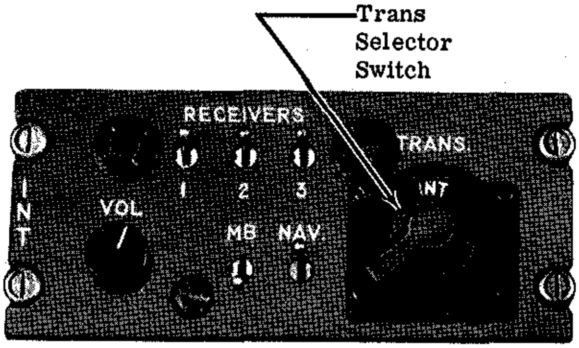
1. Whole Megacycle Selector
2. 1/10 Megacycle Selector
3. Power Switch

Figure 5-2. FM control panel SB-327/ARC-44

CONTROL	FUNCTION
Power ON-OFF switch	Turns primary power to radio set ON or OFF.
REM LOCAL switch	Must always be in the LOCAL position. REMote used only when two or more panels are used.
One tenth and whole megacycle selector switch	Selects the receiving and transmitting frequency of the FM receiver-transmitter as indicated in the FREQ window. Outside knurled knob selects the first two numbers of whole number. Inside knob selects the third number or one tenth megacycle number of the desired frequency.
Receiver VOL control	Adjusts FM receiver audio volume.

5-113. SIGNAL DISTRIBUTION PANEL SB-329/AR.

5-114. The SB-329/AR Signal Distribution Panel (see figure 5-3) is marked INT. Two of the panels are installed in the pedestal for pilot and copilot and one is installed in the cabin roof, aft of the overhead console. The signal distribution panel provides interphone circuits and microphone and headset amplifiers for the radio equipment. Switching circuits enables the crew to monitor as many as five receivers. The pilot and copilot may supply audio to any one of three transmitters that may be installed in the aircraft. Power to operate the signal distribution panels is supplied through a switch marked ICS on the ARC-44 switch panel (see figure 5-4 and refer to paragraph 5-115). The controls located on the signal distribution panel and their functions are as follows:



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AV 054526

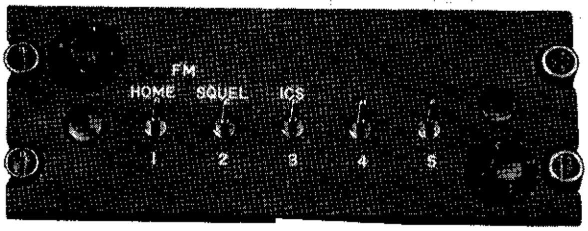
Figure 5-3. Signal distribution panel SB-329/AR

CONTROL	FUNCTION
Receive switches	The switches marked 1, 2, 3 MB and NAV are for connecting or disconnecting receiver audio signals to the associated headset. The up position is on and connects the receiver. The down position is off and disconnects the receiver. The number 1 switch is for the FM receiver, number 2 switch is for the UHF receiver and switch numbers 3 is for the VHF receiver when installed. The switch marked MB connects audio from the marker beacon receiver, and the switch marked NAV connects audio from the ADF or VHF navigation receivers.
TRANS selector switch	This is a rotary type switch with indicator window at the top. The switch has four positions, INT, 1 (FM), 2(UHF), and 3 (VHF). Positions 1, 2, and 3 select the receiver-transmitter to be used to receive or transmit regardless of the position

CONTROL	FUNCTION
	of the RECEIVERS 1, 2, 3 switches. The INT position connects signal distribution panels for interphone operation. The operator will hear side tone when transmitting. The other crew-member will hear the interphone message regardless of the position of their TRANS selector switch.
VOL control	Adjusts the volume level of the audio applied to the headset associated with the INT signal distribution panel.

5-115. FM SWITCH PANEL AN/ARC-44.

5-116. The switch panel assembly (see figure 5-4) is mounted in the pedestal and contains five toggle switches. The switches are numbered 1, 2, 3, 4 and 5 and their functions are as follows:



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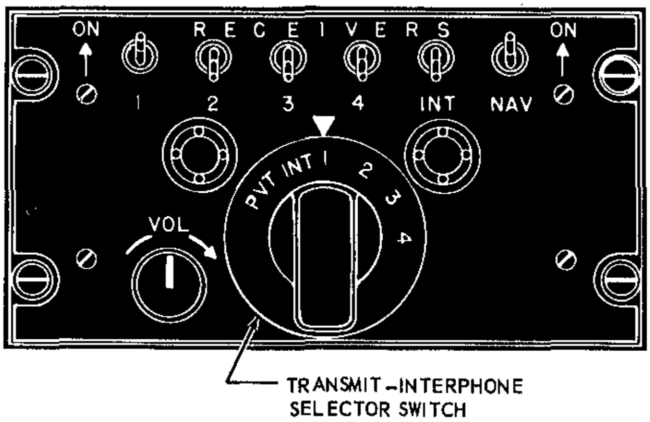
AV 054527

Figure 5-4. Switch panel assembly AN/ARC-44

CONTROL	FUNCTION
No. 1 HOME switch	In the up position the No. 1 HOME switch energizes the homing circuits and disables FM transmitter. When the switch is in the down position, the homing operation is disabled, allowing radio set to return to normal operation.
No. 2 SEQ switch	In the up position, the FM receiver output is sequelched. In the down position the receiver is unsquelched, allowing back-ground noises to be heard.
No. 3 ICS switch	In the up position the ICS circuit is energized. In the down position, ICS circuit is disabled.
No. 4 switch	The No. 4 switch is used for auxiliary FM receiver squelch when auxiliary FM receiver is installed.
No. 5 switch	Not used.

5-117. SIGNAL DISTRIBUTION PANEL C-1611/AIC.

5-118. Signal Distribution Panel C-1611/AIC (see figure 5-5) is marked INT. Two of the panels are installed in the pedestal, one each for the pilot and copilot. Another panel is installed in the cabin roof aft of the overhead console for the medical attendant. The C-1611/AIC panels are used as an intercommunication and radio control system. The panels may be used in any one of three different modes as determined by the setting of the switches and controls on the panel. The three modes of operation are two-way (air-to-air or air-to-ground) radio communication between the crew members. The switches and controls located on the C-1611/AIC panel and their functions are as follows:



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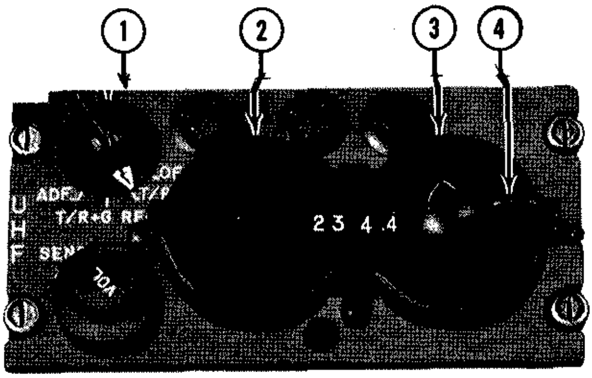
AV 054528

Figure 5-5. Signal distribution panel C-1611A/AIC

CONTROL	FUNCTION
RECEIVERS switches 1, 2, 3 and 4	The switches marked 1(FM), 2 (UHF), 3(VHF) and 4(HF) are for connecting or disconnecting audio to the headset.
RECEIVERS INT switch	Up position connects audio from the VHF navigation receiver, the ADF, and marker beacon to the earphones of the associated headset. Down position disconnects the audio from the headset.
VOL control	Adjusts the earphone volume of all radio receivers except NAV receivers. Maximum obtainable volume on all receivers depends on the setting of the volume control on each receiver.
Transmit-interphone selector switch	Positions 1(FM), 2(UHF), 3(VHF) and 4(HF) connect the receiver-transmitter to the associated headset for voice communication; cyclic stick trigger switch or foot switch must be depressed to transmit. Position INT connects the headset microphone to the interphone system. Position PVT energizes the interphone system for hot mic operation; no external key is needed.

5-119. UHF CONTROL PANEL C-1827/ARC-55B.

5-120. UHF Control Panel C-1827/ARC-55B (see figure 5-6) is marked UHF. The panel is mounted in the pedestal and is used to control the ARC-55B receiver-transmitter. The controls located on the panel and their functions are as follows:



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AV 054529

1. Function Selector Switch
2. Frequency Selector (First Two Digits)
3. Frequency Selector (Third Digit)
4. Frequency Selector (Fourth Digit)

Figure 5-6. UHF control panel C-1827/ARC-55B

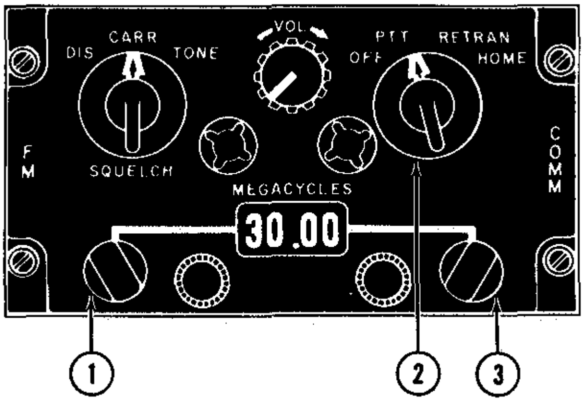
CONTROL	FUNCTION
Selector switch	Applies power to the radio set and selects the mode of operation. OFF position - turns off primary power. T/R position - transmitter and main receiver are on. T/R + G REC position - transmitter, main receiver and guard receiver are on. ADF position - Note used.
Volumn sensitivity control	This is a dual purpose rotary control. The larger or outer knob is marked SENS, and controls receiver sensitivity. The smaller or inner knob is marked VOL, and controls receiver volume.
Tuning controls	The tuning controls consist of two large control knobs, an inner control knob, and an indicator window. The large knob on the left side selects the first two digits (or ten megahertz number). The large knob on the right side selects the third digit (or one megahertz number). The inner knob selects the fractional (or tenth megahertz number).

5-121. CONTROL PANEL C-3835/ARC-54.

5-122. Control Panel C-3835 (see figure 5-7) is marked FM COMM and is mounted in the pedestal. The control panel is used to control the AN/ARC-54 Radio Set. The controls located on the panel and their functions are as follows:

CONTROL	FUNCTION
Mode selector switch	Applies power to the set and selects the mode of operation. OFF position - Turns off primary power PTT (push-to-talk) applies power. Radio set operates in normal communication mode. (Radio cyclic stick switch or foot switch must be pressed to transmit.) RETRAN (retransmit) - applies power. Radio set operates as a two-way relay station. (Two radio sets are required) HOME position - Applies power and radio set operates with 637A-2 Homing Antenna and Course indicator as a homing facility. Voice capability is provided in all three operating positions.

CONTROL	FUNCTION
VOL control	Controls the receiver audio volume.
SQUELCH control	Selects one of three squelch modes as follows: DIS (disable) position - squelch circuits are disabled. CAR (carrier) position - squelch circuits operate normally. TONE position - squelch opens (unsquelches) only on signals containing a 150-cps tone modulation.
Frequency control whole-megahertz digit	Selects the whole megahertz digits
Frequency control decimal-megahertz digit	Selects the decimal-megahertz digits.
MEGAcycles display window	Displays the selected operating frequency.



205475-33
AV 054530

1. Frequency Control Whole - Megacycle
2. Mode Selector Switch
3. Frequency Control Decimal - Megacycle

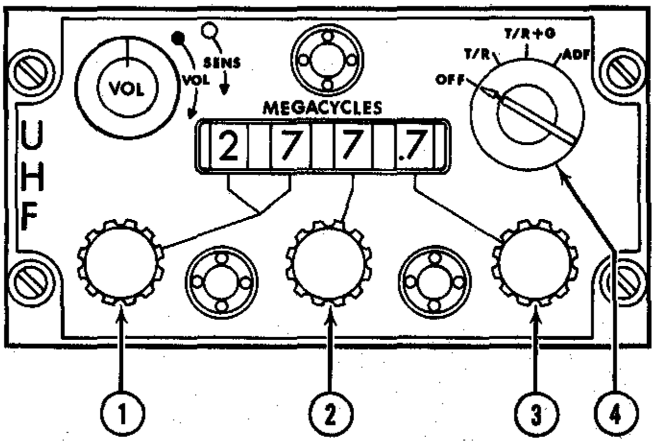
Figure 5-7. FM control panel C-3835/ARC-54

5-123. CONTROL PANEL C-4677/ARC-51X.

5-124. Control Panel C-4677 (figure 5-8) is marked UHF and is mounted in the instrument panel. The control panel is used to control the AN/ARC-51X Radio Set. The controls located on the panel and their functions are as follows:

CONTROL	FUNCTION
Function select switch	Applies power to the radio and selects type of operation as follows: OFF position - removes operating power from radio set. T/R position - applies power to the set and permits transmission and reception; guard receiver is not operative. T/R + G position - Permits transmission and reception; guard receiver is operative. ADF position - Not used.
VOL control	Controls the receiver audio volume.
SENS control	Adjusts main receiver sensitivity. When rotated fully clockwise the control disables the squelch.

CONTROL	FUNCTION
Ten-megacycles control	Selects the first two digits (or ten-megahertz number).
One-megahertz control	Selects the third digit (or one-megahertz number).
One-tenth megahertz control	Selects the fourth digit (or tenth-megahertz number).



205475-13A
AV 054531

1. Frequency Selector (First Two Digits)
2. Frequency Selector (Third Digit)
3. Frequency Selector (Fourth Digit)
4. Function Selector Switch

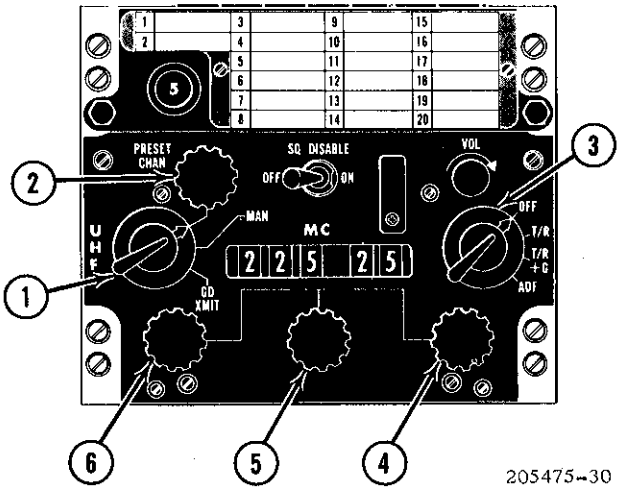
Figure 5-8. UHF control panel C-4677/ARC-51X

5-125. CONTROL PANEL C-6287/ARC-51BX.

5-126. Control Panel C-6287 (see figure 5-9) is marked UHF and is mounted in the pedestal. The control panel is used to control the AN/ARC-51BX Radio Set. The controls located on the panel and their functions are as follows:

CONTROL	FUNCTION
Function select switch	Applies power to radio set and selects type of operation as follows: OFF position - Removes operating power from the set. T/R position - Transmitter and main receiver ON. T/R + G position - Transmitter, main receiver and guard receiver ON. ADF position - Not used.
VOL control	Controls the receiver audio volume.
SQ DISABLE switch	In the ON position squelch is disabled. In the OFF position, the squelch is operative.
Mode selector	Determines the manner in which the frequencies are selected as follows:

CONTROL	FUNCTION
	PRESET CHAN position - permits selection of one of 20 preset channels by means of preset channel control.
	MAN position - Permits frequency selection by means of megacycle controls.
	GD XMIT position - Receiver-transmitter automatically tunes to guard channel frequency.
PRESET CHANnel	Permits selection of any one of 20 preset channels.
Preset channel indicator	Indicates the preset channel selected by the preset channel control.
Ten megacycle control	Selects the first two digits (or ten-megahertz number).
One megacycle control	Sslects the third digit (or 1 megahertz number).
Five-hundredths megahertz control	Selects the fourth and fifth digits (or 0.05 megahertz number).



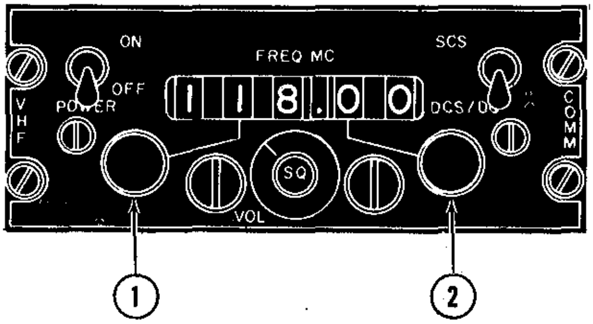
205475-30
AV 054532

1. Mode Selector
2. Preset Channel Control
3. Function Select Switch
4. 0.05 Megacycle Control
5. 1 Megacycle Control
6. 10 Megacycle Control

Figure 5-9. UHF control panel C-6287/ARC-51BX

5-127. CONTROL PANEL 614U-6.

5-128. Control Panel 614U-6 (figure 5-10) is marked VHF COMM. The panel is installed in the pedestal and is used to control the AN/ARC-73 Radio Set. The controls located on the panel and their functions are as follows:



205475-29
AV 054533

1. Megacycle Control Knob
2. Kilocycle Control Knob

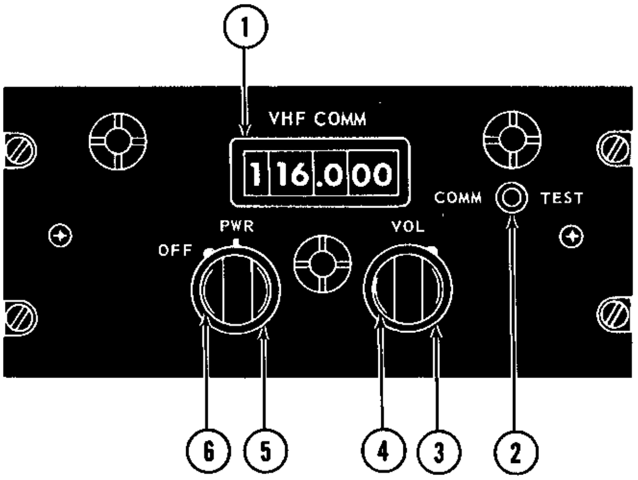
Figure 5-10. VHF control panel 614U-6/ARC-73

CONTROL	FUNCTION
POWER Switch	Turns primary power to the radio set ON or OFF.
VOL control knob	Controls the receiver audio volume.
SQ control knob	Adjusts the squelch threshold level of the receiver output.
Megacycle control knob	Selects receiver and transmitter frequency in 1-mhz steps.
Kilocycle control knob	Selects receiver and transmitter frequency in 50-khz steps.
FREQ MC indicator window	Indicates receiver and transmitter frequency selected.
SCS-DCS/DCD switch	Not used.

5-129. CONTROL PANEL C-7197/ARC-134.

5-130. Control Panel C-7197/ARC-134 (figure 5-11) is marked VHF COMM. The panel is installed in the pedestal and is used to control the AN/ARC-134. Radio Set. The control located on the panel and their functions are as follows:

CONTROL	FUNCTION
OFF-PWR switch	Turns power to the set ON-OFF.
VOL control	Controls the receiver audio volume.
COMM-TEST switch	Turns squelch on or off.
Megahertz control	Selects whole number part of operating frequency.
Kilohertz control	Selects the decimal number part of the operating frequency.



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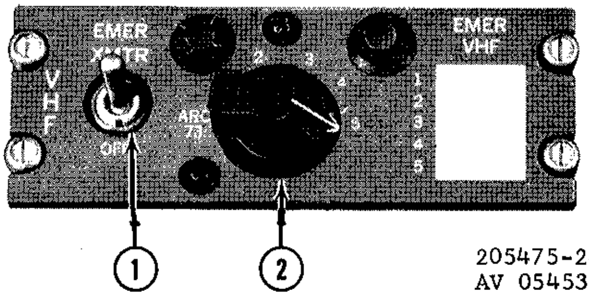
AV 054534

1. Frequency Indicator
2. Communication Test Switch
3. Volume Control
4. Kilocycle Selector
5. Off/Power Switch
6. Megacycle Selector

Figure 5-11. VHF control panel C-7197/ARC-134

5-131. VHF EMERGENCY TRANSMITTER CONTROL PANEL.

5-132. The Emergency Transmitter Control Panel (figure 5-12) is marked VHF and is installed in the pedestal. The controls located on the panel and their functions are as follows:



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AV 054535

1. Power Switch
2. Channel Selector

Figure 5-12. VHF emergency transmitter control panel

CONTROL	FUNCTION
Power switch	Turns power on and off.
Channel selector switch	Selects the desired crystal controlled operating frequency. The first position selects the ARC73 Radio Set. The frequencies selected at positions 2, 3, 4 and 5 are listed on the placard on the panel.

5-133. EMERGENCY COMMUNICATIONS SWITCH PANEL.

5-134. A switch panel (see figure 5-13) is provided for emergency operation. It is installed in the pedestal and permits operation of all remaining equipment should the AN/ARC-44 system fail. The panel contains two switches, their functions are as follows:

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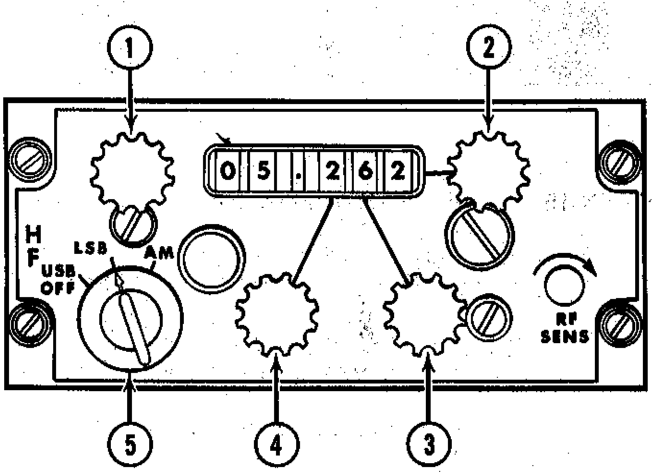
AV 054536

Figure 5-13. Emergency communication switch panel

CONTROL	FUNCTION
Pilot and copilot switches	Up position permits normal operation of UHF, VHF and interphone equipment. Down position permits operation of the standby transmitter.

5-135. HF CONTROL PANEL.

5-136. The HF control panel (see figure 5-14) is marked HF and is installed in the pedestal. It provides remote control of the AN/ARC-102 Radio Set. The operating controls and their functions are as follows:



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AV 054537

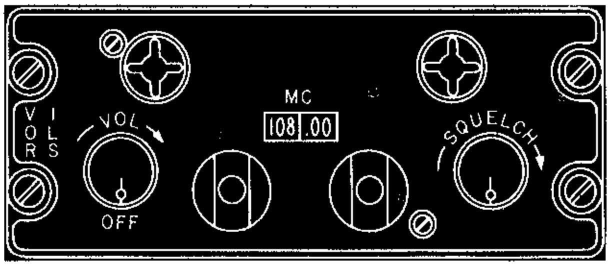
1. Frequency Selector (First Two Digits)
2. Frequency Selector (Fifth Digit)
3. Frequency Selector (Fourth Digit)
4. Frequency Selector (Third Digit)
5. Function Selector Switch

Figure 5-14. HF radio control panel

CONTROL	FUNCTION
Function selector switch (4-position rotary switch)	OFF position - Turns off primary power to the radio set. USB position - Energizes radio set for upper sideband mode of operation. LSB position - Energizes radio set for lower sideband mode of operation. AM position - Energizes radio set for amplitude modulation mode of operation.
Megahertz select knobs	Four knobs used to select the desired frequency as follows: Upper left knob selects the first two digits of the desired frequency. Left center knob selects the third digit. Right center knob selects the fourth digit. Upper right knob selects the last digit of the operating frequency.
RF SENS knob	Controls the receiver audio volume.

5-137. VHF NAVIGATION CONTROL PANEL.

5-138. The VHF navigation control panel (see figure 5-15) is marked VOR ILS and is installed in the pedestal. It provides control of the AN/ARN-30E Navigation (omni) Receiver. The controls located on the panel and their functions are as follows:



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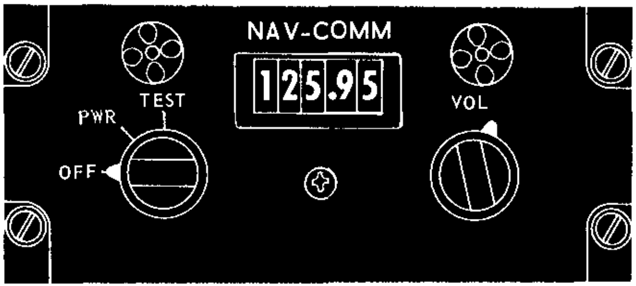
AV 054538

Figure 5-15. VHF navigation receiver control panel

CONTROL	FUNCTION
VOL-OFF switch	Turns primary power to the radio set ON or OFF and controls the receiver audio volume.
SQUELCH control	Controls receiver squelch circuit.
Whole megacycle control	Selects receiver and transmitter frequency in 1 mhz steps.
Fractional megacycle control	Selects receiver and transmitter frequency in 0.1 mhz steps.

5-139. NAVIGATION CONTROL PANEL C-6873/ARN-82.

5-140. The C-6873/ARN-82 Control Panel (see figure 5-16) is marked NAV-COMM and is installed in the pedestal. It provides remote control of the AN/ARN-82 Receiver. The controls located on the panel and their functions are as follows:



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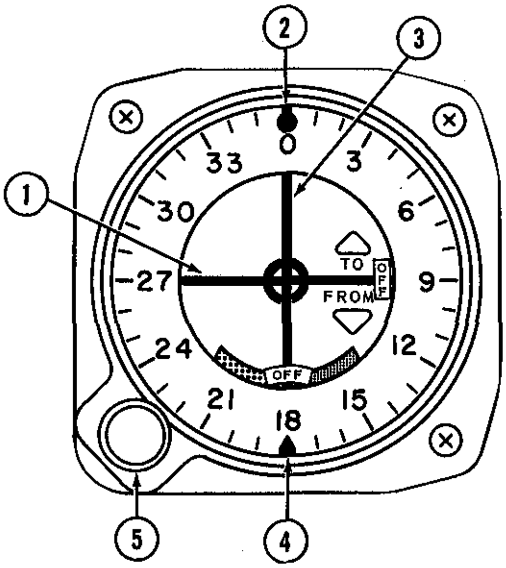
AV 054539

Figure 5-16. Navigation control panel C-6873/ARN-82

CONTROL	FUNCTION
VOL control	Controls receiver audio volume.
Power switch	Turns primary power to the radio set ON or OFF and allows for test of accuracy of Course Deviation Indicator in the TEST position.
Whole megahertz channel selector knob	This is the control knob on the left side. It is used to select the whole megahertz number of the desired frequency.
Fractional megahertz channel selector knob	This is the control knob on the right side. It is used to select the fractional megahertz number of the desired frequency.

5-141. COURSE INDICATOR.

5-142. The course indicator (see figure 5-17) is installed in the instrument panel. The purpose of the indicator is to present a visual indication of the position of the helicopter relative to the station being received. Information presented on the course indicator is received via the VHF navigation receiver and converter, and from the AN/ARC-54 when it is operating in the homing mode.



1. Horizontal Pointer
2. Reciprocal Pointer
3. Vertical Pointer
4. Course Pointer
5. Course Selector Knob

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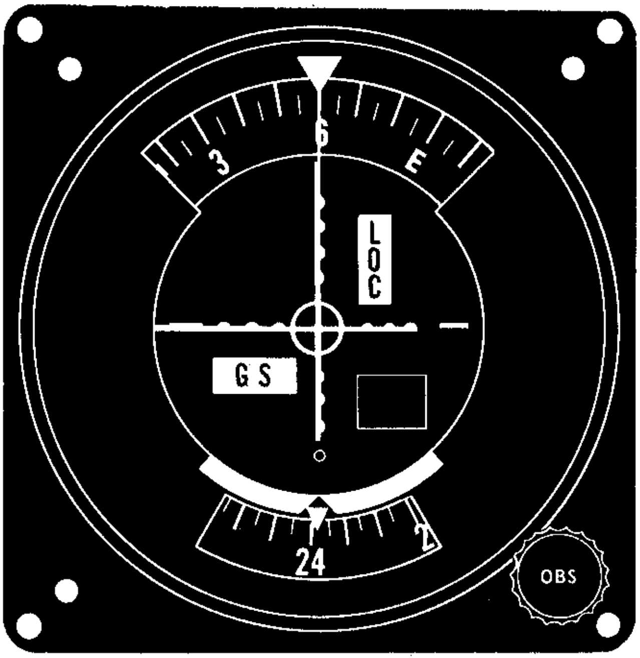
AV 054540

Figure 5-17. Course Indicator

5-143. COURSE INDICATOR - ID-1347/ARN-82.

5-144. The course indicator (see figure 5-18) used with the AN/ARN-82 system is installed in the instrument panel. The purpose of the indicator is to present a visual indication of deviation of the aircraft from a selected source. The data presented on the course indicator is from the ARN-82 or from the AN/ARC-54 FM Receiver when the mode selector switch is in the HOME position.



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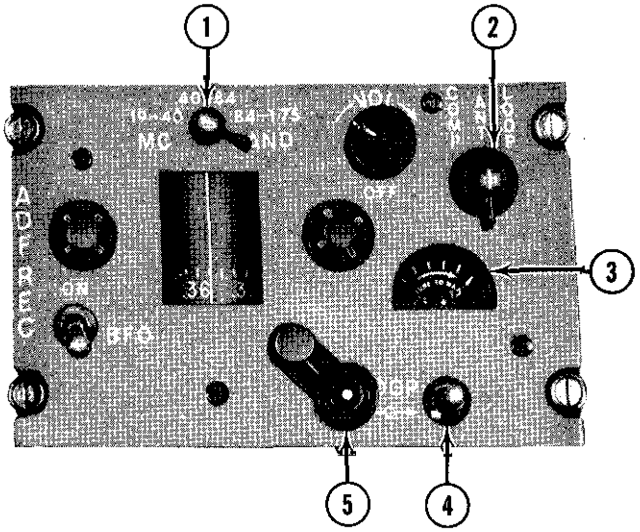
AV 054541

Figure 5-18. Course Indicator ID-1347/ARN-82

5-145. DIRECTION FINDER CONTROL PANEL.

5-146. The direction finder control panel (see figure 5-19) is marked ADF REC. The control panel is located in the pedestal and is used to control the AN/ARN-59 receiver. The controls and indicators located on the panel and their functions are as follows:

CONTROL	FUNCTION
MC BAND switch	Selects the desired frequency band.
VOL-OFF control	Turns direction finder set on or off and adjusts receiver audio volume.
Function switch	COMP position - Receiver operates on combined loop and sense antennas as a radio compass. ANT position - receiver operates with sense antenna. Loop position - receiver operates with loop antenna.
LOOP switch	Positions the loop antenna when the function switch is in either COMP or LOOP position.
Tuning crank	Tunes the receiver to the frequency of the received signal.
Tuning meter	Facilitates accurate tuning of the receiver.
BFO switch	Turns BFO ON or OFF.



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1. Band Switch
2. Function Switch
3. Tuning Meter
4. Loop Switch
5. Tuning Crank

Figure 5-19. ADF control panel

5-147. DIRECTION FINDER CONTROL PANEL - C-6899/ARN-83.

5-148. The C-6899 control panel (see figure 5-20) is marked ADF, and is located in the pedestal. The control panel is used to control the AN/ARN-83 receiver, and to select and control the loop antenna and sense antenna. The controls and indicators located on the panel and their functions are as follows:

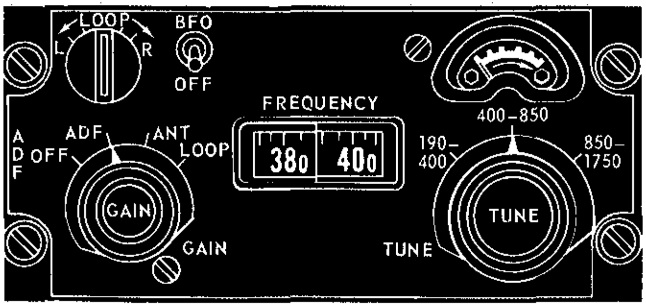

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Figure 5-20. Direction finder control panel - C6899/ARN-83

CONTROL	FUNCTION
Band selector switch	Selects the desired frequency band.
TUNE control	Selects the desired frequency.
Tuning meter	Facilitates accurate tuning of the receiver.
GAIN control	Controls receiver audio volume.

CONTROL	FUNCTION
Mode selector switch	Turns set OFF and selects ADF, ANT and LOOP modes of operation.
LOOP L-R switch	Controls rotation of loop left or right.
BFO switch	Turns BFO, on or off.

5-149. RADIO MAGNETIC INDICATOR (RMI).

5-150. The radio magnetic indicators are installed in the instrument panel (figure 5-21). The copilot's indicator (not shown) is a repeater type instrument similar to pilot's indicator except that it does not have a set heading knob, annunciator, VOR/ADF knob or a heading synchronization knob. The moving type dials on both indicators display the gyro magnetic compass heading. The No. 1 (single bar) pointers display the radio magnetic bearing from the direction finder set. The No. 2 (double bar) pointers display the bearing of the station being received on the VHF navigation receiver. The controls located on the bearing-heading indicators and their functions are as follows:

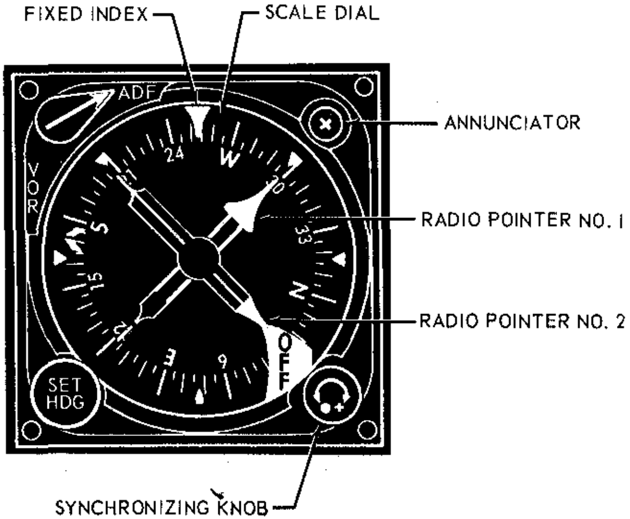

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Figure 5-21. Radio magnetic indicator (RMI)

CONTROL	FUNCTION
Heading synchronization knob	Used to align the heading indicator with the J-2 compass system.
SET HDG Knob	This knob is marked SET HDG and is in the lower left corner of the indicator. Turning the knob drives a selector pointer around the heading dial as a heading reminder.
VOR-ADF knob	This switch is to be used when two VOR and one ADF units are installed. This installation has one VOR and one ADF unit and the VOR-ADF switch shall be set to ADF at all times. Setting switch to VOR will result in no display on pointer No. 1.

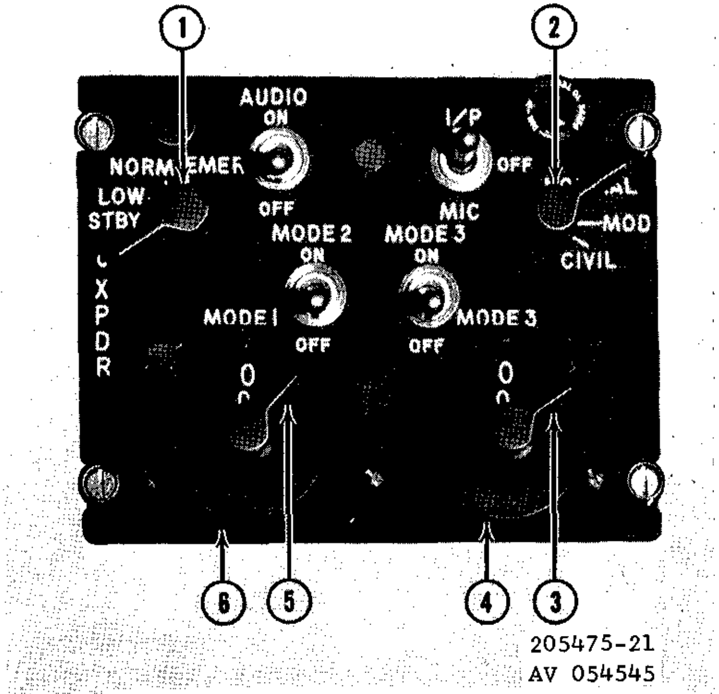
5-151. MARKER BEACON CONTROLS.

5-152. The marker beacon receiver controls (see figure 2-5) are located on the lower right section of the instrument panel. The control and indicators and their functions are as follows:

CONTROL OR INDICATOR	FUNCTION
VOLUME OFF-INCR control	Turns set ON or OFF and adjusts volume.
SENSING switch	HIGH position - Increases sensitivity.
Marker beacon indicator light	Flashes on and off when marker beacon receiver is operating and aircraft is passing over the ground transmitter.

5-153. TRANSPONDER CONTROL PANEL - AN/APX-44.

5-154. The control panel (see figure 5-22) is installed on the pedestal and provides remote control of the AN/APX-44 transponder set. The controls and indicators on the panel and their functions are as follows:



1. Master Control
2. Function Control
3. Second Digit Selector
4. First Digit Selector
5. Second Digit Selector
6. First Digit Selector

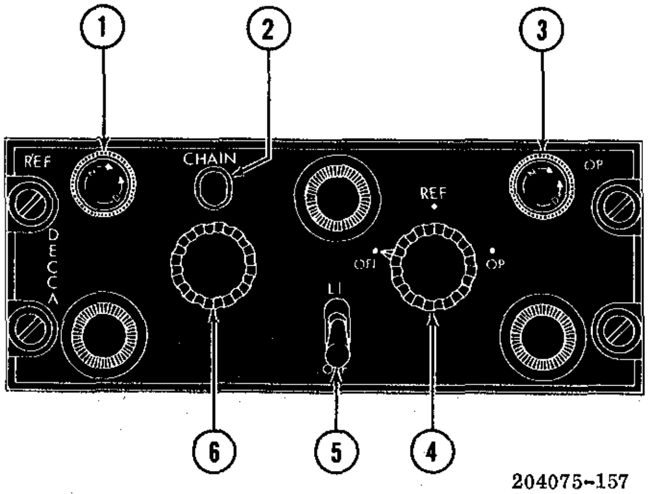
Figure 5-22. Transponder control panel AN/APX-44

CONTROL OR INDICATOR	FUNCTION
Master control	OFF position - Removes power from the equipment. STBY position - Places the set in standby or warmup condition. LOW position - Selects low receiver sensitivity. NORM position - Selects normal receiver sensitivity. EMER position - Places transmitter in condition for emergency automatic operation.
Function control	Selects operational mode as follows: NORMAL position - Permits transponder set to replay with normal pulse codes, representing modes 1, 2, and 3. MOD position - Permits transponder set to replay with SIF pulse codes, representing modes 1, 2, and 3. CIVIL position - Permits transponder set to reply with civil pulse codes, representing modes 1, 2, and 3.
I/P switch	Enables I/P reply operation as follows: MIC position - Connects I/P energizing circuits to aircraft microphone key circuits and permits aural I/P for 30 seconds when speaking into the microphone. OFF position - Disconnects microphone keying and I/P initiating circuits. I/P position - when momentarily actuated initiates I/P operation for 30 seconds.
AUDIO switch	ON position - Permits monitoring transmitted reply pulses.
MODE 2 switch	Permits transponder set to provide mode 2 replies for mode 2 interrogations.
MODE 3 switch	Permits transponder set to provide mode 3 replies for mode 3 interrogations.
MODE 1 code control	Selects and indicates the two-digit, mode 1 code number. First digit selector selects first digit of mode 1 code number. Second digit selector selects second digit of mode 1 code number.
MODE 3 code control	Selects and indicates the two-digit, mode 3, code number. First digit selector selects the first digit of the mode 3 code number. Second digit selector selects second digit of mode 3 code number.
Emergency barrier	Prevents accidental placement of the master control to the EMER position.

CONTROL OR INDICATOR	FUNCTION
Pilot light	Lights when power is applied to transponder.
Lens shutter	Controls brilliance of pilot light.
Test button	Permits test of pilot light.
Emergency barrier	Prevents accidental placement of master control switch to EMER position.

5-155. RECEIVER CONTROL PANEL AN/ASN-72.

5-156. The control panel (figure 5-23) is installed on the pedestal and provides remote control of the AN/ASN-72 receiver. The controls and indicators on the panel and their functions are as follows:



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1. REF Lamp (Amber)
2. CHAIN Indicator
3. OP Lamp (Green)
4. OFF-REF-OP Switch
5. LI-OFF Switch
6. CHAIN Selector Switch

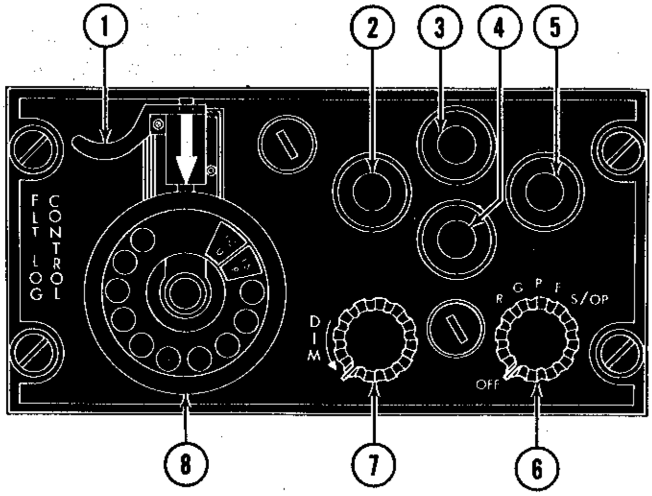
Figure 5-23. Receiver control panel AN/ASN-72

CONTROL OR INDICATOR	FUNCTION
Chain selector switch	Selects one of nine ground chain frequencies. The selected ground chain number is indicated in the small window above the switch knob.
OFF-REF-OP switch	Turns power on to receiver and selects two modes of operation. OFF position - Turns receiver off. REF position - Prepares receiver for reference checking. OP position - Sets receiver to normal operating mode.
LI-OFF switch	Applies power to lane identification indicator on each of the three decometers.

CONTROL OR INDICATOR	FUNCTION
	LI position - Allows the lane identification indicator on the proper decometer to light, during the lane identification periods.
	OFF position - Removes power from the lane identification indicators on the decometers.
REF lamp (amber)	Lights only when the OFF-REF-OP switch is set at REF position to indicate that receiver is in reference checking mode.
OP lamp (green)	Lights when the OFF-REF-OP switch is set at either REF or OP positions to indicate that receiver is turned on.

5-157. FLIGHT LOG CONTROL PANEL AN/ASN-72

5-158. The control panel (figure 5-24) is installed on the pedestal and provides remote control of the AN/ASN-72 computer and flight log display. The controls and indicators on the panel and their functions are as follows:



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1. Turret Index Lever
2. W Push-Button Switch
3. N Push-Button Switch
4. S Push-Button Switch
5. E Push-Button Switch
6. Facility Switch
7. Dim Control
8. Turret Switch

Figure 5-24. Flight log control panel - AN/ASN-72

CONTROL OR INDICATOR	FUNCTION
Turret switch (with keys)	Programs the computer for proper display on the chart selected. Key faces appear as markings on the turret switch and depend on which keys are inserted in the turret. Each key is coded to a particular chart on the roll in use.
Turret switch lamp	Illuminates key markings on the turret switch. The lamp lights when the aircraft master switch applies power to the navigation set.

CONTROL OR INDICATOR	FUNCTION
Turret index lever	Locks turret switch in selected position. Lever must be depressed to rotate the switch. Arrow indicates the key selected.
DIM control	Turns on, and controls the intensity of the backlighting on the flight log display.
Facility switch	Turns power on to the computer and flight log display and prepares the two units for adjusting the chart on the flight log. OFF position - Disconnects power from the computer and flight log display. R position - Allows use of N and S pushbuttons to move flight log pen exactly one lane in the red pattern. G position - Allows use of N and S pushbuttons to move flight log pen exactly one lane in the green pattern. P position - Allows use of N and S pushbuttons to move flight log pen exactly one lane in the purple pattern. **Note** When the N and S pushbuttons are used to move the pen one lane, the pushbutton must be depressed until the pen has traversed more than half a lane. When the pushbutton is released, the pen will continue to move until it has taken up a position exactly one lane away from its original position. If the pushbutton is released before half a lane is traversed, the pen will move back to its original position. F position - Allows use of the N and S pushbuttons to move the chart down and up, respectively, at a fast rate. The E and W pushbuttons will produce a slow movement of the pen to the right and left, respectively. S/OP position - Allows normal operation of the computer and flight log. Pushbuttons remain operative for slow movement of chart and pen.
N, S, E, W pushbuttons	Control the movement of the chart and pen on the flight log as follows: **Caution** Do not depress the N and S pushbuttons at the same time. N pushbutton - Produces a downward movement of the chart (corresponding to an upward or N movement of the pen). When the facility switch is set to its R, G, or P position, the N pushbutton will produce a pen movement of one lane in the selected color pattern, when the pushbutton is held, until more than one-half a lane is traversed and the pushbutton is released.

CONTROL OR INDICATOR	FUNCTION
	S pushbutton - Produces an upward movement of the chart (corresponding to a dwonward or S movement of the pen). When the facility switch is set to its R, G, or P position, the S pushbutton will produce a pen movement of one lane in the selected color pattern, when the pushbutton is held, until more than one-half a lane is traversed and the pushbutton is released.
	E pushbutton - Moves the flight log pen to the right.
	W pushbutton - Moves the flight log pen to the left.

5-159. TRANSPONDER CONTROL PANEL.

5-160. This control panel is located in the pedestal. It provides remote control of the APX-72 Transponder Set (see figure 5-25). Mode 2 code select switch is on the front panel of the receiver-transmitter radio. The controls and indicators on the panel and their functions are as follows:

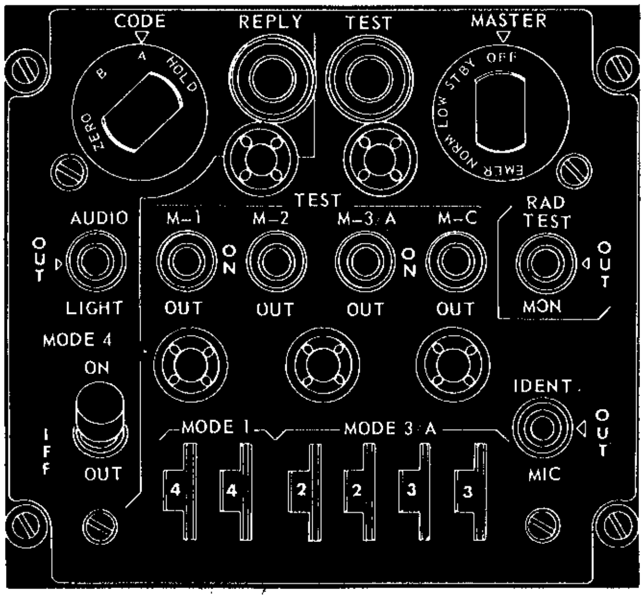

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Figure 5-25. APX-72 transponder control panel

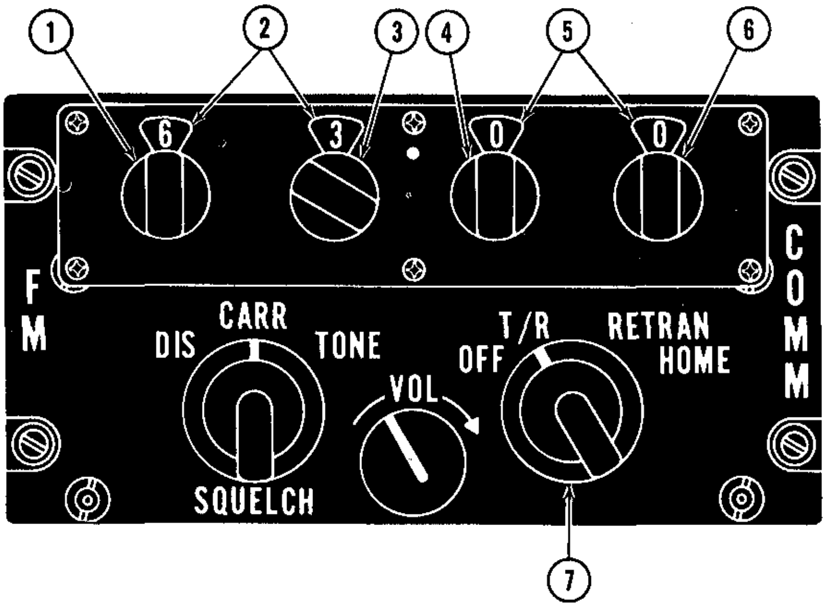
CONTROL	POSITION	FUNCTION
MASTER control	OFF	Turns set off.
	STBD	Places in warnup (standby) condition.
	LOW	Applies power to operate set, but at reduced receiver sensitivity.
	NORM	Applies power to operate set at normal receiver sensitivity.
	EMER	Transmits emergency reply signals to mode 1, 2, or 3/A interrogations regardless of mode control settings.

CONTROL	POSITION	FUNCTION
IDENT-MIC switch	IDENT	When momentarily actuated (switch has spring-loaded return) initiates identification of position reply for approximately 25 seconds.
	OUT	Prevent triggering of identification of position reply.
	MIC	Not used.
M-1 switch	ON	Enables the set to reply to mode 1 interrogations.
	OUT	Disables the reply to mode 1 interrogations.
	TEST	Enables the TS-1843/APX to locally interrogate the set in mode 1.
M-2 switch	ON	Enables the set to reply to mode 2 interrogations.
	OUT	Disables the reply to mode 2 interrogations.
	TEST	Enables the TS-1843/APX to locally interrogate the set in mode 2.
M-3/A switch	ON	Enables the set to reply to mode 3/A interrogations.
	OUT	Disables the reply to mode 3/A interrogations.
	TEST	Enables the TS-1843/APX to locally interrogate the set in mode 3/A.
MC switch	ON	Non-functional
	OUT	Non-functional
	TEST	Non-functional
MODE 1 code select switches		Selects and indicates the mode 1 two-digit reply code number.
MODE 3/A code select switches		Selects and indicates the mode 3/A four-digit reply code number.
TEST indicator		Lights when the set responds properly to a mode 1, 2, 3/A or C test, or when depressed.
MODE 4 switch	ON	Enables the set to reply to mode 4 interrogations.
	OUT	Disables the reply to mode 4 interrogations.
CODE control		Functions of this switch are operationally classified.
AUDIO-LIGHT switch	AUDIO	Enables aural and REPLY light monitoring of valid mode 4 interrogations and replies.
	LIGHT	Enables REPLY light only monitoring of valid mode 4 interrogations and replies.
	OUT	Disables aural and REPLY light monitoring of valid mode 4 interrogations and replies.
REPLY indicator		Lights when valid mode 4 replies are present, or when depressed.

CONTROL	POSITION	FUNCTION
RAD TEST-MON switch	RAD TEST	Enables set to reply to TEST mode interrogations from an AN/APM-123A(V), or equivalent. Other functions of this switch position are classified.
	MON	Enables the monitor circuits of the TS-1843/APX.
	OUT	Disables the RAD TEST and MON features of the control panel.

5-161. CONTROL PANEL C-7088/ARC-131.

5-162. Control panel C-7088/ARC-131 (figure 5-26) is separately housed and contains all the controls for the radio set. The control panel is mounted in the pedestal. All electrical connections are made through a connector at the rear of the control panel. The controls located on the panel and their functions are as follows:



1. Tens Megacycle Digit Frequency Selector
2. Frequency Indicators
3. Units Megacycle Digit Frequency Selector
4. Tenths Megacycle Digit Frequency Selector
5. Frequency Indicators
6. Hundredths Megacycle Digit Frequency Selector
7. Mode Control Switch

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Figure 5-26. AN/ARC-131 radio set control panel

CONTROL	FUNCTION
Mode control switch (four-position switch)	Applies power to the radio set and selects the mode of operation.

Switch position	Operating mode
OFF	Turns off primary power.
T/R (transmit/ receive)	Applies power. Radio set operates in normal communication mode (reception). (Aircraft transmit switch must be depressed to transmit.)

CONTROL	FUNCTION	
	RETRAN (retransmit)	Applies power. Radio set operates as a two-way relay station. (Two radio sets are required.)
	HOME	Applies power. Radio set operates as a homing facility. (Requires a homing antenna and indicator.)
VOL control	Adjusts the audio output level of the radio set.	
SQUELCH switch (three-position rotary switch)	Selects the desired squelch mode as follows:	
	Switch position	Operating mode
	DIS (disable)	Squelch circuits are disabled.
	CARR (carrier)	Squelch circuits operate normally in presence of any carrier.
	TONE	Squelch opens (unsquelches) only on selected signals (signals containing a 150-cps tone modulation).
Tens megacycle frequency selector	Selects the tens megacycle digit of the operating frequency.	
Units megacycle frequency selector	Selects the units megacycle digit of the operating frequency.	
Tenths megacycle frequency selector	Selects the tenths megacycle digit of the operating frequency.	
Hundredths megacycle frequency selector	Selects the hundredths megacycle digit of the operating frequency	
Frequency indicator	Displays the operating freuency of the radio set.	

Section IV - Operating Procedures

5-163. AN/ARC-44 OPERATION.

5-164. The ARC-44 may be operated in the following modes of operation: interphone system, FM liaison set, and FM homing. The different modes of operation and the starting and stopping procedures are presented in the following paragraphs.

5-165. PRELIMINARY CHECK.

5-166. Set the controls and switches on the SB/329-AR Signal Distribution Panel FM Control Panel and FM Switch Panel as follows:

a. FM power switch - OFF.

b. FM home switch - DOWN.

c. TRANS selector switch - INT.

d. REM-LOCAL switch - LOCAL.

e. Frequency - Select.

5-167. STARTING PROCEDURE.

5-168. With controls set as outlined in the preliminary check, perform the starting procedure as follows:

a. Battery switch - ON (OFF for APU).

b. INT and FM circuit breakers - IN.

c. ICS switch - UP (Allow three minute warm up).

5-169. INTERPHONE OPERATION.

a. Microphone switch - PRESS.

b. Speak into the microphone - Adjust interphone volume.

5-170. FM RECEIVER-TRANSMITTER OPERATION.

5-171. Refer to paragraph 5-167 for starting procedure and perform the following steps:

a. RECEIVERS NO- 1 switch - UP.

b. FM ON-OFF power switch - ON.

Note

Cycling may take place in the receiver-transmitter. This will be indicated by a 400-cycle-per-second signal heard in the headset.

c. FM VOL control - As desired.

d. TRANS selector switch - NO. 1 POSITION

e. Microphone switch - Press.

5-172. FM HOMING OPERATION.

5-173. To operate the AN/ARC-44 for FM homing perform the following step:

FM HOME switch - UP.

5-174. SHUT-DOWN PROCEDURE.

5-175. To turn off the AN/ARC-44 equipment proceed as follows:

a. FM HOME switch - DOWN.

b. FM POWER switch - OFF.

c. ICS switch - DOWN.

Note

The operation of the electronic equipment in this helicopter is dependent on the operation of the interphone system. Do not turn the interphone system off until the end of the flight day.

5-176. C-1611A/AIC OPERATION.

5-177. The procedure for operating the C-1611A/AIC Signal Distribution Panel is presented in the following steps:

a. Battery switch - ON (OFF for APU).

b. INT circuit breakers - IN.

c. Transmit-interphone selector switch - As desired.

d. Receiver switches - As desired.

e. Microphone switches - As desired.

f. VOL control - As desired.

5-178. AN/ARC-54 OPERATION.

5-179. The operating procedures for voice transmission and reception, the homing operation and stopping procedure for the AN/ARC-54 FM Liaison Set are presented in the following steps:

a. Battery switch - ON (OFF for APU).

b. FM and INT circuit breakers - IN.

c. FM Mode selector switch - PTT (Allow three minute warm up).

d. Frequency - Select.

Note

A channel changing tone should be heard in the headset while radio set is tuning. When the tone stops, the radio set is tuned.

e. FM VOL control - Adjust

f. FM SQUELCH control - CARR (or as desired).

g. Receiver switch No. 1 - UP.

h. TRANS selector switch - No. 1.

i. Microphone switch - Press.

5-180. HOMING OPERATION.

5-181. The procedure for operating the AN/ARC-54 Radio Set in the homing mode is presented as follows:

FM mode selector switch - HOME.

Note

Voice reception is possible in HOME position.

5-182. STOPPING PROCEDURE - AN/ARC-54.

FM mode selector switch - OFF.

5-183. AN/ARC-55B OPERATION.

5-184. The operating procedure for operation of the ARC-55B UHF Command Set is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. UHF circuit breaker - IN.

c. UHF function selector switch - T/R G REC AS REQUIRED. Allow five minute warmup.

d. Frequency - Select.

e. Receiver switch No. 2 - UP.

f. UHF VOL-SENS controls - Adjust.

g. Transmit-Interphone selector switch - No. 2 position.

h. Microphone switch - Press.

5-185. OPERATION ON GUARD FREQUENCY.

a. UHF function selector switch - T/R G REC.

b. Guard frequency - Select.

c. Microphone switch - Press.

5-186. STOPPING PROCEDURE - AN/ARC-55B.

UHF function selector switch - OFF.

5-187. AN/ARC-51X OPERATION.

5-188. The operating procedure for the ARC-51X UHF Command Set is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. UHF and INT circuit breakers - IN.

c. UHF function selector switch - T/R (T/R+G as desired). Allow five minute warmup.

d. Frequency - Select.

e. Receiver switch No. 2 - UP.

f. SENS and VOL controls - Adjust.

g. Transmit-interphone selector switch - No. 2 position.

h. Microphone switch - Press.

5-189. AN/ARC-51X FREQUENCY OPERATION.

5-190. The operation of the ARC-51X on the guard frequency is the same as the procedure outlined in paragraph 5-187, except, the function select switch must be in the T/R + G position, and the megacycle controls must be tuned to the assigned guard frequency.

5-191. STOPPING PROCEDURE.

UHF function selector switch - OFF.

5-192. AN/ARC-51BX OPERATION.

5-193. The operating procedure for the ARC-51BX UHF command set is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. UHF and INT circuit breakers - IN.

c. UHF function select switch - T/R (T/R G as desired).

d. UHF mode selector switch - PRESET CHAN. Allow five minute warmup.

e. RECEIVERS switch No. 2 - ON.

f. Channel - Select.

Note

An 800-cps audio tone should be heard during channel changing cycle.

g. SQ DISABLE switch - ON.

h. Volume - Adjust.

i. Transmit-interphone selector switch - No. 2 position.

j. Microphone switch - Press.

5-194. AN/ARC-51BX GUARD FREQUENCY OPERATION.

5-195. Operation of the ARC-51BX guard frequency may be accomplished by any of the following methods:

a. Preset Guard.

(1) UHF function select switch - T/R G.

(2) UHF mode selector - DF XMIT.

(3) Microphone switch - Press.

b. Preset.

(1) UHF mode selector - Preset.

(2) UHF function select switch. T/R (T/R G).

(3) Guard channel - Select.

(4) Microphone switch - Press.

c. Manual.

(1) UHF mode selector - Manual.

(2) UHF function select switch - T/R (T/R G).

(3) Guard frequency - Select.

(4) Microphone switch - Press.

5-196. STOPPING PROCEDURE.

UHF function select switch - OFF.

5-197. AN/ARC-73 OPERATION.

5-198. The operating procedure for the VHF command set is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. VHF (ARC-73) and INT circuit breakers - IN.

c. VHF POWER switch - ON.

d. Frequency - Select.

e. RECEIVERS switch No. 3 - UP.

f. VHF SQ and VOL controls - Adjust.

g. Transmit-interphone selector switch - No. 3 position.

h. Microphone switch - Press.

5-199. AN/ARC-73 GUARD FREQUENCY OPERATION.

Emergency frequency - Select.

5-200. AN/ARC-73 STOPPING PROCEDURE.

VHF POWER switch - OFF.

5-201. AN/ARC-134 OPERATION.

5-202. The operating procedure for the ARC-134 VHF Command Set is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. VHF and INT circuit breakers - IN.

c. OFF/PWR switch - PWR. Allow set to warm up.

d. Frequency - Select.

e. RECEIVERS switch No. 3 - UP.

f. Volume - Adjust. If signal is not audible with VOL control fully clockwise, press COMM TEST switch to unsquelch circuits.

g. Transmit-interphone selector switch - No. 3 position.

h. Microphone switch - Press.

5-203. AN/ARC-134 GUARD FREQUENCY OPERATION.

Emergency frequency - Select.

5-204. AN/ARC-134 STOPPING PROCEDURE.

OFF/PWR switch - OFF.

5-205. EMERGENCY TRANSMITTER OPERATION.

5-206. The operating procedure for the T366/ARC Emergency Transmitter is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. VHF XMTR T-366 circuit breaker - IN.

c. Transmit-interphone selector switch - No. 3 position.

d. Toggle switch(s) (pilot and copilot) on EMER COMM switch panel - STBY VHF.

e. Emergency VHF power switch - ON.

f. Frequency - Select.

g. Microphone switch - Press.

5-207. STOPPING PROCEDURE.

Power switch - OFF.

5-208. HF RADIO SET OPERATION.

5-209. The operating procedure for the AN/ARC-102 HF Radio Set is presented in the following steps:

Warning

> When ground testing ARC-102 equipment, be sure that personnel are clear of antenna. Serious burns can result if body contact is made with the antenna during ground testing.

a. Check that master helicopter power is on.

b. Check that ARC-102 circuit breakers are in.

c. Position the function selector switch to the desired mode of operation.

d. Rotate the frequency control knobs to select the desired frequency.

Note

> If the function selector is moved from the OFF position to an operating mode and the desired operating frequency is already set up on the control panel, rotate the 10-kilohertz knob one digit off frequency and then back to the operating frequency. This will allow the system to return to the frequency.

e. To monitor the HF receiver position RECEIVERS switch marked HF to up position.

f. Adjust RF SENS control and volume controls on HF control panel and signal distribution panel to a comfortable level.

g. To transmit set the transmit-interphone selector switch on signal distribution panel to HF position (refer to transmitter selector decal).

h. Depress foot switch or cyclic stick trigger switch and speak into the microphone.

i. To turn the HF radio set off rotate the function selector switch to OFF position.

5-210. HF RADIO EMERGENCY PROCEDURES.

5-211. The HF radio has two built in protective devices that could cause the set to stop operating. The condition and corrective steps are as follows:

a. A protective circuit is designed to turn the receiver-transmitter off, when a short exists in the output circuit. To restore the receiver-transmitter to operation, move the function selector to OFF position and then back to the desired operating mode.

b. When the associated antenna coupler is required to complete several consecutive tuning cycles it may become overheated. In this event a thermal relay in the coupler unit is designed to turn off the receiver-transmitter. If the receiver-transmitter stops operating after a series of tuning cycles, position the function selector switch to OFF position, allow the thermal relay to cool for two minutes, and return the function selector to the desired operating mode.

c. If the above procedures does not return the HF radio set to normal operation, place the function selector in the OFF position and report the failure to the maintenance personnel.

5-212. VHF NAVIGATION RECEIVER OPERATION.

5-213. The different modes of operation for the AN/ARN-30E VHF navigation receiver are presented in the following paragraphs.

5-214. VISUAL OMNI RANGE INSTRUCTIONS.

5-215. To operate the VHF receiver as a Visual Omni Range (VOR) receiver perform the following steps:

a. Rotate VOL-OFF control clockwise until a click is heard, indicating that the set is energized. Allow five minutes for set to warm up.

b. Rotate SQUELCH control knob full counterclockwise.

c. Turn selector knob to select the desired frequency on the MC dials.

d. Ensure that the warning flag for the vertical pointer is out of sight.

Warning

> The warning flag for the vertical pointer is an indication of signal strength and reliability. Under no circumstances should navigation be attempted if the flag is visible or if the TO-FROM indicator remains blank.

e. Check to see that the TO-FROM indicator is operating properly.

f. Adjust SQUELCH control knob as desired.

5-216. NAVIGATION RECEIVER - AN/ARN-82 - OPERATION.

5-217. The different modes of operation for the AN/ARN-82 Receiver are outlined in the following paragraphs.

5-218. VOR INSTRUCTION - ARN-82.

5-219. To operate the ARN-82 Receiver as a Visual omni Range (VOR) receiver perform the following steps:

a. Battery switch - ON (OFF for APU).

b. ARN-82 and INT circuit breakers - IN.

c. Power switch - PWR.

d. Frequency - Select.

e. NAV switch on C-1611/AIC panel - UP.

f. Volume - Adjust.

5-220. AN/ARN-82 STOPPING PROCEDURE.

Power switch - OFF.

5-221. DIRECTION FINDER SET OPERATION.

5-222. The operating procedure for the AN/ARN-59 Direction Finder Set is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. ADF and INT circuit breakers - IN.

c. ADF VOL control - ON.

d. Receiver switch (NAV) - ON.

e. Function switch - ANT.

f. Frequency - Select.

g. Function switch - COMP.

5-223. MANUAL OPERATION OF DIRECTION FINDER SET, AN/ARN-59.

5-224. To operate the direction finder set manually, perform the following steps:

a. Function switch - LOOP.

b. BFO switch - ON.

c. LOOP switch - Press right or left and rotate loop for null.

5-225. STOPPING PROCEDURE AN/ARN-59.

Vol control - OFF.

5-226. DIRECTION FINDER SET OPERATION - AN/ARN-83.

5-227. The operating procedure for the AN/ARN-83 Direction Finder Set is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. ADF and INT circuit breakers - IN.

c. Receiver switch (NAV) - ON.

d. Mode selector switch - ANT.

e. Frequency - Select.

f. Volume - Adjust.

g. Mode selector switch - ADF.

5-228. MANUAL OPERATION OF DIRECTION FINDER SET - AN/ARN-83.

5-229. To operate the direction finder set manually, perform the following steps:

a. Mode selector switch - LOOP.

b. BFO switch - ON.

c. LOOP L/R switch - Press right or left and rotate loop for null.

5-230. STOPPING PROCEDURE - AN/ARN-83.

Mode selector switch - OFF.

5-231. MARKER BEACON RECEIVER OPERATION.

5-232. The marker beacon on-off volume control switch and high-low sensing switch are located on the lower right corner of the instrument panel. The operating procedure is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. MARKER BEACON and INT circuit breakers-IN.

c. VOLUME ON/OFF control - ON.

d. Receiver switch (NAV) (MB switch if SB/329AR panel is used) - ON.

e. Volume - Adjust.

f. HIGH/LOW SENSING switch - As desired.

5-233. STOPPING PROCEDURE.

VOLUME ON/OFF control - OFF.

5-234. TRANSPONDER SET OPERATION.

5-235. The preliminary starting procedure and different modes of operation for the AN/APX-44 Transponder Set are given in the following paragraphs:

a. Preliminary Starting Procedure. Set the controls on the control panel as follows:

(1) Master control - OFF.
(2) AUDIO switch - OFF.
(3) I/P switch - OFF.
(4) MODE 2 switch - OFF.
(5) MODE 3 switch - OFF.
(6) MODE 1 control - To read 00.
(7) MODE 3 control - To read 00.
(8) Function control - NORMAL.

a. Starting Procedure.

(1) Battery switch - ON (OFF for APU).

(2) IFF circuit breaker - IN.

(3) Master control - STDBY. The pilot light should light. Allow three to five minutes for warmup.

Note

If the pilot light does not light, press the test button. If the light does not light when the test button is pressed, either the light is burned out or operating power is not reaching the transponder set.

(4) Pilot light - Adjust brilliance.

5-236. NORMAL OPERATION.

5-237. The normal operating procedure is outlined in the following steps:

a. For Mode 1 operation set the controls as follows:

(1) Function control - NORMAL.
(2) Master control - LOW or NORM as required.
(3) MODE 2 switch - OFF.
(4) MODE 3 switch - OFF.
(5) I/P switch - Refer to paragraph 5-242.
(6) AUDIO switch - Refer to paragraph 5-244.

b. Combined modes 1 and 2. Set the controls as follows:

(1) Function control - NORMAL.
(2) Master control - LOW or NORM as required.
(3) MODE 2 switch - ON.
(4) MODE 3 switch - OFF.
(5) I/P switch - Refer to paragraph 5-242.
(6) AUDIO switch - Refer to paragraph 5-244.

c. Combined modes 1 and 3. Set the controls as follows:

(1) Function control - NORMAL.
(2) Master control - LOW or NORM as required.
(3) MODE 3 switch - ON.
(4) MODE 2 switch - OFF.
(5) I/P switch - Refer to paragraph 5-242.
(6) AUDIO switch - Refer to paragraph 5-244.

d. Combined modes 1, 2 and 3. Set the controls as follows:

(1) Function control - NORMAL.
(2) MODE 2 switch - ON.
(3) MODE 3 switch - ON.
(4) Master control - LOW or NORM as required.
(5) I/P switch - Refer to paragraph 5-242.
(6) AUDIO switch - Refer to paragraph 5-244.

5-238. MODIFIED OPERATION.

5-239. The precedure for operating with the function selector at MOD position is outlined in the following steps:

a. Mode 1. Set the controls as follows:

(1) Function control - MOD.
(2) MODE 1 code control - Assigned two digit code number.
(3) Master control - LOW or NORM as required.
(4) MODE 2 switch - OFF.
(5) MODE 3 switch - OFF.
(6) I/P switch - Refer to paragraph 5-242.
(7) AUDIO switch - Refer to paragraph 5-244.

b. Combines Modes 1 and 2. Set the controls as follows:

(1) Function control - MOD.
(2) MODE 1 code control - Assigned two digit code number.
(3) MODE 2 switch - ON.
(4) Master control - LOW or NORM as required.
(5) MODE 3 switch - OFF.
(6) I/P switch - Refer to paragraph 5-242.
(7) AUDIO switch - Refer to paragraph 5-244.

c. Combined Modes 1 and 3. Set the controls as follows:

(1) Function control - MOD.
(2) MODE 2 switch - OFF.
(3) MODE 3 switch - ON.
(4) MODE 1 code control - Assigned two digit code number.
(5) MODE 3 code control - Assigned two digit code number.
(6) Master control - LOW or NORM as required.
(7) I/P switch - Refer to paragraph 5-242.
(8) AUDIO switch - Refer to paragraph 5-244.

d. Combined modes 1, 2 and 3. Set the controls as follows:

(1) Function control - MOD.
(2) MODE 1 code control - Assigned two digit code number.
(3) MODE 2 switch - ON.
(4) MODE 3 switch - ON.
(5) MODE 3 code control - Assigned two digit code number.
(6) Master control - LOW or NORM as required.
(7) I/P switch - Refer to paragraph 5-242.
(8) AUDIO switch - Refer to paragraph 5-244.

5-240. CIVIL OPERATION.

5-241. The procedure for operating with the function selector at civil position is outlined in the following steps:

a. Combined Civil and Military Mode 1. Set the controls as follows:

(1) Function control - CIVIL.

(2) MODE 3 code control - Assigned two digit code number.

(3) MODE 3 switch - ON.

(4) MODE 2 switch - OFF.

(5) MODE 1 code control - Assigned two digit code number.

(6) Master control - LOW or NORM as required.

(7) I/P switch - Refer to paragraph 5-242.

(8) AUDIO switch - Refer to paragraph 5-244.

b. Combined Civil and Military Mode 1 and 2. Set the controls as follows:

(1) Function control - CIVIL.

(2) MODE 3 code control - Assigned two digit code number.

(3) MODE 3 switch - ON.

(4) MODE 2 switch - ON.

(5) MODE 1 code control - Assigned two digit number.

(6) Master control - LOW or NORM as required.

(7) I/P switch - Refer to paragraph 5-242.

(8) AUDIO switch - Refer to paragraph 5-244.

5-242. I/P (POSITION IDENTIFICATION) OPERATION.

5-243. The pilot may identify the position of his helicopter without being interrogated by a ground based IFF system. This type of operation is initiated by the pilot upon receipt of request via communications set, or upon arrival at pre-established check points. The transponder set will transmit position identifying signals when either of the following procedures are used:

a. Procedure No. 1. Perform the following steps:

(1) To transmit position-identifying signals, momentarily hold the I/P switch in the I/P position.

(2) On completion, release the I/P switch.

b. Procedure No. 2. Perform the following steps:

(1) Place the I/P switch in MIC position.

(2) Press the switch on the microphone; the transponder set is now transmitting position identifying signals.

(3) On completion of identification of position, release the microphone switch button.

(4) Place the I/P switch in the OFF position.

Note

The I/P switch may remain in the MIC position for the duration of a flight. This permits position-identifying signals to be transmitted each time the radio-telephone equipment is operated.

5-244. MONITORING.

5-245. Monitor the reply pulses transmitted by the transponder set as follows:

a. Place the AUDIO switch in the ON position. Transmitted reply pulses, following interrogation, will be audible in the pilot's headset.

b. Immediately following completion of the monitoring procedure, place the AUDIO switch in the OFF position.

5-246. EMERGENCY OPERATION.

5-247. In the event of an emergency or distress condition, the transponder set may be used to transmit specially coded emergency signals. These emergency signals are automatically set up and will be transmitted as long as the master control of the transponder set remains in the EMER position. Even after the transponder set is interrogated by a ground-based IFF system, these signals will continue to be transmitted automatically, regardless of any mode and function combination previously set up, and will provide indications to the ground-based IFF system that the helicopter is in an emergency or distress condition. For emergency operation, set the controls as follows:

a. Depress and hold in the emergency barrier button.

b. Turn the master control to the EMER position.

c. Release the barrier button.

d. Permit the master control to remain in the EMER position for the duration of the emergency.

e. When the emergency is over, return the master control to the NORM or LOW position.

5-248. STOPPING PROCEDURE.

5-249. To turn off the transponder set, set the controls on the control panel as follows:

a. Master control - OFF.

b. AUDIO switch - OFF.

c. I/P switch - OFF, then release the microphone switchbutton.

d. MODE 2 switch - OFF.

e. MODE 3 switch - OFF.

f. MODE 1 code control - To read 00.

g. MODE 3 code control - To read 00.

h. Function control - NORMAL.

5-250. GYRO MAGNETIC COMPASS OPERATION.

5-251. The gyro magnetic compass may be operated in the slaved or free mode of operation, depending upon the reliability of the earth's magnetic reference.

5-252. SLAVED GYRO MODE OF OPERATION.

5-253. The procedure for the slaved gyro mode of operation is presented in the following steps:

a. Battery switch - ON (OFF for APU).

b. Inverter switch - MAIN or SPARE.

c. Compass slaving switch - IN.

d. Compass AC and DC circuit breakers - IN. Allow three minute warmup.

5-254. FREE GYRO MODE OF OPERATION.

5-255. The procedure for the free mode of operation is presented in the following steps:

a. Compass slaving switch - OUT.

b. When the compass system is initially placed in operation in the free mode, there will be no magnetic sensing, no slaving of the compass system, and consequently no reference for obtaining directional indications. In this mode of operation, the compass system is used chiefly as a turn indicator.

c. During flight from an area where magnetic sensing is reliable into or through an area where magnetic sensing is unreliable, the compass system may be used in the free mode to determine heading information. The slaving cut-out switch must be operated from the IN position (Slaved Mode) to the OUT position (Free Mode) before flying into the unreliable area. The compass system does not automatically compensate for gyro drift in the free mode, nor can manual corrections be made. Periodic correction based on the gyro drift rate and the latitude of operation must be calculated algebraically and added to the indicated heading. Heading information determined in this manner should also be checked against two known references.

d. If the aircraft lands in an area where magnetic sensing is unreliable, and the compass system is kept operating in the free mode until take off, the compass system may still be used as a turn indicator and also to supply directional information. If, however, the compass system is turned off after landing, it should be used in the free mode and only as a turn indicator on subsequent flights within the area where magnetic sensing is unreliable.

5-256. STOPPING PROCEDURE:

5-257. The compass system stops operating when the helicopter's electrical power supply is turned off.

5-258. AN/ASN-43 GYRO MAGNETIC COMPASS OPERATION.

5-259. This compass may be operated magnetically slaved (compass slaving in) or free gyro (compass slaving out).

5-260. SLAVED GYRO MODE OF OPERATION.

5-261. To operate the equipment in the slaved mode, perform the following steps:

a. Battery switch - ON (OFF for APU).

b. Inverter switch - MAIN or SPARE.

c. Compass slaving switch - MAG HDG.

d. GYRO CMPS and COURSE IND circuit breakers - IN.

Note

If a misalignment (non-synchronization) of the AN/ASN-43 Compass is indicated by the annunciator on the Pilot's Radio Magnetic Indicator (shows DOT or CROSS, the synchronizing knob on the indicator must be manually rotated to null the annunciator (neither the DOT nor CROSS is showing) prior to takeoff.

5-262. FREE GYRO MODE OF OPERATION.

a. COMPASS SLAVING switch - GYRO HDG.

b. LATITUDE knob (located on the gyro base in the aft radio compartment) - set to local latitude.

c. LATITUDE switch (beside latitude knob) - N (for northern hemisphere operation) or S (for southern hemisphere operation).

d. RMI synchronizing knob - set known heading.

Note

RMI annunicator is de-energized in the free gyro mode.

5-263. STOPPING PROCEDURE.

5-264. The compass system is turned off when helicopter electrical power is turned off.

5-265. AN/ASN-72 NAVIGATION SET OPERATION.

5-266. The operating procedure for the Navigation Set AN/ASN-72 is outlined in the following steps:

a. Battery switch - ON (OFF for APU).

b. DECCA circuit breaker - IN.

c. OFF-REF-OP switch on the receiver control panel - OP.

d. Facility switch on the flight log control panel- F.

e. Install a chart roll with a chart of the area into the flight log display. Insert the corresponding key of the chart into the turret switch of the flight log control. Set the turret switch to this key.

f. Set the CHAIN selector switch on the receiver control panel to the chain covering the area and set the LI-OFF switch to the LI position. Consult the chart and set the zone and estimated lanes on the appropriate decometers.

g. After the receiver has been on for 5 to 10 minutes, set the OFF-REF-OP switch on the receiver control panel to REF position. The amber REF lamp will light.

h. Perform receiver referencing.

i. After helicopter takeoff, set the OFF-REF-OP on the receiver control panel to OP position and check the decometers for torque.

j. Check to see that the lane identification lamps on the decometers light in the correct red-green-purple sequence.

k. Perform the LI check.

l. Use the appropriate pushbuttons on the flight log control and position the flight log display pen to agree approximately with the decometer readings.

m. Set the facility switch on the flight log control panel to S/OP position. Use the appropriate pushbuttons and accurately position the pen to agree with the decometer readings.

n. Fly the helicopter over a selected fix point, such as cross roads, bridge, tower or building and perform receiver referencing and the LI check for correct lane setting.

Note

Erratic decometer indications and intermittent disagreement between the decometers and the lane identification meter may occur, especially at distances greater than 150 miles from the master station, because of interference or atmospheric conditions. Do not reset decometers unless a discrepancy greater than half a lane is consistent for three consecutive LI check readings.

o. Reset the OFF-REF-OP switch on the receiver control panel to OP position, and accurately set the flight log display pen to the fix point. Record the decometer readings of the fix point and note the exact pen position.

p. Set the LI-OFF switch on the receiver control panel to OFF position.

q. Remaining within the confines of the area shown on the chart, fly the helicopter along a triangular flight path, each leg of which is approximately 5 to 10 miles long, and then return to the fix point. Record the decometer readings and note the pen position.

r. The decometer readings recorded (o and q) above) should not differ by more than one-tenth of a lane. The pen positions noted in the same steps should not differ more than 1/16 of an inch.

s. To turn the navigation set off, set the OFF-REF-OP switch on the receiver control panel to OFF position and set the facility switch on the flight log control panel to OFF position.

5-267. TRANSPONDER SET OPERATION - APX-72.

5-268. TYPES OF OPERATION.

5-269. The APX-72 receiver-transmitter operates as an active receiver-transmitter unit which will respond only to an interrogating signal from the external source corresponding panel and the APX-72.

a. The APX-72 is capable of responding in nine codes modes of operation to six coded modes of interrogation. The coded interrogation inputs are classified as modes 1, 2, 3/A, C, 4 and test. The normal coded output responses are classified as modes 1, 2, 3/A, C and 4. Modes 1, 2, 3/A, C and 4. Modes 1, 2, 3/A can be modified for special responses, designated identification of position, emergency and X pulse. Mode C can be modified for special pulse indications.

Note

On helicopters 68-15214 and subsequent an IFF MODE 4 indicator light and CODE HOLD switch is installed on the center area of the instrument panel. The switch when in the ON position, allows the IFF MODE 4 preset code to be retained. The indicator light serves as a reminder of the switches position.

b. To operate the APX-72 in any of the modes described above, perform the following procedures:

(1) Starting Procedures.
(2) Normal Operation.
(3) Identification of Position (I/P) Operation.
(4) Emergency Operation.
(5) Monitoring Operation.

5-270. STARTING PROCEDURE.

a. Preliminary.

(1) MASTER control - OFF.
(2) IDENT-MIC switch - OUT.
(3) M-1, M-2, M-3/A, M-C and MODE 4 switches - OUT.
(4) AUDIO-LIGHT switch - OUT.
(5) RAD TEST-MON switch - OUT.
(6) MODE 1, 3/A and 4 code select switches - Set to operational code required.
(7) MODE 2 code select switch - Set to operational code required.

b. Starting.

(1) MASTER control.

STBY - one minute for standard temperature conditions and two minutes under extreme ranges of operating temperature.

LOW - low receiver sensitivity for receiving high energy signals.

NORM - normal receiver sensitivity.

EMER - refer to paragraph 5-274.

(2) M-1, M-2, M-3/A, M-C and MODE 4 switches - ON as required.

(3) AUDIO-LIGHT switch - LIGHT.

(4) IDENT-MIC switch - OUT.

(5) RAD TEST-MON switch - MON.

5-271. NORMAL OPERATION.

a. MASTER control - LOW or NORM as required.

b. M-1, M-2, M-3/A, M-C and MODE 4 switches ON - unless operational requirements indicate that only specific modes are to be used, then all other mode switches will be OUT.

c. AUDIO-LIGHT switch - LIGHT.

d. INDENT-MIC switch - OUT.

e. RAD TEST-MON switch - OUT.

5-272. IDENTIFICATION OF POSITION (I/P) OPERATION.

5-273. The APX-72 will transmit position identifying signals to all interrogating stations on modes 1, 2, and 3/A when the IDENT-MIC switch on the control panel is set to IDENT. Transmission of the I/P signal will occur in these modes even if the mode enable switches are in the OUT position. The I/P operation is as follows: Momentarily hold the IDENT-MIC switch in the IDENT position (spring-loaded return) and then release it. This action will cause the APX-72 to transmit the I/P signal for a period of approximately 30 seconds to all interrogating stations on modes 1, 2 and 3/A. Repeat as required.

5-274. EMERGENCY OPERATION.

5-275. During an aircraft emergency or distress condition, the APX-72 may be used to transmit specially coded emergency signals on modes 1, 2, and 3/A to all interrogating stations. These emergency signals will be transmitted as long as the MASTER control on the control panel remains in the EMER position. For emergency operation, set the controls as follows:

a. MASTER control - EMER - leave in that position for the duration of the emergency.

b. MASTER control - NORM or LOW after emergency is over.

5-276. MONITORING OPERATION.

5-277. Valid mode 4 interrogations and replies can be monitored either aurally and visually or visually by placement of the AUDIO LIGHT switch on the control panel as follows:

a. AUDIO-LIGHT switch - AUDIO - Mode 4 interrogating and reply pulses will be audible in the pilot's headset and visible on the RELAY light.

b. AUDIO-LIGHT switch - LIGHT - Indication of mode 4 interrogating and reply pulses will be visible on the REPLY light.

5-278. STOPPING PROCEDURE.

a. MASTER control - OFF.

b. IDENT-MIC switch - OUT.

c. M-1, M-2, M-3/A, M-C and MODE 4 switches OUT.

d. AUDIO-LIGHT switch - OUT.

5-279. AN/ARC-131 RADIO SET OPERATION.

5-280. The operating procedure and different modes of operation for the AN/ARC-131 radio set are given in the following paragraphs:

5-281. MODES OF OPERATION.

5-282. Depending on the settings of the control panel controls (figure 5-26), the radio set can be used for the following types of operation: Two-way voice communication and homing.

5-283. TWO-WAY VOICE COMMUNICATION.

a. Battery switch - ON (OFF for APU).

b. INT and FM circuit breakers - IN.

c. Mode control switch - T/R (allow two minute warm up).

d. Frequency - Select.

e. Receivers No. 1 switch - Up position.

Note

> A channel-changing tone should be heard in the headset while radio set is tuning. When the tone stops, the radio set is tuned.

f. VOL control - Adjust for comfortable volume.

g. SQUELCH control - Set for desired squelch mode.

h. TRANS selector switch - No. 1.

i. Microphone switch - Press.

5-284. HOMING OPERATION.

a. Mode control switch - HOME.

b. FM HOME switch - UP.

c. Frequency - Adjust to frequency of selected homing station.

d. SQUELCH control may be set to CARR or TONE however, the carrier squelch is automatically selected by an internal contact arrangement on HOME position.

Note

> Operation in DIS position is possible; however, flags on course indicator will be inoperative.

e. Fly aircraft toward the homing station by heading in direction that causes homing indicator right-left vertical pointer to position itself in the center of indicator scale. To insure that aircraft is not heading away from homing station, change the heading slightly and note that the homing indicator vertical pointer reflects in direction opposite that of the turn.

5-285. STOPPING PROCEDURE - AN/ARC-131.

a. FM HOME switch - DOWN.

b. Mode control switch - OFF.

Note

> The operation of the electronic equipment in this helicopter is dependent on the operation of the interphone system. Do not turn interphone system off until the end of flight day.

CHAPTER 6

AUXILIARY EQUIPMENT

SECTION I SCOPE

6-1. SCOPE OF AUXILIARY EQUIPMENT INSTRUCTIONS.

6-2. This chapter includes the description, normal operation, and emergency operation of all equipment not directly contributing to flight, but which enables the helicopter to perform certain specialized functions.

6-3. Much of the equipment discussed in this chapter is highly specialized or interchangeable for use in other aircraft. Coverage for specialized or interchangeable equipment of this type will be brief, since complete coverage is appropriately available in publications devoted entirely to that equipment.

SECTION II HEATING AND VENTILATION

6-4. VENTILATING SYSTEM.

6-5. The ventilating system consists of four independently controlled scoop type ventilators. (9 and 28, figure 2-1) located as follows: two single orifice scoops on the top side of the cockpit section and two double orifice scoops on the top side of the cargo-passenger section of the cabin. The amount of outside air entering the cabin through the ventilators is regulated by knurled rings located on the ventilators above the pilot's, copilot's and passenger's stations.

6-6. OPERATION.

6-7. Rotate knurled control ring to desired position to provide outside air for flight.

6-8. BLEED AIR HEATING AND DEFROSTING SYSTEM.

6-9. The heating and defrosting system (see figure 6-1) consists of tube assemblies, selector valve, noise suppressors, ducts, outlets control panel, and attaching hardware. Heat is supplied from the engine compressor bleed air system (figure 6-1). Electric power for heating and defrosting system operation is supplied by the 28-volt DC electrical system. Circuit protection is provided by CABIN HEATER PWR and CONT circuit breakers. (Figure 2-11.)

6-10. BLEED AIR HEATING AND DEFROSTING SYSTEM (SERIAL NUMBERS 65-9565 THROUGH 66-16860).

6-11. This system differs from system installed on helicopters prior to serial number 65-9565 (figures 6-1 and 6-2) as follows: Bleed air ducts under seat outlets, one noise suppressor, two valve assemblies and one thermostat have been deleted. The bleed air mixing valve and one noise suppressor are relocated to the heater compartment for easy removal when winterization kit is installed.

6-12. HEATING AND DEFROSTING CONTROLS.

6-13. The heating and defrosting controls consist of the cabin heater panel and the pedestal-mounted heater control levers (figure 6-1). A dual purpose CABIN HEATING panel is located on the overhead console (figure 6-1). The aft portion of this panel, marked HEATER, is inactive unless the winterization combustion heater equipment is installed. The forward section of the panel, marked BLEED AIR is active for use of the bleed air for heating and defrosting. Electric power to the panel is supplied by the 28-volt DC electrical system.

6-14. PEDESTAL-MOUNTED HEATER CONTROL. Manual controls are secured to the forward outer edges of the pedestal installation (10, 11 and 12, figure 6-1). The outboard levers are installed as part of the winterization equipment and are used in conjunction with the combustion heater. The inner right-hand lever is used to actuate the bleed air circuit.

6-15. CABIN HEATER CONTROLS (SERIAL NUMBERS 65-9565 THROUGH 66-16860). The overhead console contains a panel labeled "CABIN HEATING" (figure 6-2). This panel contains two rotating switches, one labeled BLEED AIR and the other labeled AFT OUTLET. Rotating the BLEED AIR switch clockwise increases the amount of heated air. Rotating the switch labeled AFT OUTLET, clockwise distributes an increasing amount of heated air to the aft cabin through the door post outlets, while decreasing the amount of air to cockpit through the center pedestal outlets. In the OFF position of this switch the door post outlets are closed and all of the air is directed to the center

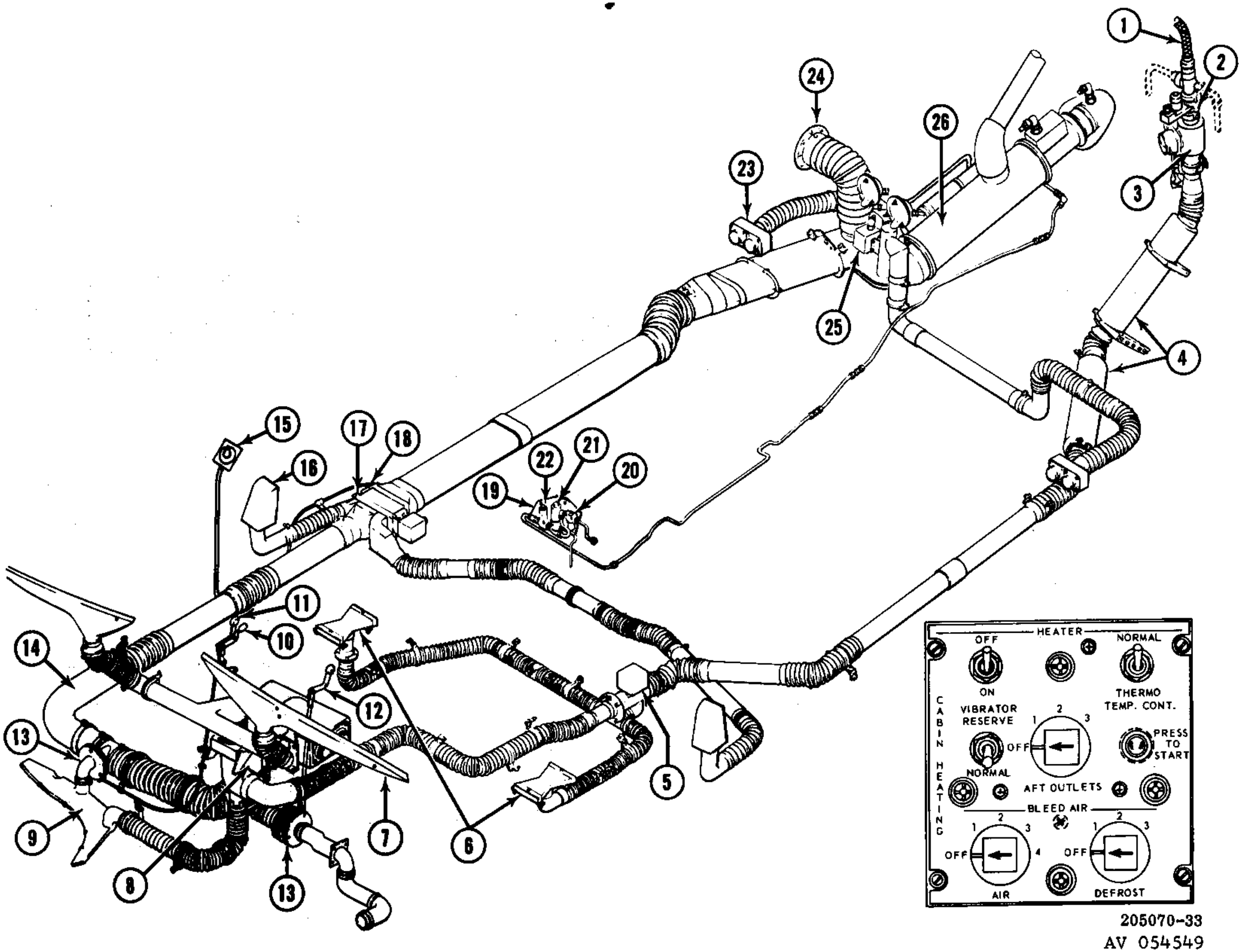

Figure 6-1. **Heating and defrosting system (Sheet 1 of 2)**

BLEED AIR HEAT SYSTEM:

1. Engine Bleed Air Hose
2. Bleed Air Control Valve
3. Air Mixing Valve
4. Noise Suppressors
5. Bleed Air Heat Distribution Valve
6. Under-Seat Registers
7. Windshield Nozzles
8. Heat Selector Valve
9. Lower Window Nozzle
10. Heat Selector Control

AUXILIARY HEATING SYSTEM:

11. Lower Right Outlet Control
12. Lower Left Outlet Control
13. Iris Valves
14. Auxiliary Heat Duct
15. Thermostat Dial
16. Door Post Outlets
17. Distribution Valve
18. Thermostat
19. Heater Fuel Train Assembly
20. Fuel Filter
21. Fuel Pump
22. Fuel Solenoid Valve
23. Aft Heat Outlets
24. Spot Heating Connection
25. Aft Outlets Valve
26. Auxiliary Combustion Heater

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Figure 6-1. Heating and defrosting system (Sheet 2 of 2)

pedestal outlet. Positions 1, 2, and 3 open the door post outlets an increasing amount so that less air is distributed through the center pedestal outlet. In No. 3 position air is still supplied through the center pedestal outlets, unless the flapper is closed in the ball outlet.

6-16. A lever on the forward right-hand edge of the center pedestal is used for directing air to the defrost nozzles on the cockpit and cabin outlets (figure 6-2). In the full forward position all of the air is directed to the defrost nozzles. Intermediate positions may be selected for partial defrost and partial cockpit and cabin heat. The full aft position permits no air flow to the defrost nozzles, and directs all heat to the cockpit and cabin area.

6-17. HEATING AND DEFROSTING SYSTEM OPERATION.

6-18. The operating procedure for the bleed air heating and defrosting system is presented in the following paragraphs.

6-19. PRECAUTIONS TO BE OBSERVED. The pilot shall comply with cautionary steps listed below. Failure to comply may cause engine compressor stall resulting in possible severe damage to engine, transmission, main rotor, or tail rotor.

a. T53-L-9 engine:

(1) Do not use bleed air heater on takeoff or during Engine Restart During Flight. (Refer to Chapter 4.)

(2) Do not use bleed air heater with AIR selector switch in position 3 or 4 when above 85 percent nI speed.

b. T53-L-9A, -11 and -13 engines:

Caution

The bleed air heater should be in the OFF position during take-off and landing and other flight conditions requiring maximum engine power available.

(1) Do not use bleed air during Engine Restart During Flight.

6-20. NORMAL OPERATION.

a. Position the inner right-hand lever on forward edge of pedestal aft to CLOSED DEFROST to actuate the system.

b. Rotate AIR switch on overhead console CABIN HEATING control panel clockwise to increase defrost air to under-seat outlet and defrost outlet.

c. Rotate DEFROST switch on control panel clockwise to:

(1) DEFROST OFF position - 100 percent to under-seat registers.

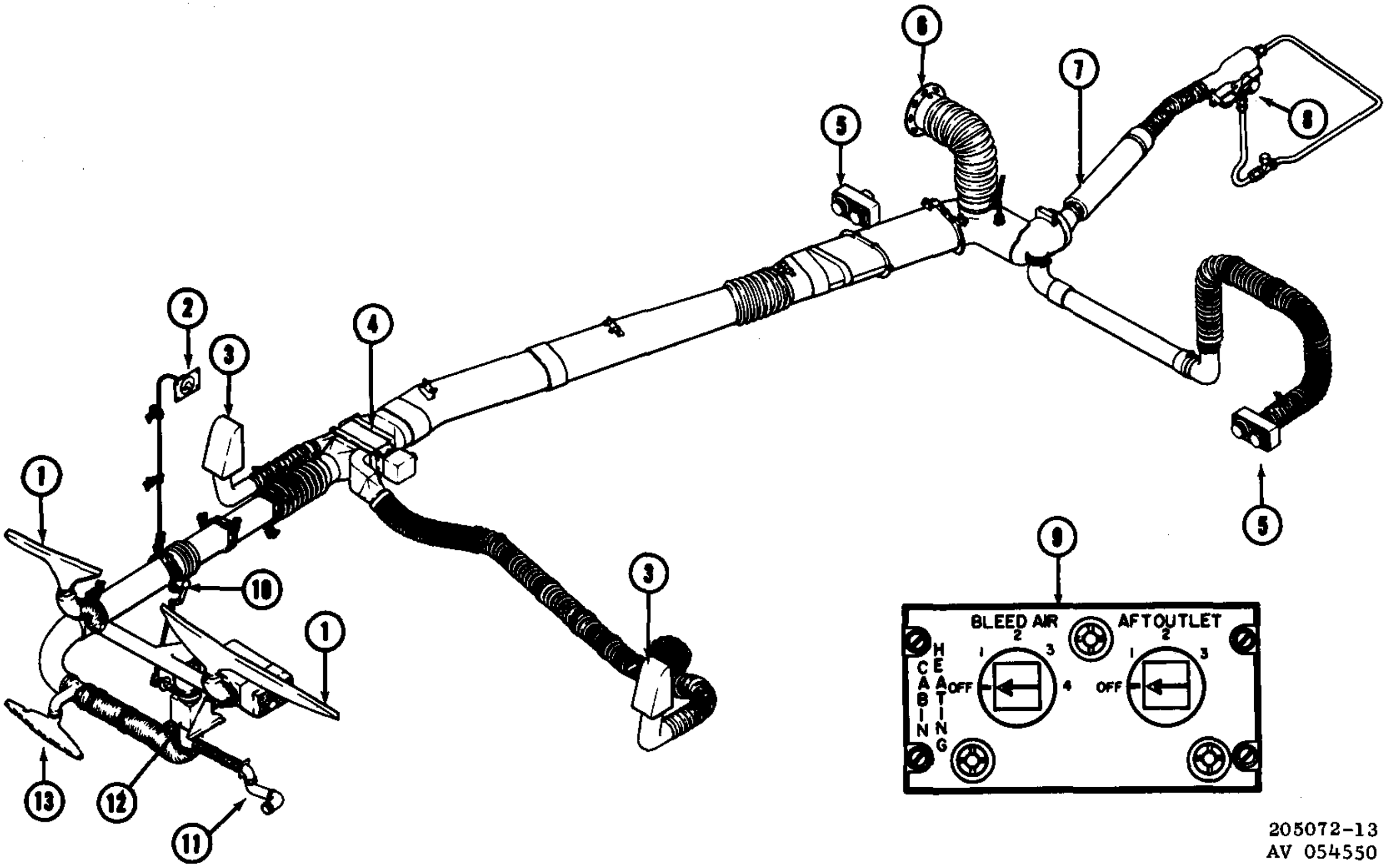
(2) No. 1 position - 33 percent to defrost nozzles and 67 percent to under-seat registers.

(3) No. 2 position - 67 percent to defrost nozzles and 33 percent to under-seat registers.

(4) No. 3 position - 100 percent to defrost nozzles.

d. To turn off the system, rotate AIR switch to OFF and position inner right-hand lever adjacent to pedestal fully forward.

6-21. NORMAL OPERATION - CABIN HEATER AND DEFROSTING SYSTEM NUMBERS (65-9565 THROUGH 66-16860.) See cabin heater controls, figure 6-2.



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1. Windshield Nozzles
2. Thermostat Dial
3. Door Post Outlets
4. Distribution Valve
5. Aft Heat Outlets
6. Spot Heating Connection
7. Noise Suppressor
8. Bleed Air Control Valve
9. Cabin Heating Panel
10. Air Directing Lever
11. Heat Outlet
12. Air Directing Valve
13. Lower Window Nozzle

Figure 6-2. Heating and defrosting system serial numbers 65-9565 through 66-16860

a. BLEED AIR rotating switch - Rotate clockwise from OFF position to actuate the system. Set to 1, 2, 3, or 4 position as required for amount of heat desired.

b. AFT OUTLET rotating switch - position to distribute the desired amount of heated air to aft cabin through door post outlets.

Note

When the AFT OUTLET switch is in the OFF position the door post outlets are closed and all of the air is directed to the center pedestal outlet.

c. Lever on pedestal - Position as required.

(1) Full forward position - all heated air is directed to the defrost nozzles.

(2) Full aft position - all heated air is directed to the cockpit and cabin area.

(3) Intermediate positions - may be selected for partial defrost and partial cockpit and cabin heat.

d. To turn off the system - Rotate BLEED AIR switch counterclockwise to OFF position.

6-22. EMERGENCY OPERATION. There is no emergency operation of the bleed air heating and defrosting system. If engine temperature surge occurs during flight, the bleed air system shall be turned off.

6-23. COMBUSTION HEATING AND DEFROSTING SYSTEM.

6-24. The 100,000 BTU combustion type heating and defrosting system (figure 6-1) equips the helicopter with a sufficient heat supply to maintain a plus 40 degrees Fahrenheit cabin temperature with an outside temperature to minus 60 degree Fahrenheit. With the combustion heater installed, a combination of bleed air heat and combustion heat is available for heating, or bleed air for defrosting and combustion heat for heating, or combustion heat for defrosting only. Bleed air is OFF for the last condition. The combustion heater consists of a fuel system, cycling switch, temperature control, and distribution system. The heater fuel system consists of a fuel pressure regulator, fuel filter, fuel pump, and a fuel shutoff valve.

Note

The main fuel switch must be ON, activating the right boost pump, before fuel is available for heater combustion.

6-25. The safety devices are: purge switch, overheat switch, and air pressure switch. The purge switch keeps the blowers operating after shutdown to prevent overheating of the system due to residual heat. The overheat switch automatically turns the heater off if a malfunction occurs, and the starting cycle has to be repeated to start the heater. In the event air blower pressure drops off the air pressure switch will trip a relay turning combustion heater off.

6-26. COMBUSTION CABIN HEATER CONTROLS.

6-27. The aft section of the dual purpose cabin heating panel (figure 6-1) located on the overhead console, controls the combustion heater when installed. Electric power to the panel is supplied by the 28-volt DC essential bus of the electrical system.

Caution

To prevent fire hazard to the helicopter due to possibility of cabin heater exhaust blast causing fire on landing surfaces, move the cabin heater switch to the OFF position at least one minute prior to landing on clean surface and at least two minutes prior to landing on surface with combustible materials present.

6-28. PEDESTAL MOUNTED HEATER CONTROLS COMBUSTION.

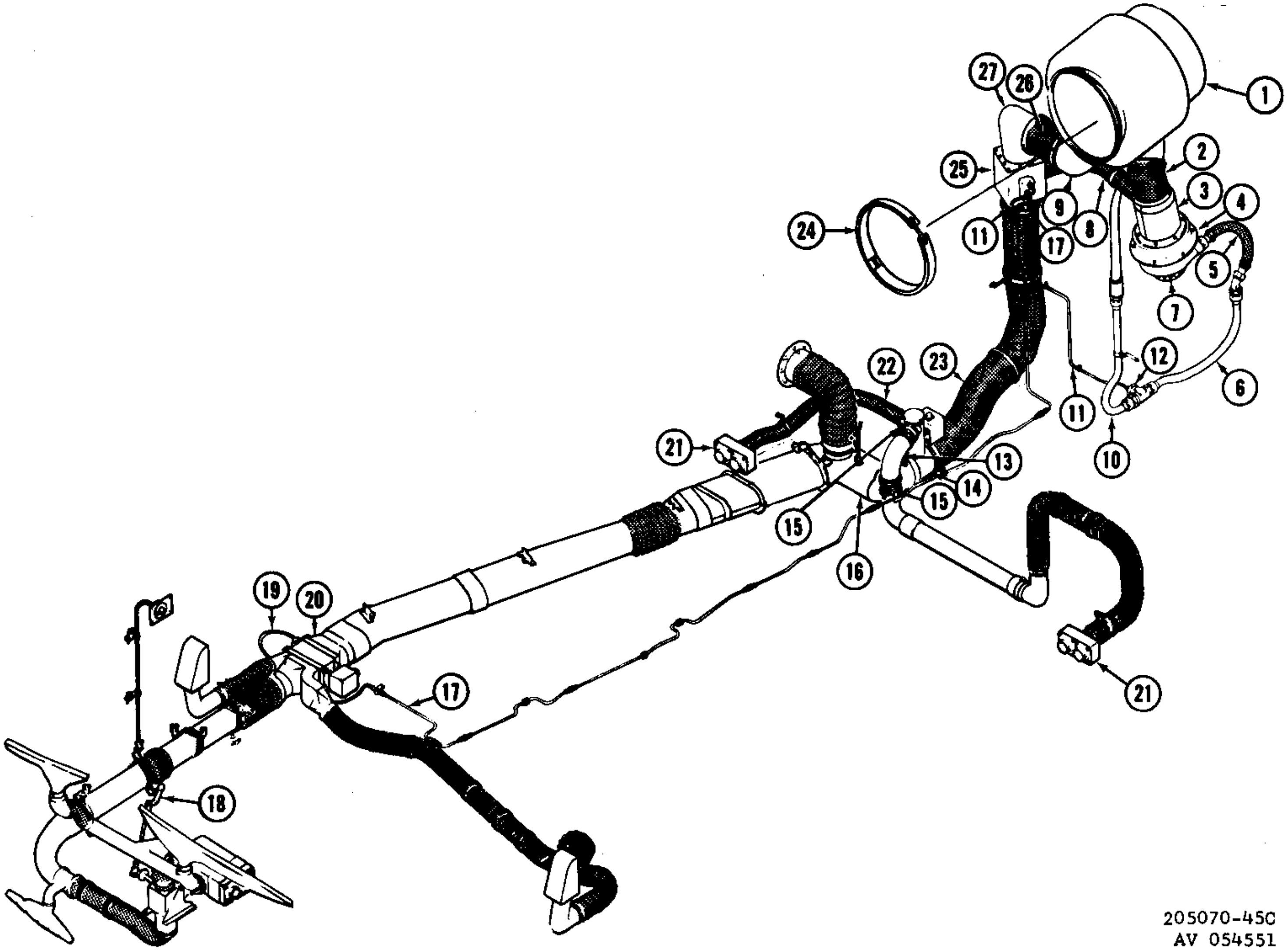
6-29. Manaul controls are secured to the forward outer edges of the pedestal installation (figure 2-3 and 6-1). The outboard levers control valves to admit hot air to the pilot's and copilot's foot area ducts. The inner right-hand lever is used to control the bleed air combustion air separator valve.

6-30. NORMAL OPERATION - COMBUSTION.

6-31. The combustion air blower and the ventilation blower are the axivane type, operated by 28-volt DC. Both of these blowers operate when the heater switch is ON and continue operation until the switch is OFF. The cycling switch, located on the heater plenum, operates in conjunction with the temperature control system and is set at 25 degrees Fahrenheit. It turns the fuel on and off, cycling the heater at approximately this temperature. The temperature control systems are the automatic or the duct sensing control. The automatic system is a three-temperature pickup system; outside temperature, cabin temperature, and duct temperature controlled from the overhead console. The duct sensing control system controls only the duct temperature from a control located on the right-hand door post.

a. External power - Connected or battery switch to BAT-ON.

b. Fuel MAIN switch - ON.



1. Heater Exchange
2. Duct
3. Tee
4. Fan
5. Hot Air Bleed Line
6. Tube
7. Blower
8. Duct
9. Elbow
10. Drain Line
11. Tubing
12. Reducer
13. Elbow
14. Hot Air Mixing Valve
15. Flexible Coupling
16. Plenum
17. Tube
18. Air Directing Lever
19. Tube
20. Distribution Valve
21. Capped Air Outlets
22. Duct
23. Duct
24. "V" Clamp
25. Temperature Control Valve
26. Duct
27. Elbow

Figure 6-3. Auxiliary exhaust heater system

c. HEATER ON/OFF switch - ON.

d. VIBRATOR switch - NORMAL.

e. PRESS TO START switch - DEPRESS and hold in for three to four seconds, then release.

f. Heater air control knobs - Regulate as desired.

g. HEATER ON/OFF switch - OFF to stop heater operation.

6-32. EMERGENCY OPERATION - COMBUSTION.

6-33. There is no emergency operation of the combustion heating and defrosting system.

6-34. AUXILIARY EXHAUST HEATER SYSTEM.

6-35. The auxiliary exhaust heater system (figure 6-3) consists of a heat exchanger, a blower for circulating air through heat exchanger, a mixing valve to control the air to maintain desired temperature, a temperature control valve assembly which controls aft cabin outlet duct and connecting ducts. The blower is bleed air driven with bleed air from the engine compressor bleed air system. The heat exchanger is heat air which in turn is distributed through the heat-defrost system by the blower fan.

6-36. EXHAUST HEATER SYSTEM CONTROLS.

6-37. The exhaust heater system controls consist of the cabin heating panel (figure 2-10) on the overhead console; duct sensing switch on right-hand door post; and the air directing lever on the pedestal (figure 6-3).

6-38. EXHAUST HEATER SYSTEM OPERATION.

Caution

> The exhaust heater system should be in OFF position during take-off and landing and other flight conditions requiring maximum engine power available.

a. BLEED AIR rotating switch (cn overhead console) - Rotate clockwise to ON position.

b. Duct sensing switch (on right-hand door post) - Adjust as desired. The larger the number the higher the temperature.

c. Air directing lever (on pedestal) - Position forward for defrost or full aft for cabin heat.

SECTION III ANTI-ICING, DE-ICING AND DEFROSTER SYSTEM

6-39. ENGINE ANTI-ICING SYSTEM.

6-40. The engine anti-icing system prevents icing of the air inlet areas when the engine is operating at low ambient temperatures. Hot air under pressure, from the annular manifold within the air diffuser housing, flows forward through the airflow shutoff anti-icing valve into the hollow annulus on top of the air inlet housing. This hot air is then directed through five of the six hollow inlet housing support struts to de-ice the air inlet area. Hot scavenge oil, draining through the lower strut into the accessory drive gearbox, de-ices the bottom of the air inlet area. Hot air also flows into the inlet guide vane area and is directed through an annulus around the region of the temperature sensing element of the main fuel control to prevent ice formation in the area of the ambient temperature sensing bulb. Small openings in the bottom of the inlet guide vanes allow hot air to bleed back into the compressor area. The shutoff anti-icing valve is spring-loaded in the open or ON position. The pilot can close the valve by positioning DE-ICE switch on ENGINE panel to OFF 9figure 2-3). This energizes a solenoid, causing the valve to shift to the closed or OFF position. If an electrical power failure occurs, the solenoid is de-energized, allowing the spring-loaded valve to open and anti-icing becomes continuous. With anti-icing ON, full power will be limited due to increased exhaust gas temperature (egt). Pilot shall closely monitor egt when anti-icing is ON.

Note

> Engine anti-icing system is inoperative on helicopters with sand and dust separator system installed. (Refer to Chapter 2.)

6-41. INDICATOR LIGHTS - ENGINE ANTI-ICING SYSTEM.

6-42. Two indicator lights are located on the pedestal-mounted CAUTION panel (figure 2-14). These lights provide visual information as to the system status. The ENGINE ICING indicator light illuminates to denote engine icing conditions and the operation of the detector proportional to the engine ice accumulation. The ENGINE ICE DET disarmed light will be illuminated when the circuit breaker is out (deactuated), or the probe is clogged, or when there is an electrical malfunction in the system.

6-43. PITOT HEATER.

6-44. The pitot heater is installed in the pitot head and functions to prevent ice forming in the pitot tube. Electric power for pitot heater operation is supplied by the 28-volt DC electrical system. Circuit protection is provided by PITOT TUBE HTR circuit breaker on the DC circuit breaker panel (figure 2-11).

6-45. PITOT HEATER SWITCH.

6-46. The PITOT HTR switch is on the DOME LT panel on the overhead console (figure 2-10). This is a two-position switch marked OFF in aft position and ON in the forward position.

6-47. OPERATION.

6-48. PITOT HTR switch - Fwd to ON to prevent ice forming in pitot tube. To shut pitot heater off, position PITOT HTR switch aft to OFF.

6-49. DEFROSTING SYSTEM.

6-50. The defrosting system is a part of the heating and de-frosting system. Refer to paragraphs 6-8 through 6-38.

SECTION IV LIGHTING EQUIPMENT

6-51. NAVIGATION LIGHTS.

6-52. The navigation lights consist of eight lights (figure 6-4). Two green lights on the right side of the fuselage are mounted, one above and one below the cabin door. Two red lights on the left side of the fuselage are mounted, one above and one below the cabin door. Two white lights are mounted on the top of the fuselage, just inboard of the red and green lights, and one white light is mounted on the bottom of the fuselage. One yellow light is mounted on the tail boom fin. Electric power to operate the lights is supplied by the 28-volt DC electrical system. Circuit protection is provided by NAV LIGHTS circuit breaker on the DC circuit breaker panel (see figure 2-11).

6-53. The navigation lights are controlled from a panel on the overhead console marked EXT LTS (figure 2-10). A three-position switch permits selection of STEADY, OFF, or FLASH. The other, a two-position switch, controls brilliance and is marked DIM and BRIGHT. When the three-position switch is in STEADY position, all eight navigation lights are illuminated. In FLASH position, the colored lights illuminate alternately with the white lights.

6-54. ANTI-COLLISION LIGHT.

6-55. One anti-collision light is mounted on top of the fuselage, aft of the cabin area (see figure 6-4). Rotation of the light creates a flashing beam of light that is visible for a considerable distance. Electric power to operate the light is supplied by the 28-volt DC electrical system. Circuit protection is provided by ANTI-COLL LIGHT circuit breaker on the DC circuit breaker panel (see figure 2-11). The light is controlled from the EXT LTS panel on the overhead console (see figure 2-10) by the ANTI-COLLISION switch marked ON and OFF.

Note

Under instrument conditions, particularly at night during conditions of extremely low visibility, unnecessary operation of the anti-collision light should be avoided. Reflections on the helicopter's windows, caused by the rotating light beams being reflected back from the clouds and through the whirling blades, may cause vertigo.

6-56. LANDING LIGHT.

6-57. The extend-retract landing light is flush-mounted to the underside of the fuselage (figure 6-4). This light may be extended or retracted, as desired, to improve forward illumination. Electric power to operate the light is supplied by the 28-volt DC electrical system. Circuit protection is provided by LDG LIGHT PWR and LDG & SEARCHLIGHT CONT circuit breakers on the DC circuit breaker panel (figure 2-11). The light is controlled by two three-position switches on the light switch box assembly on the pilot's collective stick and marked LDG LT ON/OFF and LDG LT EXT/OFF/RETR (see figure 2-4).

6-58. OPERATION.

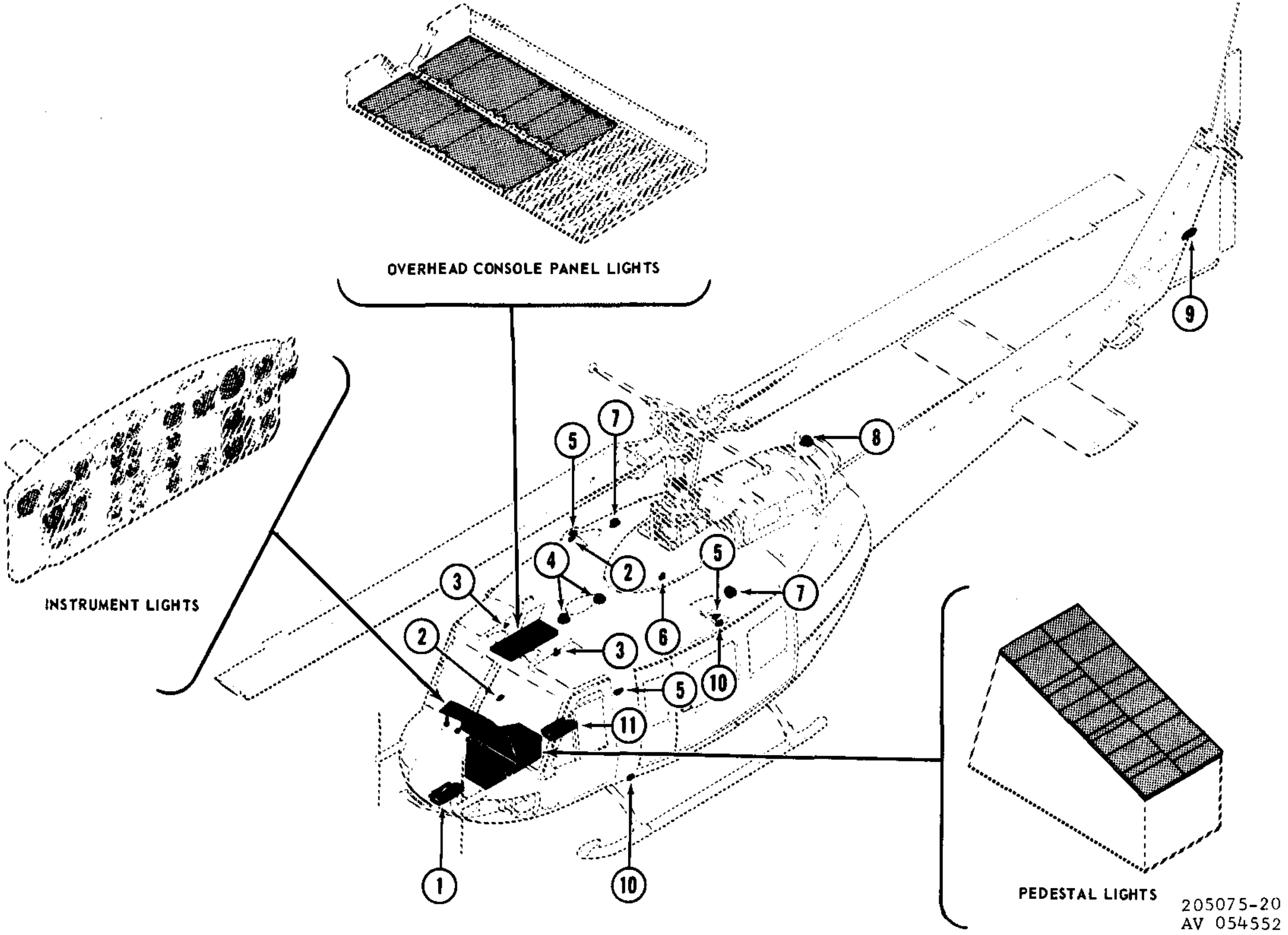
a. Upper LDG LT switch - Position to ON.

b. Lower LDG LT switch - POSITION to EXT until desired extend position is obtained, then return to OFF.

c. To retract - Position lower LDG LT switch to RETR, then return to OFF.

Caution

Upon landing turn landing light OFF to prevent fire hazard.



1. Search Light
2. Navigation Lights (Green)
3. Cockpit Lights
4. Dome Lights (Fwd)
5. Navigation Lights (White)
6. Transmission Oil Level Light
7. Dome Lights (Aft)
8. Anti-Collision Light
9. Navigation Light (Yellow)
10. Navigation Lights (Red)
11. Landing Light

Figure 6-4. Lighting equipment diagram

d. To shut off landing light - Position upper LDG LT switch to OFF.

6-59. SEARCHLIGHT.

6-60. The remote-controlled searchlight is flush-mounted to the underside of the fuselage (figure 6-4). The light can be extended or retracted for search illumination. At any desired position in the light's extend or retract arc, it may be stopped and moved in a horizontal plane to the left or right. Electric power to operate the light is supplied by the 28-volt DC electrical system. Circuit protection is provided by SEARCHLIGHT PWR and LDG & SEARCHLIGHT CONT circuit breakers on the DC circuit breaker panel (figure 2-11). The light is controlled by two switches on the light switch box assembly on the pilot's collective stick (see figure 2-4). The upper switch is marked SL ON/OFF/STOW. The lower switch is a four position switch marked SEARCH CONT EXT/RETR/L/R, and is used to control searchlight movement.

6-61. OPERATION.

a. SL switch - position to ON.

b. SEARCH CONT switch - Operate to obtain desired searchlight position.

c. To stow searchlight - Position SL switch to STOW.

Caution

> Upon landing turn searchlight OFF to prevent fire hazard.

d. To shut off light - Position SL switch to OFF.

6-62. DOME LIGHTS.

6-63. The dome lights provide overhead lighting for the cabin area. The forward lights are controlled by the pilot with FWD switch on the DOME LT panel on the overhead console. The aft dome lights are controlled by the medical attendant with a switch on the AFT DOME LTS panel on the roof within easy reach of the medical attendant's station. Electric power to operate the dome lights is supplied by the 28-volt DC electrical system. Circuit protection is provided by DOME LIGHTS circuit breaker on the DC circuit breaker panel (figure 2-11).

6-64. FWD DOME LIGHTS CONTROL PANEL - PILOT.

6-65. The DOME LT control panel, provided for pilot's control of the forward dome lights, contains a three-position switch marked FWD WHITE/OFF/RED, thus permitting a choice of red or white illumination or lights off.

6-66. AFT DOME LIGHTS CONTROL PANEL - MEDICAL ATTENDANT.

6-67. The aft dome lights control panel is conveniently located on the roof panel to provide the medical attendant control of the aft dome lights when required. The panel contains one three-position switch and a switch-type rheostat. The three-position switch is marked WHITE/OFF/RED, thus permitting a choice of red or white illumination or lights off. The rheostat marked OFF/MED/BRT functions to increase or decrease the brightness of the aft dome lights as desired.

6-68. COCKPIT LIGHTS.

6-69. Cockpit lights are provided at two locations. One is located at the right of the overhead console within easy reach of the pilot; and the other at the left of the overhead console within easy reach of the copilot or crew member. Rheostat switches for each light are part of the light assembly body. Brightness is increased by turning rheostat clockwise or dimmed by turning counterclockwise. Clockwise rotation of the lens provides white lighting. Counterclockwise rotation of the lens provides red lighting.

6-70. TRANSMISSION OIL LEVEL LIGHT.

6-71. A transmission oil level light has been installed and positioned to provide the necessary illumination to visually check the transmission oil sight gage. The circuit is actuated by a button-type switch marked XMSN OIL LEVEL LT SWITCH and is located on the right side of the transmission bulkhead, forward of the aft bulkhead. Electric power for the transmission oil level light circuit is supplied by the 28-volt DC battery circuit. Circuit protection is provided by the battery voltmeter circuit breaker

6-72. INSTRUMENT LIGHTS.

6-73. The instrument lights control panel is located on the right section of the overhead console (figure 2-10). This panel contains six switch-type rheostats for actuating and dimming the various instrument lights. The switch-type rheostats are marked CONSOLE, PED, SEC, ENGINE, COPILOT, and PILOT. Electric power to the instrument lights control panel is supplied by the 28-volt DC electrical system. Circuit protection is provided by CONSOLE PED LIGHTS INST PANEL LIGHTS, and INST SEC LIGHTS circuit breakers located on the DC circuit breaker panel.

6-74. PILOT'S INSTRUMENT LIGHTS.

6-75. The pilot's instrument lights furnish illumination for the following instruments: gas producer tachometer, torquemeter, exhaust temperature indicator, dual tachometer, airspeed indicator, clock, vertical velocity indicator, turn and slip indicator, altimeter, attitude indicator, radio magnetic indicator, OMNI indicator, and standby compass. These lights are all on one circuit and are controlled by the switch-type rheostat marked PILOT on the INST LTG control panel (figure 2-10). Clockwise rotation of the rheostat knob turns lights on and increases brilliance. Counterclockwise rotation of the rheostat knob dims lights, and the final movement (OFF position) breaks the circuit to the pilot's instrument lights. Electric power to operate the lights is supplied by the 28-volt DC electrical system. Circuit protection is provided by INST PANEL LIGHTS circuit breaker on the DC circuit breaker panel (figure 2-11).

6-76. COPILOT'S INSTRUMENT LIGHTS.

6-77. The copilot's instrument lights furnish illumination for the instruments on the copilot's section of the instrument panel. These instruments consist of an airspeed indicator, attitude indicator, altimeter, vertical velocity indicator and radio magnetic indicator. The copilot's instrument lights are all on one circuit, and control is accomplished by the switch-type rheostat marked COPILOT on the INST LTG control panel (figure 2-10). Clockwise rotation of the rheostat knob turns lights on and increases brilliance. Counterclockwise rotation of the knob dims lights, and the final (OFF position) movement breaks the circuit to the copilot's instrument lights. Electric power to operate lights is suppled by the 28-volt DC electrical system. Circuit protection is provided by INST PANEL LIGHTS circuit breaker on the DC circuit breaker panel (figure 2-11).

6-78. ENGINE INSTRUMENT LIGHTS.

6-79. The engine instrument lights furnish illumination for the following instruments: transmission oil temperature, fuel quantity, transmission oil pressure, engine oil pressure, loadmeter, AC voltmeter, fuel pressure indicator and DC voltmeter. Each instrument is individually illuminated and control is accomplished by the switch-type rheostat marked ENGINE on the INST LTG control panel (figure 2-10). Clockwise rotation of the rheostat knob turns engine instrument lights on and increases brilliance. Counterclockwise rotation of the knob dims lights, and the final movement (OFF position) breaks the circuit to the engine instrument lights. Electric power to operate the lights is supplied by the 28-volt DC electrical system. Circuit protection is provided by INST PANEL LIGHTS circuit breaker on the DC circuit breaker panel (figure 2-11).

6-80. SECONDARY LIGHTS - INSTRUMENT PANEL.

6-81. The four secondary instrument lights are spaced across the top of the instrument panel shield (see figure 2-5). These lights furnish secondary illumination for the instrument panel face. The lights are actuated and controlled by the switch-type rheostat marked SEC on the INST LTG control panel (figure 2-10). Clockwise rotation of the rheostat knob turns the four secondary lights on and increases brilliance. Counterclockwise rotation of the knob dims lights, and the final movement (OFF position) breaks the circuit to the secondary lights. Electric power to operate the lights is supplied by the 28-volt DC electrical system. Circuit protection is provided by INST SEC LIGHTS circuit breaker on the DC circuit breaker panel (figure 2-11).

6-82. OVERHEAD CONSOLE PANEL LIGHTS.

6-83. The overhead console panel lights furnish illumination for the DC POWER panel, AC POWER panel, INST LTG panel, DOME LT panel, EXT LTS panel, MISC panel, and CABIN HEATING panel. Each panel is individually illuminated and control is accomplished by the switch-type rheostat, marked CONSOLE on the INST LTG control panel (figure 2-10). Clockwise rotation of the rheostat knob turns overhead console panel lights on and increases brilliance. Counterclockwise rotation of the rheostat knob dims lights, and the final movement (OFF position) breaks the electrical circuit to the overhead console panel lights. Electric power to operate the overhead console panel lights is supplied by the 28-volt DC electrical system. Circuit protection is provided by CONSOLE PED LIGHTS circuit breaker on the DC circuit breaker panel (figure 2-11).

6-84. PEDESTAL LIGHTS.

6-85. The pedestal lights furnish illumination for the control panels on the pedestal. Each panel is individually illuminated and control is accomplished by the switch-type rheostat marked PED on the INST LTG control panel (see figure 2-10). Clockwise rotation of the rheostat knob turns the pedestal lights on and increases brilliance. Counterclockwise rotation of the knob dims lights, and the final movement (OFF position) breaks the circuit to the pedestal lights. Electric power to operate the pedestal lights is supplied by the 28-volt DC electrical system. Circuit protection is provided by CONSOLE PED LIGHTS circuit breaker on the DC circuit breaker panel (figure 2-11).

SECTION V OXYGEN SYSTEM

(Not Applicable)

SECTION VI AUXILIARY POWER UNIT

(Not Applicable)

SECTION VII ARMAMENT SYSTEM

6-86. ARMAMENT SUBSYSTEM PROVISIONS.

6-87. Attaching points for the armament subsystem are provided on each side of the helicopter at approximate fuselage stations 61 and 84, 129 and 155 by means of adapter assemblies (figure 2-15).

6-88. ARMAMENT SUBSYSTEM M23.

6-89. The armament subsystem M23 is attached to external stores hard point fittings on both sides of the helicopter (figure 6-5). The two flexible 7.62 millimeter machine guns M60D (figure 6-6) are free pointing but limited in traverse, elevation, and depression by cam surfaces and stops on pintles and pintle post assemblies of the two mount assemblies (figure 6-7) on which the M60D machine guns are mounted. An ejection control bag (figure 6-8) is latched to the right side of each M60D machine gun to hold the spent cartridges and links. Cartridges travel from ammunition box and cover assemblies (figure 6-7) to M60D machine gun through flexible chute and brace assemblies (figure 6-7).

6-90. COMPONENTS OF SUBSYSTEM M23.

a. 7.62 Millimeter Machine Gun M60D. Machine gun M60D is a link-belt fed, gas operated, air cooled, automatic weapon (figure 6-6).

b. Armament Subsystem M23 Mount Assembly. The mount assembly (figure 6-9) is installed on the aft external stores hard points on both sides of the helicopter.

6-91. TABULATED DATA - ARMAMENT SUBSYSTEM M23.

Weight (W/O ammunition)	66.0 lbs
Weight (W/ammunition-600 rounds)	104.4 lbs
Flexible chutes - links per chute	42
Rate of fire-rounds-per-minute (Approximately)	550
Ammunition - All types	7.62 mm
Overall length of machine gun M60D	44 7/8 in.

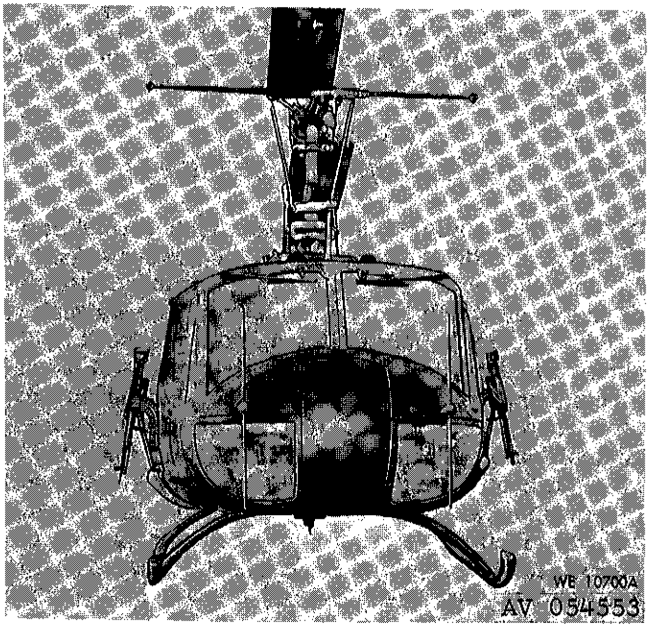


Figure 6-5. Armament subsystem M23 installed on helicopter

6-92. TRAVERSE, DEPRESSION, AND ELEVATION LIMITS.

Forward traversing limit	1546 mils.
Aft traversing limit	1546 mils.

Depression and elevation limits:

	Left and Right Side	Left and Right Side
Gun Direction	Depression	Elevation
Maximum forward	1457 Mils	61 mils
Center	1457 mils	89 mils
Maximum aft	1386 mils	115 mils

6-93. CONTROLS - ARMAMENT SUBSYSTEM.

6-94. The following paragraphs locates, describes and illustrates the controls provided for operating machine gun M60D and armament subsystem M23

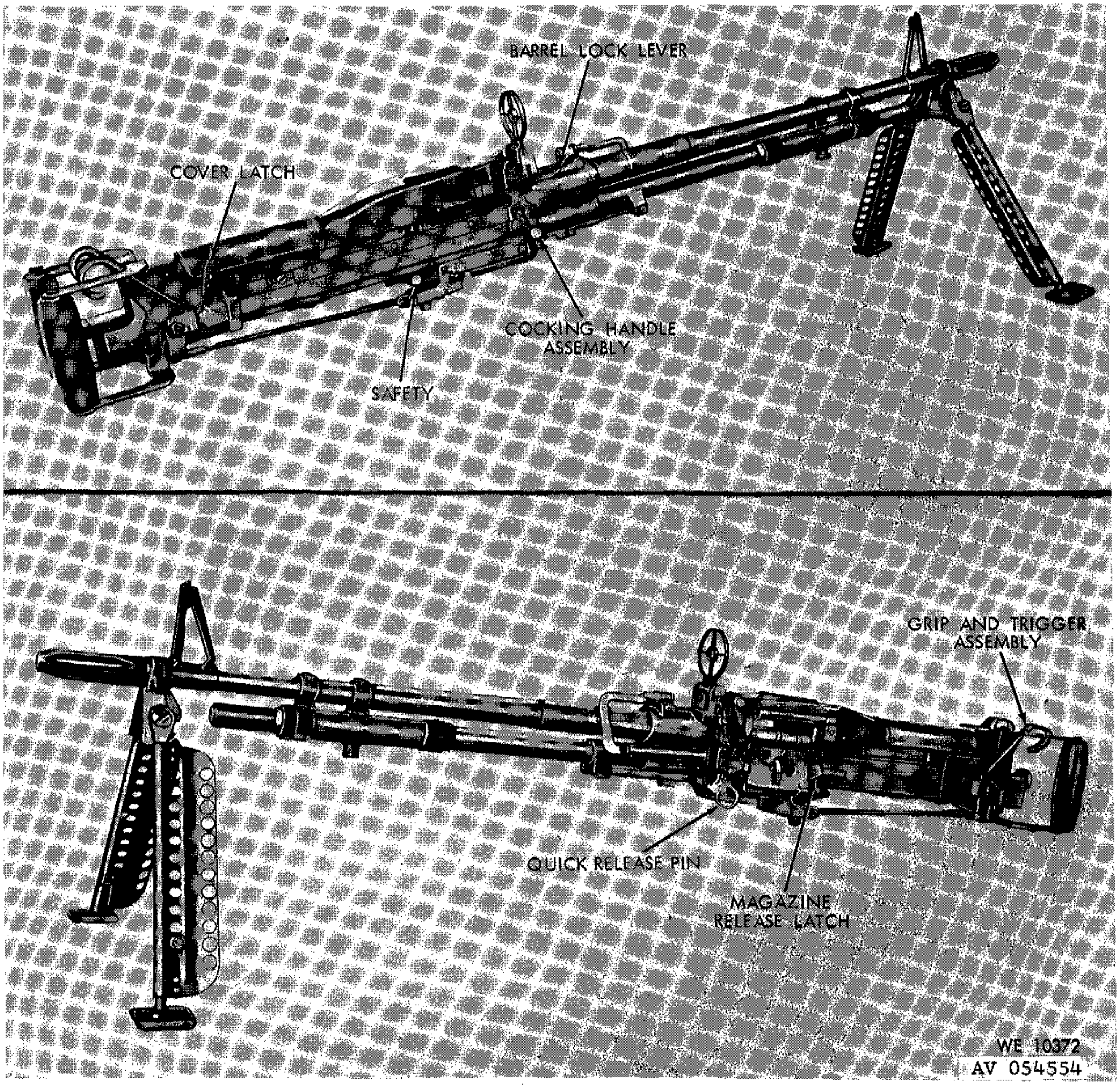


Figure 6-6. 7.62 millimeter machine gun M60D - right rear and left front views

mount assembly. For information on basic weapon 7.62 millimeter machine gun M60, refer to TM 9-1005-224-12.

6-95. MACHINE GUN M60D CONTROLS.

a. Cover latch (figure 6-6). The cover latch is located at the right rear of the cover assembly. In a vertical position it secures cover assembly in closed position, turning to horizontal position unlocks cover assembly.

b. Barrel Lock Lever (figure 6-6). The barrel lock lever, located at right front of receiver, is secured to barrel locking shaft and rotates shaft to lock or unlock barrel assembly.

c. Cocking Handle Assembly (figure 6-6). The cocking handle assembly, at right front of receiver, is used for manually charging the weapon.

Warning

Cocking handle assembly must be returned to the forward or locked position before firing to prevent injury to personnel.

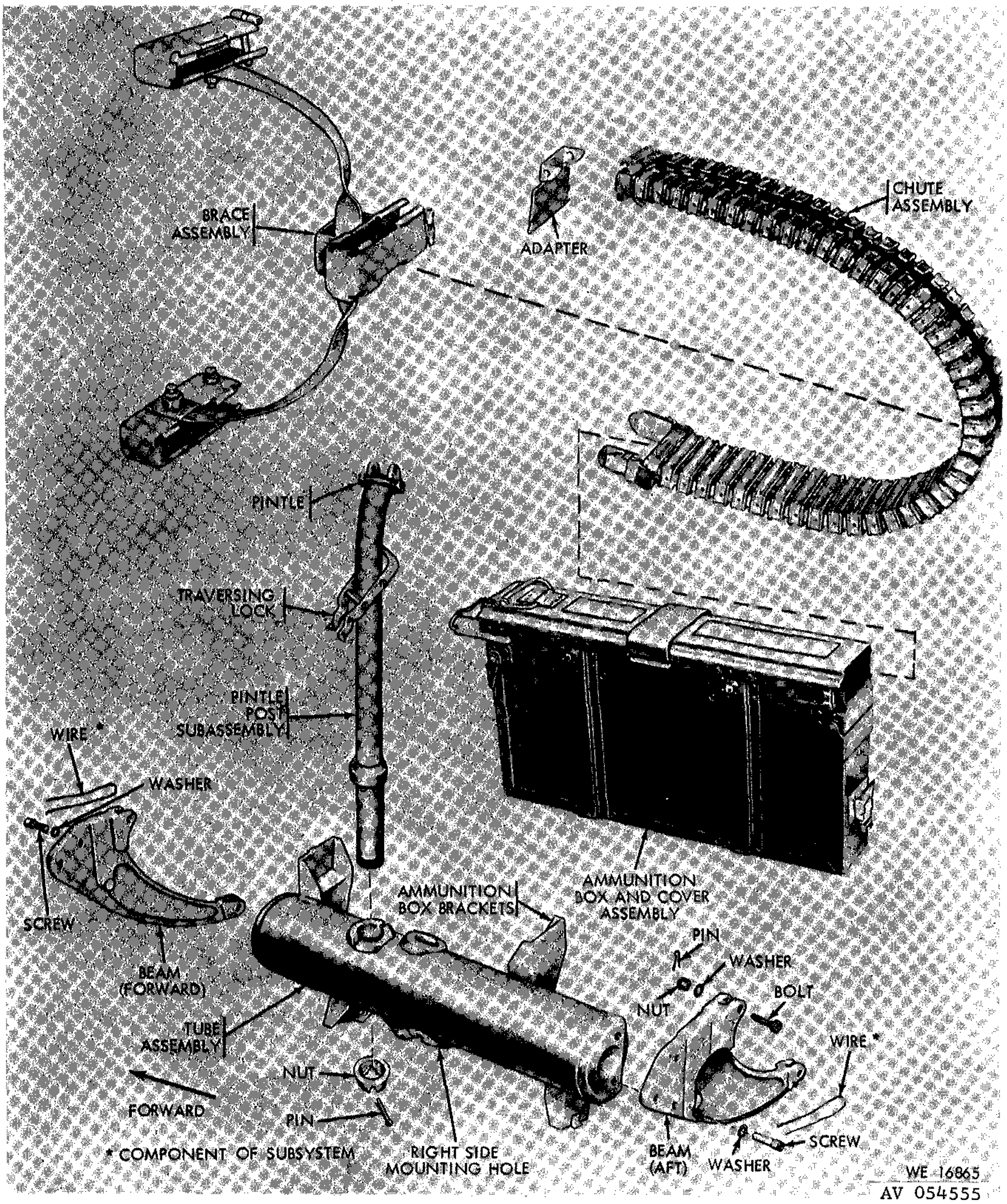


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Figure 6-7. Armament subsystem M23 mount assembly - exploded view

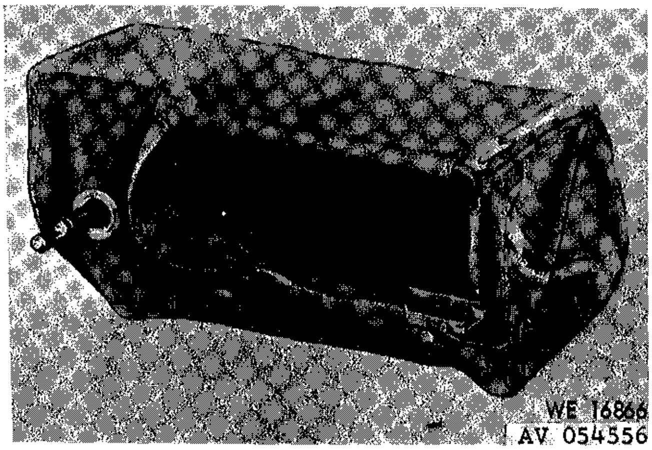


Figure 6-8. Ejection control bag

d. Safety (figure 6-6). The safety, located at lower front of receiver, consists of a cylindrical pin with a sear clearance cut which slides across receiver to block the sear and prevent accidental firing. Ends of pin are marked for pushing to "S" safe and "F" firing positions.

e. Grip and Trigger Assembly (figure 6-6). The grip and trigger assembly includes the spade grips and is located at rear of receiver. The U-shaped design permits firing of weapon by thumb pressure from either hand.

Warning

> Pressing the trigger to release the bolt assembly also accomplishes feeding and releases the firing mechanism. Make certain the weapon is cleared of cartridges before pressing trigger assembly, unless firing is intended.

Caution

> When ammunition is not present in machine gun M60D, retard forward force of released bolt assembly by manually restraining forward movement of cocking handle assembly to prevent damage to cartridge tray.

f. Magazine Release Latch (figure 6-6). The magazine release latch, located on left side of receiver, locks adapter of the ammunition chute when it is seated in magazine bracket.

6-96. ARMAMENT SUBSYSTEM M23 MOUNT ASSEMBLY CONTROL.

a. Maximum traverse movements of the machine gun M60D are controlled by stops on both sides of cam surface on pintle post assembly. Maximum elevation and depression are controlled by cam surfaces on pintle.

b. A spring-type traversing lock mounted on the pintle post assembly, is used to stow machine gun M60D in muzzle-down position (figure 6-10).

6-97. OPERATION - ARMAMENT SUBSYSTEM.

6-98. PRE-FLIGHT CHECKS.

6-99. The pre-flight check will consist of a check of the following:

a. Machine Gun M60D - Properly mounted and secured in stowed position.

b. Barrel - Dry and free of obstruction.

c. Gas Cylinder - Plug is tight in cylinder.

d. Cover Assembly - Check for freedom of movement and secureness of latch.

e. Ejection Control Bag - Properly latched (figure 6-11).

f. Ammunition Box and Cover Assembly. Secured to ammunition box brackets on tube assembly (figure 6-12).

g. Chute and Brace Assemblies - Properly fasten brace assembly to chute assembly, and chute assembly to machine gun M60D and ammunition box and cover assembly (figures 6-13 and 6-14).

h. Safety - Push safety button to safe position. Attempt to fire unloaded machine gun M60D (figure 6-6).

i. Mount Assembly - Secured, check for free pintle movement (figure 6-9).

j. Ammunition Boxes - Properly stowed.

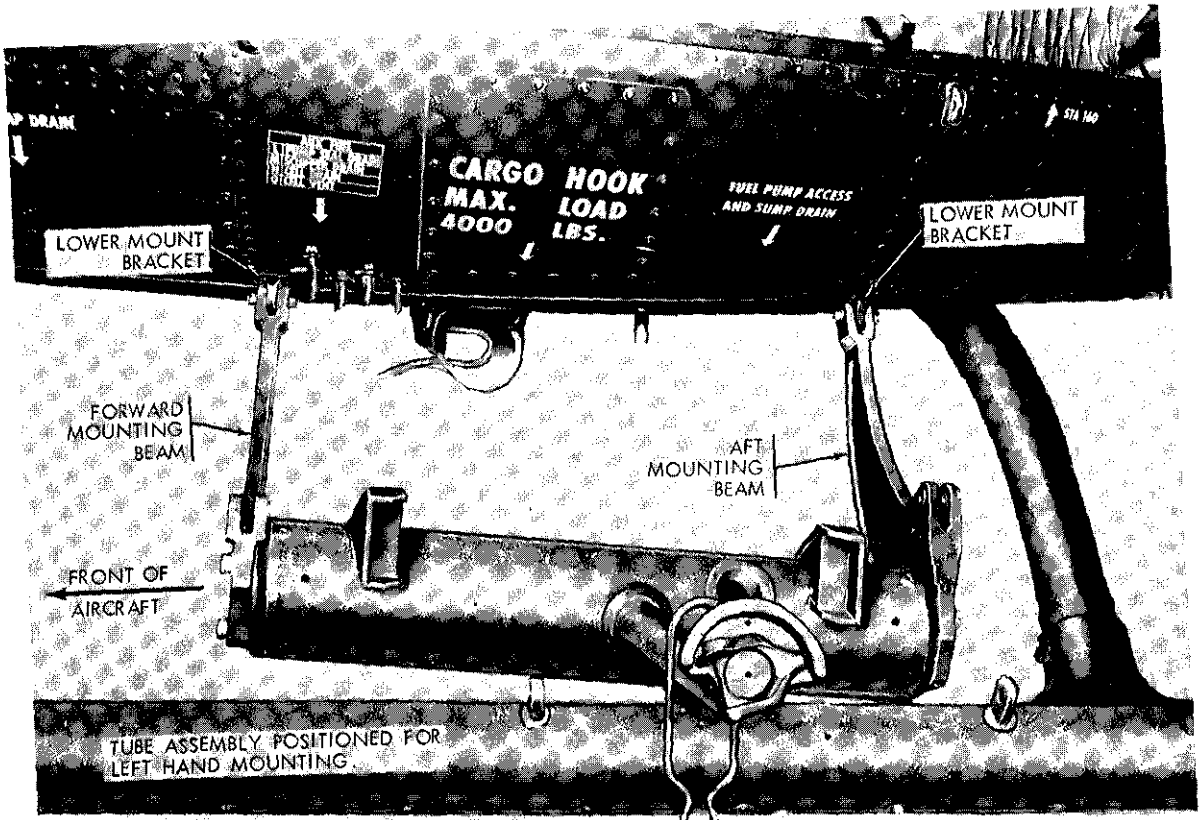
6-100. INFLIGHT OPERATION.

a. Preparation for Firing.

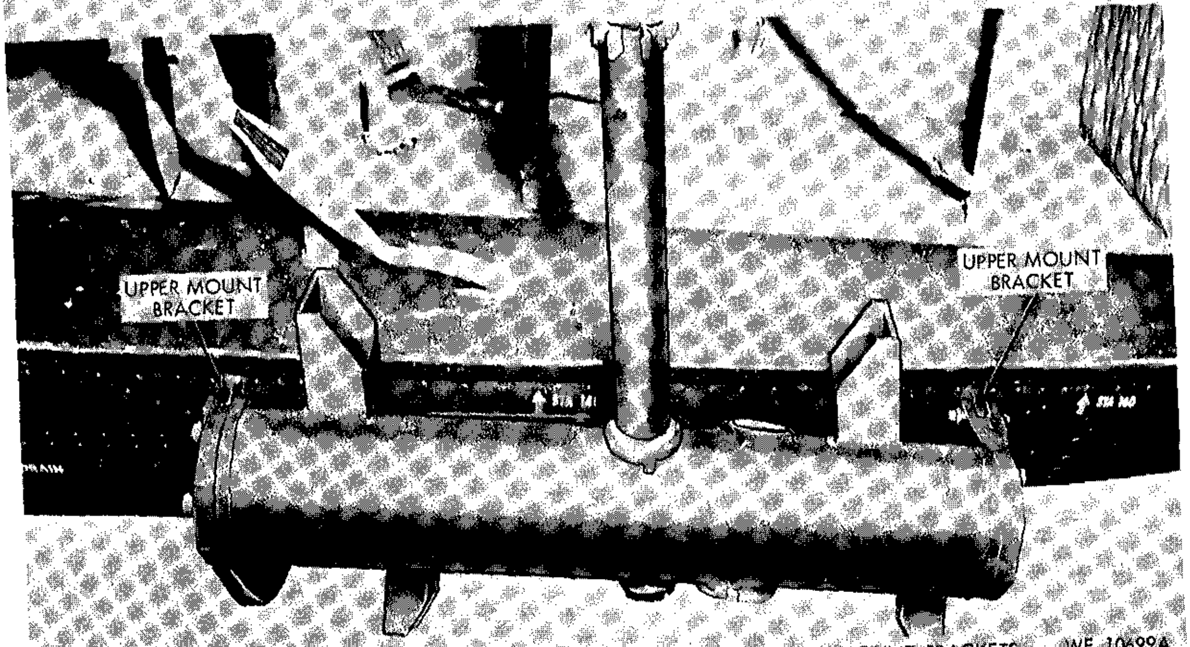
(1) Check machine gun M60D to see that it has been thoroughly cleaned and lubricated, in working order, and secured on pintle with quick release pin (figure 6-15).

(2) Check machine gun M60D for freedom of movement in elevation, depression, and traverse.

(3) Load linked cartridges into machine gun M60D (figure 6-16).



STEP 1-INSTALL OR REMOVE FORWARD AND AFT MOUNTING BEAMS - LOWER MOUNT BRACKETS.



STEP 2-INSTALL OR REMOVE MOUNTING BEAMS - UPPER MOUNT BRACKETS.

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Figure 6-9. Armament subsystem M23 mount assembly - installed on helicopter - left side shown

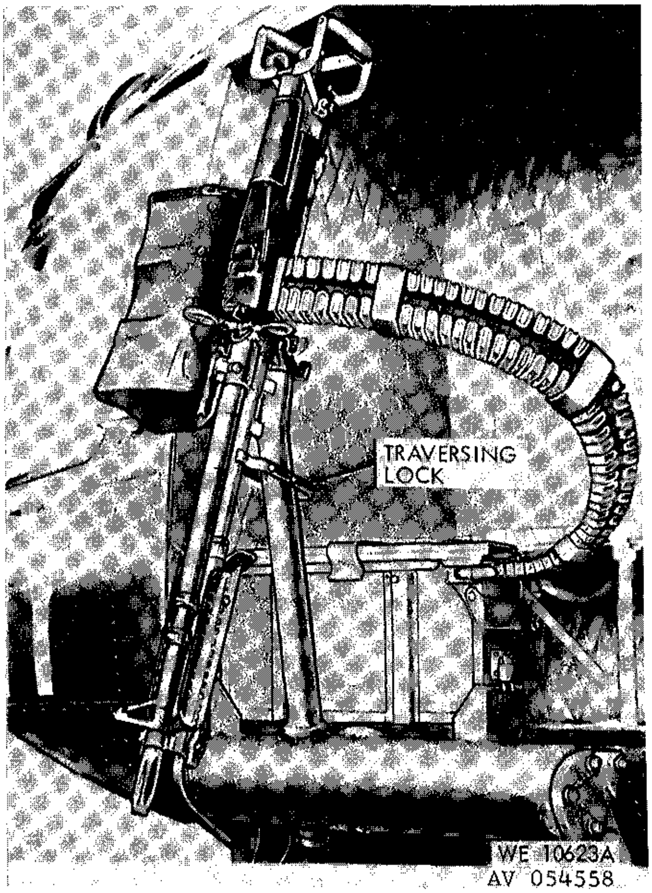


Figure 6-10. Armament subsystem M23 installed - machine gun M60D in stowed position - right side shown

Note

Inspect linked cartridges to see that cartridges are properly positioned in links.

(a) Retract bolt assembly by pulling handle assembly fully rearward until sear engages and push handle assembly to forward position. Push safety button to safe "S" position. Turn cover latch rearward to horizontal position and raise cover assembly.

(b) Place linked cartridges, with open sides of links down, on cartridge tray assembly (figure 6-16) making certain that first cartridge to be fired is in cartridge tray groove. The pawl in cartridge tray assembly will then engage the second cartridge. Cartridges must be positioned with open side of links down to permit stripping of cartridge from the link. Close and latch cover assembly.

b. Firing. With the machine gun M60D positioned, loaded, and aimed, push safety button to fire "F" position. Due to low cyclic rate of fire of machine gun, single cartridges or short bursts can be easily fired. Trigger must be completely released for each shot to fire single cartridges or to interrupt firing. When ammunition is exhausted, the last link will remain in cartridge tray assembly. Remove link and end plug by hand after cover assembly is opened for loading.

c. After Firing Operation.

(1) Push safety button to safe "S" position and attempt to fire machine gun.

(2) Retract bolt assembly by pulling handle assembly fully rearward until sear engages and push handle to the forward position. Move cover latch rearward to horizontal position and raise cover assembly. Remove linked cartridges.

(3) Inspect chamber to be sure it is clear.

(4) Close cover assembly and secure machine gun in stowed position.

6-101. EMERGENCY PROCEDURE.

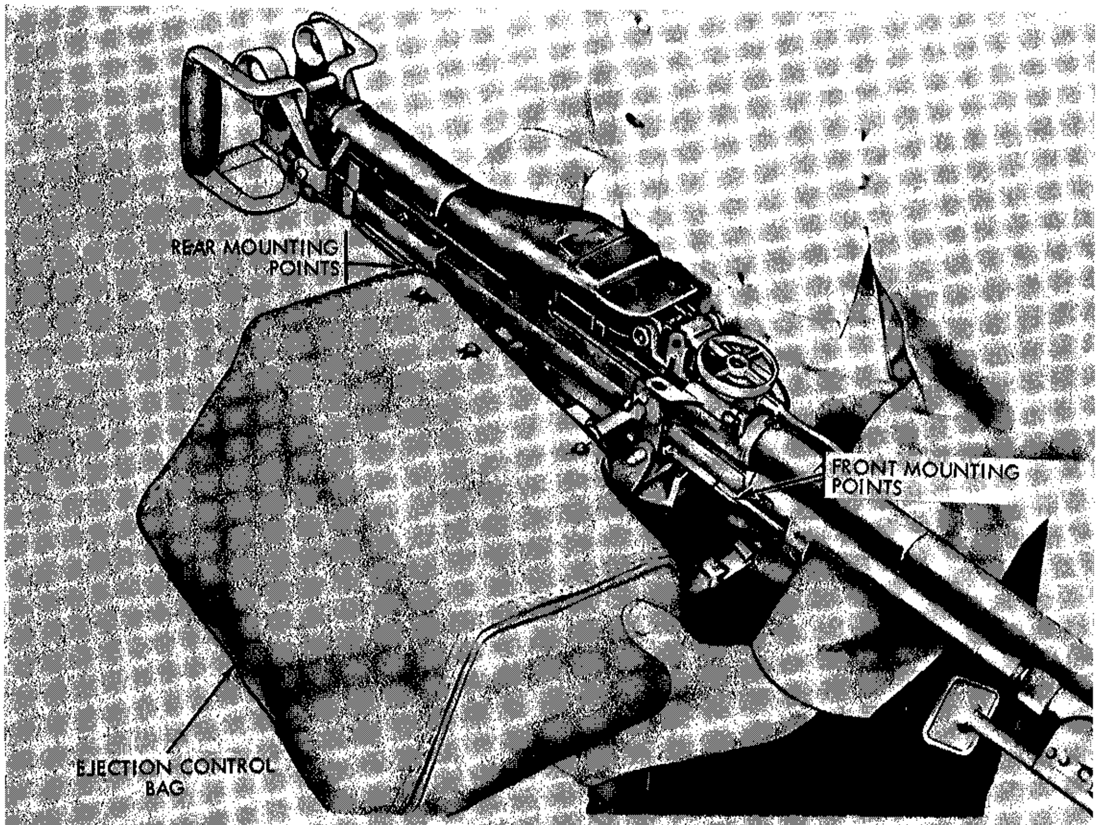
a. Failure to Fire.

(1) Misfire. A misfire is a complete failure to fire. A misfire in itself is not dangerous but since it cannot be immediately distinguished from a delay in functioning of the firing mechanism or from a hangfire (see paragraph (2) below), it should be considered as a possible hangfire until such possibility has been eliminated. Such delay in functioning of the firing mechanism, for example, could result from the presence of foreign matter, such as grit, sand, frost, ice, or improper or excessive oil or grease which might create, initially, a partial mechanical restraint but which, after some interminate delay, is overcome as a result of the continued force applied by the spring, and the firing pin then driven into the primer in normal manner. As a safety measure, no cartridges should be left in a hot machine gun any longer than the circumstances require, because of a possibility of a cock-off (see paragraph (3) below).

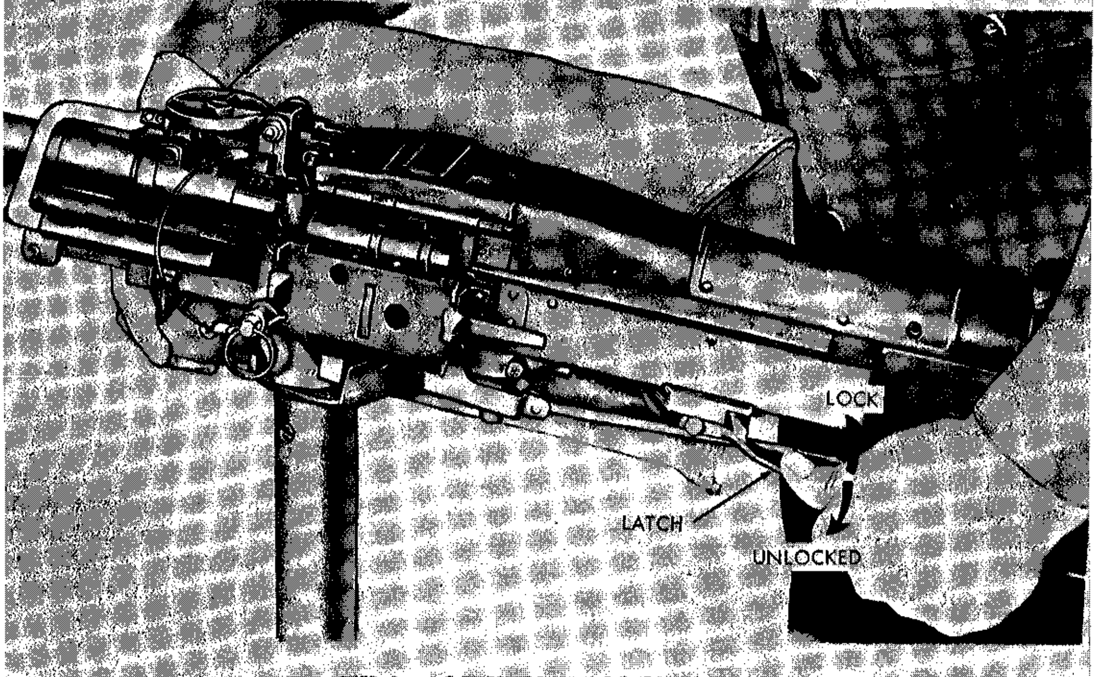
(2) Hangfire. A hangfire is a delay in the functioning of a propelling charge at the time of firing. The amount of delay is unpredictable but, in most cases, will fall within the range of a split second to several seconds. A hangfire cannot be distinguished immediately from a misfire and therein lies its principal danger. What might initially be assumed to be a failure to fire, or misfire, might prove to be a hangfire.

Warning

During the prescribed time intervals, the machine gun M60D will be kept trained on target. All personnel will stand clear of muzzle.



STEP 1 - POSITION EJECTION CONTROL BAG ON MOUNTING POINTS.



STEP 2 - LOCKED OR UNLOCKED POSITION.

Figure 6-11. Installation or removal of ejection control bag

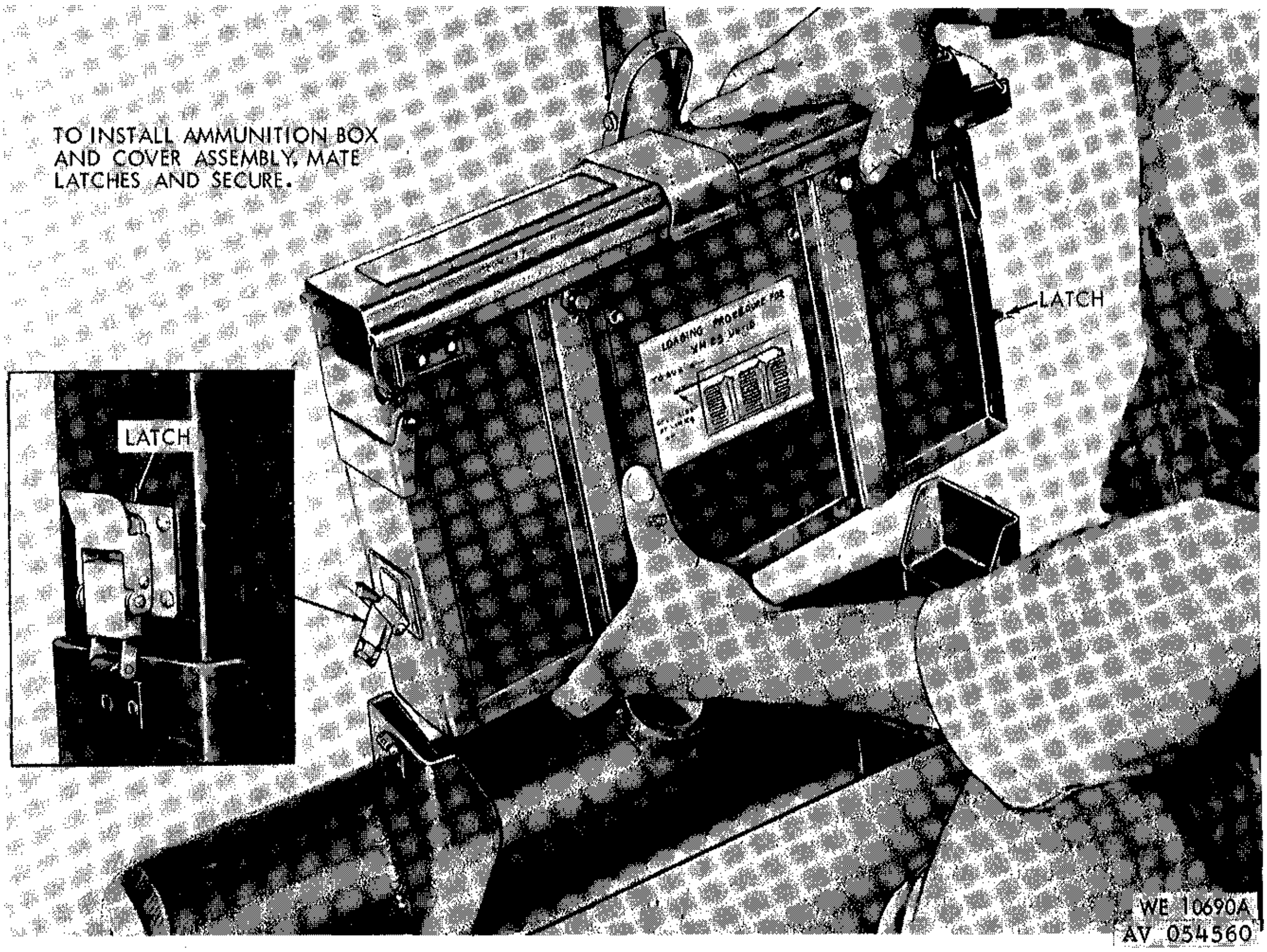


Figure 6-12. Installation or removal of ammunition box and cover assembly on tube assembly

(3) Cook-off. A cook-off is a functioning of any or all of the explosive components of a cartridge chambered in a very hot machine gun. If the primer or propelling charge should cook-off, the projectile may be propelled from the machine gun with normal velocity even through no attempt was made to fire the primer by actuating firing mechanism. In such a case, although there may be uncertainty as to whether or when cartridge will fire, the precautions to be observed are the same as those prescribed for a hangfire (see paragraph (2) above). To prevent a cook-off, a cartridge which has been loaded into a very hot machine gun should be fired immediately or removed after 5 seconds and within 10 seconds.

(4) Unloading an unfired cartridge. After a failure to fire, due to the possibility of a hangfire or a cook-off, the following general precautions, as applicable, will be observed until cartridge has been removed from the machine gun and cause of failure determined.

(a) Keep machine gun trained on target. All personnel will stand clear of muzzle.

(b) Before retracting bolt assembly either to remove cartridge or to recock as the case may be, personnel not required for operation will be cleared from the vicinity.

(c) The cartridge, after removal from the machine gun, will be kept separate from other cartridges until it has been determined whether the cartridge or the firing mechanism was at fault. If it is determined that the cartridge is at fault, it will be retained separate from other cartridges until disposed. On the other hand, if examination reveals that the firing mechanism was at fault, the cartridge may be reloaded and fired after correction of the cause for failure to fire.

(5) Time Interval. Always keep cartridge locked in chamber for 5 seconds from time a misfire occurs to insure against an explosion outside of machine gun in the event a hangfire develops. If the barrel is hot and a misfire stops automatic operation of machine gun, wait 5 seconds with cartridge locked in chamber to insure against hangfire dangers, then extract cartridge immediately to prevent a cook-off. If the cartridge cannot be extracted within 10 seconds,

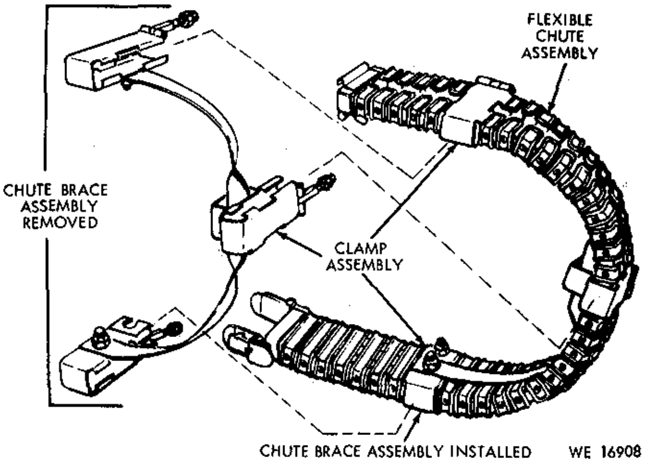


Figure 6-13. Installation or removal of brace assembly on chute assembly

it must remain locked in chamber for at least 5 minutes due to possibility of a cook-off.

Warning

> Do not retract bolt assembly when a hangfire or cook-off is suspected. A hangfire will normally occur within 5 seconds from the time the primer is struck and a cook-off after 10 seconds of contact with the chamber in a hot barrel. One hundred fifty cartridges fired in a 2 minute period will make a barrel hot enough to produce a cook-off.

b. Runway Gun. If machine gun M60D continues to fire after trigger has been released, immediately open cover assembly permitting the bolt assembly to go underneath cartridge and stop in the forward position.

6-102. AMMUNITION.

a. General. The ammunition for the 7.62 millimeter machine gun M60D is classified as small arms ammunition and is issued in the form of a complete round in linked belts. Issue is in proportion by types to meet tactical requirements.

b. Authorized 7.62 Millimeter Cartridges.

Cartridge, 7.62 millimeter:	AP, NATO, M61.
Cartridge, 7.62 millimeter:	Ball, NATO, M59.
Cartridge, 7.62 millimeter:	Ball, NATO, M80.
Cartridge, 7.62 millimeter:	Tracer, NATO, M62.
Cartridge, 7.62 millimeter:	Dummy, NATO, M63.

6-103. XM52 SMOKE GENERATOR SUBSYSTEM.

6-104. The smoke generator subsystem basically consists of the oil tank and hoses, pump and motor assembly and nozzle ring. A new designed bench seat and door panel is necessary to accept the smoke generator subsystem. The tank capacity is 50 gallons and provides approximately three (3) minutes of smoke generator operation.

Warning

> Do not use any alternate fluids in the oil tank. The prescribed fog oil is type SGF2 (Military Specification MIL-F-12070.)

6-105. COMPONENTS - XM52 SMOKE GENERATOR SUBSYSTEM.

a. The tank level fog oil circuit breaker is located in the overhead panel. The circuit breaker protects the pump and motor assembly.

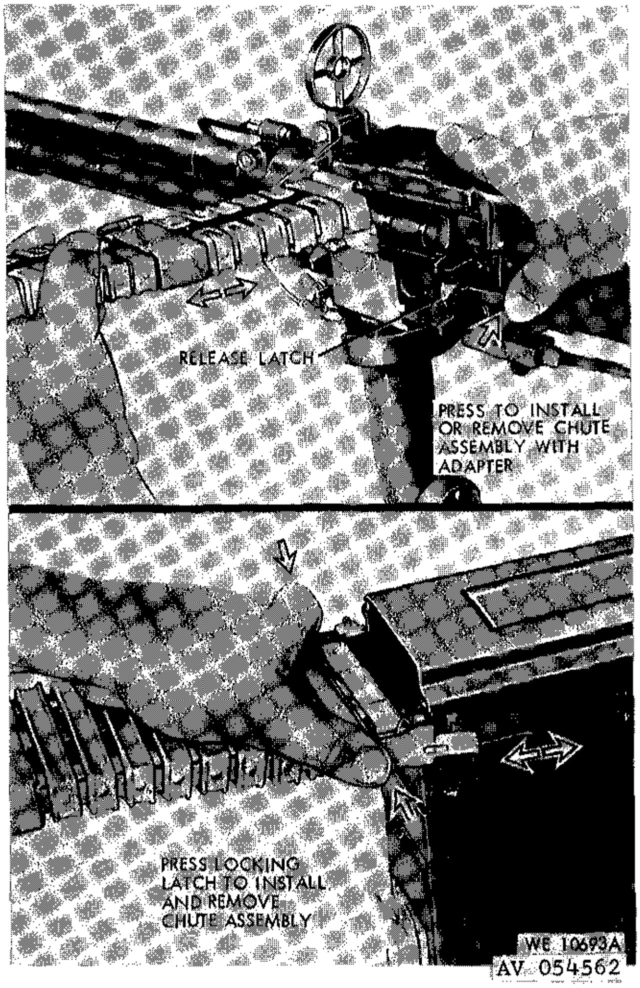


Figure 6-14. Installation or removal of chute assembly on machine gun M60D and ammunition box and cover assembly

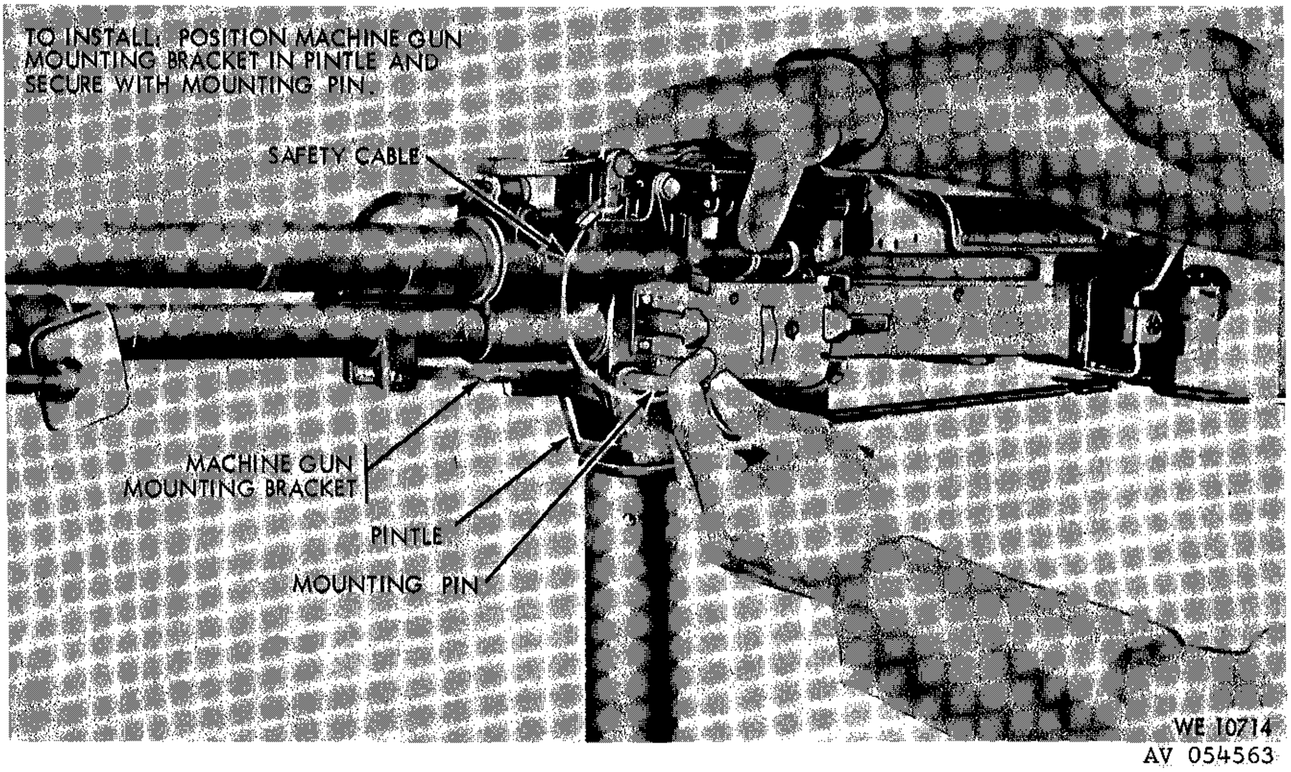


Figure 6-15. Machine gun M60D position on pintle - left side shown

b. The operating switch is a hand held push button switch that is attached to the end of a six foot length of coiled cable suspended from the cabin roof and held by a clip secured near the center line of the roof structure. Its location is accessible to the pilot, copilot, and crew members.

c. An oil level gage is mounted on the center post in the cockpit. The gage is marked from E (empty) to F (full) in 1/4 tank increments, to indicate the quantity of oil remaining in the oil tank.

6-106. OPERATION - XM52 SMOKE GENERATOR SUBSYSTEM.

a. Press tank level fog oil and smoke generator pump control circuit breakers (on overhead panel) to IN position.

b. To generate smoke, press and hold operating switch push button for as long as smoke generation is desired. The oil level gage will indicate the amount of fog oil remaining in the oil tank at all times. The total continuous operating time (starting with a full oil tank) is approximately three (3) minutes.

Note

Smoke can be generated either continuously or in short bursts. Smoke generation will stop when the operating switch push button is released.

6-107. DESTRUCTION OF MATERIAL.

6-108. GENERAL.

Note

The information contained in the following paragraphs is in accordance with demolation information contained in International Standardization Agreement-STANAG 2113.

a. It is essential to destroy to the maximum degree possible military technical equipment, abandonded in wartime operations, to prevent its eventual repair and use by the enemy.

b. Methods of destruction should achieve such damage to equipment and essential spare parts that it will not be possible to restore the equipment to a usable condition in the combat zone either by repair or cannibalization.

6-109. PRIORITIES.

a. When lack of time and/or stores prevents complete destruction of equipment priority is to be given to the destruction of essential parts, and the same parts are to be destroyed on all like equipment.

b. The priority for destruction of equipment components shall be as follows:

(1) Receiver and breech mechanism.

(2) Gun barrels.

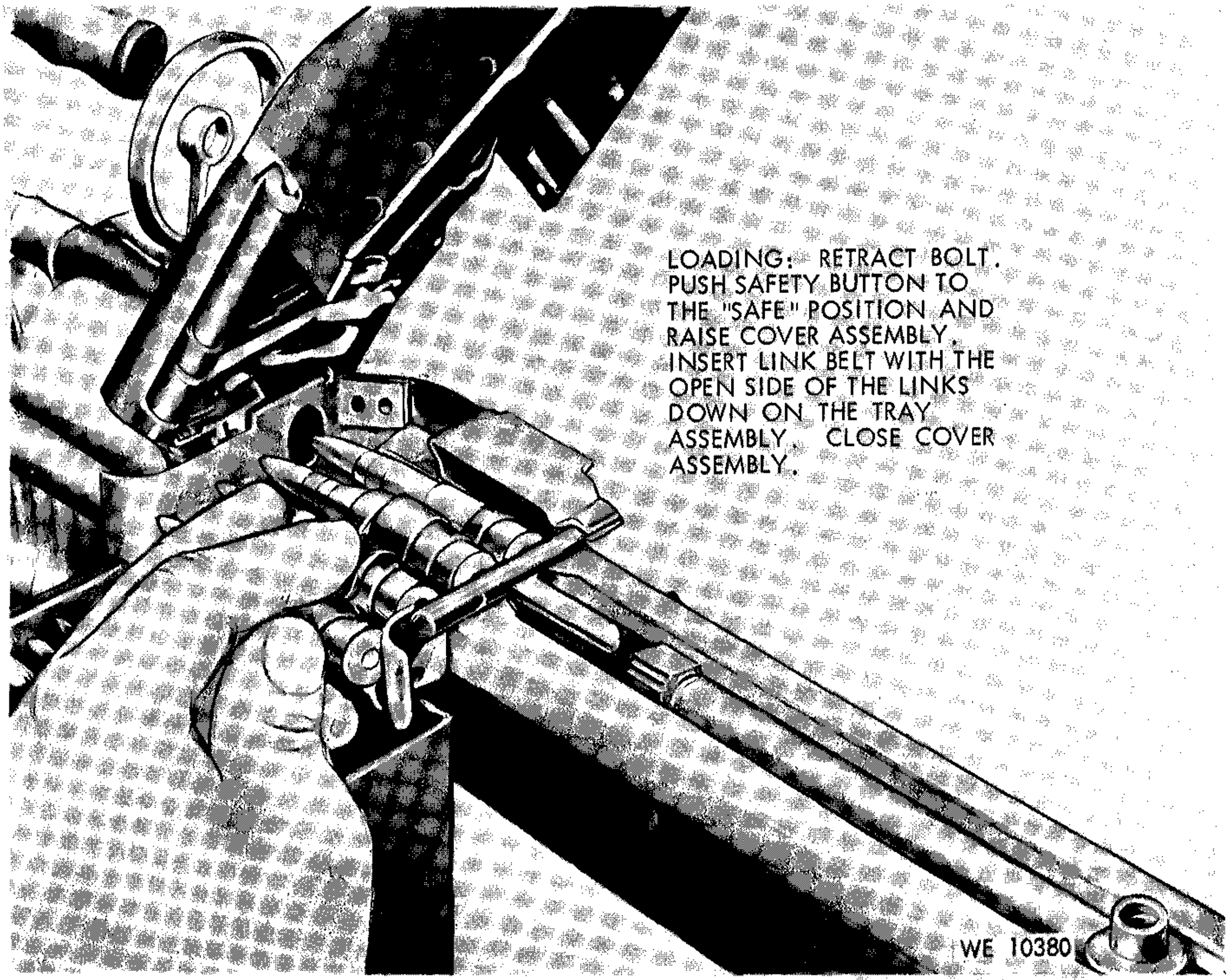


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Figure 6-16. Positioning linked cartridges on cartridge tray assembly

(3) Front and rear sights.

(4) Armament subsystem M23 Mount Assemblies.

c. Equipment installed on aircraft shall be destroyed in accordance with the priorities for the equipment itself. The same priority, for destruction of component parts of armament subsystems, must be given to the destruction of similar components in spare parts storage areas, if they cannot be evacuated.

6-110. METHODS.

a. Ordinarily the armament should be destroyed in conjunction with the destruction of the helicopter.

b. If the material is off the helicopter, the armament can be destroyed by using one of the following methods:

(1) Mechanical. Requires axe, pick, sledge, crowbar, or similar implement.

(2) Burning. Requires gasoline, oil, incendiary grenades, or other flammables, or welding or cutting torch.

(3) Demolition. Requires suitable explosives or ammunition.

6-111. AUTHORIZATION AND REPORTING.

a. The authority for ordering the destruction of equipment is vested in the divisional and higher commanders, who may delegate authority to subordinate commanders when the situation requires.

b. The reporting of the destruction of equipment is done through command channels.

SECTION VIII PHOTOGRAPHIC EQUIPMENT

(Not Applicable)

SECTION IX AUTOMATIC STABILIZATION EQUIPMENT

(Not Applicable)

SECTION X MISCELLANEOUS EQUIPMENT

6-112. WINDSHIELD WIPER.

6-113. Two windshield wipers are provided, one for the pilot on the right-hand section of the windshield and one for the copilot on the left-hand section of the windshield. The wipers are driven by electric motors with electric power supplied by the 28-volt DC electrical system. Circuit protection is provided by WINDSHIELD WIPER PILOT and WINDSHIELD WIPER COPILOT circuit breakers on the DC circuit breaker panel. (See figure 2-11.) The windshield wiper switches on the overhead console mounted MISC panel (see figure 2-10), have five positions: HIGH, MED, LOW, OFF and PARK. The panel also has a selector which permits the operation of windshield wiper for pilot, copilot or both as desired.

Caution

Do not operate the wiper on a dry windshield.

6-114. CASUALTY CARRYING EQUIPMENT.

6-115. See figure 6-17 for a typical litter installation.

6-116. LITTER PROVISION.

6-117. Provisions for the installation of folding litter racks adapt the helicopter to carry six litter patients. Three standard army medical service litters are located on each side of the transmission support structure and are attached to the transmission support structure and stanchions. Alternate litter loading is to position three litters laterally. Litter patients are loaded through the cargo doors. Passenger safety belts are used to secure litter patients to the litters. The litters are designed to be quickly installed, folded for internal storage, or removed when their use is not anticipated.

6-118. MEDICAL ATTENDANT'S SEAT.

6-119. When six litters are installed, the center forward-facing troop seat (attached to transmission support structure) is used for the medical attendant. The seat may be folded and stowed or removed, as required, for accomplishment of various missions. The seat is attached to the floor and the transmission support structure and is equipped with a detachable safety belt. When lateral litter loading is used, a single seat attached to the floor behind the pilot and copilot and facing aft, is used for the medical attendant. This seat is equipped with a safety belt.

Note

The medical attendant's seat is not installed on helicopter serial number 65-9605 and subsequent helicopters.

6-120. CARGO LOADING EQUIPMENT.

6-121. The helicopter cargo areas do not require any special loading aids or equipment to accomplish loading or unloading.

6-122. EXTERNAL CARGO SUSPENSION UNIT.

6-123. See figure 6-18, External Cargo Suspension System.

Caution

Helicopters equipped with a non-rotating cargo suspension unit, which maintains the hook in a fixed position, (facing forward) should be used only with a cargo sling having a swivel attachment ring. A device which may be used for this application is: Sling, Endless, Nylon Webbing, Type I, 10 inch, Part No. PD 101-10.

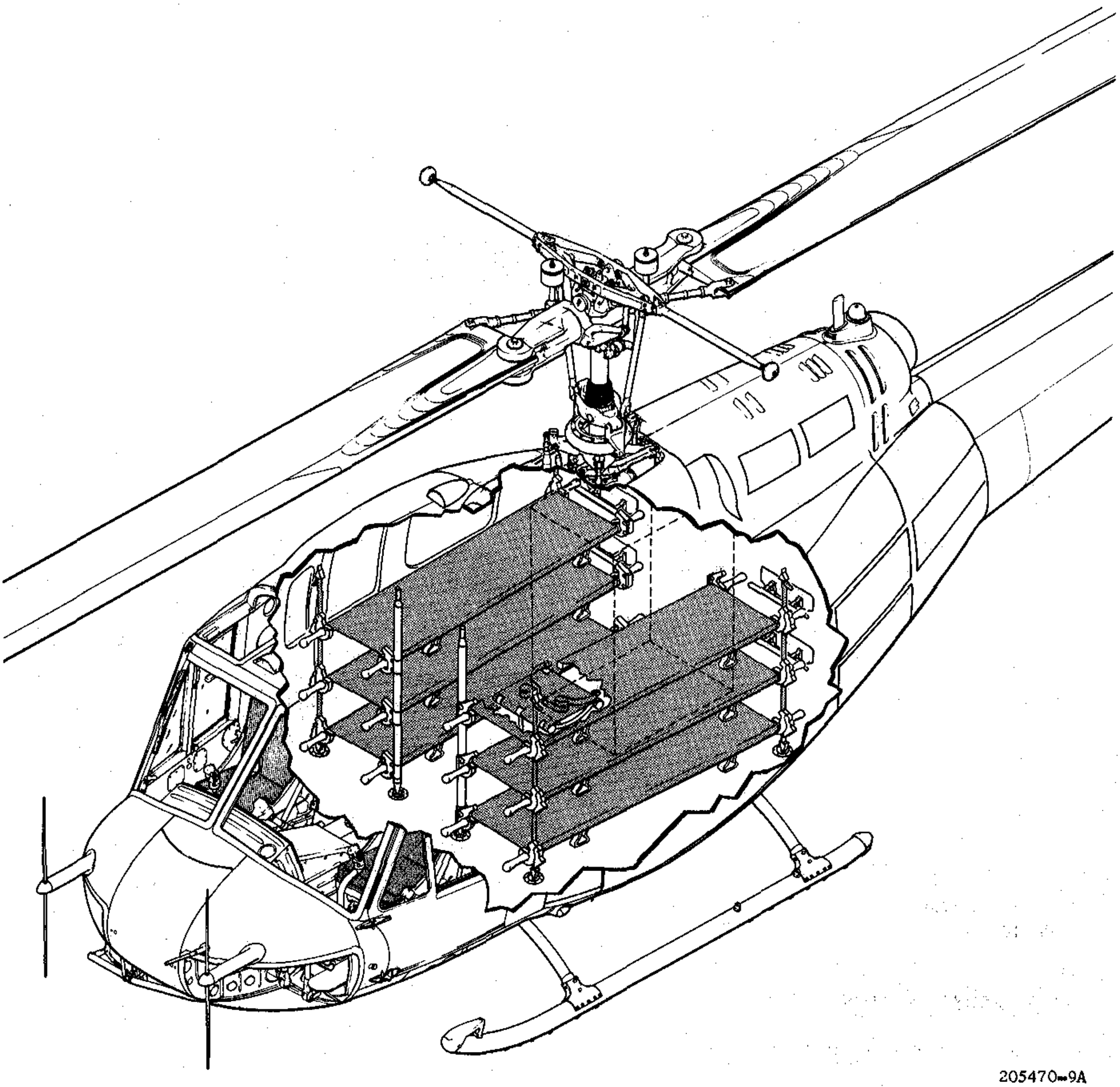
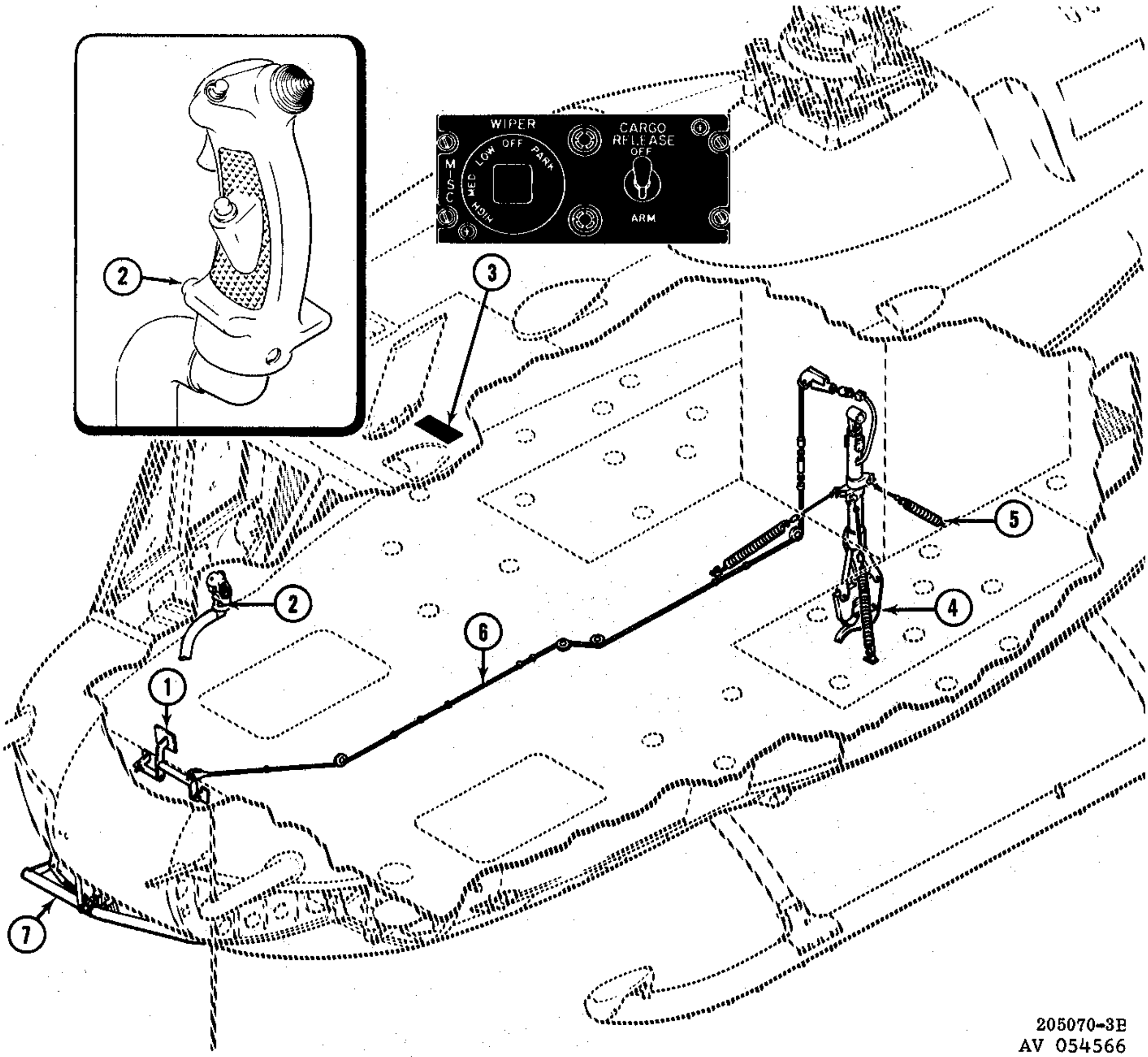


Figure 6-17. Litter installation - typical

6-124. External cargo can be carried by means of a short single-cable suspension unit (figure 6-18), secured to the primary structure and located at the approximate center of gravity. This method of attachment and location has proved to be the most satisfactory for carrying external cargo. Pitching and rolling due to cargo swinging is minimized, and good stability and control characteristics are maintained under load. A MANUAL CARGO RELEASE PUSH pedal is located between the pilot's tail rotor control pedals, and an electrical release pushbutton switch is on the cyclic control stick. Before the electrical release switch on the cyclic control stick can be actuated, the CARGO RELEASE switch on the overhead panel must be positioned to ARM. When not in use, the cargo suspension unit need not be removed, nor does it require stowing. Three cable and spring attachments keep the unit centralized, and the hook protrudes only slightly below the lower surface of the helicopter. A rear view mirror enables the pilot to visually check operation of the external cargo suspension hook.



1. External Cargo Mechanical Release
2. External Cargo Electrical Release Switch
3. Cargo Release Off/Arm Switch - Miscellaneous Panel
4. External Cargo Suspension Assembly
5. Suspension Unit Centering Assembly Springs (3)
6. Mechanical Release Cable Assembly
7. Cargo Rear View Mirror

Figure 6-18. External cargo suspension system

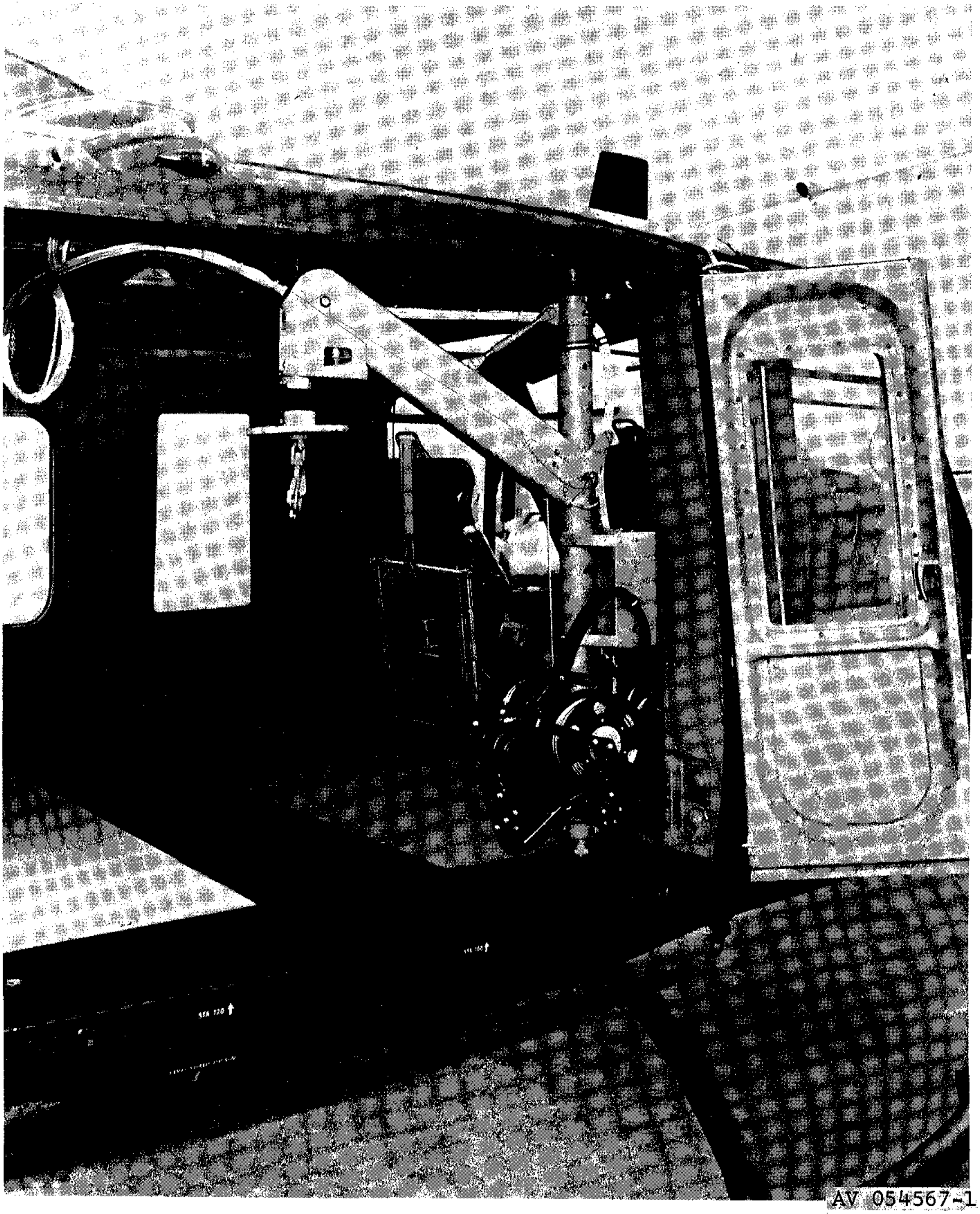


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Figure 6-19. Hoist Installation (Sheet 1 of 2)

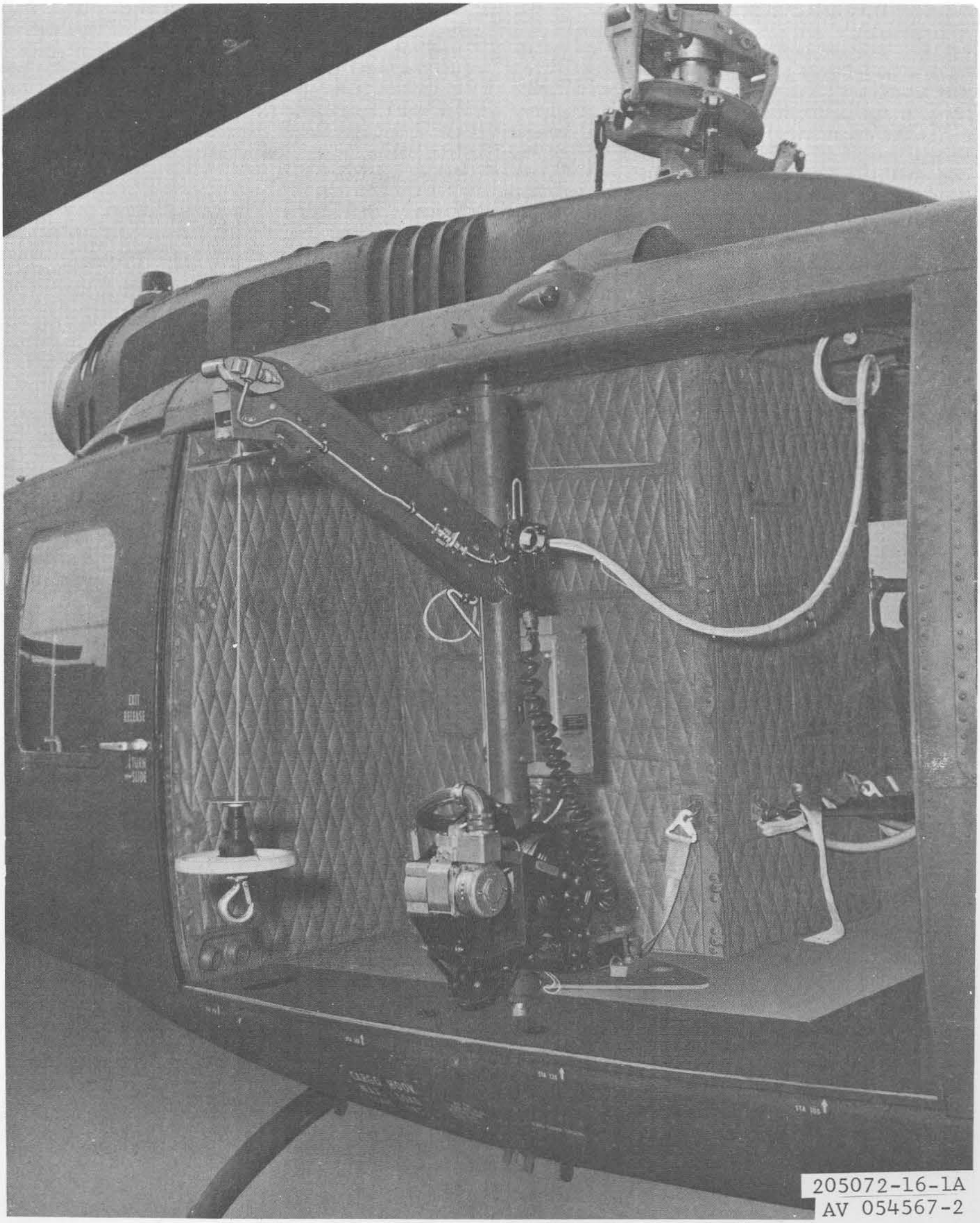
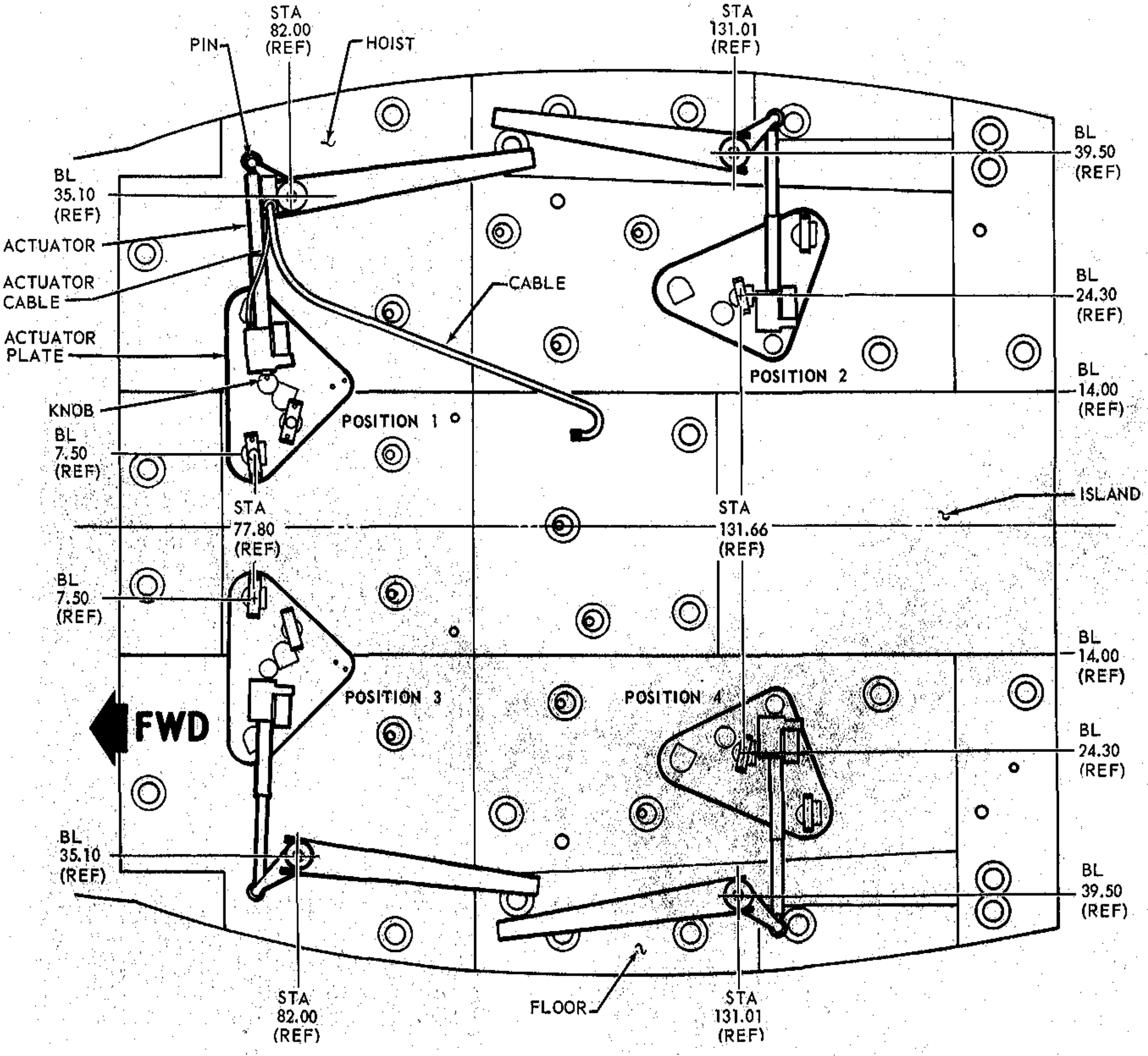


Figure 6-19. Hoist Installation (Sheet 2 of 2)

6-125. INTERNAL RESCUE HOIST.

6-126. Provisions have been made for the installation of an internal rescue hoist. (See figure 6-19.) The hoist may be installed in any one of four positions in the helicopter's cabin as shown in figure 6-20. The hoist installation consists of a vertical column extending from the floor structure to the cabin roof, a boom with an electrically powered traction sheave, and an electrically operated winch. Two electrical control stations for the operation of the rescue hoist are provided, one for the pilot, and one for the hoist operator. The pilot's control switch is located on the cyclic control stick (figure 2-4) and provides up and down operation of the hoist as well as positioning the boom. A pendant control (figure 6-21) is provided for the hoist operator and contains a boom positioning switch and a toggle switch for hoist operation. The pilot's control can override the hoist operator's control. A pressure cartridge type cable cutter is provided with two guarded type cable cutter switches.

6-127. The pilot's cable cutter switch is mounted on the pedestal (figure 6-22) and the hoist operator's cable cutter switch is mounted on the top of the hoist



PLAN VIEW OF CABIN FLOOR

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Figure 6-20. Four positions hoist may occupy in cabin

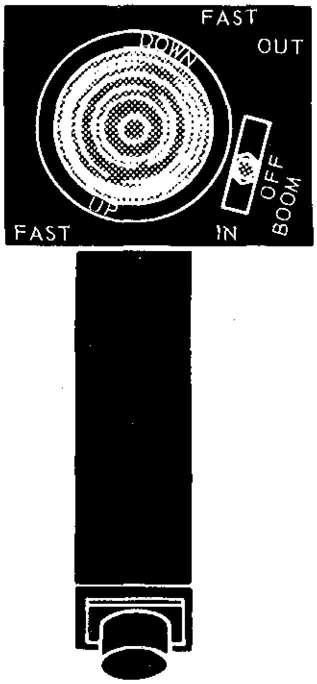

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Figure 6-21. Pendant control - rescue hoist

control box (figure 6-23). The hoist has a usable capacity of 256 feet of cable. Two limiting switches provide automatic stoppage to protect reel-in and reel-out limits of usable cable. The hoist operators intercom speaker is controlled by a switch on the pendant and gives the hoist operator interphone communications with the flight crew.

Note

The hoist cable is color coded as follows: The first 25 feet at the hook end is yellow, the next 175 feet is unpainted, the next 40 feet is yellow and the last 16 feet is red.

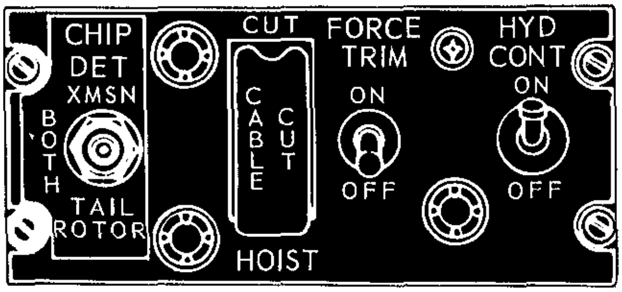

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Figure 6-22. Hoist cable cutter switch - pilot

6-128. RESCUE HOIST OPERATIONS.

6-129. The rescue hoist is used to accomplish the lifting of 600 pounds of personnel or 600 pounds of cargo when a landing cannot normally be made. The types of lifts usually required in the use of the rescue hoist are:

a. Pickups from wooded or obstructed areas.

b. Pickups from water.

c. Pickups from boats or ships where landings could not be accomplished.

Caution

The hoist should normally be operated in the full speed condition as slow speed operation will cause the motor to heat excessively.

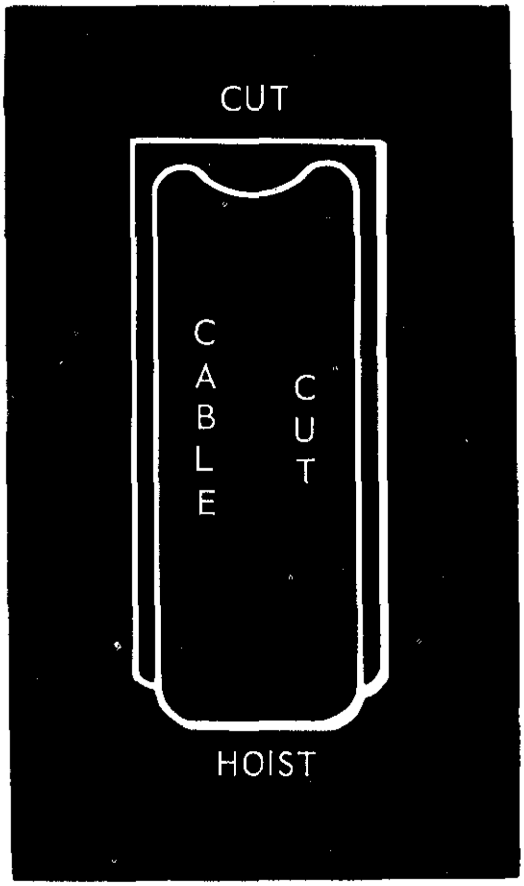

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Figure 6-23. Hoist cable cutter switch - hoist operator

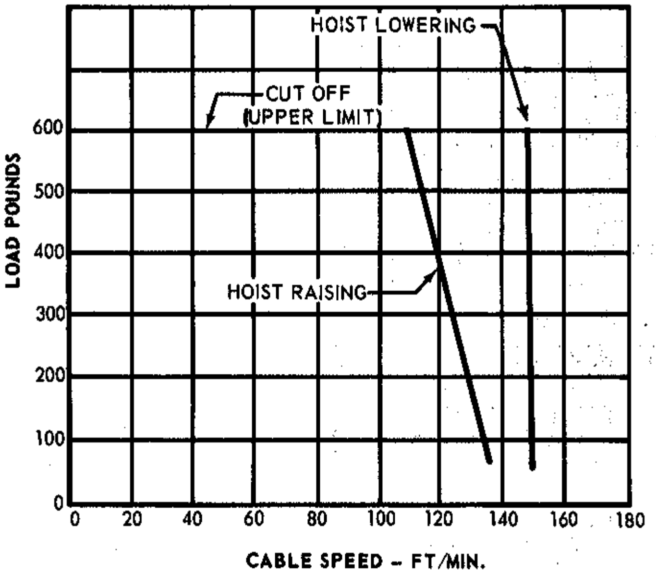

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Chart 6-1. Hoist cable speed versus load plus or minus 15 percent

Note

The hoist operator has variable speed controls for raising or lowering the cable. The further the down/up toggle is pushed from its neutral position, the faster the hoist will run. See Hoist Cable Speed Versus Load Chart, 6-1.

Caution

If the hoist does not have a traction sheave, a minimum of 5 pounds tension must be applied to the cable for a reel-out (cable down) at all times. The hook and handwheel provide this weight. DO NOT PERMIT cable to become slack.

6-130. OPERATING DATA. The following general information is provided for use when operating rescue hoist.

a. Maximum Load . . . 600 pounds for raising or lowering

b. Usable Cable Length . . . . 256 feet

c. Limits:
Boom In and Boom Out . . . . . . Preset limit switches in the actuator
Up Limit. . . . . Trigger at end of boom (Contacted by rubber bumper on the hook hand-wheel)
Down Limit . . . . . . Switch (actuated when three wraps of cable remain on storage drum)

d. Override. . . . . The pilot's control will override the operator's control.

6-131. WEIGHT AND BALANCE INFORMATION.

6-132. Weight and balance information, resulting from installation of the internal rescue hoist, is as follows:

a. Forward position (hoist arm inside).

(1) Change in basic weight. . . . . . . Plus 151.3 pounds

(2) Moment arm . . . . 87.3 inches

(3) Change in basic moment. . . . . . 11.211 inch-pounds

(4) Chart "A" entry . . . . Not applicable

(5) Chart "C" entry . . . . Weight change, plus 151.3 pounds

Moment Arm 87.3 inches

Moment/100, plus 132.1 inch-pounds

b. Aft position (hoist arm inside).

(1) Change in basic weight. . . . . . . Plus 151.3 pounds

(2) Moment arm . . . . 125.1 inches

(3) Change . . . . . . .18.927 inch-pounds

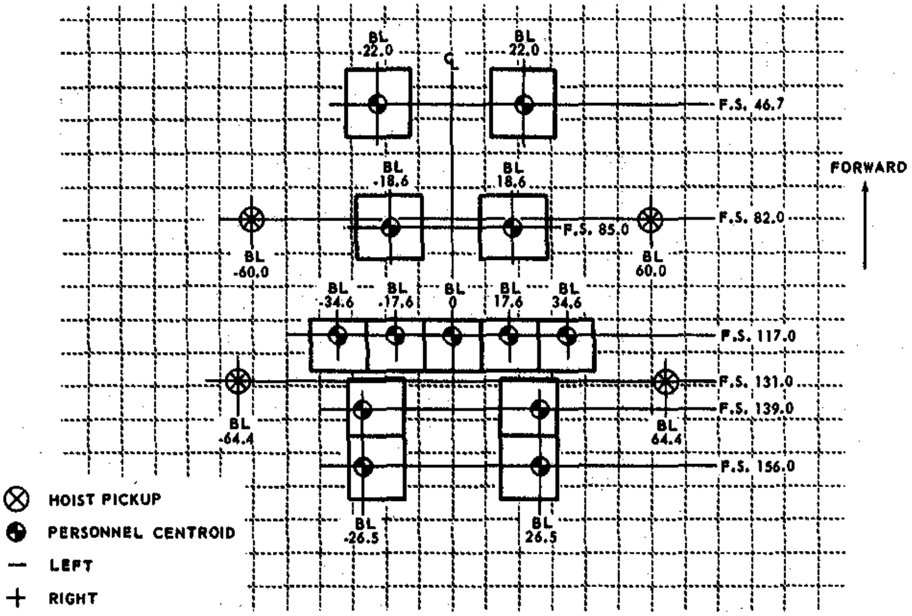
(4) Chart "A" entry . . . . Not applicable

(5) Chart "C" entry . . . . Weight change, plus 151.3 pounds

Moment arm, 125.1 inches

Moment/100, plus 189.2 inch-pounds

c. Possible seating and hoist locations. (See chart 6-2.)



POSSIBLE SEATING & HOIST LOAD LOCATIONS

C.G. Limits Longitudinal F.S. 130 to F.S. 144

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Chart 6-2. Possible seating and hoist load locations

6-133. USE OF INTERNAL HOIST LOADING CHART CHART FOR HOIST IN FORWARD RIGHT-HAND POSITION.

PROBLEM:

Determine the maximum allowable hoist load for the known weight conditions as follows:

Pilot and copilot	200 pounds each
Gross weight	6500 pounds
Longitudinal C.G.	Sta. 132.5

ANSWER:

Longitudinal Limitation (See Chart 6-3.)

Draw a straight line horizontally from C.G. location at Sta. 132.5 to extrapolated point for gross weight of 6500 pounds. Draw an intersecting vertical line down to allowable hoist load, 335 pounds.

Lateral Limitations (See Chart 6-4).

Draw a vertical line from the gross weight of 6500 pounds to the pilot and copilot line. Draw an intersecting line horizontally to the allowable hoist load, 502 pounds.

The smaller of the two weights derived must be used, therefore the maximum allowable hoist load will be 335 pounds.

Note

If additional internal load is carried during hoisting operations this load should be positioned on opposite side from hoist.

6-134. OPERATING PROCEDURE - PILOT.

6-135. The pilot's hoist control switch is located on the cyclic control stick (figure 2-4).

a. Check rescue hoist cable cutter, rescue hoist control, and rescue hoist power circuit breakers are "IN".

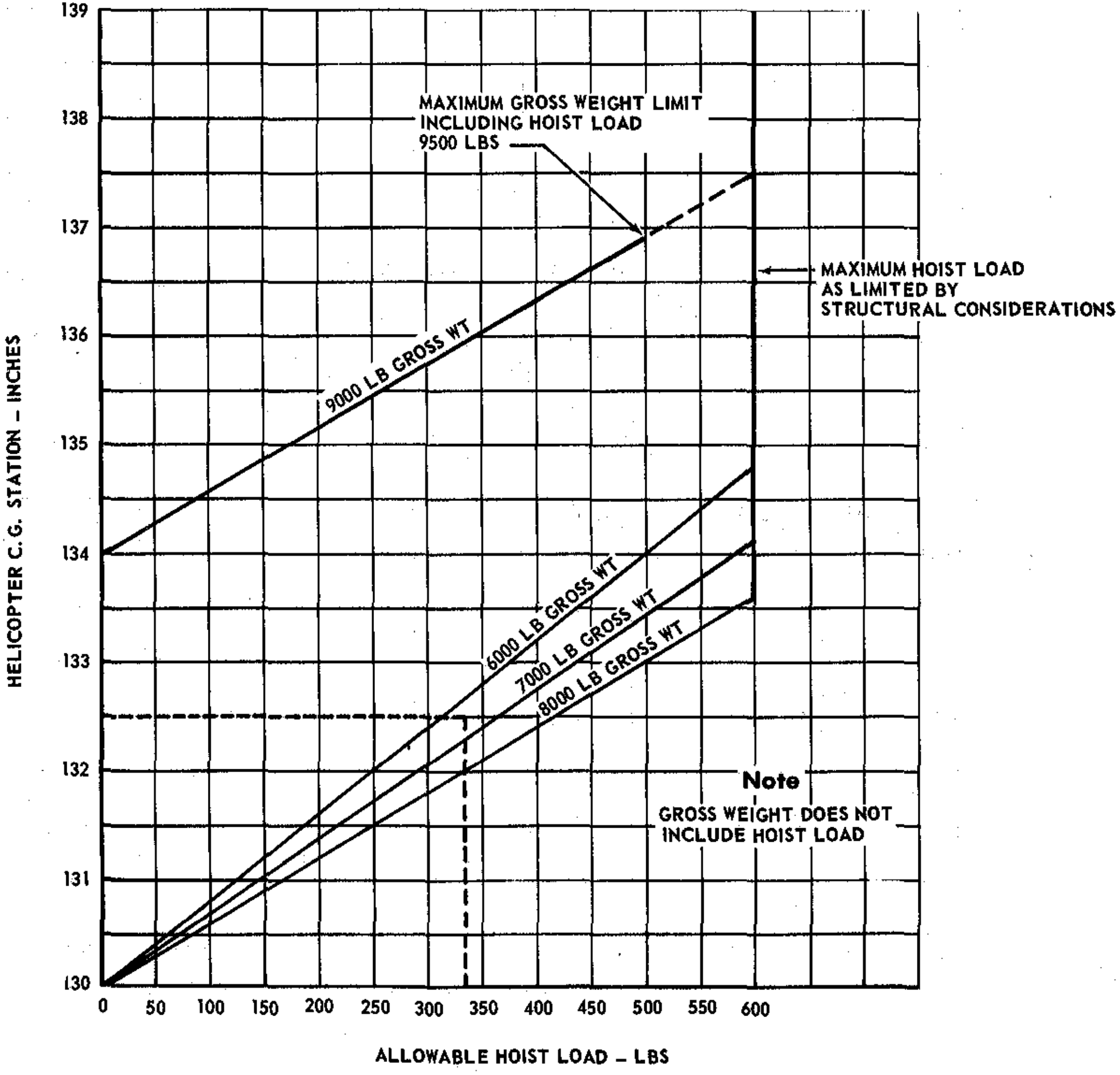
b. Establish zero ground speed over pick-up location.

c. Move hoist control, on cyclic stick, to right to swing boom outboard.

Note

Pilot's controls will override the hoist operator's control inputs; however, the pilot has only a single speed capability.

d. Move hoist control switch "down" to lower hook and hand-wheel assembly.



HOIST LOADING LIMITATIONS DUE TO LONGITUDINAL C.G. LIMITS

HOIST IN FORWARD R.H. POSITION

AV 054574

Chart 6-3. Helicopter C.G. vs allowable hoist load

Note

Hoist cable is painted at each end to provide visual indication of cable footage that is extended. The hoist cable is lowered approximately 150 feet per minute and is retracted approximately 120 feet per minute (table 6-1).

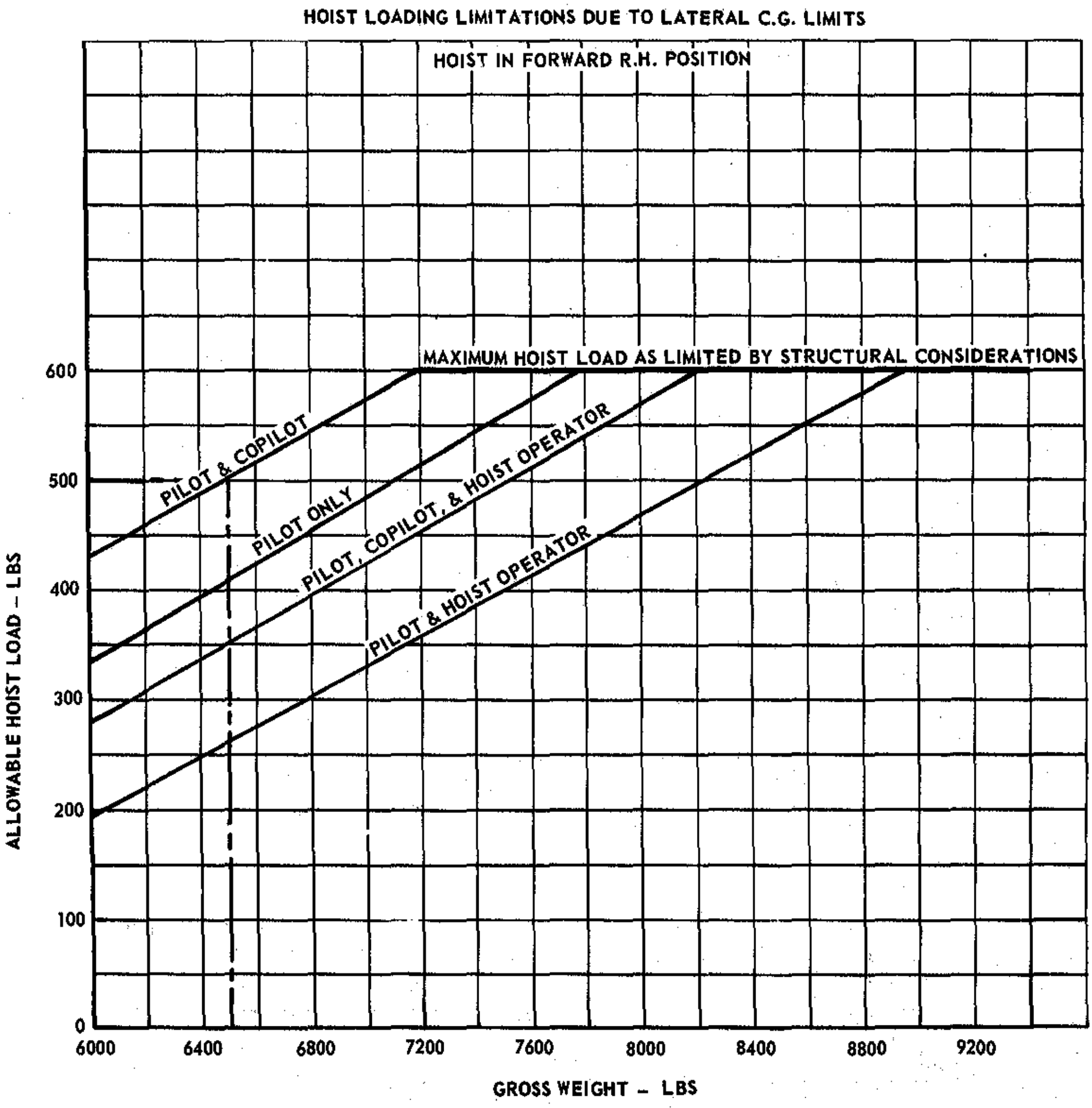
Caution

When a load attached on the hoist hook (and if conditions permit) it is advisable not to make abrupt changes in helicopter attitude until load is aboard or raised as close as possible. G-forces on hoist could become excessive if hoist load is being raised during abrupt movements of helicopter. These G-forces could result in the yield or failure of the hoist cable.

e. Move hoist control switch aft to raise hoist load.

Note

In case the extended portion of the hoist cable has to be jettisoned, a cable cut switch is provided on the instrument pedestal. (See figure 6-22.) The cable cutter is an electrically initiated pressure charged type.



Note

This weight to be the lightest weight of the helicopter during hoisting operations, but not including the weight of the hoist load. Fuel burned prior to hoisting operations must be deducted from takeoff G.W. before computing allowable hoist load.

AV 054575

Chart 6-4. Gross weight vs allowable hoist load

f. Move hoist control switch to left to swing hoist boom inboard.

g. Bring hoist load into cabin and hoist to stowed position (fully inboard).

6-136. OPERATING PROCEDURE - HOIST OPERATOR.

6-137. The hoist operator's operating procedure is set forth in Chapter 11.

6-138. HEATED BLANKET RECEPTACLES.

6-139. Six electrical receptacles are provided to furnish 28-volt DC for heated blankets. These receptacles are mounted on the inside cabin roof structure of the cargo passenger area, aligned with the forward edge of the transmission support structure, three at the right side and three at the left side. Electric power to these receptacles is supplied by the 28-volt DC nonessential bus. Circuit protection is provided by HEATED BLANKET circuit breakers on the DC circuit breaker panel (see figure 2-11).

6-140. DATA CASE.

6-141. A data case for maps, flight reports, etc., has been provided and conveniently located on the aft end of the instrument pedestal.

6-142. MOORING FITTINGS.

6-143. Moorning fittings are provided at four locations on the helicopter. Two fittings are installed under the fuselage just aft of the pilot's and copilot's stations, one at the right-hand side and one at the left-hand side. The other fittings are installed under the fuselage just aft of the skid landing gear, one on each side.

6-144. TOW RINGS.

6-145. To facilitate towing the helicopter with ground handling wheels lowered, a tow ring has been provided near the forward end of each of the landing gear skids. These rings will accommodate a standard tow bar.

6-146. GROUND HANDLING WHEELS.

6-147. Ground handling wheels have been provided on each of the landing gear skids. These wheels can be extended to accomplish ground handling (pushing and towing the helicopter). Ground handling gear is usually removed before flight, but can be left in place on skids if properly secured in retracted position by means of support rods provided on each side.

TABLE 6-1. OPERATING LIMITATIONS - HOIST

<table>
<tr><td colspan="2">256 Foot Cable:
Lower 250 lbs.
Raise 250 lbs.
Lower 0 lbs
Raise 250 lbs.
9 Cycles
The above is equivalent to lowering a medical attendant and then raising nine patients with the attendant. Use 30-second rest period at end of each raise or lower cycle. Use 30-minute rest period at completion of nine cycles.</td></tr>
<tr><td>256 Foot Cable:
Lower 0 lb.
Raise 600 lb.
3 Cycles
Thirty-second rest period at end of each raise or lower cycle. A 30-minute rest period at completion of above listed cycles.</td><td>256 Foot Cable:
Lower 0 lb.
Raise 400 lb.
5 Cycles
Thirty-second rest period at end of each raise. A 30-minute rest period at the end of five cycles.</td></tr>
<tr><td>256 Foot Cable:
Lower 600 lb.
Raise 0 lb.
3 Cycles
A 30-second rest period at end of each raise or lower cycle. A 30-minute rest period at completion of above listed cycles
250</td><td>256 Foot Cable:
Lower 400 lb.
Raise 0 lb.
5 Cycles
A 20-second rest period at end of each raise or lower cycle. A 30-minute rest period at completion of above listed cycles.</td></tr>
</table>

6-148. BLACKOUT CURTAINS.

6-149. Provisions have been made for installing blackout curtains behind pilot's and copilot's seats and between forward and aft cabin sections. Other blackout curtains may be installed over both cargo door windows and window in removable door post.

6-150. BLOOD BOTTLE HANGERS.

6-151. Two blood bottle hangers have been provided on the inside of the cabin roof structure within easy reach of the medical attendant's station, for administration of blood to litter patients in flight.

Note

> Blood bottle hangers are not installed on helicopter serial number 65-9605 and subsequent helicopters.

6-152. MAIN AND TAIL ROTOR TIE-DOWNS.

6-153. Main and tail rotor tie-downs are provided to use in mooring the aft blade of the main rotor and the tail rotor to prevent the rotors from seesawing when the helicopter is parked. The tie-downs are stowed in the cargo compartment when not in use.

6-154. CARGO TIE-DOWN FITTINGS.

6-155. For information covering cargo tie-down fittings refer to cargo tie-down equipment in Chapter 13.

6-156. EXTERNAL CARGO REAR VIEW MIRROR.

6-157. A mirror is installed under the right-hand lower nose window to give the pilot clear visibility of the external cargo. This mirror is easily removed and stowed when not in use. (Refer to Chapter 13.)

6-158. PARATROOP STATIC LINE.

6-159. Provisions are included in the cabin for the attachment of a static line kit for parachutes. This consists of attachment fittings, spreader bar and static line.

6-160. ELECTRICAL PROVISIONS FOR LYCOMING ENGINE VIBRATION CHECK EQUIPMENT - (Serial Nos. 64-13662 and Subsequent).

6-161. Provisions are provided to permit the use of engine vibration check equipment as a maintenance aid. The provisions consist of an AC electrical receptacle, associated wiring hardware and a circuit breaker. The receptacle and circuit breaker are located on the AC circuit breaker panel.

6-162. The purpose of these provisions is to facilitate the use of the Lycoming engine vibration check equipment. The 115 volt, 60-400 CPS power source for the aircraft corresponds to the requirements of the check equipment. The electrical outlet eliminates the necessity for elaborate wiring of the equipment into the aircraft electrical distribution system to provide operating power.

SECTION XI AUXILIARY FUEL EQUIPMENT

6-163. AUXILIARY FUEL EQUIPMENT.

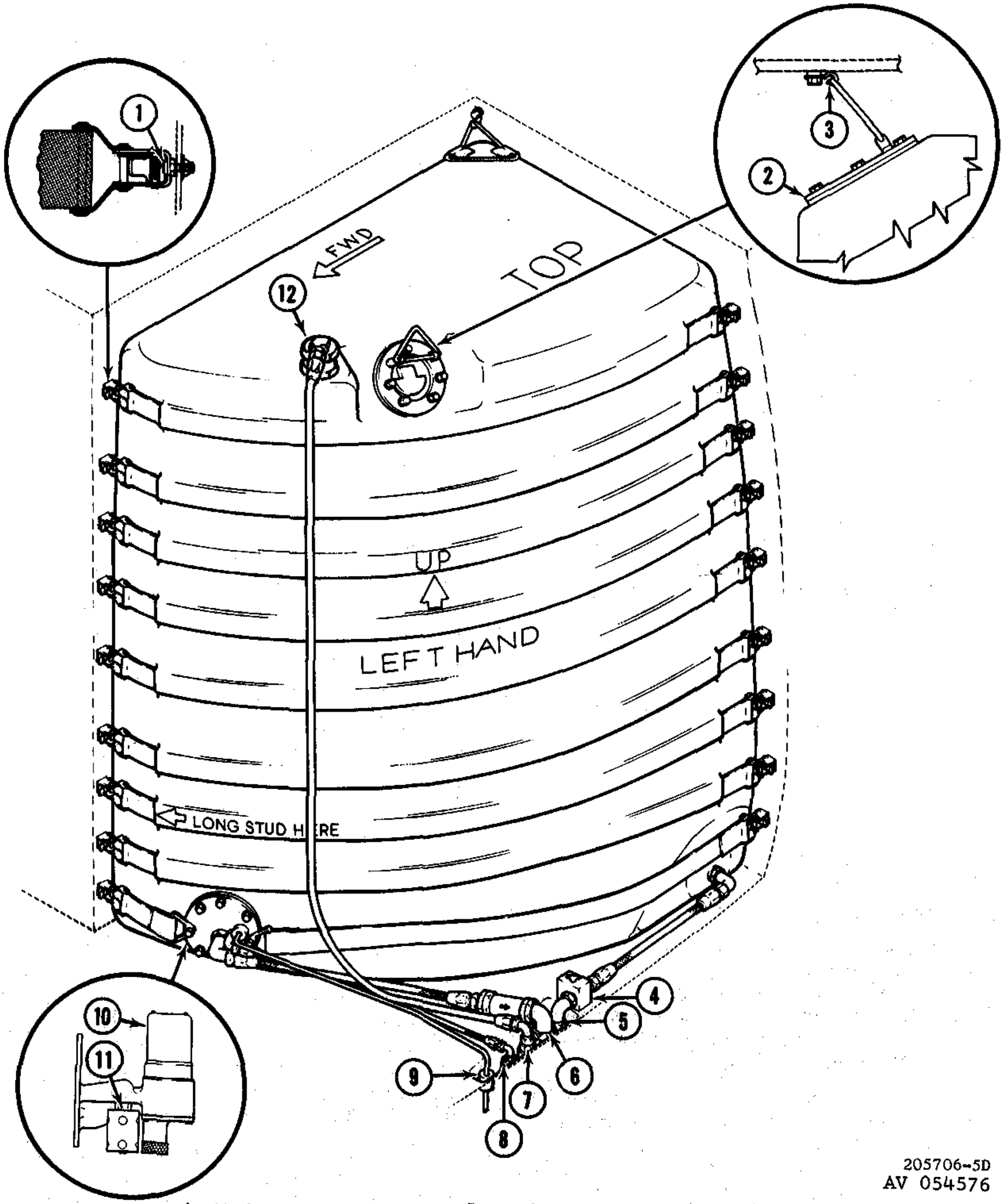
6-164. Complete privisions have been made for installing an auxiliary fuel equipment kit in the helicopter cargo-passenger compartment for extended distance and ferry missions. This equipment allows the helicopter to be serviced with an additional 300 U.S. gallons (1950 pounds) of fuel.

6-165. The kit consists of two 150-gallon bladder type tanks, fittings, fuel lines, drain lines, valves, a pump in each tank, and the necessary electrical equipment. The tanks are secured to fittings on the aft bulkhead and transmission support structure by nylon webs which are an integral part of each tank. Fuel is pumped from left auxiliary tank to left forward main fuel cell by the electrically driven transfer pump in the left auxiliary tank and controlled by the LEFT transfer pump switch. Fuel is pumped from the right auxiliary tank to the right front main fuel cell by the electrically driven transfer pump in the right auxiliary tank and controlled by the RIGHT transfer pump switch. The pilot is alerted to an auxiliary tank low condition by means of a worded segment on the CAUTION panel (figure 2-14) which illuminates when actuated by an auxiliary fuel low level switch. A check valve incorporated in the auxiliary fuel flow line attached to the tank prevents fuel flow from the main fuel cells to the auxiliary tank. This valve is so set that fuel cannot free-flow from the auxiliary tanks to the main fuel cells, thus eliminating the danger of overfilling the main fuel cells with TRANS pump switches in OFF position.

6-166. Electrical power to operate the fuel transfer pumps and the low level switches is supplied by the 28-volt DC essential bus. Circuit protection for the transfer pumps and low level electrical switches is provided by FUEL TRANSFER PUMP circuit breaker (figure 2-11) on the DC circuit breaker panel.

6-167. OPERATION - TRANSFER PUMPS.

6-168. The procedure herein outlined assumes that the complete auxiliary fuel equipment has been securely installed in the helicopter and the electrical



1. Stud
2. Fuel Tank Cap and Adapter Assembly
3. Hook
4. Valve
5. Tank Drain Line
6. Fuel Discharge Line
7. Tank Vent Line
8. Pump Seal Drain Line
9. Electrical Connector
10. Pump Assembly
11. Float Switch
12. Vent Valve

Figure 6-24. Auxiliary fuel tank - typical transfer pumps and the low level switch electrical cables are connected.

a. TRANS PUMP switch (on ENGINE control panel) - Position forward to LEFT or RIGHT as desired.

Note

When an auxiliary fuel tank has emptied of all fuel, the fuel low level switch will function to cause the illumination of the MASTER CAUTION indicator on the instrument panel and the AUX FUEL LOW worded segment on the pedestal mounted caution panel (figure 2-14). The pilot must then position the RESET/TEST switch on the caution panel to RESET to extinguish the master caution indicator. The AUX FUEL LOW worded segment will not light unless a TRANS PUMP switch is ON.

b. TRANS PUMP switch - Position aft to OFF.

Note

An automatic fuel float switch installed in the center aft fuel cell prevents inadvertent overfilling of main fuel cells when a transfer pump is ON. The pump will not operate when fuel makes contact with the high-level switch element, 1390 pounds (approximately 213 U.S. gallons) of fuel. The pump operates when the fuel makes contact with the low level switch element, 1225 pounds (approximately 188 U.S. gallons) of fuel. Power is supplied by the 28-volt DC essential bus.

6-169. EXTERNAL AUXILIARY FUEL SYSTEM.

6-170. Provisions are made in the helicopter for the operation of external auxiliary fuel kit. The external auxiliary fuel tank kit consists of the necessary fuel lines, electrical wiring and attachment fittings to attach, either two 100 gallon tanks or two 60 gallon tanks to the aft external stores support assemblies. One tank shall be located on each side of the helicopter and are electrically or manually jettisonable in an emergency.

CHAPTER 7

OPERATING LIMITATIONS

SECTION I SCOPE

7-1. SCOPE OF OPERATING LIMITATIONS DATA.

7-2. All important limitations that must be covered during normal operations are covered in this chapter.

7-3. Limitations that are characteristic only of a specialized phase of operation are not repeated here.

SECTION II LIMITATIONS

7-4. INTRODUCTION.

7-5. The flight and engine limitations set forth in this chapter are the direct result of numerous flight test programs and actual operation experience. Compliance with these limits will allow YOU, THE PILOT, to safely perform the assigned missions and permit YOU to derive maximum utility from the helicopter, when used for intended purposes. The operational range limits (figure 7-1) will serve as a constant reminder during operations. Additional limits concerning maneuvers, cg. and loading are also covered in this chapter. Close observation of instrument markings is required since they represent limits that are not necessarily repeated in the text.

7-6. MINIMUM CREW REQUIREMENTS.

7-7. The minimum crew requirement for all missions consists of only the pilot, whose station is on the right side. Additional crew members, as required, will be added at the discretion of the Commander in accordance with appropriate Department of Army Regulations.

7-8. INSTRUMENT MARKINGS.

7-9. The operating ranges and limits for both the helicopter and the engine are shown in figure 7-1.

7-10. ENGINE LIMITATIONS.

7-11. The gas turbine power plant, as installed in this helicopter, is rated at an output torque value equivalent to 1100 hp at 6600 RPM for take-off and 900 hp at 6600 RPM for continuous operation. Other engine limitations are given on the instrument markings illustration. See figure 7-1.

Caution

An Engine Inspection is required if the following limits are exceeded: 6640 rpm
H (91 percent nI) for more than 2 seconds.
D (85 percent nI) for more than 3 seconds.

7-12. ROTOR LIMITATIONS.

7-13. The normal operating range of the main rotor is 294 to 324 rpm and the range is marked on the dual tachometer as a green arc on the face of the instrument. Normally, autorotation rpm will be set at approximately 310 rotor rpm at sea level, 50 to 60 knots airspeed, and an approximate gross weight of 6600 pounds. Autorotation main rotor speed shall not exceed 339 rpm. Main rotor speeds in excess of 339 rpm shall be entered in 2408-13. Rotor Operating Limits decal (figure 7-2) located at the lower left of the instrument panel, specified limitation conditions at specific altitudes and gross weights. It is possible to encounter blade stall within the operating range under high gross weight, high altitude, or high airspeed, or during acceleration or low rpm. Blade stall and the remedy are more thoroughly discussed in Chapter 8. At heavy gross weights, high density altitudes, or during maneuvering, the rotor rpm will tend to overspeed and shall be monitored and controlled by the pilot, using collective pitch to keep the rotor within limits.

7-14. AIRSPEED LIMITATIONS.

7-15. The maximum permissible indicated forward airspeed for this helicopter is 120 knots, and this maximum is indicated by a red line on the airspeed indicator. Sideward and rearward airspeeds should be limited to 30 knots, which must be estimated for lack of instruments to provide these indications. The UH-1D/H can be flown at 120 knots with the doors locked in full open position. Cargo doors may be secured in full open position only if appropriate modifications have been made to the doors and airframe. (See figure 7-3.)

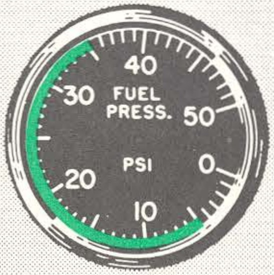
Caution

Cargo door airspeed restrictions: YUH-1D, half open, 50 knots; full open, 120 knots.

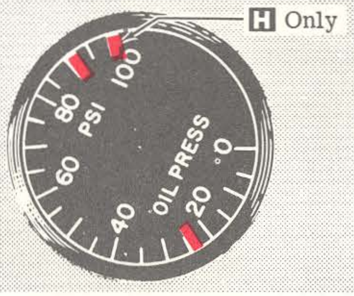
INSTRUMENT MARKINGS

FUEL
GRADE
JP-4

T53-L-11/13 Engines
JP-4 or JP-5



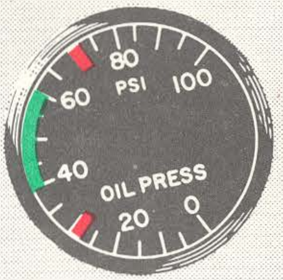
FUEL PRESSURE
🟩 5 to 35 PSI Continuous Operation



ENGINE OIL PRESSURE
🟥 25 PSI Minimum
🟥 90 PSI Maximum **D**
🟥 100 PSI Maximum **H** Only

25 PSI Minimum - Flight Idle
60 to 80 PSI Normal Operating Range **D**
80 to 100 PSI Normal Operating Range **H**

ENGINE OIL TEMPERATURE
🟥 93°C Maximum

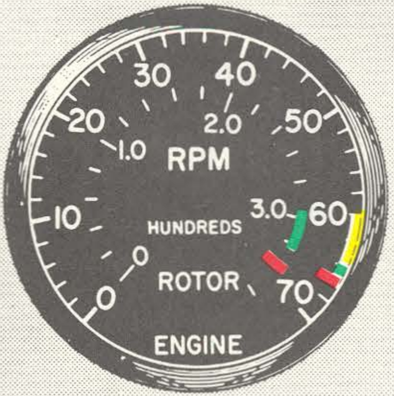


TRANSMISSION OIL PRESSURE
🟥 30 PSI Minimum
🟩 40 to 60 PSI Continuous Operation
🟥 70 PSI Maximum

TRANSMISSION OIL TEMPERATURE
🟥 110°C Maximum

205070-14-1H
AV 054577-1

Figure 7-1. Instrument markings (Sheet 1 of 3)



ROTOR TACHOMETER

🟩 294 to 324 RPM Continuous Operation

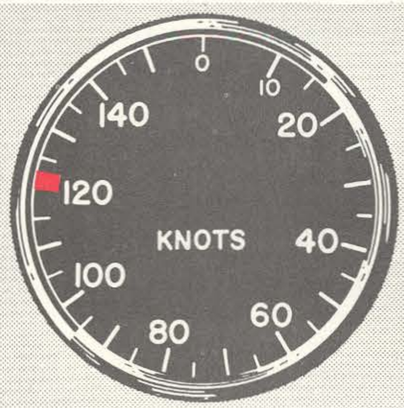
🟥 339 RPM Maximum for Autorotation

ENGINE TACHOMETER

🟨 6000 to 6400 RPM 7500 lbs. Maximum

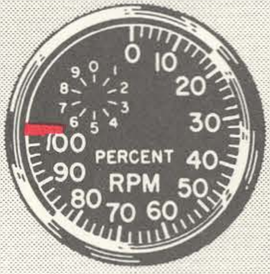
🟩 6400 to 6600 RPM Continuous Operation

🟥 6600 RPM Maximum



AIRSPEED

🟥 120 Knots Maximum



GAS PRODUCER TACHOMETER

🟥 101.5 Percent Maximum

TORQUEMETER

🟥 50 PSI Maximum

EXHAUST TEMPERATURE

🟩 390°C to 620°C Continuous Operation

🟨 620°C to 640°C 30 Minute Limit

🟥 640°C

🟥 760°C Maximum for Starting and Acceleration.

See Page 7-4
For EXH TEMP
L-13A Engine

H
ONLY

EXHAUST TEMPERATURE

🟩 390°C to 625°C Continuous Operation

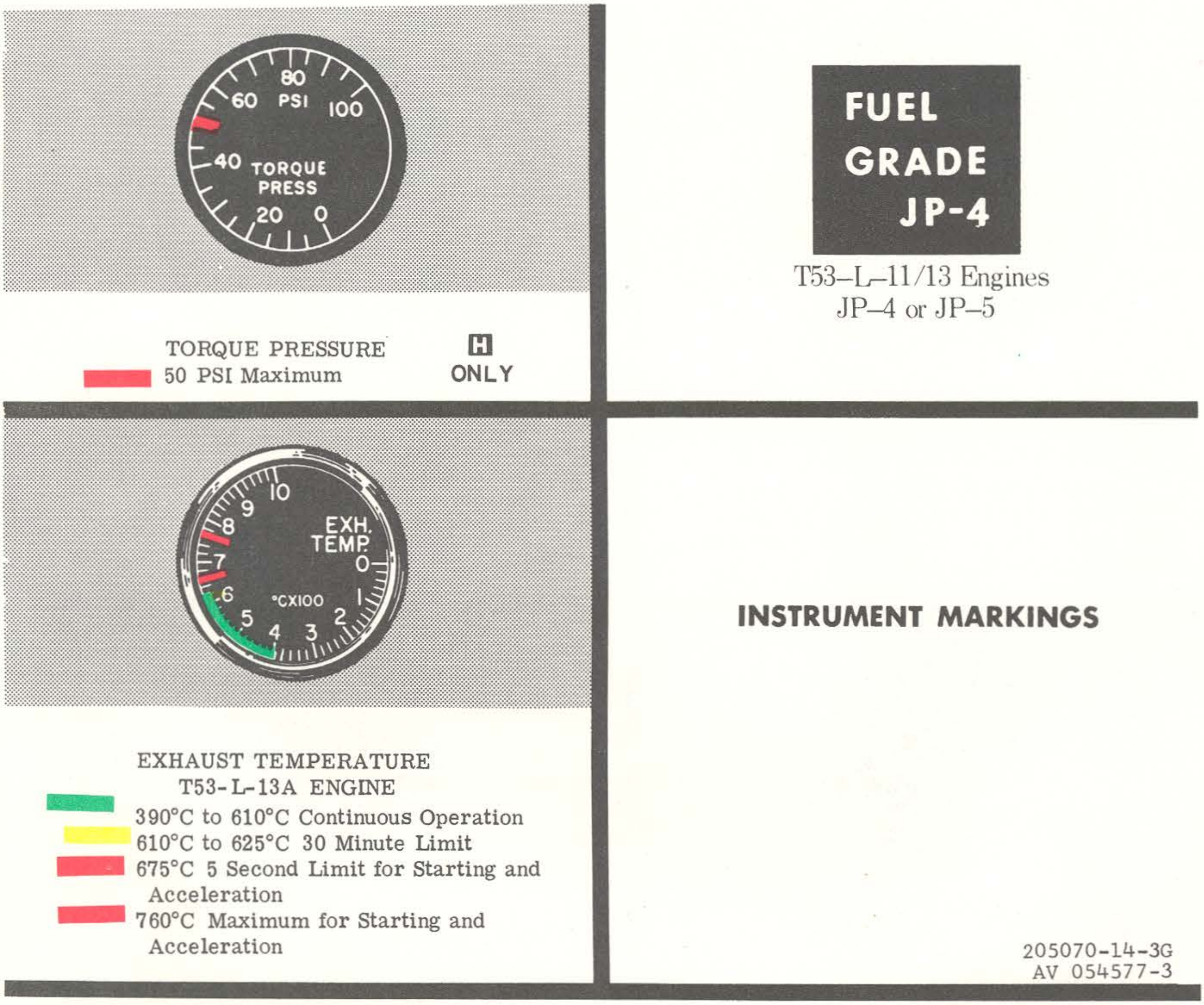
🟨 625°C to 645°C 30 Minute Limit

🟥 675°C 5 Second Limit for Starting and Acceleration

🟥 760°C Maximum for Starting and Acceleration

204070-14-2L
AV 054577-2

Figure 7-1. Instrument markings (Sheet 2 of 3)



TORQUE PRESSURE
🟥 50 PSI Maximum

H ONLY

FUEL
GRADE
JP-4

T53–L–11/13 Engines
JP–4 or JP–5

EXHAUST TEMPERATURE
T53-L-13A ENGINE

🟩 390°C to 610°C Continuous Operation
🟨 610°C to 625°C 30 Minute Limit
🟥 675°C 5 Second Limit for Starting and Acceleration
🟥 760°C Maximum for Starting and Acceleration

INSTRUMENT MARKINGS

205070-14-3G
AV 054577-3

Figure 7-1. Instrument markings (Sheet 3 of 3)

7-16. CLIMB LIMITATIONS.

7-17. During climbs at low altitude, a safe autorotative speed shall be maintained so that in the event an engine failure occurs, sufficient airspeed is available to accomplish a safe autorotative landing. See figure 7-4 for details concerning climb limitations.

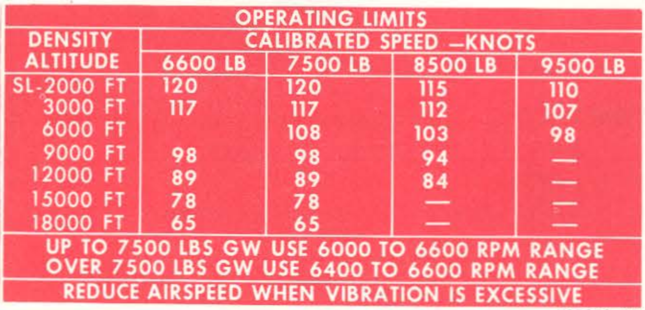
7-18. PROHIBITED MANEUVERS.

a. No aerobatic maneuvers permitted.

b. Protracted rearward flight and downwind hovering are prohibited.

c. The speed for any and all maneuvers shall not exceed the level flight velocities as stated on the Operating Limits Decal (figure 7-2).

d. Partial-power descents shall be accomplished at landing approach speed not less than shown in Landing Distance-Power Off Charts in Chapter 14.



OPERATING LIMITS				
DENSITY ALTITUDE	CALIBRATED SPEED –KNOTS			
	6600 LB	7500 LB	8500 LB	9500 LB
SL-2000 FT	120	120	115	110
3000 FT	117	117	112	107
6000 FT		108	103	98
9000 FT	98	98	94	—
12000 FT	89	89	84	—
15000 FT	78	78	—	—
18000 FT	65	65	—	—
UP TO 7500 LBS GW USE 6000 TO 6600 RPM RANGE OVER 7500 LBS GW USE 6400 TO 6600 RPM RANGE				
REDUCE AIRSPEED WHEN VIBRATION IS EXCESSIVE				

205070-39A
AV 054578

Figure 7-2. Operating limits decal

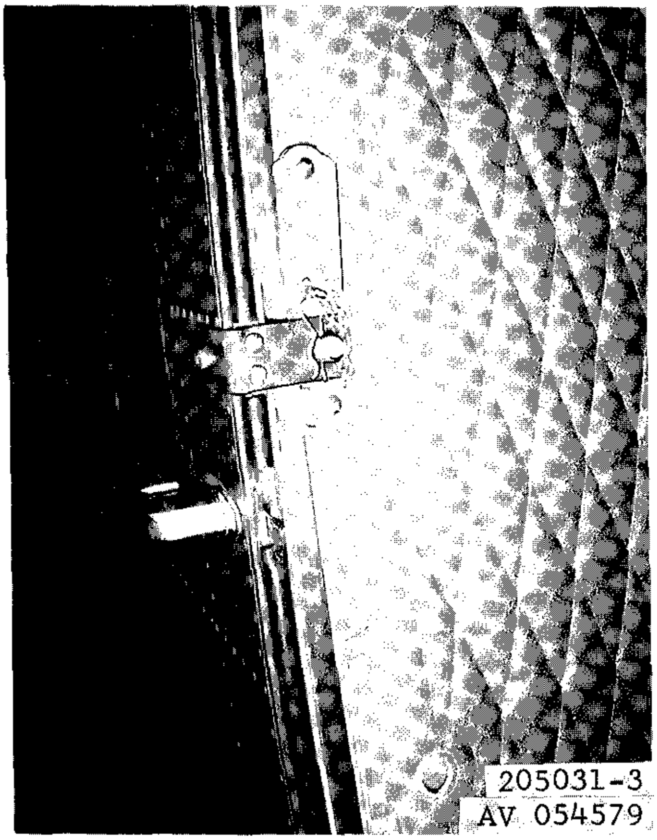


Figure 7-3. Open door latch

7-19. HOVERING LIMITATIONS.

7-20. Hovering performance limits for the helicopter are shown on the Hovering Charts in Chapter 14.

7-21. CENTER OF GRAVITY LIMITATIONS.

7-22. Center of gravity (cg) limits for loading purposes are located between fuselage station 130 and 144 (figure 7-5). For additional information concerning cg limitations, refer to Chapters 12 and 13.

Caution

> Do not attempt to carry external loads with a cg aft of station 142 prior to lifting external load.

7-23. LATERAL C.G. LIMITS.

7-24. The lateral C.G. limits are plus or minus 7.5 inches.

7-25. WEIGHT LIMITATIONS CHART.

7-26. The Weight Limitations Chart (figure 7-6) provides the flight crew a rapid means of determining the load carrying capabilities of the helicopter while remaining within safe operating limits. Performance due to the requirements of a particular mission as well as structural limitations, may restrict the maximum weight at which the helicopter can be flown. Center of gravity of the helicopter is not a consideration in the information presented in the Weight Limitations Chart. This data is available by use of Chart C of the helicopter Weight and Balance Data Handbook and Chart E in Chapter 12 of this handbook. (Refer to Chapter 12 and see chart 12-2.)

7-27. EXPLANATION OF THE CHART.

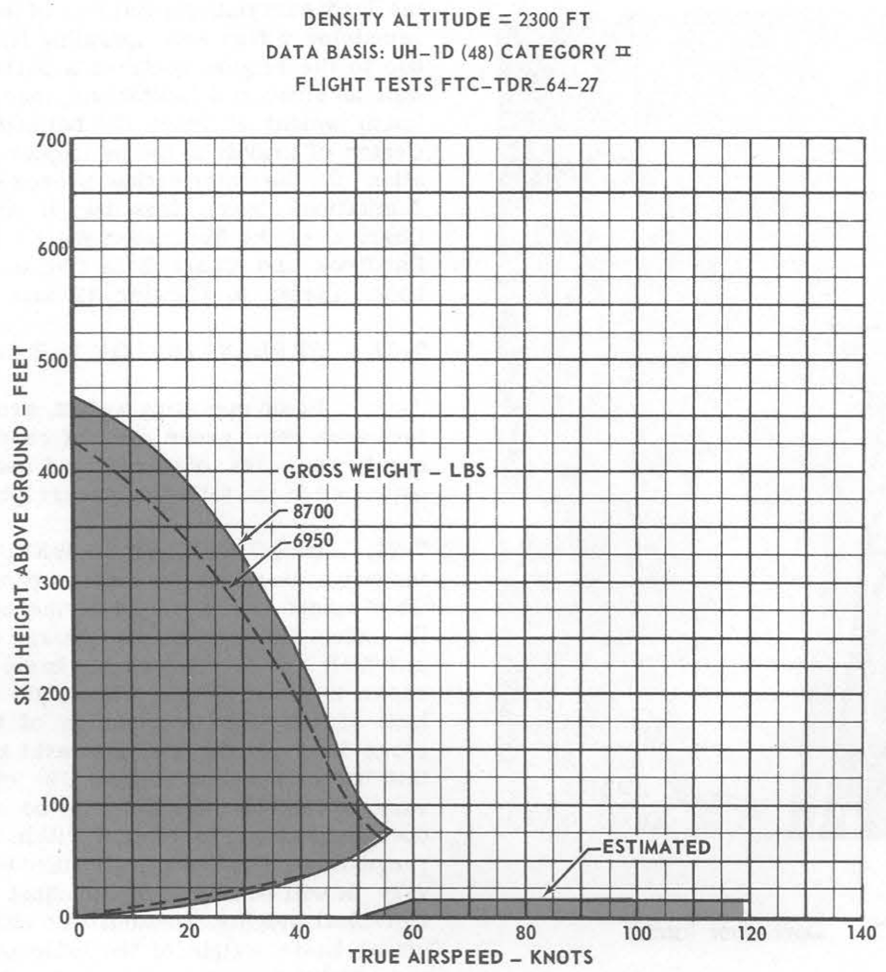
7-28. Basic operating weight, gross weight and performance data, green area of chart, yellow area of chart, red area of chart, and use of the chart are explained in the following paragraphs.

7-29. BASIC OPERATING WEIGHT. The operating weight on which the chart is based is 5120 pounds. This weight is the weight of the helicopter ready to fly except for two variables (cargo or passenger load and fuel) and is approximate basic helicopter wieght shown in Chart C plus the weight of one pilot and a tank of oil. The intersection of the passenger or cargo load and the fuel load axis at zero represents this basic operating weight. The chart indicates the various combinations that can be added to the basic operating weight to remain within the safe operating range. Since the actual weights of individual helicopters vary, it will be necessary to adjust the chart to these individual weights. To adjust the chart, determine the actual basic weight of the helicopter from chart C and add 200 pounds for the pilot and 24 pounds for the tank of oil. If the actual weight exceeds 5120 pounds, subtract the difference between the actual weight and 5120 pounds from the passenger or cargo load as shown in the chart. If the actual weight is less than 5120 pounds, add the difference to the passenger or cargo load as shown in the chart.

7-30. Four gross weights of the loaded helicopter are shown as diagonal lines in the left (colored) area of the chart: 6600 pounds design gross weight, 7500 and 8500 pounds gross weight, and 9500 pounds maximum gross weight. Performance data is presented in the right-hand area of the chart for each of these weights.

7-31. GREEN AREA. (See figure 7-6.) The green area of the chart represents normal loading conditions (figure 7-2) Operating Limits.

7-32. YELLOW AREA. (See figure 7-6.) The yellow area of the chart represents loading of progressively increasing risk as the red area is approached. Care shall be exercised when operating within this area because speed, performance, and flight load factors decrease. (See figure 7-2, Operating Limits.)



Note

Avoid continuous operation in red areas. However, if the aircraft is operated in the red areas, Emergency Procedures Relating to Engine Failures - Low Altitude, should be observed in accordance with Chapter 4.

205947-8A
AV 054580

Figure 7-4. Height velocity diagram

7-33. RED AREA. (See figure 7-6.) The red area of the chart represents loading that shall not be used except under conditions of extreme emergency when safety of flight is of secondary importance. (See figure 7-2, Operating Limits.)

Note

Operating weight should never exceed that required for the mission, since unnecessary risk and equipment wear will result. The data shown in the chart is for information and guidance; however, take-off weight, especially at high ground altitude, must be considered in relation to available runway, surrounding terrain, atmospheric temperature, mission requirements, and urgency of the mission.

7-34. USE OF THE CHART. (See figure 7-6.)

Note

* Denotes 48 foot rotor configuration. (Prior to Serial No. 65-9565.)

** Denotes 48 foot rotor configuration. (Serial No. 65-9565 and subsequent.)

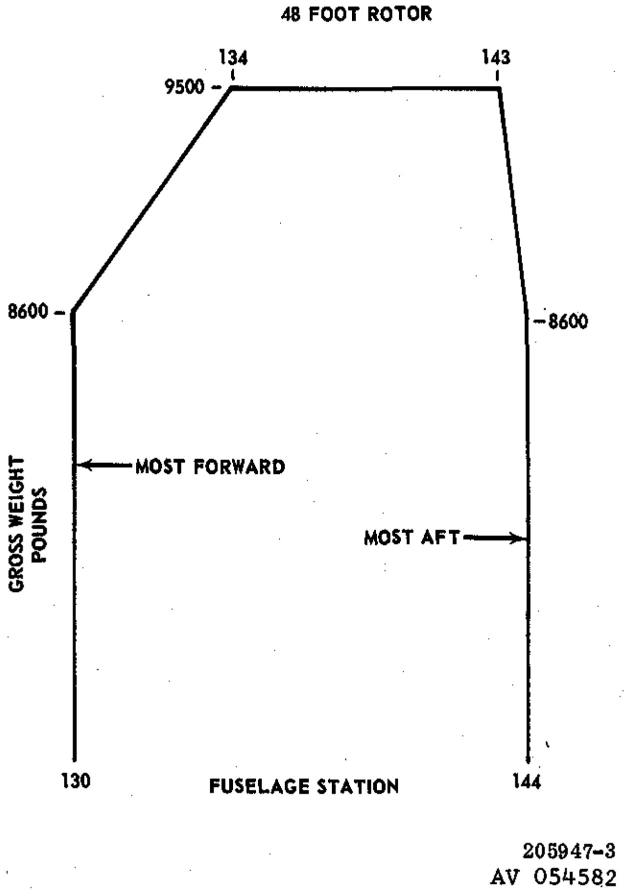


Figure 7-5. Center of gravity limits diagram

7-35. PROBLEM. In accomplishing a particular mission it is necessary to carry 800 pounds of fuel. Determine the maximum cargo load that can be carried.

7-36. SOLUTION. The chart basic operating weight will be used as actual helicopter weight in this problem. Steps e. and f. will show how to adjust the chart for actual basic weight variation.

a. Establish the basic operating weight of the helicopter by completing a Form F, using the latest basic weight from Chart C. Actual weight assumed to be chart weight (*5120, **5460 pounds) for this problem.

b. Project the fuel weight of 800 pounds vertically until the *7500, **7500 pounds gross weight line is intersected. From the intersection of the two lines, project horizontally left to the cargo load scales and read *1600, **1260 pounds. This weight is the maximum cargo load that can be carried with 800 pounds of fuel to remain at *7500, **7500 pounds gross weight.

c. For the requirements of a particular mission if it is necessary to exceed the *7500, **7500 pounds gross weight and if the reduced speed, load factor, and performance (at a higher gross weight) are satisfactory, then project the fuel weight of 800 pounds vertically until the *8500, **8500 pounds gross weight line is intersected. From this intersection, project horizontally left to the cargo load scale and read *2600, **2260 pounds.

d. When this information is obtained it is then necessary to refer to the Internal Cargo Loading Chart to obtain cargo placement information so that the center of gravity of the helicopter will be within the operating range.

e. If the actual weight of the helicopter is *5150, **5490 pounds instead of *5120, **5460 pounds, the chart must be adjusted by reducing the cargo weight. Therefore, in step b., the cargo weight will be *1600, **1260 pounds minus *30, **30 pounds, amount the helicopter is overweight, or *1570, **1230 pounds. In step c. the cargo weight will be *2600, **2260 pounds, minus *30, **30 pounds, or *2570, **2230 pounds.

f. If the actual weight of the helicopter is *5100, **5440 pounds instead of *5120, **5460 pounds, the chart must be adjusted by increasing the cargo weight by *20, **20 pounds. Therefore, in step b., the cargo weight will be *1600, **1260 pounds, plus *20, **20 pounds, or *1620, **1280 pounds. In step c., the cargo weight will be *2600, **2260 pounds, plus 20, **20 pounds, or *2620, **2280 pounds.

7-37. INTERNAL CARGO LOADING CHART.

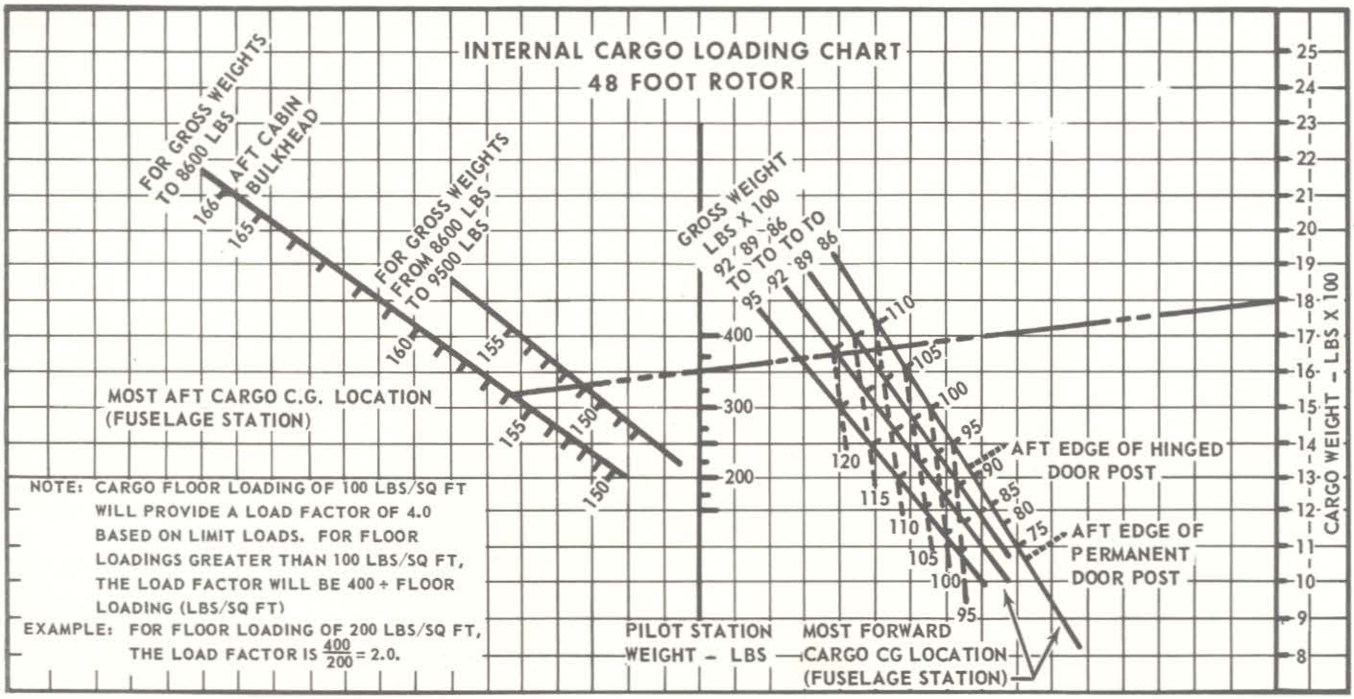
7-38. The Internal Cargo Loading Chart provides a straight line method of determining cargo location without computations. The variables shown in the chart are crew weight, cargo weight, gross weight, and most forward and most aft locations (fuselage stations) allowable. (See figure 7-6.) A sample problem is shown in the chart by dashed line (------), and working of the typical problems follows:

PROBLEM:

Determine the acceptable location for *1800, **1800 pounds of cargo, if the pilot weight is *350, **350 pounds and the gross weight is less than *8600, **8600 pounds.

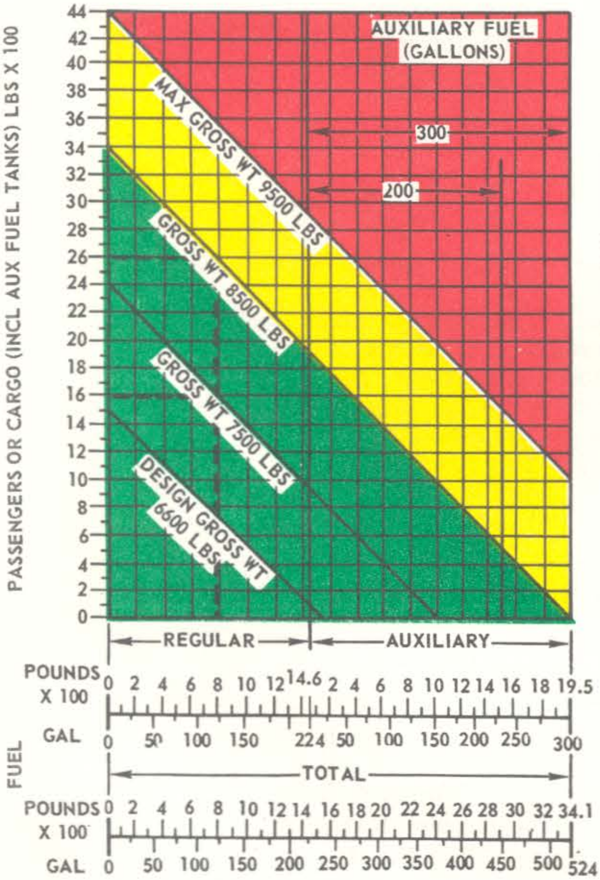
ANSWER:

Draw a straight line from the *1800, **1800 pound cargo weight point to the *350, **350 pound pilot station weight point. Extend line through most aft cargo cg location line and most forward cg location line for a gross weight of less than *8600, **8600 pounds. Cargo cg shall be located between fuselage stations *(108 and 156), **(108 and 156), shown on diagonal lines.



NOTE: CARGO FLOOR LOADING OF 100 LBS/SQ FT WILL PROVIDE A LOAD FACTOR OF 4.0 BASED ON LIMIT LOADS. FOR FLOOR LOADINGS GREATER THAN 100 LBS/SQ FT, THE LOAD FACTOR WILL BE 400 ÷ FLOOR LOADING (LBS/SQ FT)

EXAMPLE: FOR FLOOR LOADING OF 200 LBS/SQ FT, THE LOAD FACTOR IS $\frac{400}{200} = 2.0$.



STANDARD DAY PERFORMANCE

		GROSS WEIGHT - LBS			
		6600	7500	8500	9500
BEST RATE OF CLIMB AT SEA LEVEL WITH NORMAL RATED POWER (50 KNOTS)	(FPM)	2000	1660	1340	1080
SEA LEVEL VERTICAL RATE OF CLIMB WITH TAKE-OFF POWER	(FPM)	2160	1530	780	0
SERVICE CEILING WITH NORMAL RATED POWER	(FT)	23,900	20,200	16,400	12,600
HOVERING CEILING, IGE* WITH TAKE-OFF POWER	(FT)	18,200	14,200	9900	5500

*4 FT SKID HEIGHT.

🟥 NOT RECOMMENDED LOADING

🟨 CAUTIONARY LOADING

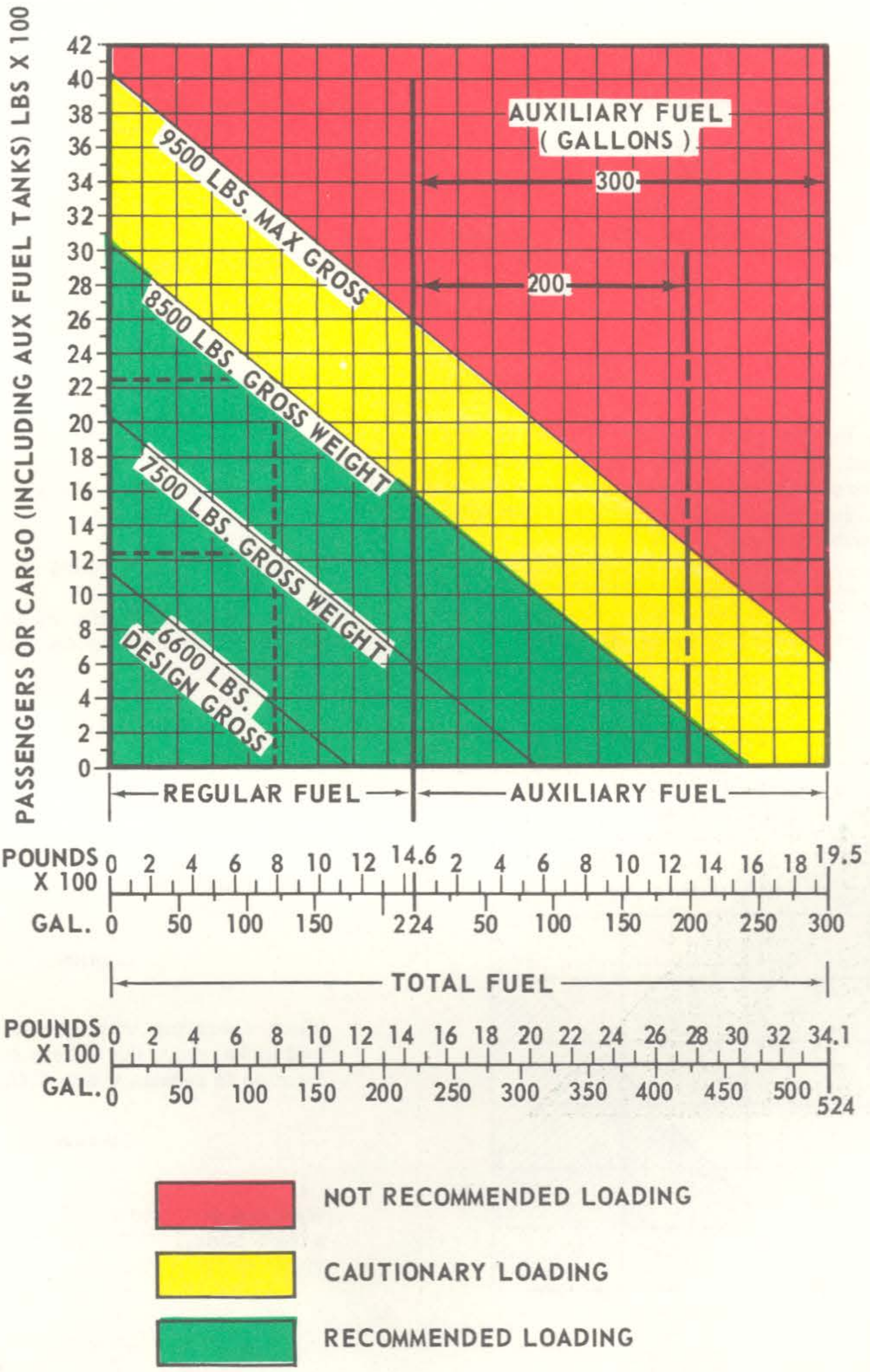
🟩 NORMAL LOADING

WEIGHT LIMITATIONS CHART
(48 FT ROTOR)
PRIOR TO FY 65 SERIAL NO 65-9565

205070-38
AV 054581-1

Figure 7-6. Weight limitations and internal cargo loading charts (Sheet 1 of 2)

WEIGHT LIMITATIONS CHART FY 65 UH-1D SERIAL NO's 65-9565 AND SUBSEQUENT INCLUDING AEROJET SEATS, P/NS 8165-1 & 8165-2



205070-46
AV 054581-2

Figure 7-6. Weight limitations and internal cargo loading charts (Sheet 2 of 2)

Note

If the drawn diagonal does not intersect the most aft cargo cg location diagonal, there is no aft location limitation. If gross weight exceeds *8600, **8600 pounds, use applicable gross weight diagonal line in determining most forward and most aft cargo cg location limits.

7-39. EXTERNAL CARGO CONFIGURATION.

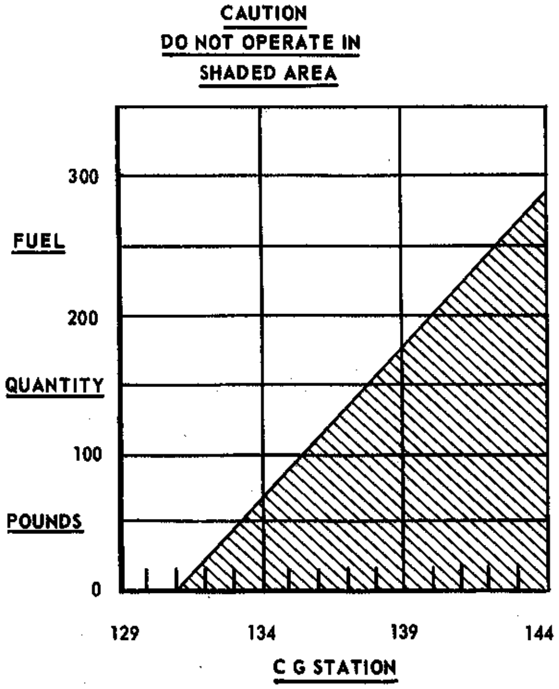
7-40. Caution should be exercised when carrying external cargo because handling characteristics may be affected by the size, weight, and shape of the cargo load. Maximum allowable weight of external cargo is 4000 pounds.

7-41. LOW LEVEL FUEL LIMITATIONS - YUH-1D.

7-42. When the 20 MINUTE FUEL light on the CAUTION panel illuminates, there is approximately enough fuel remaining for 20-minute flight time at cruise power. Return to landing field or locate suitable area to land helicopter.

Caution

Do not operate helicopter in shaded area of figure 7-7.



AV 054583

Figure 7-7. Low level fuel warning - YUH-1D

7-43. When fuel quantity drops below 300 pounds, maintain cg station forward of fuselage station 144. (See figure 7-7.)

7-44. TOWING THE HELICOPTER.

7-45. Towing the helicopter, with ground handling wheels installed, on rough surfaces at gross weights in excess of 9500 pounds may cause permanent set in the aft cross tube.

7-46. OPERATIONAL WARNINGS AND CAUTIONS.

Warning

There is insufficient left pedal to maintain directional control when hovering, making takeoffs or landings in adverse winds at weights above 8300 pounds at 5000 feet, and lower weights at higher altitudes.

Warning

Torque must be monitored as the primary power instrument below engine critical altitude.

Caution

When flying at an aft C.G. (Station 140 to 144) terminate an approach at a minimum of five-foot hover prior to landing to prevent striking the tail on the ground.

Caution

When operating with bladder-type ferry fuel tanks, move the battery to the forward location to remain within C.G. limits.

Caution

With the armored seats installed and with a left lateral C.G., the pilot's arm and right cyclic movement will be restricted.

Caution

Do not tow helicopter on rough surfaces with a gross weight in excess of 9500 pounds.

CHAPTER 8

FLIGHT CHARACTERISTICS

SECTION I SCOPE

8-1. SCOPE.

8-2. The function of this chapter is to describe the flight characteristics of the helicopter. Emphasis has been placed on the advantageous as well as dangerous flight characteristics.

8-3. The information herein is based on operations at maximum gross weight.

SECTION II GENERAL FLIGHT CHARACTERISTICS

8-4. OPERATING CHARACTERISTICS.

8-5. The flight characteristics of this helicopter in general are similar to other single-rotor helicopters. The noticeable difference is in the additional stability that is evident during take-off, hovering, and all flight speeds. This stable condition is the result of the gyroscopic action of the stabilizer bar. The control system, with hydraulic servo assist, provides the pilot with a near-zero force required for control movement; however, control feeling is induced into the cyclic stick and directional control pedals by means of a force trim system. To increase helicopter forward speed, simultaneously apply forward control stick and increase main rotor pitch; power is automatically adjusted to maintain constant rpm. Constant altitude is maintained throughout the entire range of forward flight speeds by fore and aft use of the cyclic control stick in coordination with power and main rotor pitch application. Directional heading is controlled by the application of lateral cyclic control and the appropriate directional control pedal.

8-6. BLADE STALL.

8-7. Blade stall is caused by a high angle of attack on the retreating blade and starts at the inboard section and progresses outboard with increased airspeed. However, this condition will not be encountered when the helicopter is operated within the limits imposed in the preceding chapters of this manual. Blade stall is the result of numerous contribution factors such as gross weight, rotor rpm, airspeed, acceleration, and altitude. The condition is most likely to occur at higher airspeeds and low operating rpm; it also follows that the condition will occur sooner with higher values of altitude and gross weight. One of the more important features of the two-blades seimi-rigid rotor system is its warning to the pilot of impending blade stall. Prior to progressing fully into the stall region, the pilot will feel a marked increase in airframe vibration. Consequently, corrective action can be taken before the stall condition becomes severe.

Note

When rotor stall progresses into a severe state, feedback may occur, primarily in the cyclic controls.

8-8. BLADE STALL - CORRECTIVE ACTION.

8-9. When blade stall is evident, the condition may be eliminated by accomplishing one or a combination of the following corrective actions:

a. Reduce collective.

b. Reduce airspeed.

c. Increase operating rpm.

d. Descend to lower altitude.

e. Decrease the severity of the maneuver.

8-10. MANEUVERING FLIGHT.

8-11. Action and response of the controls during maneuvering flight are normal at all times when the helicopter is operated within the limitations set forth in this manual.

8-12. ROTOR CAPABILITIES.

8-13. The UH-1D/H helicopters are capable of delivering a maximum thrust commensurate with rotor-engine limitations and the density of the atmosphere in which they are operating. Maximum thrust can be utilized to obtain maximum airspeed optimum rate of climb, or, at some reduced airspeed, the maximum maneuver potential. The pilot may employ the capabilities of the helicopter within maximum limitations and in accordance with the enviornment under which he is operating.

8-14. A descending turn or autorotational turn at a given angle of bank and stabilized rate of descent imposed the same "G" load on the rotor. Hence, if the turn is too abrupt (tight) and rotor limits are exceeded, further application of controls will not check the rate of descent if the turn is continued. In order to alleviate this condition the pilot must roll out of the turn to reduce the rotor load and provide control response, and reduce rate of descent. The permissible bank angles vs altitudes and gross weights will affect the turning radius of the helicopter. A light gross weight helicopter turns within an area comparable in size to that contained within the boundaries of a foot ball field. The same helicopter at normal gross weight and at a density altitude of 12,000 feet will require a much larger area to accomplish the same turn.

8-15. HOVERING CAPABILITIES.

8-16. Hovering capability is affected by in-ground effect (IGE), out-of-ground effect (OGE), outside air temperature (OAT), density and pressure altitude, wind speed, engine torque (power available), and gross weight of the helicopter. Hovering IGE performance is better than OGE because during IGE the rotor sets up a current flow between the helicopter and the ground, providing a cushion of air to partially support the helicopter weight. Temperature variations affect engine and rotor performance. For each four-degree centigrade rise in temperature, there is approximately a four percent loss in engine power. Hovering with heavier gross weights or at higher altitudes is possible with lower temperatures and wind velocities. Lower temperatures increase engine efficiency and wind represents airspeed therefore, either condition or both will increase hovering performance due to the ability of the main rotor to provide more lift.

8-17. OPERATING RULES OF THUMB.

8-18. The following general rules are factors contributing to the hovering capability of the helicopter.

a. A rise of three degrees centigrade above standard causes a loss of 1.5 psig or torque.

b. Assuming a standard temperature lapse rate, approximately 0.75 psig of torque is lost with each 1000-foot increase in altitude.

c. An increase of 1.0 psig in torque is equivalent to 200 pounds lift capability.

d. For a given power setting, there is approximately 1000 pounds difference in gross weight between IGE and OGE hovering.

e. Hovering OGE requires approximately five more psig of torque than hovering IGE.

f. Generally, IGE performance figures should not be used for sling loads. (Refer to Chapter 14.)

SECTION III CONTROL CHARACTERISTICS

8-19. FLIGHT WITH INTERNAL LOADS.

8-20. The airspeed with external cargo is limited by controllability.

> Exercise care, when carrying external cargo, as the handling characteristics may be affected due to the size, weight, and shape of the cargo load.

8-21. LEVEL FLIGHT CHARACTERISTICS.

8-22. The level flight characteristics of this helicopter are normal throughout the range of operating limits. Control response is immediate and gives positive results.

8-23. FLIGHT CONTROLS COORDINATION.

8-24. The most efficient performance of this helicopter is obtained by the coordinated movement of the controls; coordinated control movement is as important for helicopter operation as it is for fixed-wing aircraft.

8-25. TYPES OF VIBRATION.

a. Rotor vibrations felt during in-flight or ground operations are divided in general frequencies as follows:

Extreme low frequency - Less than one revolution (pylon rock).

Low frequency - One or two revolutions.

Medium frequency - General four, five, or six revolutions.

High frequency - Tail rotor revolutions or faster.

b. Most vibrations are always present at low magnitudes. The main problem is deciding when a vibration level has reached the point of being excessive.

c. The only source of vibrations of any frequency are the rotating or moving parts on the ship, other parts vibrating only in sympathy with an existing vibration.

d. Extreme low, low, and most medium frequency vibrations are caused by the rotor or dynamic controls. Various malfunctions in stationary components can affect the absorption or damping of the existing vibrations and increase the overall level felt.

e. A number of vibrations are present which are considered a normal characteristic. Two per revolution is the most prominent of these, with four or six revolutions the next most prominent. There is always a small amount of high-frequency vibration present that may be felt if a person looks for it. Experience is necessary to learn the normal vibration levels. Sometimes the mistake is made of concentrating on feeling one specific vibration and concluding that the level is higher than normal.

f. Extreme low-frequency vibration is usually limited to pylon rock. Pylon rocking, two to three cycles per second, is inherent with the rotor, mast, and transmission system. To keep the vibration from reaching noticeable levels, transmission mount dampening is incorporated to absorb the rocking. Malfunctions in the dampening system will allow rocking to start. A quick check of the dampening system may be made while in a hover. Moving the cyclic fore and aft at about one movement per second will start the pylon rocking. The length of time it takes for the rocking to die out after the motion of the cyclic is stopped is indicative of the quality of the dampening. An abnormal continuation of rock during the check or a continued presence of rock during normal flight is an indication that something is wrong with the transmission mounts or dampers.

8-26. LOW-FREQUENCY VIBRATIONS.

a. Low-frequency vibrations are caused by the rotor itself. One revolution vibrations are of two basic types, vertical or lateral. A one revolution vertical is caused simply by one blade developing more lift at a given point than the other blade. A lateral vibration is caused by a spanwise unbalance of the rotor due to a difference of weight between the blades. The minor differences will affect flight but are compensated for by adjustments of trim tabs and pitch settings.

b. Generally, verticals felt prodominantly in low power descent at moderate airspeeds (60-70 knots) are caused by a basic difference in blade lift and can be corrected by rolling the grip slightly out of track. Vertical vibrations felt in forward flight, worsening as airspeed increases, are usually due to one blade developing more lift with increased speed than the other (a climbing blade). This condition is corrected by adjustment of the trim tabs.

8-27. LOW - FREQUENCY VIBRATION - VERTICAL.

8-28. Associated with the one revolution vertical vibration is the intermittent one revolution vertical. Essentially, this is a vibration initiated by a gust effect causing a momentary increase of lift in one blade giving a one revolution vibration. The momentary vibration is normal; but if picked up by the rotating collective controls and fed back to the rotor causing several cycles of one revolution becomes undesirable. Sometimes during steep turns one blade will "pop" out of track and cause a hard one revolution vertical. This condition is usually caused by too much differential tab in the blades and can be corrected by rolling one blade at the grip and removing some of the tab, (as much as can be done without hurting the ride in normal flight).

8-29. LOW FREQUENCY VIBRATION - LATERAL.

a. Should a rotor, or rotor component, be out of balance, a one revolution vibration called a lateral will be present. This vibration is usually felt as a vertical due to the rolling motion it imparts to the aircraft, causing the pilot's seats to bounce up and down out of phase; that is, the pilot goes up while the copilot goes down. An unusually severe lateral vibration can be felt as a definite sideward motion as well as a vertical motion.

b. Lateral vibration existing due to an unbalance in the rotor are of two types; spanwise and chordwise.

c. Spanwise unbalance is caused simply by one blade and hub being heavier than the other (i.e., an unbalance along the rotor span).

d. A chordwise unbalance means there is more weight toward the trailing edge of one blade than the other. Both types of unbalance can be caused by the hub as well as the blades.

e. Lateral vibrations are usually felt in a hover and in descending moderate airspeed turns and tend to disappear in forward flight, although many times a lateral can manifest itself as a vertical in forward flight. An out-of-ground effect hover is usually the best place to feel a lateral vibration and reducing the RPM to 6000 will often make the lateral more prominent.

f. Two revolution vibrations are inherent with two-bladed rotor systems and a low level of vibration is present.

8-30. MEDIUM - FREQUENCY VIBRATIONS.

8-31. Medium - frequency vibrations at frequencies of four or six revolutions are another inherent vibration associated with most rotors. An increase in the level of these vibrations is caused by a change in the capability of the fuselage to absorb vibration, or a loose airframe component, such as the skids, vibrating at that frequency. Changes in the fuselage vibration absorption can be caused by such things as fuel level, external stores, structural damage, structural repairs, internal loading, or gross weight. Abnormal vibration levels of this range are nearly always caused by something loose; either a regular part of the aircraft or part of the cargo or external stores. The vibration is felt as a rattling in the aircraft structure. The most common cause is loose skids.

8-32. HIGH - FREQUENCY VIBRATIONS.

8-33. High-frequency vibrations can be caused by anything in the ship that rotates or vibrates at a speed equal to or greater than that of the tail rotor. The most common and obvious causes; tail rotor balance and track. Pilot experience can help greatly in troubleshooting the cause of a high-frequency vibration, as a pilot who has experienced a vibration can often recognize the cause the next time he feels the same vibration. A comparison between the feel of the helicopter without excessive vibration and the aircraft with the vibration is helpful in precluding erroneous conclusions.

CHAPTER 9

SYSTEMS OPERATION

(Not Applicable)

CHAPTER 10

WEATHER OPERATION

SECTION I SCOPE

10-1. SCOPE.

10-2. The purpose of this chapter is to provide information relative to operations during various weather conditions, including instrument flight, night flying, cold weather operation, high altitude operation, flight through ice and rain, hot weather operation, and turbulence and thunderstorm operation.

SECTION II INSTRUMENT FLIGHT PROCEDURES

10-3. GENERAL.

10-4. The helicopter is provided with the necessary instruments and navigation equipment to accomplish missions under instrument operations including light icing conditions, day or night flying, and to navigate by dead reckoning, or by use of radio aids to navigation. Instrument flights should be carefully planned, keeping in mind that icing conditions, turbulent air, thunderstorms will greatly affect the flight.

Note

> The decreased speeds imposed during instrument flights to insure smooth vibration free maneuvers may necessitate an appreciable loss of range. This loss of range, lack of ice protection equipment, and effect of turbulence require that all flights be carefully planned. A qualified copilot is required on all instrument flights. The copilot must be capable of navigating, handling radios, and making position reports in addition to relieving the pilot for short periods.

Caution

> Be sure external cargo hook-up mirror is removed and stowed or mirror cover is on before all instrument and night operations.

10-5. To lessen pilot fatigue during stabilized instrument flight conditions (cruise, steady state descents, etc.), full utilization should be made of the force trim (sick centering) to trim out opposing control forces. The fatigue factor will also be considerably reduced if the pilot controls the helicopter with as little tenseness as possible.

10-6. All instrument flying is to be accomplished with the power turbine speed governor set at 6600 rpm. Maintaining rpm descreases the chance of encountering retreating blade stall in turns and turbulence. The maximum throttle setting insures that the pilot has full thrust available when applying collective pitch to recover from any unusual situations that may arise. Total rotor thrust, which is a direct function of collective pitch setting, is measured by the engine torquemeter. Therefore, all power settings for instrument flying are given in terms of torquemeter readings.

10-7. PREFLIGHT AND GROUND CHECKS.

10-8. Perform the normal pre-flight check, including the night flight checks, as outlined in the normal operating instructions in Chapter 3. Check operation of flight instruments, navigation equipment, external and internal lighting, windshield wipers and defrosters, pitot heat, generators, inverters, and engine ice detector system (if installed). Inspect filter in sand and dust separator unit.

Note

> If possible, set and check altimeters for error before engine start. After engine start, note the decrease in altimeter reading induced by rotor downwash effect. This decrease will be approximately 20 feet with a collective pitch setting calling for 15 pounds torque.

10-9. INSTRUMENT TAKE-OFF.

10-10. The attitude indicator, heading indicator, and torquemeter are primary for instrument take-offs. By use of these instruments, along with the following procedures, ITO's are easily accomplished.

10-11. After positioning the helicopter on a level or near-level surface and into the wind, set helicopter heading to top of the heading indicator and adjust the horizon bar of the attitude indicator so that the miniature airplane will appear approximately one bar width above the horizon bar. Prior to take-off, set pitot heat selector switch as required and apply sufficient friction to the collective pitch control to minimize overcontrolling.

10-12. With a steady smooth motion apply collective pitch until five pounds of torque more than required for hovering is obtained. As the helicopter leaves the ground, position the cyclic stick so that the miniature airplane will appear one to two bar widths below the horizon bar and in a wing level attitude. Maintain directional control (heading), with the pedals until airspeed increases, generally 30 to 40 knots, then transition to coordinated flight.

Warning

> The airspeed and vertical speed indicators and altimeter are unreliable below 25 knots IAS because of rotor down-wash effect on the pitot static system. During take-off, do not rely on these instruments until the airspeed indicator reads at least 25 knots IAS. The time required to reach this speed will be approximately seven seconds.

10-13. The take-off attitude (miniature airplane one to two bars below horizon) and power setting (five psi plus hovering power) are to be maintained until the airspeed approaches the desired climbing airspeed, then adjust to the climbing attitude (miniature airplane on the horizon bar). As climbing airspeed and attitude are attained, the power (collective pitch) should be adjusted to result in a 500 fpm rate of climb. Higher rates of climb may be used for extended climbs.

10-14. INSTRUMENT CLIMB.

10-15. The helicopter handles well in climbs and climbing turns. After the desired rate of climb and IAS are reached, no change should be made to collective pitch setting unless the airspeed changes more than 5 knots IAS or vertical velocity more than 100 fpm. Turns should be made, using the attitude indicator to obtain the recommended 15 degree angle of bank which approximates a standard rate of turn of three degrees per second. Any pitch attitude corrections should not exceed one bar width. The angle of bank should never exceed 20 degrees.

10-16. INSTRUMENT CRUISING FLIGHT.

10-17. Upon reaching normal cruise speed the attitude indicator should be set for a nose-level indication. Thereafter, any pitch or bank corrections should be made, using the attitude indicator. Pitch corrections should not exceed one bar width. The recommended angle of bank for cruising turns is 15 degrees and should not exceed 20 degrees.

Note

> The attitude indicator should never be reset in flight except to align the miniature airplane with the horizon bar. In all cases the helicopter shall be in straight and level flight at recommended cruise speed when this adjustment is made.

10-18. The most economical long range cruise speeds are not recommended for instrument cruising because of their close proximity to the speeds at which induced vibrations occur. As the vibration level permits, use operating limits as specified on the OPERATING LIMITS decal. (Refer to Chapter 7.)

10-19. COMMUNICATIONS AND NAVIGATION EQUIPMENT.

10-20. There are no unusual transmitting or reception characteristics that render this equipment unreliable for instrument flight.

10-21. NORMAL DESCENTS.

10-22. Enroute descents to traffic altitude can be initiated and maintained without difficulty using the following procedures.

a. Before starting the descent, check and reset, if necessary, the attitude indicator for a nose-level indication with the helicopter in straight and level flight at the recommended cruise speed.

b. To establish the descent, reduce the torque to set up a 500 fpm rate of descent and maintain recommended cruise speed, angle of bank, and pitch attitude. During the descent, the miniature airplane will remain on the horizon bar. Higher rates of descent may be used for extended descents and approaches.

> In general, below 7000 feet density altitude, a reduction of one pound of torque will increase the rate of descent approximately 100 fpm.

10-23. MAXIMUM (AUTOROTATIVE) DESCENTS.

10-24. Autorotations are not difficult to perform while on instruments. However, due to the high rate of descent, they are recommended for emergencies only (loss of engine, etc.). The following procedures are for establishing and conducting autorotations on instruments.

a. Reduce collective pitch as required to maintain rotor rpm within limits.

b. Assume a one bar width nose-high attitude and maintain directional control. The airspeed will gradually decrease to 60 knots IAS. Approximately a one bar width nose-high attitude will give this speed, which should be maintained until visual contact is made. As soon as the autorotation is established and the helicopter is under positive control, complete the Engine Failure During Flight check list in Chapter 4. During the descent, limit the angle of bank in turns to 15 degrees.

10-25. HOLDING.

10-26. Holding presents no handling or control problems at speeds up to 80 knots. Speeds above 80 knots are not recommended for holding because of increased pilot workload. The decrease in fuel consumption realized from using maximum endurance airspeeds instead of 80 knots would be negligible for all practical purposes.

10-27. For all pitch and bank corrections, utilize the attitude indicator. Do not exceed a one bar width pitch correction for minor altitude changes and limit the angle of bank in turns of 15 degrees. It is best not to make a collective pitch change unless the airspeed varies more than plus or minus 10 knots IAS.

10-28. INSTRUMENT APPROACHES.

10-29. Before starting the approach, have the attitude indicator properly set (i.e., minature airplane on horizon bar at a straight and level cruise.

10-30. For all pitch and bank corrections, use the attitude indicator. Do not exceed a one bar width pitch correction for minor altitude changes and limit the angle of bank in a turn to 15 degrees.

10-31. During the descent phase of an approach, make rate-of-descent corrections with the cyclic pitch by reference to the attitude indicator. Allow the airspeed to vary plus or minus 10 knots during these corrections before making a collective pitch adjustment.

10-32. MISSED APPROACH.

10-33. A missed approach is executed at the missed approach point by applying power and establishing a normal climb.

10-34. BOOST OUT OPERATION.

10-35. It is recommended that the pilot establish VFR conditions as soon as possible, if the hydraulic control boost becomes inoperative while under instrument conditions. Safe instrument approaches can be conducted with the control boost inoperative by using the normal recommended technique and procedures.

10-36. NIGHT FLYING.

10-37. Night flying presents many of the same problems as instrument flying, plus additional problems caused by illumination of the instruments and by cockpit and exterior reflections.

Caution

During night approaches, the lower nose canopy visibility is extremely restricted due to landing light reflection; however, the visibility improves as the lighted touchdown area comes beneath the helicopter. Night landings can be made with the navigation lights on "steady" if the landing and searchlights are inoperative. However, exercise extreme caution, since the navigation lights do not furnish sufficient illumination for depth perception until just before touchdown.

Note

When operating in the clouds at night, turn navigation lights to steady and anti-collision lights off to reduce distracting reflections from the clouds.

10-38. For a night take-off and approach, set the landing light approximately 15 degrees down from horizontal. This will give the pilot a reference point during take-off and also light the approximate touchdown area following a normal approach. During take-off, climb, and approach, use the searchlight as desired to keep to a flight path that is free of obstructions.

SECTION III COLD WEATHER OPERATIONS

10-39. INTRODUCTION.

10-40. Operation of the helicopter in cold weather or in arctic environment presents no unusual problems, if the operators are aware of these changes that do take place and conditions that may exist because of the lower temperatures and freezing moisture.

10-41. PREPARATION FOR FLIGHT.

10-42. The pilot must be more thorough in the walk-around inspection when temperatures have been or are below 0°C (32°F). Water and snow may have entered many parts during operation or in periods when the helicopter was parked unsheltered. This moisture often remains to form ice which will immobilize moving parts or damage structure by expansion and will occasionally damage electric circuits. Protective covers provide adequate protection against rain, freezing rain, sleet, and snow when installed on a dry helicopter prior to the precipitation. Since it is not practicable to completely cover an unsheltered helicopter, those parts not protected by covers and those adjacent to cover overlap and joints require closer attention, especially after blowing snow or freezing rain. Accumulation of snow and ice should be removed prior to flight. Failure to do so can result in hazardous flight, due to aerodynamic and center of gravity disturbances as well as the introduction of snow, water, and ice into internal moving parts and electrical systems. The pilot should be particularly attentive to the main and tail rotor systems and their exposed control linkages.

Caution

> If temperatures are 29°C (minus 20°F) or below, the pilot should maintain minimum RPM (flight idle) in order to reduce the engine oil pressure while the oil warms and the pressure drops below maximum operating limits.

10-43. WINTERIZATION KIT.

10-44. Provisions have been made for the installation of a winterization kit to effect and maintain a cabin temperature of plus 5°C (plus 41°F) when the outside temperature is minus 54°C (minus 65°F).

10-45. ELECTRONIC EQUIPMENT.

10-46. The proper functioning of radio equipmen in the Arctic is of primary importance because o the large areas of unmapped territory and the poor check points, even in mapped areas. Although in general, radio equipment gives little additional trouble at low temperature, pilots and maintenance personnel should be aware of a few conditions and phenomena which at some time may affect their safe passage over rugged, uninhabited terrain. Radio fade-outs occur periodically in the Arctic and are caused by solar explosions and sun spot activity. The accepted theory is that the sun emits electrified particles which produce heavy ionization on reaching the earth's atmosphere. The ionized blanket disrupts radio ceilings everywhere, but particularly in the polar regions. Fade-outs may last for several weeks. As these are referable to sun spots activity, they may be forecast. Short term fade-outs caused by solar explosions, similar to the detonation of atom bombs, may occur in the Arctic during both daylight and darkness. The atmospheric disturbance is revealed about eight minutes after a solar explosion. The fade-out conditions last for 15 minutes to several hours and cannot be forecast. Radios are unserviceable and communication leading to rescue may be delayed. Do not interpret these fade-outs as faulty equipment. At temperatures below 0°C (32°F), the efficiency of the equipment is affected by decreasing temperatures.

10-47. BEFORE EXTERIOR CHECK 0°C (32°F) AND LOWER - (EXTERNAL POWER AVAILABLE).

a. All switches - OFF.

b. Collective Pitch - DOWN.

c. Throttle - CLOSED.

d. External power supply connected - CHECK that DC voltmeter shows proper polarity.

Note

> The following should be performed and the equipment left in warm-up operation during the exterior check.

e. Main Inverter switch - ON.

f. Main fuel switch - ON.

g. Heater - CHECK operation.

10-48. BEFORE EXTERIOR CHECK 0°C (32°F) AND LOWER.

10-49. Perform check as specified in Chapter 3.

10-50. EXTERIOR CHECK 0°C TO MINUS 54°C (32°F TO MINUS 65°F).

a. Perform checks as specified in Exterior Check in Chapter 3.

Caution

> Check all surfaces and controls free of ice and snow.

Note

> Contraction of fluids in the aircraft systems at low temperature causes indication of low levels.

Note

> A check made just after the previous shutdown and carried forward to the walk around check is satisfactory, if no leaks are in evidence. Filling when the system is cold-soaked will result in an over-full condition immediately after take-off, with the possibility of forced leaks at seals.

b. Main Rotor Blades - Check upper surface free of ice, frost and snow. Untie the blades and walk through 360 degrees in the direction of rotation and check to see that there is no restriction of operation due to ice formation. Check flapping action, observing the operation of the stabilizer bar.

Note

At temperatures of minus 35°C (minus 31°F) and lower, the grease in the spherical couplings of the main transmission drive shaft may congeal to a point where the couplings cannot be operated properly. If found frozen, apply heat to thaw the couplings before attempting to start the engine. Indication of proper operation is obtained by turning the main rotor opposite to direction of rotation while observer watches the drive shaft to see that there is no tendency for the transmission drive shaft to "wobble" while the drive shaft is turning.

c. Cabin Top - Remove all loose snow that could be pulled into and block the engine intake during starting.

10-51. INTERIOR CHECK - ALL FLIGHTS 0°C TO MINUS 54°C (32°F TO MINUS 65°F).

10-52. Perform checks as specified in Interior Check, Chapter 3.

10-53. INTERIOR CHECK - NIGHT FLIGHT 0°C TO MINUS 54°C (32°F TO MINUS 65°F).

a. Perform check as specified in Chapter 3.

b. External Power Connected.

Note

When an engine start is to be made without external power, the night flight checks shall be performed after engine start is accomplished and the electrical loadmeter shows an indication of sufficient generator output to prevent battery drain.

c. Cockpit lights - CHECK.

10-54. BEFORE STARTING ENGINE 0°C TO MINUS 54°C (32°F TO MINUS 65°F).

a. (External Power Available.) Perform checks as specified in Before Starting Engine, Chapter 3.

Note

External power should be used for starting when temperatures are below 0°C (32°F) to prevent draining the battery. When external power is connected, electrical systems will be powered and function normally.

b. Heater - CHECK operation by opening main fuel valve (automatically activates boost pump).

10-55. STARTING ENGINE 0°C TO MINUS 54°C (32°F TO MINUS 65°F).

10-56. With external power connected perform start as specified in Chapter 3.

L-11S **Note**

At low ambient temperatures, JP-5 fuel may cause slower engine starts. If engine fails to start when using JP-5 fuel, the starting fuel line must be disconnected from the scheduled fuel port and connected to the unscheduled port. The starting procedure for this configuration is the same as with the scheduled port.

L-13 **Note**

The engine oil pressure gage will indicate maximum during cold weather starting. Run engine at flight idle until indication is within operating limits. Time required for warm-up is dependent on the starting temperature of the engine and lubrication system.

10-57. ENGINE RUN-UP.

10-58. Perform engine run-up as specified in Chapter 3.

Caution

If temperatures are -29°C (-20°F) or below, the pilot should maintain minimum RPM (flight idle) in order to reduce the engine oil pressure while the oil warms and the pressure drops below maximum operating limits.

Note

At OAT between minus 21°C and minus 54°C (minus 4°F and minus 65°F) the exhaust gas temperature may be as low as 290°C (554°F) at flight idle.

Warning

A rapid throttle increase while parked on snow or ice can result in violent yawing.

Note

Movement of nII governor indicator may be very slow due to climatic conditions.

Warning

Control systems checks should be performed with extreme caution when helicopter is parked on snow and ice. There is reduction in ground friction holding the helicopter stationary; controls are sensitive and response is immediate.

10-59. COLD WEATHER CAPABILITY.

10-60. The cold weather capability has been improved with the installation of nickel-cadmium battery which, because of its partial immunity to low temperatures, can be used to start engine at temperatures to minus 30°C (minus 22°F). The operator is cautioned that a battery start should be attempted only if the battery is fully charged and that the safety margin for starting is increased if the battery has been warmed. Following each cold weather flight, the pilot should (before shutting down the engine), check the battery for charge using the following procedures:

a. Main Rotor Speed - Minimum 250 RPM, main generator ON.

b. Main Generator Loadmeter Reading - Note.

c. Battery Switch - OFF, note CHANGE in reading.

10-61. A change of 0.1 in loadmeter reading would indicate a charge rate of 30 amperes and the battery not sufficiently charged for subsequent engine starting. A change of 0.02 in loadmeter reading indicates a charge rate of six amperes and the battery considered reasonably charged. After a flight of one-half hour or more during which the main generator and battery were ON and the main generator voltage at 28 (plus or minus 1.5) volts, a battery charging rate of less than six amperes should be expected.

10-62. EMERGENCY ENGINE STARTING WITHOUT EXTERNAL POWER.

10-63. If a battery start must be attempted when the helicopter and battery have been cold-soaked at temperatures between minus 26°C to minus 37°C (minus 15°F to minus 35°F), preheat the engine and battery if equipment is available and time permits. Preheating will result in a faster starter cracking speed, which tends to reduce the hot start hazard by assisting the engine in reaching a self-sustaining speed (40 percent nI) in the least possible time.

10-64. ENGINE PRE-START CHECK.

10-65. Perform engine pre-start check as specified in Chapter 3.

10-66. ENGINE STARTING CHECK.

10-67. Perform engine start as specified in Chapter 3.

H **Note**

The engine oil pressure gage will indicate maximum during cold weather starting. Run engine at flight idle until indicator is within operating limits. Time required for warm-up is dependent on the starting temperature of the engine and lubrication system.

10-68. TAKE-OFF.

10-69. Take-off on snow from an air base may be considered normal except for the following precautions that should be observed.

Warning

Under cold weather conditions, make sure all instruments have warmed up sufficiently to insure normal operation. Check for sluggish instrument indications before take-off.

a. Select an area that is free of loose or powdery snow so visibility will not be restricted by blowing snow.

Warning

Pilots of aircraft with barrier filter or fine mesh screen installed will exercise extreme caution during ground operation in loose snow. Snow and ice accumulation during ground operation may be detrimental to the engine and hazardous to the aircraft and operator. Ground operation time should be minimized and filter assemblies should be inspected prior to takeoff.

b. Before attempting to take-off make sure the landing gear skids are free and not frozen to the surface.

c. The first take-off after a cold start should include a visual check of the ground surface for evidence of hydraulic leaks. This should be done under hovering power conditions. If hydraulic leaks are present, further flight should be aborted.

10-70. LANDING.

10-71. Landing on snow at an airbase may be considered normal except for the following precautions that should be observed.

a. Select an area free of loose or powdery snow so that visibility will not be restricted by blowing snow.

b. Accomplish a normal landing with a minimum hover before touchdown. Limited visibility will result from swirling snow when hovering is attempted before making a touchdown.

10-72. EVALUATION OF STRANGE AREA SNOW LANDING SITE.

10-73. Landings may often be necessary in areas other than operational air bases. In addition to the basic factors in landing site evaluation, factors pertinent to landings on snow are outlined in this paragraph.

a. The pilot should have knowledge of the type of terrain under the snow (bush, marsh land, tundra, etc.).

b. The snow depth is usually less in clear areas where there is little drifting snow effect. Clean areas normally form gentle swells with the crests of these swells usually crusted. The heaviest crust will generally be found on the upwind side of the crests.

c. Deep snow is usually found in the valleys and to the "lee". These areas are suitable for landings and take-offs if caution is exercised.

d. When making a landing on snow in a strange area, observe the following:

(1) Anticipate loose powdery snow and crusts on all landings.

(2) Landings should always be made when visual ground reference can be maintained. The reference point should be kept forward and to the right so that it will be visible to the pilot at all times.

Note

> When making an approach and landing on snow it should be one continuous operation without extended hover, in order to reduce the white-out condition that results from extended hovering over snow. This white-out will usually occur on loose snow and can cause the pilot to lose all reference with the ground or any object he is approaching. If the object being used as reference, should become completely obscured, accomplish a go-around.

10-74. STOPPING THE ENGINE.

10-75. At temperatures below minus 7°C (20°F), or if main rotor grip seal leakage is evident on engine shutdown, use the following procedure.

a. Prior to engine shutdown, maintain 6000 to 6200 rpm, for one minute in minimum pitch.

b. Make normal engine shutdown with collective pitch control in full down position.

Note

> Do not use collective pitch control to decelerate rotor speed.

c. At extreme low temperatures the time in minimum pitch may have to be extended to allow seals to seat properly.

10-76. BEFORE LEAVING THE HELICOPTER.

10-77. Before leaving the helicopter perform required checks as specified in Chapter 3.

Note

> Open pilot's and copilot's windows approximately one and one-half inches to permit free circulation of air. Install protective covers as required.

10-78. HIGH ALTITUDE OPERATION.

10-79. Before operation at high altitude accomplish the following.

a. Determine the pressure altitude for the area into which the flight is intended and compute maximum gross weight at which a hover may be possible from the appropriate charts.

b. Determine the existing and forecast wind conditions whenever possible.

c. Insofar as practicable, plan the flight to avoid known and probable areas of turbulence.

10-80. ENGINE STARTING.

10-81. For engine starting refer to Chapter 3.

10-82. TAKE-OFF.

10-83. The take-off should be made to obtain airspeed and altitude simultaneously. The take-off should begin with a slow acceleration to obtain translational lift, followed by a gradual increase in power and airspeed until a normal climb is attained.

a. All turns should be shallow. Avoid turns close to the ground.

b. Control movements should be gentle.

c. Sufficient altitude should be maintained to allow for any emergency, keeping in mind the high rate of autorotational descent associated with high altitudes.

d. Forward airspeed should be limited to prevent blade stall which is preceded by blade "buffeting".

e. Avoid areas of known turbulence such as the base of clouds, the lee side of the mountains, and steep canyons.

10-84. DESCENT.

10-85. Accomplish high altitude descents as outlined in the following steps.

a. All descents should be gradual. Under no circumstances shall a high rate of descent be allowed to develop.

b. Caution should be used during descents to maintain a safe airspeed. Increasing the airspeed above normal approach speed can cause the rate of descent to increase very rapidly. Low airspeed may also result in a high rate of descent, and when the nose is lowered in recovery the condition is aggravated.

c. Power applications should be anticipated because this helicopter does not respond to power at high altitudes as rapidly as at a lower elevation.

10-86. LANDING.

10-87. All approaches to landings should be planned and performed in an area of suitably level ground.

10-88. AUTOROTATIONS.

10-89. Autorotations at high altitudes are characterized by higher rates of descent and less effective collective pitch control available to cushion the landing. An airspeed of approximately 60 knots should be maintained during autorotation. At an altitude of 75 to 85 feet, decelerate to decrease airspeed and rate of descent. At approximately 10-15 feet, a small amount of pitch should be applied with the helicopter still in a deceleration attitude. The helicopter should then be leveled and sufficient collective pitch should be applied to cushion the touchdown. Avoid a vertical descent during the last 5 to 10 feet.

Caution

Practice autorotations at high altitudes should be made only to prepared landing areas, even when a power recovery is anticipated. Power recoveries should not be initiated below 400 to 500 feet altitudes, depending upon helicopter weight and field elevation, due to a combination of slow engine acceleration characteristics, high rotor blade angle of attack, and accompanying high rate of descent. The presence of these factors makes a quick power recovery impossible. The altitude at which safe power recovery should be initiated increases with helicopter gross weight and/or field elevation.

SECTION IV DESERT AND HOT WEATHER OPERATION

10-90. HOT WEATHER OPERATION.

10-91. Operations, when outside air temperatures are above standard day temperatures require closer monitoring of oil temperatures and EGT.

Note

At very high ambient temperatures, the helicopter loses efficiency with high gross weights.

SECTION V TURBULENCE AND THUNDERSTORM OPERATION

10-92. TURBULENCE AND THUNDERSTORMS.

10-93. Flight in thunderstorms and heavy rain which accompanies thunderstorms should be avoided. If turbulence and thunderstorms are encountered inadvertently, use the following procedures:

a. Check that all occupants are seated with safety belts and harnesses tightened.

b. Pitot heat - ON.

c. Power - Adjust to maintain a penetration speed of 80 knots.

d. Radios - Turn volume down on any radio equipment badly affected by static.

e. At night - Turn interior lights to full bright to minimize blinding effect of lightning.

10-94. IN THE STORM.

a. Maintain a level attitude and constant power setting airspeed fluctuations should be expected and disregarded.

b. Maintain the original heading, turning only when necessary.

c. The altimeter is unreliable due to differential barometric pressures within the storm. An indicated gain or loss of several hundred feet is not uncommon and should be allowed for in determining minimum safe altitude.

SECTION VI ICE AND RAIN

10-95. ICE AND RAIN.

10-96. In heavy rain, a properly adjusted wiper can be expected to clear the windshield adequately throughout the entire speed range. However, when poor visibility is encountered while cruising in rain, it is recommended that the pilot fly by reference to the flight instruments and the copilot attempt to maintain visual reference. Rain has no noticeable effect on handling or performance of the helicopter.

Note

If the windshield wiper does not start in LOW or MED position, turn the control to HIGH. After the wiper starts, the control may be set at the desired position.

10-97. Before entering icing conditions (visible moisture and below-freezing temperatures), the pilot should actuate the pitot heat, windshield defroster and de-icing system.

Caution

To preclude the possibility of icing, it is recommended that the engine inlet air filters be removed when it is anticipated that the helicopter will be flown under atmospheric conditions conducive to icing.

Caution

Continuous flight in light icing conditions is not recommended because the ice shedding induces rotor blade vibrations, adding greatly to the pilot's work load.

10-98. During flight in icing conditions, the pilot can expect one or all of the following to occur.

a. At any temperature below freezing, a low frequency main blade vibration, caused by asymmetric self-shedding ice.

b. To maintain airspeed, the torque must be increased.

c. An increase in engine egt.

Caution

When operating at outside air temperatures of 40°F or below, icing of the engine air inlet screens can be expected. Ice accumulation on the inlet screens can be detected by illumination of the "Engine Inlet Air" warning light. Continued accumulation of ice will result in partial or complete power loss. It should be noted that illumination of the "Engine Inlet Air" warning light indicates blockage at the inlet screen only and does not reveal icing conditions in the sand and dust separator or on the FOD screen.

Warning

If the ENGINE ICING light fails to illuminate in known icing conditions, or if for any other reason, the engine ice detector system is suspected to be inoperative, pull the ANTI-ICE ENG circuit breaker and check the ENGINE ICE DET light. Ensure DE-ICE switch is ON. If this light does not illuminate the pilot can be reasonably certain the engine ice detector system is inoperative.

Note

Engine ice detector system data not applicable if sand and dust separator unit is installed.

d. Illumination of the ENGINE ICING light.

Note

If the windshield defrosters fail to keep the windshield clear of ice, the side windows may be opened for clear visibility in landing.

CHAPTER 11

CREW DUTIES

SECTION I SCOPE

11-1. SCOPE.

11-2. This chapter covers the responsibilities of each crew member and the primary and alternate functions of each.

11-3. The purpose of this chapter is to provide a compact collection of material and the procedure that must be followed wherein each crew member can readily determine his complete duties.

SECTION II RESPONSIBILITIES

11-4. RESCUE HOIST OPERATING PROCEDURE - HOIST OPERATOR.

11-5. The following sets forth the necessary steps for the hoist operator to actuate the hoist boom outboard, lower cable, retract cable, and return hoist boom to the stowed position. The pilot's hoist controls have priority over the hoist operator's controls.

Note

> The hoist cable is color coded as follows: The first 25 feet from the hook end is yellow, the next 175 feet is unpainted, the next 40 feet is yellow and the last 16 feet is red.

a. Check with the pilot (use intercom) that rescue hoist cable cutter, rescue hoist control, and rescue hoist power circuit breakers are in.

b. After pilot has established zero airspeed over the desired location, move boom toggle switch to OUT position to swing hoist boom outboard.

c. Move variable speed control (labeled DOWN/UP) on the hoist control pendant to DOWN to lower the hoist cable. The speed control must be moved to the right then forward.

Note

> The further the DOWN/UP speed control is moved from its neutral position, the faster the hoist will run. Hoist cable is painted at each end to provide visual indication of cable footage that is extended.

Caution

> The hoist should normally be operated at full speed, as slow speed operation will cause the motor to heat excessively.

d. Move DOWN/UP speed control to UP to raise the hoist load. The speed control must be moved to the left then aft.

Note

> In case the extended portion of the hoist cable has to be jettisoned, a CABLE CUT switch is provided on the control box. The cable cutter is an electrically initiated pressure charge type.

e. Move boom toggle switch to IN position to swing hoist boom inboard.

f. Bring hoist load into cabin and swing hoist boom to stowed position (fully inboard).

CHAPTER 12

WEIGHT AND BALANCE COMPUTATION

SECTION I SCOPE

12-1. SCOPE OF WEIGHT AND BALANCE DATA.

12-2. This chapter contains sufficient instructions and data so that the pilot, knowing the basic weight and moment of the helicopter, can compute any combinations of weight and balance.

12-3. No computers are provided for the helicopter; hence, no computer instruction is included.

SECTION II INTRODUCTION

12-4. INTRODUCTION.

12-5. The purpose of this chapter is to provide appropriate information required for the computation of weight and balance for loading an individual helicopter. The data inserted on charts and forms are applicable only to the individual helicopter, the serial number of which appears on the title page of various forms and charts. The charts and forms may change from time to time, but the principle on which they are based will not change. The forms currently in use are the DD 365 series.

Note

> For the purpose of clarity, Models YUH-1D, UH-1D and UH-1H helicopters are in Class I Category.

12-6. The aircraft manufacture will insert all identifying data and complete one Weight and Balance Form F if applicable, at time of delivery. (Refer to TM 55-405-9 and AR95-16.)

12-7. The helicopter must be weighed periodically as required by pertinent directives, when major modification or repairs are made, when pilot reports unsatisfactory flight characteristics, and when the basic weight data contained in the records are suspected to be in error.

SECTION III CHART EXPLANATIONS

12-8. CHART C - BASIC WEIGHT AND BALANCE RECORD - DD FORM 365C.

12-9. Chart C is a continuous history of the basic weight and moment resulting from structural and equipment changes. The last weight and moment/constant entry is the current weight and balance status of the basic helicopter.

12-10. USE. See chart 12-1 for a sample of DD Form 365C. At time of delivery of a new helicopter, the manufacturer enters the basic weight and moment/constant of the individual helicopter. This chart becomes a part of the "G" file of the helicopter. Subsequent additions to or subtractions from the basic weight and moment/constant in Chart C, are made by the weight and balance technician.

12-11. CHART E - LOADING DATA.

12-12. The loading data in Chart E provides information necessary to work a loading problem for the helicopter.

12-13. USE. From the loading data tables contained in Chart E (chart 12-2) weight and moment/constant are obtained for all variable load items and are added arithmetically to the current basic weight and moment/constant (from Chart C) to obtain the gross weight and moment.

a. The cg of the loaded helicopter is represented by a moment figure opposite the gross weight on the table.

b. If the helicopter is loaded within the forward and aft cg limits, the moment figure will fall numerically between the limiting moments.

c. The effect on cg by the expenditure in flight of such items as fuel, ammunition, etc., may be checked by subtracting the weight and moments of such items from the take-off gross weight and moment, and checking the new moment with the cg table.

Note

> This check should be made to determine whether or not the cg will remain within limits during the entire flight.

12-14. The data in chart 12-3 provides weight and balance information for various kits available on the UH-D/H helicopters. Data is provided for the following listed kits:

100,000 BTU Heater Winterization Kit

Aft Battery Installation

Armored Seat Kits

300 Gallon Internal Auxiliary Fuel Tank.

60 Gallon External Auxiliary Fuel Tanks.

100 Gallon External Auxiliary Fuel Tanks.

SM-23 Door Mounted M-60.

M-6 Subsystem.

XM-3 FFAR Subsystem.

External Stores Support

XM52 Smoke Generator Sybsystem

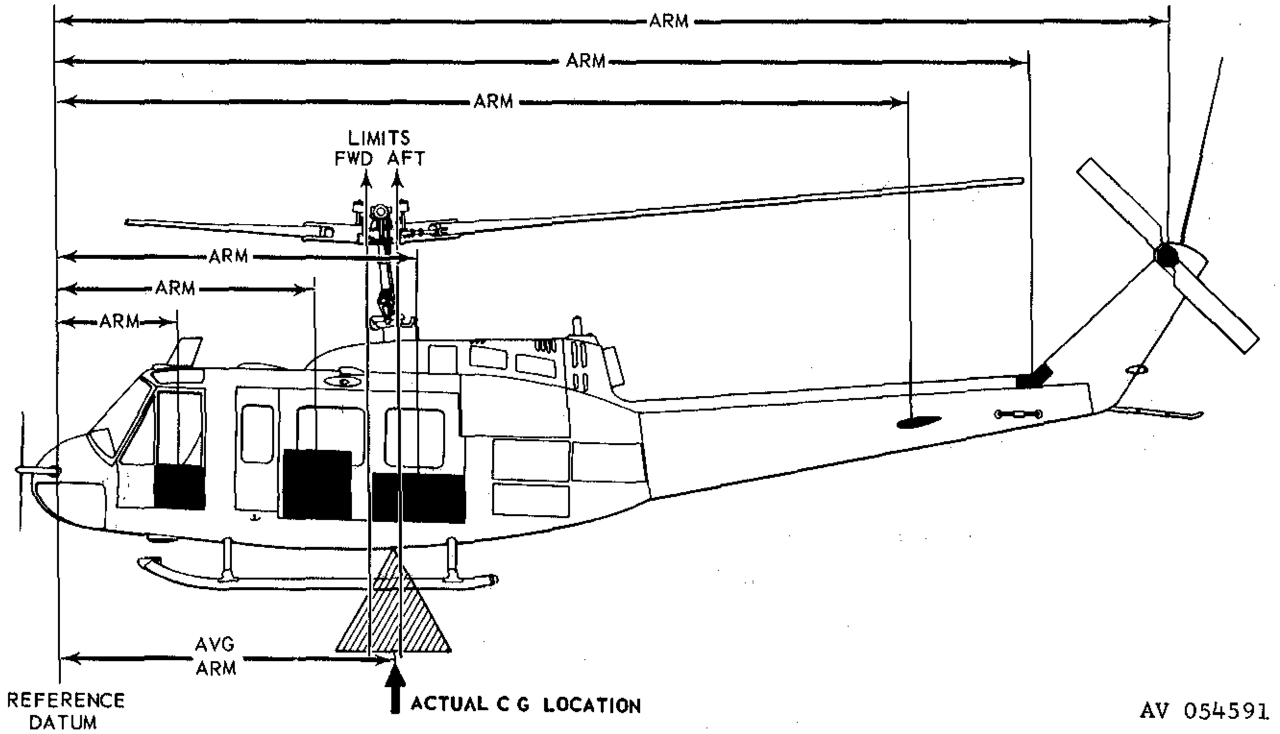


Figure 12-1. Reference datum

Chart 12-1. Sample DD form 365C (Chart C)

CHART C—BASIC WEIGHT AND BALANCE RECORD

(CONTINUOUS HISTORY OF CHANGES IN STRUCTURE OR EQUIPMENT AFFECTING WEIGHT AND BALANCE)

FOR USE IN T. O. 1-1B-40 & AN 01-1B-40

AIRPLANE MODEL YHU-1D

SERIAL NO. SAMPLE

PAGE NO.

DATE	ITEM NO.		DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE						RUNNING TOTAL BASIC AIRPLANE		
				ADDED (+)			REMOVED (–)					
	IN	OUT		WEIGHT	ARM	MOMENT[1] 100	WEIGHT	ARM	MOMENT[1] 100	WEIGHT	MOMENT[1] 100	~~INDEX[2]~~ CG
10-25-61			BASIC HELICOPTER							4722.0	6876.0	145.6
CAMPBELL 11-15-61	✓		HEATER KIT (CHARTA-ITEM D-13)	73.0	197	143.1				4795.0	7019.1	146.4
12-6-61	✓		APX-44 TRANSPONDER (CHARTA-ITEMD-10	23.0	191	43.9						
RUCKER	✓		TRANS. MT (CHART A. ITEM D-11)	2.0	191	4.3						
	✓		APX-44 CONTROL (CHARTA-ITEM B-8)	2.0	32	0.8				4822.0	7068.1	146.6
12-29-61		✓	ENGINE L-E06010				480.0	187	897.6			
RUCKER	✓		ENGINE L-E06089	478.0	187	893.9				4820.0	7064.4	146.6

EXAMPLE

---

[1] *Enter constant used below line.*

[2] *Balance computer index.*

DD FORM 1 SEP 54 365C

PREVIOUS EDITIONS OF THIS FORM MAY BE USED UNTIL STOCKS ARE EXHAUSTED.

16—70874-1 U. S. GOVERNMENT PRINTING OFFICE

HELICOPTER DIAGRAM

CHART E
SHEET 1 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

48 FOOT MAIN ROTOR

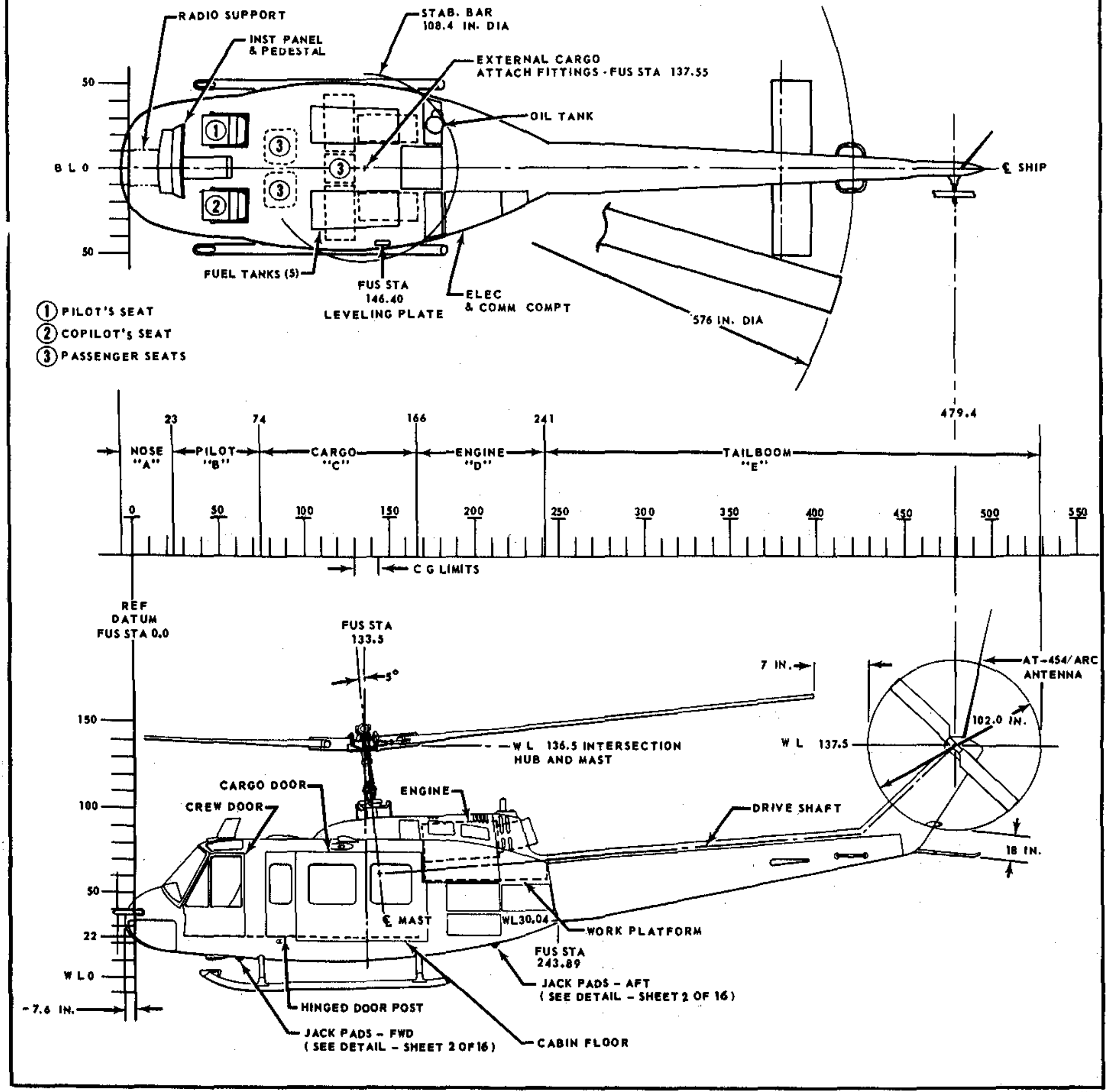
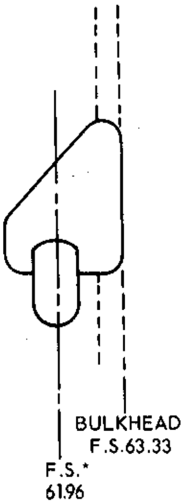
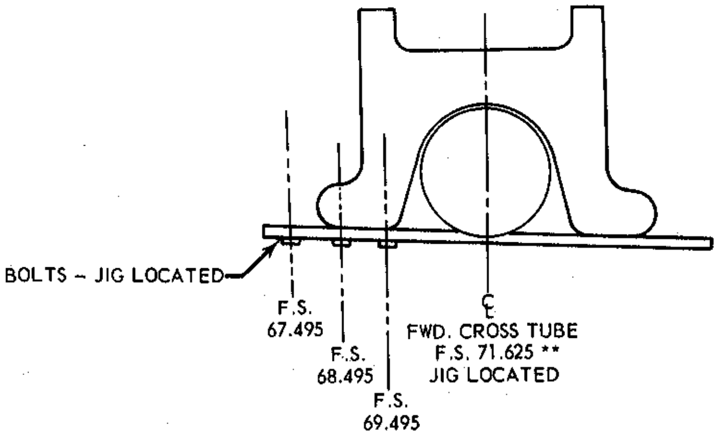


Chart 12-2. Chart E - loading data (Sheet 1 of 16)

CHART E
SHEET 2 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

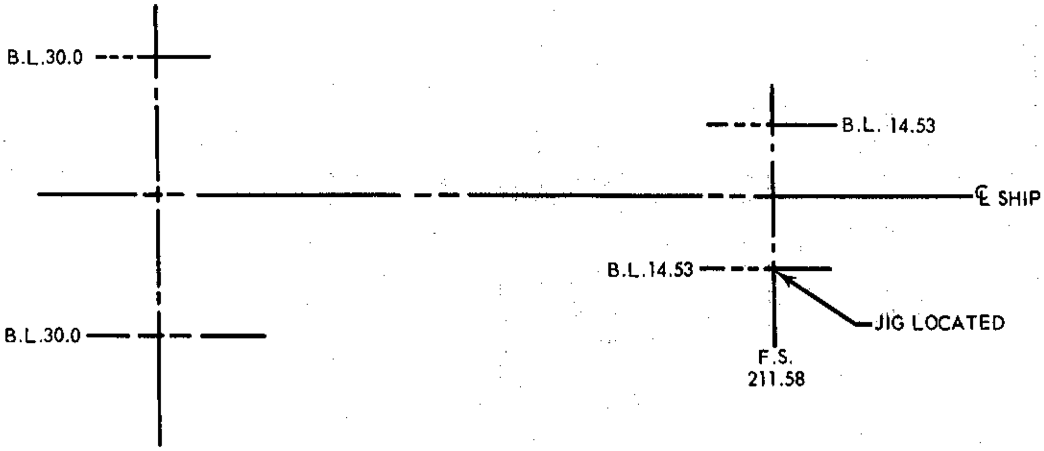
JACK PAD LOCATION DATA





*F.S. 61.96 IS APPROXIMATE BUT SHOULD BE ACCURATE WITHIN ± 1/32 INCHES. FOR EXACT STATION DROP PLUMB BOB FROM CENTER OF FORWARD CROSS TUBE (F.S. 71.625) OR FROM CENTER OF ONE OF THE STRAP ATTACHING BOLTS SHOWN IN VIEW AT RIGHT, AND FROM JACK PAD AND MEASURE EXACT DISTANCE.

**CROSS TUBE USED AS JIG POINT ON WEIGHING RECORD, FORM 365B.



JACK PADS – PLAN VIEW

Chart 12-2. Chart E – loading data (Sheet 2 of 16)

CHART E
SHEET 3 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

FUEL LOADING TABLES REGULAR

GAL	WEIGHT 6.5 LB/GAL	C G	MOMENT/100	GAL	WEIGHT 6.5 LB/GAL	C G	MOMENT/100
10	65	144.0	94	120	780	137.1	1069
20	130	144.0	187	130	845	139.4	1178
30	195	144.0	281	140	910	141.5	1288
40	260	138.0	359	150	975	143.4	1398
50	325	133.9	435	160	1040	145.1	1509
60	390	131.0	511	170	1105	146.5	1619
70	455	129.1	587	180	1170	147.8	1729
80	520	127.7	664	190	1235	148.9	1839
*85	553	127.1	703	200	1300	149.9	1949
90	585	127.7	747	210	1365	150.8	2058
100	650	130.5	848	220	1430	151.6	2168
110	715	134.1	959				

*Most critical fuel amount for most forward flight condition.

AUXILIARY-INTERNAL-300 GALLONS

GAL	WEIGHT 6.5 LB/GAL	MOMENT/100 STA 151.0	GAL	WEIGHT 6.5 LB/GAL	MOMENT/100 STA 151.0
10	65	98	190	1235	1865
20	130	196	200	1300	1963
30	195	294	210	1365	2061
40	260	393	220	1430	2159
50	325	491	230	1495	2257
60	390	589	240	1560	2356
70	455	687	250	1625	2454
80	520	785	260	1690	2552
90	585	883	270	1755	2650
100	650	982	280	1820	2748
110	715	1080	290	1885	2846
120	780	1178	300	1950	2945
130	845	1276			
140	910	1374			
150	975	1472			
160	1040	1570			
170	1105	1669			
180	1170	1767			

FUEL TANK SEQUENCE:

When auxiliary tank is installed, fuel is pumped from the auxiliary tank to the regular tank. Fuel level in regular tank is controlled by float switches. The auxiliary tank is emptied before any appreciable amount is removed from the regular tank.

Chart 12-2. Chart E - loading data (Sheet 3 of 16)

CHART E
SHEET 4 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

FUEL LOADING TABLE
AUXILIARY - EXTERNAL

GAL	WEIGHT 6.5 LB/GAL	MOMENT/100 STA 142.5	GAL	WEIGHT 6.5 LB/GAL	MOMENT/100 STA 142.5
10	65	93	110	715	1019
20	130	185	120	780	1112
30	195	278	130	845	1204
40	260	371	140	910	1297
50	325	463	150	975	1389
60	390	556	160	1040	1482
70	455	648	170	1105	1575
80	520	741	180	1170	1667
90	585	834	190	1235	1760
100	650	926	200	1300	1853

FUEL TANK SEQUENCE:

When auxiliary tank is installed, fuel is pumped from the auxiliary tank to the regular tank. Fuel level in regular tank is controlled by float switchs. The auxiliary tank is emptied before any appreciable amount is removed from the regular tank.

Chart 12-2. Chart E - loading data (Sheet 4 of 16)

CHART E
SHEET 5 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

OIL LOADING TABLE

GAL	WEIGHT (LB)	MOMENT/100 STA 173.0	GAL	WEIGHT (LB)	MOMENT/100 STA 173.0
0.5	4	7	2.5	19	33
1.0	8	14	3.0	23	40
1.5	11	19	3.5	26	45
2.0	15	26	4.0	30	52
			4.5	34	59

EXTERNAL CARGO LOADING TABLE

WEIGHT (LB)	MOMENT/100 STA 138.0	WEIGHT (LB)	MOMENT/100 STA 138.0	WEIGHT (LB)	MOMENT/100 STA 138.0
50	69	1550	2139	3050	4209
100	138	1600	2208	3100	4278
150	207	1650	2277	3150	4347
200	276	1700	2346	3200	4416
250	345	1750	2415	3250	4485
300	414	1800	2484	3300	4554
350	483	1850	2553	3350	4623
400	552	1900	2622	3400	4692
450	621	1950	2691	3450	4761
500	690	2000	2760	3500	4830
550	759	2050	2829	3550	4899
600	828	2100	2898	3600	4968
650	897	2150	2967	3650	5037
700	966	2200	3036	3700	5106
750	1035	2250	3105	3750	5175
800	1104	2300	3174	3800	5244
850	1173	2350	3243	3850	5313
900	1242	2400	3312	3900	5382
950	1311	2450	3381	3950	5451
1000	1380	2500	3450	4000	5520
1050	1449	2550	3519		
1100	1518	2600	3588		
1150	1587	2650	3657		
1200	1656	2700	3726		
1250	1725	2750	3795		
1300	1794	2800	3864		
1350	1863	2850	3933		
1400	1932	2900	4002		
1450	2001	2950	4071		
1500	2070	3000	4140		

Chart 12-2. Chart E - loading data (Sheet 5 of 16)

CARGO TIE DOWN FITTING DATA

CHART E
SHEET 6 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

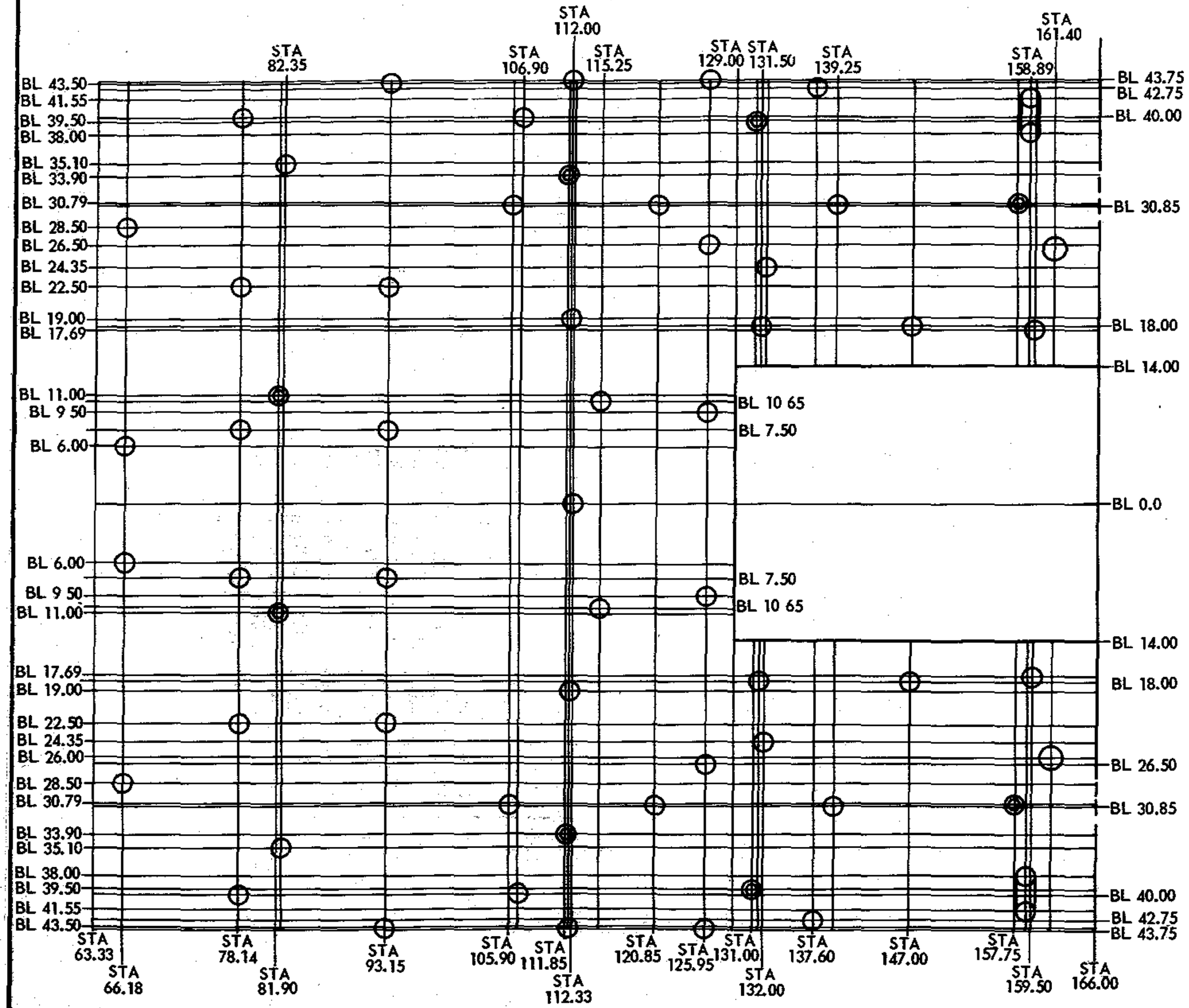


Chart 12-2. Chart E - loading data (Sheet 6 of 16)

CHART E
SHEET 7 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

INTERNAL CARGO LOADING TABLE

MOMENT/100

CARGO WEIGHT (POUNDS)	CARGO CENTER OF GRAVITY (FUS STA)						CARGO WEIGHT (POUNDS)	CARGO CENTER OF GRAVITY (FUS STA)					
	75.0	90.0	105.0	120.0	135.0	150.0		75.0	90.0	105.0	120.0	135.0	150.0
50	38	45	53	60	68	75	1550	1163	1395	1628	1860	2093	2325
100	75	90	105	120	135	150	1600	1200	1440	1680	1920	2160	2400
150	113	135	158	180	203	225	1650	1238	1485	1733	1980	2228	2475
200	150	180	210	240	270	300	1700	1275	1530	1785	2040	2295	2550
250	188	225	263	300	338	375	1750	1313	1575	1838	2100	2363	2625
300	225	270	315	360	405	450	1800	1350	1620	1890	2161	2430	2700
350	263	315	368	420	473	525	1850	1388	1665	1943	2220	2498	2775
400	300	360	420	480	540	600	1900	1425	1710	1995	2280	2565	2850
450	338	405	473	540	608	675	1950	1463	1755	2048	2340	2633	2925
500	375	450	525	600	675	750	2000	1500	1800	2100	2400	2700	3000
550	413	495	578	660	743	825	2050	1538	1845	2153	2460	2768	3075
600	450	540	630	720	810	900	2100	1575	1890	2205	2520	2835	3150
650	488	585	683	780	878	975	2150	1613	1935	2258	2580	2903	3225
700	525	630	735	840	945	1050	2200	1650	1980	2310	2640	2970	3300
750	563	675	788	900	1013	1125	2250	1688	2025	2363	2700	3038	3375
800	600	720	840	960	1080	1200	2300	1725	2070	2415	2760	3105	3450
850	638	765	893	1020	1148	1275	2350	1763	2115	2468	2820	3173	3525
900	675	810	945	1080	1215	1350	2400	1800	2160	2520	2880	3240	3600
950	713	855	998	1140	1283	1425	2450	1838	2205	2573	2940	3308	3675
1000	750	900	1050	1200	1350	1500	2500	1875	2250	2625	3000	3375	3750
1050	788	945	1103	1260	1418	1575	2550	1913	2295	2678	3060	3443	3825
1100	825	990	1155	1320	1485	1650	2600	1950	2340	2730	3120	3510	3900
1150	863	1035	1208	1380	1553	1725	2650	1988	2385	2783	3180	3578	3975
1200	900	1080	1260	1440	1620	1800	2700	2025	2430	2835	3240	3645	4050
1250	938	1125	1313	1500	1688	1875	2750	2063	2475	2888	3300	3713	4125
1300	975	1170	1365	1560	1755	1950	2800	2100	2520	2940	3360	3780	4200
1350	1013	1215	1418	1620	1823	2025	2850	2138	2565	2993	3420	3848	4275
1400	1050	1260	1470	1680	1890	2100	2900	2175	2610	3045	3480	3915	4350
1450	1088	1305	1523	1740	1958	2175	2950	2213	2655	3098	3540	3983	4425
1500	1125	1350	1575	1800	2025	2250	3000	2250	2700	3150	3600	4050	4500

CAUTION

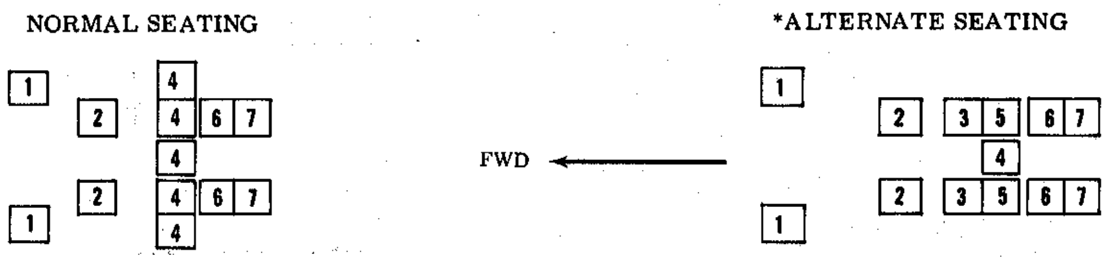
It is possible to exceed the cg limits by improper loading. Fuel consumption, cargo weight and placement, and correct crew weight must be determined for satisfactory balance. All necessary information may be obtained from this manual.

Chart 12-2. Chart E - loading data (Sheet 7 of 16)

CHART E
SHEET 8 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

TABLE OF MOMENTS FOR PERSONNEL

POSITION IDENTIFICATION



*FOR LITTER INSTALLATION, REMOVE 2, 3, 5, 6, AND 7; REPLACE 3, 5, AND 6 WITH 8

MOMENT/100

Weight (Lb)	Pilot or Copilot Sta 46.7	Passenger Sta 85.0	Passenger Sta 105.0	Passenger or Attendant Sta 117.0	Passenger Sta 122.0	Passenger Sta 139.0	Passenger Sta 156.0	Litter Patient Sta 120.0
Position -	1	2	3	4	5	6	7	8
170	79	145	179	199	207	236	265	204
180	84	153	189	211	220	250	281	216
190	89	162	200	222	232	264	296	228
200	93	170	210	234	244	278	312	240
210	98	179	221	246	256	292	328	252
220	103	187	231	257	268	306	343	264
230	107	196	242	269	281	320	359	276
240	112	204	252	281	293	334	374	288
250	117	213	263	293	305	348	390	300

TABLE OF MOMENTS FOR CREW MOVEMENT

MOMENT/100

	To Position							
From Position	1	2	3	4	5	6	7	8
1	----	+77	+117	+141	+151	+185	+219	+147
2	- 77	---	+ 40	+ 64	+ 74	+108	+142	+ 70
3	-117	-40	----	+ 24	+ 34	+ 68	+102	+ 30
4	-141	-64	- 24	----	+ 10	+ 44	+ 78	+ 6
5	-151	-74	- 34	- 10	----	+ 34	+ 68	- 4
6	-185	-108	- 68	- 44	- 34	----	+ 34	- 38
7	-219	-142	-102	- 78	- 68	- 34	----	- 72
8	-147	- 70	- 30	- 6	+ 4	+ 38	+ 72	----

NOTE: Based on 200 pounds per man.

Chart 12-2. Chart E - loading data (Sheet 8 of 16)

CENTER OF GRAVITY TABLE
MOMENT/100

CHART E
SHEET 9 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

Numbers in Italic are actual moment limits for weights indicated but not for stations shown in column head.

GROSS WEIGHT (POUNDS)	130.0	131.0	132.0	133.0	134.0	136.0	138.0	140.0	142.0	143.0	144.0
4900	6370	6419	6468	6517	6566	6664	6762	6860	6958	7007	7056
4925	6403	6452	6501	6550	6600	6698	6797	6895	6994	7043	7092
4950	6435	6485	6534	6583	6633	6732	6831	6930	7029	7069	7128
4975	6468	6517	6567	6617	6667	6766	6866	6965	7065	7114	7164
5000	6500	6550	6600	6650	6700	6800	6900	7000	7100	7150	7200
5025	6533	6583	6633	6683	6734	6834	6935	7035	7136	7186	7236
5050	6565	6616	6666	6717	6767	6868	6969	7070	7171	7222	7272
5075	6598	6648	6699	6750	6801	6902	7004	7105	7207	7257	7308
5100	6630	6681	6732	6783	6834	6936	7038	7140	7242	7293	7344
5125	6663	6714	6765	6816	6868	6970	7073	7175	7278	7329	7380
5150	6695	6747	6798	6850	6901	7004	7107	7210	7313	7365	7416
5175	6728	6779	6831	6883	6935	7038	7142	7245	7349	7400	7452
5200	6760	6812	6864	6916	6968	7072	7176	7280	7384	7436	7488
5225	6793	6845	6897	6949	7002	7106	7211	7315	7420	7472	7524
5250	6825	6878	6930	6983	7035	7140	7245	7350	7455	7508	7560
5275	6858	6910	6963	7016	7069	7174	7280	7385	7491	7543	7596
5300	6890	6943	6996	7049	7102	7208	7314	7420	7526	7579	7632
5325	6923	6976	7029	7082	7136	7242	7349	7455	7562	7615	7668
5350	6955	7009	7062	7116	7169	7276	7383	7490	7597	7651	7704
5375	6988	7041	7095	7149	7203	7310	7418	7525	7633	7686	7740
5400	7020	7074	7128	7182	7236	7344	7452	7560	7668	7722	7776
5425	7053	7107	7161	7215	7270	7378	7487	7595	7704	7758	7812
5450	7085	7140	7194	7249	7303	7412	7521	7630	7739	7794	7848
5475	7118	7172	7227	7282	7337	7446	7556	7665	7775	7829	7884
5500	7150	7205	7260	7315	7370	7480	7590	7700	7810	7865	7920
5525	7183	7238	7293	7348	7404	7514	7625	7735	7846	7901	7956
5550	7215	7271	7326	7382	7434	7548	7659	7770	7881	7937	7992
5575	7248	7303	7359	7415	7471	7582	7694	7805	7917	7972	8028
5600	7280	7336	7392	7448	7504	7616	7728	7840	7952	8008	8064
5625	7313	7369	7425	7481	7538	7650	7763	7875	7988	8044	8100
5650	7345	7402	7458	7515	7571	7684	7797	7910	8023	8080	8136
5675	7378	7434	7491	7548	7605	7718	7832	7945	8059	8115	8172
5700	7410	7467	7524	7581	7638	7752	7866	7980	8094	8151	8208
5725	7443	7500	7557	7614	7672	7786	7901	8015	8130	8187	8244
5750	7475	7533	7590	7648	7705	7820	7935	8050	8165	8223	8280
5775	7508	7565	7623	7681	7739	7854	7970	8085	8201	8258	8316
5800	7540	7598	7656	7714	7772	7888	8004	8120	8236	8294	8352
5825	7573	7631	7689	7747	7806	7922	8039	8155	8272	8338	8388
5850	7605	7664	7722	7781	7839	7956	8073	8190	8307	8366	8424
5875	7638	7696	7755	7814	7873	7990	8108	8225	8343	8401	8460

Chart 12-2. Chart E - loading data (Sheet 9 of 16)

CENTER OF GRAVITY TABLE
MOMENT/100

CHART E
SHEET 10 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

GROSS WEIGHT (POUNDS)	Numbers in Italic are actual moment limits for weights indicated but not for stations shown in column head.									
	130.0	131.0	132.0	133.0	134.0	136.0	138.0	140.0	142.0	143.0	144.0
5900	7670	7729	7788	7847	7906	8024	8142	8260	8378	8437	8496
5925	7703	7762	7821	7880	7940	8058	8177	8295	8414	8473	8532
5950	7735	7795	7854	7914	7973	8092	8211	8330	8449	8509	8568
5975	7768	7827	7887	7947	8007	8126	8246	8365	8485	8544	8604
6000	7800	7860	7920	7980	8040	8160	8280	8400	8520	8580	8640
6025	7833	7893	7953	8013	8074	8194	8315	8435	8556	8616	8676
6050	7865	7926	7986	8047	8107	8228	8349	8470	8591	8652	8712
6075	7898	7958	8019	8080	8141	8262	8384	8505	8627	8687	8748
6100	7930	7991	8052	8113	8174	8296	8418	8540	8662	8723	8784
6125	7963	8024	8085	8146	8208	8330	8453	8575	8698	8759	8820
6150	7995	8057	8118	8180	8241	8364	8487	8610	8733	8795	8856
6175	8028	8089	8151	8213	8275	8398	8522	8645	8769	8830	8892
6200	8060	8122	8184	8246	8308	8432	8556	8680	8804	8866	8928
6225	8093	8155	8217	8279	8342	8466	8591	8715	8840	8902	8964
6250	8125	8188	8250	8313	8375	8500	8625	8750	8875	8938	9000
6275	8158	8220	8283	8346	8409	8534	8660	8785	8911	8973	9036
6300	8190	8253	8316	8379	8442	8568	8694	8820	8946	9009	9072
6325	8223	8286	8349	8412	8476	8602	8729	8855	8982	9045	9108
6350	8255	8319	8382	8446	8509	8636	8763	8890	9017	9081	9144
6375	8288	8351	8415	8479	8543	8670	8798	8925	9053	9116	9150
6400	8320	8384	8448	8512	8576	8704	8832	8960	9088	9152	9216
6425	8353	8417	8481	8545	8610	8738	8867	8995	9124	9188	9252
6450	8385	8450	8514	8579	8643	8772	8901	9030	9159	9224	9288
6500	8450	8515	8580	8645	8710	8840	8970	9100	9230	9295	9360
6525	8483	8548	8613	8678	8744	8874	9005	9135	9266	9331	9396
6550	8515	8581	8646	8712	8777	8908	9039	9170	9301	9367	9432
6575	8548	8613	8679	8745	8810	8942	9074	9205	9337	9402	9468
6600	8580	8646	8712	8778	8844	8976	9108	9240	9372	9438	9504
6625	8613	8679	8745	8811	8878	9101	9143	9275	9408	9474	9540
6650	8645	8712	8778	8845	8911	9044	9177	9310	9443	9510	9576
6675	8678	8744	8811	8878	8945	9078	9212	9345	9479	9545	9612
6700	8710	8777	8844	8911	8978	9112	9246	9380	9514	9581	9648
6725	8743	8810	8877	8944	9012	9146	9281	9415	9550	9617	9684
6750	8775	8843	8910	8978	9045	9180	9315	9450	9585	9653	9720
6775	8808	8875	8943	9011	9079	9214	9350	9485	9621	9688	9756
6800	8840	8908	8976	9044	9112	9248	9384	9520	9656	9724	9792
6825	8873	8941	9009	9077	9146	9282	9419	9555	9692	9760	9828
6850	8905	8974	9042	9111	9179	9316	9453	9590	9727	9796	9864
6875	8938	9006	9075	9144	9213	9350	9488	9625	9763	9831	9900

Chart 12-2. Chart E - loading data (Sheet 10 of 16)

CENTER OF GRAVITY TABLE
MOMENT/100

CHART E
SHEET 11 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

GROSS WEIGHT (POUNDS)	Numbers in italic are actual moment limits for weights indicated but not for stations shown in column head.										
	130.0	131.0	132.0	133.0	134.0	136.0	138.0	140.0	142.0	143.0	144.0
6900	8970	9039	9108	9177	9246	9384	9522	9660	9798	9867	9936
6925	9003	9072	9141	9210	9280	9418	9557	9695	9834	9903	9972
6950	9035	9105	9174	9244	9313	9452	9591	9730	9869	9939	10008
6975	9068	9137	9207	9277	9347	9486	9626	9765	9905	9974	10044
7000	9100	9170	9240	9310	9380	9520	9660	9800	9940	10010	10080
7025	9133	9203	9273	9343	9414	9554	9695	9835	9976	10046	10116
7050	9165	9236	9306	9377	9447	9588	9729	9870	10011	10082	10152
7075	9198	9268	9339	9410	9481	9622	9664	9905	10047	10117	10188
7100	9230	9301	9372	9443	9514	9656	9798	9940	10082	10153	10224
7125	9263	9334	9405	9476	9548	9690	9833	9975	10118	10189	10260
7150	9295	9367	9438	9510	9581	9724	9867	10010	10153	10225	10296
7175	9328	9399	9471	9543	9615	9758	9902	10045	10189	10260	10332
7200	9360	9432	9504	9576	9648	9792	9936	10080	10224	10296	10368
7225	9393	9465	9537	9609	9682	9826	9971	10115	10260	10332	10404
7250	9425	9498	9570	9643	9715	9860	10005	10150	10295	10368	10440
7275	9458	9530	9603	9676	9749	9894	10040	10185	10331	10403	10476
7300	9490	9563	9636	9709	9782	9928	10074	10220	10366	10439	10512
7325	9523	9596	9669	9742	9816	9962	10109	10255	10402	10475	10548
7350	9555	9629	9702	0776	9849	9996	10143	10290	10437	10511	10584
7375	9588	9661	9735	9809	9883	10030	10178	10325	10473	10546	10620
7400	9620	9694	9768	9842	9916	10064	10212	10360	10508	10582	10656
7425	9653	9727	9801	9875	9950	10098	10247	10395	10544	10618	10692
7450	9685	9760	9834	9909	9983	10132	10281	10430	10579	10654	10728
7475	9718	9792	9867	9942	10017	10166	10316	10465	10615	10689	10764
7500	9750	9825	9900	9975	10050	10200	10350	10500	10650	10725	10800
7525	9783	9858	9933	10008	10084	10234	10385	10535	10686	10761	10836
7550	9815	9891	9966	10042	10117	10268	10419	10570	10721	10797	10872
7575	9848	9923	9999	10075	10151	10302	10454	10605	10757	10832	10908
7600	9880	9956	10032	10108	10184	10336	10488	10640	10792	10868	10944
7625	9913	9989	10065	10141	10218	10370	10523	10675	10828	10904	10980
7650	9945	10022	10098	10175	10251	10404	10557	10710	10863	10940	11016
7675	9978	10054	10131	10208	10285	10438	10592	10745	10899	10975	11052
7700	10010	10087	10164	10241	10318	10472	10626	10780	10934	11011	11088
7725	10043	10120	10197	10274	10352	10506	10661	10815	10970	11047	11124
7750	10075	10153	10230	10308	10385	10540	10695	10850	11005	11083	11160
7775	10108	10185	10263	10341	10419	10574	10730	10885	11041	11118	11196
7800	10140	10218	10296	10374	10452	10608	10764	10920	11076	11154	11232
7825	10173	10251	10329	10407	10486	10642	10799	10995	11112	11190	11268
7850	10205	10284	10362	10441	10519	10676	10833	10990	11147	11226	11304
7875	10238	10316	10395	10474	10553	10710	10868	11025	11183	11261	11340

Chart 12-2. Chart E - loading data (Sheet 11 of 16)

CENTER OF GRAVITY TABLE
MOMENT/100

CHART E
SHEET 12 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

Numbers in Italic are actual moment limits for weights indicated but not for stations shown in column head.

GROSS WEIGHT (POUNDS)	130.0	131.0	132.0	133.0	134.0	136.0	138.0	140.0	142.0	143.0	144.0
7900	10270	10349	10428	10507	10586	10744	10902	11060	11218	11297	11376
7925	10303	10382	10461	10540	10620	10778	10937	11095	11254	11333	11412
7950	10335	10415	10494	10574	10654	10812	10971	11130	11289	11369	11448
7975	10368	10447	10527	10607	10687	10846	11006	11165	11325	11404	11484
8000	10400	10480	10560	10640	10720	10880	11040	11200	11360	11440	11520
8025	10433	10513	10593	10673	10754	10914	11075	11235	11396	11476	11556
8050	10465	10546	10626	10707	10787	10948	11109	11270	11431	11512	11592
8075	10498	10578	10659	10740	10821	10982	11144	11305	11467	11547	11628
8100	10530	10611	10692	10773	10854	11016	11178	11340	11502	11583	11664
8125	10563	10644	10725	10860	10888	11050	11213	11375	11538	11619	11700
8150	10595	10677	10758	10840	10921	11084	11247	11410	11573	11655	11736
8175	10628	10709	10791	10873	10955	11118	11282	11445	11609	11690	11772
8200	10660	10742	10824	10906	10988	11152	11316	11480	11644	11726	11808
8225	10693	10775	10857	10939	11022	11186	11351	11515	11680	11762	11844
8250	10725	10808	10890	10973	11055	11220	11385	11550	11715	11798	11880
8275	10758	10840	10923	11006	11089	11254	11420	11585	11751	11833	11916
8300	10790	10873	10956	11039	11122	11288	11454	11620	11786	11869	11952
8325	10823	10906	10989	11072	11156	11322	11489	11655	11822	11905	11988
8350	10855	10939	11022	11106	11189	11356	11523	11690	11857	11941	12024
8375	10888	10971	11055	11139	11223	11390	11558	11725	11893	11976	12060
8400	10920	11004	11088	11172	11256	11424	11592	11760	11928	12012	12096
8425	10953	11037	11121	11205	11290	11458	11627	11795	11964	12048	12132
8450	10985	11070	11154	11239	11323	11492	11661	11830	11999	12084	12168
8475	11018	11102	11187	11272	11357	11526	11696	11865	12035	12119	12204
8500	11050	11135	11220	11305	11390	11560	11730	11900	12070	12155	12240
8525	11083	11168	11253	11338	11424	11594	11765	11935	12106	12191	12276
8550	11115	11201	11286	11372	11457	11628	11799	11970	12141	12227	12312
8575	11148	11233	11219	11405	11491	11662	11834	12005	12177	12262	12348
8600	11180	11266	11352	11438	11525	11696	11868	12040	12212	12298	12384
8625		11299	11385	11471	11558	11730	11903	12075	12248	12334	
8650	*11262*	11332	11418	11505	11591	11764	11937	12110	12283	12370	*12452*
8675		11364	11451	11538	11625	11798	11972	12145	12319	12405	
8700	*11345*	11397	11484	11571	11658	11832	12006	12180	12354	12441	*12519*
8725		11430	11517	11604	11692	11866	12041	12215	12390	12477	
8750	*11428*	11463	11550	11638	11725	11900	12075	12250	12425	12513	*12587*
8775		11495	11583	11671	11759	11934	12110	12285	12461	12548	
8800	*11519*	11528	11616	11704	11792	11968	12144	12320	12496	12584	*12654*
8825		11561	11649	11737	11826	12002	12179	12355	12532	12620	
8850		*11602*	11682	11771	11859	12036	12213	12390	12567	12656	*12722*
8875			11715	11804	11893	12070	12248	12425	12603	12691	

Chart 12-2. Chart E - loading data (Sheet 12 of 16)

CHART E
SHEET 13 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

CENTER OF GRAVITY TABLE
MOMENT/100

GROSS WEIGHT (POUNDS)	Numbers in Italic are actual moment limits for weights indicated but not for stations shown in column head.										
	130.0	131.0	132.0	133.0	134.0	136.0	138.0	140.0	142.0	143.0	144.0
8900		*11686*	11748	11837	11926	12104	12282	12460	12638	12727	*12789*
8925			11781	11870	11960	12138	12317	12495	12674	12763	
8950		*11769*	11814	11904	11993	12172	12351	12530	12709	12799	*12857*
8975			11847	11937	12027	12206	12386	12565	12745	12834	
9000		*11862*	11880	11970	12060	12240	12420	12600	12780	12870	*12924*
9025			11913	12003	12094	12274	12455	12635	12816	12906	
9050			11946	12037	12127	12308	12489	12670	12851	12942	*12987*
9075				12070	12161	12342	12524	12705	12887	12977	
9100			*12030*	12103	12194	12376	12558	12740	12922	13013	*13054*
9125				12136	12228	12410	12593	12775	12958	13049	
9150			*12115*	12170	12261	12444	12627	12810	12993	13085	*13121*
9175				12203	12295	12478	12662	12845	13029	13120	
9200			*12208*	12236	12328	12512	12696	12880	13064	13156	*13188*
9225				12269	12362	12546	12731	12915	13100	13192	
9250			*12293*	12303	12395	12580	12765	12950	13135	13228	*13255*
2975				12336	12429	12614	12800	12985	13171	13263	
9300				*12378*	12462	12648	12834	13020	13206	13299	*13318*
9325					12496	12682	12869	13055	13242	13335	
9350				*12464*	12529	12716	12903	13190	13277	13371	*13385*
9375					12563	12750	12938	13125	13313	13406	
9400				*12558*	12596	12784	12972	13160	13348	13442	*13451*
9425					12630	12818	13007	13195	13384	13478	
9450				*12644*	12663	12852	13041	13230	13419	13514	*13518*
9475					12697	12886	13076	13265	13455	13549	
9500					12730	12920	13110	13300	13490	13585	

GROSS WEIGHT LIMITATIONS:

Take-off ______________________ *

Landing ______________________ *

*NOTE: Service activities shall insert, or substitute, current figures from latest applicable (Technical Order) (Flight Handbook) covering operating restrictions.

Chart 12-2. Chart E - loading data (Sheet 13 of 16)

CHART E
SHEET 14 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

MISCELLANEOUS DATA
PERSONNEL CENTROIDS*

COMPARTMENT	CREW MEMBERS	ARM
B	Pilot	46.7
	Copilot	46.7
C	Passengers	85.0
	Passengers	105.0
	Passengers	117.0
	Medical Attendant	117.0
	Litter Patients	120.0
	Passengers	122.0
	Passengers	139.0
	Passengers	156.0

*See sheet 7 of 15 for seating arrangements.

DIMENSIONAL DATA

Overall Length - Blades Extended	685.4 in.
Length - M/R Blades Removed (T/R Blades F & A)	538.1 in.
Maximum Height - T/R Blades Vertical	173.5 in.
Height - T/R Blades Fore and Aft	168.8 in.
Span - Blades Rotating	576.0 in.
Span - Blades Fore & Aft	114.6 in.

Chart 12-2. Chart E - loading data (Sheet 14 of 16)

CHART E
SHEET 15 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

TYPICAL SERVICE LOADING

The items listed below are typical for the mission indicated. These load items are added to the Basic Weight to determine Operating Weight for the particular mission. (See Sheet 16 of 16 for Loading Examples.)

ITEM	ARM	BASIC MISSION		TROOP CARRIER 11 TROOPS		LITTER EVACUATION	
		Weight	Moment/100	Weight	Moment/100	Weight	Moment/100
Pilot	46.7	200	93	200	93	200	93
Troops (11)	122.3			2420	2960		
Medical Attendant (1)	117.0					200	234
Patients (6)	120.0					1500	1800
Passengers (4)	117.0	800	936				
Medical Equipment	110.0					100	110
Litters	120.0					96	115
Fuel	145.1/149.9	1040	1509	1300	1949	1300	1949
Oil - Engine	173.0	24	42	24	42	24	42
TOTALS		2064	2580	3944	5044	3420	4343

CAUTION

It is possible to exceed cg limits by overloading cabin, by improper placement of cabin load, or by carrying partial cabin load. Correct weight and placement of these variables must be determined to obtain satisfactory balance.

Chart 12-2. Chart E - loading data (Sheet 15 of 16)

CHART E
SHEET 16 of 16
MODELS UH-1D and UH-1H
CHART DATE: APRIL 20, 1964

TYPICAL LOADING EXAMPLES

In the examples below, the values for Basic Weight and Moment are assumed to be as shown. Normally these values are obtained from Chart C. To arrive at Minimum Landing Gross Weight (Operating Weight), add to the Basic Weight those load items pertinent to the mission. Refer to the Center of Gravity Table to determine if loading falls within limits. If loading is satisfactory, determine Take Off Gross Weight by adding the expendable load items to the Minimum Landing Gross Weight. Again it is necessary to check the Center of Gravity Table to determine if loading falls within the limits.

ITEM	WEIGHT	MOMENT/100
Basic Helicopter	4920	7103
Pilot	200	93
Oil - Engine	24	42
MINIMUM LANDING GROSS WEIGHT	5144	7238

The minimum Landing Gross Weight and Moment as located on the Center of Gravity Table fall within the recommended cg limits. Therefore the loading is satisfactory for landing.

Minimum Landing Gross Weight	5144	7238
Add: Fuel	1040	1509
Passengers	800	936
TAKE-OFF GROSS WEIGHT	6984	9683

Take-off Gross Weight and Moment as loacted on the Center of Gravity Table fall within the recommended cg limits; therefore, the loading is satisfactory for take-off.

Chart 12-2. Chart E - loading data (Sheet 16 of 16)

100,000 BTU HEATER WINTERIZATION KIT

ITEM	WEIGHT	ARM	MOMENT
UH-1D and UH-1H (205-706-001) Complete Heater Instl.	73.2	197.0	14421

AFT BATTERY INSTL.

ITEM	WEIGHT	ARM	MOMENT
Battery (Fwd)	80.0	5.0	400
Battery (Aft)	80.0	233.0	18640
Aft Battery Provisions (205-1682-1)	15.0	224.8	3378

ARMORED SEAT KITS

ITEM	WEIGHT	ARM	MOMENT
Pilot Seat Kit 177510	165.9	53.0	8793
Co-Pilot Seat Kit 177510	164.3	53.0	8708
Total GFE & Kit	330.2	53.0	17501

ITEM	WEIGHT	ARM	MOMENT
CFE Removed			
Standard Seats	−61.8	55.1	−3404
Inertia Reel Fittings	− 1.6	66.8	− 106
Total CFE Removed	−63.4	55.4	−3510
GFE			
Pilot Seat 177787-3	169.0	55.0	9295
Co-Pilot Seat 177755-3	165.0	55.0	9075
Total GFE	334.0	55.0	18370
Total Kit	270.6	54.9	14860

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 1 of 5)

ARMORED SEAT KITS

(Cont)

ITEM	WEIGHT	ARM	MOMENT
CFE Removed			
Standard Seats	−61.8	55.1	−3404
Inertia Reel Fittings	− 1.6	66.3	− 106
Total CFE Removed	−63.4	55.4	−3510
GFE			
Pilot Seat 178061-1	140.0	55.0	7700
Co-Pilot Seat 178062-1	135.0	55.0	7425
Total GFE	275.0	55.0	15125
Total Kit	211.6	54.9	11615

300 GALLON INTERNAL AUX. FUEL TANK

ITEM	WEIGHT	ARM	MOMENT
Tank Installation (205-706-012)			
Tank Assy., L.H.	50.8	151.3	7686
Tank Assy., R.H.	50.8	151.3	7686
Hose, Assy., L.H.	3.1	138.1	428
Hose Assy., R.H.	3.1	138.1	428
Electrical & Misc.	.4	140.0	56
Hardware	3.5	142.6	499
Total Instl. Weight	111.7	150.3	16783
Full Fuel	1950.0	151.0	294450

60 GALLON EXTERNAL AUX. FUEL TANKS

ITEM	WEIGHT	ARM	MOMENT
CFE (204-706-043)			
Tank & Pylon Adaptor Instl., L.H.	31.4	139.4	4377
Tank & Pylon Adaptor Instl., R.H.	31.4	139.4	4377
Tank Assy., L.H.	32.0	142.5	4560
Tank Assy., R.H.	32.0	142.5	4560
Aft External Stores Support Instl.	58.3	142.5	8308
Total CFE	185.1	141.4	26182

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 2 of 5)

60 GALLON EXTERNAL AUX. FUEL TANKS (Cont)

ITEM	WEIGHT	ARM	MOMENT
GFE			
Pylon Assy., L.H.	30.0	142.5	4275
Pylon Assy., R.H.	30.0	142.5	4275
Total GFE	60.0	142.5	8550
Total Kit	245.1	141.7	34732
Full Fuel	780.0	142.5	111150

100 GALLON EXT. AUX. FUEL TANKS

ITEM	WEIGHT	ARM	MOMENT
CFE (204-706-043)			
Tank & Pylon Adaptor Instl., L.H.	31.4	139.4	4377
Tank & Pylon Adaptor Instl., R.H.	31.4	139.4	4377
Aft External Stores Support Instl.	58.3	142.5	8308
Total CFE	121.1	140.9	17062
GFE			
Tank Assy., L.H.	48.4	142.5	6897
Tank Assy., R.H.	48.4	142.5	6897
Pylon Assy., L.H.	30.0	142.5	4275
Pylon Assy., R.H.	30.0	142.5	4275
Total GFE	156.8	142.5	22344
Total Kit	277.9	141.8	39406
Full Fuel	1300.0	142.5	185250

XM-23 DOOR MOUNTED M-60

ITEM	WEIGHT	ARM	MOMENT
CFE	NONE		
GFE			
Mounts & Ammunition Boxes	67.0	142.6	9555
Guns & Ejection Control Bags	56.0	142.0	7949
Total GFE & Total Kit	123.0	142.3	17504
Ammunition, 1200 Rds. 7.62 MM	78.0	140.4	10950

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 3 of 5)

M-6 SUBSYSTEM

ITEM	WEIGHT	ARM	MOMENT
CFE (204-706-024)			
Adapter, Gun Turret	7.8	74.1	578
Ammunition Tie Down Rack	13.3	81.9	1089
External Hydraulic Instl.	4.0	73.8	295
External Wiring	2.0	73.5	147
External Hardware	2.5	72.8	182
Fwd. External Stores Support Instl.	63.0	74.2	4676
Total CFE	92.6	75.2	6967
GFE			
M60-C Machine Guns	83.9	77.5	6502
02153 Ammunition Box	46.6	83.6	3896
04703 Ammunition Chutes	18.4	73.4	1351
04704 Ammunition Chutes	13.1	81.9	1073
04683 Loop Clamp	0.4	80.0	32
02234 Sight Stations	9.3	42.0	391
02109 Control Panel	5.4	50.0	270
04618 Gun Mount & Charger	130.8	73.9	9666
Total GFE	307.9	75.3	23181
Total Kit	400.5	75.3	30148
Ammunition, 7.62 MM (6000 Rounds)	390.0	83.6	32604

XM-3 FFAR SUBSYSTEM

ITEM	WEIGHT	ARM	MOMENT
CFE (204-706-041)			
Sight Support	1.6	25.0	40
Electrical Wiring, Internal Kit	3.8	118.4	450
Equipment Shelf	1.9	113.2	215
Sight Light Panel	.9	50.0	45
Hardware	.4	52.5	21
Aft External Stores Support Instl.	58.3	142.5	8308
Total CFE	66.9	135.7	9079
GFE			
Mark VIII Sight	6.0	31.0	186
Control Panel	4.0	46.0	184
External Wiring	8.0	142.0	1136

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 4 of 5)

XM-3 FFAR SUBSYSTEM (Cont)

ITEM	WEIGHT	ARM	MOMENT
Rocket Pods	268.0	146.0	39128
Pylons & Braces	33.0	147.0	4851
Cranks & Adapters	54.0	144.0	7776
Redstone Junction Box	35.0	113.0	3955
Hardware	2.0	142.0	284
Total GFE	410.0	140.2	57500
Total Kit	476.9	139.6	66579
2.75" FFAR Rockets (48)	1036.3	138.9	143942

EXTERNAL STORES SUPPORT

ITEM	WEIGHT	ARM	MOMENT
Stores Rack (205-706-013-5)			
Cross Beam Assys.	29.5	142.5	4207
Fwd. Beam Assys.	11.5	129.0	1481
Aft Beam Assys.	11.9	155.1	1843
Fwd. Sway Brace Assys.	1.1	135.3	152
Aft Sway Brace Assys.	1.2	149.7	186
Hardware	3.1	142.9	439
Total Aft Stores Instl.	58.3	142.5	8308
Stores Rack (205-706-013-11)			
Cross Beam Assys.	31.1	73.9	2301
Fwd. Beam Assys.	11.7	63.0	
Aft Beam Assys.	13.6	84.5	1148
Fwd. Sway Brace Assys.	1.9	68.4	130
Aft Sway Brace Assys.	1.5	79.7	120
Hardware	3.2	74.0	239
Total Fwd. Stores Instl.	63.0	74.2	4676

XM52 SMOKE GENERATOR SUBSYSTEM

"A" Kit	16.7	161.67	2700
"B" Kit	39.64 -20.62	120.08 122.21	4760 -2520
"C" Kit without oil in tank	117.5	127.57	14990
"C" Kit with oil in tank (50 gal)	492.5	121.81	59990

Chart 12-3. System weight and balance data, UH-1D and UH-1H kits (Sheet 5 of 5)

SECTION IV WEIGHT AND BALANCE CLEARANCE FORM F, DD FORM 365F

12-15. WEIGHT AND BALANCE CLEARANCE FORM F, DD FORM 365F.

12-16. This form is the summary of the actual disposition of the load in the helicopter. It records the balance status of the helicopter, step-by-step. It serves as a work sheet on which to record weight and balance calculations and any corrections that must be made to insure that the helicopter will be within weight and cg limits. A form F is required for Models YUH-1D, UH-1D and UH-1H helicopters only when the loading is such as to seriously affect the flying characteristics and safety of the helicopter, and in all cases where alternate loading is employed.

12-17. USE. Form F is furnished in expendable pads, or as separate sheets, which can be replenished when exhausted. An original and carbon are prepared for each loading, as applicable. The original sheets, carrying the signature of responsibility can be removed and placed in the helicopter "G" files to serve as certificates of proper weight and balance as required by AR 95-16. The duplicate copy shall be retained in the helicopter for the duration of the flight. On a cross country flight, this form aids the weight and balance technician at refueling bases and stopover stations. There are two versions of this form TRANSPORT and TACTICAL.

Note

U.S. Army special mission helicopters shall use DD Form 365F titled TRANSPORT.

12-18. These two versions were designed to provide for the prospective loading arrangement of two types of helicopters. However, the general use and fulfillment of either version is the same. Specific instructions for filling out both versions of this form, applicable to Models YUH-1D, UH-1D and UH-1H helicopters, are given in the following paragraphs.

Note

The choice of which version to use is the responsibility of the weight and balance technician at the take-off base.

12-19. DD FORM 365F - TRANSPORT (SPECIAL MISSION) HELICOPTERS.

12-20. Ascertain that transport aircraft Form (F) (see Chart 12-4) entries are completed in accordance with the following instructions.

a. Insert the necessary identifying information at the top of the form. In the blank spaces of the "Limitations" table, enter the gross weight and cg restrictions obtained from Chapter 7. (See chart 12-4 for sample form.)

b. Reference 1 - Enter the helicopter basic weight and moment/100 value. Obtain these figures from the last entry on Chart C - Basic Weight and Balance Record.

Note

Enter moment/100 values throughout the form. Obtain these values from Chart E.

c. Reference 2 - Enter the quantity and weight of oil.

d. Reference 3 - Enter the number and weight of crew. Use actual crew weights if available.

e. Reference 4 - Enter weight of crew's baggage.

f. Reference 5 - Not applicable.

g. Reference 6 - Enter the weight of emergency equipment, if applicable.

h. Reference 7 - Enter the weight of any extra equipment, if applicable.

i. Reference 8 - Enter the sum of the weights of references 1 through 7 to obtain "operating weight."

j. Reference 9 - Enter the number of gallons and weight of take-off fuel. The weight of fuel used during warm-up shall not be included.

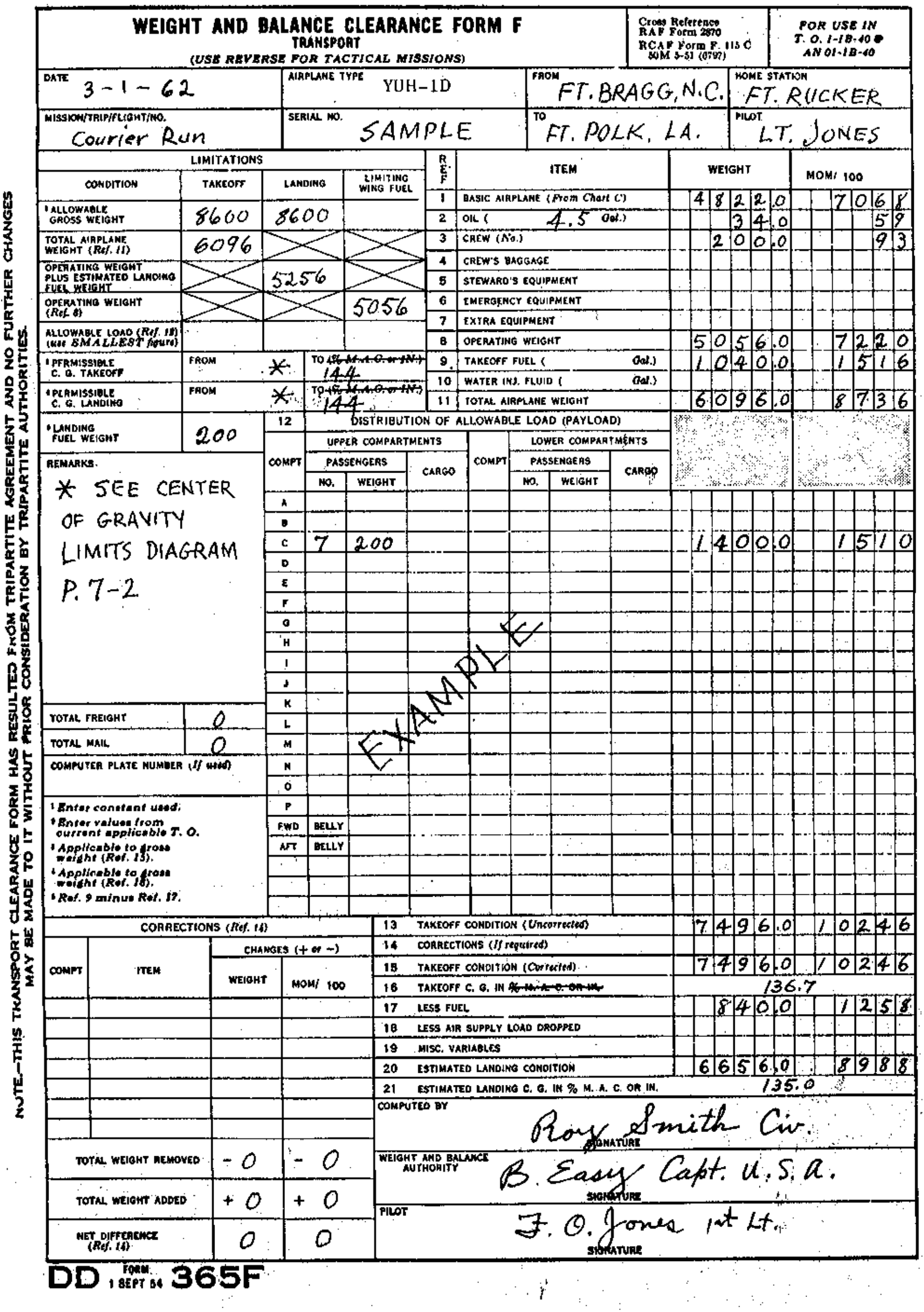
Note

List under REMARKS the fuel tanks concerned and the amount of fuel in each tank. If the external or internal fuel is carried, make appropriate entries to that effect in the space provided.

k. Reference 10 - Not applicable.

l. Reference 11 - Enter the sum of the weight for references 8 through 10 to obtain "Total Helicopter Weight."

m. Determine the "Allowable Load" based on take-off and landing by use of the "Limitations" table in the upper left-hand corner of the form as follows:



NOTE—THIS TRANSPORT CLEARANCE FORM HAS RESULTED FROM TRIPARTITE AGREEMENT AND NO FURTHER CHANGES MAY BE MADE TO IT WITHOUT PRIOR CONSIDERATION BY TRIPARTITE AUTHORITIES.

WEIGHT AND BALANCE CLEARANCE FORM F
TRANSPORT
(USE REVERSE FOR TACTICAL MISSIONS)

Cross Reference RAF Form 2870
RCAF Form F. 115 C
50M 5-51 (0797)

FOR USE IN T. O. 1-1B-40 AN 01-1B-40

DATE 3-1-62	AIRPLANE TYPE YUH-1D	FROM FT. BRAGG, N.C.	HOME STATION FT. RUCKER
MISSION/TRIP/FLIGHT/NO. Courier Run	SERIAL NO. SAMPLE	TO FT. POLK, LA.	PILOT LT. JONES

LIMITATIONS

CONDITION	TAKEOFF	LANDING	LIMITING WING FUEL
[1] ALLOWABLE GROSS WEIGHT	8600	8600	
TOTAL AIRPLANE WEIGHT (Ref. 11)	6096		
OPERATING WEIGHT PLUS ESTIMATED LANDING FUEL WEIGHT		5256	
OPERATING WEIGHT (Ref. 8)			5056
ALLOWABLE LOAD (Ref. 12) (use SMALLEST figure)			
[2] PERMISSIBLE C. G. TAKEOFF	FROM *	TO ~~(% M.A.C. or IN.)~~ 144	
[2] PERMISSIBLE C. G. LANDING	FROM *	TO ~~(% M.A.C. or IN.)~~ 144	
[5] LANDING FUEL WEIGHT	200		

REF	ITEM	WEIGHT	MOM/ 100
1	BASIC AIRPLANE (From Chart C)	4822.0	7068
2	OIL (4.5 Gal.)	34.0	59
3	CREW (No.)	200.0	93
4	CREW'S BAGGAGE		
5	STEWARD'S EQUIPMENT		
6	EMERGENCY EQUIPMENT		
7	EXTRA EQUIPMENT		
8	OPERATING WEIGHT	5056.0	7220
9	TAKEOFF FUEL (Gal.)	1040.0	1516
10	WATER INJ. FLUID (Gal.)		
11	TOTAL AIRPLANE WEIGHT	6096.0	8736

12 DISTRIBUTION OF ALLOWABLE LOAD (PAYLOAD)

UPPER COMPARTMENTS				LOWER COMPARTMENTS					
COMPT	PASSENGERS NO.	PASSENGERS WEIGHT	CARGO	COMPT	PASSENGERS NO.	PASSENGERS WEIGHT	CARGO		
A									
B									
C	7	200						1400.0	1510
D									
E									
F									
G									
H									
I									
J									
K									
L									
M									
N									
O									
P									
FWD	BELLY								
AFT	BELLY								

EXAMPLE

REMARKS.
* SEE CENTER OF GRAVITY LIMITS DIAGRAM P. 7-2

TOTAL FREIGHT	0
TOTAL MAIL	0
COMPUTER PLATE NUMBER (If used)	

[1] *Enter constant used.*
[2] *Enter values from current applicable T. O.*
[3] *Applicable to gross weight (Ref. 15).*
[4] *Applicable to gross weight (Ref. 18).*
[5] *Ref. 9 minus Ref. 17.*

CORRECTIONS (Ref. 14)

COMPT	ITEM	CHANGES (+ or −) WEIGHT	CHANGES (+ or −) MOM/ 100
	TOTAL WEIGHT REMOVED	- 0	- 0
	TOTAL WEIGHT ADDED	+ 0	+ 0
	NET DIFFERENCE (Ref. 14)	0	0

REF	ITEM	WEIGHT	MOM/ 100
13	TAKEOFF CONDITION (Uncorrected)	7496.0	10246
14	CORRECTIONS (If required)		
15	TAKEOFF CONDITION (Corrected)	7496.0	10246
16	TAKEOFF C. G. IN ~~% M. A. C. OR IN.~~	136.7	
17	LESS FUEL	840.0	1258
18	LESS AIR SUPPLY LOAD DROPPED		
19	MISC. VARIABLES		
20	ESTIMATED LANDING CONDITION	6656.0	8988
21	ESTIMATED LANDING C. G. IN % M. A. C. OR IN.	135.0	

COMPUTED BY Roy Smith Civ.
SIGNATURE

WEIGHT AND BALANCE AUTHORITY B. Easy Capt. U.S.A.
SIGNATURE

PILOT F. O. Jones 1st Lt.
SIGNATURE

DD FORM 1 SEPT 54 365F

Chart 12-4. Sample DD form 365F - special mission

(1) Enter the "Allowable Gross Weight" for the take-off landing.

(2) Enter the "Total Helicopter Weight" (from reference 11). Estimate the fuel to be aboard at time of landing. Enter the "Operating Weight" (from reference 8) and estimate Landing Fuel Weight.

(3) Subtract the above weights from the respective "Allowable Gross Weights" to obtain the respective "Allowable Loads".

Note

> The smallest of these allowable loads is the "Allowable Load" and represents the maximum amount of weight which may be distributed throughout the helicopter in the various compartments without exceeding the gross weight limits of the helicopter.

n. Reference 12 - Using the same compartment letter designation as shown in Chart E (chart 12-2), enter the number and weight of passengers and the weight of cargo (baggage, mail, etc). Use actual passenger weights, if available. Enter the total for each compartment in the weight column.

Note

> The sum of the compartment totals shall not exceed the "Allowable Load" determined in the "Limitations Table".

o. Reference 13 - Enter the sum of reference 11 and the compartment totals from reference 12 opposite "Take-Off Condition" (uncorrected). At this point, if not already done, calculate and enter the moment/100 values for references 1 through 13.

p. Check the weight figure (reference 13) against the "Gross Weight Take-off" in the "Limitations" table. Check the moment/100 figure opposite 13 by means of Chart E to verify that the indicated cg is within allowable limits.

q. Reference 14 - If changes in weight or distribution of load are required, indicate necessary adjustment by proper entries in the "Corrections" table in lower left-hand corner of the form as follows:

(1) Enter a brief description of the adjustment made in the column marked "Item".

(2) Add all the weights and add all the moment decreases. Insert the total in the space oppsite "Total Weight Removed".

(3) Add all the weights and add all the moment increases. Insert the total in the space opposite "Total Weight Added".

(4) Subtract the smaller from the larger of the two totals and enter the difference (with applicable plus or minus sign) opposite "Net Difference."

(5) Transfer these "Net Difference" figures to the space opposite reference 14.

r. Reference 15 - Enter the sum of or difference between references 13 and 14. Recheck to verify that these figures do not exceed allowable limits.

s. Reference 16 - Determine the take-off cg position by referring to the cg table in Chart E. Enter this figure in the space provided opposite "Take-Off CG".

t. Reference 17 - Estimate the weight of fuel which may be expended before landing. Enter this figure together with moment/100 in the spaces provided.

Note

> Do not consider reserve fuel as expended when determining "Estimated Landing Condition."

u. Reference 18 - Enter the Weight of "Air Supply Load" to be dropped before landing and its moment/100.

v. Reference 19 - Not applicable.

w. Reference 20 - Enter the difference in weight and moment/100 between reference 15 and the sum of references 17 and 18.

x. Reference 21 - By again referring to the cg table on Chart E, determine the estimated landing cg position. Enter this figure opposite "Estimated Landing CG."

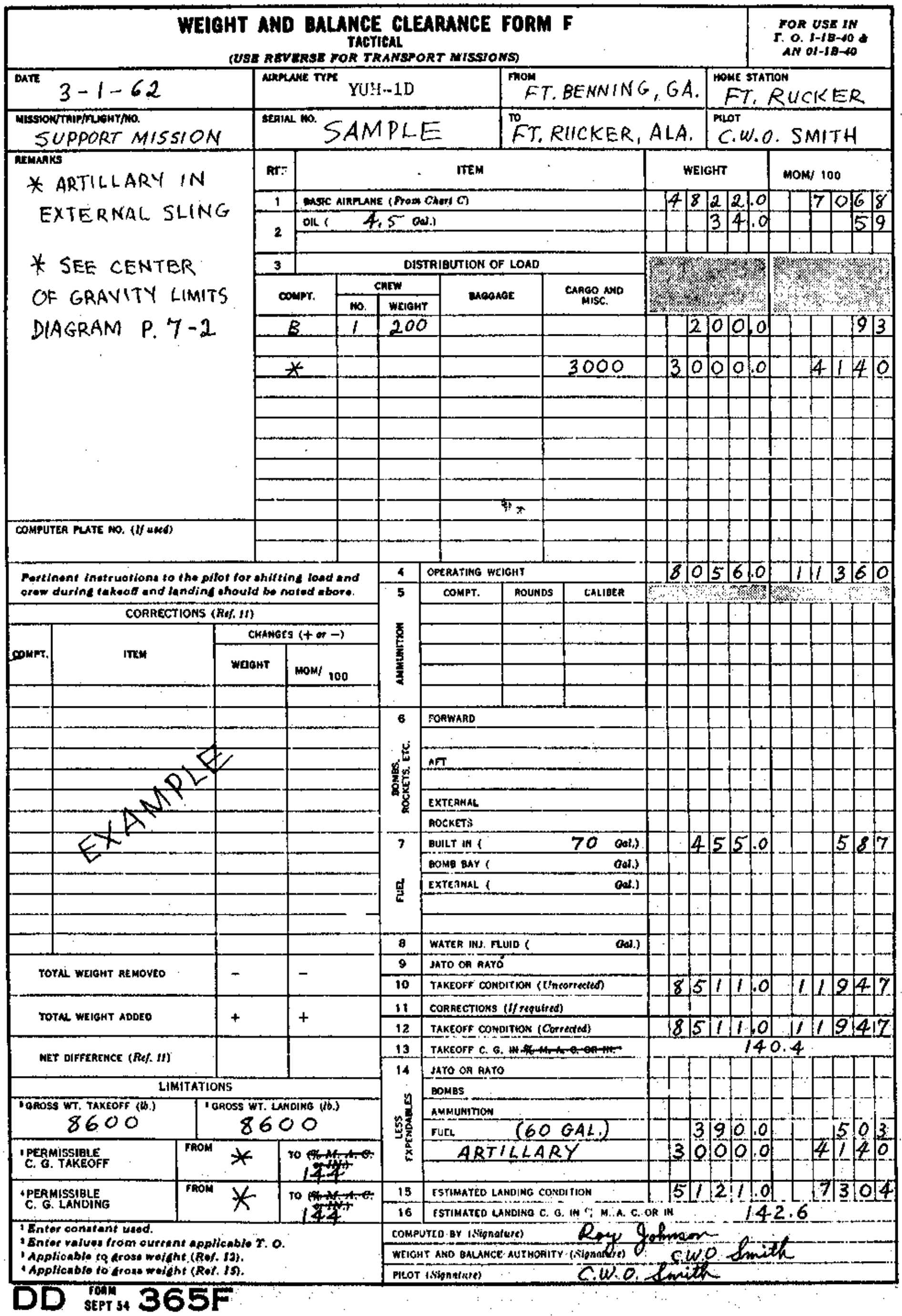
Note

> Check the landing cg figure with permissible cg figures in limitation block. The landing cg must be within the range shown.

y. The necessary signatures shall appear at the bottom of the form.

12-21. DD FORM 365F - TACTICAL HELICOPTERS.

12-22. Insert the necessary identifying information at the top of the form. In the blank spaces of the "Limitations" table enter the gross weight and cg restrictions obtained from Chapter 7. (See chart 12-5 for sample form.)



WEIGHT AND BALANCE CLEARANCE FORM F

TACTICAL

(USE REVERSE FOR TRANSPORT MISSIONS)

FOR USE IN T. O. 1-1B-40 & AN 01-1B-40

DATE 3-1-62	AIRPLANE TYPE YUH-1D	FROM FT. BENNING, GA.	HOME STATION FT. RUCKER
MISSION/TRIP/FLIGHT/NO. SUPPORT MISSION	SERIAL NO. SAMPLE	TO FT. RUCKER, ALA.	PILOT C.W.O. SMITH

REMARKS

* ARTILLARY IN EXTERNAL SLING

* SEE CENTER OF GRAVITY LIMITS DIAGRAM P. 7-2

COMPUTER PLATE NO. *(If used)*

Pertinent instructions to the pilot for shifting load and crew during takeoff and landing should be noted above.

REF.	ITEM	WEIGHT	MOM/ 100
1	BASIC AIRPLANE *(From Chart C)*	4822.0	7068
2	OIL (4.5 Gal.)	34.0	59
3	DISTRIBUTION OF LOAD		

COMPT.	CREW NO.	CREW WEIGHT	BAGGAGE	CARGO AND MISC.	WEIGHT	MOM/ 100
B	1	200			200.0	93
*				3000	3000.0	4140

REF.	ITEM	WEIGHT	MOM/ 100
4	OPERATING WEIGHT	8056.0	11360
5	AMMUNITION: COMPT. / ROUNDS / CALIBER		
6	BOMBS, ROCKETS, ETC.: FORWARD		
	AFT		
	EXTERNAL		
	ROCKETS		
7	FUEL: BUILT IN (70 Gal.)	455.0	587
	BOMB BAY (Gal.)		
	EXTERNAL (Gal.)		
8	WATER INJ. FLUID (Gal.)		
9	JATO OR RATO		
10	TAKEOFF CONDITION *(Uncorrected)*	8511.0	11947
11	CORRECTIONS *(If required)*		
12	TAKEOFF CONDITION *(Corrected)*	8511.0	11947
13	TAKEOFF C. G. IN ~~% M. A. C. OR IN~~	140.4	
14	LESS EXPENDABLES: JATO OR RATO		
	BOMBS		
	AMMUNITION		
	FUEL (60 GAL.)	390.0	503
	ARTILLARY	3000.0	4140
15	ESTIMATED LANDING CONDITION	5121.0	7304
16	ESTIMATED LANDING C. G. IN % M. A. C. OR IN	142.6	

CORRECTIONS *(Ref. 11)*

COMPT.	ITEM	CHANGES (+ or −) WEIGHT	CHANGES (+ or −) MOM/ 100
	EXAMPLE		
TOTAL WEIGHT REMOVED		−	−
TOTAL WEIGHT ADDED		+	+
NET DIFFERENCE *(Ref. 11)*			

LIMITATIONS

[1] GROSS WT. TAKEOFF *(lb.)* 8600		[1] GROSS WT. LANDING *(lb.)* 8600	
[3] PERMISSIBLE C. G. TAKEOFF	FROM *	TO ~~(% M. A. C. or IN)~~ 144	
[4] PERMISSIBLE C. G. LANDING	FROM *	TO ~~(% M. A. C. or IN)~~ 144	

[1] *Enter constant used.*
[2] *Enter values from current applicable T. O.*
[3] *Applicable to gross weight (Ref. 13).*
[4] *Applicable to gross weight (Ref. 15).*

COMPUTED BY *(Signature)* Roy Johnson

WEIGHT AND BALANCE AUTHORITY *(Signature)* CWO Smith

PILOT *(Signature)* C.W.O. Smith

DD FORM SEPT 54 365F

Chart 12-5. Sample DD form 365F - tactical

Note

Enter moment/constant values from Chart E throughout the form.

a. Reference 1 - Enter the helicopter basic weight and moment/100. Obtain these figures from the last entry on Chart C - Basic Weight and Balance Record.

b. Reference 2 - Enter the quantity and weight of oil.

c. Reference 3 - Using the compartment letter designations as shown in Chart E (helicopter diagram) enter the number and weight of the crew at their take-off stations. Use actual crew weights if available. Also, enter the weight of baggage, cargo, and miscellaneous items. Enter the total of each compartment in the "Weight" column.

d. Reference 4 - Enter the sum of the weights for references 1 through 3 to obtain "Operating Weight."

e. Reference 5 - Enter, by compartment, the number of rounds, caliber, and weight of all ammunition.

f. Reference 6 - Enter the size, distribution (forward, aft, external, etc.), and weight of all bombs torpedoes, rockets, etc.

g. Reference 7 - Enter the number of gallons and weight of fuel. If auxiliary fuel tanks are to be used, these items and their weight should also be entered as part of reference 7.

h. Reference 8 - Not applicable.

i. Reference 9 - Not applicable.

j. Reference 10 - Enter the sum of the weights for references 4 through 9 opposite "Take-Off Condition" (Uncorrected). At this point, if not already done, calculate and enter the moment/100 for references 1 through 10.

k. Check the weight figure opposite reference 10 against the "Gross Weight Take-Off" in the "Limitations" table. Check the moment/100 figure opposite reference 10 by means of Chart E to verify that the indicated cg is within allowable limits.

l. Reference 11 - If changes in weight or distribution of load are required, indicate necessary adjustments by proper entries in the "Corrections" table in lower left-hand corner of the form as follows:

(1) Enter a brief description of the adjustment in the column marked "Item".

(2) Add all the weights and add all the moment decreases. Insert the totals in the space opposite "Total Weight Removed."

(3) Add all the weights and add all the moment increases. Insert the totals in the space opposite "Net Difference."

(4) Subtract the smaller from the larger of the two totals and enter the difference (with applicable plus or minus sign) opposite "Net Difference."

(5) Transfer these net difference figures to the spaces opposite reference 11.

m. Reference 12 - Enter the sum of, or the difference between, reference 10 and 11. Recheck to verify that these figures do not exceed allowable limits.

n. Reference 13 - By referring to the cg table in Chart E, determine the take-off cg position. Enter this figure in the space provided opposite "Take-Off CG."

o. Reference 14 - Estimate the weights of ammunition (not including weight of cases and links, if retained), fuel, paratroopers (use actual weight of troops with all equipment, if available), external cargo, and any other items which may be expended before landing. Enter these figures together with their moment/100 in the space provided.

Note

Do not consider reserve fuel as expended when determining "Estimated Landing Condition."

p. Reference 15 - Enter the difference in weights and moment/100 between reference 12 and the total of reference 14.

q. Reference 16 - By again referring to the cg table in Chart E, determine the estimated landing cg position. Enter the figure opposite "Estimated Landing CG."

Note

Check the landing cg figure with permissible cg figures in limitation block. The landing cg shall be within the range of the figures shown.

r. The necessary signatures shall appear at the bottom of the form.

Note

For charts and forms refer to Weight and Balance Control Data, Military Specification MIL-W-25140.

CHAPTER 13

AIRCRAFT LOADING

SECTION I SCOPE

13-1. SCOPE OF LOADING INSTRUCTIONS.

13-2. All essential information for loading, securing, and unloading personnel and cargo is contained in this chapter.

13-3. This chapter outlines the cargo features of the helicopter and contains planning data which shall be used to obtain maximum utility.

SECTION II AIRCRAFT CARGO FEATURES

13-4. INTRODUCTION

13-5. The purpose of this chapter is to provide complete information and instructions, with complementary illustrations, to accomplish safe loading of the helicopter for the numerous types of missions the helicopter can reasonably be expected to perform. A typical loading example is also given and can be used as a guide when loading calculations need to be computed.

13-6. GENERAL CARGO FEATURES.

13-7. Cargo loading areas and dimensions, location of tie-down fittings, interior clearances, and various other cargo features are shown in figure 13-1. The cargo area, doors, tie-down equipment, and storage provisions are described in the following paragraphs.

13-8. CABIN AREA.

13-9. A large area of approximately 220 cubic feet located aft of the pilot is available for normal cargo, straight-through cargo, or personnel loading. Access to this area is provided by two doors which roll aft to open. Additional cargo loading area within the cabin may be made available by removal of the copilot's seat. Total weight in this area, however, shall be limited to 230 pounds and shall be located at station 56.6 (inches aft of reference datum). Tie-down fittings have not been provided for cargo located at the copilot's station; therefore, such cargo shall be secured to other cargo to prevent shifting.

13-10. CREW DOORS.

13-11. Access to the crew compartment is through two swingout doors hinged on the forward side (see figure 4-3). Each door has three transparent plastic windows, called the forward, upper, and adjustable window. A latch assembly, which may be opened from either side of the door, secures the door in the closed position. In an emergency, doors may be jettisoned by pulling EMERGENCY RELEASE - PULL handle on inside of each door.

13-12. CARGO - TROOP DOORS.

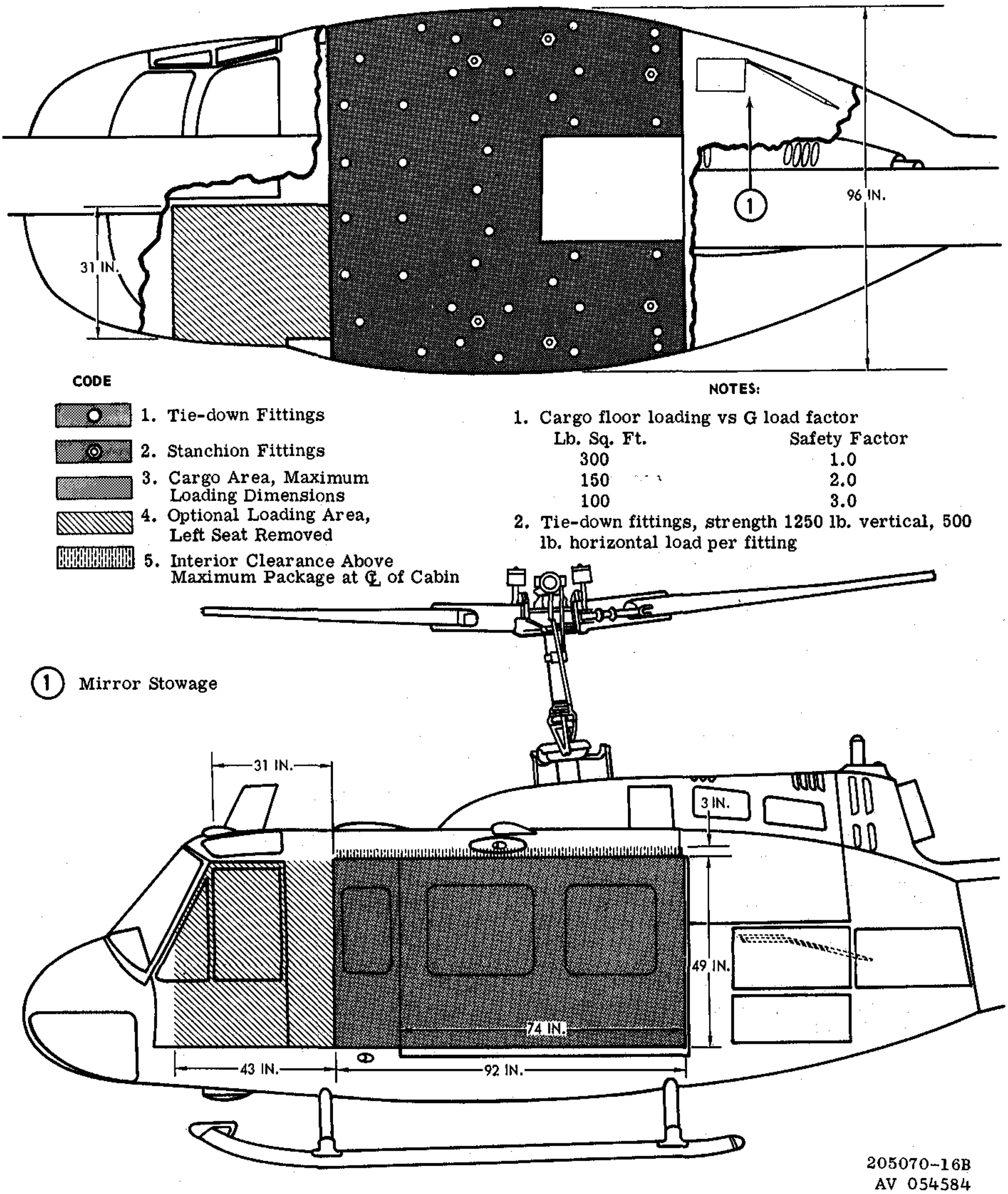
13-13. A large sliding door, operating on rollers and tracks, gives access to cargo-troop area on each side of cabin, and a hinged panel (removable door post on YUH-1D) just ahead of sliding door will provide a wider opening. Each sliding door has a latch for closed position, and two jettisonable windows which can be used as emergency escape hatches. On YUH-1D, door can be secured in open position by manually releasing the lock of a spring-loaded plunger, at the top front corner, which engages a guide in the upper frame. Plunger is automatically retracted, by means of a cable, when door latch is operated. On UH-1D, door can be secured in open position by a retractable stop located on rear bulkhead of cabin.

13-14. CARGO TIE-DOWN EQUIPMENT.

13-15. Cargo tie-down rings are provided on cabin aft bulkhead and pylon island structure, and in recessed fittings on cabin floor aft of crew seats. A three-piece cargo net is available, as loose equipment, for use in securing cargo to rings. Adjustable non-swiveling hooks with keepers are used on forward and outboard edges, and on two aft straps of center net. Fixed hooks are used on aft and inboard edges of right and left nets. Reefing rings and hooks are provided on nets for adjustment to size and shape of cargo.

13-16. STORAGE PROVISIONS.

13-17. A compartment on the right aft side of the forward fuselage between stations 178 and 211 contains bracketry for stowing the cargo rear view mirror.



CODE

- ▩ 1. Tie-down Fittings
- ▩ 2. Stanchion Fittings
- ▒ 3. Cargo Area, Maximum Loading Dimensions
- ▨ 4. Optional Loading Area, Left Seat Removed
- ▥ 5. Interior Clearance Above Maximum Package at ℄ of Cabin

① Mirror Stowage

NOTES:

1. Cargo floor loading vs G load factor

Lb. Sq. Ft.	Safety Factor
300	1.0
150	2.0
100	3.0

2. Tie-down fittings, strength 1250 lb. vertical, 500 lb. horizontal load per fitting

Figure 13-1. Cargo area and tie-down fittings

SECTION III PREPARATION OF AIRCRAFT AND PERSONNEL CARGO FOR LOADING AND UNLOADING

13-18. TROOP TRANSPORT.

13-19. Description of the troop seats, and seat and litter installation and arrangement is presented in the following paragraphs.

13-20. TROOP SEATS.

13-21. The troop seats are of tubular construction with reinforced canvas webbing for support areas. The seats are attached to the floor and transmission support structure. Seats can be quickly installed for rescue missions, then folded and stowed flat; or they can be folded for cargo missions as required.

13-22. ARRANGEMENT OF TROOP SEATS. Eleven passengers can be seated in the aft area of the forward fuselage section. Either of the two following arrangements may be used for passenger seating (see figures 13-2 and 13-3).

a. Three seats facing forward, and accommodating five passengers, may be placed across the cabin immediately forward of the transmission support structure. A one-passenger seat, without back rest, is located between two-man seats which have backs. Two more two-man seats, without backs are located aft of the five-passenger seats parallel to the helicopter center line. Passengers in these seats face outboard. Two single passenger folding seats, with backs, are located just aft of the crew seats.

b. Four two-man seats, facing outboard, may be placed, two on each side of the helicopter center line, approximately in line with the side faces of the transmission support structure. The two forward seats are equipped with backs. A one-passenger seat, without back rest, is located immediately forward of the transmission support structure on the helicopter center line and faces forward. Two single-passenger folding seats, with backs, are located aft of the pilot's and copilot's seats.

Note

Single-passenger seats can be installed facing forward, aft, or toward either side of the helicopter.

13-23. TROOP SEAT BELTS. Individual lap-type seat belts are provided for all troop seats. These same belts, with web extensions, are provided for litter patients when helicopter is used for mercy rescue missions.

13-24. LITTER RACKS.

13-25. The litter rack installation (see figure 13-4) accommodates six stretchers (three on a side one above the other) parallel to cabin center line in aft cabin passenger compartment and outboard of the transmission support structure. They can be quickly installed for transporting litter patients or may be rapidly removed for carrying cargo or personnel. The medical attendant's seat is attached to the forward side of the transmission support structure in the cabin area. It is a part of the regular troop or passenger seat installation.

13-26. CARGO LOADING.

13-27. The large cargo doors, open loading area and low floor level preclude the need for special loading aids. Through loading may be accomplished by securing cargo doors in the fully open position. (Refer to paragraph 13-13.) Thirty-nine cargo tie-down fittings are located on the cabin floor for securing cargo to prevent cargo shifting during flight.

13-28. PREPARATION OF GENERAL CARGO.

13-29. The loading crew shall assemble the cargo and baggage to be transported. At time of assembly and prior to loading, the loading crew shall compile data covering weight, dimensions, center of gravity location and contact areas for each item. Heavier packages to be loaded shall be loaded first and placed in the aft section against the bulkhead for cg range purposes. Helicopter floor loading in this area shall not exceed 100 pounds per square foot maximum package size and gross weight limits. Calculation of the allowable load and loading distribution shall be accomplished by referring to Chapter 12 to determine the final cg location and remain within the allowable limits for safe operating conditions. A loading chart is located on the right-hand hinged door post (see figure 7-6).

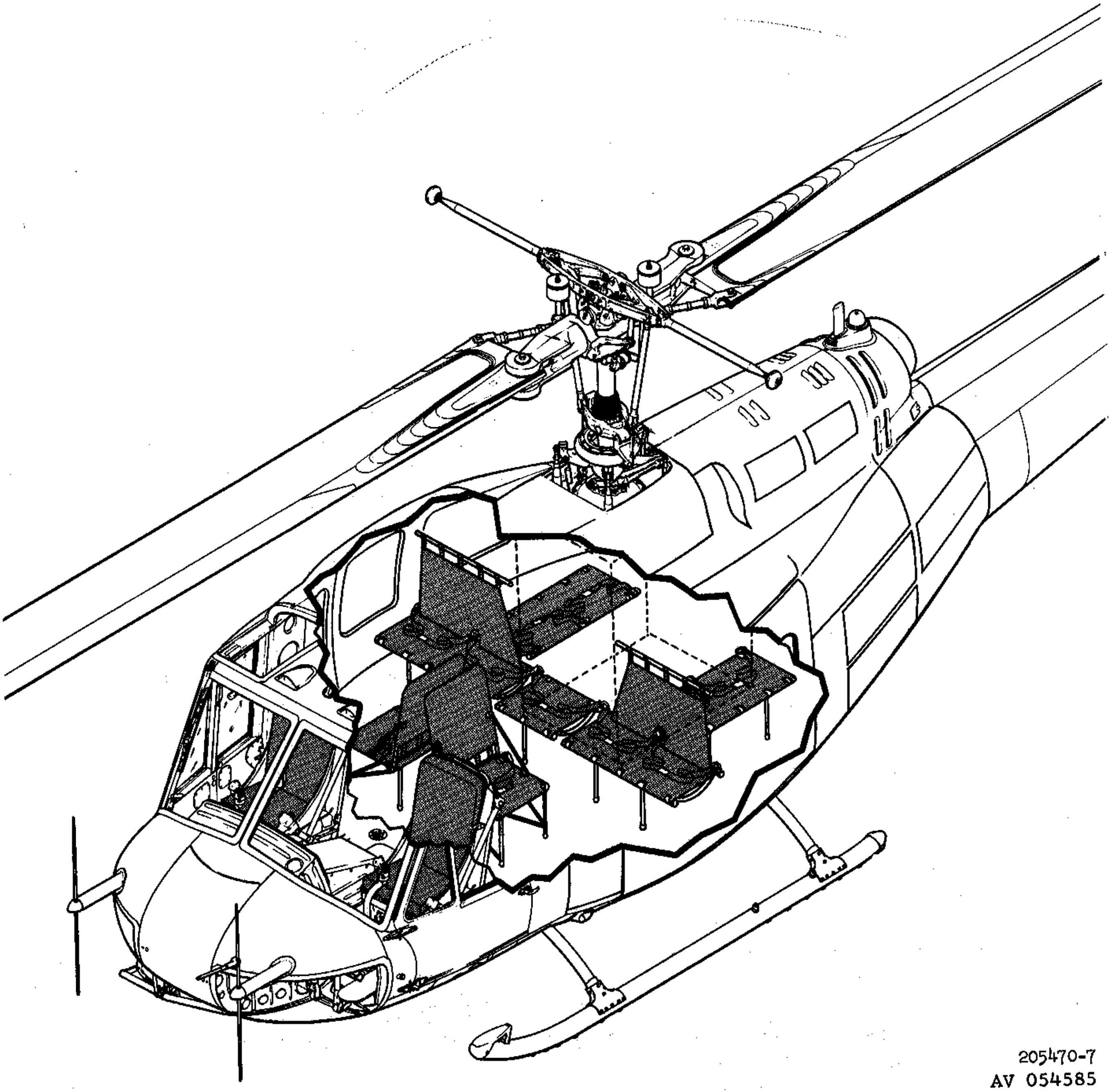


Figure 13-2. Troop seat placement

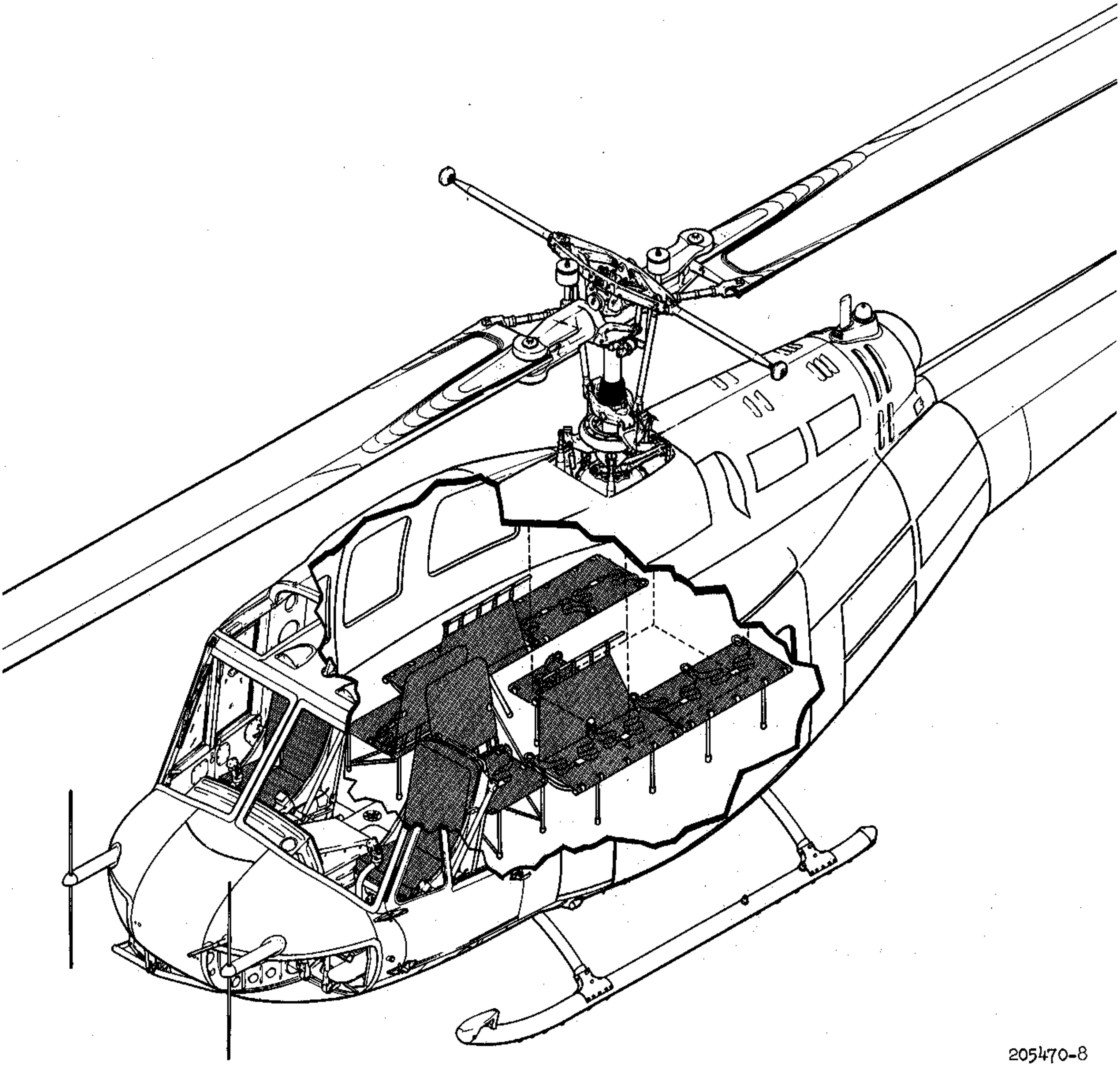


Figure 13-3. **Alternate troop seat placement**

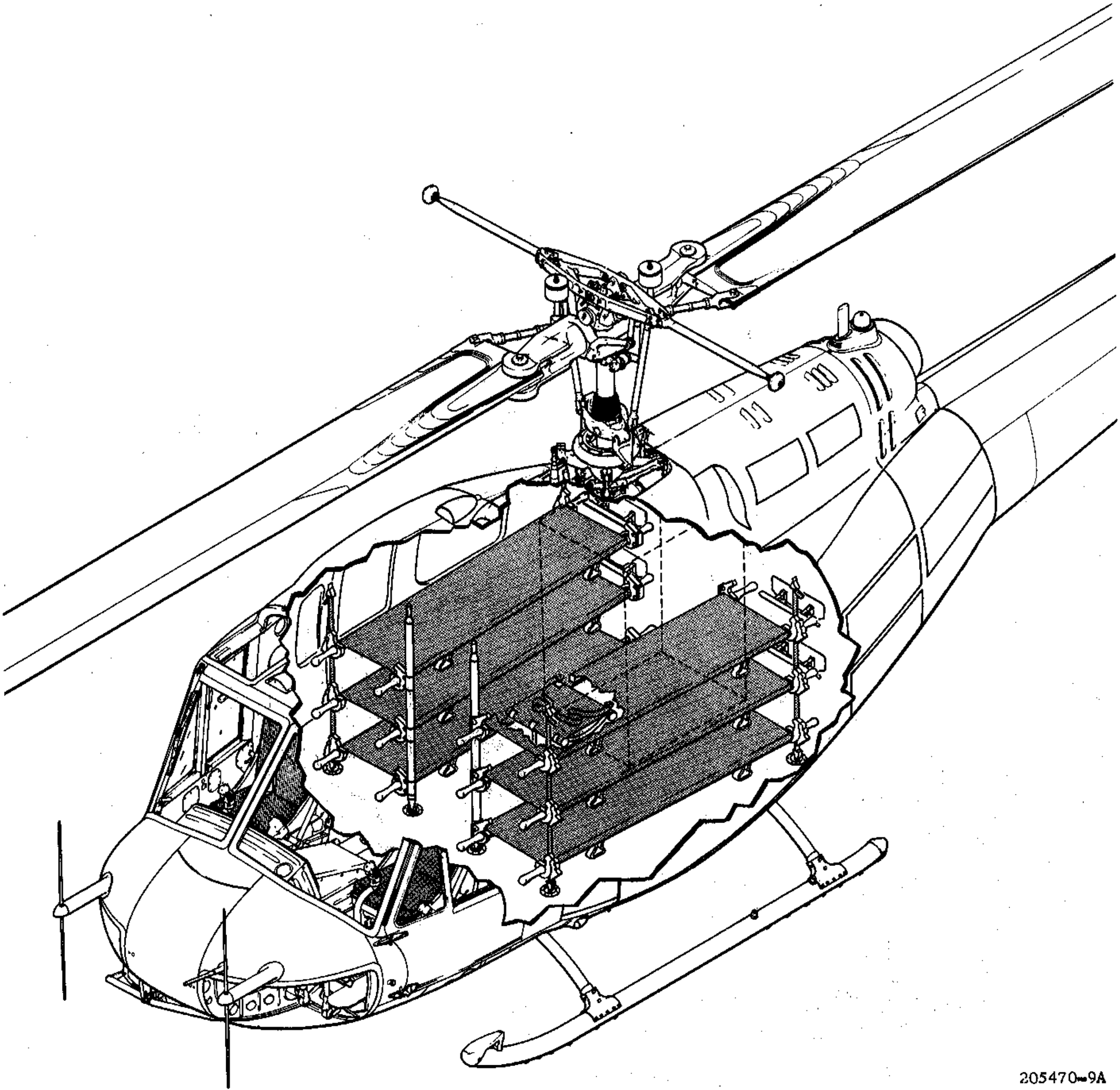


Figure 13-4. Litter installation - typical

SECTION IV GENERAL INSTRUCTIONS FOR LOADING, SECURING AND UNLOADING CARGO

13-30. CARGO CENTER OF GRAVITY PLANNING.

13-31. The items to be transported should be assembled for loading after the weight and dimensions have been recorded. Loading time will be gained if the packages are positioned as they are to be located in the helicopter. To assist in determining the locations of the various items, the individual weights and total weight must be known. When these factors are known the Loading Problem Example (see figure 13-5) can be used as a guide to determine the helicopter station at which the package cg shall be located. The information presented on the loading chart will not be affected by fuel quantity, as full to empty fuel load has been considered during data computation. Final analysis of helicopter cg location for loading shall be computed from the data presented in Chapter 12.

13-32. COMPUTATION OF CARGO CENTER OF GRAVITY. The loading data in Chart E in Chapter 12, will provide information to work a loading problem. From the loading tables, weight and moment/100 are obtained for all variable load items and are added mathematically to the current basic weight and moment/100 obtained from Chart C to arrive at the gross weight and moment. The cg of the loaded helicopter is represented by a moment figure in the center of gravity table. If the helicopter is loaded within the forward and aft cg limits, the figure will fall numerically between the limiting moments. The effect on the cg of the usable inflight items of fuel and oil may be checked by subtracting the weights and moments of such items from the take-off gross weight and moment and checking the new moment with the cg table. This check will be made to determine whether or not the cg will remain within limits during the entire flight.

13-33. LOADING PROCEDURE.

13-34. The helicopter requires no special loading preparation. The loading procedure consists of placing the heaviest items to be loaded as far aft as possible. Such placement locates the cargo nearer the helicopter cg and allows maximum cargo load to be transported, as well as maintaining the helicopter within the safe operating cg limits for flight. The mission to be performed should be known to determine the cargo, troop transport, or litter patients are to be carried on the return trip. If troops or litter patients are to be carried, troop seats and litter racks shall be loaded aboard and stowed.

13-35. SECURING LOADS. Equipment for securing cargo consists of a three piece cargo tie-down net, which attaches to tie-down rings. Nets are tightened to slip straps (refer to paragraph 13-14).

13-36. CARGO LOADING - INTERNAL.

13-37. Internal cargo is carried within the cabin, and bulk items can be accommodated.

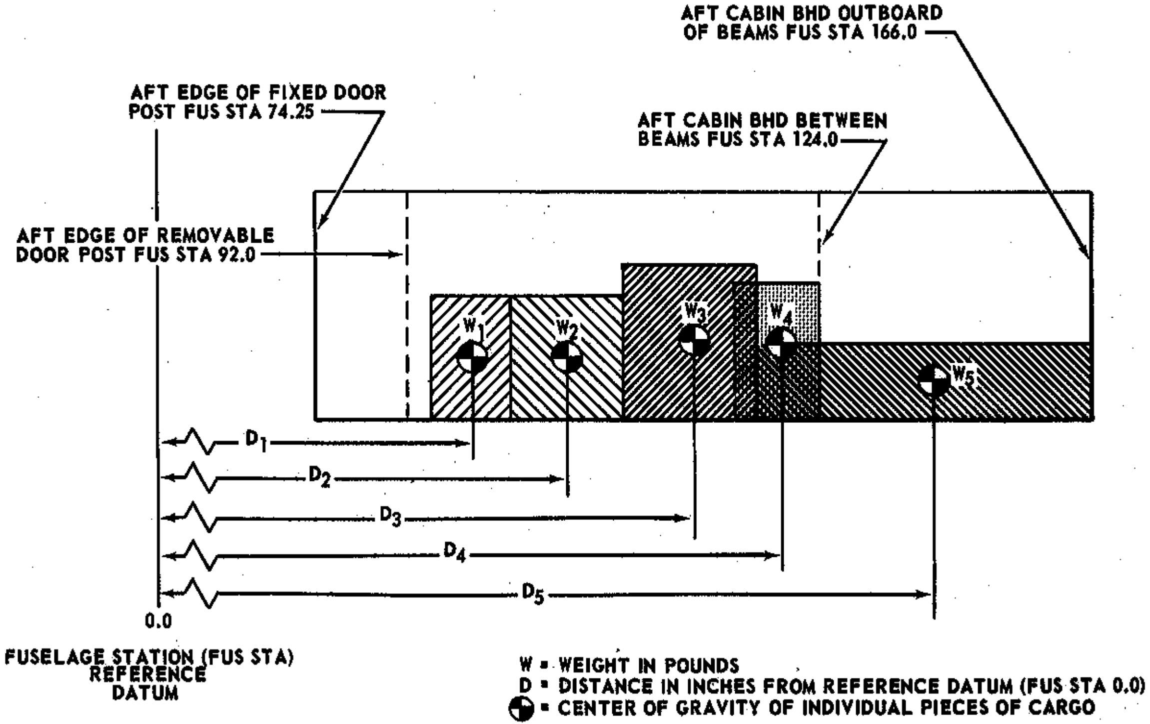
13-38. The cargo area is located aft of the crew stations and contains approximately 220 cubic feet of obstruction-free cargo load space. Ease of loading is provided by full-width sliding doors, which enclose two sides of the cargo area and provide straight-through loading capabilities. Cargo can be easily loaded without the use of specialized equipment. High density cargo distributed over the deck area to maintain 100 pounds per square foot will provide a safety load factor of 4.0 based on limit loads. The safety load factor will vary as the floor loading varies. (Load factor = 400 pounds per square foot floor loading.) Flush-mounted tie-down fittings are provided on the beam and aft cabin bulkhead. A rapid simplified visual method for placement of cargo, after cargo cg has been determined, has been provided by information in the Internal Cargo Loading Chart (refer to Chapter 7). This information, when used, will maintain the helicopter within its cg operational limits throughout its entire mission.

13-39. LOADING AND UNLOADING OF OTHER THAN GENERAL CARGO.

13-40. The helicopter is capable of transporting nuclear weapons, if required.

Warning

Before transporting nuclear weapons, the pilot shall be familiar with AR95-55 and AR385-25.



W = WEIGHT IN POUNDS
D = DISTANCE IN INCHES FROM REFERENCE DATUM (FUS STA 0.0)
◑ = CENTER OF GRAVITY OF INDIVIDUAL PIECES OF CARGO

<u>CENTER OF GRAVITY OF ENTIRE CARGO</u>

$$CG = \frac{(W_1 \times D_1) + (W_2 \times D_2) + (W_3 \times D_3) + (W_4 \times D_4) + (W_5 \times D_5)}{W_1 + W_2 + W_3 + W_4 + W_5}$$

205470-18
AV 054587

Figure 13-5. Example loading problem

CHAPTER 14

PERFORMANCE DATA

SECTION I SCOPE

14-1. SCOPE.

14-2. The charts contained in this chapter provide data to be used with the latest operating information. The data shown on these charts originates from flight test programs and the operational experience gained through actuat helicopter usage. The performance charts are presented in tubular, graphic or profile form. Calculated figures are shown in red. The charts are arranged to give maximum facility of use for pre-flight and in-flight mission planning in a safe, efficient manner.

Note

In the discussion of the various charts in Section II, when chart forms are relatively the same, only one sample problem will be provided.

14-3. SYMBOLS AND DEFINITIONS.

SYMBOL	DEFINITION
C	Centigrade
F	Fahrenheit
LB/GAL	Pound(s) per Gallon
Kts	Knots
IAS	Indicated Airspeed
CAS	Calibrated Airspeed
GAL	Gallon(s)
PSIG	Pounds per square inch gage
SHP	Shaft Horsepower
TAS	True Airspeed
R/C	Rate of Climb
FPM	Feet per minute
N.MI	Nautical mile
FT/MIN.	Feet per minute
LBS	Pounds
LB/HR	Pounds per hour
SL	Sea level
OGE	Out of ground effect
IGE	In ground effect
FT	Foot
OAT	Outside air temperature
RPM	Revolutions per minute

SECTION II CHARTS

14-4. INTERPRETATION OF THE CHARTS.

14-5. Data is given for planning the various types of missions which can reasonably be expected to be performed. Familiarization with the charts and their functions will be necessary for proper understanding and to derive maximum benefit from their use. A description of each chart and its use is also included.

14-6. READING THE CHARTS.

14-7. It is of the utmost importance that the charts be read accurately, especially in the case of multivariable graphs. In this type of presentation, errors in reading can be cumulative, with resulting large final errors. A hard, fine-pointed pencil should be used at all times when reading the curves, and close attention should be paid to subdivisions of the grid.

14-8. TRUE ALTITUDE.

14-9. True altitude is the actual height above sea level. It is sometimes called the "tapeline" altitude; that is, the altitude that would be measured by a tapeline dropped from the helicopter perpendicularly to the earth's surface at sea level.

14-10. PRESSURE ALTITUDE.

14-11. The pressure of air at a given tapeline altitude may depart considerably from standard. If the atmospheric pressure is measured at the helicopter level, and altitude corresponding to this pressure can be determined from a standard air table. This altitude is known as the pressure altitude of the helicopter. It is also the altitude recorded by the altimeter if the altimeter has no instrument error and is set to 29.92 inches of mercury at sea level. It will therefore indicate higher or lower than the true altitude in a nonstandard atmosphere. See Altimeter Correction Chart for actual altitude readings.

14-12. DENSITY ALTITUDE.

14-13. As with pressure, density of the air at a given true altitude may vary widely from the standard;

the less dense the air, the higher density altitude. If the density is measured at the helicopter level, an altitude corresponding to this density can be determined from a standard air table. This altitude is known as the density altitude of the helicopter.

14-14. DENSITY ALTITUDE CHART.

14-15. A high density altitude affects the performance of both the main rotor and the engine. When density altitude is high, less lift is developed by the rotor blades for any given power setting, and the engine is incapable of producing sea level rated power. Chart 14-1 shows temperature and pressure altitude versus density altitude. An example of the use of the chart is contained in the chart. Knowing pressure altitude and temperature, the density altitude can be determined. The explanation of $(\sqrt{\frac{1}{\sigma}})$ used in chart 14-1 is as follows: The reciprocal of the square root of density ration, at the appropriate density altitude. The Greek letter sigma (σ) is used to represent the density ratio.

14-16. STANDARD ATMOSPHERIC CHART.

14-17. To provide a convenient reference, the National Advisory Committee for Aeronautics (NACA) has established a set of values for temperature, density, and pressure at sea level (zero tapeline altitude). This is known as standard atmosphere, or just "standard day." The first row of numbers in chart 14-2 lists this relationship at sea level for standard air. In addition, a variation of these values with an increase in tapeline altitude has been established.

14-18. LIFT CAPABILITY CHART.

14-19. The lift capability chart shown in chart 14-4 provides the pilot with a means of quickly estimating whether or not the helicopter is capable of performing a given mission. The information required to use the chart can be obtained directly from the instrument panel, i.e., the pressure altimeter and the OAT indicator. Estimated capabilities derived from the chart are valid for the T53-L-9, -9A, and -11 series engines; however, the chart is actually based on the T53-L-9 engine. Consequently, when any wind is present, or when a T53-L-11 series or -13 engine is installed, the helicopter will be capable of better performance than indicated by the chart. Two examples will be given to demonstrate how the chart may be used. The first example will determine the gross weight which can be lifted at a specified altitude and outside air temperature. The second example will determine what the maximum outside air temperature should be for a specified gross take-off weight and pressure altitude.

14-20. EXAMPLE 1.

14-21. The pressure altitude indicated is 6000 feet; the OAT indication is 17°C. What is the maximum gross weight of the helicopter, both in- and out-of-ground effect? Referring to Graph A on chart 14-4, trace the dotted line upward from 17°C to the 6000 feet pressure altitude line, then to the right onto Graph B, stopping at the 6000 foot pressure altitude line on the graph. The maximum gross weight is immediately indicated at this point as 7350 pounds. The available engine torque under the specified conditions is also indicated by extending the dotted line downward and reading 36 psig torque.

14-22. EXAMPLE 2.

14-23. The gross take-off weight and pressure altitude are known; it is desired to estimate at what outside air temperature the helicopter's capabilities could become marginal. Using the same pressure altitude and weight as in Example 1, the dotted line extends from Graph B to the 6000 foot pressure altitude line on Graph A and then downward to the 17°C indication. At any OAT above this temperature, the helicopter's capabilities could become marginal and offloading of fuel or cargo should be considered.

14-24. TEMPERATURE CONVERSION CHART.

14-25. The temperature conversion chart (see figure 14-5) provides a list of temperatures from minus 54°C (minus 85°F) to 793°C (2660°F) and is grouped in columns of three. These columns allow the direct conversion of a temperature reading to either centrigrade or fahrenheit.

14-26. AIRSPEED INSTALLATION CORRECTION CHART.

14-27. Airspeed installation correction chart (chart 14-6) is provided to supply the correction required to determine calibrated airspeed (CAS). Indicated airspeed (IAS), as read from the instrument and corrected for instrument error, plus or minus installation correction, equals calibrated airspeed. Because of the speed range at which the helicopter operates, compressibility correction is negligible; therefore, it has been intentionally omitted. An approximate true airspeed (TAS) for a standard day can be obtained from CAS by adding 1-1/2 percent of CAS per 1000 feet density altitude to CAS.

14-28. ENGINE OPERATING LIMITS CHART.

14-29. Maximum power available for the T53-L-9, -9A, and -11 series engines is given in chart 14-7 (14-8 for T53-L-13 engine). These powers are based on the engine manufacturer's specifications and guarantees. Correction based on flight tests are included for installation losses of the engine in the helicopter.

14-30. Performance data given in this manual are based on an engine which can produce specification or rated power. Ordinarily, the engine installed in the helicopter is capable of producing more power; therefore, unless engine deterioration has occurred, adequate power should be available for loading and ceilning limits given in this manual. If deterioration in engine output is suspected, the curves in chart 14-7 or 14-8 may be used to make a rough comparison of actual and rated engine performance, using the flight instruments available to the pilot. To make the comparison, mentally record pressure altitude and OAT; and, at the same time apply full power. Now note the torquemeter reading. Enter the curves at the recorded pressure altitude and temperature, and read torque pressure available. The torquemeter reading attained in flight should be at least as great as that shown on the curve. It is emphasized that such comparisons are approximate, and they can result in low engine power indications. This is due to several factors: (1) the high rate of climb when full power is applied, which in turn results in rapidly changing air pressure and temperatures; (2) manufacturing tolerances in the torquemeter and flight instruments; (3) readability of flight instruments; (4) and pilot techniques. In addition, two precautions should be observed by the pilot when making the flight check. (1) Avoid hovering with full power in-ground effect, except for take-off and translational lift, due to the decrease in power caused by an engine inlet temperature rise when in-ground effect (2) more torque will be obtained if engine rpm is allowed to drop below 6600 when full power is applied.

14-31. If the engine does not appear to be producing specification power and torque, allowable hovering ceiling or load limits as given in this manual will be decreased. Conservative rules of thumb in this event are to reduce gross weight 200 pounds for each psig of deficient torque - or reduce hovering ceiling 1000 feet for each psig of deficient torque. These increments may be subtracted directly from the maximum take-off gross weight and ceiling which the pilot determines from the curves and tables given elsewhere in the manual. The curves and tables are entered normally at the actual or anticipated air temperature and pressure altitude of the flight, then the increments in gross weight or altitude are subtracted.

14-32. TAKE-OFF DISTANCE CHART.

14-33. The take-off distance charts (charts 14-9 and 14-10) list minimum take-off distances for various pressure altitudes, air temperatures, and gross weights. Take-off distances are given for maximum performance take-off procedures only, as distinguished from normal take-off procedures described in Chapter 3. Maximum performance take-offs result in the minimum take-off distance.

14-34. One set of charts lists take-off distances using the maximum performance hover and level acceleration method. Engine speed is maintained at 6600 rpm. If the helicopter can hover out-of-ground effect, take-off distances and climb-out airspeeds are given as zero. This procedure requires a vertical lift-off and a vertical climb to an altitude above the obstacle before accelerating into forward flight. If the take-off distance is greater than zero, this means the helicopter cannot hover out-of-ground effect. In these cases, the helicopter takes off vertically to a skid height of two feet above the ground, accelerates to the climb-out airspeed given in the charts, and climbs over the obstacle at that airspeed. If the climb-out airspeed is greater or less than the value given in the chart, take-off distances will be increased. If the skid height is greater than two feet prior to obtaining climb-out airspeed, the take-off distances will be greater. Under power limited conditions (two foot hover and full power available) a greater than normal nose-down flight attitude is required during acceleration. If loss of lift occurs in the area just prior to translational lift, the helicopter shall be leveled to avoid ground contact with the forward portion of the skids. If ground contact does occur, take-off distances will be greatly increased in addition to possible skid damage. If the helicopter cannot hover two feet off the ground, take-off distances are not shown and the gross weight should be reduced.

Note

> When the take-off distance is zero, the climb-out airspeed is also zero (vertical climb is possible). In the charts, the accelerating run column is deleted and the climb-out airspeed is given adjacent to each take-off distance.

14-35. The second method involves hovering with the helicopter light on skids and then increasing airspeed and altitude simultaneously. Engine speed is maintained at 6600 rpm. If the helicopter can hover out-of-ground effect, take-off distances and climb-out airspeed are given as zero. This procedure requires a vertical lift-off and a vertical climb to an altitude above the obstacle before accelerating into forward flight. If the take-off distance is greater than zero, this means the helicopter cannot hover out-of-ground effect. In these cases, the helicopter is brought to a hover, light on skids. As power is applied and the helicopter leaves the ground, hold constant pitch altitude until airspeed starts to register. When this occurs, fine pitch attitude adjustments are required to obtain the desired airspeed. Once airborne, the pilot should allow airspeed and altitude to increase simultaneously until the obstacle is cleared. The airspeed and altitude should then be increased as soon as possible to avoid operation in the restricted area of the height-velocity diagram. If the climb-out airspeed is greater or less than the value given in the chart, take-off distances will be increased. If the helicopter cannot hover light on skids, take-off distances are not shown and the gross weight should be reduced.

14-36. The third method involves hovering the helicopter at a 15-foot skid height and then increasing airspeed and altitude simultaneously. Engine speed is maintained at 6600 rpm. This is primarily for use when carrying external cargo on the sling. When the helicopter can hover out-of-ground effect, take-off distances and climb-out airspeeds are given as zero in the charts. For these cases, climb vertically until the sling load will clear the obstacle, then proceed into forward flight. When take-off distances are greater than zero, the take-off procedure is as follows: Apply sufficient power to hover at a skid height of 15 feet. Apply power and allow airspeed and altitude to increase simultaneously until the obstacle is cleared. As power is applied, hold a constant pitch attitude until the airspeed starts to register. When this occurs, fine pitch attitude adjustments are required to obtain the desired airspeed. When the obstacle is cleared, the airspeed and altitude should be increased as soon as possible to avoid operation in the restricted area of the height-velocity diagram. If the climb-out airspeed is greater or less than the value given in the chart, take-off distances will be increased. If the helicopter cannot hover at 15 feet, take-off distances are not shown and the gross weight should be reduced.

14-37. The last set of charts, with the red border, lists take-off distances using rpm bleed-off. As in the first set of charts, the take-off distance is given as zero when the helicopter can hover out-of-ground effect. It is when the helicopter cannot hover out-of-ground effect that use of the bleed-off method can reduce take-off distances or permit a greater load to be carried by experienced pilots. When take-off distances are greater than zero, the take-off procedure is as follows: Apply sufficient power at 6600 engine rpm to maintain helicopter light on the skids. Increase collective pitch to lift the helicopter off the ground and apply forward cyclic control to start forward movement of the helicopter. Accelerate into forward flight, allowing the engine speed to decrease to a minimum of 6400 rpm. When translational lift is attained, increase collective pitch to decrease engine speed to a minimum of 5900 rpm. Just prior to obtaining climb-out airspeed given in the chart, rotate the helicopter nose up and climb at that airspeed, maintaining 5900 engine rpm. When clear of obstacle, reduce pitch slightly to regain 6600 engine rpm. If the climb-out airspeed is greater or less than the chart value, take-off distance will be increased. If the helicopter has insufficient power to hover light on the skids, take-off distances are not shown and gross weight should be reduced.

Warning

The procedure for maximum performance take-off using rpm bleed-off requires precise application and timing with respect to rpm control and obtaining optimum climb-out airspeed. All charts with red borders are for emergency use only.

14-38. TAKE-OFF GROSS WEIGHT LIMITATIONS.

14-39. The take-off gross weight limitation curve (chart 14-11) is used in determining maximum take-off gross weight as limited by vertical climb performance. Maximum take-off gross weights are given as a function of pressure altitude, outside air temperature, and the desired vertical rate of climb. Engine speed is 6600 rpm and take-off power is used. The take-off gross weight which, for a given altitude and temperature, results in a 100 foot-per-minute vertical rate of climb is the overload limit. The gross weight, altitude, and temperature which results in a 300-foot-per-minute rate of climb is the normal limit.

14-40. HOVERING CHART.

14-41. The hovering charts (chart 14-12, 14-13, 14-14, and 14-15) provide information to determine the maximum gross weights at which the helicopter can hover. The first charts are for hovering out-of-ground effect at various pressure altitudes, temperatures, and wind velocities. The last charts are for hovering in-ground effect at various pressure altitudes and temperatures. Both sets of charts are for operation at 6600 rpm.

14-42. Charts for hovering out-of-ground effect are shown for both take-off and normal rated power. The chart for normal rated power should be used if prolonged hovering is to be accomplished. Charts for hovering in-ground effect are shown for take-off power only but for both a normal 2°C inlet temperature rise and a 10°C inlet temperature rise. For short periods of hovering in-ground effect (less than one minute) the 2°C temperature rise chart should be used. For longer periods the 10°C temperature chart should be used since for prolonged periods of hovering in-ground effect the inlet temperature rises due to recirculation of the air into the engine inlet.

14-43. The known conditions necessary to use the out-of-ground effect with take-off power chart, are pressure altitude, temperature, and wind velocity. The chart contains two graphs, both of which are used to determine the operating capabilities of the helicopter. The top graph contains the pressure altitude scale and temperature gradient curves which are used for the initial entrance into the chart for problem solution. The bottom graph contains a vertical scale for headwind in knots and flow curves, to be followed before the drop to the gross weight scale at the bottom of the graph. The out-of-ground effect with normal rated power chart and the in-ground effect chart are used in a similar manner except that the wind velocity curves have been omitted.

14-44. The following problem and example are for use with the Hovering Out-of-Ground Effect chart with take-off rated power; however, the procedure to obtain the gross weight operating limits is applicable for both charts.

PROBLEM	**CLIMATIC CONDITION**
Take-off Rated Power Pressure Altitude	7000 feet
Temperature	15°C (59°F)
Head Wind	10 knots

14-45. EXAMPLE:

14-46. (See chart 14-12.) Enter the upper chart at 7000 feet pressure altitude and move to the right to intersect the 15°C temperature curve. From this point drop vertically to the wind chart. Follow the flow curve on the wind scale to the 10 knot windline. Drop vertically from the 10 knot point to the weight scale and read 7410 pounds maximum hovering weight for the existing conditions with 6600 engine rpm.

14-47. CLIMB CHART.

14-48. The climb chart (charts (14-16 and 14-17) data includes rate of climb, distance, time, and quantity of fuel used to climb to altitude. The figures stated are for normal power performance, based upon the use of optimum climbing speed schedules shown. Use of climbing speeds other than those shown on the climb chart will result in a reduced rate of climb, and increase in fuel use, and an increase in time required at all altitudes. On warm days, rates of climb will be less than the chart values.

14-49. EXAMPLE:

14-50. (See chart 14-16.) Determine the time required to climb to 4000 feet and quantity of fuel required for a gross weight of 7000 pounds. At the top of the chart, find 7000 pounds gross weight and in the center column locate 4000 feet altitude. By reading horizontally on the chart at this altitude, the following are obtained. The best climbing speed is 53 knots IAS, fuel consumed to climb from sea level is 47 pounds (which includes 23 pounds required for warm-up and take-off), time required during climb in 2.2 minutes, the distance traveled is two nautical miles, and the rate of climb at 4000 feet is 1826 feet per minute.

14-51. RANGE CHART.

14-52. The range chart (charts 14-18 and 14-19) shows the range and endurance capacities for various power conditions and fuel allowance. This chart may be used for inflight and preflight planning. The initial conditions are gross weight, actual pressure altitude of the helicopter, and fuel quantity.

Note

Ferry Mission Range =

$$\frac{\text{Range for 100 lb Fuel x Fuel Available.}}{1000}$$

14-53. The chart is divided into four main sections, gross weight, pressure altitude, power settings, and range in nautical miles for various fuel quantities as listed above fuel columns. Fuel allowances must be made for various contingencies such as take-off, climb, wind, and landing conditions. All data in the range chart is for standard day conditions (i.e., 15°C at sea level). On days when free air temperature is other than standard, range performances will be slightly different from values given.

Note

> Cargo mirror should be removed and stowed in the fuselage unless external sling load is being carried. Cargo mirror installation will reduce range by eight percent.

14-54. To use the range chart, refer to the chart for the appropriate cruise condition. Enter the chart at gross weight and altitude and read the approximate fuel consumption and airspeed. Read range under the fuel quantity for the desired flight condition. At any time before or during the flight, the pilot may refer to the chart with actual conditions of weight, altitude, and fuel to obtain range remaining.

14-55. EXAMPLE:

14-56. (See chart 14-18.) The helicopter is to fly at 4000 feet altitude (Long Range-Cruise Speed) with take-off gross weight of 8000 pounds.

a. It is desired to have 160 pounds of fuel in reserve and from the climb chart (chart 14-16) it is found that approximately 53 pounds of fuel are required for warm-up and climb to 4000 feet altitude from sea level. Adding 160 pounds reserve and 53 pounds for climb and subtracting the total from the total fuel load of 1430 pounds gives a fuel balance for cruise of 1217 pounds.

b. Enter the (Long Range-Cruise Speed) range chart at 8000 pounds, and 4000 feet altitude, and a fuel quantity of 1200 pounds.

c. Read 240 nautical miles range in a no-wind condition; fuel consumption 543 pounds per hour; and indicated airspeed (IAS) 97 knots.

14-57. MAXIMUM ENDURANCE CHART.

14-58. The maximum endurance chart (charts 14-20 and 14-21) shows the maximum available flight time with various gross weight conditions at sea level and at increasing altitudes. All data in the chart is for standard day conditions (i.e., 15°C at sea level).

14-59. EXAMPLE:

14-60. The helicopter is to fly at 2000 feet altitude with a take-off gross weight of 8000 pounds and a fuel load of 1430 pounds. It is desired to have 150 pounds of fuel in reserve. From the climb chart (chart 14-16), it is found that approximately 38 pounds of fuel are required for warm-up, take-off and climb to 2000 feet altitude from sea level. Subtracting desired fuel reserve and fuel required for climb from total fuel load gives a fuel balance for cruise of 1242 pounds.

14-61. Enter the maximum endurance chart (chart 14-20) at 8000 pounds gross weight, 2000 feet pressure altitude, and a fuel quantity of 1200 pounds, and read a maximum endurance of 2.9 hours, with an engine rpm of 6600. Under these conditions, the rate of fuel consumption is 418 pounds per hour at 56 knots IAS.

14-62. HOVERING ENDURANCE CHART.

14-63. The hovering endurance chart (charts 14-22 and 14-23) shows the maximum endurance possible while hovering with various gross weight conditions at sea level and at increasing altitudes. All chart data is for standard day conditions; therefore, when the free air temperature is other than standard (i.e., 15°C at seal level and decreasing at 2°C per 1000 feet), hovering endurance performance will be slightly different from that shown on the chart.

14-64. EXAMPLE:

14-65. (See chart 14-22.) The helicopter is to hover at 4000 feet altitude with a take-off gross weight of 7500 pounds with an alloted 1430 pounds of fuel to be used. Enter the hovering endurance chart at 7500 pounds gross weight, 4000 feet pressure altitude, and a fuel quantity of 1430 pounds. Read hovering endurance of 2.3 hours with an engine rpm of 6600. Under these conditions the engine will be using 618 pounds of fuel an hour.

14-66. LANDING DISTANCE CHART.

14-67. Two sets of landing distance charts are furnished. Both sets of charts give maximum possible landing distances. The power-on chart (charts 14-24 and 14-26) shows minimum landing distances over a 50-foot obstacle with power on. The landing distances are less than those required if the normal operating procedures in Chapter 3 are followed. Whenever the helicopter can hover out-of-ground effect, landing distances are given as zero. Corresponding approach speeds over the 50-foot obstacle are also zero. When the helicopter can hover in-ground effect, landing distance will be other than zero. When the helicopter cannot hover in-ground effect, a ground run distance is included in the distance to clear a 50-foot obstacle. A note is added to the power-on charts that a safer, more normal approach and landing will result if the power-off landing distances in charts 14-25 and 14-27 are used. The power-off chart shows helicopter requirements where autorotational landing technique is used as recommended in Chapter 4. Both sets of charts list landing distances for various pressure altitudes, air temperatures, and gross weights. Greater landing distances are required at higher altitude, on warm, humid days, and for heavier gross weights.

14-68. EXAMPLE:

14-69. (See chart 14-24.) Power-On landing gross weight 8000 pounds, pressure altitude 6000 feet, and outside air temperature plus 15°C (plus 59°F). Select the 8000 pounds gross weight line at 6000 feet altitude, and move horizontally across chart to the plus 15°C temperature column. Note that the best approach speed is 14 knots, zero ground roll is required, and 29 feet distance is necessary to clear a 50-foot obstacle.

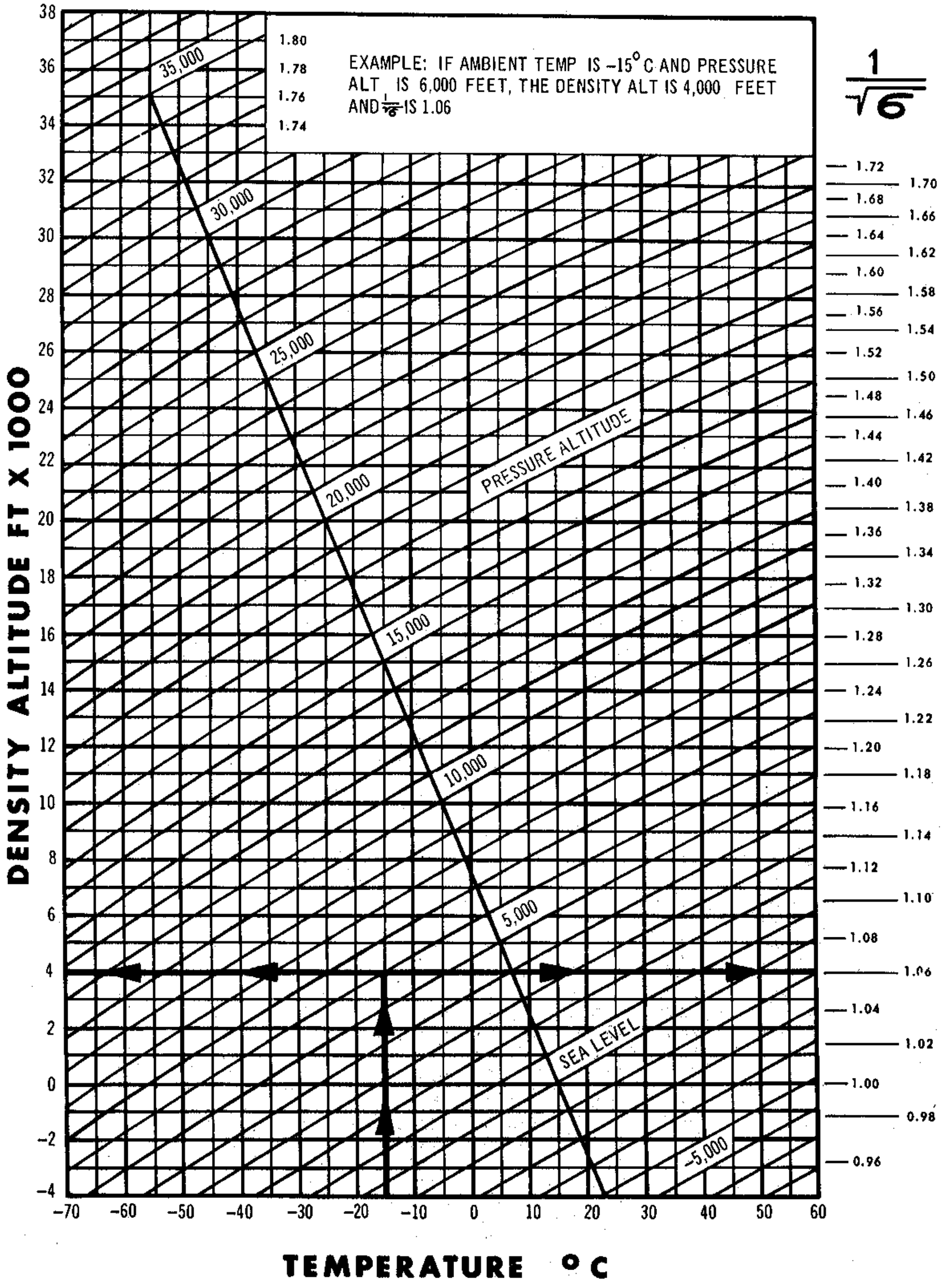


Chart 14-1. Density altitude chart

Standard Sea Level Air:
T = 15°C (59° F)   W = 0.07651 lb/cu ft P_o = 0.002378 slugs/cu ft
P = 29.921 in. of Hg   1 in. of Hg = 70.732 lb/sq ft = 0.4912 lb/sq in.
This table is based on NACA Technical Report No. 218 a_o = 1116 ft/sec

Alti-tude-feet	Density Ratio-P/P_o	$\frac{1}{\sqrt{\sigma}}$	Temperature		Speed of Sound Ratio-a/a_o	Pressure	
			Deg C	Deg F		In. of Hg	Ratio-P/Po
0	1.0000	1.0000	15.000	59.000	1.0000	29.92	1.0000
1000	.9710	1.0148	13.019	55.434	.997	28.86	.9644
2000	.9428	1.0299	11.038	51.868	.993	27.82	.9298
3000	.9151	1.0454	9.056	48.301	.990	26.81	.8962
4000	.8881	1.0611	7.075	44.735	.986	25.84	.8636
5000	.8616	1.0773	5.094	41.169	.983	24.89	.8320
6000	.8358	1.0938	3.113	37.603	.979	23.98	.8013
7000	.8106	1.1107	1.132	34.037	.976	23.09	.7716
8000	.7859	1.1280	-0.850	30.471	.972	22.22	.7427
9000	.7619	1.1456	-2.831	26.904	.968	21.38	.7147
10000	.7384	1.1637	-4.812	23.338	.965	20.58	.6876
11000	.7154	1.1822	-6.793	19.772	.962	19.79	.6614
12000	.6931	1.2012	-8.774	16.206	.958	19.03	.6359
13000	.6712	1.2206	-10.756	12.640	.954	18.29	.6112
14000	.6499	1.2404	-12.737	9.074	.950	17.57	.5873
15000	.6291	1.2608	-14.718	5.507	.947	16.88	.5642
16000	.6088	1.2816	-16.699	1.941	.943	16.21	.5418
17000	.5891	1.3029	-18.680	-1.625	.940	15.56	.5202
18000	.5698	1.3247	-20.662	-5.191	.936	14.94	.4992
19000	.5509	1.3473	-22.643	-8.757	.932	14.33	.4790
20000	.5327	1.3701	-24.624	-12.323	.929	13.75	.4594
21000	.5148	1.3937	-26.605	-15.890	.925	13.18	.4405
22000	.4974	1.4179	-28.586	-19.456	.922	12.63	.4222
23000	.4805	1.4426	-30.568	-23.022	.917	12.10	.4045
24000	.4640	1.4681	-32.549	-26.588	.914	11.59	.3874
25000	.4480	1.4940	-34.530	-30.154	.910	11.10	.3709
26000	.4323	1.5209	-36.511	-33.720	.906	10.62	.3550
27000	.4171	1.5484	-38.493	-37.287	.903	10.16	.3397
28000	.4023	1.5768	-40.474	-40.853	.899	9.720	.3248
29000	.3879	1.6056	-42.455	-44.419	.895	9.293	.3106
30000	.3740	1.6352	-44.436	-47.985	.891	8.880	.2969
31000	.3603	1.6659	-46.417	-51.551	.887	8.483	.2834
32000	.3472	1.6971	-48.399	-55.117	.883	8.101	.2707
33000	.3343	1.7295	-50.379	-58.684	.879	7.732	.2583
34000	.3218	1.7628	-52.361	-62.250	.875	7.377	.2466
35000	.3098	1.7966	-54.342	-65.816	.871	7.036	.2352
36000	.2962	1.8374	-55.000	-67.000	.870	6.708	.2242
37000	.2824	1.8818	-55.000	-67.000	.870	6.396	.2137
38000	.2692	1.9273	-55.000	-67.000	.870	6.096	.2037
39000	.2566	1.9738	-55.000	-67.000	.870	5.812	.1943
40000	.2447	2.0215	-55.000	-67.000	.870	5.541	.1852
41000	.2332	2.0707	-55.000	-67.000	.870	5.283	.1765
42000	.2224	2.1207	-55.000	-67.000	.870	5.036	.1683
43000	.2120	2.1719	-55.000	-67.000	.870	4.802	.1605
44000	.2021	2.2244	-55.000	-67.000	.870	4.578	.1530
45000	.1926	2.2785	-55.000	-67.000	.870	4.364	.1458
46000	.1837	2.3332	-55.000	-67.000	.870	4.160	.1391
47000	.1751	2.3893	-55.000	-67.000	.870	3.966	.1325
48000	.1669	2.4478	-55.000	-67.000	.870	3.781	.1264
49000	.1591	2.5071	-55.000	-67.000	.870	3.604	.1205
50000	.1517	2.5675	-55.000	-67.000	.870	3.436	.1149

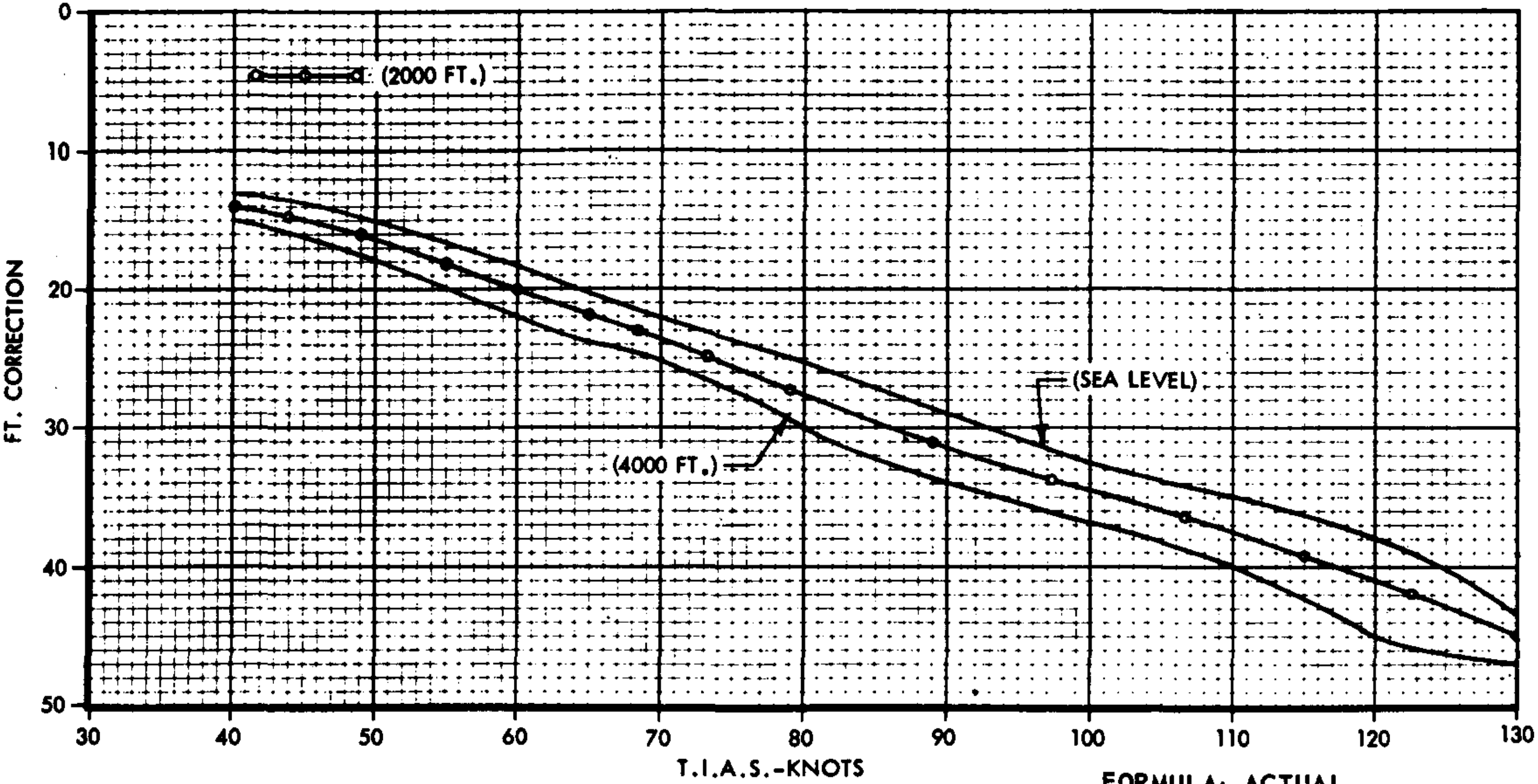
Chart 14-2. Standard atmospheric (altitude) chart

MODEL: UH-1D 48 FT.

CONDITION: CRUISE FLT

DATA AS OF: AUG 1966

DATA BASIS: 81:JAB:eh 625



EXAMPLE: ALTIMETER READS 2000 FT. AT 120 KNOTS.
ACTUAL 2041 FT.

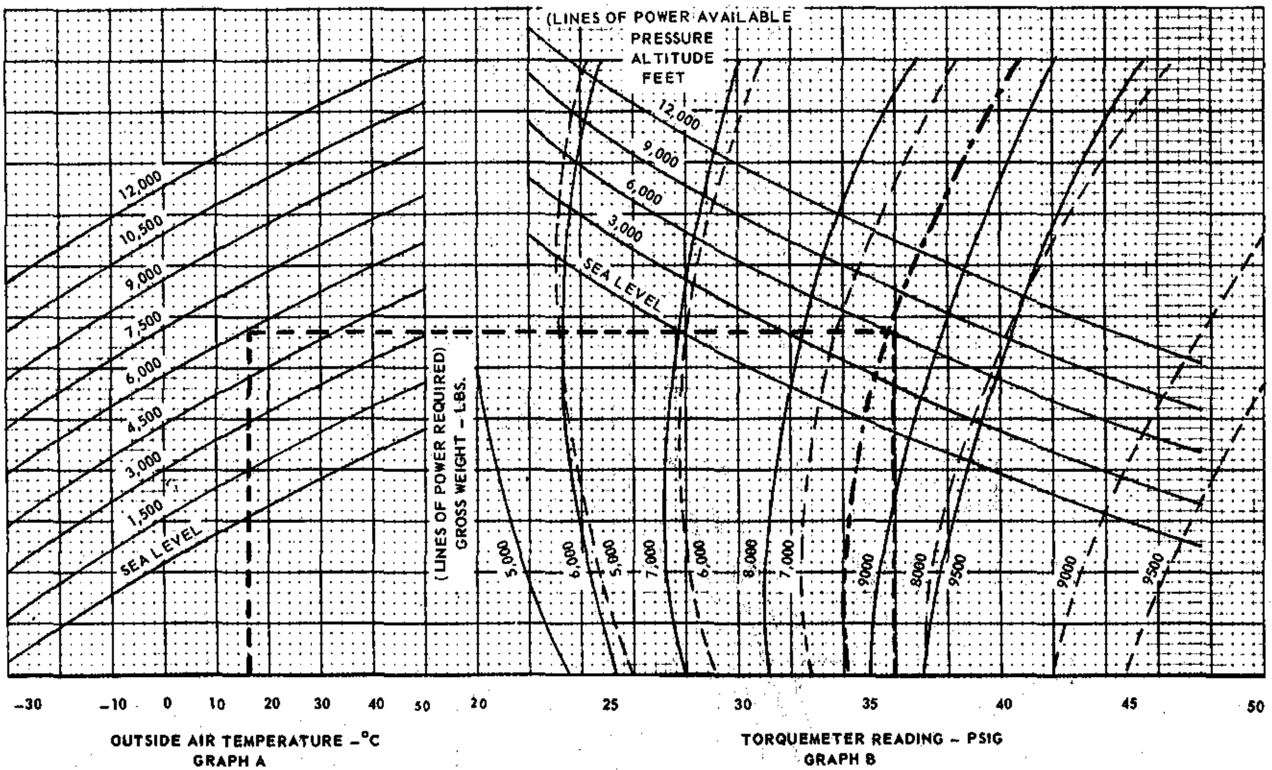
FORMULA: ACTUAL
ALTITUDE= ALTIMETER
READING + CORRECTION

Chart 14-3. Altimeter correction chart

LIFT CAPABILITY
OAT and PRESSURE ALTITUDE vs TORQUEMETER PRESSURE and GROSS WEIGHT

MODEL: UH-1D
DATA AS OF : MARCH 1967
DATA BASIS : CAT. II FLIGHT TEST

ENGINE: T53-L-11
FUEL GRADE: JP-4
FUEL DENSITY: 6.5 LB/GAL
——— IGE
- - - - OGE



EXAMPLE: IF OUTSIDE AIR TEMPERATURE IS 17°C
AND PRESSURE ALTITUDE IS 6,00. FEET;
MAXIMUM POWER AVAILABLE-36 PSIG.
OUT-OF-GROUND EFFECT-7350 LB
IN-GROUND EFFECT-8675 LB

REMARKS:

Chart 14-4. Lift capability - OAT and pressure altitude versus torquemeter pressure and gross weight

Look up reading in middle column; if in degrees Centigrade, read Fahrenheit equivalent in right-hand column; if in degrees Fahrenheit, read Centrigrade equivalent in left-hand column.

C		F	C		F	C		F	C		F	C		F
-54	-65	- 85	5.6	42	107.6	32.8	91	195.8	249	480	896	521	970	1778
-51	-60	- 76	6.1	43	109.4	33.3	92	197.6	254	490	914	527	980	1796
-46	-50	- 58	6.7	44	111.2	33.9	93	199.4	260	500	932	532	990	1814
-40	-40	- 40	7.2	45	113.0	34.4	94	201.2	266	510	950	538	1000	1832
-34	-30	- 22	7.8	46	114.3	35.0	95	203.0	271	520	968	543	1010	1850
-29	-20	- 4	8.3	47	116.6	35.6	96	204.8	277	530	986	549	1021	1868
-23	-10	14	8.9	48	118.4	36.1	97	206.6	282	540	1004	554	1031	1886
-17.8	0	32	9.4	49	120.2	36.7	98	208.4	288	550	1022	560	1040	1904
-17.2	1	33.8	10.0	50	122.0	37.2	99	210.2	293	560	1040	566	1050	1922
-16.7	2	35.6	10.6	51	123.8	37.8	100	212.0	299	570	1058	571	1060	1940
-16.1	3	37.4	11.1	52	125.6	38	101	212	304	580	1076	577	1070	1958
-15.6	4	39.2	11.7	53	127.4	43	110	230	310	590	1094	582	1080	1976
-15.0	5	41.0	12.2	54	129.2	49	120	248	316	600	1112	588	1090	1994
-14.4	6	42.8	12.8	55	131.0	54	130	266	321	610	1130	593	1100	2012
-13.9	7	44.6	13.3	56	132.8	60	140	284	327	620	1148	599	1110	2030
-13.3	8	46.4	13.9	57	134.6	66	150	302	332	630	1166	604	1120	2048
-12.8	9	48.2	14.4	58	136.4	71	160	320	338	640	1184	610	1130	2066
-12.2	10	50.0	15.0	59	138.2	77	170	338	343	650	1202	616	1140	2084
-11.7	11	51.8	15.6	60	140.0	82	180	356	349	660	1220	621	1150	2102
-11.1	12	53.6	16.1	61	141.8	88	190	374	354	670	1238	627	1160	2120
-10.6	13	55.4	16.7	62	143.6	93	200	392	360	680	1256	632	1170	2138
-10.0	14	57.2	17.2	63	145.4	99	210	410	366	690	1274	638	1180	2156
- 9.4	15	59.0	17.8	64	147.2	100	212	413.6	371	700	1292	643	1190	2174
- 8.9	16	60.8	18.3	65	149.0	104	220	428	377	710	1310	649	1200	2192
- 8.3	17	62.6	18.9	66	150.8	110	230	446	382	720	1328	654	1210	2210
- 7.8	18	64.4	19.4	67	152.6	116	240	464	388	730	1346	660	1220	2228
- 7.2	19	66.2	20.0	68	154.4	121	250	482	393	740	1364	666	1230	2246
- 6.7	20	68.0	20.6	69	156.2	127	260	500	399	750	1382	671	1240	2264
- 6.1	21	69.8	21.1	70	158.0	132	270	518	404	760	1400	677	1250	2282
- 5.6	22	71.6	21.7	71	159.8	138	280	536	410	770	1418	682	1260	2300
- 5.0	23	73.4	22.2	72	161.6	143	290	554	416	780	1436	688	1270	2318
- 4.4	24	75.2	22.8	73	163.4	149	300	572	421	790	1454	693	1280	2336
- 3.9	25	77.0	23.3	74	165.2	154	310	590	427	800	1472	699	1290	2354
- 3.3	26	78.8	23.9	75	167.0	160	320	608	432	810	1490	704	1300	2372
- 2.8	27	80.6	24.4	76	168.8	166	330	626	438	820	1508	710	1310	2390
- 2.3	28	82.4	25.0	77	170.6	171	340	644	443	830	1526	716	1320	2408
- 1.7	29	84.2	25.6	78	172.4	177	350	662	449	840	1544	721	1330	2426
- 1.1	30	86.0	26.1	79	174.3	182	360	680	454	850	1562	727	1340	2444
- 0.6	31	87.8	26.7	80	176.0	188	470	698	460	860	1580	732	1350	2462
0.0	32	89.6	27.2	81	177.8	193	380	716	466	870	1598	738	1360	2480
0.6	33	91.4	27.8	82	179.6	199	390	734	471	880	1616	743	1370	2498
1.1	34	93.2	28.3	83	181.4	204	400	752	477	890	1634	749	1380	2516
1.7	35	95.0	28.9	84	183.2	210	410	770	482	900	1652	754	1390	2534
2.2	36	96.8	28.4	85	185.0	216	420	788	488	910	1670	760	1400	2552
2.8	37	98.6	30.0	86	186.8	221	430	806	493	920	1688	766	1410	2570
3.3	38	100.4	30.6	87	188.6	227	440	824	499	930	1706	771	1420	2588
3.9	39	102.2	31.1	88	190.4	232	450	842	504	940	1724	777	1430	2606
4.4	40	104.0	31.7	89	192.2	238	460	860	510	950	1742	782	1440	2624
5.0	41	105.8	32.2	90	194.0	243	470	878	516	960	1760	788	1450	2642
												793	1460	2660

Chart 14-5. Temperature conversion

AIRSPEED INSTALLATION CORRECTION TABLE

CLEAN CONFIGURATION

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test, FTC-TDR-64-27.
Nose Mounted Pitot Static Tube

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

	Indicated Airspeed* (IAS)-Kts	Airspeed Correction --Kts	Calibrated Airspeed (CAS)-Kts
Level Flight & Climb*	20	4.5	24.5
	30	4.5	34.5
	40	4.5	44.5
	50	4.5	54.5
	60	4.5	64.5
	70	4.5	74.5
	80	4.5	84.5
	90	4.5	94.5
	100	4.5	104.5
	110	4.5	114.5
	120	4.5	124.5
	130	4.5	134.5
Autorotation	40	7	47
	50	6	56
	60	6	66
	70	5	75
	80	6	86
	90	6	96
	100	7	107

Add Correction To Indicated Airspeed*
To Obtain Calibrated Airspeed

*Corrected For Instrument Error

Chart 14-6. Airspeed installation correction - D (Sheet 1 of 3)

AIRSPEED INSTALLATION CORRECTION TABLE

CLEAN CONFIGURATION

Model(s): UH-1H
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test, FTC-TDR-64-27.
Nose Mounted Pitot Static Tube

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

	Indicated Airspeed* (IAS)-Kts	Airspeed Correction -- Kts	Calibrated Airspeed (CAS)-Kts
Level Flight and Climb*	20	4.5	24.5
	30	4.5	34.5
	40	4.5	44.5
	50	4.5	54.5
	60	4.5	64.5
	70	4.5	74.5
	80	4.5	84.5
	90	4.5	94.5
	100	4.5	104.5
	110	4.5	114.5
	120	4.5	124.5
	130	4.5	134.5
Autorotation	40	7	47
	50	6	56
	60	6	66
	70	5	75
	80	6	86
	90	6	96
	100	7	107

Add Correction To Indicated Airspeed*
To Obtain Calibrated Airspeed

*Corrected For Instrument Error

Chart 14-6. Airspeed installation correction - **H** (Sheet 2 of 3)

AIRSPEED INSTALLATION CORRECTION TABLE

CLEAN CONFIGURATION

Model(s): UH-1D and UH-1H
Data as of: September 23, 1966
DATA BASIS: Bell Helicopter Company Flight Tests With Roof Mounted Pitot Static Tube

Engine(s): Lycoming T53-L-11/L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

	Indicated Airspeed* (IAS)-Kts	Airspeed Correction --Kts	Calibrated Airspeed (CAS)-Kts
Level Flight	20	5.5	25.5
	30	3.0	33.0
	40	1.5	41.5
	50	-0.0	50.0
	60	-1.5	58.5
	70	-2.0	68.0
	80	-3.0	77.0
	90	-3.2	86.8
	100	-3.5	96.5
	110	-3.7	106.3
	120	-4.0	116.0
	130	-4.2	125.8
Climb	40	+5.0	45.0
	50	+6.0	56.0
	60	+5.0	65.0
	70	+2.0	72.0
	80	+1.2	81.2
Autorotation	40	0.0	40.0
	50	-2.4	47.6
	60	-5.0	55.0
	70	-6.2	63.8
	80	-8.0	72.0
	90	-9.0	81.0
	100	-10.0	90.0

Add Correction To Indicated Airspeed* To Obtain Calibrated Airspeed

*Corrected For Instrument Error

Chart 14-6. Airspeed installation correction - **D** & **H** (Sheet 3 of 3)

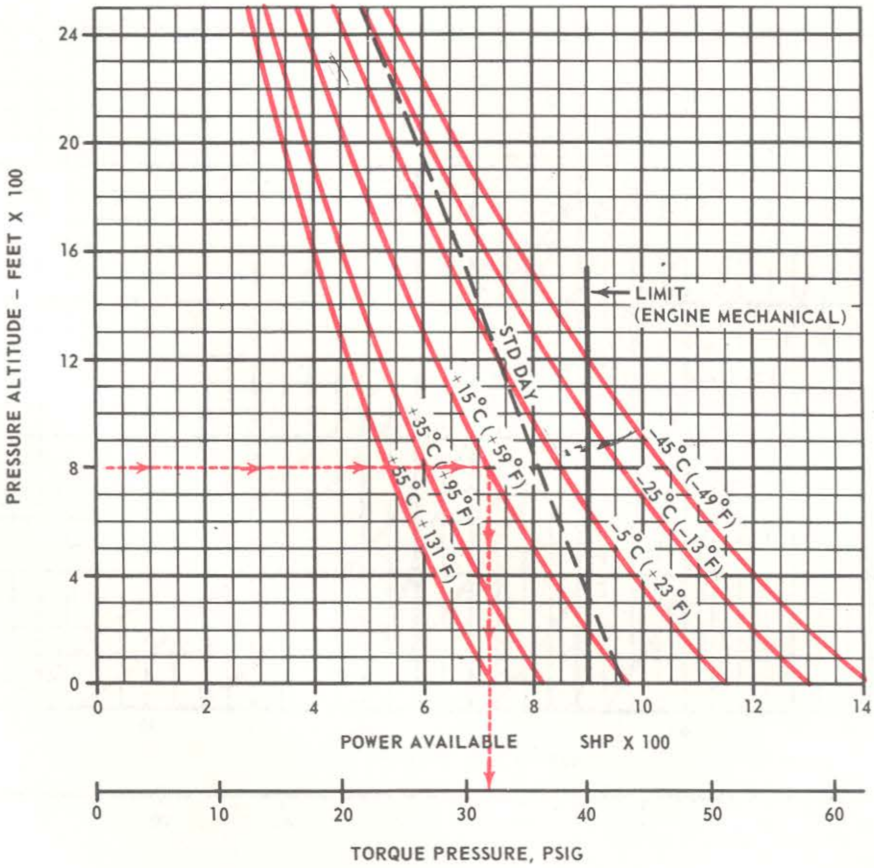
ENGINE OPERATING LIMITS

NORMAL POWER AVAILABLE

2°C INLET TEMPERATURE RISE

ARMY MODEL(S) UH-1D
DATA AS OF: MARCH 1963
DATA BASIS: CALCULATED FROM FTC-TDR-62-21 "YUH-1B CATEGORY II PERFORMANCE TESTS" AND LYCOMING ENGINE SPECIFICATION NO. 104.28

ENGINES: Lycoming T53-L-9/9A/11
ENGINE SPEED: 6400 RPM
FUEL GRADE: JP-4
FUEL DENSITY: 6.5 LB/GAL



REMARKS:

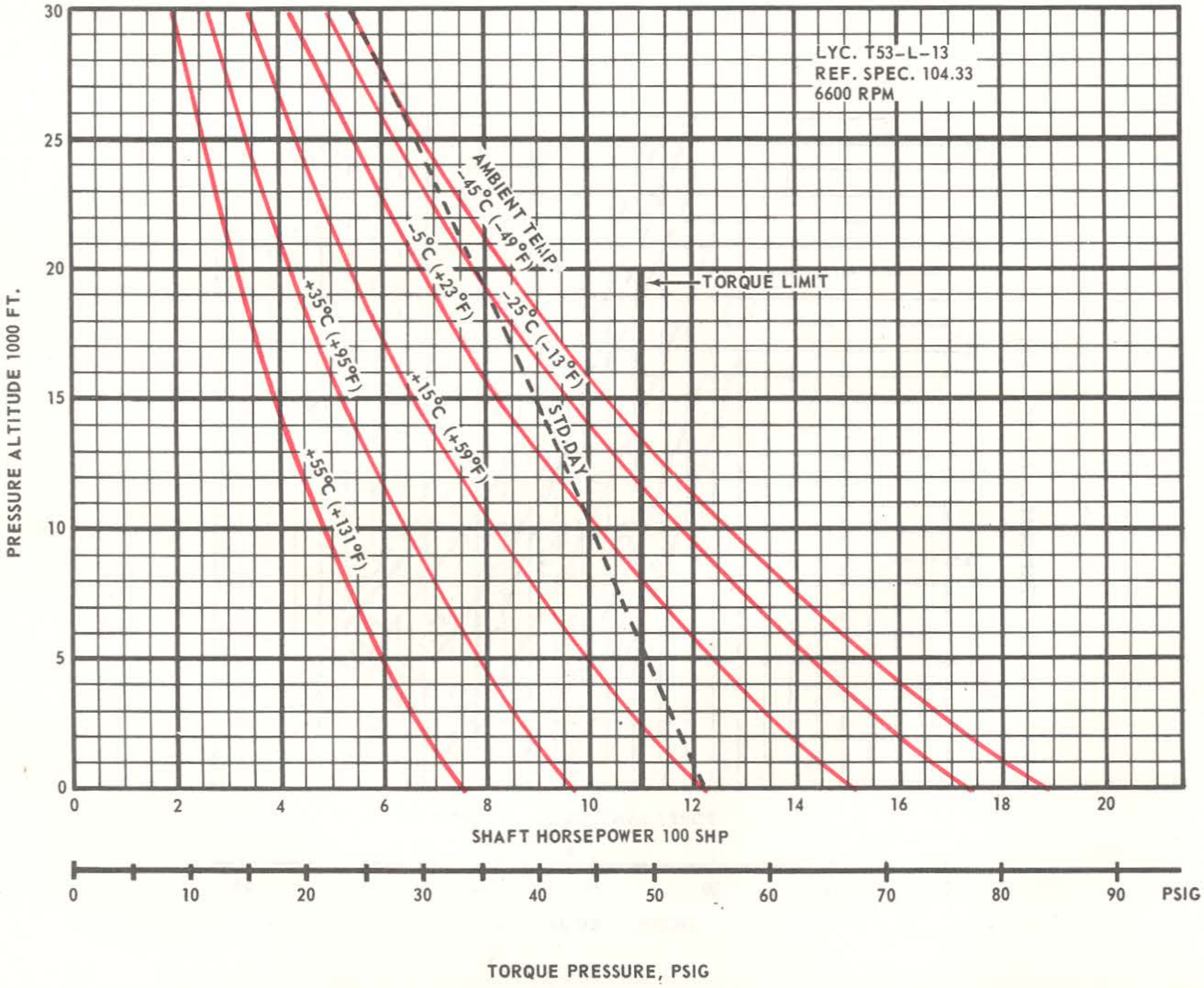
Chart 14-7. Engine operating limits - D

ENGINE OPERATING LIMITS

NORMAL POWER AVAILABLE
2°C INLET TEMPERATURE RISE

ARMY MODEL UH-1H
DATA AS OF: AUGUST 1966
DATA BASIS: CALCULATED, Lycoming Engine Spec. No. 104.33 (Engine Installed)

ENGINES: Lycoming T53-L-13
ENGINE SPEED: 6600 RPM
FUEL GRADE: JP-4
FUEL DENSITY: 6.5 LB/GAL.



REMARKS:

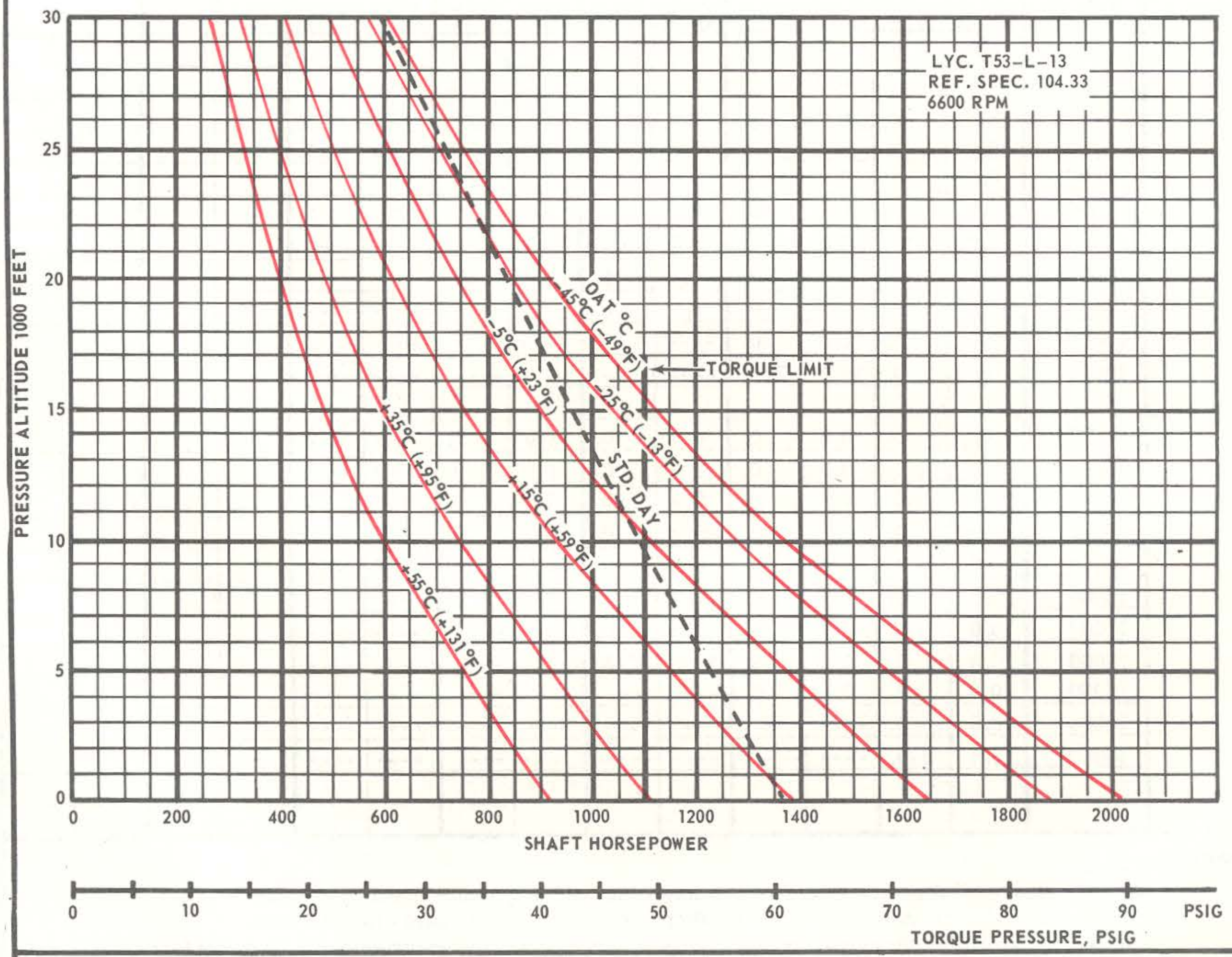
Chart 14-8. Engine operating limits - **H** - normal power (Sheet 1of 2)

ENGINE OPERATING LIMITS

MILITARY POWER AVAILABLE
2°C INLET TEMPERATURE RISE

ARMY MODEL: UH-1H
DATA AS OF: AUGUST 1966
DATA BASIS: CALCULATED, Lycoming Engine
Spec. No. 104.33 (Engine Installed)

ENGINES: Lycoming T53-L-13
ENGINE SPEED: 6600 RPM
FUEL GRADE JP-4
FUEL DENSITY: 6.5 LB/GAL.



REMARKS:

Chart 14-8. Engine operating limits - H - military power (Sheet 2 of 2)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
5000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	21.4	387.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	20000	0.0	0.	19.7	282.	----	----	----	----	----	----				
5500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.7	343.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	14000	0.0	0.	0.0	0.	18.9	243.	----	----	----	----				
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	18000	0.0	0.	----	----	----	----	----	----	----	----				
	20000	19.6	279.	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 1 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Grade: JP-4
Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
6000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.4	386.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	19.3	266.	----	----	----	----				
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	16000	0.0	0.	----	----	----	----	----	----	----	----				
	18000	19.8	289.	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
6500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.8	414.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	19.6	277.	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	----	----	----	----	----	----	----	----				
	16000	19.6	279.	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 2 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
7000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.9	422.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	19.6	277.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	----	----	----	----	----	----	----	----				
	14000	19.1	255.	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
7500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.7	408.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	19.4	268.	----	----	----	----				
	8000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	10000	0.0	0.	19.8	288.	----	----	----	----	----	----				
	12000	18.5	225.	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 3 of 20)

TAKE-OFF DISTANCE — FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s):Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
8000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	4000	0.0	0.	0.0	0.	19.0	249.	----	----	----	----				
	6000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	8000	0.0	0.	19.2	256.	----	----	----	----	----	----				
	10000	17.7	193.	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
8500	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	6000	0.0	0.	18.4	224.	----	----	----	----	----	----				
	8000	0.0	0.	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 4 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
9000	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----
	6000	0.0	0.	----	----	----	----	----	----	----	----
	8000	----	----	----	----	----	----	----	----	----	----
	10000	----	----	----	----	----	----	----	----	----	----
	12000	----	----	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----
9500	0.	0.0	0.	0.0	0.	20.3	319.	----	----	----	----
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----
	4000	0.0	0.	----	----	----	----	----	----	----	----
	6000	19.0	251.	----	----	----	----	----	----	----	----
	8000	----	----	----	----	----	----	----	----	----	----
	10000	----	----	----	----	----	----	----	----	----	----
	12000	----	----	----	----	----	----	----	----	----	----
	14000	----	----	----	----	----	----	----	----	----	----
	16000	----	----	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 5 of 20)

TAKE-OFF DISTANCE — FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
5000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	20.0	322.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	20000	0.0	0.	20.0	286.	----	----	----	----	----	----				
5500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	307.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	14000	0.0	0.	0.0	0.	20.0	272.	----	----	----	----				
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	18000	0.0	0.	----	----	----	----	----	----	----	----				
	20000	20.0	285.	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 6 of 20)

TAKE-OFF DISTANCE – FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
6000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	321.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	20.0	280.	----	----	----	----				
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	16000	0.0	0.	----	----	----	----	----	----	----	----				
	18000	20.0	289.	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
6500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	330.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	20.0	284.	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	----	----	----	----	----	----	----	----				
	16000	20.0	285.	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No. wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 7 of 20)

TAKE-OFF DISTANCE – FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take-off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
7000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	333.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	20.0	284.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	----	----	----	----	----	----	----	----				
	14000	20.0	276.	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
7500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	328.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	20.0	281.	----	----	----	----				
	8000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	10000	0.0	0.	20.0	288.	----	----	----	----	----	----				
	12000	20.0	264.	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 8 of 20)

TAKE-OFF DISTANCE – FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
8000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	4000	0.0	0.	0.0	0.	20.0	274.	----	----	----	----				
	6000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	8000	0.0	0.	20.0	277.	----	----	----	----	----	----				
	10000	20.0	251.	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
8500	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	6000	0.0	0.	20.0	264.	----	----	----	----	----	----				
	8000	0.0	0.	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 9 of 20)

TAKE-OFF DISTANCE – FEET

2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 5.6 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
9000	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	6000	0.0	0.	----	----	----	----	----	----	----	----				
	8000	----	----	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
9500	0	0.0	0.	0.0	0.	20.0	299.	----	----	----	----				
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	4000	0.0	0.	----	----	----	----	----	----	----	----				
	6000	20.0	275.	----	----	----	----	----	----	----	----				
	8000	----	----	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown wher hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 10 of 20)

TAKE-OFF DISTANCE — FEET

15 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
5000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	20.0	767.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	20000	0.0	0.	20.0	378.	----	----	----	----	----	----				
5500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	566.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	14000	0.0	0.	0.0	0.	20.0	310.	----	----	----	----				
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	18000	0.0	0.	20.0	480.	----	----	----	----	----	----				
	20000	20.0	372.	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 11 of 20)

TAKE-OFF DISTANCE – FEET

15 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.
6000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	759.
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	12000	0.0	0.	0.0	0.	20.0	346.	----	----	----	----
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----
	16000	0.0	0.	20.0	539.	----	----	----	----	----	----
	18000	20.0	396.	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----
6500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	915.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----
	10000	0.0	0.	0.0	0.	20.0	368.	----	----	----	----
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----
	14000	0.0	0.	20.0	529.	----	----	----	----	----	----
	16000	20.0	372.	----	----	----	----	----	----	----	----
	18000	----	----	----	----	----	----	----	----	----	----
	20000	----	----	----	----	----	----	----	----	----	----

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 12 of 20)

TAKE-OFF DISTANCE – FEET

15 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
7000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	969.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	20.0	369.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	20.0	469.	----	----	----	----	----	----				
	14000	20.0	327.	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
7500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	883.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	20.0	350.	----	----	----	----				
	8000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	10000	0.0	0.	20.0	393.	----	----	----	----	----	----				
	12000	20.0	289.	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeec (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 13 of 20)

TAKE-OFF DISTANCE – FEET

15 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
8000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	4000	0.0	0.	0.0	0.	20.0	318.	----	----	----	----				
	6000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	8000	0.0	0.	20.0	330.	----	----	----	----	----	----				
	10000	20.0	267.	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
8500	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	6000	0.0	0.	20.0	288.	----	----	----	----	----	----				
	8000	0.0	0.	----	----	----	----	----	----	----	----				
	10000	20.0	759.	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 14 of 20)

TAKE-OFF DISTANCE — FEET

15 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
9000	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	2000	0.0	0.	0.0	0.	20.0	764.	----	----	----	----				
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	6000	0.0	0.	20.0	940.	----	----	----	----	----	----				
	8000	20.0	461.	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
9500	0	0.0	0.	0.0	0.	20.0	480.	----	----	----	----				
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	4000	0.0	0.	20.0	568.	----	----	----	----	----	----				
	6000	20.0	321.	----	----	----	----	----	----	----	----				
	8000	----	----	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 15 of 20)

TAKE-OFF DISTANCE — FEET

BLEED OFF TECHNIQUE

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Tests, (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
5000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	20.0	276.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	20000	0.0	0.	20.0	248.	----	----	----	----	----	----				
5500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	265.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	14000	0.0	0.	0.0	0.	20.0	236.	----	----	----	----				
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	18000	0.0	0.	----	----	----	----	----	----	----	----				
	20000	20.0	247.	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 16 of 20)

TAKE-OFF DISTANCE – FEET

BLEED OFF TECHNIQUE

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Tests, (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
6000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.	276.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	20.0	243.	----	----	----	----				
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	16000	0.0	0.	----	----	----	----	----	----	----	----				
	18000	20.0	250.	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
6500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	283.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	20.0	247.	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	----	----	----	----	----	----	----	----				
	16000	20.0	247.	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 17 of 20)

TAKE-OFF DISTANCE – FEET

BLEED OFF TECHNIQUE

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Tests, (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
7000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	285.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	20.	247.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	----	----	----	----	----	----	----	----				
	14000	20.0	240.	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
7500	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	281.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	20.0	244.	----	----	----	----				
	8000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	10000	0.0	0.	20.0	250.	----	----	----	----	----	----				
	12000	20.0	230.	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 18 of 20)

TAKE-OFF DISTANCE – FEET

BLEED OFF TECHNIQUE

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Tests, (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
8000	0	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	4000	0.0	0.	0.0	0.	20.0	238.	----	----	----	----				
	6000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	8000	0.0	0.	20.0	241.	----	----	----	----	----	----				
	10000	20.0	219.	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
8500	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	6000	0.0	0.	20.0	230.	----	----	----	----	----	----				
	8000	0.0	0.	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 19 of 20)

TAKE-OFF DISTANCE – FEET

BLEED OFF TECHNIQUE

Model(s): UH-1D (48)
Data as of: November 1964
DATA BASIS: AFFTC Category II, Flight Tests, (FTC-TDR-64-27)
Take off Distance, Flight Test Method

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED KNOTS	DIST TO CLEAR 50 FT.				
9000	0	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	4000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	6000	0.0	0.	----	----	----	----	----	----	----	----				
	8000	----	----	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				
9500	0	0.0	0.	0.0	0.	20.0	259.	----	----	----	----				
	2000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	4000	0.0	0.	----	----	----	----	----	----	----	----				
	6000	20.0	239.	----	----	----	----	----	----	----	----				
	8000	----	----	----	----	----	----	----	----	----	----				
	10000	----	----	----	----	----	----	----	----	----	----				
	12000	----	----	----	----	----	----	----	----	----	----				
	14000	----	----	----	----	----	----	----	----	----	----				
	16000	----	----	----	----	----	----	----	----	----	----				
	18000	----	----	----	----	----	----	----	----	----	----				
	20000	----	----	----	----	----	----	----	----	----	----				

REMARKS:
1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in trud airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-9. Take-off distance chart D (Sheet 20 of 20)

TAKE-OFF DISTANCE — FEET

LIGHT ON SKIDS - TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
5000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.2	371.				
	14000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	18.5	228.	----	----				
	18000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	20000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
5500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	19.2	260.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	18000	0.0	0.	0.0	0.	15.9	138.	----	----	----	----				
	20000	0.0	0.	0.0	0.	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart H (Sheet 1 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS - TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
6000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	19.5	272.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	16000	0.0	0.	0.0	0.	16.3	148.	----	----	----	----				
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	20000	0.0	0.	14.2	99.	----	----	----	----	----	----				
6500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	21.2	376.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	19.4	267.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	14000	0.0	0.	0.0	0.	16.2	146.	----	----	----	----				
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	18000	0.0	0.	14.3	99.	----	----	----	----	----	----				
	20000	0.0	0.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart H (Sheet 2 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS - TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
7000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.6	332.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	19.0	247.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	15.8	133.	----	----	----	----				
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	16000	0.0	0.	13.8	90.	----	----	----	----	----	----				
	18000	0.0	0.	----	----	----	----	----	----	----	----				
7500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	19.8	291.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	18.3	217.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	12.9	76.	----	----	----	----	----	----				
	16000	0.0	0.	----	----	----	----	----	----	----	----				
	18000	15.9	137.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 3 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS - TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
8000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	19.3	264.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	----	----	----	----	----	----	----	----				
	16000	14.5	103.	----	----	----	----	----	----	----	----				
8500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	18.0	205.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	16.3	148.	----	----	----	----	----	----				
	14000	12.7	73.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 4 of 20)

TAKE-OFF DISTANCE – FEET

LIGHT ON SKIDS - TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
9000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	19.6	279.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	16.3	148.	----	----	----	----				
	8000	0.0	0.	14.5	103.	----	----	----	----	----	----				
	10000	14.5	103.	14.6	106.	----	----	----	----	----	----				
	12000	14.6	106.	----	----	----	----	----	----	----	----				
9500	S.L.	0.0	0.	0.0	0.	0.0	0.	17.9	203.	----	----				
	2000	0.0	0.	0.0	0.	17.9	202.	----	----	----	----				
	4000	0.0	0.	17.9	202.	18.0	207.	----	----	----	----				
	6000	17.9	202.	18.0	207.	----	----	----	----	----	----				
	8000	18.0	207.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 5 of 20)

TAKE-OFF DISTANCE – FEET

MAXIMUM PERFORMANCE - HOVERING TECHNIQUE - TWO FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
5000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	317.				
	14000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	20.0	265.	----	----				
	18000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
5000	20000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
5500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	20.0	278.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	18000	0.0	0.	0.0	0.	20.0	224.	----	----	----	----				
	20000	0.0	0.	0.0	0.	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 6 of 20)

TAKE-OFF DISTANCE — FEET

MAXIMUM PERFORMANCE - HOVERING TECHNIQUE - TWO FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
6000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	20.0	283.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	16000	0.0	0.	0.0	0.	20.0	230.	----	----	----	----				
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----				
6000	20000	0.0	0.	20.0	201.	----	----	----	----	----	----				
6500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	318.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	20.0	281.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	14000	0.0	0.	0.0	0.	20.0	228.	----	----	----	----				
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	18000	0.0	0.	20.0	201.	----	----	----	----	----	----				
6500	20000	0.0	0.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 7 of 20)

TAKE-OFF DISTANCE – FEET

MAXIMUM PERFORMANCE - HOVERING TECHNIQUE - TWO FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
7000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	304.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	20.0	273.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	20.0	221.	----	----	----	----				
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	16000	0.0	0.	20.0	195.	----	----	----	----	----	----				
7000	18000	0.0	0.	----	----	----	----	----	----	----	----				
7500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	289.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	20.0	261.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	20.0	184.	----	----	----	----	----	----				
	16000	0.0	0.	----	----	----	----	----	----	----	----				
7500	18000	20.0	224.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 8 of 20)

TAKE-OFF DISTANCE – FEET

MAXIMUM PERFORMANCE - HOVERING TECHNIQUE - TWO FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
8000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	280.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	----	----	----	----	----	----	----	----				
8000	16000	20.0	204.	----	----	----	----	----	----	----	----				
8500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	20.0	256.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	20.0	229.	----	----	----	----	----	----				
8500	14000	20.0	182.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 9 of 20)

TAKE-OFF DISTANCE – FEET

MAXIMUM PERFORMANCE - HOVERING TECHNIQUE - TWO FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
9000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	20.0	285.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	20.0	229.	----	----	----	----				
	8000	0.0	0.	20.0	204.	----	----	----	----	----	----				
	10000	20.0	204.	20.0	205.	----	----	----	----	----	----				
9000	12000	20.0	206.	----	----	----	----	----	----	----	----				
9500	S.L.	0.0	0.	0.0	0.	0.0	0.	20.0	255.	----	----				
	2000	0.0	0.	0.0	0.	20.0	255.	----	----	----	----				
	4000	0.0	0.	20.0	255.	20.0	257.	----	----	----	----				
	6000	20.0	255.	20.0	257.	----	----	----	----	----	----				
9500	8000	20.0	257.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 2 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 10 of 20)

TAKE-OFF DISTANCE – FEET

HOVERING TECHNIQUE - FIFTEEN FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
5000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	688.				
	14000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	20.0	292.	----	----				
	18000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
5000	20000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
5500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	874.				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	20.0	335.	----	----				
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	18000	0.0	0.	0.0	0.	20.0	252.	----	----	----	----				
5500	20000	0.0	0.	0.0	0.	20.0	952.	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 11 of 20)

TAKE-OFF DISTANCE – FEET

HOVERING TECHNIQUE - FIFTEEN FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
6000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	867.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	20.0	359.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	16000	0.0	0.	0.0	0.	20.0	254.	----	----	----	----				
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----				
6000	20000	0.0	0.	20.0	233.	----	----	----	----	----	----				
6500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	709.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	20.0	348.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	14000	0.0	0.	0.0	0.	20.0	254.	----	----	----	----				
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	18000	0.0	0.	20.0	233.	----	----	----	----	----	----				
6500	20000	0.0	0.	20.0	603.	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 12 of 20)

TAKE-OFF DISTANCE – FEET

HOVERING TECHNIQUE - FIFTEEN FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
7000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	525.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	20.0	315.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	20.0	251.	----	----	----	----				
	14000	0.0	0.	0.0	0.	20.0	832.	----	----	----	----				
	16000	0.0	0.	20.0	224.	----	----	----	----	----	----				
	18000	0.0	0.	20.0	483.	----	----	----	----	----	----				
7000	20000	20.0	258.	----	----	----	----	----	----	----	----				
7500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	399.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	20.0	282.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	20.0	553.	----	----	----	----				
	14000	0.0	0.	20.0	203.	----	----	----	----	----	----				
	16000	0.0	0.	20.0	348.	----	----	----	----	----	----				
7500	18000	20.0	252.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 13 of 20)

TAKE-OFF DISTANCE – FEET

HOVERING TECHNIQUE - FIFTEEN FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
8000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	343.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	20.0	357.	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	20.0	273.	----	----	----	----	----	----				
	16000	20.0	236.	----	----	----	----	----	----	----	----				
8000	18000	20.0	873.	----	----	----	----	----	----	----	----				
8500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	20.0	644.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	20.0	273.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	20.0	254.	----	----	----	----	----	----				
	14000	20.0	198.	----	----	----	----	----	----	----	----				
8500	16000	20.0	389.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 14 of 20)

TAKE-OFF DISTANCE – FEET

HOVERING TECHNIQUE - FIFTEEN FOOT SKID HEIGHT
TAKE-OFF POWER

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
9000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	20.0	372.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	20.0	254.	----	----	----	----				
	8000	0.0	0.	20.0	236.	----	----	----	----	----	----				
	10000	20.0	236.	20.0	238.	----	----	----	----	----	----				
	12000	20.0	238.	20.0	667.	----	----	----	----	----	----				
9000	14000	20.0	264.	----	----	----	----	----	----	----	----				
9500	S.L.	0.0	0.	0.0	0.	0.0	0.	20.0	272.	----	----				
	2000	0.0	0.	0.0	0.	20.0	271.	----	----	----	----				
	4000	0.0	0.	20.0	271.	20.0	274.	----	----	----	----				
	6000	20.0	271.	20.0	275.	20.0	460.	----	----	----	----				
	8000	20.0	274.	20.0	287.	----	----	----	----	----	----				
	10000	20.0	287.	20.0	320.	----	----	----	----	----	----				
	12000	20.0	320.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering at 15 foot skid height is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 5 of 20)

TAKE-OFF DISTANCE — FEET

MAXIMUM PERFORMANCE - BLEED-OFF TECHNIQUE - LIGHT ON SKIDS
TAKE-OFF POWER - ENGINE SPEED MAXIMUM 6400 RPM, MINIMUM 5800 RPM

Model(s): **UH-1H**
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
5000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	272.				
	14000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	---				
	16000	0.0	0.	0.0	0.	0.0	0.	20.0	231.	----	---				
	18000	0.0	0.	0.0	0.	0.0	0.	----	----	----	---				
	20000	0.0	0.	0.0	0.	0.0	0.	----	----	----	---				
5500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	---				
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	---				
	14000	0.0	0.	0.0	0.	0.0	0.	20.0	242.	----	---				
	16000	0.0	0.	0.0	0.	0.0	0.	----	----	----	---				
	18000	0.0	0.	0.0	0.	20.0	197.	----	----	----	---				
	20000	0.0	0.	0.0	0.	----	----	----	----	----	---				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 16 of 20)

TAKE-OFF DISTANCE – FEET

MAXIMUM PERFORMANCE - BLEED-OFF TECHNIQUE - LIGHT ON SKIDS
TAKE-OFF POWER - ENGINE SPEED MAXIMUM 6400 RPM, MINIMUM 5800 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
6000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	20.0	245.	----	----				
	14000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	16000	0.0	0.	0.0	0.	20.0	201.	----	----	----	----				
	18000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	20000	0.0	0.	-0.0	176.	----	----	----	----	----	----				
6500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	273.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	20.0	244.	----	----				
	12000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	14000	0.0	0.	0.0	0.	20.0	200.	----	----	----	----				
	16000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	18000	0.0	0.	20.0	176.	----	----	----	----	----	----				
	20000	0.0	0.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 17 of 20)

TAKE-OFF DISTANCE — FEET

MAXIMUM PERFORMANCE - BLEED-OFF TECHNIQUE - LIGHT ON SKIDS
TAKE-OFF POWER - ENGINE SPEED MAXIMUM 6400 RPM, MINIMUM 5800 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
7000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	262.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	20.0	238.	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	20.0	194.	----	----	----	----				
	14000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	16000	0.0	0.	20.0	171.	----	----	----	----	----	----				
	18000	0.0	0.	----	----	----	----	----	----	----	----				
7500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	251.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	20.0	228.	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	20.0	161.	----	----	----	----	----	----				
	16000	0.0	0.	----	----	----	----	----	----	----	----				
	18000	20.0	196.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 18 of 20)

TAKE-OFF DISTANCE — FEET

MAXIMUM PERFORMANCE - BLEED-OFF TECHNIQUE - LIGHT ON SKIDS
TAKE-OFF POWER - ENGINE SPEED MAXIMUM 6400 RPM, MINIMUM 5800 RPM

Model(s): **UH-1H**
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
8000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	20.0	243.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	14000	0.0	0.	----	----	----	----	----	----	----	----				
	16000	20.0	179.	----	----	----	----	----	----	----	----				
8500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	8000	0.0	0.	0.0	0.	20.0	224.	----	----	----	----				
	10000	0.0	0.	0.0	0.	----	----	----	----	----	----				
	12000	0.0	0.	20.0	201.	----	----	----	----	----	----				
	14000	20.0	159.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 19 of 20)

TAKE-OFF DISTANCE — FEET

MAXIMUM PERFORMANCE - BLEED-OFF TECHNIQUE - LIGHT ON SKIDS
TAKE-OFF POWER - ENGINE SPEED MAXIMUM 6400 RPM, MINIMUM 5800 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

GROSS WT. LB.	PRESSURE ALTITUDE 1000 FEET	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.	CLIMB OUT SPEED TAS KNOTS	DIST TO CLEAR 50 FT.
9000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	----	----				
	2000	0.0	0.	0.0	0.	0.0	0.	20.0	247.	----	----				
	4000	0.0	0.	0.0	0.	0.0	0.	----	----	----	----				
	6000	0.0	0.	0.0	0.	20.0	201.	----	----	----	----				
	8000	0.0	0.	20.0	179.	----	----	----	----	----	----				
	10000	20.0	179.	20.0	180.	----	----	----	----	----	----				
	12000	20.0	181.	----	----	----	----	----	----	----	----				
9500	S.L.	0.0	0.	0.0	0.	0.0	0.	20.0	223.	----	----				
	2000	0.0	0.	0.0	0.	20.0	222.	----	----	----	----				
	4000	0.0	0.	20.0	222.	20.0	224.	----	----	----	----				
	6000	20.0	222.	20.0	224.	----	----	----	----	----	----				
	8000	20.0	224.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Take-off distance is zero when hovering out-of-ground-effect is possible.
3. No take-off distance is shown where hovering light on skids is not possible.
4. Take-off distance will exceed those shown if hovering in-ground-effect is performed for over one minute immediately prior to take-off.
5. Speed over the 50 foot obstacle is in true airspeed (TAS) because values of indicated airspeed (IAS) below 20 knots may not be reliable.

Chart 14-10. Take-off distance chart - H (Sheet 20 of 20)

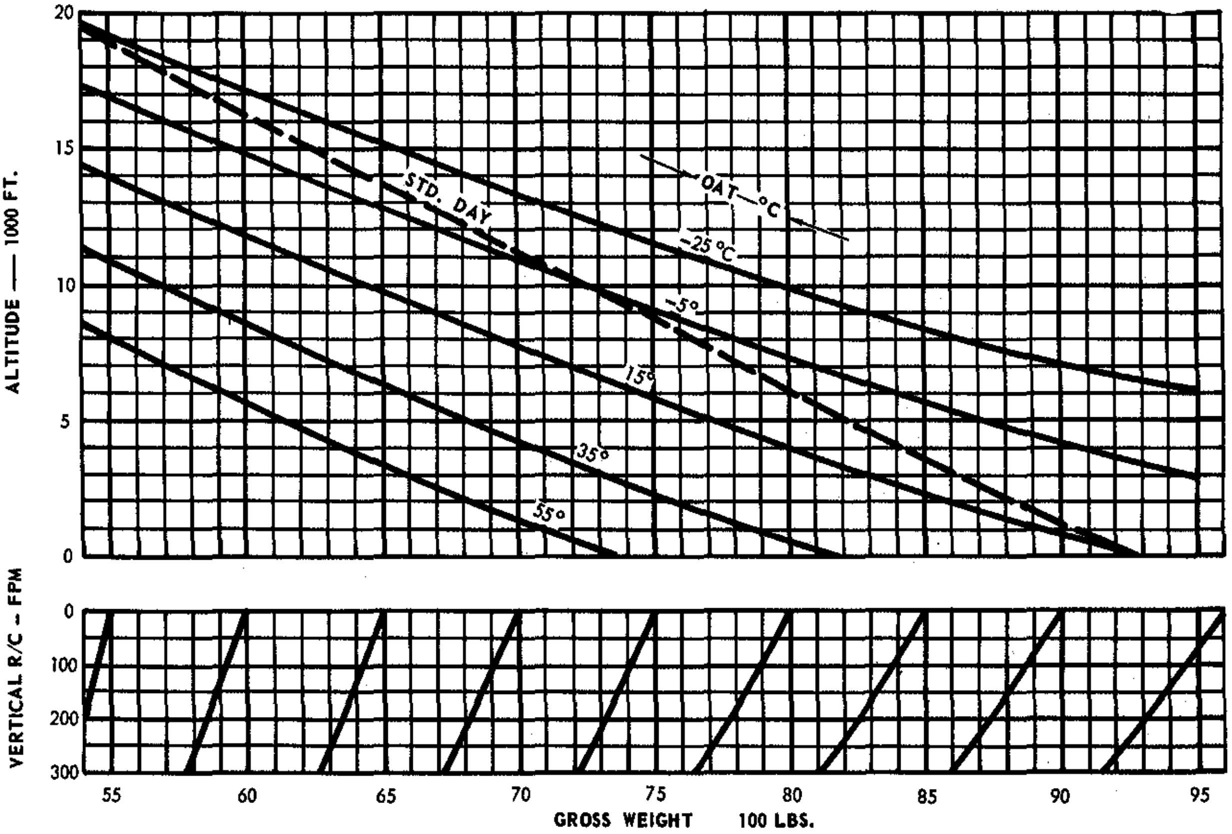
TAKE-OFF GROSS WEIGHT LIMITATIONS

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING
OUT-OF-GROUND EFFECT WITH TAKE-OFF POWER

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CAT. II FLIGHT TEST

2°C INLET TEMPERATURE RISE

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

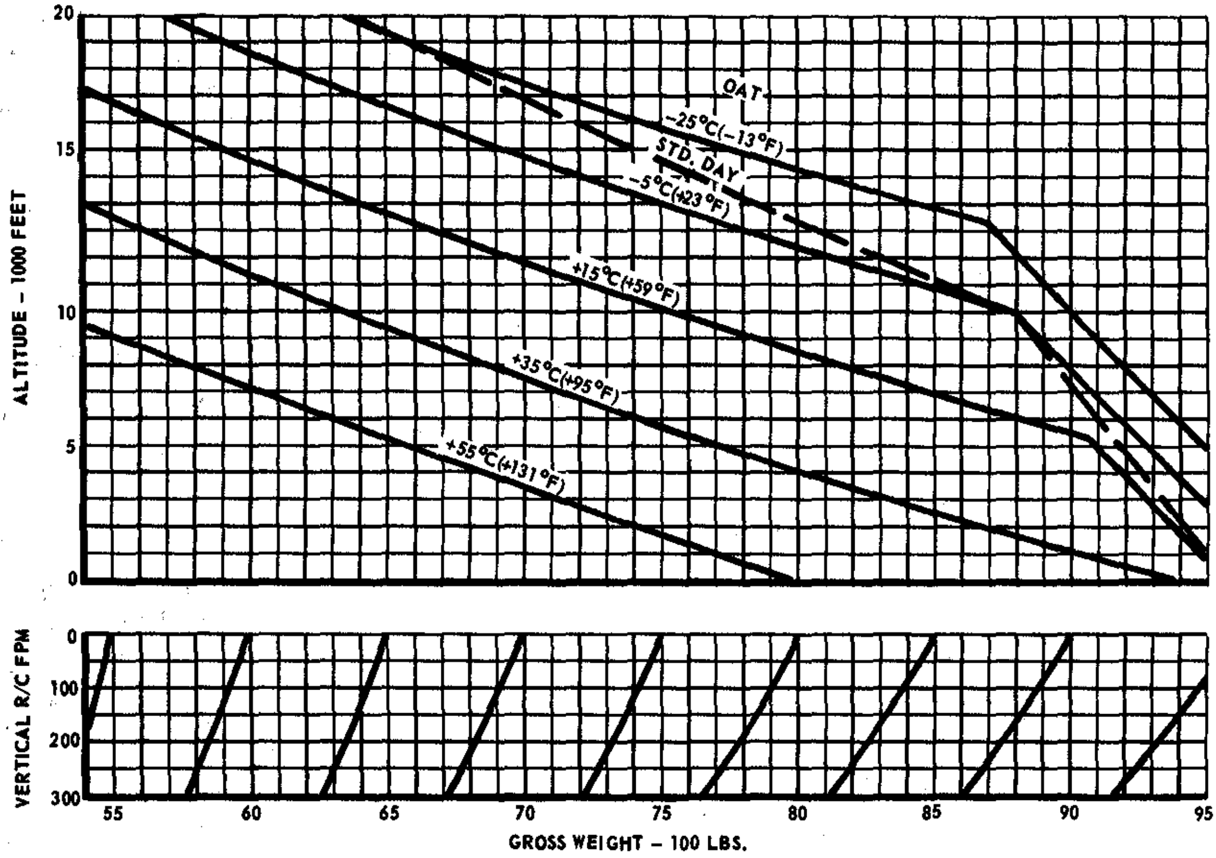
Chart 14-11. Take-off gross weight limitations curve D (Sheet 1 of 3)

TAKE-OFF GROSS WEIGHT LIMITATIONS

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING OUT OF GROUND
EFFECT WITH MILITARY POWER
2°C INLET TEMPERATURE RISE

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CATEGORY II, FLIGHT TEST

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

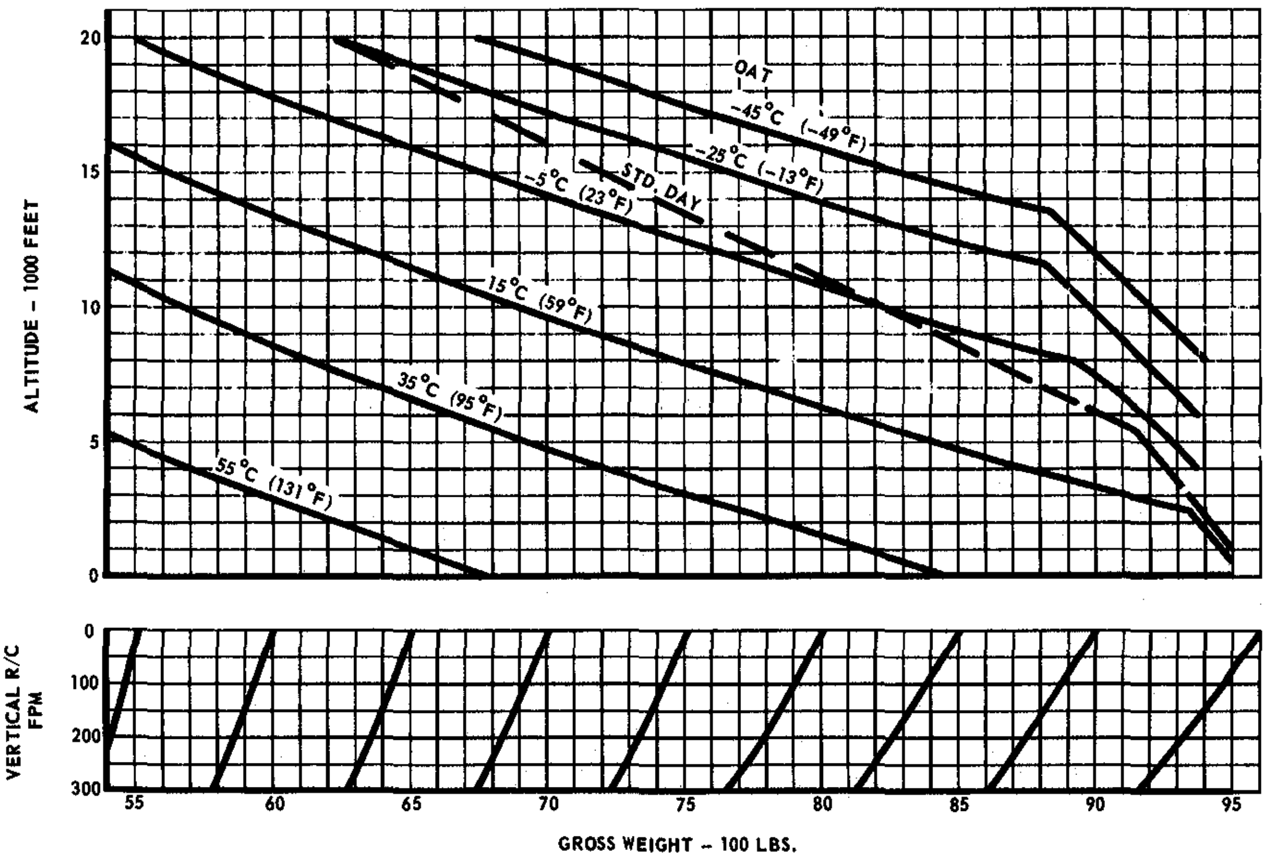
Chart 14-11. Take-off gross weight limitations curve H (Sheet 2 of 3)

TAKE-OFF GROSS WEIGHT LIMITATIONS

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING OUT OF GROUND
EFFECT WITH NORMAL POWER
2°C INLET TEMPERATURE RISE

Model(s):	UH-1H
Data as of:	NOVEMBER 1964
DATA BASIS:	UH-1D CATEGORY II, FLIGHT TEST

Engine(s):	Lycoming T53-L-13
Engine RPM:	6600
Fuel Grade:	JP-4
Fuel Density:	6.5 LB/GAL.



REMARKS:

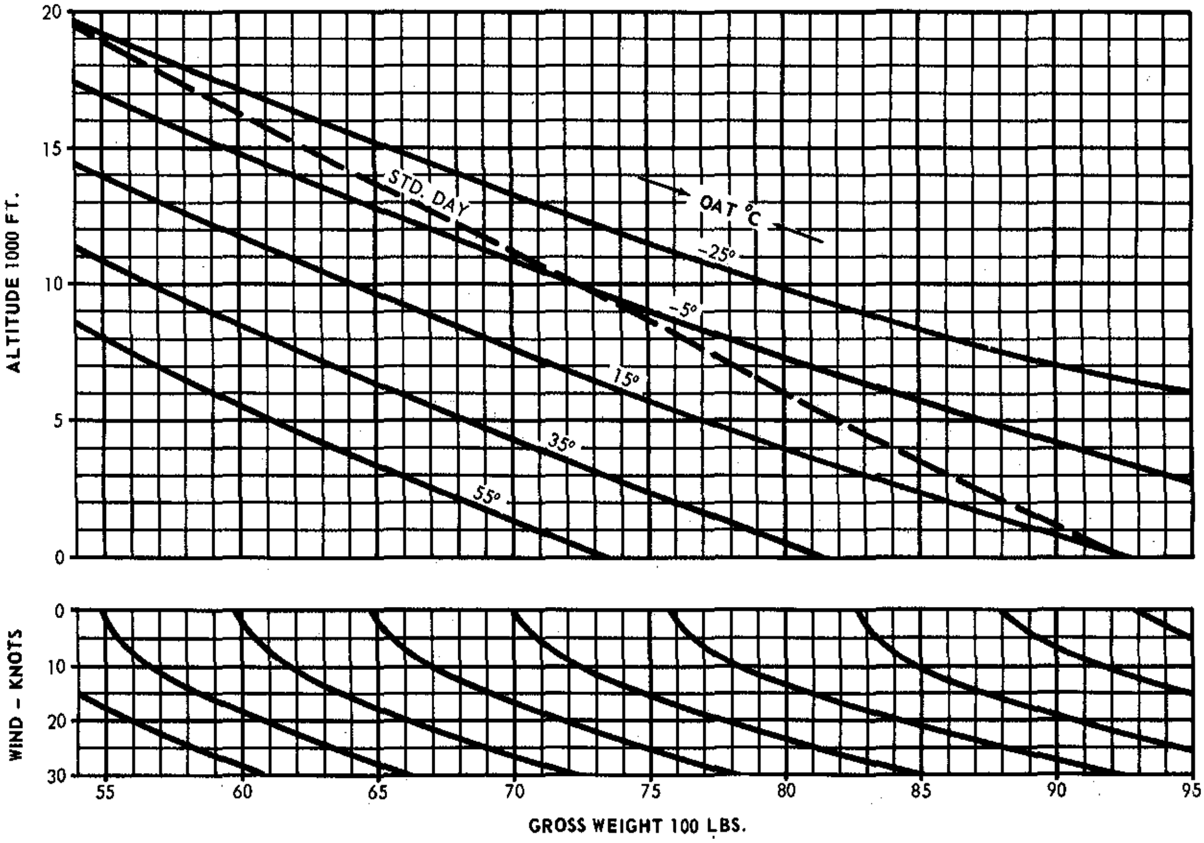
Chart 14-1.1. Take-off gross weight limitations curve **H** (Sheet 3 of 3)

HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING
OUT-OF-GROUND EFFECT WITH TAKE-OFF POWER
2°C INLET TEMPERATURE RISE

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CAT. II FLIGHT TEST

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

Chart 14-12. Hovering out-of-ground effect chart D (Sheet 1 of 2)

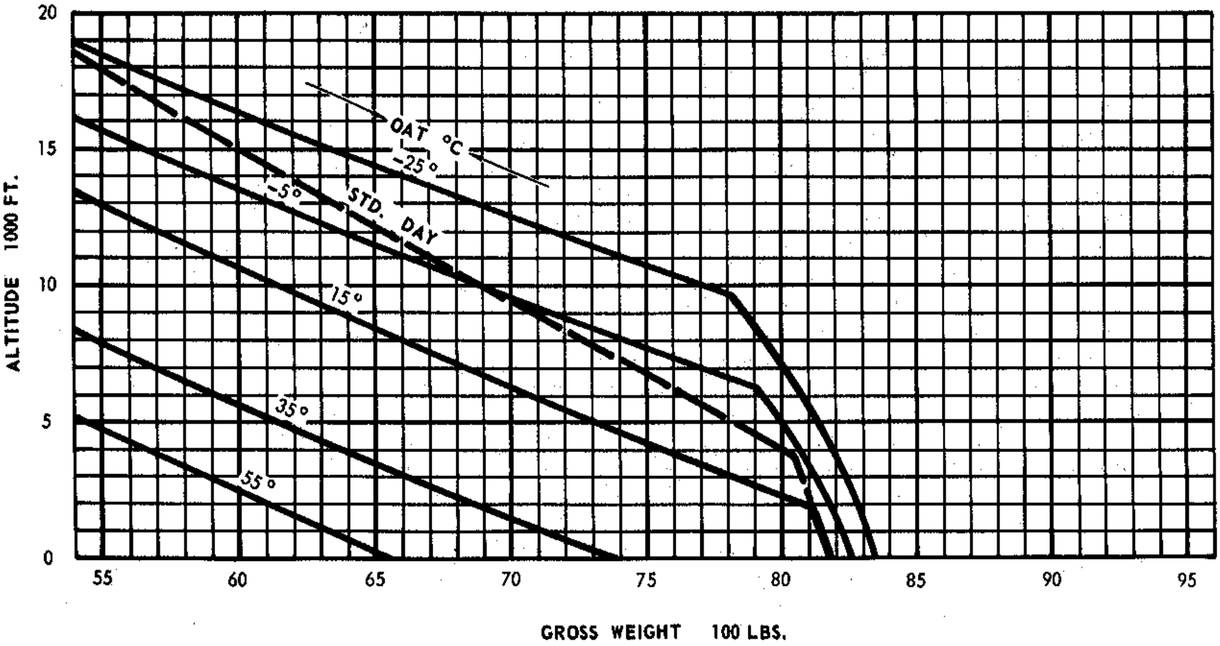
HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING
OUT OF GROUND EFFECT WITH NORMAL RATED POWER

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CAT. II FLIGHT TEST

2°C INLET TEMPERATURE RISE

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

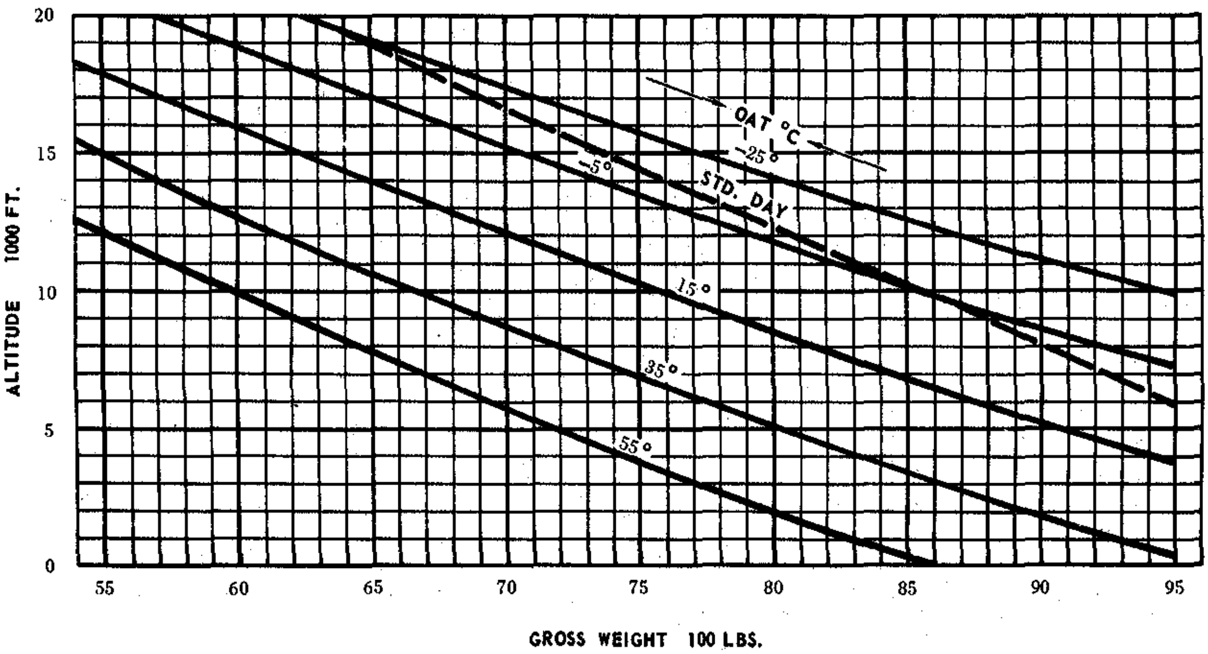
Chart 14-12. Hovering out-of-ground effect chart D (Sheet 2 of 2)

HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING
IN GROUND EFFECT WITH TAKE-OFF POWER
2°C INLET TEMPERATURE RISE
2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CAT. II FLIGHT TEST

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

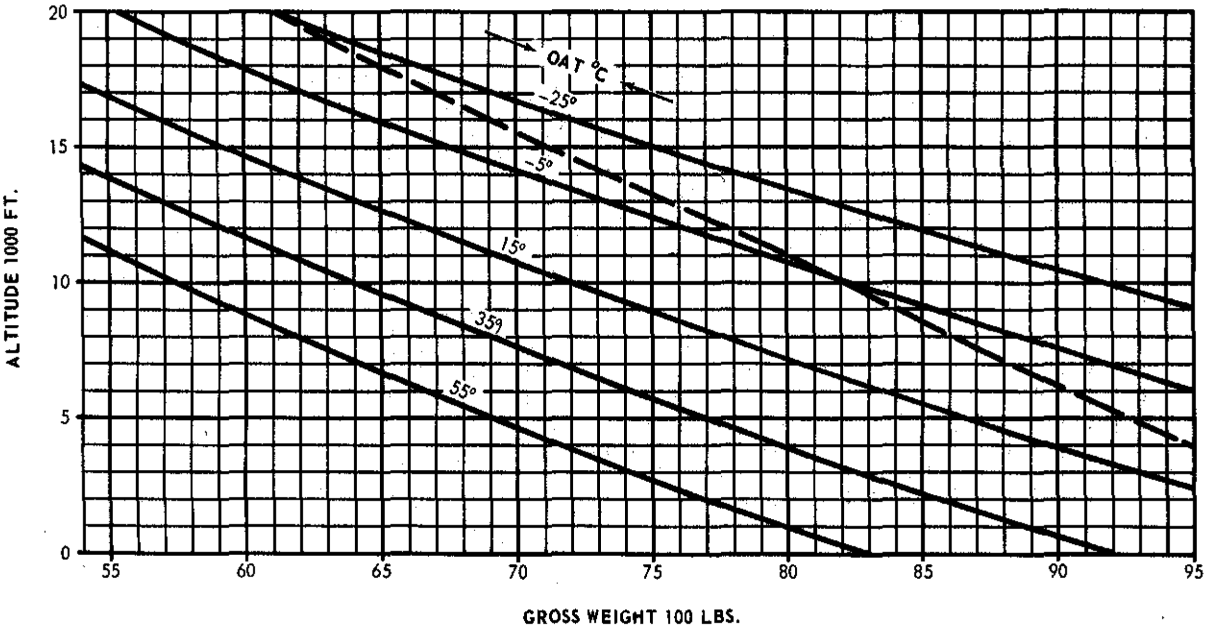
Chart 14-13. Hovering in-ground effect chart D (Sheet 1 of 2)

HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING
IN GROUND EFFECT WITH TAKE-OFF POWER
10°C INLET TEMPERATURE RISE
2 FOOT SKID HEIGHT

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CAT. II FLIGHT TEST

Engine(s): Lycoming T53-L-11
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

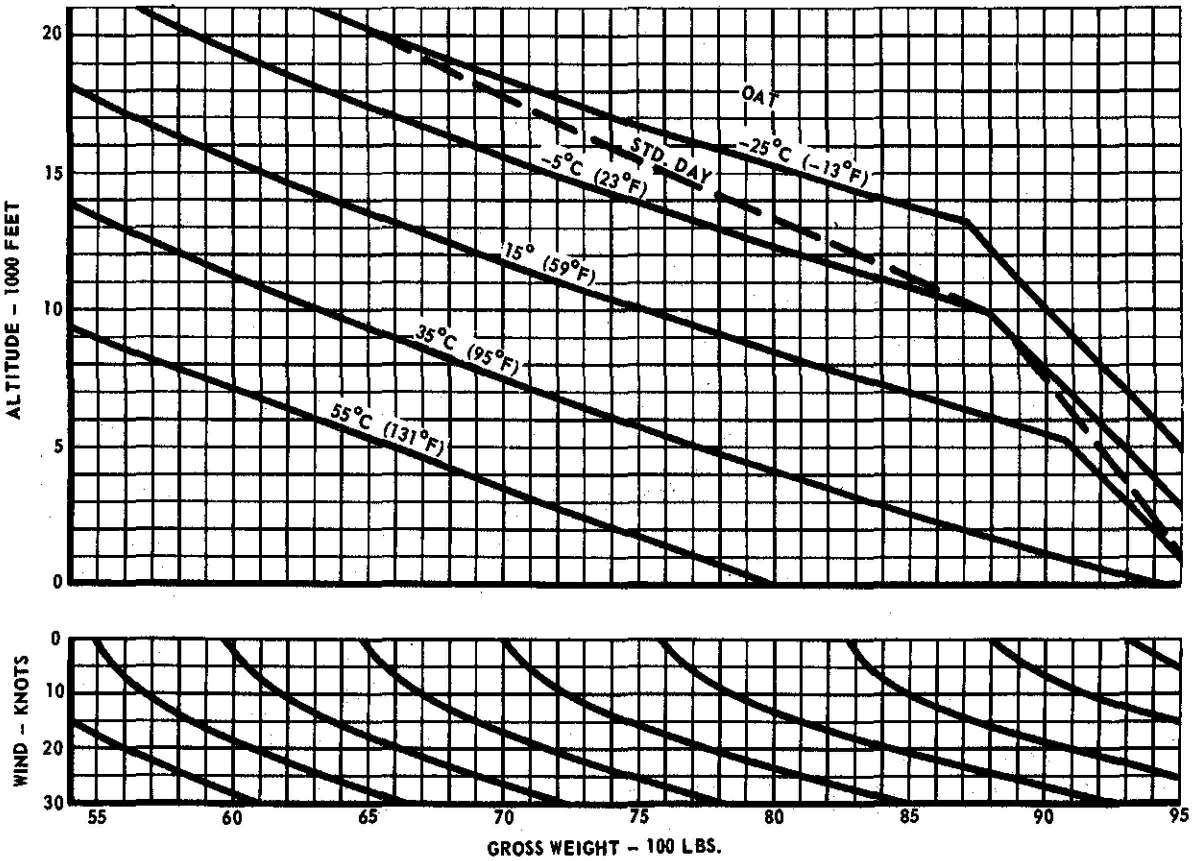
Chart 14-13. Hovering in-ground effect chart D (Sheet 2 of 2)

HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING OUT-OF-GROUND EFFECT WITH MILITARY POWER
2°C INLET TEMPERATURE RISE

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CATEGORY II, FLIGHT TEST

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

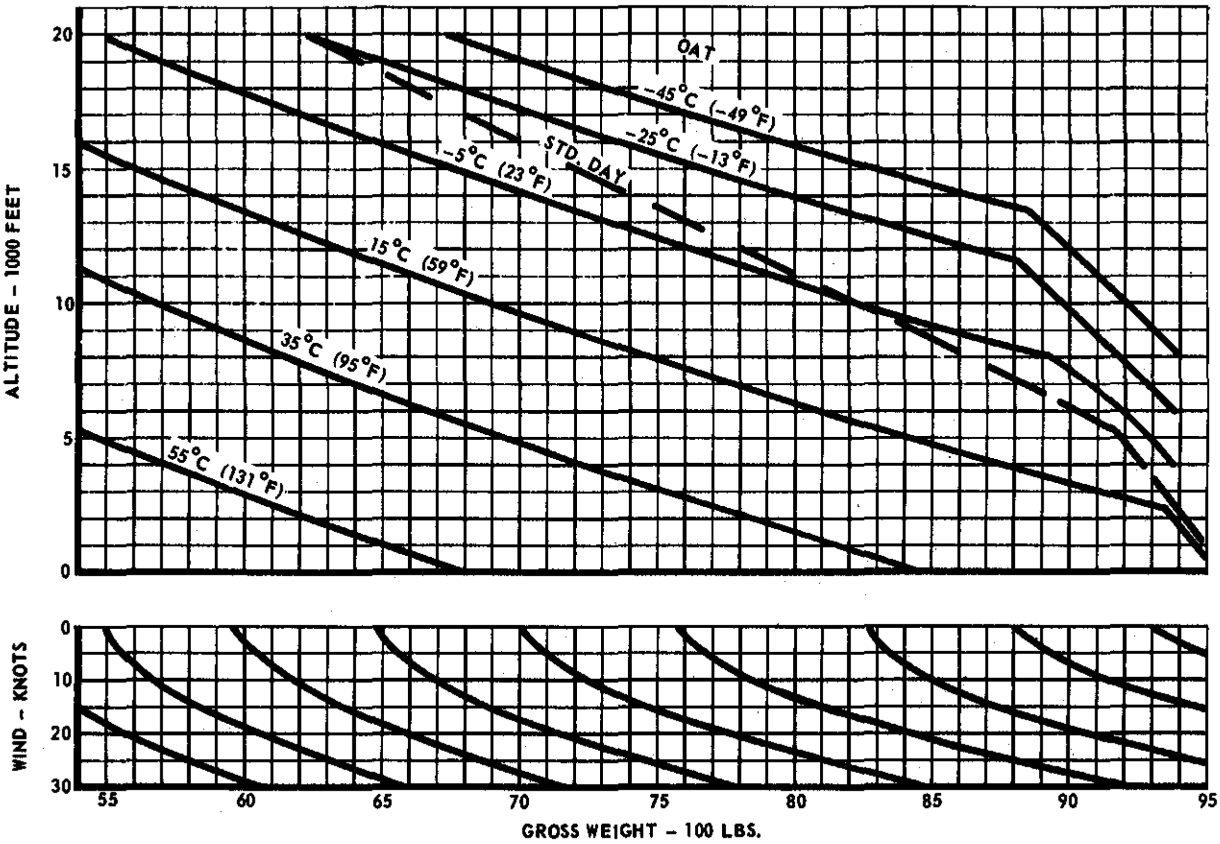
Chart 14-14. Hovering out-of-ground effect chart H (Sheet 1 of 2)

HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING OUT-OF-GROUND EFFECT WITH NORMAL POWER
2°C INLET TEMPERATURE RISE

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CATEGORY II, FLIGHT TEST

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

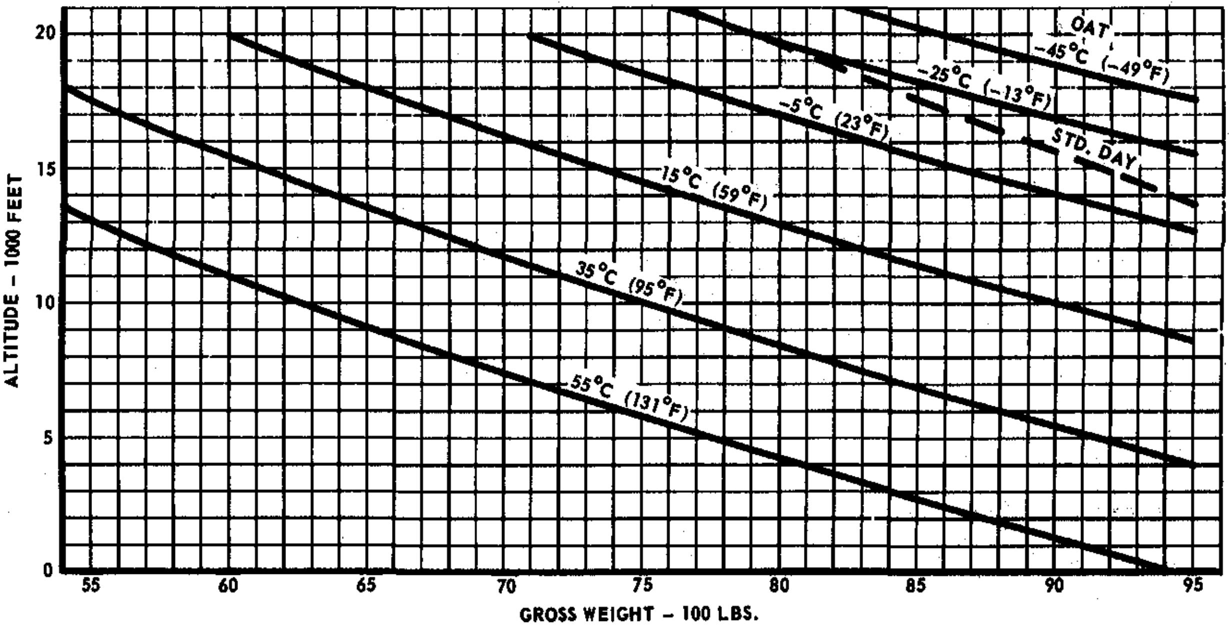
Chart 14-14. Hovering out-of-ground effect chart **H** (Sheet 2 of 2)

HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING IN GROUND EFFECT WITH MILITARY POWER
2°C INLET TEMPERATURE RISE

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CATEGORY II, FLIGHT TEST

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

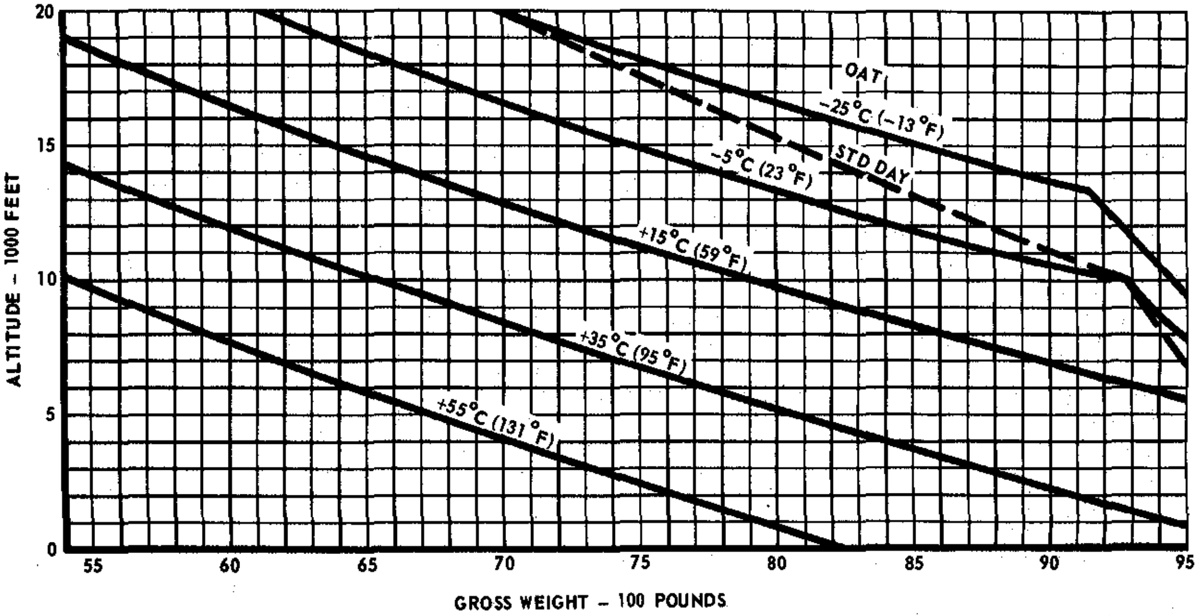
Chart 14-15. Hovering in-ground effect chart H (Sheet 1 of 3)

HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING IN GROUND EFFECT WITH MILITARY POWER
2°C INLET TEMPERATURE RISE - 15 FEET

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CATEGORY II, FLIGHT TEST

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

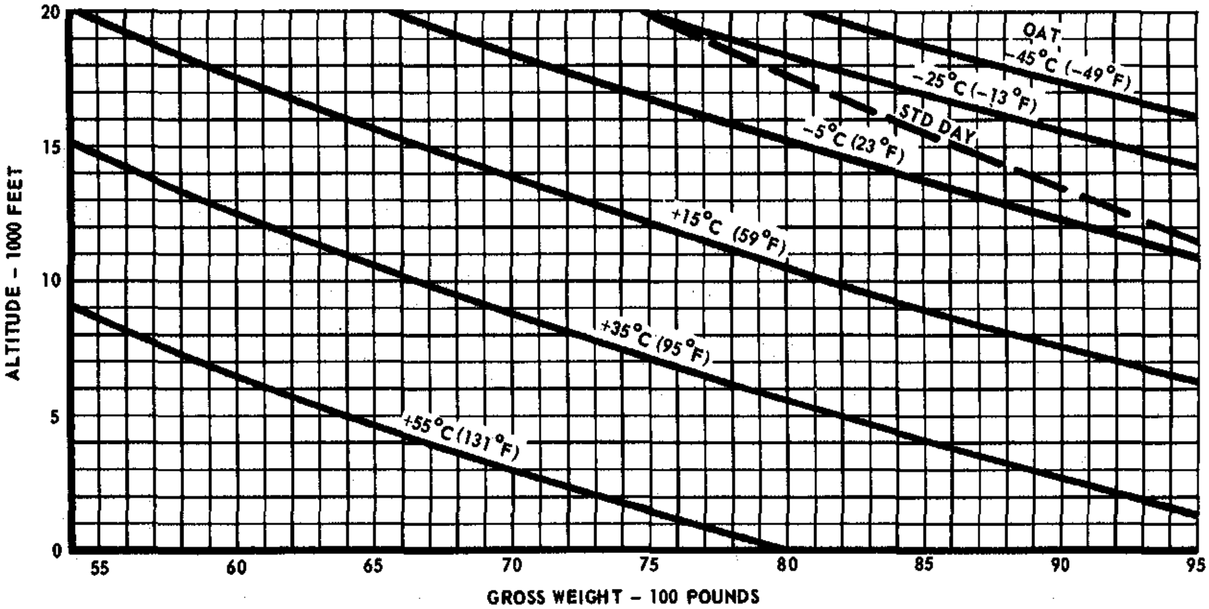
Chart 14-15. Hovering in-ground effect chart H (Sheet 2 of 3)

HOVERING

CLEAN CONFIGURATION
MAXIMUM GROSS WEIGHT FOR HOVERING IN GROUND EFFECT WITH NORMAL POWER
2°C INLET TEMPERATURE RISE

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: UH-1D CATEGORY II, FLIGHT TEST

Engine(s): Lycoming T53-L-13
Engine RPM: 6600
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.



REMARKS:

Chart 14-15. Hovering in-ground effect chart **H** (Sheet 3 of 3)

CLIMB CHART FOR NORMAL POWER

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

CONFIGURATION: CLEAN WEIGHT: 5000											CONFIGURATION: CLEAN WEIGHT: 5500			
APPROXIMATE				TORQUE PRESS PSIG	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE PRESS PSIG.	APPROXIMATE			
RATE OF CLIMB FT/MIN	FROM SEA LEVEL										FROM SEA LEVEL			RATE OF CLIMB FT/MIN.
	DIST. N. MI.	TIME MIN.	FUEL LBS.		N	R		N	R		FUEL LBS.	TIME MIN.	DIST. N. MI.	
3074	0.0	0.0	23	40.1	46	45	SL	48	47	40.1	23	0.0	0.0	2668
3066	0.5	0.7	30	40.1	46	45	2000	48	47	40.1	31	0.7	0.6	2666
3009	0.9	1.3	38	39.7	45	44	4000	47	46	39.7	40	1.5	1.2	2623
2817	1.5	2.0	45	37.9	45	44	6000	47	46	37.9	48	2.3	1.8	2455
2636	2.0	2.7	53	36.3	45	44	8000	47	46	36.3	57	3.1	2.6	2289
2458	2.7	3.5	60	34.6	45	44	10000	47	46	34.6	66	4.0	3.4	2121
2270	3.5	4.4	68	33.0	45	44	12000	46	45	33.0	75	5.0	4.4	1945
2075	4.3	5.3	76	31.3	44	43	14000	46	45	31.3	84	6.1	5.4	1765
1871	5.3	6.3	84	29.6	44	43	16000	45	44	29.6	94	7.3	6.6	1582
1675	6.5	7.4	92	27.9	43	42	18000	44	43	27.9	104	8.6	8.0	1398
1473	7.8	8.7	102	26.2	42	42	20000	43	42	26.2	115	10.2	9.7	1200
1255	9.3	10.2	111	24.4	41	41	22000	42	41	24.4	127	12.0	11.6	963
1029	11.2	11.9	122	22.7	40	39	24000	39	39	22.7	143	14.5	14.3	637
739	13.6	14.2	135	21.1	38	38	26000							
209	18.1	18.4	158	19.6	35	36	28000							

REMARKS:

1. Fuel used for warm-up and take-off is 23 pounds.
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-16. Climb chart D (Sheet 1 of 5)

CLIMB CHART FOR NORMAL POWER
STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s):Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

CONFIGURATION: CLEAN WEIGHT: 6000								CONFIGURATION: CLEAN WEIGHT: 6500						
APPROXIMATE				TORQUE PRESS PSIG	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE PRESS PSIG	APPROXIMATE			
RATE OF CLIMB FT/MIN	FROM SEA LEVEL										FROM SEA LEVEL			RATE OF CLIMB FT/MIN.
	DIST. N. MI.	TIME MIN.	FUEL LBS.		N	R		N	R		FUEL LBS.	TIME MIN.	DIST. N. MI.	
2340	0.0	0.0	23	40.1	50	49	SL	52	50	40.1	23	0.0	0.0	2070
2344	0.7	0.9	33	40.1	50	48	2000	51	50	40.1	34	1.0	0.9	2080
2313	1.5	1.7	42	39.7	49	48	4000	51	50	39.7	45	1.9	1.7	2052
2156	2.3	2.6	52	37.9	49	48	6000	50	50	37.9	56	2.9	2.7	1902
1999	3.2	3.6	62	36.3	49	48	8000	50	49	36.3	67	4.0	3.8	1751
1840	4.2	4.6	72	34.6	48	47	10000	49	49	34.6	78	5.2	5.0	1600
1675	5.3	5.8	82	33.0	48	47	12000	44	48	33.0	90	6.5	6.3	1445
1508	6.6	7.0	93	31.3	47	46	14000	43	47	31.3	103	8.0	7.9	1285
1337	8.1	8.4	104	29.6	46	45	16000	47	45	29.6	116	9.7	9.7	1106
1149	9.8	10.0	116	27.9	44	44	18000	45	44	27.9	131	11.7	11.8	879
918	11.9	12.0	130	26.2	43	42	20000	43	42	26.2	152	14.5	14.9	536
567	14.7	14.6	148	24.4	41	40	22000							

REMARKS:

1. Fuel used for warm-up and take-off is 23 pounds.
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-16. Climb chart D (Sheet 2 of 5)

CLIMB CHART FOR NORMAL POWER

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

CONFIGURATION: CLEAN **WEIGHT:** 7000														**CONFIGURATION: CLEAN** **WEIGHT:** 7500
APPROXIMATE				TORQUE	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE	APPROXIMATE			
RATE OF CLIMB FT/MIN	FROM SEA LEVEL			PRESS PSIG						PRESS PSIG	FROM SEA LEVEL			RATE OF CLIMB FT/MIN.
	DIST. N. MI.	TIME MIN.	FUEL LBS.		N	R		N	R		FUEL LBS.	TIME MIN.	DIST. N. MI.	
1844	0.0	0.0	23	40.1	53	52	SL	55	54	40.1	23	0.0	0.0	1653
1857	1.0	1.1	35	40.1	53	52	2000	54	53	40.1	37	1.2	1.2	1662
1826	2.0	2.2	47	39.7	53	51	4000	54	53	39.7	50	2.4	2.4	1627
1682	3.2	3.3	60	37.9	52	51	6000	53	52	37.9	64	3.7	3.7	1486
1537	4.4	4.5	72	36.3	52	50	8000	53	51	36.3	79	5.1	5.1	1345
1392	5.8	5.9	86	34.6	51	50	10000	52	50	34.6	94	6.7	6.8	1200
1239	7.5	7.4	100	33.0	50	49	12000	50	49	33.0	110	8.5	8.8	1036
1069	9.3	9.2	114	36.3	48	47	14000	48	47	31.3	128	10.6	11.1	831
852	11.6	11.3	131	29.6	47	45	16000	46	45	29.6	152	13.6	14.3	532
523	14.7	14.2	153	27.9	44	43	18000							

REMARKS:

1. Fuel used for warm-up and take-off is 23 pounds.
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-16. Climb chart D (Sheet 3 of 5)

CLIMB CHART FOR NORMAL POWER
STANDARD DAY
ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

CONFIGURATION: CLEAN **WEIGHT:** 8000 | **CONFIGURATION: CLEAN** **WEIGHT:** 8500

APPROXIMATE RATE OF CLIMB FT/MIN	FROM SEA LEVEL DIST. N. MI.	FROM SEA LEVEL TIME MIN.	FROM SEA LEVEL FUEL LBS.	TORQUE PRESS PSIG	IAS KNOTS N	IAS KNOTS R	PRESSURE ALTITUDE FEET	IAS KNOTS N	IAS KNOTS R	TORQUE PRESS PSIG	FROM SEA LEVEL FUEL LBS.	FROM SEA LEVEL TIME MIN.	FROM SEA LEVEL DIST. N. MI.	APPROXIMATE RATE OF CLIMB FT/MIN.
1486	0.0	0.0	23	40.1	56	55	SL	58	57	40.1	23	0.0	0.0	1335
1487	1.3	1.3	38	40.1	56	55	2000	57	56	40.1	40	1.5	1.5	1327
1448	2.7	2.7	53	39.7	55	54	4000	56	55	39.7	57	3.0	3.1	1282
1309	4.3	4.2	69	37.9	54	53	6000	55	54	37.9	75	4.7	4.9	1141
1166	6.0	5.8	86	36.3	54	52	8000	54	53	36.3	94	6.6	6.9	988
1009	8.0	7.6	104	34.6	52	51	10000	52	51	34.6	116	8.8	9.4	804
814	10.4	9.8	123	33.0	50	50	12000	50	49	33.0	143	11.7	12.6	553
544	13.6	12.8	159	31.3	48	47	14000	47	46	31.3	189	17.2	18.5	183
120	20.1	18.8	197	29.6	45	44	16000							

REMARKS:
1. Fuel used for warm-up and take-off is 23 pounds.
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-16. Climb chart D (Sheet 4 of 5)

CLIMB CHART FOR NORMAL POWER

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

CONFIGURATION: CLEAN WEIGHT: 9000								CONFIGURATION: CLEAN WEIGHT: 9500						
APPROXIMATE				TORQUE PRESS PSIG	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE PRESS PSIG	APPROXIMATE			
RATE OF CLIMB FT/MIN	FROM SEA LEVEL										FROM SEA LEVEL			RATE OF CLIMB FT/MIN.
	DIST. N. MI.	TIME MIN.	FUEL LBS.		N	R		N	R		FUEL LBS.	TIME MIN.	DIST. N. MI.	
1193	0.0	0.0	23	40.1	59	58	SL	60	60	40.1	23	0.0	0.0	1059
1178	1.8	1.7	42	40.1	58	57	2000	59	58	40.1	45	1.9	2.0	1034
1125	3.6	3.4	61	39.7	57	56	4000	58	57	39.7	67	3.9	4.2	969
975	5.7	5.3	82	37.9	56	55	6000	56	55	37.9	91	6.2	6.7	801
799	8.2	7.6	105	36.3	54	53	8000	54	53	36.3	121	9.1	9.9	587
569	11.4	10.5	134	34.6	52	51	10000	52	50	34.6	165	13.6	14.8	290
235	16.8	15.5	179	33.0	49	48	12000							

REMARKS:

1. Fuel used for warm-up and take-off is 23 pounds
2. Engine specification fuel flow increased 5% per MIL-M-7700A
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-16. Climb chart D (Sheet 5 of 5)

CLIMB CHART FOR NORMAL POWER

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

CONFIGURATION: CLEAN
WEIGHT: 5000

CONFIGURATION: CLEAN
WEIGHT: 5500

APPROXIMATE				TORQUE PRESS	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE PRESS	APPROXIMATE			
RATE OF CLIMB FT/MIN	FROM SEA LEVEL										FROM SEA LEVEL			RATE OF CLIMB FT/MIN.
	DIST. N. MI.	TIME MIN.	FUEL LBS.	PSIG	N	R		N	R	PSIG	FUEL LBS.	TIME MIN.	DIST. N. MI.	
3074	0.0	0.0	24	40.1	47	45	S.L.	47	48	40.1	24	0.0	0.0	2668
3066	0.5	0.7	31	40.1	47	45	2000	46	47	40.1	32	0.7	0.6	2666
3060	0.9	1.3	37	40.1	46	44	4000	46	47	40.1	39	1.5	1.2	2670
3068	1.4	2.0	44	40.1	46	44	6000	46	47	40.1	47	2.2	1.8	2684
3082	1.9	2.6	50	40.1	46	44	8000	46	47	40.1	54	3.0	2.4	2694
3091	2.4	3.3	56	40.1	46	44	10000	46	47	40.1	61	3.7	3.1	2697
3094	3.0	3.9	62	40.1	46	44	12000	45	46	40.1	68	4.5	3.8	2694
3090	3.5	4.5	68	40.1	44	43	14000	45	46	40.1	74	5.2	4.5	2688
2927	4.1	5.2	74	38.8	44	43	16000	44	46	38.8	81	6.0	5.2	2541
2691	4.8	5.9	80	36.7	43	42	18000	43	44	36.7	88	6.8	6.0	2322
2449	5.6	6.7	86	34.6	42	42	20000	43	43	34.6	95	7.7	6.9	2087
2193	6.4	7.6	92	32.5	41	41	22000	43	41	32.5	103	8.7	8.0	1816
1912	7.4	8.5	99	30.4	40	39	24000	39	40	30.4	111	10.0	9.3	1440
1552	8.6	9.7	106	28.2	37	37	26000	37	36	28.2	122	11.8	11.2	780
952	10.3	11.3	116	26.0	35	36	28000							

REMARKS:

1. Fuel used for warm-up and take-off = 24 pounds.
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-17. Climb chart **H** (Sheet 1 of 5)

CLIMB CHART FOR NORMAL POWER

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

CONFIGURATION: CLEAN WEIGHT: 6000											CONFIGURATION: CLEAN WEIGHT: 6500			
APPROXIMATE				TORQUE PRESS	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE PRESS	APPROXIMATE			
RATE OF CLIMB FT/MIN	FROM SEA LEVEL										FROM SEA LEVEL			RATE OF CLIMB FT/MIN.
	DIST. N. MI.	TIME MIN.	FUEL LBS.	PSIG	N	R		N	R	PSIG	FUEL LBS.	TIME MIN.	DIST. N. MI.	
2340	0.0	0.0	24	40.1	51	49	S.L.	52	50	40.1	24	0.0	0.0	2070
2344	0.7	0.9	33	40.1	50	48	2000	52	50	40.1	34	1.0	0.9	2080
2355	1.4	1.7	42	40.1	50	48	4000	52	50	40.1	44	1.9	1.7	2091
2366	2.2	2.6	50	40.1	50	48	6000	51	49	40.1	53	2.9	2.6	2096
2370	3.0	3.4	58	40.1	50	48	8000	51	49	40.1	62	3.8	3.5	2094
2368	3.8	4.2	66	40.1	49	47	10000	50	48	40.1	71	4.8	4.5	2088
2362	4.6	5.1	74	40.1	49	47	12000	50	48	40.1	80	5.7	5.4	2079
2355	5.4	5.9	81	40.1	47	45	14000	49	47	40.1	89	6.7	6.4	2066
2217	6.3	6.8	89	38.8	45	43	16000	47	45	38.8	98	7.7	7.5	1918
1996	7.3	7.8	97	36.7	44	43	18000	45	44	36.7	107	8.8	8.7	1661
1732	8.4	8.8	105	34.6	41	40	20000	43	42	34.6	118	10.2	10.1	1286
1349	9.8	10.1	115	32.5	39	38	22000	40	39	32.5	133	12.3	12.3	631
672	11.8	12.1	128	30.4			24000							

REMARKS:

1. Fuel used for warm-up and take-off = 24 pounds.
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-17. Climb chart **H** (Sheet 2 of 5)

CLIMB CHART FOR NORMAL POWER

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

CONFIGURATION: CLEAN WEIGHT: 7000								CONFIGURATION: CLEAN WEIGHT: 7500						
APPROXIMATE				TORQUE PRESS PSIG	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE PRESS PSIG	APPROXIMATE			
RATE OF CLIMB FT/MIN	FROM SEA LEVEL										FROM SEA LEVEL			RATE OF CLIMB FT/MIN.
	DIST. N. MI.	TIME MIN.	FUEL LBS.		N	R		N	R		FUEL LBS.	TIME MIN.	DIST. N. MI.	
1844	0.0	0.0	24	40.1	54	52	S.L.	56	55	40.1	24	0.0	0.0	1653
1857	1.0	1.1	35	40.1	54	52	2000	55	53	40.1	37	1.2	1.2	1662
1863	2.0	2.2	46	40.1	53	51	4000	55	53	40.1	49	2.4	2.4	1661
1861	3.1	3.2	57	40.1	53	51	6000	54	52	40.1	61	3.6	3.6	1654
1855	4.2	4.3	67	40.1	52	50	8000	53	51	40.1	72	4.8	4.8	1642
1844	5.3	5.4	77	40.1	51	49	10000	52	50	40.1	84	6.1	6.1	1622
1828	6.4	6.5	87	40.1	50	48	12000	51	49	40.1	95	7.3	7.4	1585
1794	7.6	7.6	97	40.1	49	47	14000	47	48	40.1	107	8.6	8.8	1508
1606	8.8	8.8	108	38.8	47	45	16000	47	45	38.8	120	10.1	10.4	1235
1250	10.3	10.2	119	36.7	45	43	18000	44	43	36.7	137	12.1	12.6	702
646	12.5	12.3	136	34.6	42	41	20000							

REMARKS:

1. Fuel used for warm-up and take-off = 24 pounds.
2. Engine specification fuel flow increased 5% per MIL-M.7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-17. Climb chart H (Sheet 3 of 5)

CLIMB CHART FOR NORMAL POWER

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

CONFIGURATION: CLEAN WEIGHT: 8000															CONFIGURATION: CLEAN WEIGHT: 8500
APPROXIMATE				TORQUE PRESS	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE PRESS	APPROXIMATE				
RATE OF CLIMB FT/MIN	FROM SEA LEVEL										FROM SEA LEVEL			RATE OF CLIMB FT/MIN.	
	DIST. N. MI.	TIME MIN.	FUEL LBS.	PSIG	N	R		N	R	PSIG	FUEL LBS.	TIME MIN.	DIST. N. MI.		
1486	0.0	0.0	24	40.1	57	55	S.L.	58	57	40.1	24	0.0	0.0	1335	
1487	1.3	1.3	38	40.1	57	55	2000	58	57	40.1	40	1.5	1.5	1327	
1480	2.7	2.7	52	40.1	56	54	4000	57	56	40.1	55	3.0	3.1	1313	
1466	4.1	4.1	65	40.1	55	53	6000	56	54	40.1	70	4.6	4.8	1289	
1444	5.6	5.4	78	40.1	54	52	8000	55	53	40.1	85	6.1	6.5	1250	
1405	7.1	6.8	92	40.1	53	51	10000	53	51	40.1	101	7.8	8.2	1177	
1329	8.7	8.3	105	40.1	51	49	12000	51	49	40.1	118	9.6	10.2	1038	
1178	10.4	9.9	119	40.1	49	47	14000	48	46	40.1	137	11.8	12.6	780	
780	12.6	11.9	137	38.8	46	45	16000								

REMARKS:

1. Fuel used for warm-up and take-off = 24 pounds.
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-17. Climb chart H (Sheet 4 of 5)

CLIMB CHART FOR NORMAL POWER

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s):Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lbs/Gal

CONFIGURATION: CLEAN WEIGHT: 9000											CONFIGURATION: CLEAN WEIGHT: 9500			
APPROXIMATE				TORQUE PRESS	IAS KNOTS		PRESSURE ALTITUDE FEET	IAS KNOTS		TORQUE PRESS	APPROXIMATE			
RATE OF CLIMB FT/MIN	FROM SEA LEVEL										FROM SEA LEVEL			RATE OF CLIMB FT/MIN.
	DIST. N. MI.	TIME MIN.	FUEL LBS.	PSIG	N	R		N	R	PSIG	FUEL LBS.	TIME MIN.	DIST. N. MI.	
1193	0.0	0.0	24	40.1	60	59	S.L.	61	60	40.1	24	0.0	0.0	1059
1178	1.8	1.7	42	40.1	59	58	2000	60	59	40.1	44	1.9	2.0	1034
1153	3.6	3.4	59	40.1	58	57	4000	58	57	40.1	64	3.9	4.2	996
1114	5.5	5.2	76	40.1	57	56	6000	57	55	40.1	84	6.0	6.5	933
1046	7.5	7.0	94	40.1	55	53	8000	55	53	40.1	106	8.2	8.9	822
921	9.7	9.1	108	40.1	53	51	10000	52	50	40.1	132	11.0	12.0	624
693	12.4	11.5	136	40.1	50	48	12000	49	47	40.1	173	15.4	16.7	284
298	16.7	15.6	173	40.1	47	45	14000							

REMARKS:

1. Fuel used for warm-up and take-off = 24 pounds.
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-17. Climb chart **H** (Sheet 5 of 5)

RANGE CHART

STANDARD DAY

ENGINE SPEED 6400 RPM
LONG RANGE - CRUISE SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
5000	SL	28.4	528	106	114	298	292	250	209	167	125	83	42						
	2000	26.8	497	101	109	312	305	262	218	174	131	87	44						
	4000	25.8	474	98	106	326	319	274	228	182	137	91	46						
	6000	24.7	447	94	102	342	335	287	239	191	144	96	48						
	8000	23.8	424	90	98	359	351	301	251	201	150	100	50						
	10000	23.2	406	88	95	374	367	314	262	210	157	105	52						
	12000	22.5	387	84	91	391	382	328	273	219	164	109	55						
	14000	20.4	353	78	85	410	402	344	287	230	172	115	57						
	16000	18.0	315	70	77	428	419	359	299	239	179	120	60						
	18000	16.0	286	62	68	435	426	365	304	243	183	122	61						
5000	20000	14.6	263	54	60	429	420	360	300	240	180	120	60						
5500	SL	29.0	534	106	114	294	288	247	206	165	124	82	41						
	2000	27.4	504	101	109	308	301	258	215	172	129	86	43						
	4000	26.5	482	98	106	321	314	269	224	179	135	90	45						
	6000	25.5	457	94	102	335	328	281	235	188	141	94	47						
	8000	24.5	433	90	98	351	343	294	245	196	147	98	49						
	10000	24.1	417	88	95	365	357	306	255	204	153	102	51						
	12000	23.4	398	84	91	380	372	319	266	212	159	106	53						
	14000	21.4	365	78	85	397	389	333	278	222	167	111	56						
	16000	19.0	328	70	77	412	403	345	288	230	173	115	58						
	18000	17.3	300	62	68	414	405	347	290	232	174	116	58						
5500	20000	16.1	280	54	60	403	395	338	282	226	169	118	56						

REMARKS:

1. Clean configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 1 of 10)

RANGE CHART
STANDARD DAY

ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
6000	SL	29.7	542	106	114	290	284	244	203	162	122	81	41						
	2000	28.7	519	102	110	302	295	253	211	169	127	84	42						
	4000	27.3	491	98	106	315	308	264	220	176	132	88	44						
	6000	26.3	467	94	102	328	321	275	229	184	138	92	46						
	8000	25.4	444	90	98	342	335	287	239	191	143	96	48						
	10000	25.1	428	88	95	355	348	298	248	199	149	99	50						
	12000	24.5	412	84	91	367	360	308	257	205	154	103	51						
	14000	22.6	379	78	85	382	374	321	267	214	160	107	53						
	16000	20.5	345	70	77	391	383	328	274	219	164	109	55						
	18000	19.1	322	62	68	386	378	324	270	216	162	108	54						
6000	20000	18.4	308	54	60	367	359	308	257	205	154	103	51						
6500	SL	31.0	557	107	115	285	279	239	199	159	120	80	40						
	2000	29.4	528	102	110	296	290	249	207	166	124	83	41						
	4000	28.1	501	98	106	308	302	258	215	172	129	86	43						
	6000	27.2	478	94	102	320	314	269	224	179	134	90	45						
	8000	26.4	457	90	98	333	326	279	233	186	140	93	47						
	10000	26.2	442	88	95	344	337	289	241	193	144	96	48						
	12000	25.8	428	84	91	353	346	296	247	198	148	99	49						
	14000	24.2	398	78	85	364	356	305	254	204	153	102	51						
	16000	22.6	371	70	77	364	356	305	254	203	153	102	51						
	18000	21.8	356	62	68	349	342	293	244	195	146	98	49						
6500	20000	22.4	359	54	60	314	308	264	220	176	132	88	44						

REMARKS:

1. Clean configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 2 of 10)

RANGE CHART
STANDARD DAY

ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
7000	SL	31.8	566	107	115	280	274	235	196	157	118	78	39						
	2000	30.3	539	102	110	290	284	244	203	162	122	81	41						
	4000	29.0	513	97	106	301	295	253	211	168	126	84	42						
	6000	28.2	491	93	102	312	305	262	218	174	131	87	44						
	8000	27.5	471	90	98	323	316	271	226	180	135	90	45						
	10000	27.6	460	88	95	331	324	278	232	185	139	93	45						
	12000	27.0	443	83	90	338	331	284	237	189	142	95	47						
	14000	26.6	429	78	85	337	330	283	236	089	142	94	47						
	16000	25.7	410	70	77	329	322	276	230	184	138	92	49						
	18000	26.0	412	61	68	302	295	253	211	169	127	84	42						
7000	20000	26.2	413	39	43	207	203	174	145	116	87	58	29						
7500	SL	32.7	577	107	115	275	269	231	192	154	115	77	42						
	2000	31.2	550	102	110	284	278	239	199	159	119	80	40						
	4000	30.1	526	97	106	294	287	246	205	164	123	82	41						
	6000	29.3	506	93	102	303	297	254	212	169	127	85	42						
	8000	28.9	489	90	98	311	304	261	217	174	130	87	43						
	10000	28.7	474	86	94	318	311	267	222	178	133	89	44						
	12000	28.6	465	82	89	316	310	265	221	177	133	88	44						
	14000	29.0	461	76	83	308	301	258	215	172	129	86	43						
	16000	29.0	461	68	75	288	282	241	201	161	121	80	43						
7500	18000	27.9	441	44	48	207	203	174	145	116	87	58	29						

REMARKS:

1. Clean configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 3 of 10)

RANGE CHART
STANDARD DAY

ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
8000	SL	33.3	585	107	115	270	264	227	189	151	113	76	38						
	2000	32.0	560	102	110	278	272	233	194	155	117	78	39						
	4000	31.3	543	97	106	285	280	240	200	160	120	80	40						
	6000	30.3	519	93	100	293	287	246	205	164	123	82	41						
	8000	30.1	505	90	98	299	292	251	209	167	125	84	42						
	10000	29.9	491	84	91	299	293	251	209	167	125	84	42						
	12000	30.5	491	79	86	291	285	244	204	163	122	81	41						
	14000	31.3	494	73	80	275	270	231	193	154	116	77	39						
8000	16000	29.6	466	48	54	210	205	176	147	117	88	59	29						
8500	SL	34.1	595	106	114	264	259	222	185	148	111	74	37						
	2000	33.3	578	102	110	271	265	227	189	151	114	76	38						
	4000	32.4	557	97	105	277	271	232	193	155	116	77	39						
	6000	31.4	534	93	101	283	277	237	198	158	119	79	40						
	8000	31.7	528	88	95	282	276	236	197	158	118	79	39						
	10000	31.6	515	82	89	278	272	233	194	155	117	78	39						
	12000	32.9	528	77	84	262	257	220	183	147	110	73	37						
8500	14000	31.3	494	54	60	211	206	177	147	118	88	59	29						

REMARKS:

1. Clean configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 4 of 10)

RANGE CHART

STANDARD DAY

ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
9000	SL	35.4	612	107	115	258	253	217	180	144	108	72	36						
	2000	34.4	591	102	110	263	257	221	184	147	110	74	37						
	4000	33.5	572	97	105	268	262	225	187	150	112	75	37						
	6000	32.7	553	91	99	268	263	225	188	150	113	75	38						
	8000	33.0	547	86	94	265	259	222	185	148	111	74	37						
	10000	33.6	548	79	86	253	248	212	177	141	106	71	35						
9000	12000	33.0	529	60	67	211	206	177	147	118	88	59	29						
9500	SL	35.8	618	105	113	252	247	212	176	141	106	71	35						
	2000	35.4	606	101	109	255	250	214	179	143	107	71	36						
	4000	34.6	588	95	108	256	251	215	179	143	107	72	36						
	6000	34.2	574	89	97	254	249	213	178	142	107	71	36						
	8000	35.2	581	84	91	243	238	204	170	136	102	68	34						
9500	10000	34.6	565	68	75	212	208	078	148	119	89	59	30						

REMARKS:

1. Clean configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 5 of 10)

RANGE CHART

STANDARD DAY

ENGINE SPEED 6400 RPM

RANGE - MAXIMUM SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
5000	SL	34.2	596	116	124	288	282	242	201	161	121	81	40						
	2000	34.9	600	116	124	294	288	247	206	165	124	82	41						
	4000	32.4	557	110	118	311	304	261	217	174	130	87	43						
	6000	29.9	513	104	112	329	322	276	230	184	138	92	46						
	8000	27.2	467	97	105	349	342	293	244	195	147	98	49						
	10000	24.9	426	91	99	370	363	311	259	207	155	104	52						
	12000	22.8	392	85	92	390	381	327	272	218	163	109	54						
	14000	20.4	353	78	85	410	402	344	287	230	172	115	57						
	16000	18.0	315	70	77	428	419	359	299	239	179	120	60						
	18000	16.0	286	62	68	435	426	365	304	243	183	122	61						
5000	20000	14.6	263	54	60	429	420	360	300	240	180	120	60						
5500	SL	34.7	603	116	124	285	279	239	199	159	119	80	40						
	2000	35.4	605	116	124	292	285	245	204	163	122	82	41						
	4000	33.0	565	110	118	306	300	257	214	171	128	86	43						
	6000	30.6	523	104	112	323	316	271	226	181	135	90	45						
	8000	28.0	477	97	105	342	335	287	239	191	144	96	48						
	10000	25.8	437	91	99	361	353	303	252	202	150	101	50						
	12000	23.8	403	85	92	379	371	318	265	212	159	106	53						
	14000	21.4	365	78	85	397	389	333	278	222	167	111	56						
	16000	19.0	328	70	77	412	403	345	288	230	173	115	58						
	18000	17.3	300	62	68	414	405	347	290	232	174	116	58						
5500	20000	16.1	280	54	60	403	395	338	282	226	169	113	56						

REMARKS:

1. Clean Configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available)(Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 6 of 10)

RANGE CHART
STANDARD DAY

ENGINE SPEED 6400 RPM

RANGE - MAXIMUM SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
6000	SL	35.3	610	116	124	281	275	236	197	157	118	79	39						
	2000	36.1	616	116	124	287	281	241	201	160	120	80	40						
	4000	33.7	575	110	118	301	294	252	210	168	126	84	42						
	6000	31.5	535	104	112	316	309	265	221	177	132	88	44						
	8000	29.0	490	97	105	333	326	280	233	186	140	93	47						
	10000	26.8	450	91	99	351	344	295	246	196	147	98	49						
	12000	24.9	417	85	92	366	359	307	256	205	154	102	51						
	14000	22.6	379	78	85	382	374	321	267	214	160	107	53						
	16000	20.5	345	70	77	391	383	328	274	219	164	109	55						
	18000	19.1	322	62	68	386	378	324	270	216	162	108	54						
6000	20000	18.4	308	54	60	367	359	308	257	205	154	103	51						
6500	SL	36.1	621	116	124	276	271	232	193	155	116	77	39						
	2000	36.8	627	116	124	282	276	236	197	158	118	79	39						
	4000	34.7	589	110	118	294	288	246	205	164	123	82	41						
	6000	32.5	550	104	112	307	301	258	215	172	129	86	43						
	8000	30.1	505	97	105	324	317	272	226	181	136	91	45						
	10000	27.9	465	91	99	340	333	285	238	190	143	95	48						
	12000	26.2	433	85	92	352	345	296	246	197	148	99	49						
	14000	24.2	398	78	85	364	356	305	254	204	153	102	51						
	16000	22.6	371	70	77	364	356	305	254	203	153	102	51						
	18000	21.8	356	62	68	349	342	293	244	195	146	98	49						
6500	20000	22.4	359	54	60	314	308	264	220	176	132	88	44						

REMARKS:

1. Clean configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 7 of 10)

RANGE CHART
STANDARD DAY
ENGINE SPEED 6400 RPM

RANGE - MAXIMUM SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE FUEL FLOW	APPROXIMATE IAS KNOTS		1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB/HR	N	R														
7000	SL	36.9	632	116	124	272	266	228	190	152	114	76	38						
	2000	37.9	642	116	124	275	269	231	192	154	115	77	38						
	4000	35.8	605	110	118	286	280	240	200	160	120	80	40						
	6000	33.7	566	104	112	298	292	250	209	167	125	83	42						
	8000	31.3	521	97	105	313	307	263	219	175	131	88	44						
	10000	29.4	484	91	99	327	320	274	228	183	137	91	46						
	12000	27.8	454	85	92	336	329	282	235	188	141	94	47						
	14000	26.6	429	78	85	337	330	283	236	189	142	94	47						
	16000	25.7	410	70	77	329	322	276	230	184	138	92	46						
	18000	26.0	412	62	68	302	295	253	211	169	127	84	42						
7000	20000	26.2	413	40	48	207	203	174	145	116	87	58	29						
7500	SL	37.9	646	116	124	266	260	223	186	149	111	74	37						
	2000	39.0	659	116	124	268	262	225	187	150	112	75	37						
	4000	37.0	623	110	118	278	272	233	194	155	116	78	39						
	6000	34.9	585	104	112	289	283	242	202	161	121	81	40						
	8000	32.8	544	97	105	301	294	252	210	168	126	84	42						
	10000	31.0	507	91	99	312	305	262	218	174	131	87	44						
	12000	30.5	490	85	92	311	305	261	218	174	131	87	44						
	14000	30.0	475	78	85	305	298	256	213	171	128	85	43						
	16000	29.6	465	68	76	288	282	241	201	161	121	80	40						
7500	18000	27.9	441	44	48	207	203	174	145	116	87	58	29						

REMARKS:

1. Clean configuration
2. Engine Specification fuel flow increased 5% per MIL-M-7700A
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 8 of 10)

RANGE CHART

STANDARD DAY

ENGINE SPEED 6400 RPM

RANGE - MAXIMUM SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE																
			FUEL FLOW	IAS KNOTS		1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB/HR	N	R														
8000	SL	37.4	639	114	122	263	258	221	184	147	110	74	37						
	2000	38.8	655	113	121	264	258	221	185	148	111	74	37						
	4000	36.7	619	108	116	273	268	229	191	153	115	76	38						
	6000	35.0	586	101	109	281	275	236	197	157	118	79	39						
	8000	33.1	548	95	103	291	285	244	204	163	122	81	41						
	10000	32.4	527	89	97	292	286	245	204	163	123	82	41						
	12000	32.5	521	83	90	285	279	239	199	160	120	80	40						
	14000	31.3	494	73	80	275	270	231	193	154	116	77	39						
8000	16000	29.6	466	49	54	210	205	176	147	117	88	59	29						
8500	SL	37.0	633	111	119	260	254	218	182	145	109	73	36						
	2000	38.5	651	111	119	260	255	218	182	146	109	73	36						
	4000	36.8	620	105	113	267	261	224	187	149	112	75	37						
	6000	35.1	587	99	107	274	268	230	192	153	115	77	38						
	8000	34.3	566	93	101	275	269	231	192	154	115	77	38						
	10000	34.1	556	86	93	270	265	227	189	151	113	76	38						
	12000	32.9	528	77	84	262	257	220	183	147	110	73	37						
8500	14000	31.3	494	55	60	211	206	177	147	118	88	59	29						

REMARKS:

1. Clean configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart D (Sheet 9 of 10)

RANGE CHART
STANDARD DAY

ENGINE SPEED 6400 RPM

RANGE - MAXIMUM SPEED

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
9000	SL	36.6	628	109	117	256	251	215	179	143	108	72	36						
	2000	38.4	649	108	116	255	250	214	178	143	107	71	36						
	4000	36.8	620	103	111	261	255	219	182	146	109	73	36						
	6000	35.9	601	96	104	261	256	219	183	146	110	73	37						
	8000	35.7	590	90	98	258	252	216	180	144	108	72	36						
	10000	34.6	565	81	88	250	245	210	175	140	105	70	35						
9000	12000	33.0	529	61	67	211	206	177	147	118	88	59	29						
9500	SL	36.4	626	106	114	251	246	211	176	141	105	70	35						
	2000	38.3	648	106	114	250	244	210	175	140	105	70	35						
	4000	37.5	630	100	108	250	245	210	175	140	105	70	35						
	6000	36.9	616	94	102	248	243	208	174	139	104	69	35						
	8000	36.3	599	85	92	241	236	202	169	135	101	67	35						
9500	10000	34.6	565	68	74	212	208	178	148	119	89	59	30						

REMARKS:

1. Clean configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-18. Range chart **D** (Sheet 10 of 10)

RANGE CHART
STANDARD DAY

ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
5000	SL	34.2	584	116	124	294	288	247	205	164	123	82							
	2000	34.4	563	115	123	311	304	261	217	174	130	87							
	4000	32.4	524	110	118	330	323	277	231	185	139	92							
	6000	29.9	483	104	112	350	342	294	245	196	147	98							
	8000	27.2	445	97	105	367	359	308	257	205	154	103							
	10000	24.9	410	91	99	385	377	323	269	215	162	108							
	12000	22.8	377	85	92	405	396	340	283	227	170	113							
	14000	20.4	340	78	85	426	417	357	298	238	179	119							
	16000	18.0	305	70	77	442	433	371	309	247	186	124							
	18000	16.0	276	62	68	450	441	378	315	252	189	126							
5000	20000	14.6	253	54	59	447	438	375	313	250	188	125							
5500	SL	34.7	589	116	124	291	285	245	204	163	122	82							
	2000	35.4	572	116	124	308	302	259	216	173	129	86							
	4000	33.0	530	110	118	327	320	274	228	183	137	91							
	6000	30.6	490	104	112	345	337	289	241	193	145	96							
	8000	28.0	452	97	105	361	354	303	253	202	152	101							
	10000	25.8	419	91	99	377	369	317	264	211	158	106							
	12000	23.8	386	85	92	396	387	332	277	221	166	111							
	14000	21.4	350	78	85	414	405	348	290	232	174	116							
	16000	19.0	315	70	77	429	420	360	300	240	180	120							
	18000	17.3	288	62	68	432	423	362	302	242	181	121							
5500	20000	16.1	266	54	59	424	415	356	297	237	178	119							

REMARKS:

1. Clean Configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available)(TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-19. Range chart **H** (Sheet 1 of 5)

RANGE CHART
STANDARD DAY

ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
6000	SL	35.3	594	116	124	289	283	242	202	162	121	81							
	2000	36.1	579	115	123	305	298	256	213	170	128	85							
	4000	33.7	537	110	118	322	316	270	225	180	135	90							
	6000	31.5	498	104	112	339	332	285	237	190	142	95							
	8000	29.0	462	97	105	354	346	297	247	198	148	99							
	10000	26.8	428	91	99	369	361	310	258	207	155	103							
	12000	24.9	396	85	92	385	377	323	269	216	162	108							
	14000	22.6	361	78	85	401	393	337	281	225	168	112							
	16000	20.5	328	70	77	411	402	345	287	230	172	115							
	18000	19.1	305	62	68	408	399	342	285	228	171	114							
6000	20000	18.4	288	54	59	392	384	329	274	219	164	110							
6500	SL	36.1	602	116	124	285	279	239	199	160	120	80							
	2000	36.8	586	116	124	301	295	253	210	168	126	84							
	4000	34.7	546	110	118	317	310	266	222	177	133	89							
	6000	32.5	508	104	112	332	325	279	232	186	139	93							
	8000	30.1	472	97	105	346	339	291	242	194	145	97							
	10000	27.9	439	91	99	360	352	302	252	201	151	101							
	12000	26.2	409	83	90	373	366	313	261	209	157	104							
	14000	24.2	375	78	85	386	378	324	270	216	162	108							
	16000	22.6	348	70	77	387	379	325	271	217	162	108							
	18000	21.8	331	62	68	376	368	315	263	210	158	105							
6500	20000	22.4	327	54	59	346	339	290	242	194	145	97							

REMARKS:

1. Clean Configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available) (Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-19. Range chart **H** (Sheet 2 of 5)

RANGE CHART

STANDARD DAY

ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
7000	SL	36.9	609	116	124	282	276	236	197	158	118	79							
	2000	37.9	596	115	123	296	290	248	207	166	124	83							
	4000	35.8	556	110	118	311	304	261	217	174	130	87							
	6000	33.7	519	104	112	325	318	273	227	182	136	91							
	8000	31.3	483	97	105	338	331	284	236	189	142	95							
	10000	29.4	452	91	99	349	342	293	244	195	146	98							
	12000	27.8	424	85	92	360	352	302	252	201	151	101							
	14000	26.6	399	78	85	363	355	305	254	203	152	102							
	16000	25.7	378	70	77	357	349	299	249	200	150	100							
	18000	26.0	371	62	68	335	328	281	234	187	141	94							
7000	20000	33.8	444	54	59	255	249	214	178	142	107	71							
7500	SL	37.9	618	116	124	278	272	233	194	155	116	78							
	2000	39.0	607	116	124	291	285	244	203	163	122	81							
	4000	37.0	568	110	118	304	298	255	213	170	128	85							
	6000	34.9	532	104	112	318	311	267	222	178	133	89							
	8000	32.8	498	97	105	328	321	275	229	183	138	92							
	10000	31.0	468	91	99	337	330	283	236	189	142	94							
	12000	30.5	450	83	90	339	332	285	237	190	142	95							
	14000	30.0	432	78	85	335	328	281	234	187	141	94							
	16000	29.9	420	70	77	321	314	269	224	180	135	90							
7500	18000	36.7	483	58	64	243	238	204	170	136	102	68							

REMARKS:

1. Clean Configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available) (TAS)}}{\text{Fuel Flow}}$ = (Fuel Available)(Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-19. Range chart **H** (Sheet 3 of 5)

RANGE CHART

STANDARD DAY

ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles														
		TORQUE PRESS	APPROXIMATE			1430	1400	1200	1000	800	600	400								
			FUEL FLOW	IAS KNOTS		LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB/HR	N	R															
8000	SL	37.4	614	113	121	274	268	230	191	153	115	77								
	2000	38.8	605	113	121	286	280	240	200	160	120	80								
	4000	36.7	566	107	115	299	293	251	209	167	125	84								
	6000	35.0	532	101	109	310	303	260	217	173	130	87								
	8000	33.1	501	95	103	319	312	267	223	178	134	89								
	10000	32.4	481	89	97	320	313	269	224	179	134	90								
	12000	32.5	470	82	89	316	310	265	221	177	133	88								
	14000	32.8	460	75	82	306	299	256	214	171	128	85								
8000	16000	38.8	513	62	68	237	232	199	166	132	99	66								
8500	SL	37.0	610	111	119	270	264	226	189	151	113	75								
	2000	38.5	602	111	119	281	275	236	197	157	118	79								
	4000	36.8	566	105	113	292	286	245	204	163	123	82								
	6000	35.1	533	99	107	302	296	253	211	169	127	84								
	8000	34.3	513	93	101	304	298	255	213	170	128	85								
	10000	34.1	498	86	93	302	295	253	211	169	127	84								
	12000	35.1	496	80	87	292	286	245	204	163	122	82								
8500	14000	40.1	537	67	73	234	229	197	164	131	98	66								

REMARKS:

1. Clean Configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range = $\frac{\text{(Fuel Available)(TAS)}}{\text{Fuel Flow}}$ = (Fuel Available)(Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-19. Range chart **H** (Sheet 4 of 5)

RANGE CHART
STANDARD DAY
ENGINE SPEED 6400 RPM

LONG RANGE - CRUISE SPEED

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				RANGE - Nautical Airmiles													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
9000	SL	36.6	606	108	116	265	260	223	186	148	111	74							
	2000	38.4	601	108	116	275	270	231	193	154	116	77							
	4000	36.8	566	102	110	285	279	239	200	160	120	80							
	6000	35.9	542	96	104	290	284	243	203	162	122	81							
	8000	35.7	527	90	98	289	283	242	202	161	121	81							
	10000	36.4	521	84	91	281	275	236	196	157	118	79							
9000	12000	40.1	547	71	78	235	230	197	165	132	99	66							
9500	SL	36.4	605	106	114	260	255	218	182	145	109	73							
	2000	38.3	601	106	114	270	264	226	189	151	113	75							
	4000	37.5	573	100	108	275	270	231	193	154	116	77							
	6000	36.9	551	94	102	277	272	233	194	155	116	78							
	8000	37.8	548	88	95	271	265	227	189	151	114	76							
9500	10000	40.1	558	76	83	239	234	201	167	134	100	67							

REMARKS:

1. Clean Configuration
2. Engine specification fuel flow increased 5% per MIL-M-7700A.
3. Range $= \frac{\text{(Fuel Available)(TAS)}}{\text{Fuel Flow}} =$ (Fuel Available)(Specific Range)
4. Range not shown above 20,000 feet or cruise ceiling.
5. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-19. Range chart H (Sheet 5 of 5)

MAXIMUM ENDURANCE
STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
5000	SL	13.5	376	47	51	3.8	3.7	3.2	2.7	2.1	1.6	1.1	0.5						
	2000	13.6	361	47	51	4.0	3.9	3.3	2.8	2.2	1.7	1.1	0.6						
	4000	13.6	345	45	50	4.1	4.1	3.5	2.9	2.3	1.7	1.2	0.6						
	6000	13.5	328	45	50	4.4	4.3	3.7	3.0	2.4	1.8	1.2	0.6						
	8000	13.4	313	45	50	4.6	4.5	3.8	3.2	2.6	1.9	1.3	0.6						
	10000	13.3	296	45	50	4.8	4.7	4.1	3.4	2.7	2.0	1.4	0.7						
	12000	13.3	285	45	50	5.0	4.9	4.2	3.5	2.8	2.1	1.4	0.7						
	14000	13.4	275	44	49	5.2	5.1	4.4	3.6	2.9	2.2	1.5	0.7						
	16000	13.4	266	44	49	5.4	5.3	4.5	3.8	3.0	2.3	1.5	0.8						
	18000	13.4	257	43	48	5.6	5.4	4.7	3.9	3.1	2.3	1.6	0.8						
5000	20000	13.4	250	42	47	5.7	5.6	4.8	4.0	3.2	2.4	1.6	0.8						
5500	SL	14.7	387	48	53	3.7	3.6	3.1	2.6	2.1	1.5	1.0	0.5						
	2000	14.7	371	47	52	3.9	3.8	3.2	2.7	2.2	1.6	1.1	0.5						
	4000	14.7	356	47	52	4.0	3.9	3.4	2.8	2.3	1.7	1.1	0.6						
	6000	14.5	339	47	52	4.2	4.1	3.5	3.0	2.4	1.8	1.2	0.6						
	8000	14.5	323	47	52	4.4	4.3	3.7	3.1	2.5	1.9	1.2	0.6						
	10000	14.4	308	47	52	4.6	4.5	3.9	3.2	2.6	1.9	1.3	0.6						
	12000	14.5	298	46	51	4.8	4.7	4.0	3.4	2.7	2.0	1.3	0.7						
	14000	14.5	287	46	51	5.0	4.9	4.2	3.5	2.8	2.1	1.4	0.7						
	16000	14.6	277	45	50	5.2	5.1	4.3	3.6	2.9	2.2	1.4	0.7						
	18000	14.6	270	44	49	5.3	5.2	4.4	3.7	3.0	2.2	1.5	0.7						
5500	20000	14.7	265	43	48	5.4	5.3	4.5	3.8	3.0	2.3	1.5	0.8						

REMARKS:

1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.
4. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-20. Maximum endurance chart D (Sheet 1 of 5)

MAXIMUM ENDURANCE
STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE																
			FUEL FLOW	IAS KNOTS		1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB/HR	N	R														
6000	SL	15.8	398	50	56	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	2000	15.8	381	49	55	3.8	3.7	3.1	2.6	2.1	1.6	1.0	0.5						
	4000	15.6	365	49	55	3.9	3.8	3.3	2.7	2.2	1.6	1.1	0.5						
	6000	15.5	349	49	55	4.1	4.0	3.4	2.9	2.3	1.7	1.1	0.6						
	8000	15.5	334	49	55	4.3	4.2	3.6	3.0	2.4	1.8	1.2	0.6						
	10000	15.5	320	48	53	4.5	4.4	3.8	3.1	2.5	1.9	1.3	0.6						
	12000	15.6	310	48	53	4.6	4.5	3.9	3.2	2.6	1.9	1.3	0.6						
	14000	15.6	299	47	52	4.8	4.7	4.0	3.3	2.7	2.0	1.3	0.7						
	16000	15.7	290	46	51	4.9	4.8	4.1	3.5	2.8	2.1	1.4	0.7						
	18000	16.0	286	44	49	5.0	4.9	4.2	3.5	2.8	2.1	1.4	0.7						
6000	20000	16.0	286	44	49	5.0	4.9	4.2	3.5	2.8	2.1	1.4	0.7						
6500	SL	16.8	408	51	57	3.5	3.4	2.9	2.5	2.0	1.5	1.0	0.5						
	2000	16.7	390	51	57	3.7	3.6	3.1	2.6	2.1	1.5	1.0	0.5						
	4000	16.6	374	51	57	3.8	3.7	3.2	2.7	2.1	1.6	1.1	0.5						
	6000	16.5	359	50	56	4.0	3.9	3.3	2.8	2.2	1.7	1.1	0.6						
	8000	16.5	344	50	56	4.2	4.1	3.5	2.9	2.3	1.7	1.2	0.6						
	10000	16.6	331	49	55	4.3	4.2	3.6	3.0	2.4	1.8	1.2	0.6						
	12000	16.7	322	49	55	4.4	4.4	3.7	3.1	2.5	1.9	1.2	0.6						
	14000	16.9	312	48	53	4.6	4.5	3.8	3.2	2.6	1.9	1.3	0.6						
	16000	17.2	306	46	51	4.7	4.6	3.9	3.3	2.6	2.0	1.3	0.7						
	18000	18.0	309	44	49	4.6	4.5	3.9	3.2	2.6	1.9	1.3	0.6						
6500	20000	20.1	329	42	47	4.3	4.3	3.6	3.0	2.4	1.8	1.2	0.6						

REMARKS:
1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.
4. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-20. Maximum endurance chart D (Sheet 2 of 5)

MAXIMUM ENDURANCE

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Categoty II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
7000	SL	17.8	417	53	59	3.4	3.4	2.9	2.4	1.9	1.4	1.0	0.5						
	2000	17.6	398	53	59	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	4000	17.5	383	52	58	3.7	3.7	3.1	2.6	2.1	1.6	1.0	0.5						
	6000	17.5	369	52	58	3.9	3.8	3.3	2.7	2.2	1.6	1.1	0.5						
	8000	17.6	355	51	57	4.0	3.9	3.4	2.8	2.3	1.7	1.1	0.6						
	10000	17.8	343	50	56	4.2	4.1	3.5	2.9	2.3	1.7	1.2	0.6						
	12000	18.0	335	49	55	4.3	4.2	3.6	3.0	2.4	1.8	1.2	0.6						
	14000	18.4	329	48	53	4.3	4.3	3.6	3.0	2.4	1.8	1.2	0.6						
	16000	19.3	331	46	51	4.3	4.2	3.6	3.0	2.4	1.8	1.2	0.6						
7000	18000	21.5	353	45	49	4.1	4.0	3.4	2.8	2.3	1.7	1.1	0.6						
7500	SL	18.6	426	55	61	3.4	3.3	2.8	2.3	1.9	1.4	0.9	0.5						
	2000	18.5	408	54	60	3.5	3.4	2.9	2.5	2.0	1.5	1.0	0.5						
	4000	18.5	394	54	60	3.6	3.6	3.0	2.5	2.0	1.5	1.0	0.5						
	6000	18.6	380	53	59	3.8	3.7	3.2	2.6	2.1	1.6	1.1	0.5						
	8000	18.8	367	52	58	3.9	3.8	3.3	2.7	2.2	1.6	1.1	0.5						
	10000	19.0	357	51	57	4.0	3.9	3.4	2.8	2.2	1.7	1.1	0.6						
	12000	19.5	353	50	56	4.1	4.0	3.4	2.8	2.3	1.7	1.1	0.6						
	14000	20.5	354	48	53	4.0	4.0	3.4	2.8	2.3	1.7	1.1	0.6						
	16000	22.7	372	46	51	3.8	3.8	3.2	2.7	2.1	1.6	1.1	0.5						
7500	18000	27.6	436	44	48	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						

REMARKS:

1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.
4. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-20. Maximum endurance chart D (Sheet 3 of 5)

MAXIMUM ENDURANCE

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE FUEL FLOW	IAS KNOTS		1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB/HR	N	R														
8000	SL	19.5	434	56	62	3.3	3.2	2.8	2.3	1.8	1.4	0.9	0.5						
	2000	19.5	418	56	62	3.4	3.3	2.9	2.4	1.9	1.4	1.0	0.5						
	4000	19.6	405	55	61	3.5	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	6000	19.8	392	54	60	3.6	3.6	3.1	2.6	2.0	1.5	1.0	0.5						
	8000	20.1	381	53	59	3.8	3.7	3.2	2.6	2.1	1.6	1.1	0.5						
	10000	20.6	376	52	58	3.8	3.7	3.2	2.7	2.1	1.6	1.1	0.5						
	12000	21.7	378	50	56	3.8	3.7	3.2	2.6	2.1	1.6	1.1	0.5						
	14000	23.8	393	48	53	3.6	3.6	3.1	2.5	2.0	1.5	1.0	0.5						
8000	16000	28.0	442	45	51	3.2	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
8500	SL	20.5	444	58	63	3.2	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	2000	20.6	429	56	62	3.3	3.3	2.8	2.3	1.9	1.4	0.9	0.5						
	4000	20.8	417	56	62	3.4	3.4	2.9	2.4	1.9	1.4	1.0	0.5						
	6000	21.1	406	55	61	3.5	3.4	3.0	2.5	2.0	1.5	1.0	0.5						
	8000	21.7	399	54	60	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	10000	22.8	401	52	58	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	12000	24.8	416	50	56	3.4	3.4	2.9	2.4	1.9	1.4	1.0	0.5						
8500	14000	28.6	456	47	52	3.1	3.1	2.6	2.2	1.8	1.3	0.9	0.4						

REMARKS:

1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.
4. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-20. Maximum endurance chart D (Sheet 4 of 5)

MAXIMUM ENDURANCE

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
9000	SL	21.5	455	59	66	3.1	3.1	2.6	2.2	1.8	1.3	0.9	0.4						
	2000	21.8	441	58	65	3.2	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	4000	22.1	431	57	63	3.3	3.2	2.8	2.3	1.9	1.4	0.9	0.5						
	6000	22.7	424	56	62	3.4	3.3	2.8	2.4	1.9	1.4	0.9	0.5						
	8000	23.8	424	54	60	3.4	3.3	2.8	2.4	1.9	1.4	0.9	0.5						
	10000	25.8	437	52	58	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
9000	12000	29.3	474	49	55	3.0	3.0	2.5	2.1	1.7	1.3	0.8	0.4						
9500	SL	22.7	467	60	67	3.1	3.0	2.6	2.1	1.7	1.3	0.9	0.4						
	2000	23.1	456	59	65	3.1	3.1	2.6	2.2	1.8	1.3	0.9	0.4						
	4000	23.7	449	57	63	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						
	6000	24.8	448	56	62	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						
	8000	26.6	459	54	60	3.1	3.0	2.6	2.2	1.7	1.3	0.9	0.4						
9500	10000	29.8	490	51	57	2.9	2.9	2.4	2.0	1.6	1.2	0.8	0.4						

REMARKS:

1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.
4. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-20. Maximum endurance chart D (Sheet 5 of 5)

MAXIMUM ENDURANCE

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
5000	S.L.	13.5	398.4	47	51	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	2000	13.6	376.1	46	50	3.8	3.7	3.2	2.7	2.1	1.6	1.1	0.5						
	4000	13.6	355.2	46	50	4.0	3.9	3.4	2.8	2.3	1.7	1.1	0.6						
	6000	13.5	336.0	46	50	4.3	4.2	3.6	3.0	2.4	1.8	1.2	0.6						
	8000	13.4	318.9	46	50	4.5	4.4	3.8	3.1	2.5	1.9	1.3	0.6						
	10000	13.3	302.1	46	50	4.7	4.6	4.0	3.3	2.6	2.0	1.3	0.7						
	12000	13.3	288.4	45	49	5.0	4.9	4.2	3.5	2.8	2.1	1.4	0.7						
	14000	13.4	275.3	45	49	5.2	5.1	4.4	3.6	2.9	2.2	1.5	0.7						
	16000	13.4	263.9	45	49	5.4	5.3	4.5	3.8	3.0	2.3	1.5	0.8						
	18000	13.4	252.9	44	48	5.7	5.5	4.7	4.0	3.2	2.4	1.6	0.8						
5000	20000	13.4	242.3	43	47	5.9	5.8	5.0	4.1	3.3	2.5	1.7	0.8						
5500	S.L.	14.7	408.8	49	58	3.5	3.4	2.9	2.4	2.0	1.5	1.0	0.5						
	2000	14.7	386.3	48	52	3.7	3.6	3.1	2.6	2.1	1.6	1.0	0.5						
	4000	14.7	364.3	48	52	3.9	3.8	3.3	2.7	2.2	1.6	1.1	0.5						
	6000	14.5	344.5	48	52	4.2	4.1	3.5	2.9	2.3	1.7	1.2	0.6						
	8000	14.5	327.9	48	52	4.4	4.3	3.7	3.0	2.4	1.8	1.2	0.6						
	10000	14.4	311.9	47	51	4.6	4.5	3.8	3.2	2.6	1.9	1.3	0.6						
	12000	14.5	298.7	47	51	4.8	4.7	4.0	3.3	2.7	2.0	1.3	0.7						
	14000	14.5	285.7	46	50	5.0	4.9	4.2	3.5	2.8	2.1	1.4	0.7						
	16000	14.6	274.0	46	50	5.2	5.1	4.4	3.6	2.9	2.2	1.5	0.7						
	18000	14.6	263.5	45	49	5.4	5.3	4.6	3.8	3.0	2.3	1.5	0.8						
5500	20000	14.7	254.2	43	47	5.6	5.5	4.7	3.9	3.1	2.4	1.6	0.8						

REMARKS:

1. Engine specification fuel flow increased 5% per MIL-M-7700A.
2. Endurance not shown where power required exceeds power available.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-21. Maximum endurance chart **H** (Sheet 1 of 5)

MAXIMUM ENDURANCE

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
6000	S.L.	15.8	418.6	50	55	3.4	3.3	2.9	2.4	1.9	1.4	1.0	0.5						
	2000	15.8	395.4	50	55	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	4000	15.6	372.5	50	55	3.8	3.8	3.2	2.7	2.1	1.6	1.1	0.5						
	6000	15.5	352.9	50	55	4.1	4.0	3.4	2.8	2.3	1.7	1.1	0.6						
	8000	15.5	337.1	49	53	4.2	4.2	3.6	3.0	2.4	1.8	1.2	0.6						
	10000	15.5	322.0	49	53	4.4	4.3	3.7	3.1	2.5	1.9	1.2	0.6						
	12000	15.6	308.9	48	52	4.6	4.5	3.9	3.2	2.6	1.9	1.3	0.6						
	14000	15.6	295.9	48	52	4.8	4.7	4.1	3.4	2.7	2.0	1.4	0.7						
	16000	15.7	284.5	47	51	5.0	4.9	4.2	3.5	2.8	2.1	1.4	0.7						
	18000	16.0	275.9	45	49	5.2	5.1	4.3	3.6	2.9	2.2	1.4	0.7						
6000	20000	16.6	271.4	44	48	5.3	5.2	4.4	3.7	2.9	2.2	1.5	0.7						
6500	S.L.	16.8	427.5	52	57	3.3	3.3	2.8	2.3	1.9	1.4	0.9	0.5						
	2000	16.7	403.7	52	57	3.5	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	4000	16.6	380.5	52	57	3.8	3.7	3.2	2.6	2.1	1.6	1.1	0.5						
	6000	16.5	361.5	51	56	4.0	3.9	3.3	2.8	2.2	1.7	1.1	0.6						
	8000	16.5	346.6	51	56	4.1	4.0	3.5	2.9	2.3	1.7	1.2	0.6						
	10000	16.6	332.2	50	55	4.3	4.2	3.6	3.0	2.4	1.8	1.2	0.6						
	12000	16.7	319.3	50	55	4.5	4.4	3.8	3.1	2.5	1.9	1.3	0.6						
	14000	16.9	307.0	48	52	4.7	4.6	3.9	3.3	2.6	2.0	1.3	0.7						
	16000	17.2	297.7	47	51	4.8	4.7	4.0	3.4	2.7	2.0	1.3	0.7						
	18000	18.0	294.8	45	49	4.9	4.7	4.1	3.4	2.7	2.0	1.4	0.7						
6500	20000	20.1	304.5	43	47	4.7	4.6	3.9	3.3	2.6	2.0	1.3	0.7						

REMARKS:

1. Engine specification fuel flow increased 5% per MIL-M-7700A.
2. Endurance not shown where power required exceeds power available.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-21. Maximum endurance chart H (Sheet 2 of 5)

MAXIMUM ENDURANCE

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
7000	S.L.	17.8	435.9	54	59	3.3	3.2	2.8	2.3	1.8	1.4	0.9	0.5						
	2000	17.6	411.6	54	59	3.5	3.4	2.9	2.4	1.9	1.5	1.0	0.5						
	4000	17.5	388.8	53	58	3.7	3.6	3.1	2.6	2.1	1.5	1.0	0.5						
	6000	17.5	370.4	53	58	3.9	3.8	3.2	2.7	2.2	1.6	1.1	0.5						
	8000	17.6	356.4	52	57	4.0	3.9	3.4	2.8	2.2	1.7	1.1	0.6						
	10000	17.8	342.9	51	56	4.2	4.1	3.5	2.9	2.3	1.7	1.2	0.6						
	12000	18.0	330.9	50	55	4.3	4.2	3.6	3.0	2.4	1.8	1.2	0.6						
	14000	18.4	320.8	49	53	4.5	4.4	3.7	3.1	2.5	1.9	1.2	0.6						
	16000	19.3	317.3	47	51	4.5	4.4	3.8	3.2	2.5	1.9	1.3	0.6						
	18000	21.5	328.3	45	49	4.4	4.3	3.7	3.0	2.4	1.8	1.2	0.6						
7000	20000	26.8	370.0	42	46	3.9	3.8	3.2	2.7	2.2	1.6	1.1	0.5						
7500	S.L.	18.6	443.8	55	60	3.2	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	2000	18.5	419.7	55	60	3.4	3.3	2.9	2.4	1.9	1.4	1.0	0.5						
	4000	18.5	397.4	55	60	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	6000	18.6	379.8	54	59	3.8	3.7	3.2	2.6	2.1	1.6	1.1	0.5						
	8000	18.8	366.9	53	58	3.9	3.8	3.3	2.7	2.2	1.6	1.1	0.5						
	10000	19.0	355.0	52	57	4.0	3.9	3.4	2.8	2.3	1.7	1.1	0.6						
	12000	19.5	345.5	51	56	4.1	4.1	3.5	2.9	2.3	1.7	1.2	0.6						
	14000	20.5	340.9	49	53	4.2	4.1	3.5	2.9	2.3	1.8	1.2	0.6						
	16000	22.7	349.5	47	51	4.1	4.0	3.4	2.9	2.3	1.7	1.1	0.6						
7500	18000	27.6	387.4	44	48	3.7	3.6	3.1	2.6	2.1	1.5	1.0	0.5						

REMARKS:

1. Engine specification fuel flow increased 5% per MIL-M-7700A.
2. Endurance not shown where power required exceeds power available.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-21. Maximum endurance chart H (Sheet 3 of 5).

MAXIMUM ENDURANCE

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
8000	S.L.	19.5	451.6	57	62	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						
	2000	19.5	428.4	56	61	3.3	3.3	2.8	2.3	1.9	1.4	0.9	0.5						
	4000	19.6	406.8	56	61	3.5	3.4	2.9	2.5	2.0	1.5	1.0	0.5						
	6000	19.8	390.2	55	60	3.7	3.6	3.1	2.6	2.1	1.5	1.0	0.5						
	8000	20.1	378.9	54	59	3.8	3.7	3.2	2.6	2.1	1.6	1.1	0.5						
	10000	20.6	370.0	53	58	3.9	3.8	3.2	2.7	2.2	1.6	1.1	0.5						
	12000	21.7	365.9	51	56	3.9	3.8	3.3	2.7	2.2	1.6	1.1	0.5						
	14000	23.8	371.6	49	53	3.8	3.8	3.2	2.7	2.2	1.6	1.1	0.5						
8000	16000	28.0	400.5	46	50	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
8500	S.L.	20.5	460.0	58	63	3.1	3.0	2.6	2.2	1.7	1.3	0.9	0.4						
	2000	20.6	437.8	57	62	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	4000	20.8	417.1	57	62	3.4	3.4	2.9	2.4	1.9	1.4	1.0	0.5						
	6000	21.1	402.0	56	61	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	8000	21.7	393.7	55	60	3.6	3.6	3.0	2.5	2.0	1.5	1.0	0.5						
	10000	22.8	390.2	53	58	3.7	3.6	3.1	2.6	2.1	1.5	1.0	0.5						
	12000	24.8	395.5	51	56	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
8500	14000	28.6	418.4	48	52	3.4	3.3	2.9	2.4	1.9	1.4	1.0	0.5						

REMARKS:

1. Engine specification fuel flow increased 5% per MIL-M-7700A.
2. Endurance not shown where power required exceeds power available.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-21. Maximum endurance chart H (Sheet 4 of 5)

MAXIMUM ENDURANCE

STANDARD DAY

ENGINE SPEED 6400 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: AFFTC Category II (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROXIMATE			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	IAS KNOTS															
POUNDS	FEET	PSIG	LB/HR	N	R														
9000	S.L.	21.5	469.5	59	64	3.0	3.0	2.6	2.1	1.7	1.3	0.9	0.4						
	2000	21.8	448.3	59	64	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						
	4000	22.1	429.0	58	63	3.3	3.3	2.8	2.3	1.9	1.4	0.9	0.5						
	6000	22.7	416.4	56	61	3.4	3.4	2.9	2.4	1.9	1.4	1.0	0.5						
	8000	23.8	413.0	55	60	3.5	3.4	2.9	2.4	1.9	1.5	1.0	0.5						
	10000	25.8	418.2	53	58	3.4	3.3	2.9	2.4	1.9	1.4	1.0	0.5						
	12000	29.3	438.5	50	55	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
9000	14000	35.5	487.4	47	51	2.9	2.9	2.5	2.1	1.6	1.2	0.8	0.4						
9500	S.L.	22.7	480.1	61	67	3.0	2.9	2.5	2.1	1.7	1.2	0.8	0.4						
	2000	23.1	460.2	60	66	3.1	3.0	2.6	2.2	1.7	1.3	0.9	0.4						
	4000	23.7	443.2	58	63	3.2	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	6000	24.8	434.8	57	62	3.3	3.2	2.8	2.3	1.8	1.4	0.9	0.5						
	8000	26.6	438.9	55	60	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	10000	29.8	457.0	52	57	3.1	3.1	2.6	2.2	1.8	1.3	0.9	0.4						
9500	12000	35.4	499.1	49	53	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						

REMARKS:

1. Engine specification fuel flow increased 5% per MIL-M-7700A.
2. Endurance not shown where power required exceeds power available.
3. IAS in knots shown for nose-mounted (N) or roof-mounted (R) pitot tube.

Chart 14-21. Maximum endurance chart H (Sheet 5 of 5)

HOVERING ENDURANCE

STANDARD DAY

ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX.			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	SPEED/KNTS															
POUNDS	FEET	PSIG	LB/HR	TAS	CAS														
5000	2000	23.3	467	0	0	3.1	3.0	2.6	2.1	1.7	1.3	0.9	0.4						
	4000	23.2	453	0	0	3.2	3.1	2.6	2.2	1.8	1.3	0.9	0.4						
	6000	23.2	438	0	0	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	8000	23.1	424	0	0	3.4	3.3	2.8	2.4	1.9	1.4	0.9	0.5						
	10000	23.1	413	0	0	3.5	3.4	2.9	2.4	1.9	1.5	1.0	0.5						
	12000	23.2	403	0	0	3.5	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	14000	23.4	395	0	0	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	16000	23.7	392	0	0	3.7	3.6	3.1	2.6	2.0	1.5	1.0	0.5						
	18000	24.2	395	0	0	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	20000	24.7	400	0	0	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
5500	0	25.6	507	0	0	2.8	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	2000	25.5	493	0	0	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	4000	25.5	478	0	0	3.0	2.9	2.5	2.1	1.7	1.3	0.8	0.4						
	6000	25.4	465	0	0	3.1	3.0	2.6	2.2	1.7	1.3	0.9	0.4						
	8000	25.5	453	0	0	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						
	10000	25.7	443	0	0	3.2	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	12000	25.9	437	0	0	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	14000	26.3	432	0	0	3.3	3.2	2.8	2.3	1.9	1.4	0.9	0.5						
	16000	26.8	433	0	0	3.3	3.2	2.8	2.3	1.8	1.4	0.9	0.5						
	18000	27.3	439	8	6	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	20000	25.6	413	14	10	3.5	3.4	2.9	2.4	1.9	1.5	1.0	0.5						

REMARKS:
1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.

Chart 14-22. Hovering endurance chart D (Sheet 1 of 4)

HOVERING ENDURANCE

STANDARD DAY

ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX.			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	SPEED/KNTS															
POUNDS	FEET	PSIG	LB/HR	TAS	CAS														
6000	0	27.8	533	0	0	2.7	2.6	2.3	1.9	1.5	1.1	0.8	0.4						
	2000	27.7	518	0	0	2.8	2.7	2.3	1.9	1.5	1.2	0.8	0.4						
	4000	27.8	506	0	0	2.8	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	6000	27.9	494	0	0	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	8000	28.1	486	0	0	2.9	2.9	2.5	2.1	1.6	1.2	0.8	0.4						
	10000	28.4	479	0	0	3.0	2.9	2.5	2.1	1.7	1.3	0.8	0.4						
	12000	28.9	477	0	0	3.0	2.9	2.5	2.1	1.7	1.3	0.8	0.4						
	14000	29.5	477	0	0	3.1	2.9	2.5	2.1	1.7	1.3	0.8	0.4						
	16000	28.9	463	11	9	3.1	3.0	2.6	2.2	1.7	1.3	0.9	0.4						
	18000	27.3	439	16	12	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	20000	25.6	413	20	15	3.5	3.5	2.9	2.4	1.9	1.5	1.0	0.5						
6500	0	30.1	559	0	0	2.6	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	2000	30.1	547	0	0	2.6	2.6	2.2	1.8	1.5	1.1	0.7	0.4						
	4000	30.3	537	0	0	2.7	2.6	2.2	1.9	1.5	1.1	0.7	0.4						
	6000	30.5	529	0	0	2.7	2.6	2.3	1.9	1.5	1.1	0.8	0.4						
	8000	30.9	525	0	0	2.7	2.7	2.3	1.9	1.5	1.1	0.8	0.4						
	10000	31.4	523	0	0	2.7	2.7	2.3	1.9	1.5	1.1	0.8	0.4						
	12000	32.1	526	0	0	2.7	2.7	2.3	1.9	1.5	1.1	0.8	0.4						
	14000	30.6	494	13	10	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	16000	28.9	463	17	13	3.1	3.0	2.6	2.2	1.7	1.3	0.9	0.4						
	18000	27.3	439	21	16	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	20000	25.6	413	26	19	3.5	3.4	2.9	2.4	1.9	1.5	1.0	0.5						

REMARKS:
1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.

Chart 14-22. Hovering endurance chart D (Sheet 2 of 4)

HOVERING ENDURANCE

STANDARD DAY

ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX.			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	SPEED/KNTS															
POUNDS	FEET	PSIG	LB/HR	TAS	CAS														
7000	0	32.5	587	0	0	2.4	2.4	2.0	1.7	1.4	1.0	0.7	0.3						
	2000	32.6	580	0	0	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						
	4000	32.9	574	0	0	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						
	6000	33.4	571	0	0	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	8000	34.0	572	0	0	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						
	10000	33.9	563	10	8	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	12000	32.2	528	14	12	2.7	2.7	2.3	1.9	1.5	1.1	0.8	0.4						
	14000	30.6	494	18	14	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	16000	28.9	463	22	17	3.1	3.0	2.6	2.2	1.7	1.3	0.9	0.4						
	18000	27.3	439	27	20	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
7500	0	35.0	620	0	0	2.3	2.3	1.9	1.6	1.3	1.0	0.6	0.3						
	2000	35.4	617	0	0	2.3	2.3	1.9	1.6	1.3	1.0	0.6	0.3						
	4000	35.9	618	0	0	2.3	2.3	1.9	1.6	1.3	1.0	0.6	0.3						
	6000	36.5	622	0	0	2.3	2.3	1.9	1.6	1.3	1.0	0.6	0.3						
	8000	35.7	600	11	10	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						
	10000	33.9	563	15	13	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	12000	32.2.	528	19	15	2.7	2.7	2.3	1.9	1.5	1.1	0.8	0.4						
	14000	30.6	494	23	18	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	16000	28.9	27	21	3.1	3.0	2.6	2.2	1.7	1.7	1.3	0.9	0.4						

REMARKS:
1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.

Chart 14-22. Hovering endurance chart **D** (Sheet 3 of 4)

HOVERING ENDURANCE
STANDARD DAY
ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: November 1964
DATA BASIS: AFFTC Category II Flight Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LBS/GAL.

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX.			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	SPEED/KNTS															
POUNDS	FEET	PSIG	LB/HR	TAS	CAS														
8000	0	37.8	658	0	0	2.2	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	2000	38.3	661	0	0	2.2	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	4000	39.0	668	0	0	2.1	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	6000	37.4	637	12	11	2.2	2.2	1.9	1.6	1.3	0.9	0.6	0.3						
	8000	35.7	600	15	14	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						
	10000	33.9	563	19	16	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	12000	32.3	528	23	19	2.7	2.7	2.3	1.9	1.5	1.1	0.8	0.4						
	14000	30.6	494	27	22	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
8500	0	40.7	704	0	0	2.0	2.0	1.7	1.4	1.1	0.9	0.6	0.3						
	4000	39.2	671	13	12	2.1	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	6000	37.4	637	16	15	2.2	2.2	1.9	1.6	1.3	0.9	0.6	0.3						
	8000	35.7	600	19	17	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						
	10000	33.9	563	23	20	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	12000	32.2	528	27	23	2.7	2.7	2.3	1.9	1.5	1.1	0.8	0.4						
9000	4000	39.2	671	16	15	2.1	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	6000	37.4	637	19	18	2.2	2.2	1.9	1.6	1.3	0.9	0.6	0.3						
	8000	35.7	600	23	20	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						
	10000	33.9	563	27	23	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
9500	2000	41.0	705	16	16	2.0	2.0	1.7	1.4	1.1	0.9	0.6	0.3						
	4000	39.2	671	20	18	2.1	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	6000	37.4	637	23	21	2.2	2.2	1.9	1.6	1.3	0.9	0.6	0.3						
	8000	35.7	600	27	24	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						

REMARKS:
1. Fuel used for warm-up and take-off is 23 pounds.
2. Specification fuel flow increased 5% per MIL-M-7700A.
3. Endurance not shown where power required exceeds normal rated power available.

Chart 14-22. Hovering endurance chart D (Sheet 4 of 4)

HOVERING ENDURANCE

STANDARD DAY

ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX.			1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
			FUEL FLOW	SPEED/KNTS															
POUNDS	FEET	PSIG	LB/HR	TAS	CAS														
5000	2000	23.3	476.1	0	0	3.0	2.9	2.5	2.1	1.7	1.3	0.8	0.4						
	4000	23.2	453.4	0	0	3.2	3.1	2.6	2.2	1.8	1.3	0.9	0.4						
	6000	23.2	433.9	0	0	3.3	3.2	2.8	2.3	1.8	1.4	0.9	0.5						
	8000	23.1	417.8	0	0	3.4	3.4	2.9	2.4	1.9	1.4	1.0	0.5						
	10000	23.1	402.2	0	0	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	12000	23.2	389.6	0	0	3.7	3.6	3.1	2.6	2.1	1.5	1.0	0.5						
	14000	23.4	378.0	0	0	3.8	3.7	3.2	2.6	2.1	1.6	1.1	0.5						
	16000	23.7	369.2	0	0	3.9	3.8	3.3	2.7	2.2	1.6	1.1	0.5						
	18000	24.2	363.3	0	0	3.9	3.9	3.3	2.8	2.2	1.7	1.1	0.6						
5000	20000	24.7	358.5	0	0	4.0	3.9	3.3	2.8	2.2	1.7	1.1	0.6						
5500	SL	25.6	520.9	0	0	2.7	2.7	2.3	1.9	1.5	1.2	0.8	0.4						
	2000	25.5	496.4	0	0	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	4000	25.5	474.3	0	0	3.0	3.0	2.5	2.1	1.7	1.3	0.8	0.4						
	6000	25.4	455.7	0	0	3.1	3.1	2.6	2.2	1.8	1.3	0.9	0.4						
	8000	25.5	440.8	0	0	3.2	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	10000	25.7	426.8	0	0	3.4	3.3	2.8	2.3	1.9	1.4	0.9	0.5						
	12000	25.9	415.9	0	0	3.4	3.4	2.9	2.4	1.9	1.4	1.0	0.5						
	14000	26.3	406.4	0	0	3.5	3.4	3.0	2.5	2.0	1.5	1.0	0.5						
	16000	26.8	399.8	0	0	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
	18000	27.4	396.3	0	0	3.6	3.5	3.0	2.5	2.0	1.5	1.0	0.5						
5500	20000	28.2	393.9	0	0	3.6	3.6	3.0	2.5	2.0	1.5	1.0	0.5						

REMARKS:

1. Engine Specification fuel flow increased 5% per MIL-M-7700A
2. Endurance data not shown where power required exceeds normal rated power available.

Chart 14-23. Hovering endurance chart **H** (Sheet 1 of 5)

HOVERING ENDURANCE

STANDARD DAY

ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX. FUEL FLOW	APPROX. SPEED/KNTS		1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB/HR	TAS	CAS														
6000	SL	27.8	540.9	0	0	2.6	2.6	2.2	1.8	1.5	1.1	0.7	0.4						
	2000	27.7	517.1	0	0	2.8	2.7	2.3	1.9	1.5	1.2	0.8	0.4						
	4000	27.8	496.2	0	0	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	6000	27.9	479.1	0	0	3.0	2.9	2.5	2.1	1.7	1.3	0.8	0.4						
	8000	28.1	466.0	0	0	3.1	3.0	2.6	2.1	1.7	1.3	0.9	0.4						
	10000	28.4	454.2	0	0	3.1	3.1	2.6	2.2	1.8	1.3	0.9	0.4						
	12000	28.9	445.5	0	0	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						
	14000	29.5	438.1	0	0	3.3	3.2	2.7	2.3	1.8	1.4	0.9	0.5						
	16000	30.2	434.0	0	0	3.3	3.2	2.8	2.3	1.8	1.4	0.9	0.5						
	18000	31.0	432.7	0	0	3.3	3.2	2.8	2.3	1.8	1.4	0.9	0.5						
6000	20000	31.8	432.1	0	0	3.3	3.2	2.8	2.3	1.9	1.4	0.9	0.5						
6500	SL	30.1	561.5	0	0	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	2000	30.1	538.9	0	0	2.7	2.6	2.2	1.9	1.5	1.1	0.7	0.4						
	4000	30.3	519.8	0	0	2.8	2.7	2.3	1.9	1.5	1.2	0.8	0.4						
	6000	30.5	504.7	0	0	2.8	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	8000	30.9	493.8	0	0	2.9	2.8	2.4	2.0	1.6	1.2	0.8	0.4						
	10000	31.4	484.5	0	0	3.0	2.9	2.5	2.1	1.7	1.2	0.8	0.4						
	12000	32.1	478.1	0	0	3.0	2.9	2.5	2.1	1.7	1.3	0.8	0.4						
	14000	32.9	473.2	0	0	3.0	3.0	2.5	2.1	1.7	1.3	0.8	0.4						
	16000	33.7	471.2	0	0	3.0	3.0	2.5	2.1	1.7	1.3	0.8	0.4						
	18000	34.6	471.6	0	0	3.0	3.0	2.5	2.1	1.7	1.3	0.8	0.4						
6500	20000	33.6	451.7	15	11	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						

REMARKS:

1. Engine Specification fuel flow increased 5% per MIL-M-7700A
2. Endurance data not shown where power required exceeds normal rated power available.

Chart 14-23. Hovering endurance chart **H** (Sheet 2 of 5)

HOVERING ENDURANCE
STANDARD DAY
ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s):Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX. FUEL FLOW	SPEED/KNTS		1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB/HR	TAS	CAS														
7000	SL	32.5	583.5	0	0	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						
	2000	32.6	562.4	0	0	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	4000	32.9	545.3	0	0	2.6	2.6	2.2	1.8	1.5	1.1	0.7	0.4						
	6000	33.4	532.5	0	0	2.7	2.6	2.3	1.9	1.5	1.1	0.8	0.4						
	8000	34.0	524.1	0	0	2.7	2.7	2.3	1.9	1.5	1.1	0.8	0.4						
	10000	34.7	517.2	0	0	2.8	2.7	2.3	1.9	1.5	1.2	0.8	0.4						
	12000	35.5	513.4	0	0	2.8	2.7	2.3	1.9	1.6	1.2	0.8	0.4						
	14000	36.4	510.9	0	0	2.8	2.7	2.3	2.0	1.6	1.2	0.8	0.4						
	16000	37.4	510.8	0	0	2.8	2.7	2.3	2.0	1.6	1.2	0.8	0.4						
	18000	35.6	482.4	15	11	3.0	2.9	2.5	2.1	1.7	1.2	0.8	0.4						
7000	20000	33.6	451.7	15	11	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						
7500	SL	35.0	607.1	0	0	2.4	2.3	2.0	1.6	1.3	1.0	0.7	0.3						
	2000	35.4	587.9	0	0	2.4	2.4	2.0	1.7	1.4	1.0	0.7	0.3						
	4000	35.9	573.1	0	0	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						
	6000	36.5	562.7	0	0	2.5	2.5	2.1	1.8	1.4	1.1	0.7	0.4						
	8000	37.3	556.7	0	0	2.6	2.5	2.2	1.8	1.4	1.1	0.7	0.4						
	10000	38.2	551.9	0	0	2.6	2.5	2.2	1.8	1.4	1.1	0.7	0.4						
	12000	39.1	550.6	0	0	2.6	2.5	2.2	1.8	1.5	1.1	0.7	0.4						
	14000	39.5	543.7	15	12	2.6	2.6	2.2	1.8	1.5	1.1	0.7	0.4						
	16000	37.5	512.7	15	12	2.8	2.7	2.3	2.0	1.6	1.2	0.8	0.4						
	18000	35.6	482.4	15	11	3.0	2.9	2.5	2.1	1.7	1.2	0.8	0.4						
7500	2000	33.6	451.7	15	11	3.2	3.1	2.7	2.2	1.8	1.3	0.9	0.4						

REMARKS:
1. Engine Specification fuel flow increased 5% per MIL-M-7700A
2. Endurance data not shown where power required exceeds normal rated power available.

Chart 14-23. Hovering endurance chart H (Sheet 3 of 5)

HOVERING ENDURANCE

STANDARD DAY

ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s):Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX. FUEL FLOW	APPROX. SPEED/KNTS TAS	CAS	1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB/HR	TAS	CAS														
8000	SL	37.8	632.6	0	0	2.3	2.2	1.9	1.6	1.3	0.9	0.6	0.3						
	2000	38.3	615.5	0	0	2.3	2.3	1.9	1.6	1.3	1.0	0.6	0.3						
	4000	39.0	603.3	0	0	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						
	6000	39.8	595.3	0	0	2.4	2.4	2.0	1.7	1.3	1.0	0.7	0.3						
	8000	40.7	591.2	0	0	2.4	2.4	2.0	1.7	1.4	1.0	0.7	0.3						
	10000	41.7	587.9	0	0	2.4	2.4	2.0	1.7	1.4	1.0	0.7	0.3						
	12000	41.4	574.7	15	12	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						
	14000	39.5	543.7	15	12	2.6	2.6	2.2	1.8	1.5	1.1	0.7	0.4						
	16000	37.5	512.7	15	12	2.8	2.7	2.3	2.0	1.6	1.2	0.8	0.4						
8000	18000	35.6	482.4	15	11	3.0	2.9	2.5	2.1	1.7	1.2	0.8	0.4						
8500	SL	40.7	660.1	0	0	2.2	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	2000	41.4	645.7	0	0	2.2	2.2	1.9	1.5	1.2	0.9	0.6	0.3						
	4000	42.3	635.9	0	0	2.2	2.2	1.9	1.6	1.3	0.9	0.6	0.3						
	6000	43.3	630.0	0	0	2.3	2.2	1.9	1.6	1.3	1.0	0.6	0.3						
	8000	44.3	627.4	0	0	2.3	2.2	1.9	1.6	1.3	1.0	0.6	0.3						
	10000	43.3	604.1	15	13	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						
	12000	41.4	574.7	15	12	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						
	14000	39.5	543.7	15	12	2.6	2.6	2.2	1.8	1.5	1.1	0.7	0.4						
8500	16000	37.5	512.7	15	12	2.8	2.7	2.3	2.0	1.6	1.2	0.8	0.4						

REMARKS:

1. Engine Specification fuel flow increased 5% per MIL-M-7700A
2. Endurance data not shown where power required exceeds normal rated power available.

Chart 14-23. Hovering endurance chart H (Sheet 4 of 5)

HOVERING ENDURANCE

STANDARD DAY

ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: NOVEMBER 1964
DATA BASIS: AFFTC Category II Test (FTC-TDR-64-27)

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL

GROSS WEIGHT	PRESS. ALT.	POWER SETTINGS				ENDURANCE - Hours													
		TORQUE PRESS	APPROX. FUEL FLOW	APPROX. SPEED KNTS		1430 LBS FUEL	1400 LBS FUEL	1200 LBS FUEL	1000 LBS FUEL	800 LBS FUEL	600 LBS FUEL	400 LBS FUEL	200 LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL	LBS FUEL
POUNDS	FEET	PSIG	LB HR	TAS	CAS														
9000	SL	43.8	689.9	0	0	2.1	2.0	1.7	1.4	1.2	0.9	0.6	0.3						
	2000	44.7	678.4	0	0	2.1	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	4000	45.7	671.1	0	0	2.1	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	6000	46.8	667.2	0	0	2.1	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	8000	45.3	637.2	15	13	2.2	2.2	1.9	1.6	1.3	0.9	0.6	0.3						
	10000	43.3	604.1	15	13	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						
	12000	41.4	574.7	15	12	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						
9000	14000	39.5	543.7	15	12	2.6	2.6	2.2	1.8	1.5	1.1	0.7	0.4						
9500	SL	47.1	721.9	0	0	2.0	1.9	1.7	1.4	1.1	0.8	0.6	0.3						
	2000	47.5	707.0	15	15	2.0	2.0	1.7	1.4	1.1	0.8	0.6	0.3						
	4000	47.5	689.8	15	14	2.1	2.0	1.7	1.4	1.2	0.9	0.6	0.3						
	6000	47.1	670.4	15	14	2.1	2.1	1.8	1.5	1.2	0.9	0.6	0.3						
	8000	45.3	637.2	15	13	2.2	2.2	1.9	1.6	1.3	0.9	0.6	0.3						
	10000	43.3	604.1	15	13	2.4	2.3	2.0	1.7	1.3	1.0	0.7	0.3						
9500	12000	41.4	574.7	15	12	2.5	2.4	2.1	1.7	1.4	1.0	0.7	0.3						

REMARKS:

1. Engine Specification fuel flow increased 5% per MIL-M-7700A
2. Endurance data not shown where power required exceeds normal rated power available.

Chart 14-23. Hovering endurance chart **H** (Sheet 5 of 5)

LANDING DISTANCE — FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 59 FT.				
5000	SL	0	0	0	0	0	0	0	0	0	0				
	2000	0	0	0	0	0	0	0	0	0	0				
	4000	0	0	0	0	0	0	0	0	0	0				
	6000	0	0	0	0	0	0	0	0	0	0				
	10000	0	0	0	0	0	0	0	0	0	0				
	12000	0	0	0	0	0	0	0	0	12	15				
	14000	0	0	0	0	0	0	11	12	17	29				
	16000	0	0	0	0	0	0	16	25	22	77				
	18000	0	0	0	0	13	18	20	72	26	98				
5000	20000	0	0	11	12	18	34	25	93	31	128				
5500	SL	0	0	0	0	0	0	0	0	0	0				
	2000	0	0	0	0	0	0	0	0	0	0				
	4000	0	0	0	0	0	0	0	0	0	0				
	6000	0	0	0	0	0	0	0	0	0	0				
	8000	0	0	0	0	0	0	0	0	9	8				
	10000	0	0	0	0	0	0	0	0	14	20				
	12000	0	0	0	0	0	0	12	16	18	36				
	14000	0	0	0	0	9	8	17	31	22	85				
	16000	0	0	0	0	14	22	21	79	27	109				
	18000	0	0	12	15	19	70	26	103	32	145				
5500	20000	11	14	18	34	24	95	32	139	41	217				

REMARKS:

1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when helicopter can hover OGE. When helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Landing distances include a 30 foot estimated skid distance where it is not possible to hover at a 2 foot skid height (IGE)
5. Landing distances not shown above 20,000 feet or cruise ceiling.

Chart 14-24. Landing distance chart - power on D (Sheet 1 of 5)

LANDING DISTANCE — FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 59 FT.				
6000	SL	0	0	0	0	0	0	0	0	0	0				
	2000	0	0	0	0	0	0	0	0	0	0				
	4000	0	0	0	0	0	0	0	0	0	0				
	6000	0	0	0	0	0	0	0	0	10	11				
	8000	0	0	0	0	0	0	0	0	14	25				
	10000	0	0	0	0	0	0	13	19	19	71				
	12000	0	0	0	0	9	10	17	35	23	92				
	14000	0	0	0	0	15	25	22	85	27	119				
	16000	0	0	12	17	19	75	26	111	33	159				
	18000	12	16	18	38	25	102	32	151	42	242				
6000	20000	18	39	24	98	31	146	46	288	-	-				
6500	SL	0	0	0	0	0	0	0	0	0	0				
	2000	0	0	0	0	0	0	0	0	0	0				
	4000	0	0	0	0	0	0	0	0	10	13				
	6000	0	0	0	0	0	0	0	0	15	28				
	8000	0	0	0	0	0	0	13	22	19	76				
	10000	0	0	0	0	9	12	17	39	23	98				
	12000	0	0	0	0	15	28	22	90	27	126				
	14000	0	0	12	19	19	79	26	117	33	169				
	16000	11	17	18	41	24	107	32	159	42	255				
	18000	18	41	23	101	31	153	45	293	-	-				
6500	20000	24	106	30	150	48	332	-	-	-	-				

REMARKS:
1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when helicopter can hover OGE. When helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Landing distances include a 30 foot estimated skid distance where it is not possible to hover at a 2 foot skid height (IGE).
5. Landing distances not shown above 20,000 feet or cruise ceiling.

Chart 14-24. Landing distance chart - power on D (Sheet 2 of 5)

LANDING DISTANCE – FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 59 FT.
7000	SL	0	0	0	0	0	0	0	0	0	0
	2000	0	0	0	0	0	0	0	0	10	14
	4000	0	0	0	0	0	0	0	0	15	31
	6000	0	0	0	0	0	0	13	23	19	80
	8000	0	0	0	0	9	12	17	42	23	103
	10000	0	0	0	0	15	29	21	94	27	132
	12000	0	0	12	19	19	81	26	122	32	176
	14000	11	16	17	42	24	110	31	164	41	262
	16000	17	41	23	103	30	156	42	281	-	-
	18000	23	107	29	151	44	302	-	-	-	-
7000	20000	31	161	-	-	-	-	-	-	-	-
7500	SL	0	0	0	0	0	0	0	0	10	15
	2000	0	0	0	0	0	0	0	0	15	32
	4000	0	0	0	0	0	0	13	24	19	82
	6000	0	0	0	0	9	12	17	43	23	107
	8000	0	0	0	0	14	30	21	96	27	137
	10000	0	0	11	18	19	52	25	126	32	180
	12000	9	13	17	41	23	112	30	167	39	261
	14000	16	39	22	103	29	157	40	265	-	-
	16000	22	105	28	150	41	276	-	-	-	-
7500	18000	29	158	43	312	-	-	-	-	-	-

REMARKS:
1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when helicopter can hover OGE. When helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Landing distances include a 30 foot estimated skid distance where it is not possible to hover at a 2 foot skid height (IGE).
5. Landing distances not shown above 20,000 feet or cruise ceiling.

Chart 14-24. Landing distance chart - power on D (Sheet 3 of 5)

LANDING DISTANCE – FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 59 FT.				
8000	SL	0	0	0	0	0	0	0	0	14	32				
	2000	0	0	0	0	0	0	12	24	18	83				
	4000	0	0	0	0	8	11	17	43	22	109				
	6000	0	0	0	0	14	29	21	97	26	140				
	8000	0	0	10	16	18	52	25	127	31	182				
	10000	8	10	16	39	23	112	29	168	38	255				
	12000	15	36	21	101	28	155	37	250	-	-				
	14000	21	71	27	146	37	249	-	-	-	-				
8000	16000	28	152	38	255	-	-	-	-	-	-				
8500	SL	0	0	0	0	0	0	11	22	18	53				
	2000	0	0	0	0	0	0	16	43	22	109				
	4000	0	0	0	0	13	28	20	97	26	141				
	6000	0	0	9	13	17	50	24	127	30	181				
	8000	0	0	15	36	22	110	28	166	36	248				
	10000	14	32	20	67	27	152	35	235	51	468				
	12000	20	65	26	141	34	228	-	-	-	-				
	14000	26	144	34	223	-	-	-	-	-	-				
8500	16000	36	248	-	-	-	-	-	-	-	-				

REMARKS:
1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when helicopter can hover OGE. When helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Landing distances include a 30 foot estimated skid distance where it is not possible to hover at a 2 foot skid height (IGE).
5. Landing distances not shown above 20,000 feet or cruise ceiling.

Chart 14-24. Landing distance chart - power on D (Sheet 4 of 5)

LANDING DISTANCE – FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 59 FT.
9000	SL	0	0	0	0	0	0	15	40	21	107
	2000	0	0	0	0	12	25	19	95	25	140
	4000	0	0	0	0	16	48	23	125	29	179
	6000	0	0	13	32	21	107	27	162	34	242
	8000	12	26	19	62	25	146	33	222	44	380
	10000	18	59	24	133	31	207	48	436	-	-
	12000	24	134	30	197	48	448	-	-	-	-
9000	14000	31	206	-	-	-	-	-	-	-	-
9500	SL	0	0	0	0	10	20	18	62	24	136
	2000	0	0	0	0	15	44	22	122	28	176
	4000	0	0	12	28	20	103	26	158	33	234
	6000	10	20	17	56	24	140	31	212	41	342
	8000	16	51	22	125	30	196	40	337	-	-
	10000	22	123	28	181	40	339	-	-	-	-
9500	12000	29	185	41	347	-	-	-	-	-	-

REMARKS:
1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when helicopter can hover OGE. When helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Landing distances include a 30 foot estimated skid distance where it is not possible to hover at a 2 foot skid height (IGE).
5. Landing distances not shown above 20,000 feet or cruise ceiling.

Chart 14-24. Landing distance chart - power on D (Sheet 5 of 5)

LANDING DISTANCE – FEET

POWER OFF

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	BEST APPROACH	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)			
		KNOTS	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL		
5000	SL	46	-	-	-	-	-	-	307	30	320	30		
	2000	46	-	-	-	-	-	-	322	30	337	30		
	4000	46	-	-	339	30	331	30	339	30	355	30		
	6000	47	359	30	353	30	348	30	358	30	374	30		
	8000	46	371	30	368	30	368	30	378	30	395	30		
	10000	46	384	30	388	30	388	30	399	30	418	30		
	12000	45	399	30	402	30	409	30	422	30	440	30		
	14000	44	414	30	421	30	431	30	445	30	463	30		
	16000	44	430	30	439	30	452	30	468	30	483	30		
	18000	43	445	30	457	30	471	30	487	30	500	30		
5000	20000	41	459	30	472	30	487	30	501	30	508	30		
5500	SL	48	-	-	-	-	348	30	357	30	373	30		
	2000	49	-	-	374	30	366	30	376	30	393	30		
	4000	49	395	30	390	30	386	30	396	30	415	30		
	6000	49	409	30	407	30	407	30	418	30	438	30		
	8000	48	423	30	425	30	429	30	442	30	462	30		
	10000	47	439	30	444	30	452	30	467	30	487	30		
	12000	46	456	30	464	30	475	30	492	30	511	30		
	14000	46	473	30	484	30	498	30	516	30	532	30		
	16000	45	489	30	502	30	519	30	536	30	549	30		
	18000	43	503	30	519	30	535	30	550	30	557	30		
5500	20000	42	514	30	529	30	543	30	554	30	550	30		

REMARKS:
1. No wind.
2. Clean Configuration
3. Ground roll limited to 30 feet by skid gear
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-25. Landing distance chart - power off D (Sheet 1 of 5)

LANDING DISTANCE — FEET
POWER OFF

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6-5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	BEST APPROACH	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		KNOTS	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL
6000	SL	52	418	30	409	30	401	30	411	30	431	30
	2000	52	431	30	426	30	422	30	434	30	454	30
	4000	51	446	30	444	30	445	30	458	30	479	30
	6000	50	461	30	464	30	469	30	483	30	505	30
	8000	49	478	30	484	30	494	30	510	30	532	30
	10000	49	496	30	506	30	519	30	537	30	557	30
	12000	48	515	30	527	30	543	30	562	30	580	30
	14000	47	532	30	547	30	565	30	584	30	597	30
	16000	45	547	30	564	30	582	30	598	30	604	30
	18000	45	558	30	575	30	590	30	601	30	596	30
6000	20000	42	562	30	576	30	586	30	588	30	-	-
6500	SL	54	466	30	460	30	457	30	470	30	492	30
	2000	53	482	30	480	30	481	30	496	30	519	30
	4000	52	499	30	501	30	507	30	523	30	547	30
	6000	52	517	30	523	30	534	30	551	30	575	30
	8000	51	536	30	546	30	560	30	580	30	602	30
	10000	50	555	30	569	30	586	30	607	30	626	30
	12000	49	574	30	590	30	609	30	630	30	645	30
	14000	47	590	30	608	30	627	30	645	30	652	30
	16000	46	602	30	620	30	637	30	649	30	644	30
	18000	44	606	30	622	30	633	30	635	30	644	30
6500	20000	42	599	30	609	30	610	30	-	-	-	-

REMARKS:
1. No wind.
2. Clean Configuration
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-25. Landing distance chart - power off D (Sheet 2 of 5)

LANDING DISTANCE – FEET

POWER OFF

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	BEST APPROACH	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)			
		KNOTS	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	C	
7000	SL	55	517	30	515	30	517	30	532	30	557	30		
	2000	55	535	30	538	30	544	30	561	30	587	30		
	4000	54	554	30	561	30	572	30	591	30	617	30		
	6000	52	595	30	609	30	628	30	650	30	671	30		
	8000	52	595	30	609	30	628	30	650	30	671	30		
	10000	51	615	30	632	30	653	30	675	30	691	30		
	12000	50	632	30	652	30	672	30	692	30	700	30		
	14000	48	645	30	665	30	683	30	697	30	692	30		
	16000	47	651	30	668	30	680	30	684	30	659	30		
	18000	44	644	30	656	30	658	30	-	-	-	-		
7000	20000	42	623	30	625	30	-	-	-	-	-	-		
7500	SL	57	570	30	573	30	579	30	597	30	625	30		
	2000	56	590	30	597	30	609	30	629	30	656	30		
	4000	55	612	30	623	30	639	30	661	30	687	30		
	6000	54	633	30	648	30	668	30	692	30	715	30		
	8000	53	654	30	673	30	695	30	718	30	736	30		
	10000	52	673	30	694	30	716	30	738	30	748	30		
	12000	50	688	30	709	30	729	30	745	30	742	30		
	14000	47	695	30	714	30	728	30	734	30	711	30		
	16000	46	690	30	704	30	708	30	698	30	-	-		
	18000	44	671	30	675	30	-	-	-	-	-	-		
7500	20000	42	632	30	-	-	-	-	-	-	-	-		

REMARKS:
1. No wind.
2. Clean Configuration.
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-25. Landing distance chart - power off D (Sheet 3 of 5)

LANDING DISTANCE – FEET
POWER OFF

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	BEST APPROACH KNOTS	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)			
			CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL		
8000	SL	58	625	30	632	30	644	30	665	30	694	30		
	2000	57	647	30	659	30	676	30	699	30	727	30		
	4000	56	670	30	686	30	706	30	732	30	757	30		
	6000	55	693	30	712	30	735	30	761	30	781	30		
	8000	54	713	30	735	30	759	30	782	30	795	30		
	10000	52	730	30	752	30	774	30	792	30	792	30		
	12000	50	739	30	759	30	776	30	785	30	766	30		
	14000	48	736	30	753	30	760	30	753	30	-	-		
	16000	46	719	30	726	30	717	30	-	-	-	-		
	18000	44	683	30	-	-	-	-	-	-	-	-		
8000	20000	-	-	-	-	-	-	-	-	-	-	-		
8500	SL	59	682	30	693	30	710	30	735	30	765	30		
	2000	58	706	30	722	30	743	30	770	30	797	30		
	4000	57	730	30	749	30	774	30	801	30	823	30		
	6000	56	752	30	774	30	800	30	825	30	840	30		
	8000	56	770	30	794	30	818	30	839	30	842	30		
	10000	52	782	30	804	30	824	30	836	30	821	30		
	12000	50	782	30	801	30	812	30	809	30	-	-		
	14000	48	769	30	779	30	774	30	-	-	-	-		
	16000	46	681	30	733	30	-	-	-	-	-	-		
	18000	43	681	30	-	-	-	-	-	-	-	-		
8500	20000	-	-	-	-	-	-	-	-	-	-	-		

REMARKS:
1. No wind.
2. Clean configuration
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-25. Landing distance chart - power off D (Sheet 4 of 5)

LANDING DISTANCE — FEET
POWER OFF

Model(s): UH-1D
Data as of: NOVEMBER 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-11
Fuel Grade: 'JP-4
Fuel Density: 6.5 LB/GAL.

GROSS WEIGHT	PRESS. ALT	BEST APPROACH	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)			
		KNOTS	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL		
9000	SL	60	740	30	756	30	778	30	805	30	835	30		
	2000	59	765	30	785	30	810	30	839	30	864	30		
	4000	58	789	30	812	30	839	30	867	30	885	30		
	6000	56	809	30	834	30	861	30	884	30	891	30		
	8000	54	824	30	848	30	871	30	886	30	876	30		
	10000	53	828	30	849	30	864	30	865	30	-	-		
	12000	51	818	30	832	30	832	30	-	-	-	-		
	14000	48	790	30	791	30	-	-	-	-	-	-		
	16000	45	739	30	-	-	-	-	-	-	-	-		
	18000	-	-	-	-	-	-	-	-	-	-	-		
9000	20000	-	-	-	-	-	-	-	-	-	-	-		
9500	SL	61	800	30	819	30	845	30	876	30	904	30		
	2000	60	825	20	848	30	876	30	906	30	928	30		
	4000	58	847	30	873	30	901	30	928	30	939	30		
	6000	56	864	30	890	30	916	30	935	30	931	30		
	8000	56	872	30	896	30	914	30	921	30	892	30		
	10000	52	867	30	884	30	890	30	878	30	-	-		
	12000	51	844	30	850	30	-	-	-	-	-	-		
	14000	48	799	30	-	-	-	-	-	-	-	-		
	16000	-	-	-	-	-	-	-	-	-	-	-		
	18000	-	-	-	-	-	-	-	-	-	-	-		
9500	20000	-	-	-	-	-	-	-	-	-	-	-		

REMARKS:
1. No wind.
2. Clean configuration
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-25. Landing distance chart - power off D (Sheet 5 of 5)

LANDING DISTANCE – FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.
5000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	10.3	11.
	14000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	15.4	24.
	16000	0.0	0.	0.0	0.	0.0	0.	8.9	8.	19.9	69.
	18000	0.0	0.	0.0	0.	0.0	0.	14.8	22.	24.2	89.
5000	20000	0.0	0.	0.0	0.	0.0	0.	19.8	69.	29.1	115.
5500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	11.1	14.
	12000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	16.2	29.
	14000	0.0	0.	0.0	0.	0.0	0.	10.0	11.	20.7	77.
	16000	0.0	0.	0.0	0.	0.0	0.	15.5	27.	25.1	100.
	18000	0.0	0.	0.0	0.	7.0	5.	20.4	76.	30.2	131.
5500	20000	0.0	0.	0.0	0.	14.3	23.	25.8	103.	37.9	188.

REMARKS:

1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when the helicopter can hover OGE. When the helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Ground roll is limited to 30 feet by the skid gear if helicopter cannot hover IGE.
5. Landing distances are not shown above 20,000 feet or cruise ceiling.

Chart 14-26. Landing distance chart - power on **H** (Sheet 1 of 5)

LANDING DISTANCE – FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	−25° C (−13° F)		−5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.				
6000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	11.3	15.				
	10000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	16.5	33.				
	12000	0.0	0.	0.0	0.	0.0	0.	10.4	13.	21.0	83.				
	14000	0.0	0.	0.0	0.	0.0	0.	15.8	30.	25.5	108.				
	16000	0.0	0.	0.0	0.	7.7	7.	20.6	81.	30.8	144.				
	18000	0.0	0.	0.0	0.	14.7	26.	26.0	111.	38.7	210.				
6000	20000	0.0	0.	6.8	6.	21.0	83.	34.6	173.	----	----				
6500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	10.9	16.				
	8000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	16.2	34.				
	10000	0.0	0.	0.0	0.	0.0	0.	10.3	14.	20.9	87.				
	12000	0.0	0.	0.0	0.	0.0	0.	15.6	32.	25.4	114.				
	14000	0.0	0.	0.0	0.	7.5	7.	20.5	85.	30.8	153.				
	16000	0.0	0.	0.0	0.	14.6	28.	25.8	117.	38.6	224.				
	18000	0.0	0.	6.8	6.	20.8	86.	34.1	181.	----	----				
6500	20000	0.0	0.	16.1	34.	29.9	146.	----	----	----	----				

REMARKS:
1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when the helicopter can hover OGE. When the helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Ground roll is limited to 30 feet by the skid gear if helicopter cannot hover IGE.
5. Landing distances are not shown above 20,000 feet or cruise ceiling.

Chart 14-26. Landing distance chart - power on H (Sheet 2 of 5)

LANDING DISTANCE — FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	−25° C (−13° F)		−5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)					
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST. AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.				
7000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	10.2	14.				
	6000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	15.5	34.				
	8000	0.0	0.	0.0	0.	0.0	0.	9.8	13.	20.3	88.				
	10000	0.0	0.	0.0	0.	0.0	0.	15.3	33.	25.0	117.				
	12000	0.0	0.	0.0	0.	6.8	6.	20.1	86.	30.3	159.				
	14000	0.0	0.	0.0	0.	14.0	28.	25.3	120.	38.0	232.				
	16000	0.0	0.	5.3	4.	20.2	57.	33.0	182.	----	----				
	18000	0.0	0.	15.4	33.	28.7	146.	----	----	----	----				
7000	20000	13.0	24.	24.7	85.	----	----	----	----	----	----				
7500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	0.0	0.				
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	9.2	13.				
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	14.7	32.				
	6000	0.0	0.	0.0	0.	0.0	0.	8.9	12.	19.4	86.				
	8000	0.0	0.	0.0	0.	0.0	0.	14.5	32.	24.1	117.				
	10000	0.0	0.	0.0	0.	0.0	0.	19.4	86.	29.3	159.				
	12000	0.0	0.	0.0	0.	13.2	26.	24.5	120.	36.5	230.				
	14000	0.0	0.	0.0	0.	19.4	56.	31.3	177.	----	----				
	16000	0.0	0.	14.3	31.	27.2	141.	----	----	----	----				
	18000	11.5	20.	23.3	81.	----	----	----	----	----	----				
7500	20000	22.2	74.	----	----	----	----	----	----	----	----				

REMARKS:

1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when the helicopter can hover OGE. When the helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Ground roll is limited to 30 feet by the skid gear if helicopter cannot hover IGE.
5. Landing distances are not shown above 20,000 feet or cruise ceiling.

Chart 14-26. Landing distance chart - power on H (Sheet 3 of 5)

LANDING DISTANCE – FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s):	UH-1H
Data as of:	November, 1964
DATA BASIS:	ESTIMATED
Engine(s):	Lycoming T53-L-13
Fuel Grade:	JP-4
Fuel Density:	6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.
8000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	8.4	11.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	13.7	30.
	4000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	18.4	54.
	6000	0.0	0.	0.0	0.	0.0	0.	13.6	29.	23.0	114.
	8000	0.0	0.	0.0	0.	0.0	0.	18.5	55.	28.0	156.
	10000	0.0	0.	0.0	0.	12.0	23.	23.4	118.	34.7	222.
	12000	0.0	0.	0.0	0.	18.2	53.	29.6	170.	----	----
	14000	0.0	0.	12.7	26.	25.4	133.	----	----	----	----
	16000	9.2	14.	21.5	74.	----	----	----	----	----	----
8000	18000	20.0	64.	----	----	----	----	----	----	----	----
8500	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	12.8	28.
	2000	0.0	0.	0.0	0.	0.0	0.	0.0	0.	17.2	50.
	4000	0.0	0.	0.0	0.	0.0	0.	12.3	26.	21.8	110.
	6000	0.0	0.	0.0	0.	0.0	0.	17.4	52.	26.5	149.
	8000	0.0	0.	0.0	0.	10.4	18.	22.1	113.	32.5	209.
	10000	0.0	0.	0.0	0.	16.7	47.	27.7	160.	43.8	356.
	12000	0.0	0.	10.5	19.	23.3	122.	----	----	----	----
	14000	4.9	4.	19.1	62.	----	----	----	----	----	----
8500	16000	17.3	51.	----	----	----	----	----	----	----	----

REMARKS:

1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when the helicopter can hover OGE. When the helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Ground roll is limited to 30 feet by the skid gear if helicopter cannot hover IGE.
5. Landing distances are not shown above 20,000 feet or cruise ceiling.

Chart 14-26. Landing distance chart - power on H (Sheet 4 of 5)

LANDING DISTANCE – FEET

POWER ON

ENGINE SPEED 6600 RPM

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.	BEST APPROACH TAS KNOTS	DIST AFTER CLEAR 50 FT.
9000	S.L.	0.0	0.	0.0	0.	0.0	0.	0.0	0.	16.2	48.
	2000	0.0	0.	0.0	0.	0.0	0.	10.7	21.	20.4	105.
	4000	0.0	0.	0.0	0.	0.0	0.	16.1	47.	24.9	141.
	6000	0.0	0.	0.0	0.	7.9	11.	20.7	107.	30.5	198.
	8000	0.0	0.	4.5	4.	14.9	40.	25.9	151.	39.2	306.
	10000	3.8	3.	7.5	10.	20.9	109.	34.3	242.	----	----
	12000	7.7	11.	16.3	48.	29.8	189.	----	----	----	----
9000	14000	13.9	35.	----	----	----	----	----	----	----	----
9500	S.L.	0.0	0.	0.0	0.	0.0	0.	8.7	14.	19.3	101.
	2000	0.0	0.	0.0	0.	8.7	14.	14.5	40.	23.4	134.
	4000	0.0	0.	8.7	14.	9.8	18.	19.3	101.	28.4	184.
	6000	8.7	14.	10.0	19.	12.8	31.	24.3	142.	35.6	271.
	8000	10.4	20.	11.5	25.	19.0	69.	30.9	211.	----	----
	10000	12.1	28.	13.9	37.	26.7	166.	----	----	----	----
	12000	14.6	40.	22.6	97.	----	----	----	----	----	----
9500	14000	21.0	84.	----	----	----	----	----	----	----	----

REMARKS:

1. No wind.
2. Clean configuration.
3. Distance to clear 50 feet are given as zero when the helicopter can hover OGE. When the helicopter cannot hover OGE, MINIMUM possible distances and speeds to clear a 50 foot obstacle are given. These are minimum values and require good pilot technique. For a normal landing, the distances and speeds given for power off landings will provide safer operation within the height-velocity diagram for the helicopter.
4. Ground roll is limited to 30 feet by the skid gear if helicopter cannot hover IGE.
5. Landing distances are not shown above 20,000 feet or cruise ceiling.

Chart 14-26. Landing distance chart - power on H (Sheet 5 of 5)

LANDING DISTANCE – FEET

POWER OFF

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	BEST APPROACH IAS KNOTS	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)			
			CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL		
5000	S.L.	46	---	--	---	--	---	--	307	30	320	30		
	2000	46	---	--	---	--	314	30	322	30	337	30		
	4000	46	---	--	339	30	331	30	339	30	355	30		
	6000	47	359	30	353	30	348	30	358	30	374	30		
	8000	46	371	30	368	30	368	30	378	30	395	30		
	10000	46	384	30	385	30	388	30	399	30	418	30		
	12000	45	399	30	402	30	409	30	422	30	440	30		
	14000	44	414	30	421	30	431	30	445	30	463	30		
	16000	44	430	30	439	30	452	30	468	30	483	30		
	18000	43	445	30	457	30	471	30	487	30	500	30		
5000	20000	43	459	30	472	30	487	30	501	30	---	--		
5500	S.L.	46	---	--	---	--	348	30	357	30	373	30		
	2000	48	---	--	374	30	366	30	376	30	393	30		
	4000	49	395	30	390	30	386	30	396	30	415	30		
	6000	49	409	30	407	30	407	30	418	30	438	30		
	8000	48	423	30	425	30	429	30	442	30	462	30		
	10000	47	439	30	444	30	452	30	467	30	487	30		
	12000	46	456	30	464	30	475	30	492	30	511	30		
	14000	46	473	30	484	30	498	30	516	30	532	30		
	16000	45	489	30	502	30	519	30	536	30	549	30		
	18000	44	503	30	519	30	535	30	550	30	---	--		
5500	20000	43	514	30	529	30	543	30	554	30	---	--		

REMARKS:

1. No wind.
2. Clean configuration.
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-27. Landing distance chart - power off H (Sheet 1 of 5)

LANDING DISTANCE – FEET
POWER OFF

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s):Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	BEST APPROACH IAS	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)			
		KNOTS	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL		
6000	S.L.	52	418	30	409	30	401	30	411	30	431	30		
	2000	52	431	30	426	30	422	30	434	30	454	30		
	4000	51	446	30	444	30	445	30	458	30	479	30		
	6000	50	461	30	464	30	469	30	483	30	505	30		
	8000	49	478	30	484	30	494	30	510	30	532	30		
	10000	49	496	30	506	30	519	30	537	30	557	30		
	12000	48	515	30	527	30	543	30	562	30	580	30		
	14000	47	532	30	547	30	565	30	584	30	597	30		
	16000	46	547	30	564	30	582	30	598	30	---	--		
	18000	45	558	30	575	30	590	30	601	30	---	--		
6000	20000	43	562	30	576	30	586	30	---	--	---	--		
6500	S.L.	54	466	30	460	30	457	30	470	30	492	30		
	2000	53	482	30	480	30	481	30	496	30	519	30		
	4000	52	499	30	501	30	507	30	523	30	547	30		
	6000	52	517	30	523	30	534	30	551	30	575	30		
	8000	51	536	30	546	30	560	30	580	30	602	30		
	10000	50	555	30	569	30	586	30	607	30	626	30		
	12000	49	574	30	590	30	609	30	630	30	645	30		
	14000	48	590	30	608	30	627	30	645	30	---	--		
	16000	47	602	30	620	30	637	30	649	30	---	--		
	18000	45	606	30	622	30	633	30	---	--	---	--		
6500	20000	43	599	30	609	30	---	--	---	--	---	--		

REMARKS:

1. No wind.
2. Clean configuration.
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-27. Landing distance chart - power off H (Sheet 2 of 5)

LANDING DISTANCE — FEET

POWER OFF

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	BEST APPROACH IAS	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)			
		KNOTS	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL		
7000	S.L.	55	517	30	515	30	517	30	532	30	557	30		
	2000	55	535	30	538	30	544	30	561	30	587	30		
	4000	54	554	30	561	30	572	30	591	30	617	30		
	6000	53	574	30	585	30	601	30	621	30	646	30		
	8000	52	595	30	609	30	628	30	650	30	671	30		
	10000	51	615	30	632	30	653	30	675	30	691	30		
	12000	51	632	30	652	30	672	30	692	30	---	--		
	14000	49	645	30	665	30	683	30	697	30	---	--		
	16000	47	651	30	668	30	680	30	---	--	---	--		
	18000	44	644	30	656	30	658	30	---	--	---	--		
7000	20000	42	623	30	625	30	---	--	---	--	---	--		
7500	S.L.	57	570	30	573	30	579	30	597	30	625	30		
	2000	56	590	30	597	30	609	30	629	30	656	30		
	4000	55	612	30	623	30	639	30	661	30	687	30		
	6000	54	633	30	648	30	668	30	692	30	715	30		
	8000	53	654	30	673	30	695	30	718	30	736	30		
	10000	52	673	30	694	30	716	30	738	30	---	--		
	12000	51	688	30	709	30	729	30	745	30	---	--		
	14000	49	695	30	714	30	728	30	---	--	---	--		
	16000	45	690	30	704	30	708	30	---	--	---	--		
7500	18000	45	671	30	675	30	---	--	---	--	---	--		

REMARKS:

1. No wind.
2. Clean configuration.
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-27. Landing distance chart - power off **H** (Sheet 3 of 5)

LANDING DISTANCE – FEET
POWER OFF

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	BEST APPROACH IAS	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
		KNOTS	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL
8000	S.L.	58	625	30	632	30	644	30	665	30	694	30
	2000	57	647	30	659	30	676	30	699	30	727	30
	4000	56	670	30	686	30	706	30	732	30	757	30
	6000	55	693	30	712	30	735	30	761	30	781	30
	8000	55	713	30	735	30	759	30	782	30	---	--
	10000	52	730	30	752	30	774	30	792	30	---	--
	12000	51	739	30	759	30	776	30	785	30	---	--
	14000	49	736	30	753	30	760	30	---	--	---	--
	16000	47	719	30	726	30	---	--	---	--	---	--
8000	18000	44	683	30	---	--	---	--	---	--	---	--
8500	S.L.	59	682	30	693	30	710	30	735	30	765	30
	2000	58	706	30	722	30	743	30	770	30	797	30
	4000	57	730	30	749	30	774	30	801	30	823	30
	6000	56	752	30	774	30	800	30	825	30	840	30
	8000	55	770	30	794	30	818	30	839	30	---	--
	10000	52	782	30	804	30	824	30	836	30	---	--
	12000	51	782	30	801	30	812	30	---	--	---	--
	14000	49	769	30	779	30	---	--	---	--	---	--
8500	16000	47	736	30	---	--	---	--	---	--	---	--

REMARKS:

1. No wind.
2. Clean configuration.
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-27. Landing distance chart - power off H (Sheet 4 of 5)

LANDING DISTANCE – FEET

POWER OFF

Model(s): UH-1H
Data as of: November, 1964
DATA BASIS: ESTIMATED

Engine(s): Lycoming T53-L-13
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

GROSS WEIGHT	PRESS. ALT	BEST APPROACH IAS KNOTS	-25° C (-13° F)		-5° C (+23° F)		+15° C (+59° F)		+35° C (+95° F)		+55° C (+131° F)	
			CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL	CLEAR 50 FT	GROUND ROLL
9000	S.L.	60	740	30	756	30	778	30	805	30	835	30
	2000	59	765	30	785	30	810	30	839	30	864	30
	4000	58	789	30	812	30	839	30	867	30	885	30
	6000	57	809	30	834	30	861	30	884	30	---	--
	8000	55	824	30	848	30	871	30	886	30	---	--
	10000	53	828	30	849	30	864	30	---	--	---	--
	12000	51	818	30	832	30	---	--	---	--	---	--
9000	14000	49	790	30	---	--	---	--	---	--	---	--
9500	S.L.	61	800	30	819	30	845	30	876	30	904	30
	2000	60	825	30	848	30	876	30	906	30	928	30
	4000	59	847	30	873	30	901	30	928	30	---	--
	6000	57	864	30	890	30	916	30	935	30	---	--
	8000	55	872	30	896	30	914	30	---	--	---	--
	10000	53	867	30	884	30	890	30	---	--	---	--
9500	12000	51	844	30	850	30	---	--	---	--	---	--

REMARKS:

1. No wind.
2. Clean configuration.
3. Ground roll limited to 30 feet by skid gear.
4. Landing distances are not shown above 20,000 feet, cruise ceiling, or where flight test data are not available.

Chart 14-27. Landing distance chart - power off **H** (Sheet 5 of 5)

APPENDIX A

REFERENCES

The following references of the issue in effect at the date of this publication are required for use by the operator in performance of his duties.

MAINTENANCE FORMS

AR 95-2	Flight Regulations for Army Aircraft
AR 95-16	Weight and Balance Army Aircraft
AR 95-55	Nuclear Weapons Jettison (0)
AR 310-1	Military Publications, General Policies
AR 310-3	Military Publications, Preparation, Coordination, and Approval
AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes
AR 385-25	United States Army Safety Studies and Reviews of Atomic Weapon Systems
AR 385-40	Accident Reporting and Records
DA Form 2407	Maintenance Request
DA Form 2408A	Equipment Log Book Assembly (Records)
DA Form 2408-12	Army Aviator's Flight Record
DA Form 2408-15	Service Record for Aircraft
DA Form 2408-17	Aircraft Inventory Record
DD Form 365-Series	Weight and Balance Record
DA Pam 310-1	Index of Administrative Publications
DA Pam 310-2	Index of Blank Forms
DA Pan 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 4, 6, 7, 8 and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders
TB 55-9150-200-25	Engine and transmission oils, fuels and additives for Army Aircraft
TB AVN 23-16	Test Flights and Maintenance Operational Checks for Army Aircraft
TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination
TM 38-750	The Army Equipment Record System and Procedures

ALPHABETICAL INDEX

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Z

By Order of the Secretary of the Army:

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Major General, United States Army,
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DISTRIBUTION:

To be distributed in accordance with DA Form 12-31 (qty rqr block no. 69) requirements for Operator and Crew Maintenance Instructions for UH-1D aircraft.

☆U.S. GOVERNMENT PRINTING OFFICE: 1969—346-461/1081