TM 55-1520-228-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

Operator's Manual

ARMY MODEL OH-58A HELICOPTER

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1969

WARNING

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

STARTING ENGINES

Coordinate all cockpit actions with ground observer. Insure that rotors and blast areas are clear and fire guard is posted.

FIRE EXTINGUISHER

Exposure to high concentrations of monobromotrifluoromethane (CF_3Br) extinguishing agent or decomposition products should be avoided. The liquid should not be allowed to come into contact with the skin, as it may cause frost bite or low temperature burns.

GROUND OPERATION

Engines will be started and operated only by authorized personnel. Reference AR 95-13.

ARMAMENT

Loaded weapons, or weapons being loaded or unloaded, shall be pointed in a direction which offers the least exposure to personnel or property in the event of accidental firing. Personnel should remain clear of hazardous area of all loaded weapons.

ANY ROTATION OF THE GUN ARMAMENT SUBSYSTEM BARRELS WILL CAUSE THE GUN TO FIRE.

Upon landing, immediately alert personnel to probable presence of live rounds in the gun. Summon armament repairman to clear weapon.

ACIDS

Battery electrolyte is harmful to the skin and clothing. Neutralize any spilled electrolyte by flushing contacted areas thoroughly with water.

CARBON MONOXIDE

When smoke, suspected carbon monoxide fumes, or symptoms of anoxia exist, the crew should immediately ventilate cabin and shut off heater.

HANDLING FUEL AND OILS

Turbine fuels and lubricating oil contain additives which are poisonous and readily absorbed through the skin. Do not allow them to remain on skin longer than necessary.

TECHNICAL MANUAL
No. 55-1520-228-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *22 July 1969*

Operator's Manual

ARMY MODEL OH-58A HELICOPTER

*This manual supersedes TM 55-1520-228-10, 3 April 1969.

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CHAPTER 1

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. SCOPE.

1-2. This manual, issued expressly for operators, is an official document for Army Model OH-58A aircraft, serial No. 68-16687 through 68-16986. The purpose of this manual is to supply you with the latest information and performance data derived from flight test programs and operational experiences. The study and use of this manual will enable you to perform the assigned missions and duties with maximum efficiency and safety.

1-3. 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 Model OH-58A aircraft, its flight characteristics, and specific normal and emergency operating procedures.

1-4. Reports necessary to comply with the Army Safety Program are prescribed in detail in AR 385-40.

1-5. DA Forms and procedures used for equipment maintenance will be only those prescribed by TM 38-750.

1-6. Equipment serviceability criteria applicable to Army Model OH-58A aircraft are presented in TM 55-1520-228-ESC.

SECTION II GENERAL

1-7. DISTRIBUTION AND REVISION SYSTEM.

a. Distribution, revision, and mandatory requirements are accomplished in accordance with AR 310-1.

b. Authorization for issue is accomplished in accordance with AR 310-3.

1-8. DEFINITIONS. (Refer to AR 320-5.)

1-9. Warnings, cautions and notes shall be used to emphasize important and critical instructions, and shall be used for the following conditions.

Warning

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

Caution

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

Note

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

1-10. REPORTING OF IMPROVEMENTS.

1-11. Report of errors, omissions, and recomendations for 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- P.O. Box 209, St. Louis, Mo. 63166.

OH-58A HELICOPTER

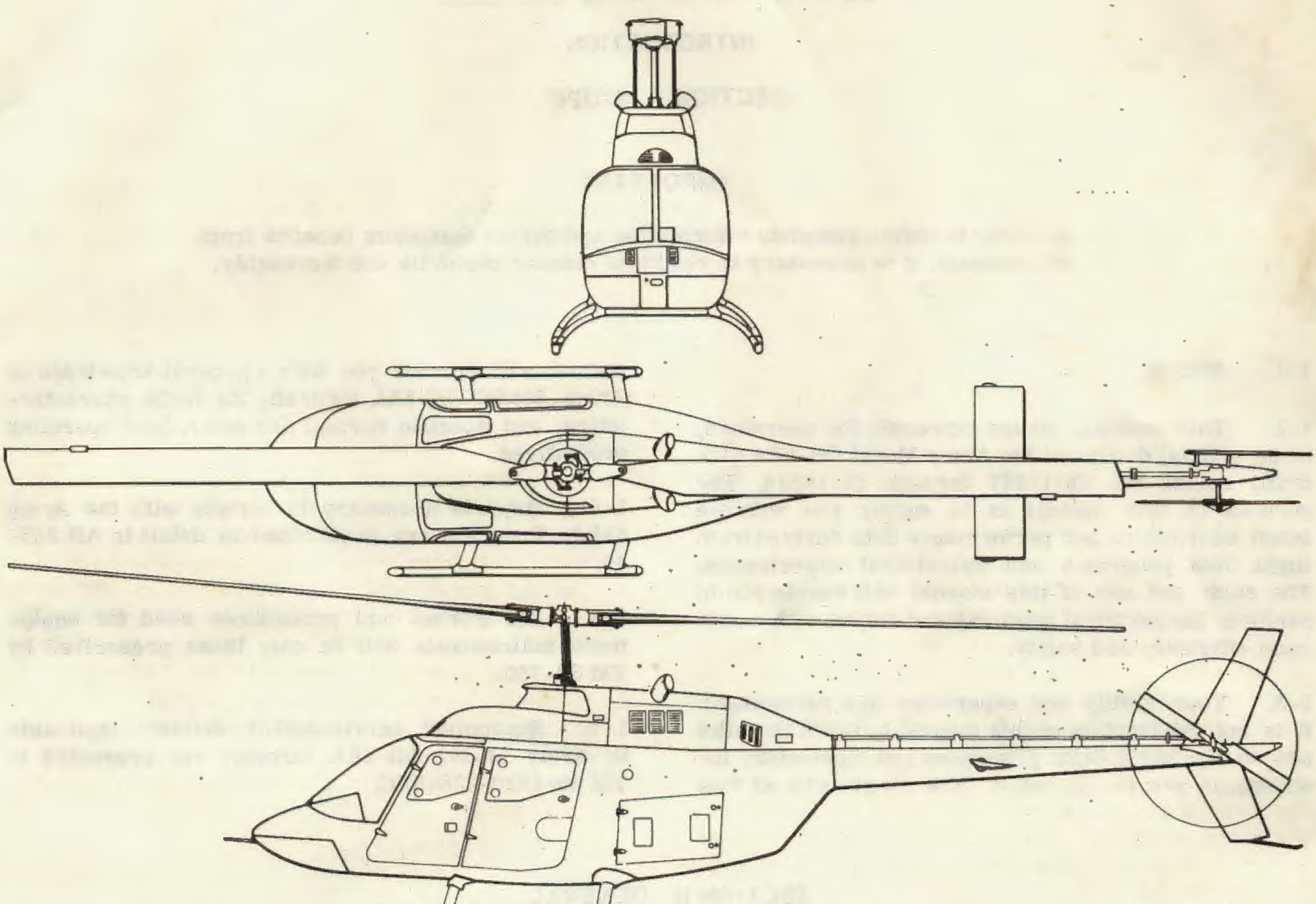

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Figure 1-1. OH-58A helicopter

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. Included 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. GENERAL CONFIGURATION AND ARRANGEMENT.

2-5. The OH-58A helicopter, is a single engine, observation type helicopter designed for landing and take off from prepared or unprepared surfaces. The fuselage consists of the forward section, intermediate or transition section and the aft or tail boom section. The forward section provides the cabin and fuel cell enclosure as well as pylon support. Entrance to the cabin is provided by two doors on each side. The pilot's station is located on the right and the copilot/observer's station on the left side of the helicopter. The area aft of the pilot and copilot may be used as a cargo/passenger compartment and provides support for the XM-27E-1 armament system. The intermediate section supports the engine and includes the equipment and electronic compartment. The tail boom supports the horizontal stabilizer, vertical stabilizer, and tail rotor.

2-6. The basic structure of the fuselage forward section consists of a lower-curved honeycomb sandwich panel and an upper longitudinal aluminum beam. The core of the sandwich structure is aluminum alloy throughout. The faces are aluminum alloy except in the fuel cell region, where they are fiberglass. The aluminum alloy sandwich panel is capable of withstanding the specified design cargo loadings, while the fiberglass sandwich supports the fuel cell pressures. The rotor, transmission and engine are supported by the upper longitudinal beam. The upper and lower structures are interconnected by three fuselage bulkheads and a centerpost to form an integrated structure. The most forward and aft bulkheads act as carry-through structure for the skid landing gear crosstubes. The tail boom is a full monocoque structure with aluminum skin and aluminum substructure.

2-7. The missions for which the OH-58A helicopters are to be employed are visual observation, target acquisition, armed reconnaissance and command and control. In the armed configuration, the helicopter is used to provide ground forces at the lowest practicable echelon with an organic capability for armed reconnaisance, observation and screening observations where high mobility is required. The helicopter is readily adaptable to utility tasks at the combat company level without the use of special kits or special arrangements. Additionally, the helicopter is organic to division, brigade, battalion or equivalent level and is capable of continuous daily operation in forward areas with maximum availability to the tactical commander.

2-8. PASSIVE DEFENSE.

2-9. The armor protection is a combination of ceramic and fiberglass composite with a small amount of dual hardness steel. The armor protection is removable.

2-10. CREW PROTECTION. Armor protection is furnished for the pilot and copilot and consists of panels on seat bottom, seat back and outboard side of each seat.

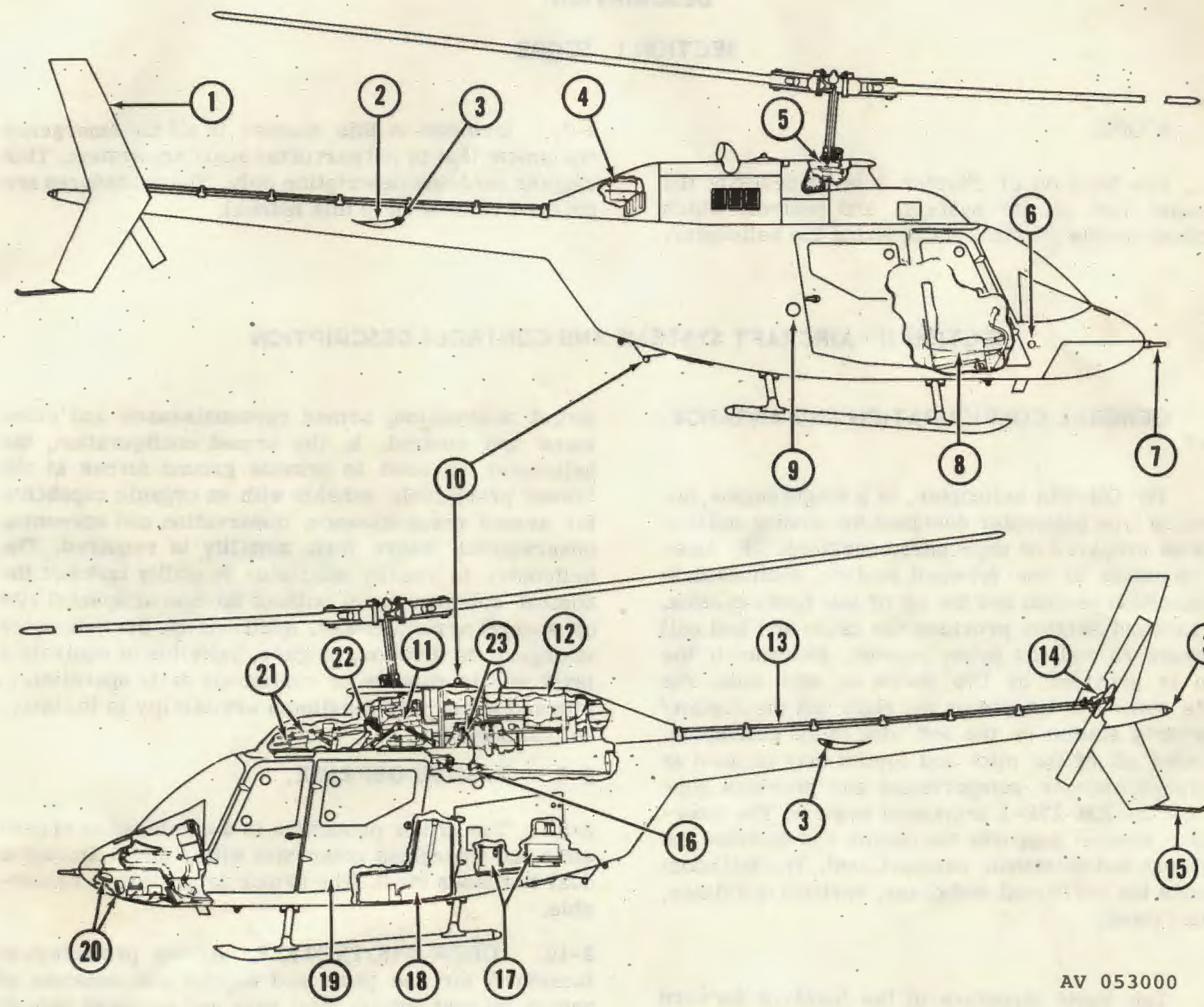
2-11. COMPONENT PROTECTION. Armor protection is furnished for the compressor section of the engine and consists of a panel on each side of the engine. The fuel cell and fuel lines and the oil cell and oil lines are self sealing.

2-12. CREW CONFIGURATION.

2-13. The crew consists of the pilot alone or pilot and copilot, or pilot and gunner.

2-14. WEIGHTS.

2-15. The helicopter weight empty and gross operating weight will change according to the configuration or equipment installed for the type of mission to be performed. Refer to Chapter 12, Weight and Balance Computation.



1. Vertical Fin
2. Horizontal Stabilizer
3. Navigation Lights
4. Oil Tank Filler
5. Swashplate
6. Static Port
7. Pitot Tube
8. Pilot's Station
9. Fuel Tank Filler
10. Anti-Collision Lights
11. Transmission Assembly
12. Engine
13. Tail Rotor Drive Shaft
14. Tail Rotor Gearbox
15. Tail Skid
16. Bleed Air Heater
17. Battery and Avionics
18. Fuel Cell
19. Passenger Station
20. Landing Lights
21. Cyclic and Collective Servo Actuators
22. Hydraulic Pump and Reservoir
23. Freewheeling Unit

Figure 2-1. General arrangement

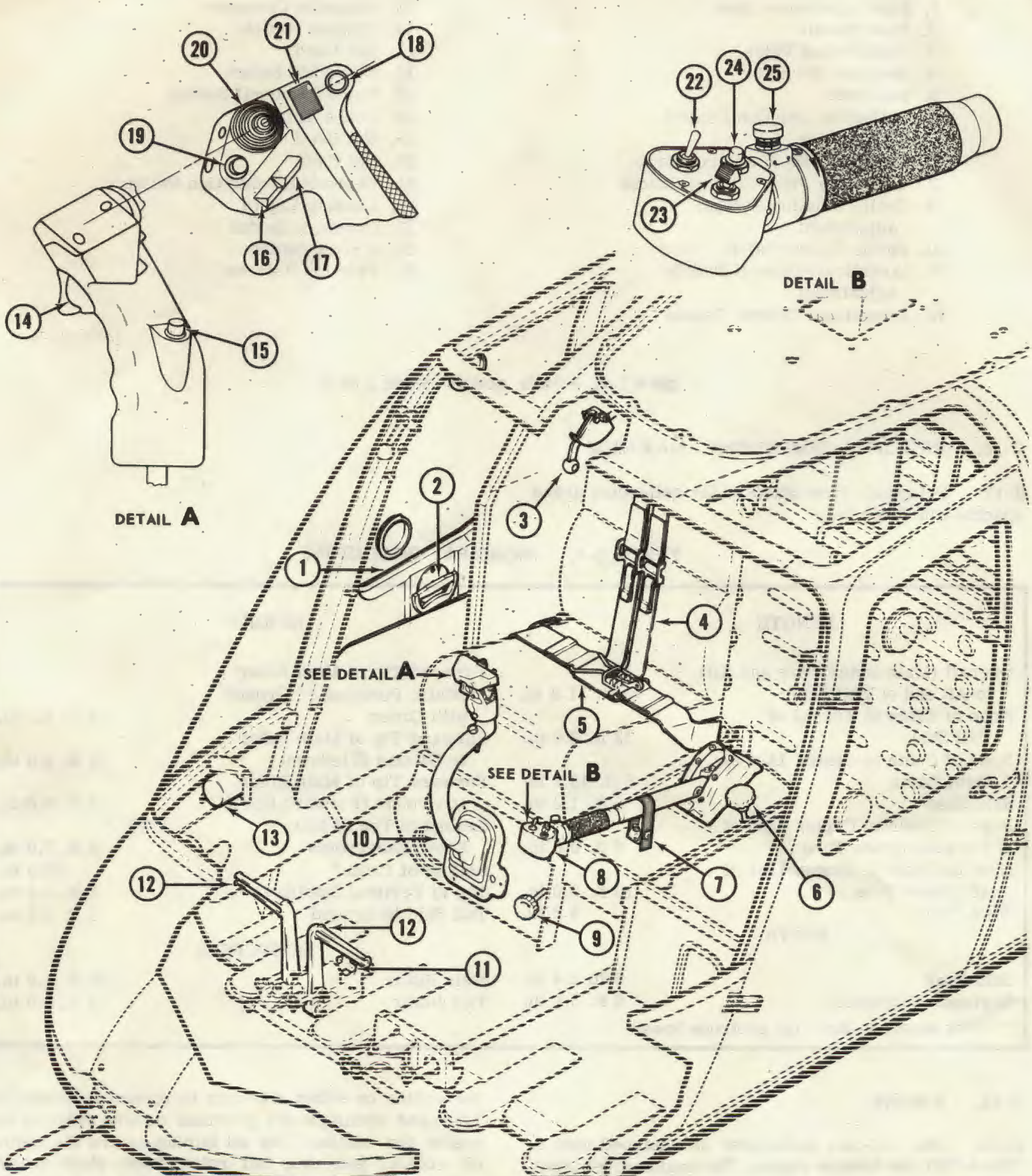


Figure 2-2. Pilot station (Sheet 1 of 2)

1. Pilot's Entrance Door
2. Door Handle
3. Fuel Shutoff Valve
4. Shoulder Harness
5. Seat Belt
6. Collective Friction Control Adjustment
7. Collective Pitch Control Strap
8. Collective Pitch Control Handle
9. Cyclic Friction Control Adjustment
10. Cyclic Control Stick
11. Directional Control Pedals Adjustment
12. Directional Control Pedals
13. Magnetic Compass
14. Trigger Switch
15. Not Used
16. Radio ICS Switch
17. Radio Transmit Switch
18. Force Trim
19. Not Used
20. Not Used
21. Depress Elevate Gun Switch
22. Landing Lights
23. Governor Switch
24. Starter Switch
25. Friction Release

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Figure 2-2. Pilot's station (Sheet 2 of 2)

2-16. PRINCIPAL DIMENSIONS - MAXIMUM

2-17. Principal dimensions of the helicopter areas specified in Table 2-1.

TABLE 2-1. PRINCIPAL DIMENSIONS

LENGTH		HEIGHT	
Overall (Main Rotor Fore and Aft) to Aft end of Tail Skid	40 ft. 11.8 in.	Forward Tip of Main Rotor (Static Position) to Ground with Droop	9 ft. 6.0 in.
Nose of Cabin to Aft end of Tail Skid	32 ft. 2.0 in.	Forward Tip of Main Rotor to Ground (Tiedown)	12 ft. 0.0 in.
Nose of Cabin to Center Line of Main Rotor	8 ft. 10.1 in.	Forward Tip of Main Rotor to Ground (Forward Down)	6 ft. 8.0 in.
Skid Gear	8 ft. 1.3 in.	Ground to Top of Main Rotor Reservoirs	9 ft. 7.0 in.
Nose of Cabin to Center Line of Forward Cross Tube	6 ft. 0.0 in.	Bottom of Cabin*	13.0 in.
Nose of Cabin to Center Line of Aft Cross Tube	10 ft. 9.0 in.	Top of Vertical Stabilizer	8 ft. 1.5 in.
Pitot Tube	6.8 in.	Tail Skid to Ground	1 ft. 4.4 in.
WIDTH		DIAMETERS	
Skid Gear	6 ft. 5.4 in.	Main Rotor	35 ft. 4.0 in.
Horizontal Stabilizer	6 ft. 5.2 in.	Tail Rotor	5 ft. 2.0 in.

* Check antennas that may protrude lower

2-18. ENGINE

2-19. The OH-58A helicopter is equipped with a T63-A-700 gas turbine engine. The engine is designed for a low fuel consumption, light weight, minimum size, maximum reliability and ease of maintenance. The engine is installed aft of the mast and passenger compartment to simplify drive system, improve the inlet-exhaust arrangement, reduce cabin noise level and provide better structural integrity. The engine cowl aft of the engine air inlet screen is removable as a single unit or the hinged section the length of the engine on either side may be opened individually. Louvered openings are provided on both sides of the engine for cooling. The aft fairing covers the engine oil cooler, provides tail rotor drive shaft access and provides an area for oil cooler exit air. The center cowl section houses the engine air inlet, the inlet bellmouth and the forward firewall. Below the engine is a titanium floor which acts as a drip pan and also gives insulation from heat. This pan is curved to provide sufficient clearance to allow the removal of accessories from the bottom of the engine without removing the engine.

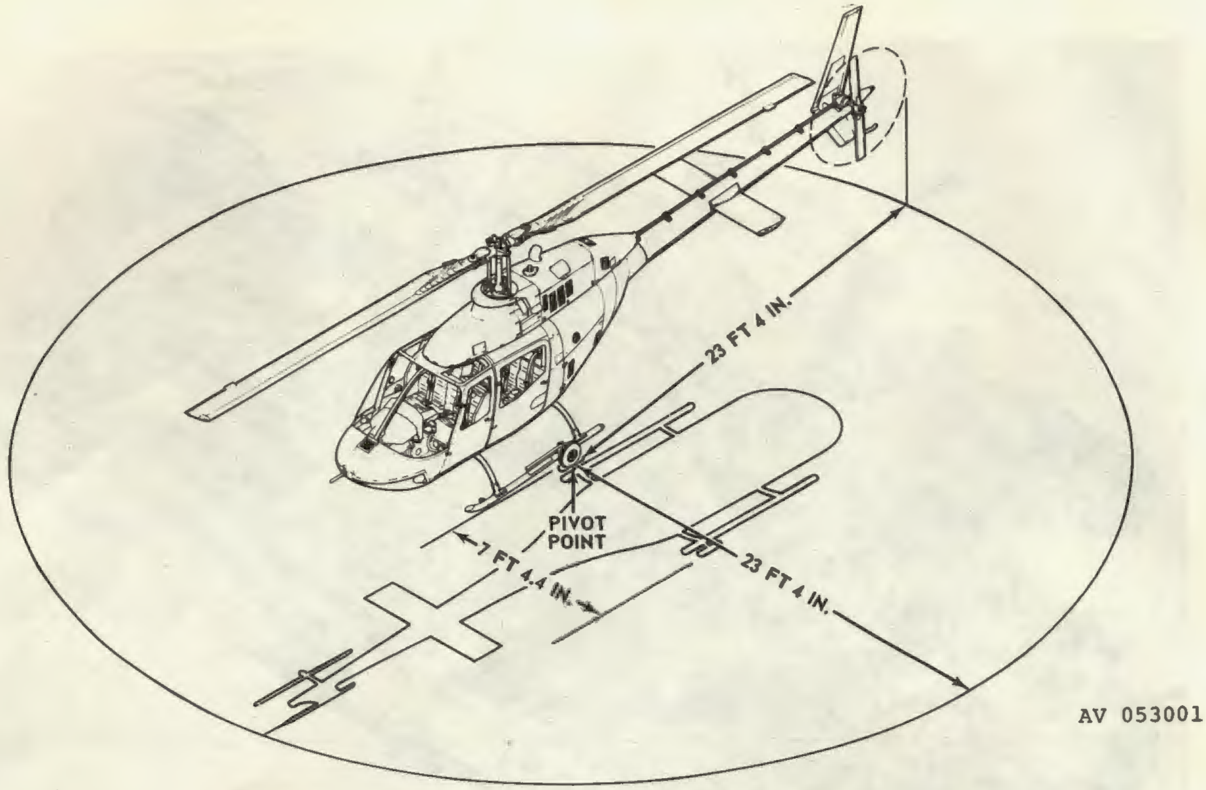


Figure 2-3. Turning radius and ground clearance

2-20. The major engine components are a compressor, combustion section, turbine, and power and accessory gearbox. Air enters the engine through the compressor inlet and is compressed by six axial compressor stages and one centrifugal stage. The compressed air is discharged through the scroll type diffuser into two external ducts which convey the air to the combustion section. The combustion section consists of the outer combustion case and the combustion liner. A spark igniter and a fuel nozzle are mounted in the aft end of the outer combustion case. Air enters the single combustion liner at the aft end, through holes in the liner dome and skin. The air is mixed with fuel sprayed from the fuel nozzle and combustion takes place. Combustion gasses move forward out of the combustion liner to the first-stage gas producer turbine nozzle. The turbine consists of a gas producer turbine support, a power turbine support, a turbine and exhaust collector support, a gas producer turbine rotor and a power turbine rotor. The turbine is mounted between the combustion section and the power and accessory gearbox. The two-stage gas producer turbine furnishes the output power of the engine. The expanded gas discharges in an upward direction through the twin ducts of the turbine and exhaust collector support.

2-21. The main power and accessory drive gear train are enclosed in a single gear case. The gear case serves as a structural support of the engine. All engine components including the engine mounted accessories are attached to the case. A two-stage helical and spur gear set is used to reduce rotational speed from 36,000 rpm at the power turbine to 6180 rpm at the output drive spline. Accessories driven by the power turbine gear train are the power turbine tachometer-generator and the power turbine governor. The gas producer gear train drives the compressor, fuel pump, gas producer tachometer-generator and gas producer fuel control. The starter drive and freewheeling unit are driven by the gas producer gear train.

2-22. ENGINE FUEL SYSTEM.

2-23. A gas producer fuel control assembly is located in the fuel system between the fuel pump assembly and the fuel nozzle. A power turbine fuel governor, which provides control intelligence to the gas producer fuel control, is also a part of the fuel system.

2-24. FUEL SYSTEM CONTROL.

2-25. The system controls, engine power output by controlling the gas producer speed. Gas producer speed levels are established by the action of the power turbine fuel governor which senses power turbine speed. The power turbine (load) speed is selected by the operator and the power required to maintain this speed is automatically maintained by power turbine governor

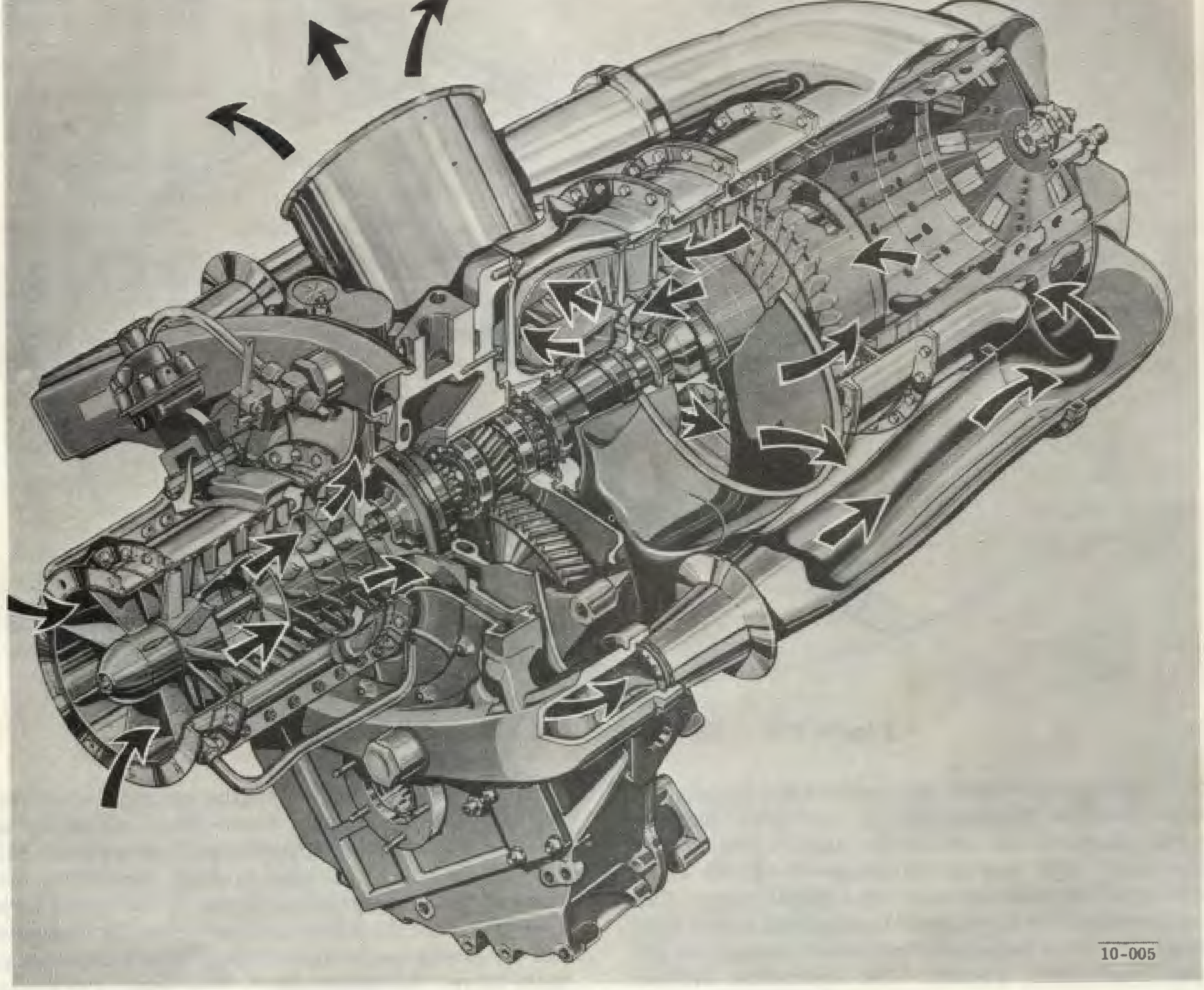


Figure 2-4. Engine airflow

action on metered fuel flow. The power turbine governor lever schedules the power turbine governor requirements. The power turbine governor, in turn, schedules the gas producer speed to a changed power output to maintain output shaft speed.

2-26. GAS PRODUCER FUEL CONTROL.

2-27. The gas producer fuel control has a bypass valve, metering valve, acceleration bellows, governing and enrichment bellows, manually operated cutoff valve, maximum pressure relief valve, and a torque tube seal and lever assembly. A maximum pressure relief valve is incorporated to protect the system from excessive fuel pressure.

2-28. POWER TURBINE FUEL GOVERNOR.

2-29. The power turbine speed is scheduled by the power turbine governor lever and the power turbine speed scheduling cam. The cam sets a governor spring load which opposes a speed-weight output.

2-30. FUEL PUMP AND FILTER ASSEMBLY.

2-31. The fuel pump and filter assembly incorporates two gear-type pumping elements arranged in tandem and driven by a common drive shaft. Fuel enters the engine fuel system at the inlet port of the pump and passes through a low pressure filter before entering the gear elements. The gear elements are arranged in parallel and each pumping element has sufficient capacity to permit takeoff power operation in the event of failure of the other pump element. Two discharge check valves are provided in the assembly to prevent reverse flow in event of failure of one gear pumping element. A bypass valve in the pump assembly allows fuel to bypass the filter element if it becomes clogged.

2-32. The bypass return flow from the fuel control is passed back to the inlet of the gear elements through a pressure regulating valve which maintains the bypass flow pressure above inlet pressure. By means of passages leading to auxiliary filling ports on the periphery of the gear elements, a portion of the bypass flow is used to fill the gear teeth when vapor-liquid conditions exist at the inlet to the gear elements.

2-33. The 10 micron nominal paper filter is located inside the fuel pump assembly upstream of the gear elements. It is retained by a threaded cover (distinguished by a hex) which can be found on the lower side of the pump assembly. To minimize the spillage of fuel, fuel may be drained through the "Before Filter" pressure drop port (BF) before removing the filter cover.

2-34. FUEL NOZZLE.

2-35. The fuel nozzle is a single-entry dual-orifice type unit which contains an integral valve for dividing primary and secondary flow. This same valve acts as a fuel shutoff valve when the fuel manifold pressure falls below a predetermined pressure, thus keeping fuel out of the combustion chamber at shutdown.

2-36. LUBRICATION SYSTEM.

2-37. The lubrication system is a dry sump type with an external reservoir and heat exchanger. A gear type pressure and scavenge pump assembly is mounted within the power and accessory gearbox. The oil filter, filter bypass valve, and pressure regulating valve are in a unit which is located in the upper right-hand side of the power and accessory gearbox housing and are accessible from the top of the engine. A check valve is located between the housing and the filter unit. Probe type magnetic chip detectors are installed at the bottom of the power accessory gearbox, and at the engine oil outlet connection. All engine oil system lines and connections are internal with the exception of pressure and scavenge lines to the front compressor support, the gas producer turbine support and the power turbine support.

2-38. IGNITION SYSTEM.

2-39. The engine ignition system consists of a low tension capacitor discharge ignition exciter, a spark igniter lead, and a shunted surface gap spark igniter. The system derives its input power from the 28-volt DC helicopter electrical system.

2-40. TEMPERATURE MEASUREMENT SYSTEM.

2-41. The temperature measurement system consists of four chromel-alumel single junction thermocouples in the gas producer turbine outlet and an associated integral harness. The voltages of the four thermocouples are electrically averaged in the assembly and delivered by the assembly lead to the airframe terminal block for attachment to the airframe temperature indicating system.

2-42. ANTI-ICING SYSTEM.

2-43. The compressor inlet guide vanes and front bearing support hub are the only engine components with anti-icing provisions. Anti-icing is provided by the use of compressor discharge.

2-44. COMPRESSOR BLEED AIR SYSTEM.

2-45. The compressor bleed air system permits rapid engine response. The system consists of a compressor discharge pressure sensing port on the scroll, tubing from the sensing port to the bleed valve, a compressor bleed control valve, and a bleed air manifold on the compressor case.

2-46. Elongated slots between every other vane in the compressor fifth stage, bleeds compressor air into a manifold which is an integral part of the compressor case. The manifold forms the mounting flange for the compressor bleed control valve when the compressor case halves are assembled.

2-47. Compressor discharge air pressure sensing, for bleed control valve operation, is obtained at a sensing port on the compressor scroll. The bleed control valve is normally open; it is closed by compressor discharge pressure.

2-48. DROOP COMPENSATOR.

2-49. A droop compensator is installed in the governor control linkage to maintain a constant nII speed, selected by the pilot, as power is changed. Governor droop should not be confused with rpm variations (transient droop) due to the acceleration-deceleration limiters in the fuel control, or droop caused by attempting to use more than available power. Rapid movements of the collective stick may require power changes at a rate in excess of the capabilities of the engine.

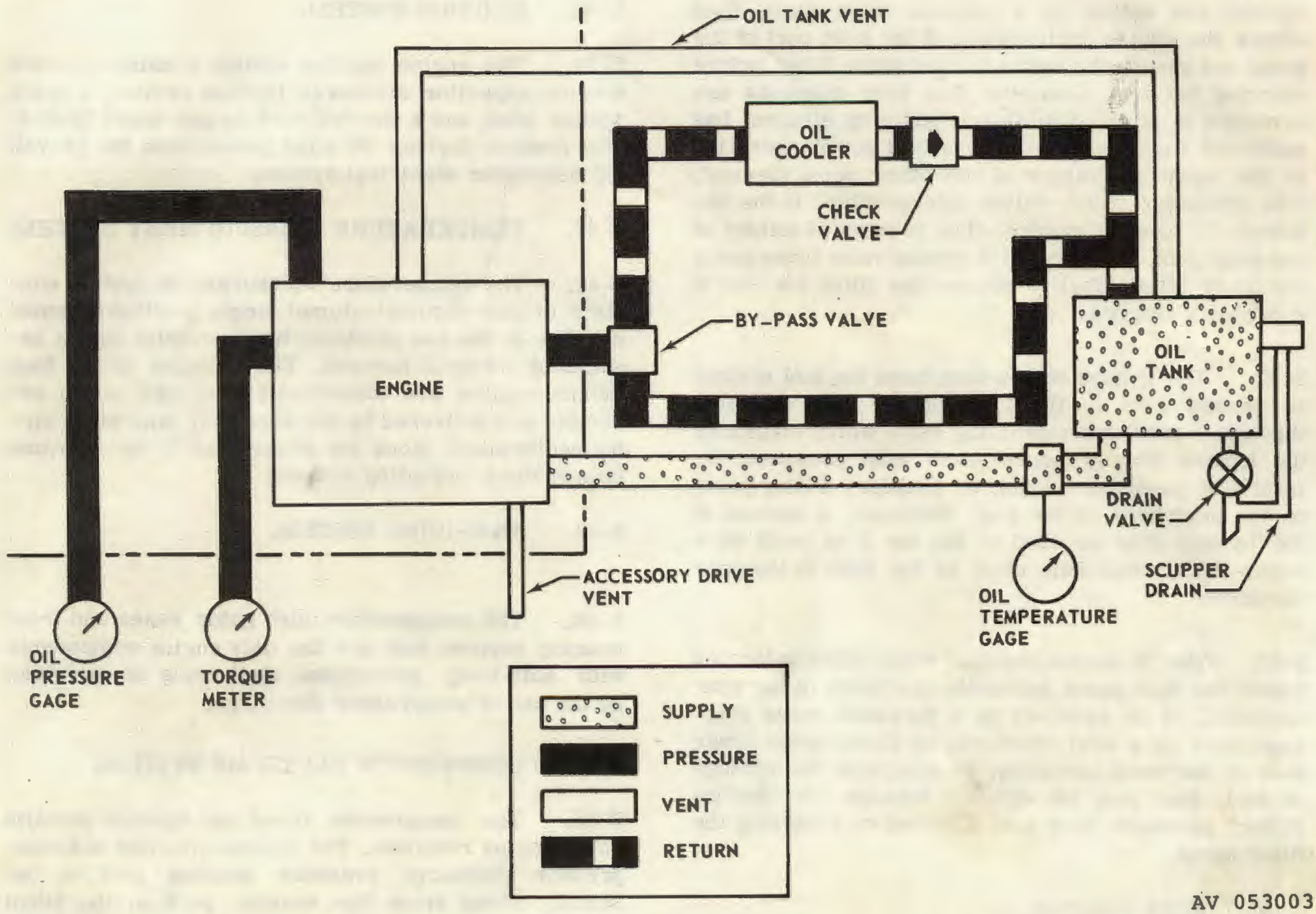


Figure 2-5. Oil system schematic

2-50. POWER CONTROL (THROTTLE).

2-51. The power control (throttle) is a simple twist grip type on the collective stick. The throttle is rotated to the left to increase or to the right to decrease power.

2-52. GOVERNOR CONTROL.

2-53. GOVERNOR RPM SWITCH.

2-54. The GOV INCR/DECR switch is mounted in the pitch control lever. The switch is a three-position momentary type and is held (forward) in the INCR position to increase the power turbine (nII) speed or (Aft) DECR position to decrease the power turbine (nII) speed. Regulated power turbine speed may be adjusted in flight through the operating range by movement of the switch as required. Electrical power for circuit operation is supplied by the 28-volt DC electrical system.

2-55. ENGINE IDLE RELEASE CONTROL.

2-56. The engine idle release is a spring loaded plunger mounted in the switch box of the pilot's collective pitch lever. The plunger prevents the pilot from accidentally retarding the power control beyond flight idle position. This acts as a safety feature by preventing inadvertent engine shutdown. The plunger need not be depressed when performing an engine start or runup; however, the plunger must be depressed when accomplishing an engine shutdown or when it is desired to retard the power control below the flight idle position.

2-57. ENGINE OUT WARNING.

2-58. An RPM sensor is connected to the gas producer tachometer. Power is supplied from the caution panel circuit breaker and connections are made to the master caution light and ENGINE OUT warning light, and to a tone generator which produces a tone in the pilot's headset. The warning system is activated until nI reaches 52 plus or minus 3 percent and is deactivated when this gas producer percent is reached.

2-59. AUDIO WARNING SWITCH.

2-60. An engine out warning switch enables the pilot to prevent audio warning in the headset while helicopter is in a none flight status.

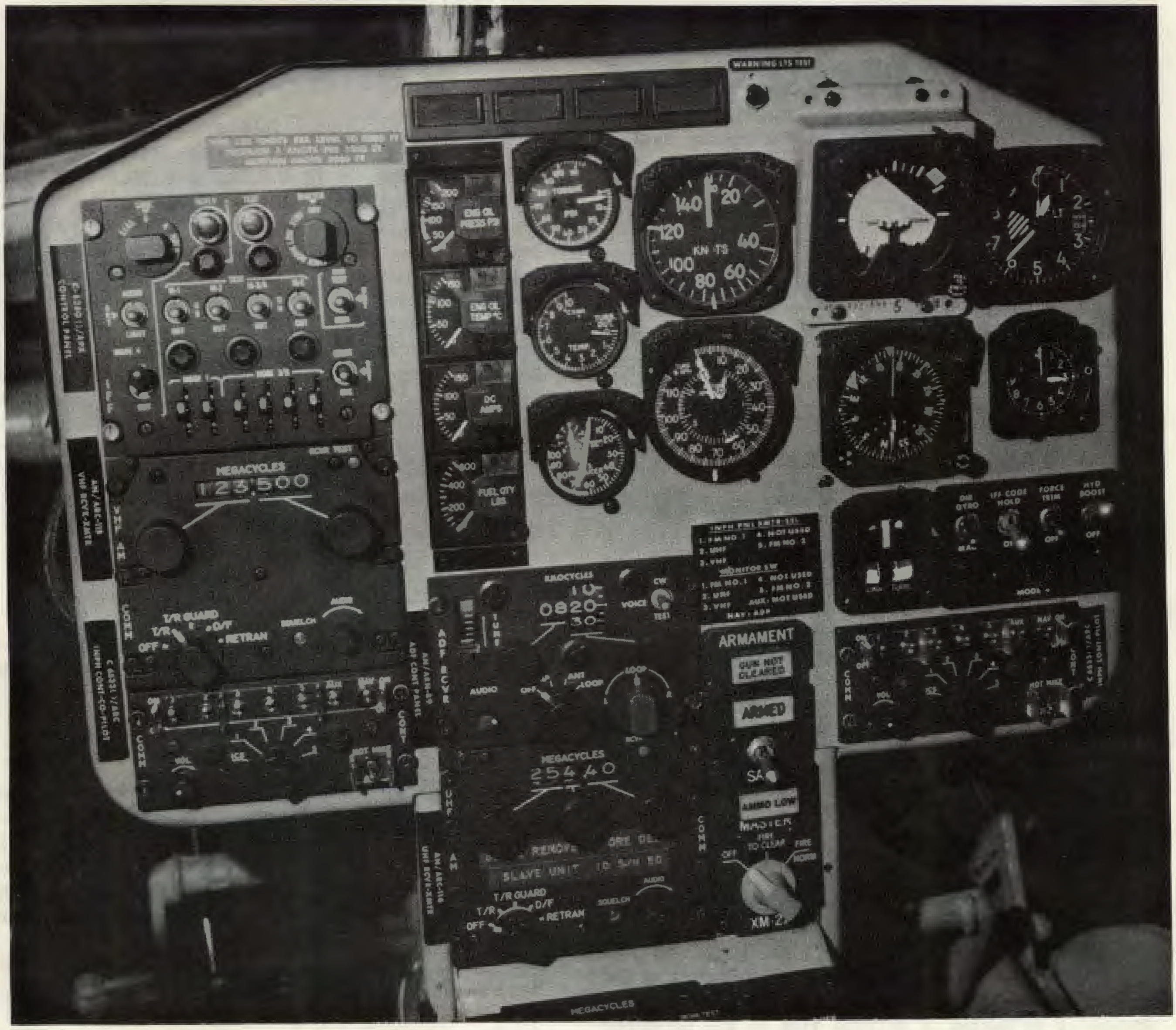


Figure 2-6. Instrument panel

2-61. FUEL FILTER CAUTION LIGHT.

2-62. When the fuel filter is blocked and is about to be bypassed, the FUEL FILTER caution light in the caution panel is illuminated.

2-63. ENGINE CHIP DETECTOR.

2-64. Engine chip detectors are located below the nI tachometer generator and at lowest part of the accessory gear case, to indicate evidence of ferrous metal particles in the engine lubricating system through the ENGINE CHIP DET caution light.

2-65. TORQUEMETER.

2-66. A torquemeter indicator is located on the instrument panel and is connected to a transmitter which is part of the engine oil system. The torque indicating system, converts the pressure sensed at the torquemeter pressure sensing port, on the front side of the accessory gearbox, into an indication, in psi, of torque output.

2-67. TURBINE OUTLET TEMPERATURE GAGE.

2-68. An equal resistance branch thermocouple harness assembly with four integral probes is used to sense the temperature of the gases on the outlet side of the gas producer turbine rotor. Each thermocouple probe consists of a single element, chromel-alumel assembly with a bare wire junction. A DC voltage, which is directly proportional to the gas temperature it senses, is generated by each thermocouple. The thermocouple and thermocoupel harness provide an average of firm voltages representative of the turbine outlet temperature (T.O.T.) and this is the temperature indication on the TOT gage on the instrument panel.

2-69. GAS PRODUCER TACHOMETER.

2-70. The gas producer tachometer generator generates an AC voltage with a frequency that is a function of gas producer turbine rotor (nI) RPM. The output of this tachometer generator is delivered to the gas producer tachometer indicator which indicates the frequency in terms of percent rpm of gas producer turbine speed. The power for the gas producer tachometer is engine generated and does not depend on the helicopter electrical system.

2-71. OIL PRESSURE GAGE.

2-72. The oil pressure indicator is a direct reading wet line system and pressure readings are taken from pressure side of the oil pump and provides readings in psi.

2-73. OIL TEMPERATURE GAGE.

2-74. The engine oil temperature gage located on the instrument panel is connected to an electrical resistance type thermocouple and indicated the temperature of the oil at the oil inlet.

2-75. ENGINE OIL BYPASS CAUTION LIGHT.

2-76. Oil at a low level or oil cooler being bypassed by engine oil will cause the ENG OIL BYPASS caution light to illuminate.

2-77. HELICOPTER FUEL SUPPLY SYSTEM.

2-78. The helicopter fuel system incorporates a single bladder type, self-sealing cell with a total usable capacity of 73 U.S. gallons. The cell is located below and aft of the passenger seat. In addition, the fuel lines are self-sealing. Mounted in the bottom of the cell is one boost pump, one fuel quantity transmitter, low fuel transmitter, and one fuel sump drain and defuel valve. Installed in top of the cell is one fuel quantity transmitter, a vent line, boost pump pressure switch, and governor return line fitting. A fuel filler cap is located on the right side just aft of the passenger door. The fuel, shut-off valve is mounted on the right side of aircraft above fuel cell cavity and is manually operated by control handle on the overhead console. A connector for auxiliary fuel cell is located on the forward side of the fuel cell beneath the seat.

2-79. FUEL QUANTITY GAGE.

2-80. The fuel quantity gage is a transistorized electrical receiver which continuously indicated the quantity of fuel in pounds, 0 to 600.

2-81. FUEL QUANTITY CAUTION LIGHT.

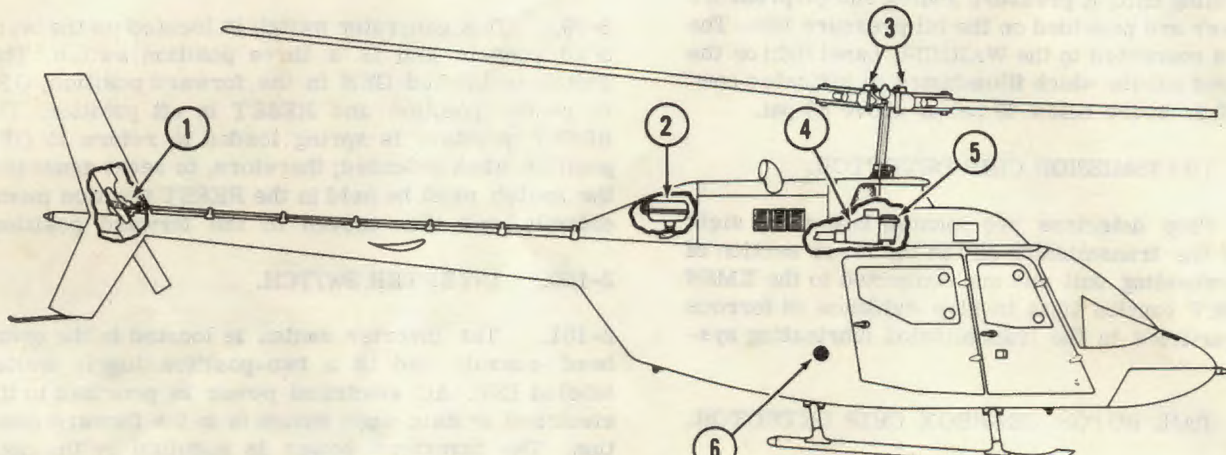
2-82. The 20 minute fuel caution light is located on the pedestal mounted CAUTION panel. The helicopter has two switch assemblies in the fuel cell. The switches function to close the circuit and illuminate the CAUTION light when there is approximately enough fuel remaining for 20 minutes flight time at cruise power.

2-83. FUEL BOOST CAUTION LIGHT.

2-84. The fuel boost caution light is illuminated if the fuel boost pump is inoperative.

2-85. TRANSMISSION SYSTEM.

2-86. Lubrication is provided by a system which includes pump, relief valves, filter, spray jets, temperature bulb, and an oil cooler. The pump is a constant volume type driven by the accessory gear. An oil level sight gage is located on the right side of the transmission. A breather type filler cap and a magnetic drain plug are incorporated. The transmission also furnishes lubrication for the freewheeling unit. A pressure line and a return oil line pass through



1. Tail Rotor Gear Box
2. Engine Oil Tank
3. Main Rotor Reservoirs (4)
4. Transmission Oil Filler
5. Hydraulic Reservoir
6. Fuel Filler

ENGINE FUEL		MIL-T-5624 (JP-4 ASTM Type B) MIL-T-5624 (JP-5 ASTM Type A and Al)
Capacity	73.0 U.S. Gallons	EMERGENCY FUEL MIL-G-5572
ENGINE OIL		MIL-L-7808 or MIL-L-23699
Capacity	1.5 U.S. Gallons	
TRANSMISSION OIL		MIL-L-7808 or MIL-L-23699
Capacity	4.0 U.S. Quarts (Includes Freewheeling Unit)	
HYDRAULIC FLUID		MIL-H-5606
Capacity	System 2.25 U.S. Pints Reservoir 1.375 U.S. Pints	
MAIN ROTOR RESERVOIRS		MIL-L-2104 10W30 Motor Oil
Capacity	1.0 U.S. Pints	
TAIL ROTOR GEAR BOX		MIL-L-7808 or MIL-L-23699
Capacity	1.25 U.S. Pints	

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Figure 2-7. Servicing diagram

the forward bulkhead to connect the transmission and freewheeling unit. A pressure switch and oil pressure transducer are provided on the oil pressure line. The switch is connected to the WARNING panel light on the instrument panels which illuminates to indicate a condition of pressure below 30 psi or above 80 psi.

2-87. TRANSMISSION CHIP DETECTOR.

2-88. Chip detectors are located below the sight glass of the transmission and in the lower section of the freewheeling unit and are connected to the XMSN CHIP DET caution light to give evidence of ferrous metal particles in the transmission lubricating system.

2-89. TAIL ROTOR GEARBOX CHIP DETECTOR.

2-90. A chip detector is located in the lower section of the tail rotor gearbox to give evidence of ferrous metal particles in the tail rotor gearbox through the T/R CHIP DET caution light.

2-91. ELECTRICAL SUPPLY SYSTEMS.

2-92. DIRECT CURRENT PRIMARY POWER.

2-93. The OH-58A helicopter is equipped with a 28-volt direct current dual bus (essential and non-essential) system supplied by a starter-generator and battery. Major components of the direct current power system include battery, starter generator, voltage regulator, relays, switches and circuit breakers. All circuits in the electrical system are single wire with common ground return. The negative terminals of the starter-generator and the battery are grounded to the helicopter structure. In the event of generator failure, the non-essential bus is automatically dropped from the generator and battery bus. The battery then supplies power to the essential bus load. The non-essential bus may be manually reactivated.

2-94. DC POWER CONTROL.

2-95. The DC power is controlled by the battery switch, generator switch, non-essential bus switch and circuit breakers.

2-96. BATTERY SWITCH.

2-97. The battery switch is located in the overhead console and is a two-position toggle switch, labeled BAT. Battery electrical power is supplied to the helicopter's electrical system when the switch is in the BAT position. When the switch is in the BAT position, it closes the circuit to the actuating coil of the battery relay and battery power is then being delivered from the battery to the primary bus. When the switch is placed in the OFF position it opens the circuit to the actuating coil of the battery relay and no power is delivered from the battery to the primary bus.

2-98. GENERATOR SWITCH.

2-99. This generator switch is located on the overhead console and is a three position switch. This switch is labeled GEN in the forward position, OFF in center position and RESET in aft position. The RESET position is spring loaded to return to OFF position when released; therefore, to reset generator the switch must be held in the RESET position momentarily and then moved to the forward position.

2-100. INVERTER SWITCH.

2-101. The inverter switch is located in the overhead console and is a two-position toggle switch labeled INV. AC electrical power is provided to the electrical system when switch is in the forward position. The inverters power is supplied by the non-essential bus, therefore, to have AC power, electrical power must be available at the non-essential bus. When the switch is in the OFF position it opens the circuit to the inverter.

2-102. NON-ESSENTIAL BUS SWITCH.

2-103. The non-essential bus switch is located in the overhead console and is a two-position switch labeled NON-ESS BUS. When the switch is in the NORM position, power is supplied to the non-essential bus provided the generator is operating and charging. When the switch is in the MAN position, power is supplied to the non-essential bus regardless of generator operation. In all normal flight operations the switch should be in the NORM position.

2-104. DC CIRCUIT BREAKER PANEL.

2-105. The DC circuit breaker panel is located in the overhead console. Each individual circuit 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. The circuit is reactivated by pushing the circuit breaker button.

2-106. DC SYSTEM INDICATOR.

2-107. The ammeter is mounted in the instrument cluster on the instrument panel and indicates the ampere load being used. The circuit is protected by two circuit breakers in the aft electrical compartment.

2-108. ALTERNATING CURRENT POWER.

2-109. The OH-58A helicopter is equipped with a 65 volt-ampere solid state inverter powered from the non-essential 28-volt DC bus through a 5 ampere INVERTER circuit breaker and is manually controlled by an INVERTER switch. The inverter delivers 115 volt AC 400 Hz to the 115 volt AC bus. A caution panel segment INST INVTR will illuminate when AC power is lost.

2-110. AC POWER CONTROL.

2-111. The AC power is controlled by the inverter switch and AC circuit breakers.

2-112. AC CIRCUIT BREAKERS.

2-113. The AC circuit breakers are on the aft end of the overhead console. In the event of a circuit overload, the circuit breaker protecting that circuit will pop out. The circuit is reactivated by pushing in the circuit breaker button.

2-114. EXTERNAL POWER RECEPTACLE.

2-115. During ground operations, external power may be connected to the electrical system through an external power receptacle located on the lower right side of the helicopter just aft of the rear landing gear cross tube. The generator and battery switches should be in the OFF position when external power is connected. The external power relay closes automatically and connects the ground unit to the main power direct current bus.

2-116. HYDRAULIC POWER SYSTEM.

2-117. The hydraulic system consists of a variable delivery pump and reservoir, servo actuators with irreversible valve circuits for cyclic and collective controls. A pressure line filter, a return line filter, and a solenoid shutoff valve are also incorporated in the system. The pump is on the forward face of the transmission. The hydraulic system provides for fully powered flight controls being available during autorotative flight.

2-118. SYSTEM CONTROL.

2-119. An Hydraulic System ON-OFF switch located on the lower right portion of the instrument panel controls the activation and deactivation of the hydraulic system.

2-120. ROTOR SYSTEM.

2-121. The rotor system consists of the main rotor and anti-torque tail rotor system.

2-122. MAIN ROTOR.

2-123. The main rotor assembly is a two blade, semi-rigid, see-saw type rotor called an Underslung Feathering Axis (U.F.A.) hub. The blades are mounted in the hub assembly grips with blade retaining bolts, which have hollow shanks for installation of weights to balance the hub and blade assembly. After balancing, the bolts must be kept with their respective rotor hub grips. Blade alignment is accomplished by adjustment of blade latches, which engage the root end of the blade. The blade grips are retained on the hub yoke by means of tension-torsion strap assemblies. Changes in blade pitch angle are made by turning the grips on the yoke journal; each grip has two pitch change alignment bearings. Oil reservoirs, with sight gages, are provided for pitch change bearings in the two grips and for the two pillow block bearings utilized with the flapping axis trunnion. The rotor blades are all metal, consisting of an extruded aluminum alloy nose block, aluminum alloy trailing edge and an aluminum honeycomb filler.

2-124. ROTOR RPM INDICATOR.

2-125. The rotor RPM indicator is part of the dual tachometer and is located on the instrument panel. The rotor rpm reading is indicated on the inner scale and the pointer needle is marked with an R. The indicator is powered by a tachometer generator mounted on and driven by the transmission and is independent of the helicopter electrical system.

2-126. TAIL ROTOR.

2-127. The tail rotor is driven by the transmission through tail rotor drive shafts and the tail rotor gearbox. The tail rotor hub and blade assembly consists of an aluminum alloy forged yoke and aluminum alloy blades. The blades are mounted in the grip plates on the pitch change axis. The spherical bearings provide for pitch change of the blades. The hub and blade assembly are mounted on the tail rotor gearbox shaft by means of a splined trunnion, mounted in bearings in the yoke, to provide a flapping axis for the assembly. The tail rotor gearbox has a breather type filler cap, magnetic drain plug and oil level sight gage, all accessible from ground level.

2-128. FLIGHT CONTROL SYSTEM.

2-129. 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. Dual flight controls are provided. The system includes; the cyclic control stick, used for fore and aft and lateral control; the collective pitch control lever, used for vertical control; tail rotor (directional) control pedals used for heading control. The control forces of the main rotor flight control system are reduced to a near zero pounds force to lessen pilot fatigue, by hydraulic servo cylinders connected to the control system mechanical linkage and powered by the transmission driven pump. Force trims (force gradients) connected to the cyclic controls are electrically operated mechanical units; used to induce aritifical control feeling into the cyclic controls and to prevent the cyclic stick from moving of their own accord. The tail rotor controls are dynamically balanced for minimum force.

2-130. FORCE TRIMS (FORCE GRADIENT).

2-131. Force gradient devices are incorporated in the controls. These devices are installed in the flight

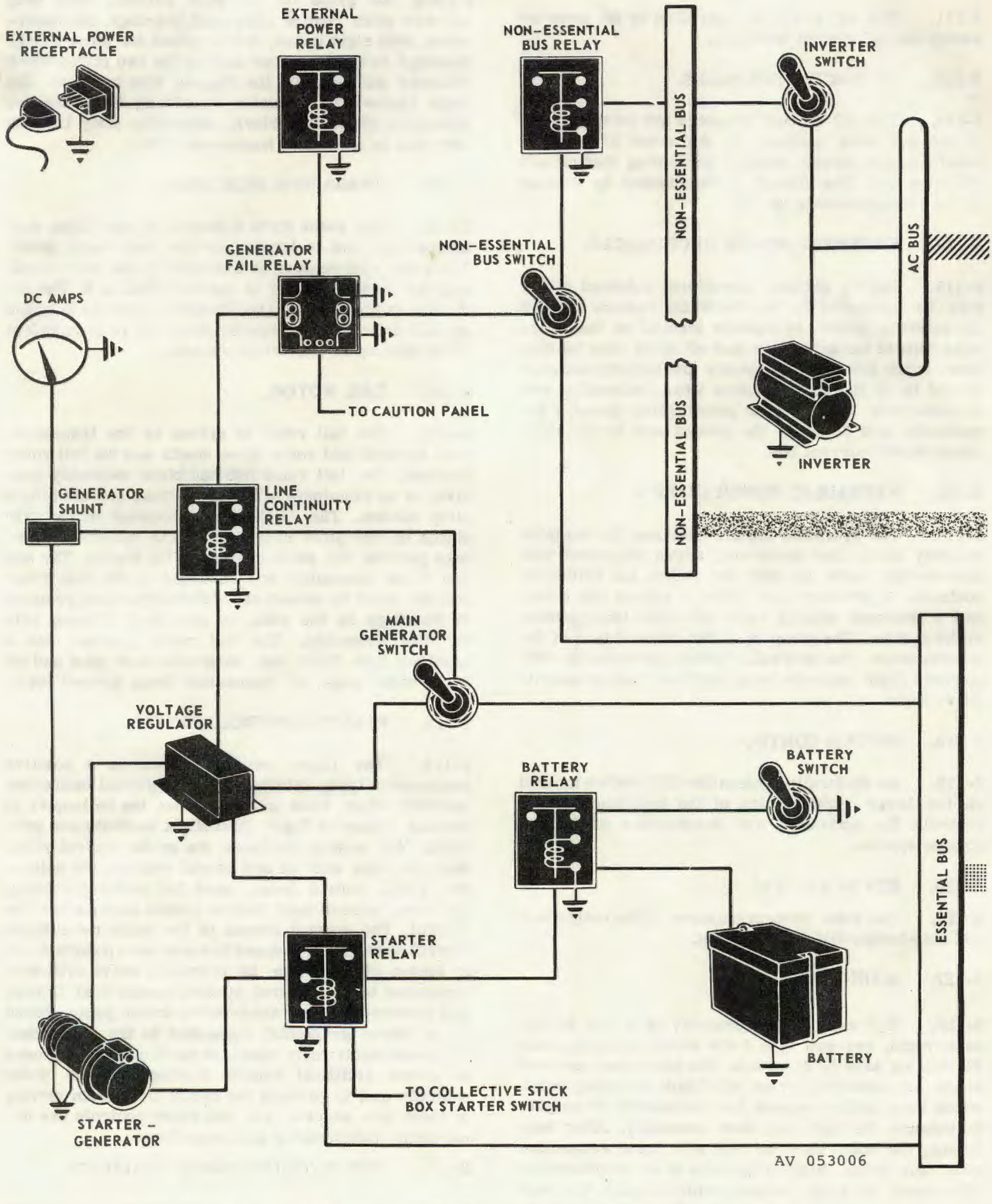

Figure 2-8. Electrical system schematic (Sheet 1 of 2)

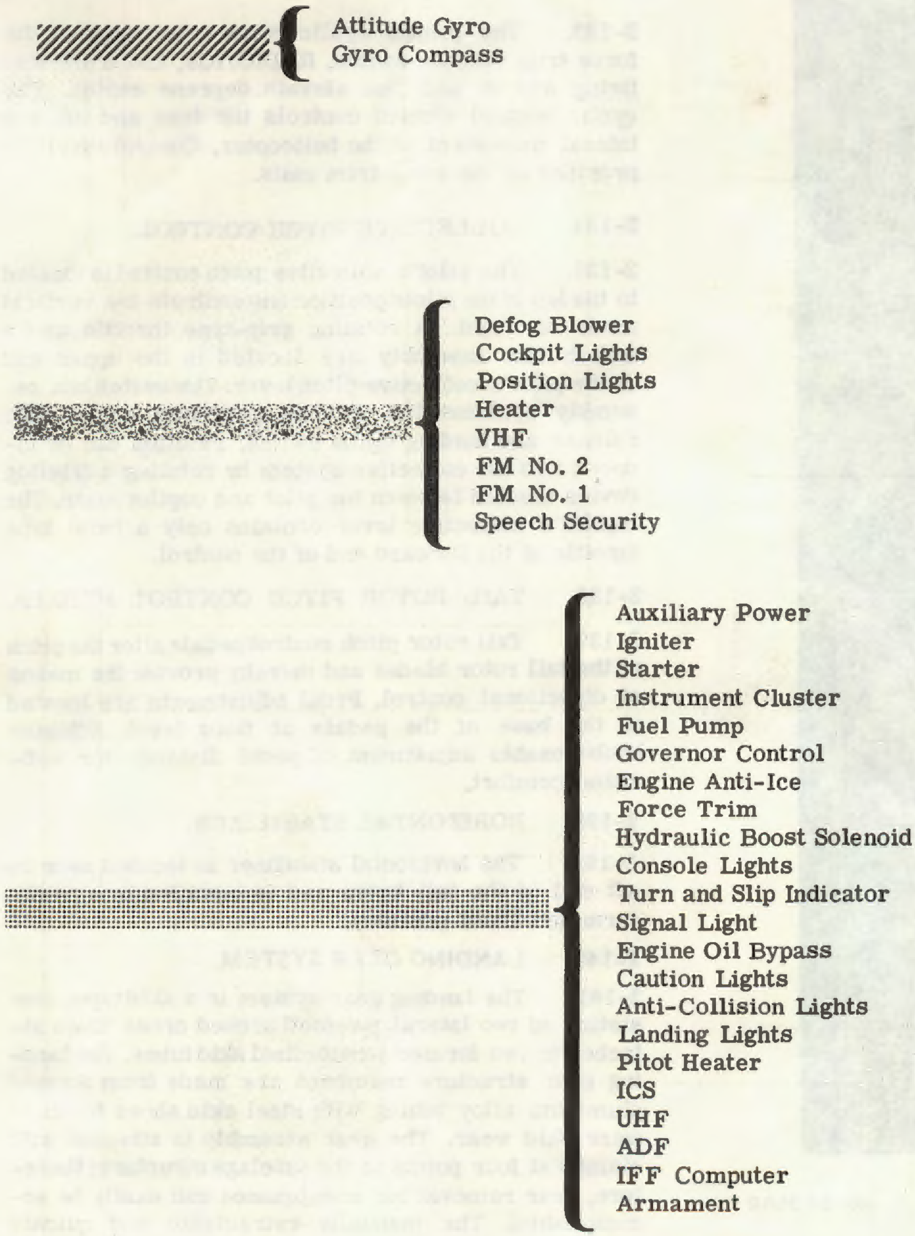

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Figure 2-8. Electrical system schematic (Sheet 2 of 2)

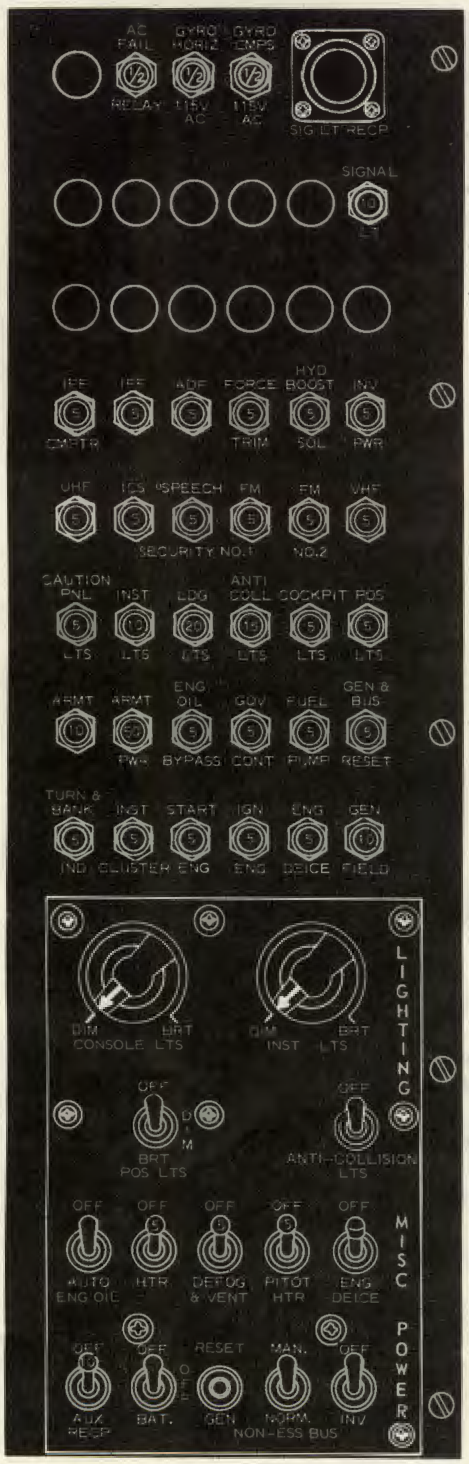

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Figure 2-9. Overhead console

control system between the cyclic stick and the hydraulic power cylinder (servos). The devices act to furnish a force gradient or "feel" to the cyclic control stick, however, these forces can be reduced to zero by depressing the force trim button on the cyclic stick. The 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 toggle switch is installed in the control panel on the lower right section of the instrument panel to activate the force trim system.

2-132. CYCLIC CONTROL.

2-133. The pilot's cyclic stick grip contains the force trim release switch. RADIO/ICS, and armament firing switch and gun elevate depress switch. The cyclic control system controls the fore and aft and lateral movement of the helicopter. Control "feel" is provided by the force trim units.

2-134. COLLECTIVE PITCH CONTROL.

2-135. The pilot's collective pitch control is located to the left of the pilots position and controls the vertical mode of flight. A rotating grip-type throttle and a switch box assembly are located in the upper end of the pilot's collective pitch lever. The switch box assembly contains the starter, governor, engine idle release and landing lights switch. Friction can be induced into the collective system by rotating a friction device located between the pilot and copilot seats. The copilot's collective lever contains only a twist type throttle at the forward end of the control.

2-136. TAIL ROTOR PITCH CONTROL PEDALS.

2-137. Tail rotor pitch control pedals alter the pitch of the tail rotor blades and thereby provide the means of directional control. Pedal adjustments are located at the base of the pedals at floor level. Adjuster knobs enable adjustment of pedal distance for individual comfort.

2-138. HORIZONTAL STABILIZER.

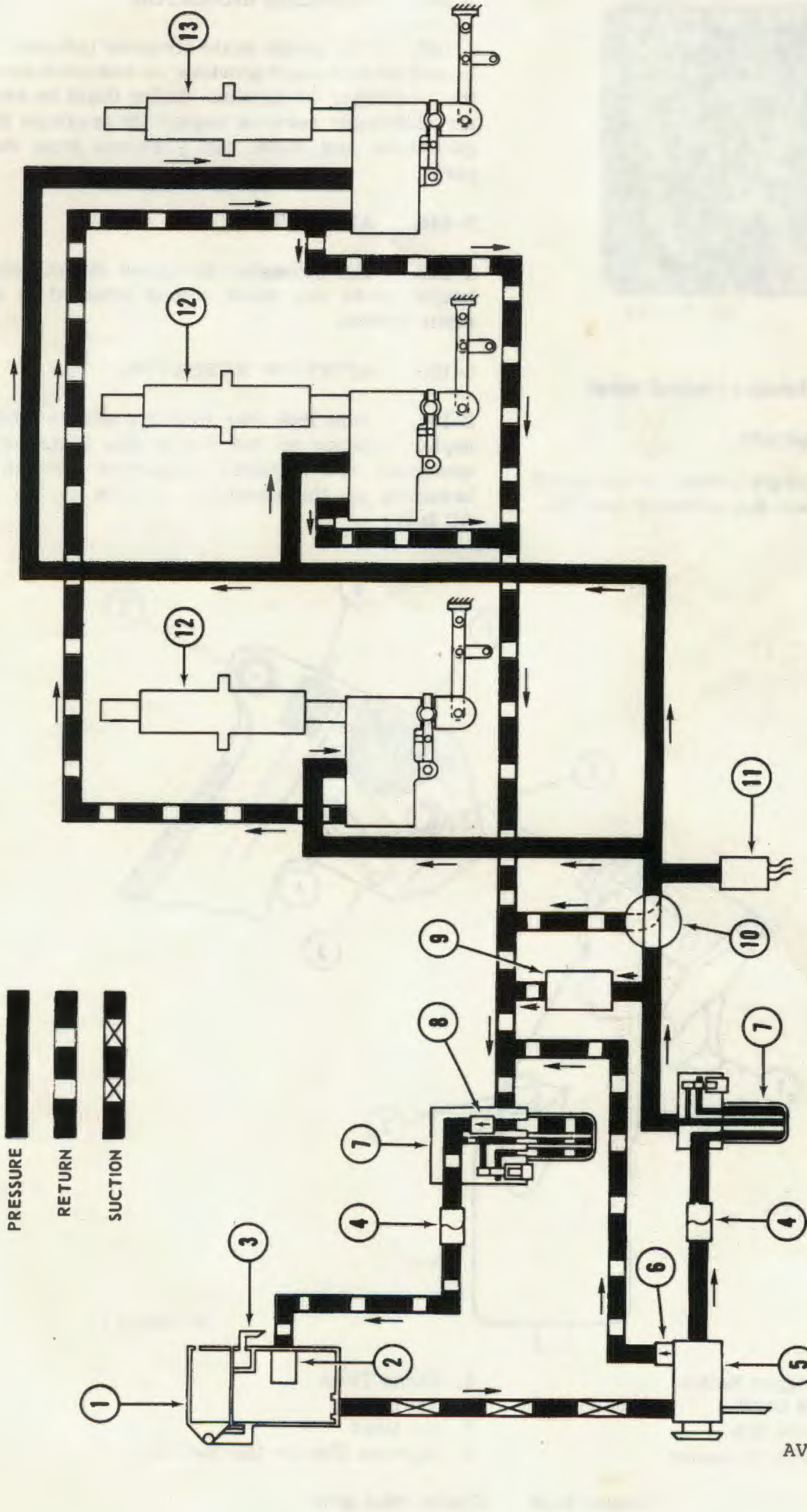
2-139. The horizontal stabilizer is located near the aft end of the tail boom and is installed in a predetermined fixed position.

2-140. LANDING GEAR SYSTEM.

2-141. The landing gear system is a skid type, consisting of two lateral mounted arched cross tubes attached to two formed longitudinal skid tubes. The landing gear structure members are made from formed aluminum alloy tubing with steel skid shoes to minimize skid wear. The gear assembly is attached with clamps at four points to the fuselage structure; therefore, gear removal for maintenance can easily be accomplished. The manually retractable and quickly removable wheel assemblies have been provided to facilitate helicopter ground handling operations.

2-142. TAIL SKID.

2-143. A tubular steel tail skid is attached at the lower section of the vertical fin and acts as a warning to the pilot upon an inadvertent tail low landing.



1. Reservoir
2. Baffle
3. Scupper Drain
4. Quick Disconnects
5. Pump
6. Check Valve
7. Filter
8. Filter By-Pass Valve
9. Relief Valve
10. Solenoid Valve
11. Pressure Switch
12. Servo Actuator, Cyclic
13. Servo Actuator, Collective

Figure 2-10. Hydraulic system schematic

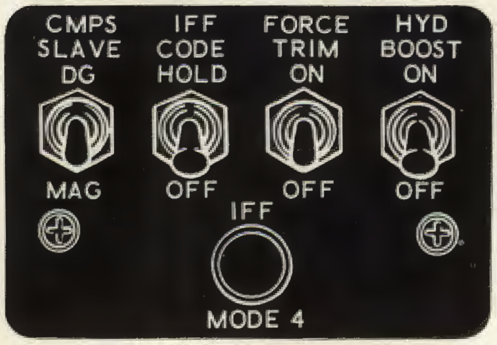


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Figure 2-11. Miscellaneous control panel

2-144. FLIGHT INSTRUMENTS.

2-145. The flight instruments consist of airspeed indicator, altimeter, turn and slip indicator and attitude indicator.

2-146. AIRSPEED INDICATOR.

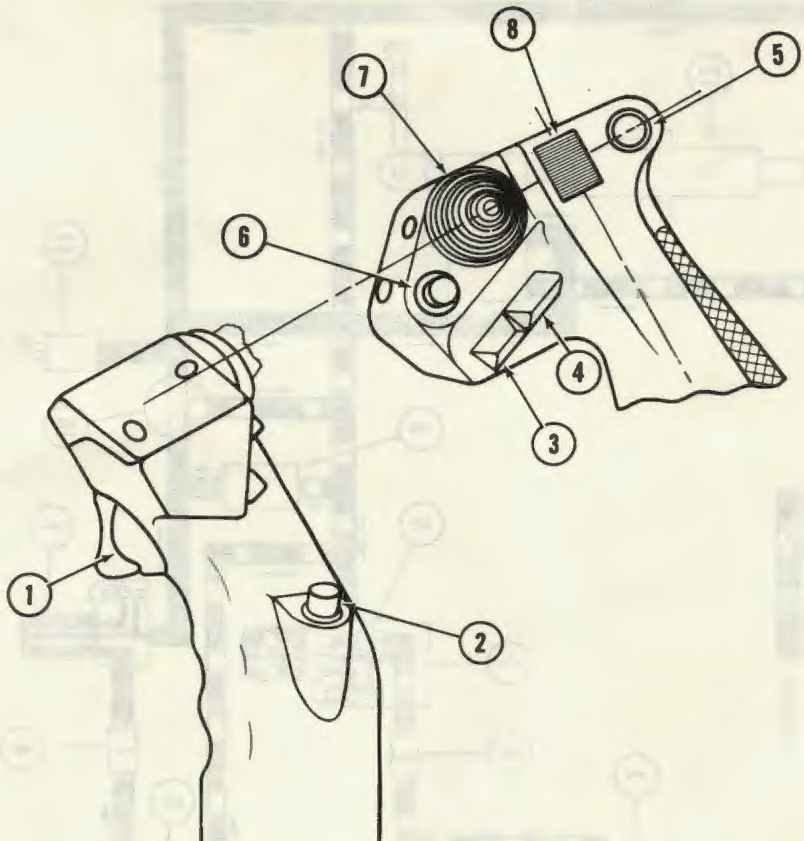
2-147. The single scale airspeed indicator is calibrated in knots and provides an indicated airspeed of the helicopter at anytime during flight by measuring the difference between impact air pressure from the pilot tube and static air pressure from the static ports.

2-148. ALTIMETER.

2-149. The altimeter furnishes direct readings of height above sea level and is actuated by the pilot static system.

2-150. ATTITUDE INDICATOR.

2-151. This indicator displays attitude of the helicopter relative to the earth. The indicator is self contained and required connection through circuit breakers on the overhead console to the 115-volt AC bus.



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1. Trigger Switch
2. Not Used
3. Radio ICS
4. Radio Transmit
5. Force Trim
6. Not Used
7. Not Used
8. Depress Elevate Gun Switch

Figure 2-12. Cyclic stick grip

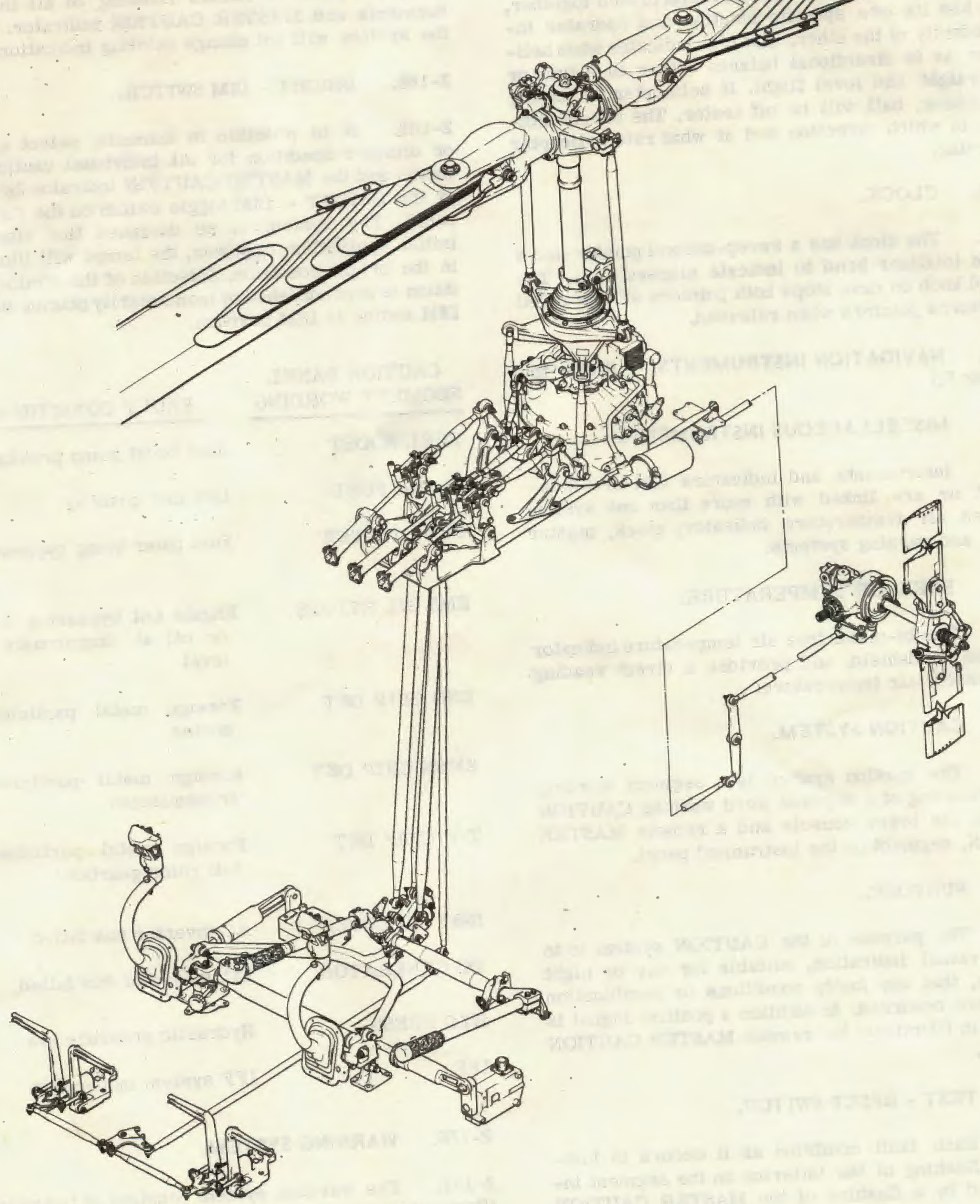

Figure 2-13. Flight controls

2-152. TURN AND SLIP INDICATOR.

2-153. The turn and slip indicator is controlled by an electrically actuated gyro. This instrument has a needle (turn indicator) and a ball (slip indicator). Although 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 helicopter is in directional balance either in a turn or in straight and level flight. If helicopter is yawing or slipping, ball will be off center. The needle indicates in which direction and at what rate helicopter is turning.

2-154. CLOCK.

2-155. The clock has a sweep-second pointer and a minute totalizer hand to indicate elapsed time. The control knob on case stops both pointers when pressed and returns pointers when released.

2-156. NAVIGATION INSTRUMENTS. (Refer to Chapter 5.)

2-157. MISCELLANEOUS INSTRUMENTS.

2-158. Instruments and indicators that are independent or are linked with more than one system are free air temperature indicator, clock, master caution and warning systems.

2-159. FREE AIR TEMPERATURE.

2-160. The bi-metal free air temperature indicator is in the windshield, and provides a direct reading of the outside air temperature.

2-161. CAUTION SYSTEM.

2-162. The caution system is a segment wording type, consisting of a segment word warning CAUTION panel on the lower console and a remote MASTER CAUTION, segment on the instrument panel.

2-163. PURPOSE.

2-164. The purpose of the CAUTION system is to provide visual indication, suitable for day or night operation, that any faulty conditions or combination thereof has occurred. In addition a positive signal is provided to illuminate the remote MASTER CAUTION indicator.

2-165. TEST - RESET SWITCH.

2-166. Each fault condition as it occurs is indicated by flashing of the lettering on the segment involved and by a flashing of the MASTER CAUTION indicator. A momentary positioning of TEST RESET switch to RESET extinguishes the MASTER CAUTION light so that it will illuminate for the next fault indication; also the fault segment will be steady ON. Segments will remain lighted as long as the fault condition(s) exist.

2-167. Momentarily pressing RESET - TEST switch in TEST position causes flashing of all individual segments and MASTER CAUTION indicator. Testing the system will not change existing indications.

2-168. BRIGHT - DIM SWITCH.

2-169. It is possible to manually select a bright or dimmed condition for all individual caution segments and the MASTER CAUTION indicator by means of the BRIGHT - DIM toggle switch on the CAUTION panel. The system is so designed that after each initial application of power, the lamps will illuminate in the bright condition. Selection of the dimmed condition is accomplished by momentarily placing BRIGHT DIM switch in DIM position.

CAUTION PANEL SEGMENT WORDING	FAULT CONDITIONS
FUEL BOOST	Fuel boost pump pressure low
20 MIN FUEL	Low fuel quantity
FUEL FILTER	Fuel filter being bypassed
ENG OIL BYPASS	Engine Oil bypassing cooler, or oil at dangerously low level
ENG CHIP DET	Foreign metal particles in engine
XMSN CHIP DET	Foreign metal particles in transmission
T/R CHIP DET	Foreign metal particles in tail rotor gearbox
INST INVERTER	AC inverter has failed
DC GENERATOR	DC generator has failed
HYD PRESS	Hydraulic pressure low
IFF	IFF system inoperative

2-170. WARNING SYSTEM.

2-171. The warning system consists of indivudally illuminated warning light segments mounted in the MASTER CAUTION and warning light panel on the instrument panel. The purpose of this system is to provide visual indication for day or night operation

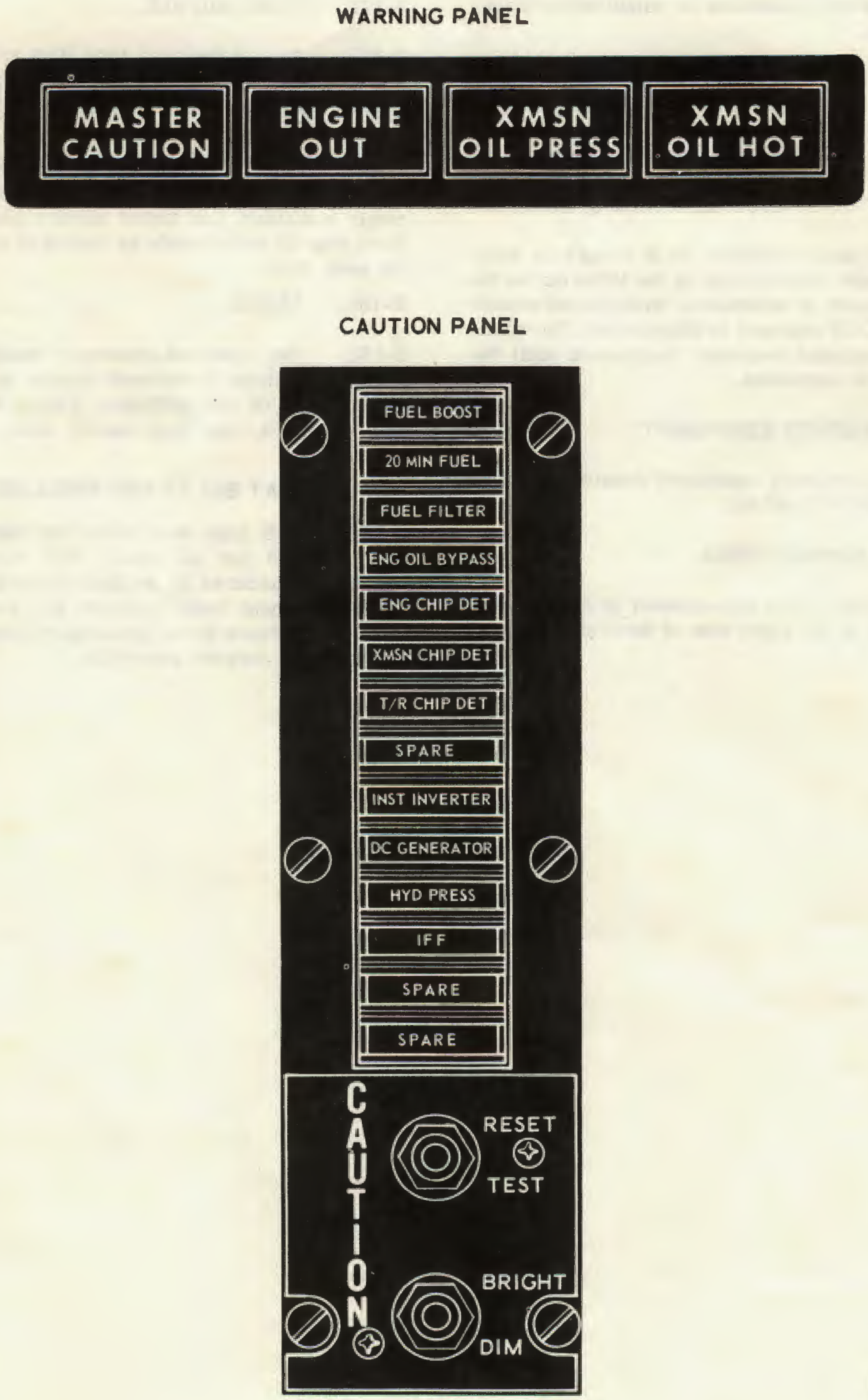

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Figure 2-14. Warning and caution panels

that any of the three conditions or combination thereof has occurred.

ENGINE OUT	Engine nI speed below 55%
XMSN OIL PRESS	Transmission oil pressure dangerously low or high
XMSN OIL HOT	Transmission dangerously hot

2-172. Each fault condition as it occurs is indicated by a steady illumination of the lettering on the particular segment. In addition an audio signal sounds when ENGINE OUT segment is illuminated. The warning indicator segment remains illuminated until the fault condition is corrected.

2-173. EMERGENCY EQUIPMENT.

2-174. The emergency equipment consists of a fire extinguisher and first aid kit.

2-175. FIRE EXTINGUISHER.

2-176. A portable fire extinguisher is carried in a bracket located on the right side of the center support column.

2-177. FIRST AID KIT.

2-178. An aeronautical type first aid kit is located on the right-hand side of the center support column.

2-179. DOORS.

2-180. Four entrance doors are provided for access to the cabin section. The doors utilize a honeycomb structure and tinted acrylic plastic windows. Each door is jettisonable by means of a release handle for each door.

2-181. SEATS.

2-182. The crew and passenger seats are constructed of aluminum honeycomb panels and form an integral part of the airframe. Each seat is equipped with cushions, lap type safety belts and shoulder harness.

2-183. SEAT BELTS AND SHOULDER HARNESS.

2-184. Web type seat belts and shoulder harness are provided for all seats. The forward shoulder harness is secured to an inertia reel, which incorporates manual lock controls for each seat. The shoulder harness in the passenger compartment is secured to a support assembly.

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 55-1520-228-CL.

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 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 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.

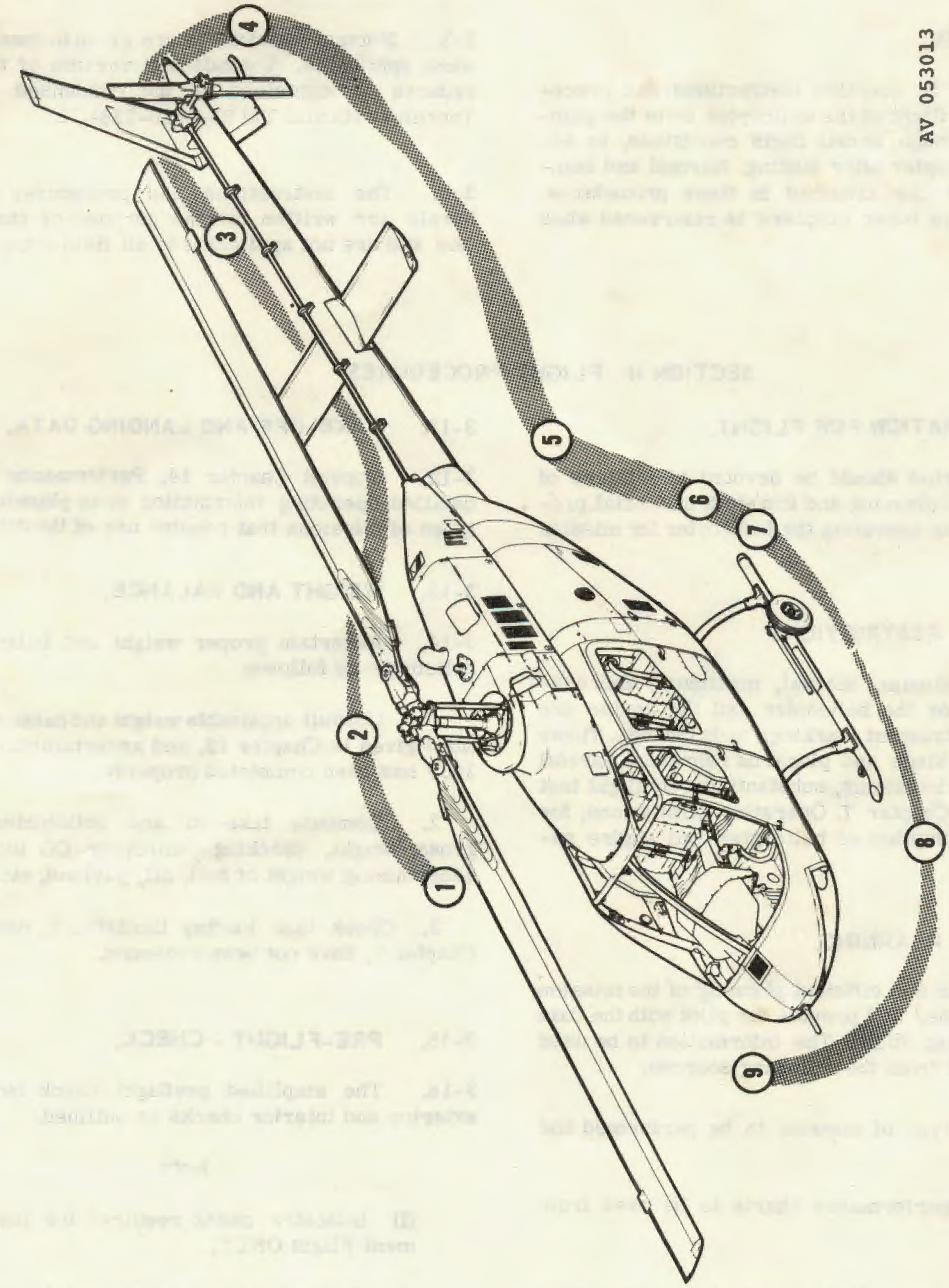

Figure 3-1. Exterior check diagram

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 preflight checks required by the amplified or condensed checklists for beginning flights. Under these conditions, only the asterisked (*) items in these lists are required checks to assure safe operation.

3-17. BEFORE EXTERIOR CHECK

*1. Publications - Check DA Forms 2408, DD Form 365F, locally required forms and publications and availability of Operators Manual (-10).

2. ARMED - SAFE switch - SAFE.

3. ARMAMENT MASTER switch - OFF.

*4. BAT switch - BAT.

(N) 5. LANDing lights and POS LTS - Check.

*6. Fuel Quantity indication - Check.

*7. BAT switch - OFF.

8. First Aid Kit - Check security.

9. Fire Extinguisher - Condition and security.

3-18. EXTERIOR CHECK - FUSELAGE RIGHT SIDE FORWARD - AREA 1.

1. Right static port - Unobstructed.

2. Crew door - Condition and security.

3. Landing gear - Condition and security; handling wheels removed.

4. Passenger door - Condition and security.

5. Hydraulic servos and flight controls - Check for security and leaks.

*6. Hydraulic reservoir - Check fluid level.

3-19. FUSELAGE - RIGHT SIDE AFT - AREA 2.

*1. Transmission - Condition and oil level.

2. Transmission cowling - Secure.

3. Swashplate - Condition and security.

4. Engine inlet cover - Removed, inlet clear.

*5. Fuel - Check quantity, secure cap.

6. Drain lines and vents - Condition, unobstructed.

7. Engine exhaust cover - Removed.

8. Engine compartment - Condition, fuel and oil leaks, generator air intake - Condition.

9. Engine and aft cowling - Secure.

10. Fuselage - Condition.

11. Lower anti-collision light - Condition.

*12. Oil tank - Check oil level and secure cap.

3-20. TAIL BOOM - RIGHT SIDE - AREA 3.

1. Tail rotor drive shaft, bearings and hangers-condition and security.

2. Tail boom - Condition.

3. Horizontal stabilizer - Condition.

4. Right navigation light - Condition.

*5. Main rotor blade - Condition. Blade tie down removed.

6. Vertical fin - Condition and security.

7. Tail skid - Condition and security.

3-21. TAIL BOOM - FULL AFT - AREA 4.

1. Aft navigation light - Condition.

*2. Tail rotor gear box - Condition, oil level, chip detector wiring and oil filler cap secure.

3. Boot - Condition.

4. Tail rotor - Condition and security of blades and controls.

3-22. TAIL BOOM - LEFT SIDE - AREA - 5.

1. Tail rotor drive shaft, bearing and hangers-condition and security.

2. Horizontal stabilizer - Condition.

3. Left navigation light - Condition.

3-23. FUSELAGE - LEFT SIDE AFT - AREA - 6.

1. Fuselage - Condition.

*2. Oil tank sight glass - Oil level.

3. Avionics compartment - Condition and security of components, battery connected, and secure door.

4. Engine exhaust cover - Removed.

5. Engine compartment - Condition, fuel and oil leaks.

6. Engine and aft cowling - Secure.

7. Heater vent - Unobstructed.

8. Transmission cowling - Secure.

9. Engine inlet cover - Removed, inlet clear.

3-24. FUSELAGE - TOP - AREA 7.

1. Anti-collision light - Condition.

2. Swashplate and flight controls - Condition and security.

3. Mast - Condition and security.

4. Main rotor system - Check condition, cleanliness, and security. Check oil level of grip and pillow block reservoirs. Check security of mast nut and blade retention bolts.

*5. Main rotor blades - Condition.

3-25. FUSELAGE - LEFT SIDE FORWARD - AREA 8.

1. Hydraulic servos and flight controls - Check for security and leaks.

2. Passenger door - Condition and security.

3. Landing gear - Condition and security; handling wheels removed.

4. Fuel sump - Drain.

5. Crew door - Condition and security.

6. Lift static port - Unobstructed.

3-26. FUSELAGE - FRONT - AREA 9.

*1. Main rotor blade - Condition.

2. Windshield - Condition and cleanliness.

3. Free-air temperature bulb - Condition unobstructed.

4. Ram air grille - Unobstructed.

5. Pitot tube - Cover removed; unobstructed.

6. Landing lights - Condition.

7. Fuselage underside - Condition.

3-27. INTERIOR CHECK

*1. Doors - Secure.

2. Emergency door releases - Secure.

*3. Pedals - Adjust.

*4. Seat belt and shoulder harness - Secure.

5. Shoulder harness lock - Check operation; leave unlocked.

*6. Flight controls - Friction off - Check freedom of movement.

*7. Cyclic - Neutral, friction on.

*8. Collective pitch - Down, friction on.

*9. Throttle - Full increase, close to flight idle stop, press IDLE REL. button, then throttle closed.

10. Landing lights switch - OFF.

*11. Radio - OFF; Set to desired frequency.

*12. Engine instruments - Check static indications, slippage marks, and operating range limit markings.

13. Radio Bearing Heading indicator - Check.

14. Turn and slip indicator - Check.

15. DIR GYRO/MAG switch - MAG.

16. IFF CODE switch - OFF.

*17. FORCE TRIM switch - OFF.

*18. HYD BOOST switch - ON.

*19. Magnetic compass - Check fluid, heading and deviation card.

*20. Clock - Set and Running.

*21. Altimeter - Set.

*22. Attitude Indicator - Check.

*23. Airspeed indicator - Check.

24. Free air temperature - Check.

*25. BAT switch - BAT (OFF for APU start).

*26. GEN switch - OFF.

*27. NON-ESS BUS switch - NORM.

*28. INV switch - OFF.

*29. MAIN FUEL VALVE handle - Fwd (OFF).

*30. ENG DEICE switch - OFF.

31. PITOT HTR switch - OFF.

32. DEFOG and VENT switch - OFF.

33. HTR switch - OFF.

*34. ENGINE OIL BYPASS switch - As desired.

Note

In a combat situation with the possibility of oil cooler failure, oil cooler bypass switch should be in the AUTO position.

35. POS LTS switch - OFF (Night flights - as required).

36. ANTI-COLLISION LTS - OFF.

37. CONSOLE and INST LTS switches - As required.

38. Circuit breakers - IN.

3-28. BEFORE STARTING.

*1. BAT switch - BAT (OFF for APU start).

*2. ENGINE OUT Warning light - Check illumination.

Note

If ENGINE OUT warning light is not illuminated, check circuit breaker in. Do not fly aircraft until malfunction is corrected

*3. CAUTION TEST/RESET - TEST; check illumination of CAUTION lights; RESET.

*4. GOV-RPM switch - DECR 7 seconds.

3-29. ENGINE STARTING AND RUN-UP.

*1. Rotor blades - Check clear and untied.

*2. Fireguard - Posted.

Caution

In case of false start, or a start not completed in a total time of 45 seconds at ambient air temperature above 10°C close throttle. At temperatures below 10°C, starting times will increase. Motor engine with throttle closed for at least 10 seconds and until residual TOT indication reads less than 200°C. Ignition time limits are: 2 minutes, ON; 3 minutes, OFF; 2 minutes ON; 23 minutes, OFF.

*3. Starter button - PRESS and hold.

*4. Throttle - Open to flight idle at 15% gas producer RPM (nI) or above. (Do not open if nI is below 15% or TOT at or above 200°C.

Caution

If the main rotor is not rotating by 25% gas producer speed (nI) abort start and investigate for possible mechanical failure or drive system malfunction.

*5. TOT indicator - Monitor for overtemperature indication.

CONDITION	ACTION
During Start:	
749°C is exceeded for more than 10 seconds.	Shutdown. Record peak temperature and duration. Maintenance action required before next flight.
Any time 927°C is exceeded.	Shutdown. Record peak temperature and duration. Maintenance action required before next flight.
During power change and/or transient:	
749°C is exceeded for more than 6 seconds.	During runup - shutdown. Record peak temperature and duration. Maintenance action required before next flight.
	During flight - abort mission. Land at nearest suitable site. Record peak temperature and duration. Maintenance action required before next flight.
Any time 843°C is exceeded, excluding starts.	During runup - shutdown. Record peak temperature and duration. Maintenance action required before next flight.
	During flight - abort mission. Land at nearest suitable site. Record peak temperature and duration. Maintenance action required before next flight.
Any time 927°C is exceeded.	During runup - shutdown. Record peak temperature and duration. Maintenance action required before next flight.
	During flight - reduce power. Execute precautionary landing. Be prepared for complete power failure. Record peak temperature and duration. Maintenance action required before next flight.

*6. Starter button - Release (58 to 62% nI).

*7. ENG OIL PRESS - Check for indication.

*8. XMSN OIL PRESS Warning light - OUT.

*9. APU - Disconnect (APU start).

*10. BAT switch - BAT (APU start).

*11. GEN switch - GEN (below 70% nI).

*12. INV switch - INV.

*13. DC AMPS - Check normal indication.

*14. DIR GYRO/MAG switch - DIR GYRO.

*15. WARNING lights button - PRESS-TO-TEST. Check for illumination of lights.

*16. Radios - ON.

*17. Helmets - ON.

Caution

Maintain nI idle for 40 seconds or until generator output decreases to less than 60 amperes.

*18. Throttle - Full OPEN.

*19. GOV RPM switch - INCR (103% nII).

*20. ENG DE-ICE switch - ON, check for rise in TOT then OFF.

*21. PITOT HTR switch ON, check DC AMPS indication, then OFF.

*22. Force trim switch - OFF.

*23. Flight controls - Freedom of movement.

*24. HYD BOOST switch - OFF, check controls, then ON. Force trim switch ON.

*25. ANTI-COLLISION LTS switch - ON.

(N)*26. Interior lights - As desired.

3-30. BEFORE TAKE-OFF AND LANDING.

*1. Warning lights - Check.

*2. Engine and transmission instruments - Check.

*3. RPM - Check.

*4. Fuel - Check.

*5. CAUTION lights - Check.

*6. HTR, DEFOG and VENT switches - OFF.

3-31. ENGINE SHUT DOWN.

*1. Throttle - Flight idle (Stabilize TOT for 2 minutes).

*2. Controls - Cyclic neutral collective, down, friction.

*3. ANTI-COLLISION LTS switch - OFF.

*4. Radios - OFF.

*5. Throttle - CLOSED.

*6. Main Fuel Valve handle - Aft (closed).

*7. GEN switch - OFF.

*8. All electrical switches - OFF.

*9. BAT switch - OFF.

*10. Main rotor blades - Tie down.

*11. Conduct a thorough walk around inspection of the aircraft. Check oil levels and check for leaks.

12. Complete DA Forms 2408.

3-32. TAKE-OFF.

1. Collective pitch - Increase to hover.

2. Directional control - As required to maintain desired heading.

3. Cyclic control - Apply as required to accelerate smoothly.

4. Collective - As required to obtain desired speed and rate of climb.

3-33. NORMAL CRUISE.

1. Airspeed - As desired (not to exceed Vne at flight altitudes.

2. ANTI-ICE switch - ON in visible moisture when temperature is below 4°C (40°F).

Note

When anti-ice is on, TOT will be higher for the same power setting as with anti-ice off.

3-34. DESCENT AND LANDING.

1. Flight controls - As desired.

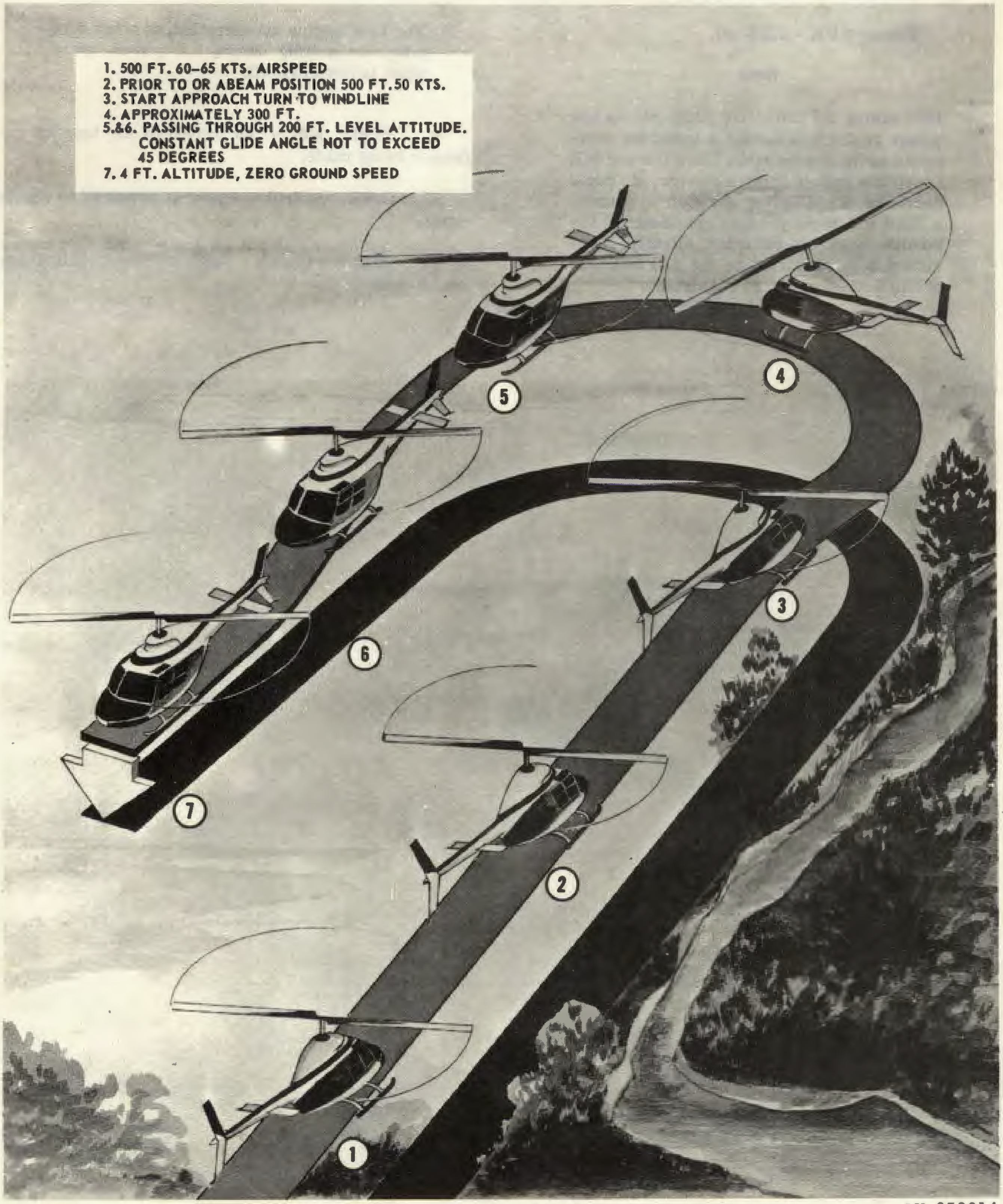

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Figure 3-2. Normal approach and landing - power ON

2. Throttle - Full INCREASE.

3. Engine RPM - 103% nII.

Note

Decreasing the collective pitch into the low power realm will permit a transient overspeed of the engine rpm. The governor will reset this rpm to trim. However, if a rapid decrease of collective is required causing a need for more precise rpm control, the throttle may be retarded slightly, providing it is advanced to the full increase position when power is required.

Warning

For best engine acceleration, do not reduce governor setting during low power operation below 103% nII.

4. Flight path - As required for type of approach being made.

5. Cyclic control - Apply as required to decelerate.

6. Collective pitch - Apply as required to cushion landing.

CHAPTER 4

EMERGENCY PROCEDURE

SECTION I SCOPE

4-1. SCOPE.

4-2. Procedures in this chapter describes action to be followed in emergencies, that can, within reason be anticipated. In some cases emergency situations can be avoided by maintaining operation within the limitations described in Chapter 7.

4-3. Emergency operation of auxiliary equipment is contained in this chapter only insofar as its utility affects safety of flight. Detailed descriptions and operation 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 TM 55-1520-228-CL.

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 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 over estimate 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 three to six seconds. Of the three to six seconds, four to five seconds are allowed to compensate for pilot reaction time and effects due to altitude and temperature.

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.

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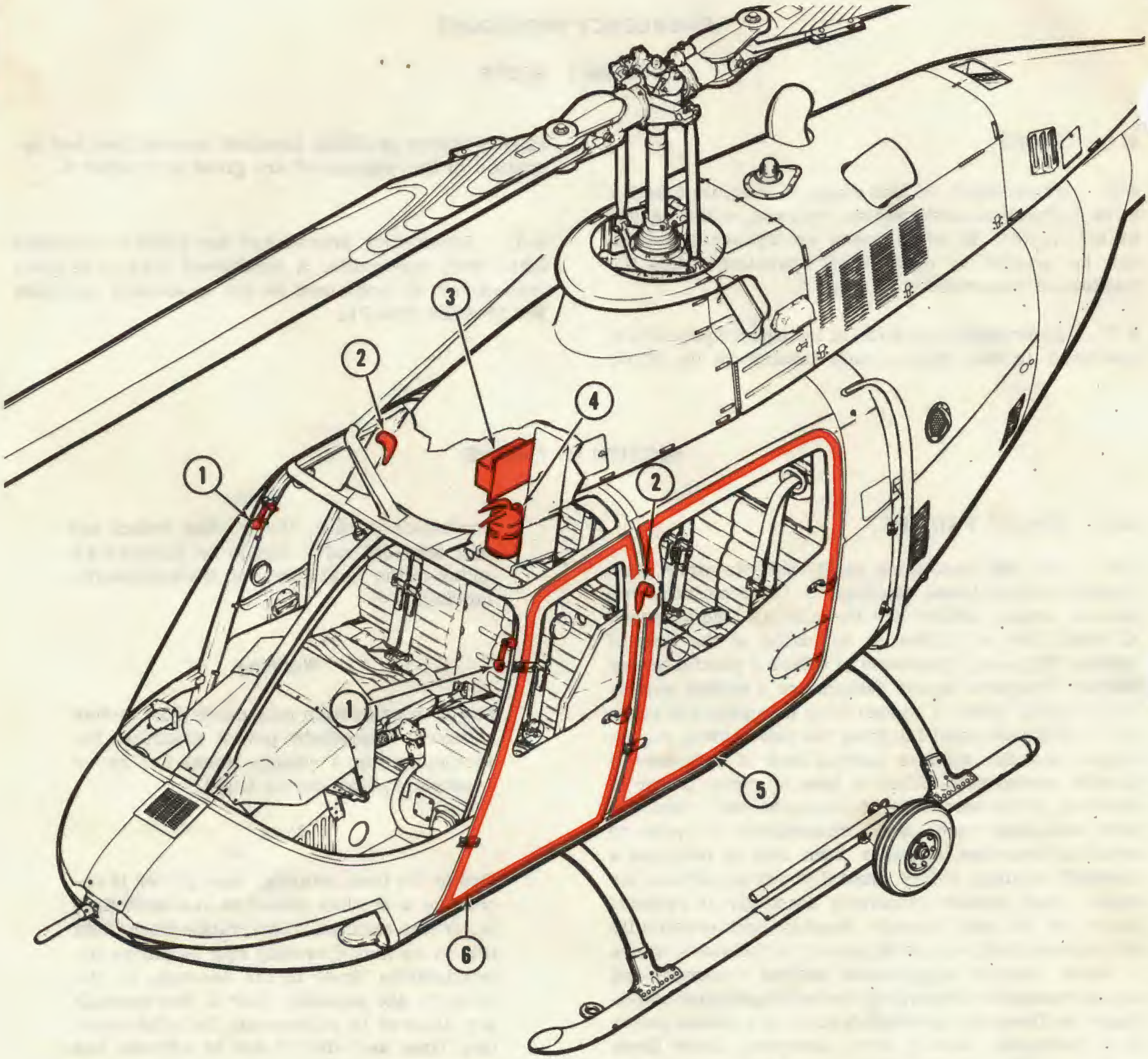

1. Crew Jettisonable Door Release (2)
2. Passenger Jettisonable Door Release (2)
3. First Aid Kit
4. Fire Extinguisher
5. Passenger Exit (2)
6. Crew Exit (2)

AV 053015

Figure 4-1. Emergency exits and equipment

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. Fuel shut-off valve - Aft (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 altitude 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. Shoulder Harness - LOCK.

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

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

7. BAT switch - OFF.

8. Fuel shut-off valve - Aft (OFF).

4-10. ENGINE FAILURE DURING FLIGHT. (See figure 4-3.)

Warning

When engine out warning light illuminates and audio signal sound, execute engine failure procedure; cross reference engine instruments. If engine instruments show normal indications, a malfunction of the Warning System 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 at 50 to 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.

4-11. MINIMUM RATE OF DESCENT.

4-12. The power-off minimum rate of descent is obtained by maintaining an indicated airspeed of approximately 42 knots IAS, and rotor rpm 330.

4-13. MAXIMUM GLIDE.

4-14. Maximum gliding distance is obtained by an indicated airspeed of 74 knots and rotor rpm 330.

4-15. ENGINE RESTART DURING FLIGHT.

4-16. 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. 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 above 10,000 feet.

1. Establish autorotational glide.
2. Select forced landing area.
3. Throttle - CLOSED.
4. Attempt start.
5. Throttle - Open slowly to full open after start.

1. COLLECTIVE PITCH CONTROL-ADJUST AS REQUIRED TO MAINTAIN ROTOR RPM WITHIN LIMITS.

2 & 3. AUTOROTATIONAL GLIDE-ESTABLISH AT 60 KNOTS IAS.

4. AT APPROXIMATELY 75 FT. ASSUME A DECELERATING ALTITUDE AS NECESSARY TO SLOW RATE OF DESCENT AND FORWARD AIRSPEED.

5. AT APPROXIMATELY 10-15 FT. APPLY SUFFICIENT COLLECTIVE PITCH TO FURTHER SLOW RATE OF DESCENT AND FORWARD SPEED.

6. JUST PRIOR TO GROUND CONTACT, INCREASE COLLECTIVE PITCH AS NECESSARY TO CUSHION LANDING.

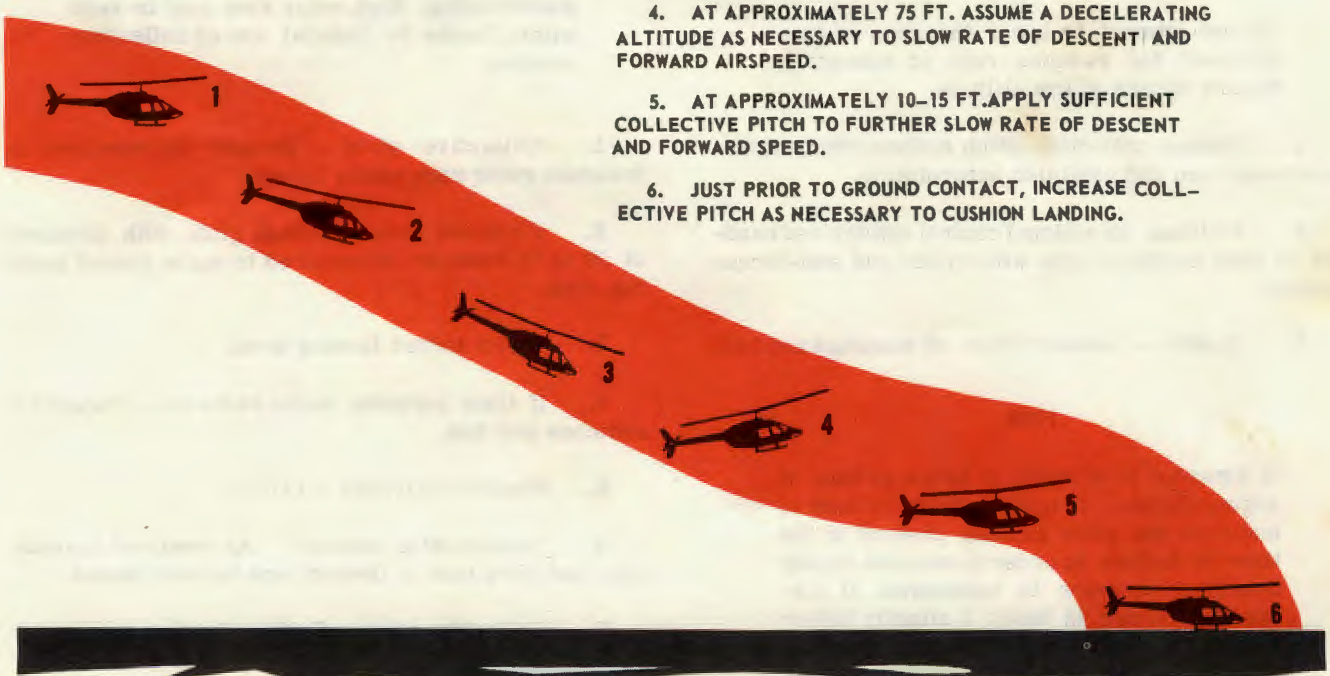

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Figure 4-2. Normal approach and landing, power OFF

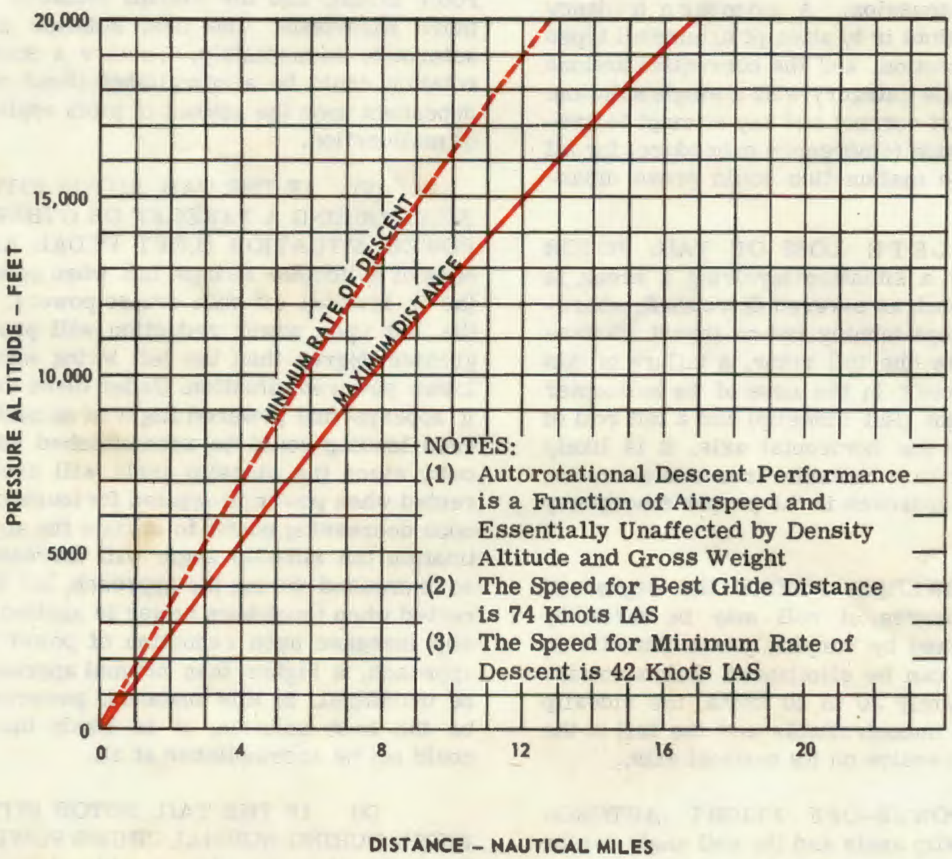


Figure 4-3. Maximum glide distance, power OFF

SECTION III ROTORS, TRANSMISSIONS, AND DRIVE SYSTEMS

4-17. 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 among 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 of 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 50 to 60 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. Normally under these circumstances the directional pitch setting that is in the tail rotor at the time 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. 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 SITUATION (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 swings left when power is reduced (as in leveling off with cruise power). This swing 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 50 to 60 knots, the tail pylon should streamline with very little, if any, sidelsip or roll angle. In this instance, autorotation may aggravate the situation because a reduction of power (torque) may then result in a right sidelsip. 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 tail rotor transmission gearbox", 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 Anti-torque 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 area 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 50 and 60 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 60 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 in a level attitude with minimum ground roll (zero, if possible).

(3) If the pilot has determined 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.

4-18. TAIL ROTOR FAILURE DURING TAKE-OFF.

4-19. Close throttle immediately and accomplish an autorotational landing.

4-20. TAIL ROTOR FAILURE WHILE HOVERING BELOW 10 FEET.

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

4-22. LOSS OF ENGINE/TRANSMISSION OIL PRESSURE OR EXCESSIVE ENGINE/TRANSMISSION OIL TEMPERATURE.

4-23. The loss of engine/transmission oil pressure will be indicated by a drop or loss of pressure on the engine oil gage and/or the illumination of the warning panel light marked "XMSN OIL PRESS". Excessive transmission oil temperature will be indicated by the illumination of the warning 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

4-24. ENGINE FIRE DURING STARTING - INTERNAL.

4-25. Internal fire (hot start) may be caused by overloading of fuel in the combustion chamber. It may be detected by flames emitting from the engine exhausts or by excessive TOT readings. To extinguish the fire - proceed as follows:

1. Continue to press starter and roll throttle closed.

2. Throttle - closed.

3. Main fuel shut-off valve - Aft OFF.

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

4-26. ENGINE FIRE DURING STARTING - EXTERNAL.

4-27. External fire can be detected by the fireguard. Proceed as follows:

1. Close throttle.
2. Complete shut-down.
3. Exit the aircraft.
4. Use fire extinguisher.

4-28. ENGINE FIRE DURING FLIGHT.

4-29. Immediately on discovery of an engine fire during flight prepare for a power-off landing and accomplish the following:

1. Select forced landing area (time permitting).
2. Autorotational glide - Establish and prepare for power off landing.
3. Throttle - closed.
4. Main fuel shut-off valve - Aft (OFF).
5. BAT and GEN switches - OFF (except when ON GEN switch is required to supply electrical power for operation of lights or Avionics equipment).
6. Shoulder harness - lock.
7. Landing - accomplish.

Caution

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

4-30. FUSELAGE FIRE.

1. Airspeed - Reduce to minimum to lessen possibility of spreading fire.
2. Ventilators and doors - open, if smoke enters cabin.
3. BAT switch - OFF.
4. GEN switch - OFF (ON if lighting or Avionics 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 nearest available, SAFE landing area (open field, etc.).

4-31. ELECTRICAL FIRE.

4-32. The electrical system is protected throughout by circuit breakers; therefore, the possibility of electrical fire is remote. Should there be an electrical fire, accomplish the following:

1. Battery and generator switches - OFF.
2. Land as soon as possible.

Note

The helicopter is capable of remaining airborne with battery and generator switches OFF.

4-33. SMOKE ELIMINATION.

4-34. Smoke of toxic fumes entering the cabin can be exhausted by the following procedure:

1. Cabin heat - OFF, if ON.
2. Ram air - OPEN.
3. OPEN cabin door vents.
4. Land as soon as possible and investigate.

SECTION V FUEL SYSTEM

4-35. HELICOPTER FUEL SYSTEM FAILURE.

1. FUEL BOOST caution light illumination indicates failure of the fuel boost pump.
2. The engine will operate without boost pump pressure at altitudes below 5,000 feet.
3. Landing - Accomplish at nearest safe landing area.

4-36. FUEL SYSTEM FAILURE.

4-37. The engine high pressure fuel pump is a dual element unit and either element is capable of supplying engine fuel requirements. Failure of both elements will result in engine flamout and the ENGINE OUT warning system will be activated.

4-38. POWER TURBINE GOVERNOR FAILURE

a. If a system failure results in overspeed and/or an increase in torque, the following procedures shall be followed:

Warning

Do not decrease collective pitch until overspeed and/or torque has been decreased after emergency engine shutdown procedures have been completed.

(1) If above safe landing area, initiate emergency shutdown of engine, observe rotor RPM decrease to safe limits and autorotate to landing site.

(2) If above unsafe landing area, gain altitude and change direction as required while decreasing throttle and using collective pitch and/or throttle as required to control rotor RPM. The compound power turbine governor will govern RPM approximately eight percent above that which engine was operating when the fuel control failure occured, thus preventing catastrophic engine failure. This governing action will result in a pulsating increase/decrease of engine power. When above safe landing area initiate emergency shut down of engine. Observe rotor RPM decrease to safe limits and autorotate to landing site.

b. If engine power surges, resulting in torque and nI fluctuations, increase beep trim to maximum beep; then reduce nII speed to 100 percent by retarding throttle. This action eliminates control effect of the power turbine governor and should stop the engine surge.

4-39. COMPRESSOR STALL.

4-40. Compressor stall may be audibly detected during a rapid engine acceleration from idle speed and the condition will tend to be more severe as altitude is increased. Stall can be reduced by the following procedure:

1. Reduce power.

2. Deice switch - OFF.

3. HTR switch - OFF.

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

SECTION VI ELECTRICAL SYSTEM

4-41. ELECTRICAL POWER FAILURE.

1. Generator switch - CYCLE. If power is not restored - GEN OFF.

2. Electrical equipment - OFF except as needed.

3. Descend to below 5000 feet.

4. Landing - Accomplish at nearest safe landing area (open field, etc.).

SECTION VII HYDRAULIC SYSTEM

4-42. HYDRAULIC SYSTEM FAILURE.

Note

Failure of the hydraulic boost system will be indicated by a caution light on the CAUTION panel and an increase in the force required for control movement. Feed-back forces will be noted in the collective and cyclic controls. Control movements will result in normal flight reactions, except for the increased force required for control movement.

4-43. If hydraulic boost failure occurs, accomplish the following:

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).

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

SECTION VIII LANDING AND DITCHING

4-44. EMERGENCY LANDING

4-45. 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.

4-46. LANDING IN TREES.

4-47. 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.

4-48. EMERGENCY ENTRANCE.

4-49. To gain entrance to the cabin in the event of an emergency, break the pilot's or copilot's windows, reach forward and PULL the jettisonable door release, if door will not jettison break windshield to gain access. To gain entrance to passenger area in an emergency, break door window, reach forward and pull the jettisonable door release.

4-50. DITCHING - POWER OFF.

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

2. Autorotational glide - Establish an autorotational glide into the wind.

3. Helicopter position - Radio position to aid in search and rescue.

4. Passengers - alerted.

5. Fuel shut-off valve - Aft (OFF).

6. BATT and GEN switches - OFF.

7. Pilot, copilot's and passenger doors - Jettison, at low altitude.

8. Shoulder harness - Lock.

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

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

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

12. Shoulder harness and safety belt - Release and CLEAR helicopter when main rotor blades have stopped.

4-51. DITCHING - POWER ON.

1. Helicopter position - Radio position to aid in search and rescue.

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

3. Passengers - Alerted.

4. Pilot's, copilot's passenger's door - Jettison while hovering a few feet above the water.

5. Instruct passengers and copilot to exit helicopter.

6. Fly a safe distance - Avoid possible passenger injury.

7. BATT switch - OFF.

8. Throttle - Close. Allow aircraft to descend vertically, as gear contacts the water, apply full collective, when aircraft starts to roll apply full cyclic in the direction of roll.

9. Shoulder harness and safety belt - RELEASE and CLEAR helicopter when main rotor blade has stopped.

SECTION IX FLIGHT CONTROLS

4-52. FLIGHT CONTROL SYSTEM FAILURE.

4-53. 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. The servo cylinders are installed solely to reduce control forces and lessen pilot fatigue. The design of the control mechanical linkage is sturdy, control movements are positive and the possibility of failure is remote; therefore, an emergency system has not been provided.

4-54. MAST BUMPING.

4-55. 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.

SECTION X BAIL OUT

4-56. BAIL OUT.

4-57. Helicopter design, flight characteristics and autorotation qualities virtually eliminate the necessity for leaving the helicopter in flight (bail out); however, if a decision to bail out is made, accomplish as follows:

1. Passengers - ALERTED.
2. Helicopter position - RADIO position to aid in search and rescue.
3. Doors - RELEASE.
4. Controls - SET to establish CRUISE forward speed with flight attitude slightly nose down.
5. When ready - BAIL OUT through nearest exit.

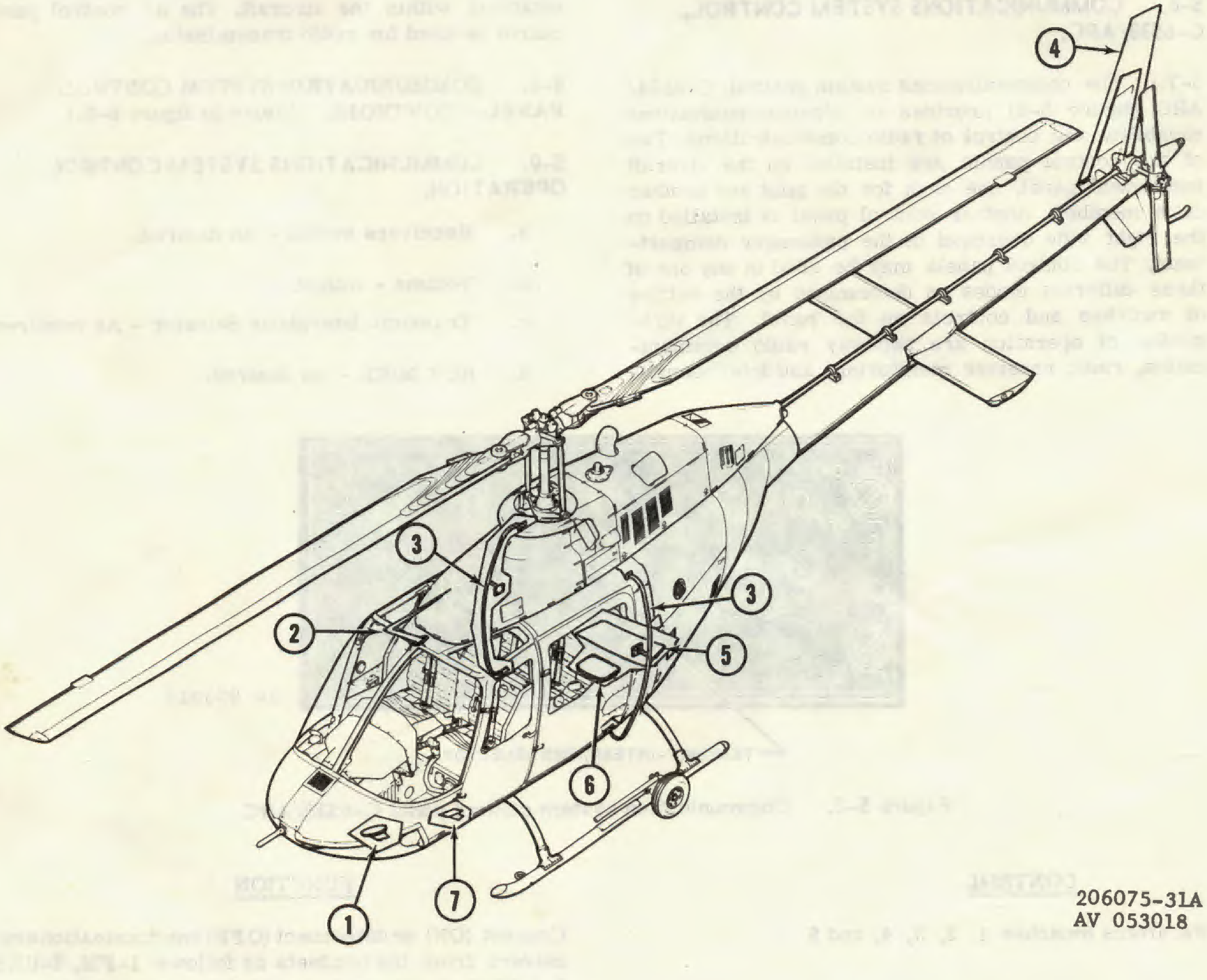
CHAPTER 5

AVIONICS

SECTION I GENERAL

5-1. SCOPE

5-2. This chapter covers the communications and navigation equipment installed in Army Model OH-58A helicopter. It includes a brief description of the equipment, their technical characteristics, capabilities and location. The chapter also contains operating instructions for all avionics equipment installed in the aircraft.



1. UHF Antenna
2. FM Antenna
3. Homing Antennas
4. FM-VHF Antennas
5. Sense Antenna
6. Loop Antenna
7. IFF Antenna

Figure 5-1. Antenna installation

SECTION II DESCRIPTION AND OPERATION

5-3. PURPOSE AND USE.

5-4. Communications and navigation equipment description and operating procedures in this chapter are oriented toward normal operating procedures in Chapter 3. For more technical information refer to references listed in Appendix A.

5-5. Avionics equipment may vary among different serial numbered aircraft. Additionally, equipment for installation provisions are made may not be installed; therefore, no attempt is made to specify the exact combinations of equipment in a particular aircraft. All equipment installed or equipment for which installation provisions are made is described.

SECTION III COMMUNICATION SYSTEMS

5-6. COMMUNICATIONS SYSTEM CONTROL, C-6533/ARC.

5-7. The communications system control, C-6533/ARC (figure 5-2) provides an intercommunications capability and control of radio communications. Two of the control panels are installed on the aircraft instrument panel, one each for the pilot and another crew member. Another control panel is installed on the right side overhead in the passenger compartment. The control panels may be used in any one of three different modes as determined by the setting of switches and controls on the panel. The three modes of operation are two-way radio communication, radio receiver monitoring, and intercommunications within the aircraft. The aft control panel cannot be used for radio transmission.

5-8. COMMUNICATION SYSTEM CONTROL PANEL - CONTROLS. (Refer to figure 5-2.)

5-9. COMMUNICATIONS SYSTEM CONTROL OPERATION.

a. Receivers switch - As desired.

b. Volume - Adjust.

c. Transmit-Interphone Selector - As required.

d. HOT MIKE - As desired.

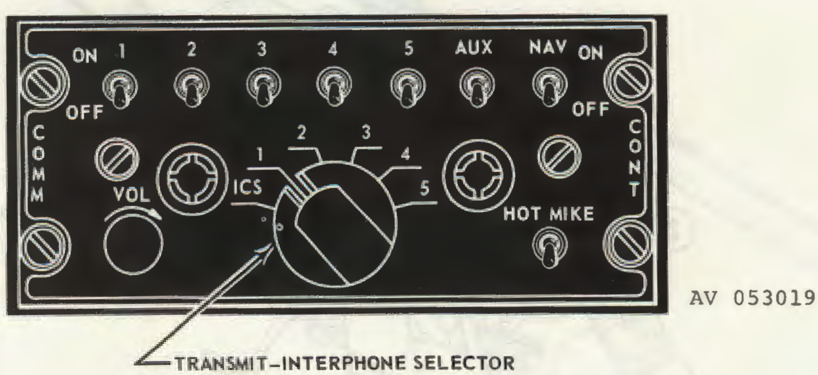


Figure 5-2. Communication system control panel C-6533/ARC

CONTROL	FUNCTION
Receivers Switches 1, 2, 3, 4, and 5	Connect (ON) or disconnect (OFF) communications receivers from the headsets as follows: 1-FM, 2-UHF, 3 3-VHF, 4 not used, 5-FM (when second FM set is installed).
AUX Receiver Switch	Not used.
NAV Receiver Switch	Connects (ON) or disconnects (OFF) navigation receiver from the headset.

CONTROL	FUNCTION
VOL Control	Adjusts volume from receivers 1, 2, 3, 5 and AUX. Adjusts interceommunications volume.
Transmit-Interphone Selector ICS position	Connects the microphone to the intercommunications system only, disconnecting microphone from transmitters.
Positions 1, 2, 3, 4, and 5	Connects microphone to transmitters as follows: 1-FM, 2-UHF, 3-UHF, 4 not used, and 5-FM (when second FM set is installed).
HOT MIKE Switch	Permits hand-free intercommunications with transmit-interphone selector in the ICS position.

TABLE 5-1. NOMENCLATURE AND COMMON NAMES

NOMENCLATURE	COMMON NAME	NOMENCLATURE	COMMON NAME
Communication System Control C-6533/ARC	Communication Control	Control Panel C-7392/ARN-89	ADF Control Panel
Radio Set AN/ARC-114 FM	FM Radio Set	Amplifier, Impelance Matching AM-4859/ARN-89	Sense Preamplifier
FM Communication antenna	FM Communication Antenna	Sense Antenna 206-032-310	Sense Antenna
FM Homing Antenna	FM Homing Antenna	Gyromagnetic Compass Set AN/ASN-43	Gyromagnetic Compass
Radio Set AN/ARC-115 VHF-AM	VHF Radio Set	Transmitter, Induction Compass T-611/ASN	Flux Valve
Radio Set AN/ARC-116 UHF-AM	UHF Radio Set	Compensator, Magnetic Flux CN-405/ASN	Flux Compensator
UHF Communication Antenna	UHF Antenna	Directional Gyro, CN-998/ASN-43	Directional Gyro
Direction Finder/Set AN/ARN-89	ADF	Transponder Set AN/APX-72	Transponder Set
Loop Antenna AS-2108/ARN-89	Loop Antenna	Receiver-Transmitter Radio RT-859/APX-72	Receiver-Transponder
Radio Set AN/ARC-51BX	UHF Radio Set	Transponder Set Control C-6280(P)A/PX	IFF Control Panel
Receiver-Transmitter RT-742/ARC-51BX	Receiver-Transmitter	Test Set TS-1843A/APX	Test Set
Control Radio Set C-6287/ARC-51BX	Control Panel	Antenna AT-884 ( )APX-44	Antenna
Radio Receiver R-1496/ARN-89	ADF Receiver	Computer Kit 1A/TSEC	IFF Computer

5-10. FM RADIO SET - AN/ARC-114.

5-11. The ARC-114 (figure 5-3) provides two-way frequency modulated (FM) narrow band voice communications and homing capability then the frequency range of 30.00 to 75.95 MHz on 920 channels for a distance range limited to line of sight. A guard receiver is incorporated in the set and is fixed tuned to 40.50 MHz. It has the additional capability for retransmission of voice, CW, or X-mode communications when a second set is installed in the aircraft. The radio set is marked VHF FM COMM and is mounted on the center console. Antenna installations are shown in figure 5-1.

5-12. FM CONTROLS. Refer to figure 5-3.

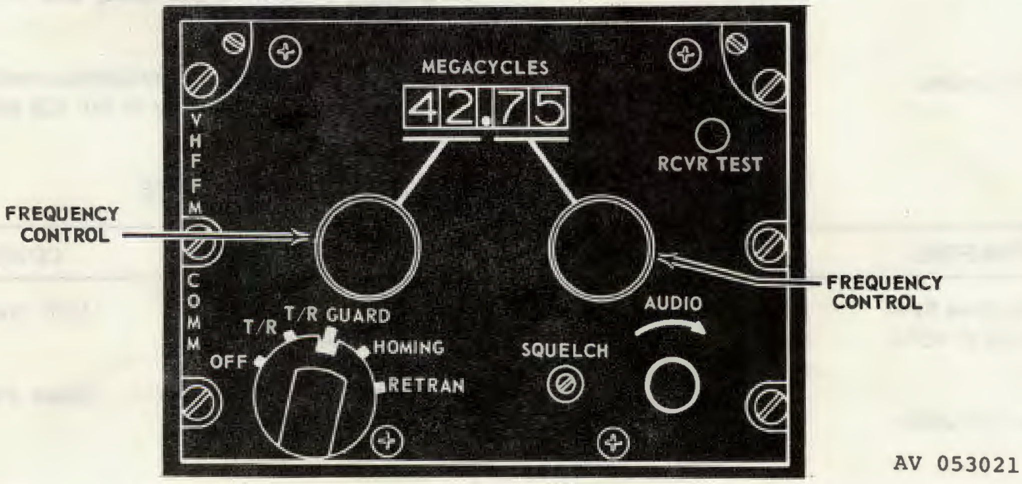


Figure 5-3. AN/ARC-114 control panel

CONTROL	FUNCTION
Function Selector	
OFF position	Power off.
TR position	Receiver - On; Transmitter-standby
TR GUARD position	Receiver-on; Transmitter-standby; guard receiver - ON.

Note

Reception on guard frequency is unaffected by frequencies selected for normal communications.

CONTROL	FUNCTION
HOMING	Activates the homing mode and display on the radio bearing heading indicator. May be used also for normal voice communications.
RETRAN	Activates the retransmission mode when second FM set is installed in the aircraft. May be used also for normal voice communications.
Frequency Selectors Left Selector	Selects first two digits of desired frequency.
Right Selector	Selects third and forth digits of desired frequency.
RCVR TEST Button	When pressed, audible signal indicates proper receiver performance.

CONTROL	FUNCTION
SQUELCH	Squelch control adjusted by maintenance personnel only.
AUDIO	Adjusts receiver volume.

5-13. FM OPERATION.

5-14. TRANSMIT/RECEIVE.

a. Function selector - As desired.

b. Frequency - Select.

c. RCVR TEST - Press to test.

d. AUDIO - Adjust.

(1) Transmit-Interphone selector - Number 1 position (Number 5 position for second FM set).

(2) RADIO transmit switch - Press.

TABLE 5-2. COMMUNICATIONS AND ASSOCIATED ELECTRIC EQUIPMENT

FACILITY	NOMENCLATURE	USE	RANGE	LOCATION OF CONTROLS
Communication Control	C-6533/ARC Control	Interphone for pilot and crew, Integrates all communication equipment		
VHF - FM Communications	Radio Set AN/ARC-114	Two-way Voice Communications in frequency range of 30.00 to 75.95 MHz	Line of sight	Pedestal
VHF - AM Communications	Radio Set AN/ARC-115	Two-way Voice Communication in the frequency range of 116.00 to 149.975 MHz	Line of sight	Instrument Panel
UHF - AM Communications	Radio Set AN/ARC-116	Two-way Voice Communications in the frequency range of 225.00 to 399.96 MHz	Line of Sight	Instrument Panel
Automatic Direction Finding	Direction Finder Set AN/ARN-89	Radio Range Navigation and position fixing Automatic direction finding and homing in the frequency range of 100 to 3000 KHz	150 to 200 miles average depending on terrain interference noise	Instrument Panel
Magentic Heading Indications	Gyromatic Compass AN/ASN-43	Navigational Aid provides accurate heading information		Instrument Panel
Identification	Transponder Set AN/APX-72	Transmits a special coded reply to ground based IFF radar interrogator system	Line of Sight	Instrument Panel
UHF Command Communications	Radio Set AN/ARC-51BX	Two-way voice Communitions in the frequency range of 225 to 399.9 MHz	Line of sight	Instrument Panel

5-15. HOMING.

a. Function selector - HOMING.

b. AUDIO - Adjust.

c. Observe homing indications on the radio bearing heading indicator.

5-16. RETRANSMISSION.

a. Frequencies - Select (Both FM sets).

b. Communications - Establish with each facility by selecting number 1 position and then number 5 position on the Transmit-Interphone selector.

c. Function selectors - RETRAN (Both FM sets).

d. Receivers switches - Number 1 and number 5 positions as desired for monitoring.

5-17. STOPPING PROCEDURE.

5-18. Function Selector - OFF.

5-19. VHF RADIO SET - AN/ARC-115.

5-20. The ARC-115 (figure 5-4) provides two-way VHF amplitude modulated (AM) narrow band voice communications within the frequency range of 116.00 to 149.75 MHz on 1360 channels for a distance range of approximately 50 miles line of sight. A guard receiver is incorporated in the set and is fixed turned to 121.50 MHz. The radio set is marked VHF AM COMM and is mounted on the left side of the instrument panel. Antenna installation is shown in figure 5-1.

5-21. VHF CONTROLS.

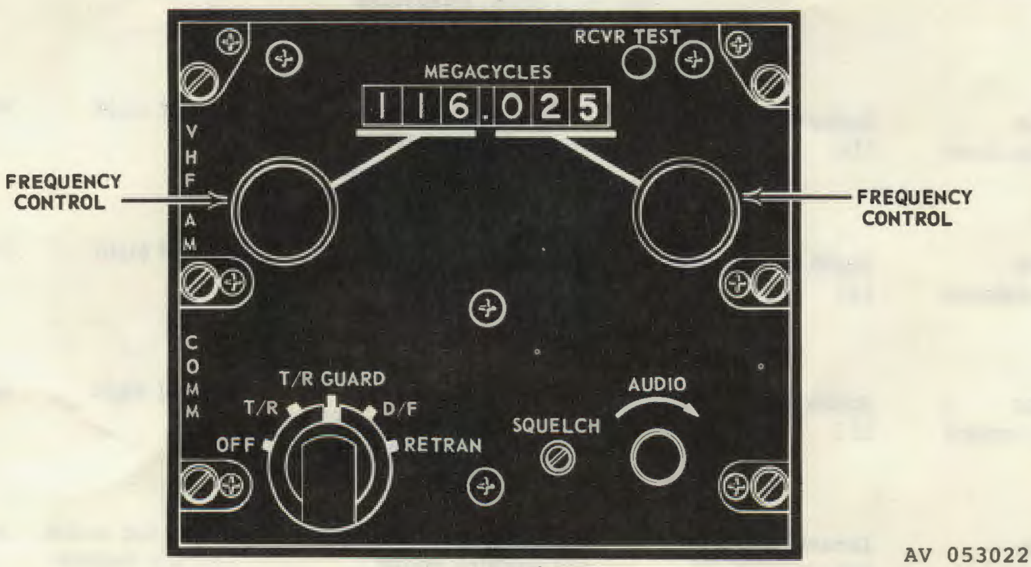


Figure 5-4. AN/ARC-115 control panel

CONTROL	FUNCTION
FUNCTION Selector	
OFF position	Power off
TR position	Receiver-On; Transmitter - Standby
TR GUARD position	Receiver-On; Transmitter-Standby; Guard receiver-on.

Note

Reception on guard frequency is unaffected by frequencies selected for normal communications.

CONTROL	FUNCTION
DF	Not used.
RETRAN	Not used.
Frequency selectors	
Left Selector	Selects first two digits of desired frequency.
Center selector	Selects third digit of desired frequency.
Right selector	Selects fourth and fifth digits of desired frequency.
RCVR TEST	When pressed, audible signal indicates proper receiver performance.
SQUELCH	Squelch control adjusted by maintenance personnel only.
AUDIO	Adjusts receiver volume.

5-22. VHF OPERATION.

5-23. TRANSMIT/RECEIVE.

a. Function selector - As desired.

b. Frequency - Select.

c. RCVR TEST - Press to test.

d. AUDIO - Adjust.

e. Transmit.

(1) Transmit-interphone selector - Number 3 position.

(2) RADIO transmit switch - PRESS.

5-24. STOPPING PROCEDURE.

5-25. Function Selector - OFF.

5-26. UHF RADIO SET - AN/ARC-116.

5-27. The ARC-116 (figure 5-5) provides two-way UHF amplitude modulated (AM) narrow band voice communications within the frequency range of 225.00 to 399.95 MHz on 3500 channels for a distance range of approximately 50 miles line of sight. A guard receiver is incorporated in the set and is fixed tuned to 243.00 MHz. The radio set is marked UHF AM and is mounted in the bottom center section of the instrument panel. Antenna installation is shown in figure 5-1.

5-28. UHF CONTROLS.

CONTROL	FUNCTION
FUNCTION SELECTOR	
OFF position	Power off.
TR position	Receiver-on; Transmitter-standby.
TR GUARD position	Receiver-on; Transmitter-standby; guard receiver - on.

Note

Reception on guard frequency is unaffected by frequencies selected for normal communications.

CONTROL	FUNCTION
DF	Not used.
RETRAN	Not used.

CONTROL	FUNCTION
FREQUENCY Selector	
Left selector	Selects first three digits of desired frequency.
Right selector	Selects fourth, fifth, and sixth digits of desired frequency.
RCVR TEST	When pressed, audible signal indicates proper receiver performance.
squelch	Squelch control adjusted by maintenance personnel only.
AUDIO	Adjusts receiver volume.

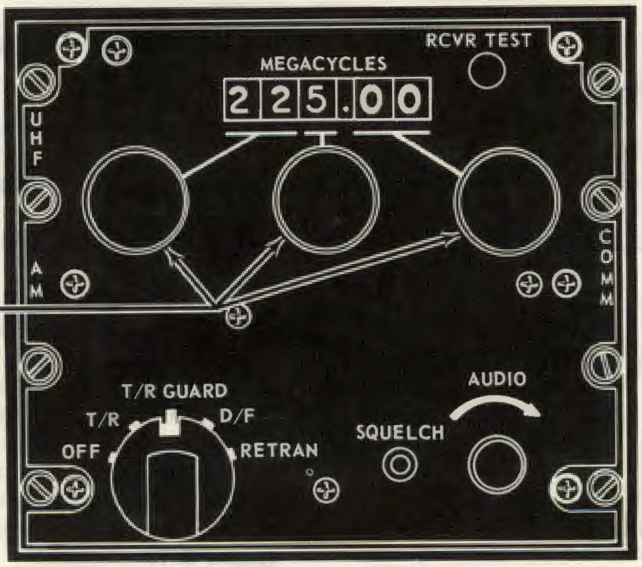


Figure 5-5. AN/ARC-116 control panel

5-29. UHF OPERATION.

5-30. TRANSMIT/RECEIVE.

a. Function selector - As desired.

b. Frequency - Select.

c. RCVR TEST - Press to test.

d. AUDIO - Adjust.

e. Transmit.

(1) Transmit - Interphone selector - Number 2 position.

(2) RADIO transmit switch - PRESS.

5-31. STOPPING PROCEDURE.

5-32. Function Selector - OFF.

5-33. ADF RADIO SET - AN/ARN-89.

5-34. The ARN-89 (figure 5-6) provides a LF/MF amplitude modulated (AM) navigation capability within the frequency range of 100 to 3000 KHz. Reception distance of reliable radio signals depends on the power output of transmitting stations. Navigation information may be presented visually on the radio bearing heading indicator (figure 5-7) located on the instrument panel or received aurally in the headset as a code or tone. The radio set is marked ADF RCVR and is mounted in the center section of the instrument panel. Antenna installations are shown in figure 5-1.

5-35. ADF CONTROLS.

CONTROL	FUNCTION
AUDIO	Adjusts receiver volume.
FUNCTION SELECTOR	
OFF position	Power off.
COMP position	Activates the ADF pointer on the radio bearing heading indicator.
ANT position	Receiver provides aural information only.
LOOP position	Receiver operates using only the loop antenna.
LOOP switch	Used to rotate loop antenna by moving switch left or right. Direction and degree of turn are shown on the radio bearing heading indicator.
TUNE meter	Up deflection of the needle indicates most accurate tuning of the receiver when function selector is in the COMP position.
FREQUENCY SELECTOR	
Left selector	Selects first two digits of desired frequency.
Right selector	Selects third and fourth digits of desired frequency.
CW VOICE TEST Switch	
CW Position	Provides tone that may be used for identification, tuning, or for loop operation.
VOICE position	Permits normal aural reception.
TEST position	Rotates ADF needle to provide a check of needle accuracy with function selector in the COMP position. Inoperative in LOOP and ANT positions. The switch is spring loaded away from TEST position.

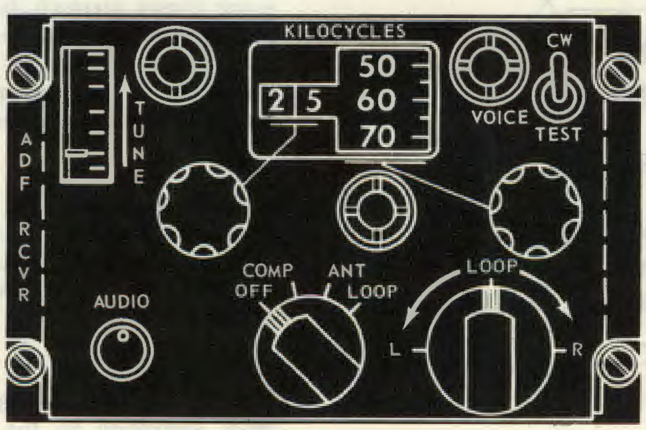


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Figure 5-6. AN/ARN-89 (ADF) control panel

5-36. ADF OPERATION.

5-37. COMP.

a. Function selector - COMP.

b. Frequency - Select. Tuning may be accomplished with function selector in COMP, ANT, or LOOP positions; however, less noise is encountered in the ANT position.

c. AUDIO - Adjust.

d. TUNE meter - Tune for maximum up deflection of needle.

e. CW VOICE TEST switch - TEST then release.

f. OBserve ADF needle indications.

5-38. LOOP.

a. Function selector - LOOP.

b. AUDIO - Adjust.

c. CW VOICE TEST switch - CW.

d. LOOP switch - Move left or right as required to obtain aural null.

5-39. STOPPING PROCEDURE.

5-40. Function Selector - OFF.

5-41. RADIO BEARING HEADING INDICATOR - ID-1351A. (Refer to figure 5-7.)

5-42. The ID-1351/A indicator is mounted on the instrument panel and provides magnetic heading information and radio bearings by displaying information

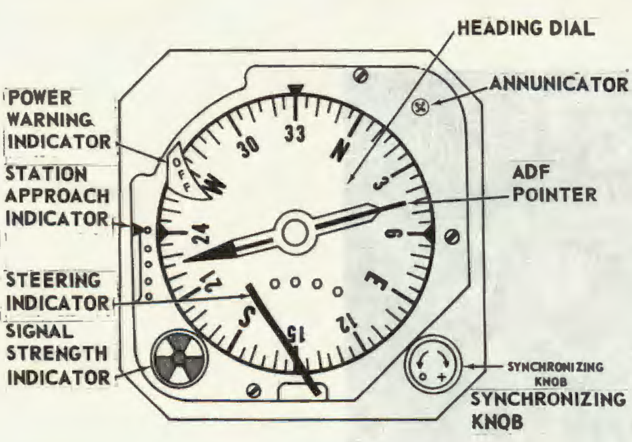

Figure 5-7. Radio bearing heading indicator ID-1351/A

from the gyromagnetic compass set, ADF and FM radios. Additionally, it provides visual indications of gyromagnetic compass failure, compass syncronization and approach to a radio station.

5-43. GYRO-MAGNETIC HEADING DISPLAY AND SYNCHRONIZATION.

5-44. Gyro-magnetic heading information is displayed by the heading dial which rotates to indicate the aircraft's magnetic heading under the index.

5-45. Heading syncronization is accomplished by twisting the synchronizing knob. The annunciator indicates, by means of a dot (.) or cross (+), the direction that the synchronizing know should be turned to give immediate and accurate synchronization. If a cross (+) is showing in the annunciator, the synchronizing knob should be turned clockwise, and if a dot (.) is showing, the synchronizing know should be turned counterclockwise. The system is synchronized when the annunciator indicates neither a dot (.) nor a cross(2). If, shortly after synchronizing the system, the heading dial drifts and a dot (.) or cross (+) appears in the annunciator, then the system was synchronized to a false null located 180 degrees from the correct heading and should be re-synchronized to the correct aircraft heading. The aircraft standby magnetic compass may be checked for reference.

5-46. ADF POINTER.

5-47. Radio magnetic bearing information is indicated by the ADF Pointer of the indicator. The arrow end of this pointer indicates the bearing of the radio station from the aircraft. The ADF set furnishes the bearing information to the pointer.

5-48. FM HOMING.

5-49. The Steering Indicator receives its input from the number 1 FM radio homing system. By moving to the right or left of its center indication, the indicator shows aircraft deviation from a direct approach path to the FM radio transmitter. The indicator moves to the right when the homing transmitter site is to the right of the aircraft, and to the left when the transmitter is to the left of the aircraft.

5-50. An FM signal strength indicator shows red whenever the FM radio receiver signal is absent or is too weak for a reliable indication. When the signal strength is acceptable, the FM Warning Indicator shows black.

5-51. The Station Approach Indicator indicates aircraft approach to the FM radio transmitter. The pointer moves down as the transmitter is approached and then rises as the aircraft flies over the ground station.

5-52. POWER WARNING INDICATOR.

5-53. The power warning indicator, comes into view whenever electrical AC power to the gyromagnetic compass is off.

5-54. TRANSPONDER SET AN/APX-72.

5-55. The APX-72 (figure 5-8) provides a radar identification capability. 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 4,096 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 4,096 possible codes, any 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 programmed prior to flight to display any one of many classified operational codes for security identification. The effective range depends on the capability of interrogating radar and line-of-sight. The transponder set is mounted on the upper left side of the instrument panel. The associated antenna is shown in figure 5-1.

5-56. TRANSPONDER CONTROLS.

5-57. TRANSPONDER CONTROL PANEL.

5-58. This control panel is located on the instrument panel. It provides remote control of the APX-72. Transponder Set. 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:

CONTROL	FUNCTION
MASTER Control	
OFF	Turns set off.
STBY	Places in warmup (standby) condition.
LOW	Set operates at reduced receiver sensitivity.
NORM	Set operates at normal receiver sensitivity.
EMER	Transmits emergency reply signals to mode 1, 2, or 3/A interrogations regardless of mode control settings.
IDENT-MIC switch	
IDENT	Initiates identification reply for approximately 25 seconds
OUT	Prevents triggering of identification reply. Spring loaded to OUT.
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	Provides test of mode 1 interrogation by indication on TEST light.
M-2 switch	
ON	Enables the set to reply to mode 2 interrogations.
OUT	Disables the reply to mode 2 interrogations.
TEST	Provides test of mode 2 interrogation by indication on TEST light.

CONTROL	FUNCTION
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	Provides test of mode 3/A interrogation by indication on TEST light.
M-C switch	Not used.
MODE 1 code selected 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 pressed.
	Note Computer, transponder must be installed before set will reply to a mode 4 interrogation.
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 pressed.
RAD TEST-MON switch	
RAD TEST	Enables set to reply to TEST mode interrogations. Other functions of this switch position are classified.
MON	Enables the monitor test circuits.
OUT	Disables the RAD TEST and MON features.

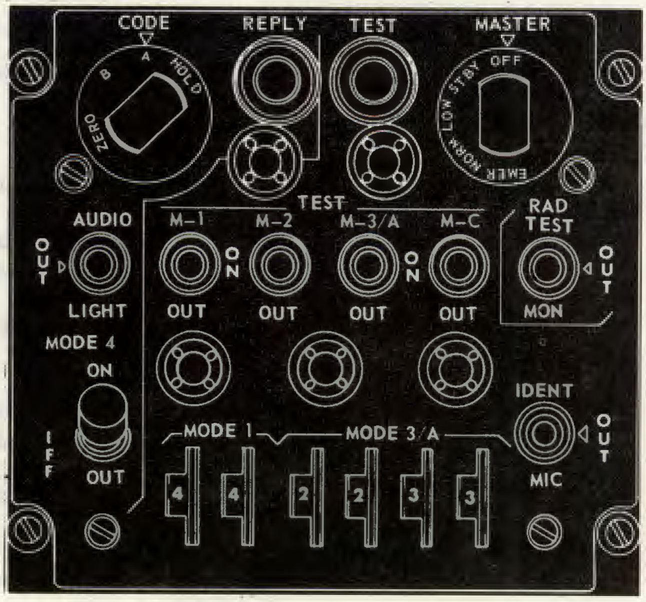

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Figure 5-8. Transponder APX-72 control panel

5-59. TRANSPONDER OPERATION.

a. MASTER control - STBY. Allow approximately 2 minutes for warmup.

b. Mode and code - Select as required.

c. Test as required.

d. MASTER control - LOW, NORM, EMER as required.

e. IDENT - As required.

5-60. STOPPING PROCEDURE.

5-61. Master Control - OFF.

5-62. GYRO MAGNETIC COMPASS AN/ASN-43.

5-63. The gyro magnetic compass set provides accurate heading information, referenced to a free directional gyro heading when operated in the DIR gyro mode (free gyro), or slaved to the earth's magnetic field when operated in the MAG mode (magnetically slaved). It provides heading information in the form of a synchro output to the radio bearing heading indicator.

5-64. VOICE SECURITY UNIT, TSEC/KY 28.

5-65. Voice security unit TSEC/KY 28 is a classified audio processing device that accepts voice communications from the aircraft communications system control, encodes the audio, and delivers it to the FM radio set for transmission. It decodes information received by the FM radio set and delivers decoded voice through the communications system control to the headset.

5-66. UHF COMMAND SET AN/ARC-51BX.

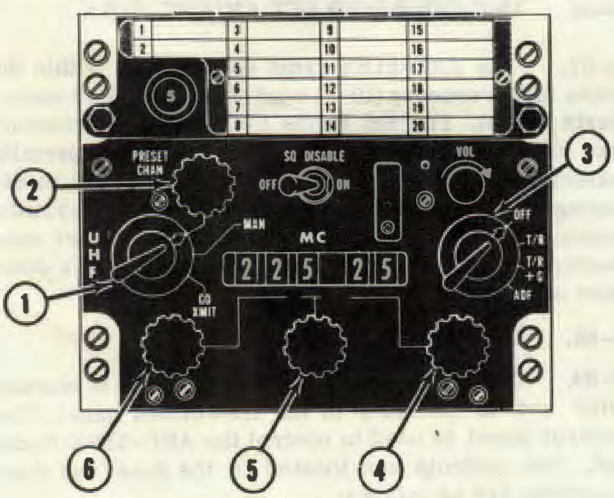
5-67. The ARC-51BX radio set operates within the ultra high frequency (UHF) band of 225.0 to 399.9 megahertz (MHz). The set times in 0.05 MHz increments and provides 3500 channels. This radio also permits selection of 20 preset channels and permits monitoring of the guard channel and provides two-way radio communication. Transmission and reception are conducted on the same frequency with the use of a common antenna.

5-68. COMMAND SET CONTROL.

5-69. Control panel C-6287 (figure 5-9) is marked UHF and is mounted in the instrument panel. The control panel is used to control the ARC-51BX Radio Set. The controls are located on the panel and their functions are as follows:

CONTROL	FUNCTION
Functions Selector	Applies power to radio and selects type of operation.
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 DISABLED 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:
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 frequency controls.
GD XMIT position	Receiver-transmitter automatically tunes to guard channel frequency.
PRESET CHANnel	Permits selection of any of 20 preset channels.
Preset channel indicator	Indicates the preset channel selected by preset channel control.
Frequency Controls	
Left-hand control	Selects the first two digits of desired frequency.
Center control	Selects the third digit of desired frequency.
Right-hand control	Selects the fourth and fifth digits of the desired frequency.



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

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Figure 5-9. AN/ARC-51BX control panel

5-70. ARC-51BX OPERATION.

5-71. The operating procedure for the command set is outlined in the following steps:

a. BAT switch - BAT (OFF for APU).

b. UHF and INT circuit breakers - IN.

c. Function select switch - T/R (T/R+G) as desired.

d. Mode selector switch - PRESET CHAN. allow five minute warmup.

e. RECEIVERS switch No. 2 - ON.

f. Channel - Select.

Note

An 800 Hz audio tone should be heard during channel changing cycle.

g. SQ DISABLE switch - ON.

h. VOLume - Adjust.

i. Transmit - Interphone No. 2 position selector switch.

j. Microphone switch - Press.

5-72. ARC-51BX GUARD FREQUENCY OPERATION.

5-73. Operation of the guard frequency may be accomplished by any of the following methods.

a. Preset Guard.

(1) Function select switch - T/R+G.

(2) Mode selector - DF XMIT.

(3) Microphone switch - Press.

b. Preset.

(1) Mode selector - Preset.

(2) Function select switch - T/R(T/R+G).

(3) Guard Channel - Select.

(4) Microphone switch - Press.

c. Manual.

(1) Mode selector - Manual.

(2) Function select switch - T/R(T/R+G).

(3) Guard frequency - Select.

(4) Microphone switch - Press.

5-74. STOPPING PROCEDURE.

5-75. Function select switch - OFF.

CHAPTER 6

AUXILIARY EQUIPMENT

SECTION I SCOPE

6-1. SCOPE.

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 interchangeably used in many aircraft. Coverage for specialized or interchangeable equipment of this type will be brief, since complete coverage is available in publications devoted entirely to that equipment.

SECTION II HEATING AND VENTILATING SYSTEM

6-4. HEATING AND VENTILATING SYSTEM.

6-5. The bleed air heating system and the ventilating and defogging system are interconnected by ducts. The bleed air heater is installed in the equipment compartment aft of the passenger seat. The system consists of a solenoid controlled bleed air valve, mixing valve, outside air vent, a remote sensor with manual control and connecting ducts and tubing.

6-6. A circuit breaker switch in the overhead console actuates a solenoid valve. The switch in the ON position permits air from the engine compressor section to pass through the bleed air nozzle. A venturi working in conjunction with the bleed air nozzle draws in outside air through the outside air vent. Bleed air and outside air is fed into the mixing valve where a sensor determines the mixing ratio to produce the desired temperature. Bleed air forces heated air through the duct system to registers under the seat and/or to the defroster nozzles.

6-7. Temperature is regulated by a manual control knob and flexible cable connected to a variable remote sensor in the heater compartment. The sensor has a bi-metalic element which controls the mixing valve. The ventilating and defogging system is installed in the nose and consists of a ram air intake, two blower fans, defroster nozzles and ducts. The bleed air system is also connected to the ventilating and defogging system. Outside air flow to the cabin and defogging nozzles is controlled by manual push-pull type controls located below the instrument panel. The blowers direct air to the defogging nozzles and are controlled by an ON-OFF switch in the overhead console. (See figure 6-1.)

SECTION III ANTI-ICING, DEICING AND DEFROSTING SYSTEMS

6-8. ENGINE ANTI-ICING SYSTEM.

6-9. The engine has an anti-icing system to prevent ice formation on the compressor front support. The anti-icing system includes an anti-icing valve mounted at the 12 o'clock position on the front face of the diffuser scroll, two stainless steel lines between the anti-icing valve and the compressor front support, and passages within the compressor front support. Protection for the anti-icing is provided by a circuit breaker on the overhead console.

6-10. PRINCIPLES OF ANTI-ICE SYSTEM.

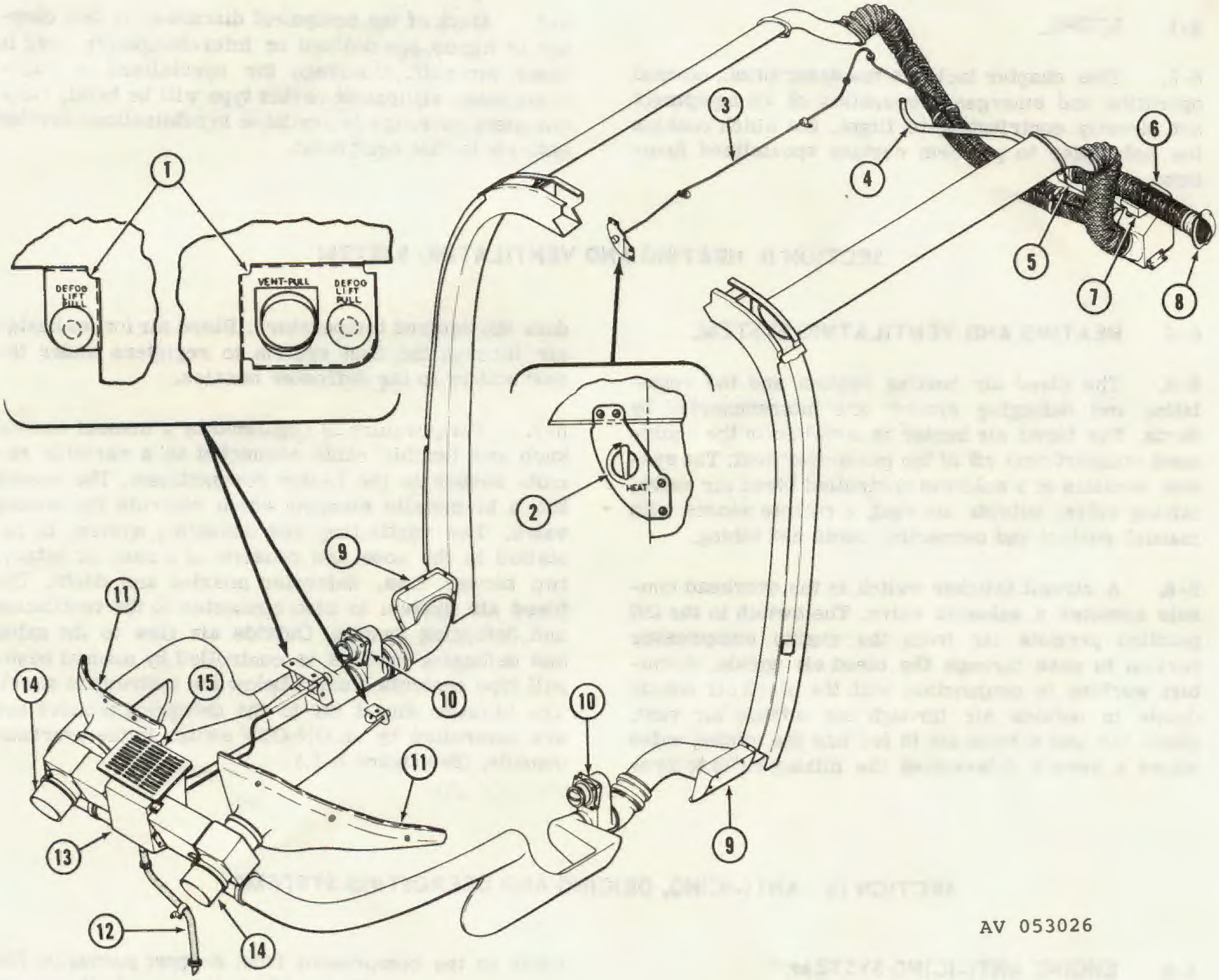
6-11. When the system is in operation, compressor discharge air, which has been heated due to compression, will flow through the anti-icing valve and tubes to the compressor front support passages. Hot air flows between the double wall outer shell and into the seven hollow radial struts. The hot air flowing through the radial struts exhausts either out of small slots in the trailing edge of the struts or out of the double wall "bullet nose" hub of the compressor front support.

6-12. PITOT HEATER.

6-13. The pitot heater is installed on the pitot head and functions to prevent ice forming in the pitot tube. Electric power for the pitot heater operation is supplied from the 28-volt helicopter electrical system. Circuit protection is provided by a 5 ampere circuit breaker switch on the overhead console.

6-14. OPERATION PITOT HEATER SYSTEM.

6-15. The pitot heater switch should be in PITOT HTR position to prevent ice forming in pitot tube. To shut off pitot heater, position switch to OFF.



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1. Vent and Defog Control
2. Heat Control
3. Heat Control Cable
4. Bleed Air Tube
5. Mixing Valve
6. Plenum
7. Remote Sensor
8. Fresh Air Inlet
9. Post Plenum
10. Air Distribution Valves
11. Windshield Defog Nozzle
12. Plenum Drain
13. Plenum Valve Assembly
14. Ventilating and Defogging Blower
15. Ram Air Intake Grill

Figure 6-1. Heating and defrosting system

SECTION IV LIGHTING EQUIPMENT

6-16. POSITION LIGHTS.

6-17. The position lights consist of three lights. A green light is located on the right horizontal stabilizer tip, and red light on the left horizontal stabilizer tip and a white light is located on the aft end of the tail boom. Electrical power is supplied from the 28-volt DC non-essential bus. Circuit protection is provided by the POS LTS circuit breaker on the overhead console.

6-18. The position lights are controlled by the POS LTS switch on the overhead console. The switch is a three-position toggle switch with BRT forward DIM center and OFF aft position.

6-19. ANTI-COLLISION LIGHTS.

6-20. The anti-collision lights are located one on top of the engine cowling and one centered at the lower section of the fuselage aft of the avionics compartment. Electrical power for the anti-collision lights is provided by the 28-volt DC electrical system.

6-21. The anti-collision light switch is located on the overhead console. The switch is a two position toggle type labeled ANTI-COLLISION LTS and OFF. The forward position energizes the anti-collision light circuit.

6-22. LANDING LIGHTS.

6-23. Two fixed landing lights are located in the lower nose section of the helicopter. The lights are controlled by a switch located on the pilot's collective lever switch box. The switch is labeled BOTH, DOWN and OFF. The aft light illuminates forward and the forward light illuminates downward. The switch in BOTH position illuminates both landing lights in the DOWN position only the forward landing light is illuminated. Electrical power is provided from the 28-volt DC electrical system.

6-24. INSTRUMENT LIGHTS.

6-25. The instrument lights are all on one circuit and are controlled by a rheostat switch on the overhead console labeled INST LTS. Clockwise rotation of the rheostat knob activates the console panel circuit and increases brilliance. Counterclockwise rotation of the knob dims, with final movement (OFF) deactivating the electrical circuit.

6-26. CONSOLE LIGHTS.

6-27. The console lights are all on one circuit and are controlled by a rheostat switch on the overhead console labeled CONSOLE LTS. Clockwise rotation of the rheostat knob activates the console panel circuit and increases brilliance. Counterclockwise rotation of the knob dims, with final movement (OFF) deactivating the electrical circuit.

SECTION V OXYGEN SYSTEM

(Not Applicable)

SECTION VI AUXILIARY POWER UNIT

(Not Applicable)

SECTION VII ARMAMENT SYSTEM

6-28. ARMAMENT SUBSYSTEM XM27E1.

6-29. The armament subsystem XM27E1 is used on the left side of OH-58A helicopters. The aircraft is equipped with complete cabling and installation provisions for the XM27E1, making modification of the subsystem unnecessary. The subsystem can be completely removed or installed in a minimum amount of time to allow helicopter to be employed in a different mode of operation.

6-30. The major components of the subsystem are: the gun assembly containing a 7.62 millimeter machine gun M134, a delinking feeder, and an electric gun driving assembly, a mount assembly containing a motor and sensor assembly, a control rod assembly, an ammunition container, and a control box; a fairing assembly; and a sight, reflex XM70E1 (figures 6-2 through 6-5).

6-31. TABULATED DATA.

6-32. ARMAMENT SUBSYSTEM XM27E1.

Weight (Subsystem W/O Ammo)	107 lb. max.
Weight (Subsystem W/Ammo W/O Spare Can)	234 lb. max.
Weight (Subsystem W/Ammo W/Spare Can)	245 lb. max.
Ammo Capacity	2000 rds
Elevation limits:	
Elevation	97.35 mils (+5 1/2°)
Depression	354 mils (-20°)
Azimuth control	Maneuver Aircraft

6-33. MACHINE GUN M134.

Caliber	7.62 millimeter
Cooling	Air
Rate of fire:	
Low	2000 spm
High	4000 spm
Feed	M13 type, linked belt
Muzzle velocity	2850 fps
Rotation of barrels	Counterclockwise, Viewed from breech end

6-34. DRIVE ASSEMBLY.

Type	Electric motor, dual speed
Speed control	Electronic switch

6-35. SIGHT, REFLEX XM70E1.

Length (with mount)	36 in.
Width (extended)	10 in.
Width (stowed)	14 in.
Height	9 in.
Weight (with mount)	4.8 in.
Type	Collimated, Illuminated reticle
Projection lamp	Dual filament
Reticle:	
Line width	1 mil
Outer circle diameter	60 mil
Inner circle diameter	30 mil
Optical Characteristics:	
Clean aperture	0.94 x 1.4 in. (Beam-splitter)
Objective EFL	4.0 in. nominal

6-36. SUBSYSTEM ELECTRICAL CHARACTERISTICS.

Nominal operating voltage	28VDC
Drive motor (steady state)	40 amp (slow rate max) 75 amp (fast rate max)
Sight lamp	0.68 amp (each filament)
Operable temperature range	-65°F to +165°F

6-37. AMMUNITION AUTHORIZED.

7.62 Millimeter ball cartridge M59 (NATO)
7.62 Millimeter ball cartridge M80 (NATO)
7.62 Millimeter tracer cartridge M62 (NATO)
7.62 Millimeter armor piercing cartridge M61 (NATO)
7.62 Millimeter dummy cartridge M172 (inert loaded)

Caution

Do not use fluted case dummy cartridges.

6-38. CONTROLS.

6-39. ARMAMENT CONTROL SYSTEM.

6-40. The control system consists of trigger and elevation/depression switches on the pilot and copilot cyclic stick grips and an ARMAMENT SYSTEM MODE control panel located in the instrument panel (figure 2-6). The control panel contains a three-position SYSTEM MODE MASTER switch, warning lights marked GUN NOT CLEARED, ARMED and AMMO LOW, and a two-position toggle switch that mechanically locks in the SAFE position (figure 6-5).

Note

Gun elevation/depression and firing can be accomplished with the switches located on the copilot's cyclic stick grip. However, the reflex sight cannot be used from the copilot seat position. Except for sighting, all of the following information is applicable to the copilot position as well as the pilot seat location.

6-41. The function of the various controls and indicator lights are as follows:

a. SYSTEM MODE MASTER switch.

(1) OFF disconnects the ARMED - SAFE switch circuit and gun sub-system firing control circuit from the ARM circuit breaker.

Warning

Placing the SYSTEM MODE MASTER switch in the FIRE TO CLEAR position does not clear the gun; it is necessary to fire a one second or longer burst in order to complete the gun clearing. Firing is still possible when the GUN NOT CLEARED light is out. It is important to understand the AMMUNITION REMAINS IN THE DELINKING FEEDER after each gun clearing operation. Also the GUN WILL FIRE AGAIN IF THE TRIGGER IS DEPRESSED.

(2) FIRE TO CLEAR connects the armament subsystem firing control circuits so that the gun motor will continue to operate for an additional 0.2 seconds after the trigger is released (gun loading solenoid on feeder disengaged) thereby firing remaining rounds in the gun chambers and ejecting live rounds from the feeder. De-energizing is caused by trigger release or the automatic 3-second burst limits if the trigger is not released within three seconds. The GUN NOT CLEARED light will extinguish after a successful clearing burst has been fired. After the gun has been cleared, firing may be resumed by merely depressing the trigger switch. The reflex sight reticle lamp remains illuminated as long as the SYSTEM MODE MASTER switch is in FIRE TO CLEAR.

Note

Each gun clearing burst will jettison 30 to 35 live rounds in low rate after firing ceases. For this reason, it is recommended that the FIRE TO CLEAR mode be used principally for gun clearing and that all anticipated or normal firing will be accomplished in the FIRE NORM mode. To conserve ammunition with the MX27E1. clearing bursts should be fired at the LOW rate whenever possible. It is normal for the GUN NOT CLEARED light to remain ON when the ammunition supply is exhausted. If the AMMO LOW light is ON and the gun barrels are observed to rotate without firing during the gun clearing operation, the ammunition supply is exhausted.

(3) FIRE NORM connects the armament subsystem firing control circuits so that ammunition will be fed to the gun for one-half second while it is coasting to a stop after trigger release or cutoff by the 3-second burst limiter. In this way, the gun receivers are fully loaded for immediate firing. In the FIRE NORM mode, the GUN NOT CLEARED light will illuminate only after the trigger switch has been depressed. The reflex reticle lamp remains illuminated at all times.

Note

Turning the SYSTEM MODE MASTER switch to the OFF position will not turn off the GUN NOT CLEARED light. The light is wired to prevent it from being turned off until the gun has been cleared.

Warning

WHEN THE GUN IS NOT CLEARED ANY ROTATION OF THE GUN BARRELS WILL CAUSE THE GUN TO FIRE.

b. ARMED-SAFE switch.

(1) SAFE position disconnects the cyclic grip trigger switch circuits from the SYSTEM MODE MASTER switch and the ARM circuit breaker.

(2) ARMED position connects cyclic trigger circuits to the subsystem when either of the firing modes (FIRE NORM OR FIRE TO CLEAR) is selected on the SYSTEM MODE MASTER switch. The ARMED position also illuminates the ARMED light.

Note

If the ARMED-SAFE switch is returned to SAFE while the SYSTEM MODE MASTER switch is set to FIRE NORM, the GUN NOT CLEARED light will remain illuminated.

c. WARNING LIGHTS. The function of the GUN NOT cleared light is described in a. above. The ARMED light illuminates whenever the ARMED-SAFE switch is moved to the ARMED position, b. above. The AMMO LOW light is illuminated when the ammunition is running low - approximately 400 rounds remaining or 6 seconds of fire at high rate. The AMMO LOW light is actuated by a microswitch in the low ammunition switch assembly located on the gun mount assembly. The switch is operated by a switch depressor mounted on the ammunition sensor and leveler located inside the ammunition container.

d. CYCLIC GRIP TRIGGER switches.

(1) The switch first step position energizes the low (2000 shots per minute) fire rate circuit of the gun drive motor.

Note

At either the high or low firing rate, the gun will stop firing after 3-seconds because of the subsystem burst limiter. The trigger must be released and pulled again for each additional burst.

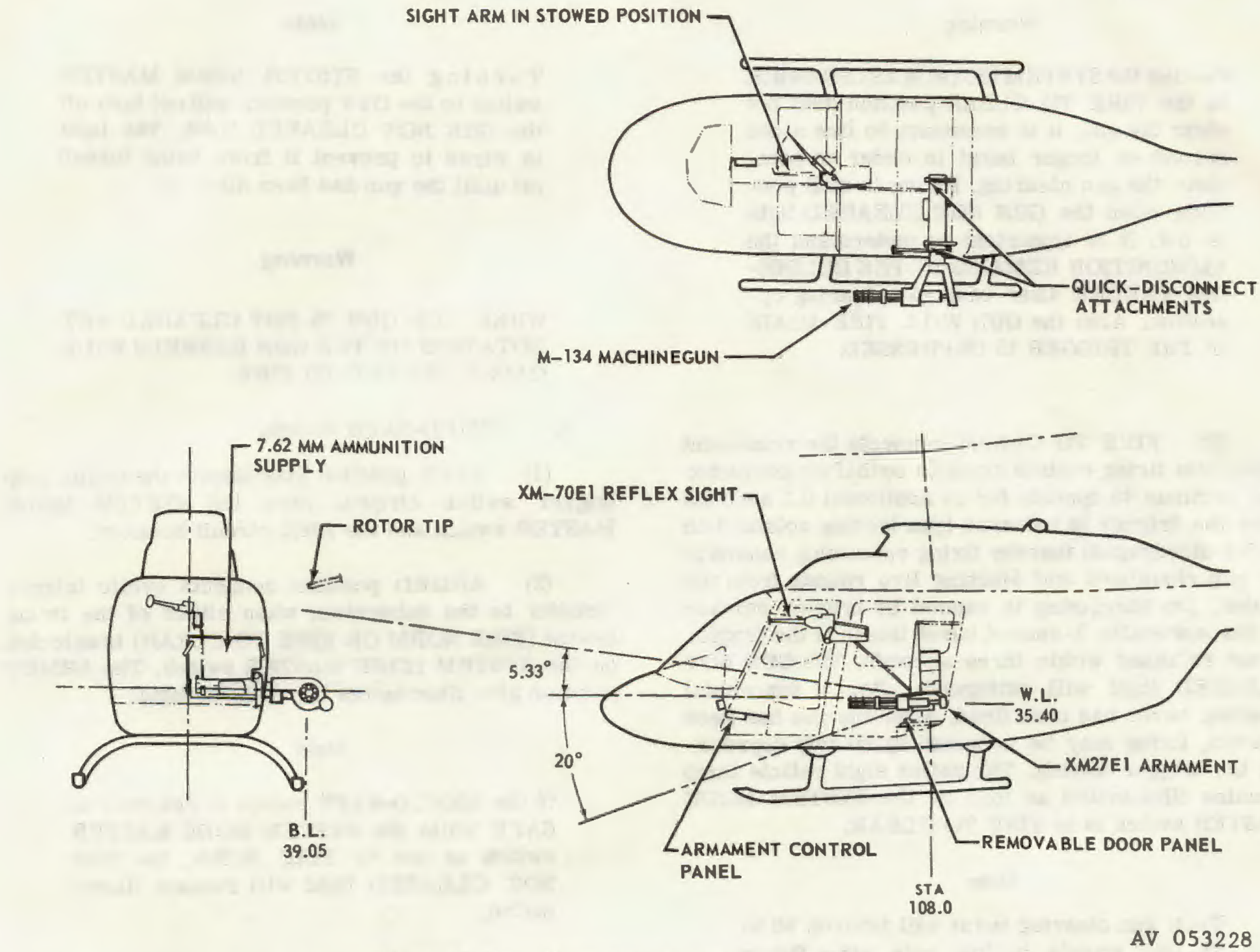

Figure 6-2. Components of armament system

(2) The switch second step position energizes the high (4000 shots per minute) fire rate circuit of the gun drive motor.

Note

At subzero temperatures, the gun should be fired at the high rate only.

e. CYCLIC GRIP ELEVATION/DEPRESSION switches. With the ARM circuit breaker on the elevation/depression switches have a continuous supply of power that is unaffected by the position of any of the other control system switches. Pressing the switch upward depresses the gun 20 degrees from level, pressing the switch downward elevates the gun 5 1/2 degrees above level.

Caution

The elevation/depression motor has no limit switches. To prevent elevation drive motor overheating, do not hold the elevation/depression switch on after the system has reached its limit of travel. System's limit can be determined when movement of sight has stopped in either depression or elevation.

6-42. SIGHT, REFLEX XM70E1.

6-43. PLUNGER ASSEMBLY AND DETENT.

6-44. The plunger assembly is located on the end of the sight operating arm. The detent is centrally located on the left side of the reticle housing. When sight is to be used, the operating arm is swung out of its stowed position to the right until the plunger assembly rides over the detent and locks the arm in operating position. Two plate stops, one on the reticle housing and one on the clevis of the pivot arm, assure positive positioning of the sight for operating use.

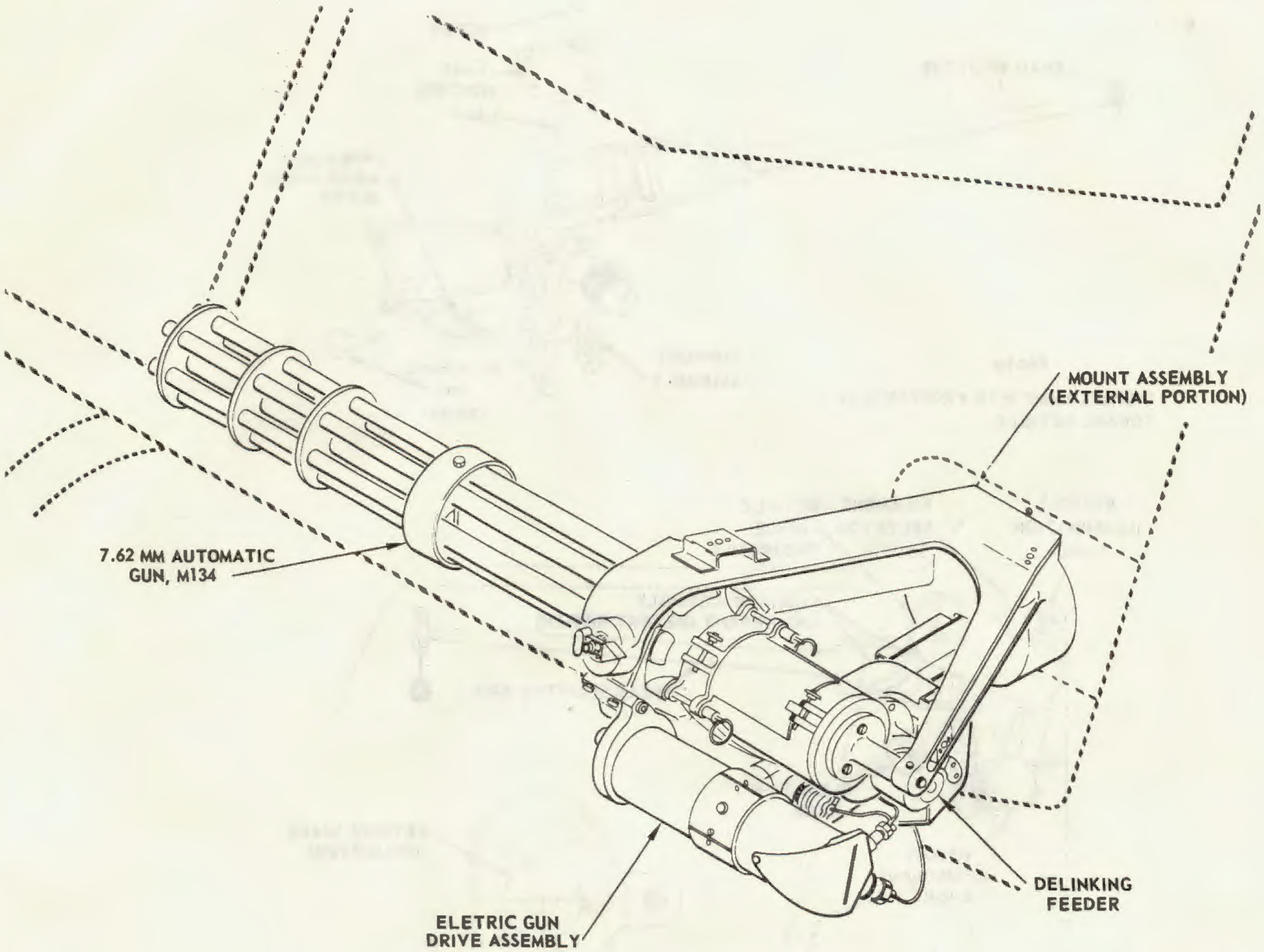

Figure 6-3. Gun assembly mounted

6-45. HEIGHT ADJUSTMENT KNOB.

6-46. This adjustment knob provides a means for locking the sight at a convenient viewing height, depending upon individual pilot's eye level. Counterclockwise rotation of the knob unlocks the sight to be raised or lowered within its adjustment range. Clockwise rotation of the knob locks the sight at the selected position. When extreme gun depression angles are used, a higher than normal sight adjustment level will make sighting easier.

6-47. ELEVATION CONTROL ASSEMBLY KNOB.

6-48. This adjustment knob is used to set the sight for a preselected (expected) target distance. A white numerical scale on the rotating portion of the knob is graduated in meters, with a range of 0 to 1000. The range is selected by rotating the knob until the expected target range marking is aligned with the white index arrow adjacent to the knob scale. When the expected target range has been set, the sight is adjusted for the gravity drop of the projectiles at that distance. If the target being fired upon is at the expected range, the center of the reticle will coincide with the point of impact. At shorter or longer distances, it will be necessary to maneuver the aircraft to lower or raise the sight reticle a proportionate distance below or above the aiming point.

Note

The yellow range markings are intended for use with the XM8 armament subsystem and should be locked out of position when the XM27E1 subsystem is being used.

6-49. FILAMENT SELECTOR SWITCH.

6-50. The filament selector switch receives electrical power from the ARM circuit breaker and SYSTEM MODE MASTER switch. The filament selector

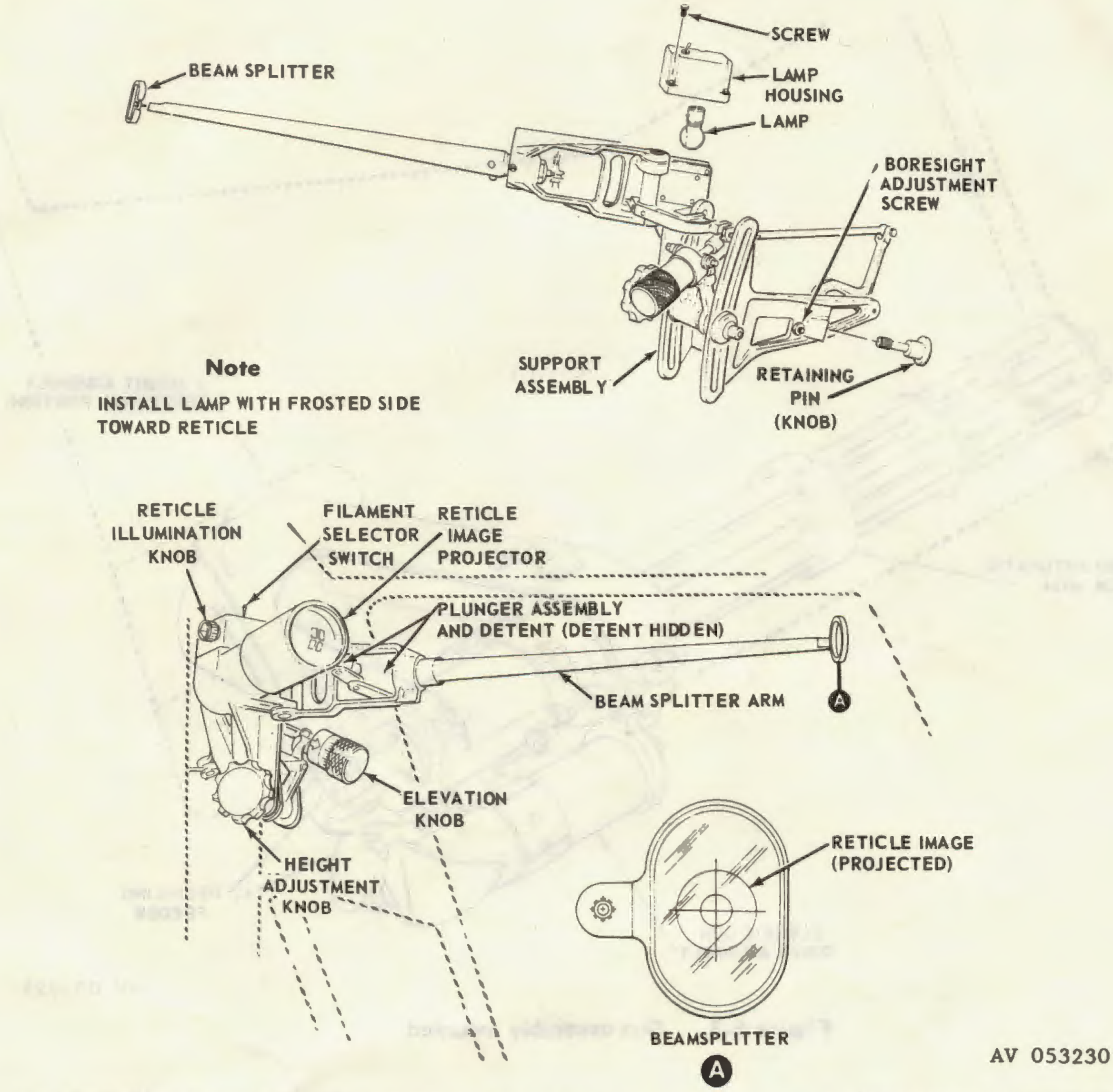

Figure 6-4. Reflex sight XM70E1, control and reticle

switch is a two-position toggle switch located on top of the lamp housing. When moved to either position, one filament of the reticle lamp on the reticle pattern is illuminated. The forward switch position is the normally used position. The rear position (spare filament) should only be used after failure of the normal or primary filament.

6-51. RETICLE ILLUMINATION KNOB.

6-52. The reticle illumination knob is located on the upper portion of the lamp housing clockwise rotation of the knob increases reticle illumination intensity; counterclockwise rotation decreases intensity.

6-53. OPERATION.

CHECK SEQUENCE	CONTROL	OPERATION AND CHECK
1	ARMED/SAFE switch	Place in SAFE position
2	SYSTEM MODE MASTER switch	Place in OFF position, GUN NOT CLEARED, ARMED, and AMMO LOW light should be out.

CHECK SEQUENCE	CONTROL	OPERATION AND CHECK
3	SYSTEM MODE MASTER switch	Place in FIRE TO CLEAR position. AMMO LOW light illuminates. GUN NOT CLEARED and ARMED lights should be out.
4	ARMED/SAFE switch	Pull up switch and place in ARMED position. ARMED light illuminates.
5	Cyclic stick trigger switch	Press trigger to fire, either 2,000 or 4,000 spm position. Gun rotates for approximately 3-seconds. GUN NOT CLEARED light illuminates.
6	SYSTEM MODE MASTER switch	Place in FIRE NORMAL position.
7	Cyclic trigger switch	Press trigger to fire. GUN NOT CLEARED light remains on. Gun rotates for approximately 3-seconds if trigger is held down.
8	SYSTEM MODE MASTER switch	Place in FIRE TO CLEAR position
9	Cyclic stick trigger switch	Press trigger to fire then immediately release. Gun rotates for approximately 1/4-second after trigger is released. GUN NOT CLEARED light will remain on since seven rounds of ammunition must be expelled to activate the gun cleared logic circuit. Press RESET button on control box to extinguish GUN NOT CLEARED light.
10	ARMED/SAFE switch	Place in SAFE position.
11	SYSTEM MODE MASTER	Place in either FIRE TO CLEAR of FIRE NORMAL position.
12	Reflex sight filament selector switch	Place in either filament position. Reticle lamp comes on. Switch to other filament position. Reticle lamp comes on. Return switch to the forward position.
13	Reflex sight reticle illumination knob	Rotate knob. Intensity of light should increase when turning clockwise.
14	Reflex sight elevation knob	Rotate knob to increased range, sight elevates. Rotate knob to low range, sight depresses.
15	Cyclic stick elevation/depression switch	Push down on switch, weapon and sight elevate. Push up on switch, weapon and sight depress.
16	Low ammunition sensor switch	Open cover on ammunition container assembly and depress the lower forward ammunition leveling assembly. AMMO LOW light shall go out.
17	SYSTEM MODE MASTER switch	Place in OFF position. Check that gun is depressed so it will not interfere when the left pilot's door of the aircraft is opened. Turn off helicopter 28 VDC supply.

6-54. PREFLIGHT CHECKS.

6-55. EXTERIOR CHECK

Warning

Copilot's door must remain on during firing of weapons.

(1) Gun - INSTALLED AND SECURED.

(2) Ammunition container - LOADED, ammutition belt ENGAGED in delinking feeder.

(3) Gun elevation - DEPRESSED below door sill.

6-56. COCKPIT CHECK.

(1) ARM POWER and ARM circuit breakers - DEPRESSED.

(2) SYSTEM MODE MASTER switch - OFF.

(3) ARMED - SAFE switch - SAFE.

(4) Sight filament selector switch - REAR (Spare filament).

(5) SYSTEM MODE MASTER switch - FIRE NORM.

Warning

Do not turn ARMED-SAFE switch away from SAFE position during following checks.

(6) Reflex sight - ADJUST HEIGHT, NOTE RETICLE AND LOCK.

(7) Reticle illumination knob - DESIRED INTENSITY.

(8) Sight filament selector switch - FORWARD (primary filament), check that reticle is still visible.

(9) SYSTEM MODE MASTER switch - OFF.

(10) Sight elevation control knob - SET, set to expected target range.

Note

The yellow range markings are intended for use with the XM8 armament subsystem and should be locked out of position when the XM27E1 subsystem is installed.

(11) Reflex sight - Move to STOWED position if desired.

6-57. IN-FLIGHT OPERATION.

6-58. BEFORE FIRING.

(1) Reflex sight - POSITION for use.

(2) Sight elevation control knob - RESET DISTANCE if necessary and if time permits.

(3) SYSTEM MODE MASTER switch - FIRE NORM or FIRE TO CLEAR.

Note

If four or more 3-second firing bursts will be fired in extremely rapid succession, it is advisable to use the FIRE TO CLEAR mode rather than the FIRE NORM mode. Repeated firing of full 3-second bursts in the FIRE NORM mode increases possibility of ammunition "cook off" and gun jamming.

(4) Reticle illumination knob - RESET INTENSITY if required.

(5) ARMED - SAFE switch - ARMED.

(6) Gun elevation/depression switch - AS REQUIRED.

5-59. FIRING.

(1) Aircraft - MANEUVER AS REQUIRED. Maneuver to position reticle pattern on target.

(2) Trigger switch - LIFT GUARD and DEPRESS. Depress to low or high firing rate position as desired.

5-60. AFTER FIRING.

(1) SYSTEM MODE MASTER switch - FIRE TO CLEAR.

Warning

Do not depress trigger until the clearing burst can be directed into a safe area.

(2) Trigger switch - LIFT GUARD and momentarily DEPRESS to high rate position to complete clearing cycle.

(3) GUN NOT CLEARED light - OUT.

Note

It is normal for the GUN NOT CLEARED light to remain ON when the ammunition supply is exhausted. If the AMMO LOW light is ON and the gun barrels are observed to rotate without firing during the gun clearing operation, the ammunition supply is exhausted.

(4) SYSTEM MODE MASTER switch - OFF.

(5) ARMED - SAFE switch - SAFE.

(6) Gun elevation/depression switch - DEPRESS GUN below door sill level.

(7) Reflex sight - STOWED POSITION.

6-61. BEFORE LEAVING HELICOPTER.

6-62. Verify that control switch and lights are in the specified positions or conditions.

(1) GUN NOT CLEARED light - OFF.

(2) ARMED - SAFE switch - SAFE.

(3) ARMED light - OFF.

(4) SYSTEM MODE MASTER switch - OFF.

(5) Helicopter electrical power switch - OFF.

(6) Reflex sight - STOWED position.

6-63. EMERGENCY PROCEDURES.

6-64. GUN FAILS TO FIRE.

(1) Make sure control switches are positioned as follows:

a. ARM POWER and ARM circuit breakers - DEPRESSED.

b. SYSTEM MODE MASTER switch - FIRE NORM.

c. ARMED-SAFE switch - ARMED.

(2) Trigger switch - LIFT GUARD and DEPRESS If gun fails to fire, release trigger switch.

(3) SYSTEM MODE MASTER switch - FIRE TO CLEAR.

(4) Trigger switch - LIFT GUARD and DEPRESS. Depress trigger to both low and high rate position.

(5) If gun still fails to fire, accomplish the following.

a. Trigger switch - RELEASE.

b. SYSTEM MODE MASTER switch - OFF.

c. ARMED-SAFE switch - SAFE.

d. ARM POWER and ARM circuit breakers - PULLED.

Warning

Upon landing, immediately alert personnel to probable presence of live rounds in gun. ANY ROTATION OF THE GUN BARRELS WILL CAUSE THE GUN TO FIRE. Summon armament repairman to clear weapon.

6-65. RUNAWAY GUN.

(1) ARMED-SAFE switch - SAFE.

(2) SYSTEM MODE MASTER switch - OFF.

(3) ARM POWER and ARM circuit breakers - PULLED.

Warning

Upon landing, immediately alert personnel to presence of live round in gun. ANY ROTATION OF GUN BARRELS WILL CAUSE GUN TO FIRE. Summon armament repairman to clear weapon.

6-66. SIGHT RETICLE NOT ILLUMINATED.

(1) Sight filament selector switch - TO REAR. Move switch to spare filament position.

(2) Reticle illumination knob - ROTATE CLOCKWISE. Rotate to increase brilliance.

(3) If reticle is still not visible, accomplish the following checks:

a. SYSTEM MODE MASTER switch - FIRE NORM or FIRE TO CLEAR.

b. ARM POWER and ARM circuit breakers - DEPRESSED.

6-67. AIRCRAFT GENERATOR FAILURE.

6-68. If helicopter GENERATOR OUT caution light illuminates, any additional firing should be accomplished at the high rate.

Note

Firing - out of complete ammunition container (2000 rounds) will consume approximately five percent of the energy of a fully charged battery.

6-69. DESTRUCTION OF MATERIAL.

6-70. Ordinarily the armament should be destroyed in conjunction with the destruction of the aircraft. Priority should be given to the weapon and sighting equipment.

6-71. OPERATIONAL CHECKS.

Warning

Do not attempt to perform operational checks with ammunition present in gun, delinking feeder, ammunition chutes or container.

(1) Place battery and generator switch in OFF position and connect 28-volts DC power to the helicopter.

(2) Depress ARM and ARM PWR circuit breakers.

Caution

Gun operation (dry) firing shall be held to a minimum to avoid damaging firing pins. The gun safing sector must be installed to prevent gun jamming and damage to bolt assemblies.

6-72. LOADING INSTRUCTIONS.

Warning

Do not load more than 2000 rounds of ammunition in the container.

(1) Prior to loading the gun check to be sure the following conditions exist.

a. Helicopter battery and generator switches OFF.

b. Armament SYSTEM MODE switch, OFF and ARMED SAFE switch in SAFE position.

c. Warning light out.

(2) Fold ammunition belt into ammunition container assembly and work it through ammunition chutes to the delinking feeder.

(3) Remove safing sector and housing cover of gun.

(4) Feed ammunition into delinking feeder by working through open top of ammunition chute.

(5) Rotate gun barrel counterclockwise (as viewed from rear of gun) until a round drops from the delinking feeder.

(6) Install safing sector and housing cover on gun and install gun fairing. Close and latch ammunition container assembly cover.

6-73. UNLOADING AND CLEARING INSTRUCTIONS.

(1) Prior to unloading and clearing the gun, check to be sure the following conditions exist.

a. Helicopter battery and generator switches, OFF.

b. Armament SYSTEM MODE switch, OFF and ARMED/SAFE switch in SAFE position.

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Figure 6-5. Armament control panel

c. Warning lights out.

Warning

A firing pin may be cocked and ready to be released. Before removing safing sector and housing cover, rotate barrels clockwise (opposite firing direction) slightly to prevent firing.

(2) Release ammunition chute from delinking feeder and remove one cartridge from the linked cartridge.

(3) Manually rotate barrels counterclockwise, viewed from breech end (firing direction), until remaining cartridges are cleared from delinking feeder and the gun.

(4) Open cover on ammunition container assembly and pull linked ammunition from chutes and into ammunition container assembly. Remove ammunition container assembly if required.

SECTION VIII PHOTOGRAPHIC EQUIPMENT

(Not Applicable)

SECTION IX AUTOMATIC STABILIZATION EQUIPMENT

(Not Applicable)

SECTION X MISCELLANEOUS EQUIPMENT

6-74. DATA CASE.

6-75. A data case for maps, flight reports etc., has been provided. The data case is located on the aft side of the vertical control column.

6-76. MOORING FITTINGS.

6-77. The mooring fittings are provided one on each side below crew doors and one on aft lower section of the fuselage forward of the tail boom. All mooring fittings are dual purpose jackpoint and mooring fitting.

6-78. TOW RINGS.

6-79. To facilitate towing the helicopter, with ground handling wheels lowered, a tow ring has been provided on the inboard side of teach skid gear directly beneath the crew doors.

6-80. ROTOR TIE DOWNS.

6-81. Rotor tie down are provided for use in mooring the aft main rotor and the tail rotor. The tie downs prevent the rotors from see-sawing when the helicopter is parked. The tie downs can be stowed in the avionics compartment.

6-82. ENGINE INLET SHIELDS AND PITOT COVERS.

6-83. A combined engine inlet and pitot cover is provided to prevent entrance of dust etc., into the engine inlet and pitot system when helicopter is parked. The cover can be stowed in the avionics compartment.

6-84. ENGINE EXHAUST COVERS.

6-85. Individual covers are provided for the exhaust stacks to prevent entrance of foreign objects into the engine exhaust when helicopter is parked. The covers can be stowed in the avionics compartment.

CHAPTER 7

OPERATING LIMITATIONS

SECTION I SCOPE

7-1. SCOPE OR OPERATING LIMITS DATA.

7-2. All important limitations that must be observed during normal operations of the helicopter are provided in this Chapter.

7-3. Limitations that are characteristic only to 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 purpose. Limits concerning maneuvers and "CG" limitations are also covered in this Chapter. Close attention must be given to the instrument markings, since they represent limitations that are not necessarily repeated in the text.

7-6. MINIMUM CREW REQUIREMENTS.

7-7. The minimum crew consists of the pilot only. Additional crewmembers, as required, will be added at the discretion of the Commander, in accordance with appropriate Department of the Army Regulations.

7-8. INSTRUMENT MARKINGS.

7-9. The operating ranges for both the helicopter and engine are listed below and shown on figure 7-1.

A. ENGINE OIL PRESSURE.
50 psi MINIMUM
130 psi MAXIMUM

B. ENGINE OIL TEMPERATURE.
107°C MAXIMUM

C. POWER TURBINE TACHOMETER
101% MINIMUM
103% MAXIMUM

D. GAS PRODUCER
104% rpm MAXIMUM

E. TURBINE OUTLET TEMPERATURE.
749°C Take-Off (5 minute limit)
693°C Maximum Continuous
749°C to 843°C During power transient (6 second maximum)
Intentional use of these limitations in access of 749°C is not authorized

F. TORQUE PRESSURE
92 psi MAXIMUM

G. ROTOR TACHOMETER
330 rpm MINIMUM
390 rpm MAXIMUM

H. AIRSPEED
30 knot rearward, 35 knots sideward and 120 knots forward with armament installed
ESTIMATED same as above.
100 Knot Maximum Airspeed with any door removal combination

7-10. MAIN ROTOR LIMITATIONS

Power OFF - 330 RPM to 390 RPM
Power ON - 347 RPM = 101% nII
354 RPM - 103% nII

7-11. ENGINE LIMITATIONS DURING START.

Overtemperature Limitations:
To 749°C No Limit
749°C to 927°C Maximum (10 seconds)
Never Exceed 927°C

7-12. CENTER OF GRAVITY LIMITATIONS.

The maximum center of gravity limitations are:
Forward Limit Station 105.2
Aft Limit Station 114.2
Lateral CG Limits (To be supplied at a later date)

7-13. TRANSMISSION OIL TEMPERATURE LIMITS.

Warning Light ON above 110°C.

FUEL GRADE JP-4 OR JP-5

POWER TURBINE TACHOMETER

- 101% Minimum
- 101% to 103% Continuous Operation
- 103% Maximum

ROTOR TACHOMETER

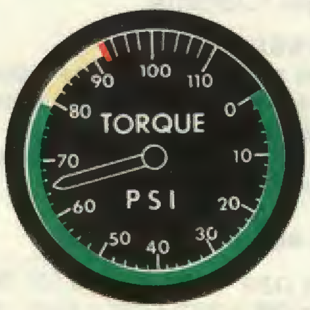
- 330 RPM Minimum
- 330 to 390 RPM Continuous Operation
- 390 RPM Maximum

AIRSPEED

- 120 Knots Maximum

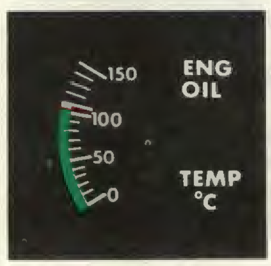
ENGINE OIL PRESSURE

- 50 to 110 PSI Avoid Continuous Operation
- 110 to 130 PSI Continuous Operation
- 130 PSI Maximum



TORQUEMETER

- 0 to 79 PSI Continuous Operation
- 79 to 92 PSI Avoid Continuous Operation
- 92 PSI Maximum

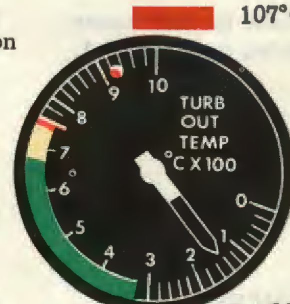


ENGINE OIL TEMPERATURE

- 0 to 107°C Continuous Operation
- 107°C Maximum

GAS PRODUCER TACHOMETER

- 62 to 104%
- 104% Maximum



TURBINE OUTLET TEMPERATURE

- ● 927° Maximum for Starting
- 330° to 693°C Continuous Operation
- 693° to 749°C Starting and Transient
- 749°C Maximum

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Figure 7-1. Instrument markings

7-14. TRANSMISSION OIL PRESSURE.

Warning light ON below 30 psi and above 80 psi.

7-15. FIRING LIMITATIONS.

Warning

Copilot's door must remain on during firing of weapons.

7-16. TOWING LIMITATIONS.

7-17. The maximum gross weight for towing the helicopter is 3000 pounds on prepared or unprepared surfaces.

7-18. WEIGHT LIMITATIONS.

3000 Pounds Maximum Gross Weight.

7-19. MINIMUM HEIGHT FOR SAFE LANDING AFTER ENGINE FAILURE.

7-20. The minimum height for safe landing after engine failure chart (figure 7-3) is a conservative estimate of the relative importance of various parameters on the execution of an autorotative landing without aircraft damage. The chart shows the critical areas of operation at sea level and zero wind for gross weights of 2600 and 3000 pounds. It should be noted that approximately the same degree of skill would be required to execute a safe autorotative landing under conditions of 2600 pounds, sea level and zero wind or 3000 pounds, sea level and 20 knot wind. The altitude versus gross weight limit plot indicates the range of parameters for which the minimum height for safe landing charts may be considered valid.

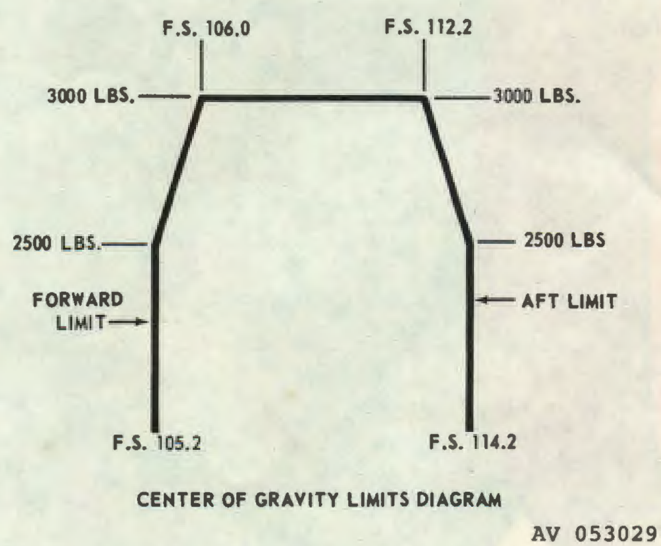

Figure 7-2. Center of gravity diagram

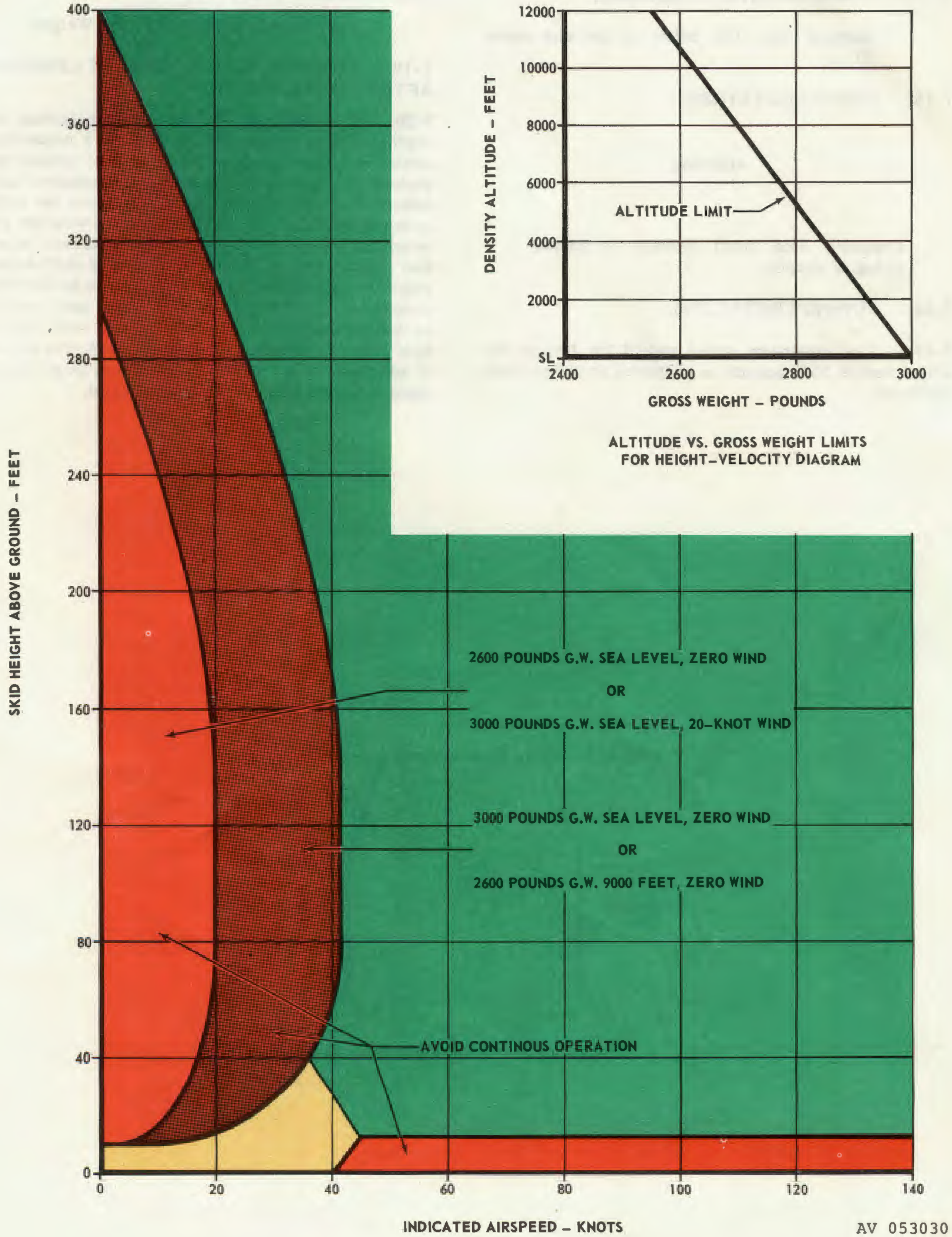

Figure 7-3. Height velocity diagram

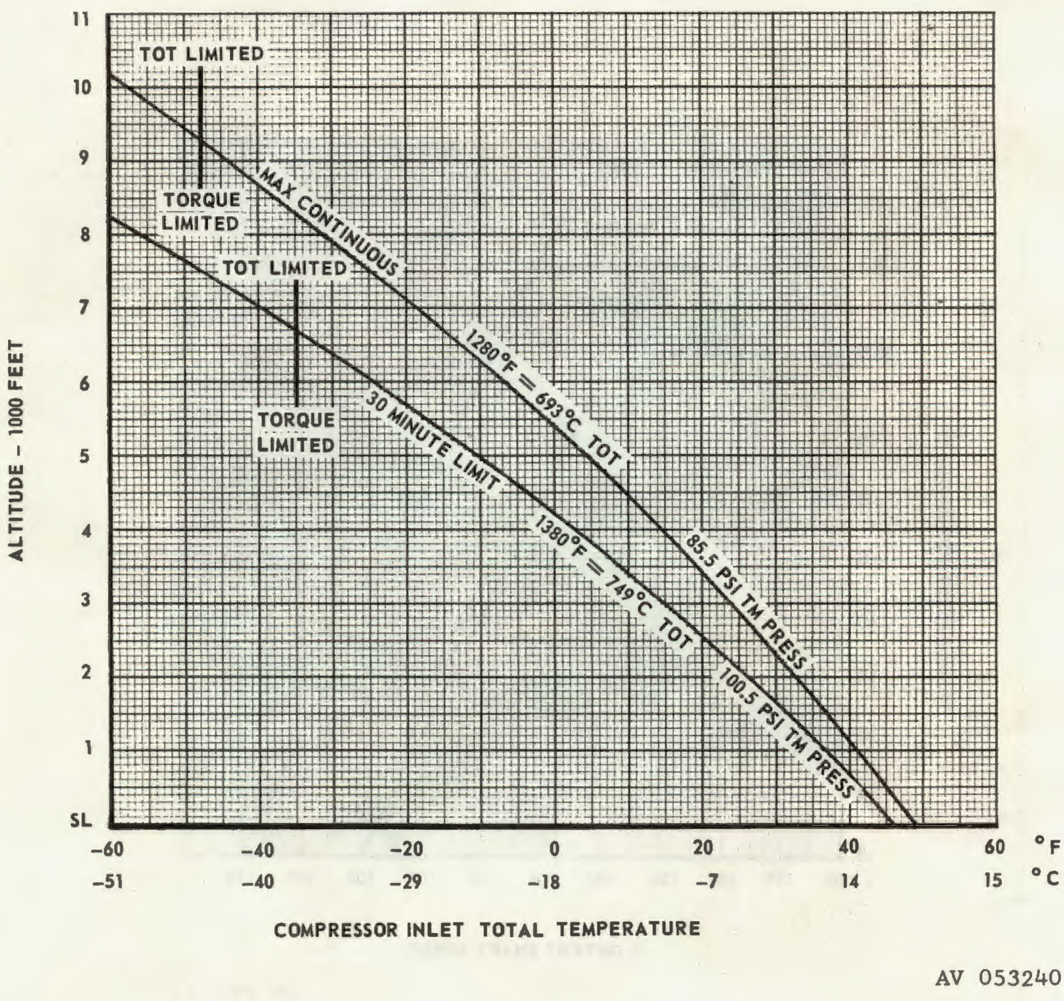

Figure 7-4. Engine operating limits

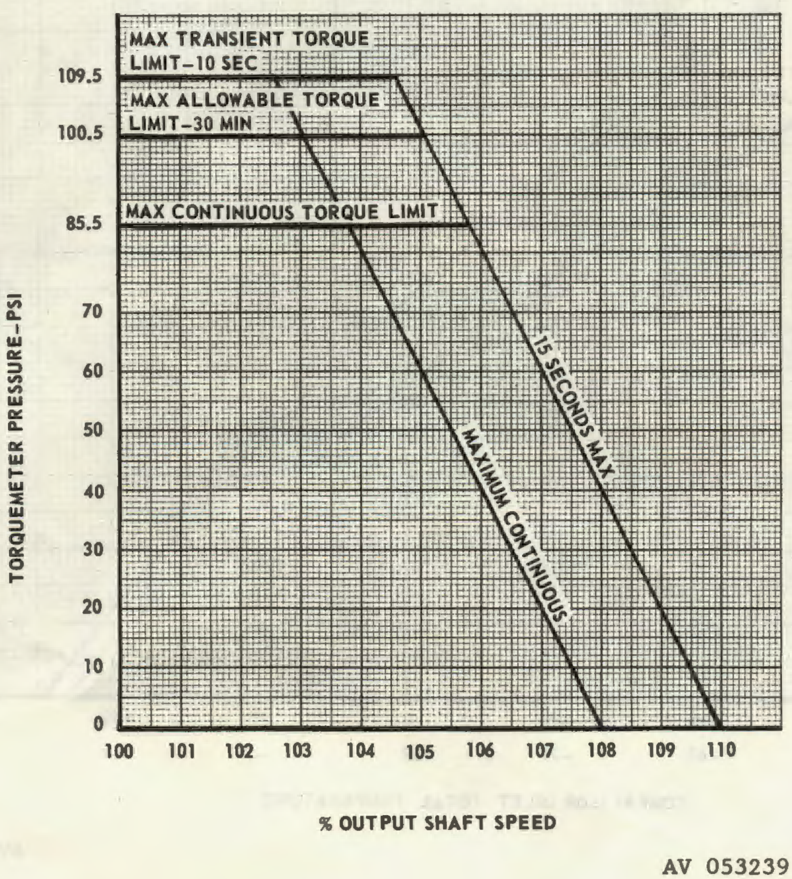

Figure 7-5. Maximum allowable nil speed

CHAPTER 8

FLIGHT CHARACTERISTICS

SECTION I SCOPE

8-1. PURPOSE.

8-2. The purpose of this chapter is to describe the flight characteristics of the aircraft.

SECTION II GENERAL FLIGHT CHARACTERISTICS

8-3. OPERATING CHARACTERISTICS.

8-4. The flight characteristics of this helicopter in general are similar to other single rotor helicopters. The particular difference is the additional stability that is evident during take-off, hovering and all flight speeds.

8-5. ROTOR BLADE STALL.

8-6. Rotor blade stall is a condition which occurs when the rotor blade angle of attack reaches a high value. When this condition is attained, increased blade pitch (or collective) will not result in increased lift and may result in reduced lift. The threshold of stall is approached as gross weight, airspeed, altitude and "G" loading increase and RPM decrease. One of the more important features of the two-bladed, semi-rigid 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 stall becomes severe.

8-7. BLADE STALL - CORRECTIVE ACTION.

8-8. When blade stall is evident the condition may be eliminated by accomplishing one or a combination of the following corrective actions.

Warning

The use of the following procedures are predicated on the helicopter's altitude above the terrain. Sufficient recovery altitude must be available for these procedures to be effective.

a. Reduce collective.

b. Reduce airspeed.

c. Increase operating rpm.

d. Descend to lower altitude.

e. Decrease the severity of the maneuver.

CHAPTER 9

SYSTEMS OPERATION

(Not Applicable)

CHAPTER 10

WEATHER OPERATIONS

SECTION I SCOPE

10-1. SCOPE OF WEATHER OPERATION INSTRUCTIONS.

10-2. The purpose of this Chapter is to provide information relative to operation under conditions of instrument flight and approach. This includes ground control approach, turbulent air flight, extreme cold and hot weather operations, night flying, etc. Description of the equipment is not covered, since that information is appropriately covered in other chapters,

10-3. Except for some repetition which is necessary for continuity of thought, the flight procedures in this chapter contain only procedures that differ from, or are in addition to normal procedures covered in Chapter 3. The checklists presented in Chapter 3, and the operating procedures or the navigation equipment in Chapter 5, are to be used in conjunction with the information presented in this Chapter.

SECTION II INSTRUMENT FLIGHT PROCEDURES

Instrument Flight Prohibited (Not Applicable)

SECTION III COLD WEATHER OPERATION

10-4. COLD WEATHER OPERATION.

a. Preparation for flight.

(1) Remove ice and snow from the engine air inlet.

(2) Insure all engine controls are operable through the full range of travel without any binding or excessive stiffness.

b. Engine Starting. When compressor icing occurs (TOT will gradually increase with corresponding decreases in (nI)), apply anti-icing air immediately.

c. Take off and flight.

(1) Exercise caution while flying in wet snow that accumulates on the aircraft or in the engine air inlet. Accumulated snow may slide off and enter the compressor in quantities large enough to cause engine flameout.

(2) Engine anti-ice should be used when flying in visible moisture at OAT 5°C (41°F) or below.

SECTION IV DESERT AND HOT WEATHER OPERATION

10-5. HOT WEATHER OPERATION

10-6. Hot weather operations are the same as normal operations with the exception of the starting procedure. Hot weather operation requires constant monitoring of the TOT indicator. The initial start is not as critical as subsequent starts; however, during each start in hot weather the starts should be allowed to reach maximum rpm (peak out) before igniting (turning twist grip throttle to idle stop), and the minimum light off speed of 15 percent (nI) should be rigidly observed.

10-7. In restarting a hot engine, the TOT indicator should be checked after the starter has peaked out, and ingition should be delayed until the temperature has dropped to 200°C (392°F) or below.

Note

During hot weather operation, engine performance can be temperature - limited rather than torque-limited; therefore, the TOT indicator must be monitored as well as the torquemeter to insure that neither limit is exceeded.

SECTION V TURBULENCE AND THUNDERSTORM OPERATION

Information to be supplied at a later date.

CHAPTER 11

CREW DUTIES

Note

Crew duties are listed in Chapter 3, and Chapter 6.

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 363 series.

Note

For the purpose of clarity, Model OH-58A helicopters are in Class I Category.

12-6. The aircraft manufacturer 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 AR 95-16.)

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. At all times, the last weight and moment/constant entry is considered current weight and balance status of the basic helicopter.

12-10. USE. (Refer to figure 12-1 for a sample of DD Form 365C.)

12-11. At time of delivery of a new helicopter, the manufacturer entered the basic weight and moment/constant of the individual helicopter. This chart becomes a part of the "G" file of the helicopter. Subsequent additions or subtractions to the basic weight and moment/constant on Chart C are made by the weight and balance technician.

12-12. CHART E - LOADING DATA.

12-13. The loading data on Chart E are intended to provide information necessary to work a loading problem for the helicopters to which this manual is applicable.

12-14. USE.

12-15. From the loading table contained in Chart E (see figure 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 opposing the gross weight of the table.

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	SERIAL NO.	PAGE NO.
OH-58A	SAMPLE ONLY	

DATE	ITEM NO. IN	ITEM NO. OUT	DESCRIPTION OF ARTICLE OR MODIFICATION	WEIGHT CHANGE ADDED (+) WEIGHT	ADDED (+) ARM	ADDED (+) MOMENT¹ 100	REMOVED (−) WEIGHT	REMOVED (−) ARM	REMOVED (−) MOMENT¹ 100	RUNNING TOTAL BASIC AIRPLANE WEIGHT	MOMENT¹ 100	~~INDEX²~~ C.G.
7-12-69			BASIC INCLUDING ARMAMENT SUBSYSTEM							1669	1964.3	117.7

EXAMPLE ONLY

¹Enter constant used below line.
²Balance computer index.
Previous editions of this form may be used until stocks are exhausted.

DD FORM 1 SEPT 54 365C

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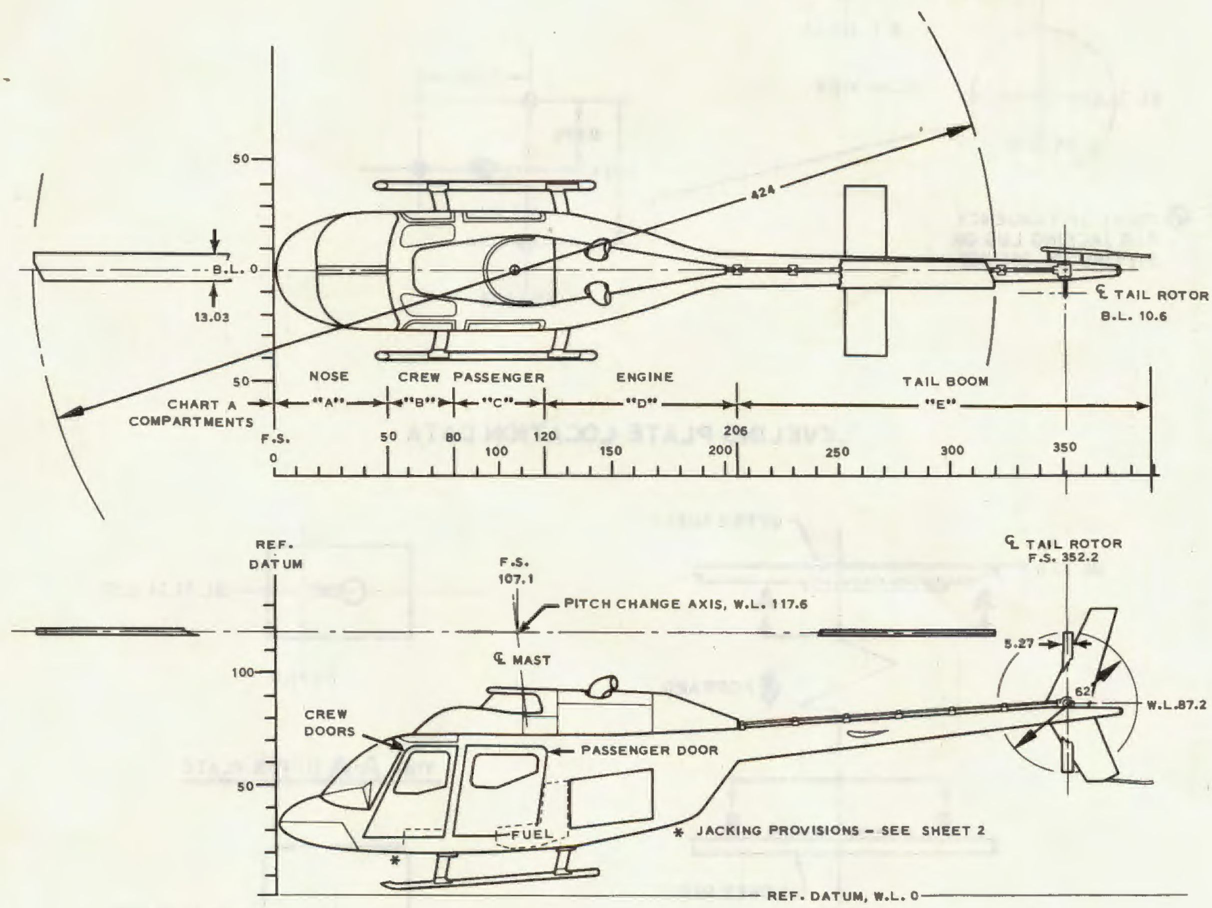
Figure 12-1. Sample DD Form 365 C

CHART E
SHEET 1 OF 10
MODEL OH-58A
CHART DATE: DECEMBER 2,1968

HELICOPTER DIAGRAM



AV 053032

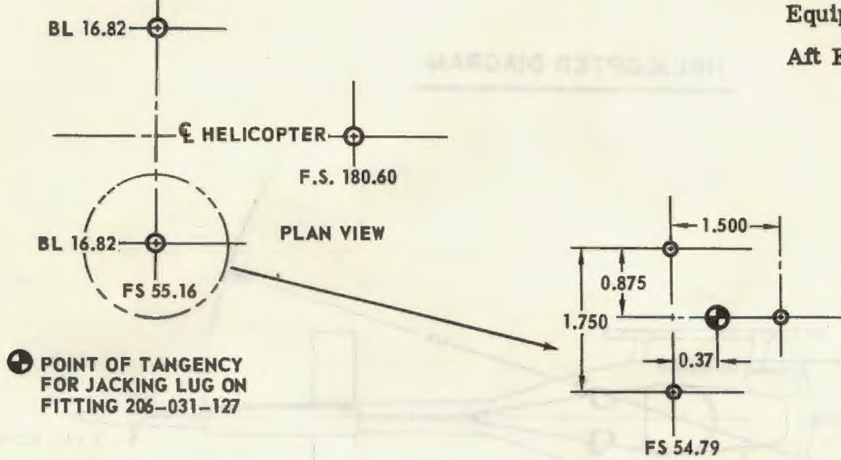
Figure 12-2. Chart E - loading data (Sheet 1 of 10)

Chart: E
Sheet: 2 of 10
Model: OH-58A
Chart Date: See Sheet 1

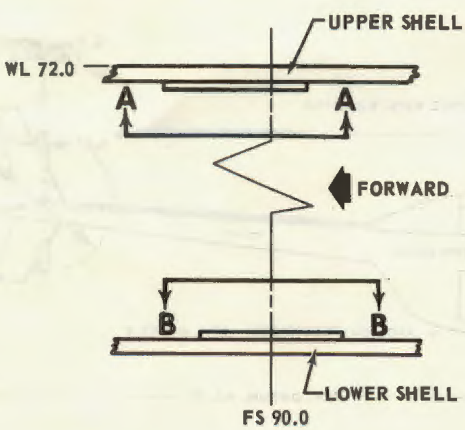
JACK PAD LOCATION DATA

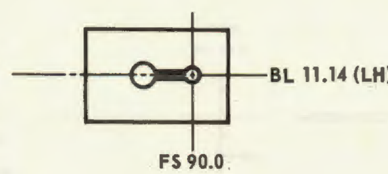
Forward Fittings and Attaching Hardware Included in Loose Equipment Delivered with Helicopter.

Aft Fitting is not Removable.

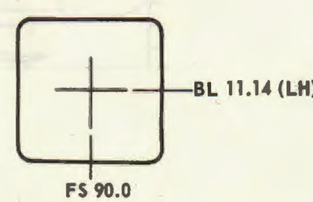


LEVELING PLATE LOCATION DATA





VIEW A-A UPPER PLATE



VIEW B-B LOWER PLATE

Drop Plumb Bob from Smaller Hole in Upper Plate. When Pointer is at Center of "+" Target on Lower Plate, The Helicopter is Level.

AV 053033

Figure 12-2. Chart E - loading data (Sheet 2 of 10)

Chart: E
Sheet: 3 of 10
Model: OH-58A
Chart Date: See Sheet 1

FUEL LOADING TABLE
MOMENT/100

GAL.	JP-4 @ 6.5 LBS/GAL		JP-5 @ 6.8 LBS/GAL		GAL.	JP-4 @ 6.5 LBS/GAL		JP-5 @ 6.8 LBS/GAL.	
	WEIGHT	MOMENT*	WEIGHT	MOMENT*		WEIGHT	MOMENT*	WEIGHT	MOMENT*
5	33	36	34	37	45	293	331	306	346
10	65	72	68	75	50	325	371	340	388
15	98	109	102	114	55	358	411	374	429
20	130	145	136	152	60	390	450	408	471
25	163	183	170	191	65	423	491	442	513
30	195	219	204	229	70	455	531	476	555
35	228	257	238	268	75	488	571	510	597
40	260	293	272	306	78	507	594	530	621

*Moment Arm Varies

ENGINE OIL LOADING TABLE

GAL.	WEIGHT (LBS)	MOMENT/100 (F.S. 179.9)	GAL.	WEIGHT (LBS)	MOMENT/100 (F.S. 179.9)
0.5	3.8	7	1.5	11.3	20
1.0	7.5	14			

Figure 12-2. Chart E - loading data (Sheet 3 of 10)

Chart: E
Sheet 4 of 10
Model: OH-58A
Chart Date: See Sheet 1

TABLE OF MOMENTS FOR PERSONNEL

FRONT SEAT

Weight (Lbs)	Moment/100 F.S. 65.0	Weight (Lbs)	Moment/100 F.S. 65.0	Weight (Lbs)	Moment/100 F.S. 65.0	Weight (Lbs)	Moment/100 F.S. 65.0
150	98	230	150	310	202	390	254
160	104	240	156	320	208	400	260
170	111	250	163	330	215	410	267
180	117	260	169	340	221	420	273
190	124	270	176	350	228	430	280
200	130	280	182	360	234	440	286
210	137	290	189	370	241		
220	143	300	195	380	247		

BACK SEAT

Weight (Lbs)	Moment/100 F.S. 104.0	Weight (Lbs)	Moment/100 F.S. 104.0	Weight (Lbs)	Moment/100 F.S. 104.0	Weight (Lbs)	Moment/100 F.S. 104.0
150	156	270	281	390	406	510	530
160	166	280	291	400	416	520	541
170	177	290	302	410	426	530	551
180	187	300	312	420	437	540	562
190	198	310	322	430	447	550	572
200	208	320	333	440	458	560	582
210	218	330	343	450	468	570	593
220	229	340	354	460	478	580	603
230	239	350	364	470	489	590	614
240	250	360	374	480	499	600	624
250	260	370	385	490	510		
260	270	380	395	500	520		

Figure 12-2. Chart E - loading data (Sheet 4 of 10)

Chart: E
Sheet 5 of 10
Model: OH-58A
Chart Date: See Sheet 1

7.62MM AMMUNITION LOADING TABLE

FORWARD BOX			AFT BOX		
ROUNDS	WEIGHT (LBS) @ 0.065 LBS/RND	MOMENT/100 F.S. 105.6	ROUNDS	WEIGHT (LBS) @ 0.065 LBS/RND	MOMENT/100 F.S. 108.7
50	3.3	4	50	3.3	4
100	6.5	7	100	6.5	7
150	9.8	10	150	9.8	11
200	13.0	14	200	13.0	14
250	16.3	17	250	16.3	18
300	19.5	21	300	19.5	21
350	22.8	24	350	22.8	25
400	26.0	28	400	26.0	28
450	29.3	31	450	29.3	32
500	32.5	34	500	32.5	35
550	35.8	38	550	35.8	39
600	39.0	41	600	39.0	42
650	42.3	45	650	42.3	46
700	45.5	48	700	45.5	50
750	48.8	52	750	48.8	53
800	52.0	55	800	52.0	57
850	55.3	58	850	55.3	60
900	58.5	62	900	58.5	64
950	61.8	65	950	61.8	67
1000	65.0	69	1000	65.0	71

Figure 12-2. Chart E - loading data (Sheet 5 of 10)

Chart: E
Sheet 6 of 10
Model: OH-58A
Chart Date: See Sheet 1

CENTER OF GRAVITY TABLE

MOMENT/100

GROSS WEIGHT (POUNDS)	← FWD LIMIT		FUSELAGE STATIONS					AFT LIMIT →		
	105.2	106.0	107.0	108.0	109.0	110.0	111.0	112.0	113.0	114.2
1700	1788	1802	1819	1836	1853	1870	1887	1904	1921	1941
1710	1799	1813	1830	1847	1864	1881	1898	1915	1932	1953
1720	1809	1823	1840	1858	1875	1892	1909	1926	1944	1964
1730	1820	1834	1851	1868	1886	1903	1920	1938	1955	1976
1740	1830	1844	1862	1879	1897	1914	1931	1949	1966	1987
1750	1841	1855	1873	1890	1908	1925	1943	1960	1978	1999
1760	1852	1866	1883	1901	1918	1936	1954	1971	1989	2010
1770	1862	1876	1894	1912	1929	1947	1965	1982	2000	2021
1780	1873	1887	1905	1922	1940	1958	1976	1994	2011	2033
1790	1883	1897	1915	1933	1951	1969	1987	2005	2023	2044
1800	1894	1908	1926	1944	1962	1980	1998	2016	2034	2056
1810	1904	1919	1937	1955	1973	1991	2009	2027	2045	2067
1820	1915	1929	1947	1966	1984	2002	2020	2038	2057	2078
1830	1925	1940	1958	1976	1995	2013	2031	2050	2068	2090
1840	1936	1950	1969	1987	2006	2024	2042	2061	2079	2101
1850	1946	1961	1980	1998	2017	2035	2054	2072	2091	2113
1860	1957	1972	1990	2009	2027	2046	2065	2083	2102	2124
1870	1967	1982	2001	2020	2038	2057	2076	2094	2113	2136
1880	1978	1993	2012	2030	2049	2068	2087	2106	2124	2147
1890	1988	2003	2022	2041	2060	2079	2098	2117	2136	2158
1900	1999	2014	2033	2052	2071	2090	2109	2128	2147	2170
1910	2009	2025	2044	2063	2082	2101	2120	2139	2158	2181
1920	2020	2035	2054	2074	2093	2112	2131	2150	2170	2193
1930	2030	2046	2065	2084	2104	2123	2142	2162	2181	2204
1940	2041	2056	2076	2095	2115	2134	2153	2173	2192	2215
1950	2051	2067	2087	2106	2126	2145	2165	2184	2204	2227
1960	2062	2078	2097	2117	2136	2156	2176	2195	2215	2238
1970	2072	2088	2108	2128	2147	2167	2187	2206	2226	2250
1980	2083	2099	2119	2138	2158	2178	2198	2218	2237	2261
1990	2093	2109	2129	2149	2169	2189	2209	2229	2249	2273
2000	2104	2120	2140	2160	2180	2200	2220	2240	2260	2284
2010	2115	2131	2151	2171	2191	2211	2231	2251	2271	2295
2020	2125	2141	2161	2182	2201	2222	2242	2262	2283	2307
2030	2136	2152	2172	2192	2213	2233	2253	2274	2294	2318
2040	2146	2162	2183	2203	2224	2244	2264	2285	2305	2330
2050	2157	2173	2194	2214	2235	2255	2276	2296	2317	2341
2060	2167	2184	2204	2225	2245	2266	2287	2307	2328	2353
2070	2178	2194	2215	2236	2256	2277	2298	2318	2339	2364
2080	2188	2205	2226	2246	2267	2288	2309	2330	2350	2375
2090	2199	2215	2236	2257	2278	2299	2320	2341	2362	2387

Figure 12-2. Chart E - loading data (Sheet 6 of 10)

Chart: E
Sheet 7 of 10
Model: OH-58A
Chart Date: See Sheet 1

CENTER OF GRAVITY TABLE

MOMENT/100

Approximate flight limits shown by heavy vertical line. Numbers in BOLD FACE are actual moment limits for weights indicated but not for Fuselage Stations shown in column head.

GROSS WEIGHT (POUNDS)	FUSELAGE STATIONS									
	105.2	106.0	107.0	108.0	109.0	110.0	111.0	112.0	113.0	114.2
2100	2209	2226	2247	2268	2289	2310	2331	2352	2373	2398
2110	2220	2237	2258	2279	2300	2321	2342	2363	2384	2410
2120	2230	2247	2268	2290	2311	2332	2353	2374	2396	2421
2130	2241	2258	2279	2300	2322	2343	2364	2386	2407	2432
2140	2251	2268	2290	2311	2333	2354	2375	2397	2418	2444
2150	2262	2279	2301	2322	2344	2365	2387	2408	2430	2455
2160	2272	2290	2311	2333	2354	2376	2398	2419	2441	2467
2170	2283	2300	2322	2344	2365	2387	2409	2430	2452	2478
2180	2293	2311	2333	2354	2376	2398	2420	2442	2463	2490
2190	2304	2321	2343	2365	2387	2409	2431	2453	2475	2501
2200	2314	2332	2354	2376	2398	2420	2442	2464	2486	2512
2210	2325	2343	2365	2387	2409	2431	2453	2475	2497	2524
2020	2335	2353	2375	2398	2420	2442	2464	2486	2509	2535
2230	2346	2364	2386	2408	2431	2453	2475	2498	2520	2547
2240	2356	2374	2397	2419	2442	2464	2486	2509	2531	2558
2250	2367	2385	2408	2430	2453	2475	2498	2520	2543	2570
2260	2378	2396	2418	2441	2463	2486	2509	2531	2554	2581
2270	2388	2406	2429	2452	2474	2497	2520	2542	2565	2592
2280	2399	2417	2440	2462	2485	2508	2531	2554	2576	2604
2290	2409	2427	2450	2473	2496	2519	2542	2565	2588	2615
2300	2420	2438	2461	2484	2507	2530	2553	2576	2599	2627
2310	2430	2449	2472	2495	2518	2541	2564	2587	2610	2638
2320	2441	2459	2482	2506	2529	2552	2575	2598	2622	2649
2330	2451	2470	2493	2516	2540	2563	2586	2610	2633	2661
2340	2462	2480	2504	2527	2551	2574	2597	2621	2644	2672
2350	2472	2491	2515	2538	2562	2585	2609	2632	2656	2684
2360	2483	2502	2525	2549	2572	2596	2620	2643	2667	2695
2370	2493	2512	2536	2560	2583	2607	2631	2654	2678	2707
2380	2504	2523	2547	2570	2594	2618	2642	2666	2689	2718
2390	2514	2533	2557	2581	2605	2629	2653	2677	2701	2729
2400	2525	2544	2568	2592	2616	2640	2664	2688	2712	2741
2410	2535	2555	2579	2603	2627	2651	2675	2699	2723	2752
2420	2546	2565	2589	2614	2638	2662	2686	2710	2735	2764
2430	2556	2576	2600	2624	2649	2673	2697	2722	2746	2775
2440	2567	2586	2611	2635	2660	2684	2708	2733	2757	2786
2450	2577	2597	2622	2646	2671	2695	2720	2744	2769	2798
2460	2588	2608	2632	2657	2681	2706	2731	2755	2780	2809
2470	2598	2618	2643	2668	2692	2717	2742	2766	2791	2821
2480	2609	2629	2654	2678	2703	2728	2753	2778	2802	2832
2490	2619	2639	2664	2689	2714	2739	2764	2789	2814	2844

Figure 12-2. Chart E - loading data (Sheet 7 of 10)

Chart: E
Sheet 8 of 10
Model: OH-58A
Chart Date: See Sheet 1

CENTER OF GRAVITY TABLE

MOMENT/100

Approximate flight limits shown by heavy vertical line. Numbers in BOLD FACE are actual moment limits for weights indicated but not for Fuselage Stations shown in column head.

GROSS WEIGHT (POUNDS)	FUSELAGE STATIONS 105.2	106.0	107.0	108.0	109.0	110.0	111.0	112.0	113.0	114.2
2500	2630	2650	2675	2700	2725	2750	2775	2800	2825	2855
2510	2641	2661	2686	2711	2736	2761	2786	2811	2836	2865
2520	2652	2671	2696	2722	2747	2772	2797	2822	2848	2876
2530	2663	2682	2707	2732	2758	2783	2808	2834	2859	2886
2540	2674	2692	2718	2743	2769	2794	2819	2845	2870	2897
2550	2685	2703	2729	2754	2780	2805	2831	2856	2882	2907
2560	2696	2714	2739	2765	2790	2816	2842	2867	2893	2917
2570	2706	2724	2750	2776	2801	2827	2853	2878	2904	2928
2580	2718	2735	2761	2786	2812	2838	2864	2890	2915	2938
2590	2728	2745	2771	2797	2823	2849	2875	2901	2927	2948
2600	2739	2756	2782	2808	2834	2860	2886	2912	2938	2959
2610	2750	2767	2793	2819	2845	2871	2897	2923	2949	2969
2620	2761	2777	2803	2930	2856	2882	2908	2934	2961	2979
2630	2772	2788	2814	2840	2867	2893	2919	2946	2972	2990
2640	2783	2798	2825	2851	2878	2904	2930	2957	2983	3000
2650	2794	2809	2836	2862	2889	2915	2942	2968	2995	3010
2660	2805	2820	2846	2873	2899	2926	2953	2979	3006	3021
2670	2816	2830	2857	2884	2910	2937	2964	2990	3017	3031
2680	2827	2841	2868	2894	2921	2948	2975	3002	3028	3041
2690	2838	2851	2878	2905	2932	2959	2986	3013	3040	3052
2700	2849	2862	2889	2916	2943	2970	2997	3024	3051	3062
2710	2860	2860	2900	2927	2954	2981	3008	3035	3062	3072
2720	2871	2883	2910	2938	2965	2992	3019	3046	3074	3082
2730	2882	2894	2921	2948	2976	3003	3030	3058	3085	3093
2740	2893	2904	2932	2959	2987	3014	3041	3069	3096	3103
2750	2904	2915	2943	2970	2998	3025	3053	3080	3108	3113
2760	2915	2926	2953	2981	3008	3036	3064	3091	3119	3123
2770	2926	2936	2964	2992	3019	3047	3075	3102	3130	3133
2780	2937	2947	2975	3002	3030	3058	3086	3114	3141	3144
2790	2948	2957	2985	3013	3041	3069	3097	3125	3153	3154
2800	2959	2968	2996	3024	3052	3080	3108	3136	3164	
2810	2970	2979	3007	3035	3063	3091	3119	3147	3174	
2820	2981	2989	3017	3046	3074	3102	3130	3158	3184	
2830	2992	3000	3028	2056	3085	3113	3141	3170	3195	
2840	3003	3010	3039	3067	3096	3124	3152	3181	3205	
2850	3014	3021	3050	3078	3107	3135	3164	3192	3215	
2860	3025	3032	3060	3089	3117	3146	3175	3203	3225	
2870	3036	3042	3071	3100	3128	3157	3186	3214	3235	
2880	3047	3053	3082	3110	3139	3168	3197	3226	3245	
2890	3058	3063	3092	3121	3150	3179	3208	3237	3255	

Figure 12-2. Chart E - loading data (Sheet 8 of 10)

Chart: E
Sheet: 10 of 10
Model: OH-58A
Chart Date: See Sheet 1

TYPICAL SERVICE LOAD CONDITIONS

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.

ITEM	ARM	OBSERVATION MISSION		SCOUT MISSION	
		WEIGHT	MOMENT/100	WEIGHT	MOMENT/100
Crew	65.0	400	260	400	260
Fuel	-	455	531	423	491
Oil, Engine	179.9	11	20	11	20
Armor (Removable)	74.9	109	82	109	82
Armor Chest Protectors	65.0	30	20	30	20
Armament Subsystem	107.8			106	114
Ammunition, 2000 Rounds	-			130	140
TOTAL		1005	913	1209	1127

DIMENSIONAL DATA

CONDITION	DIMENSION (INCHES)
Overall Length - Blades Extended and Rotating	488.0
Length - Blades Removed	392.8
Maximum Height	118.0
Span - Blades Rotating	424.0
Span - Blades Fore and Aft or Removed	77.4
Tread	77.4

Figure 12-2. Chart E - loading data (Sheet 10 of 10)

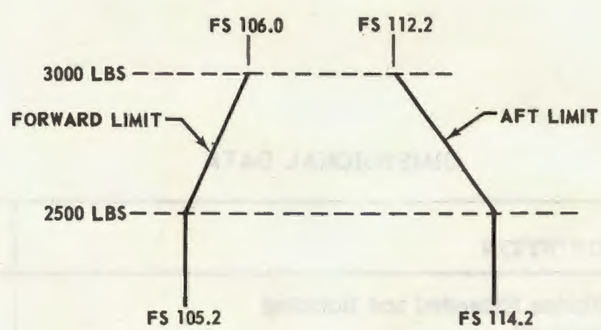
Chart: E
Sheet 9 of 10
Model OH-58A
Chart Date: See Sheet 1

CENTER OF GRAVITY TABLE

MOMENT/100

Approximate flight limits shown by heavy vertical line. Numbers in BOLD FACE are actual moment limits for weights indicated but not for Fuselage Stations shown in column head.

GROSS WEIGHT (POUNDS)	FUSELAGE STATIONS 105.2	106.0	107.0	108.0	109.0	110.0	111.0	112.0	113.0	114.2
2900	**3069**	3074	3103	3132	3161	3190	3219	3248	**3265**	
2910	**3081**	3085	3114	3143	3172	3201	3230	3259	**3275**	
2920	**3091**	3095	3124	3154	3183	3212	3241	3270	**3286**	
2930	**3103**	3106	3135	3164	3194	3223	3252	3282	**3296**	
2940	**3113**	3116	3146	3175	3205	3234	3263	3293	**3306**	
2950	**3125**	3127	3157	3186	3216	3245	3275	3304	**3316**	
2960	**3136**	3138	3167	3197	3226	3256	3286	3315	**3326**	
2970	**3147**	3148	3178	3208	3237	3267	3297	3326	**3336**	
2980	**3158**	3159	3189	3218	3248	3278	3308	3338	**3346**	
2990	**3169**	3169	3199	3229	3259	3289	3319	3349	**3356**	
3000		3180	3210	3240	3270	3300	3330	3360	**3366**	



FLIGHT LIMITS

Gross Weight Limitations:

Takeoff __________ * Pounds; Landing __________ * Pounds

*Service Activities shall insert, or substitute, current figures from latest applicable Technical Manual covering operating restrictions.

Figure 12-2. Chart E - loading data (Sheet 9 of 10)

Chart: E
Sheet: 10 of 10
Model: OH-58A
Chart Date: See Sheet 1

TYPICAL SERVICE LOAD CONDITIONS

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.

ITEM	ARM	OBSERVATION MISSION		SCOUT MISSION	
		WEIGHT	MOMENT/100	WEIGHT	MOMENT/100
Crew	65.0	400	260	400	260
Fuel	-	455	531	423	491
Oil, Engine	179.9	11	20	11	20
Armor (Removable)	74.9	109	82	109	82
Armor Chest Protectors	65.0	30	20	30	20
Armament Subsystem	107.8			106	114
Ammunition, 2000 Rounds	-			130	140
TOTAL		1005	913	1209	1127

DIMENSIONAL DATA

CONDITION	DIMENSION (INCHES)
Overall Length - Blades Extended and Rotating	488.0
Length - Blades Removed	392.8
Maximum Height	118.0
Span - Blades Rotating	424.0
Span - Blades Fore and Aft or Removed	77.4
Tread	77.4

Figure 12-2. Chart E - loading data (Sheet 10 of 10)

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 weights and moments of such items from the take-off 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.

SECTION IV WEIGHT AND BALANCE CLEARANCE FORM F - DD FORM 365F

12-16. GENERAL

12-17. This form is a summary of actual disposition of the load in the helicopter. It records the balance status of the helicopter, step-by-step. It serves as work sheet on which the record weight and balance calculations, and any corrections that must be made to ensure that the helicopter will be within weight and cg limits. A Form F is required only when the loading is such as to seriously effect the flying characteristics and safety of the helicopter and in all cases where alternate loading is employed.

12-18. USE.

12-19. 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 should 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." These two versions were designed to provide for the respective loading arrangements of two types of helicopters. However, the general use and fullfillment of either version is the same. Specific instructions for filling out the "TACTICAL" is given in the following paragraphs.

12-20. DD FORM 365F - TACTICAL HELICOPTERS.

12-21. Insert the necessary identifying information at the top of the form. In the blank spaces of the "Limitation" table, enter the gross weight and cg restrictions obtained from Chapter 7.

Note

Enter moment/constant values from Chart E throughout the form.

a. Reference 1 - Enter the helicopter basic weight and moment/constant (see figure 12-3). Obtain these figures from the last entry on Chart C - Basic Weight and Balance Record.

b. Reference 2 - Enter the amount and weight of oil.

c. Reference 3. - Using the compartment letter designations as shown on Chart E (helicopter diagram) enter the number and weight of the crew at their "take-off stations". Use actual crew weight if available.

d. Reference 4 - Enter the sum of the weight for reference 1 through reference 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.).

g. Reference 7 - Enter the number of gallons and weight of fuel.

h. Reference 8 - Not applicable.

i. Reference 9 - Not applicable.

j. Reference 10 - Enter the sum of the weights for reference 4 through reference 9 opposite "Take-Off Condition" (uncorrected). At this point, if not already done, calculate and enter the moment/constant for reference 1 through reference 10, inclusive.

k. Check the weight figure opposite reference 10 against the "Gross Weight Take-Off" in the "Limitations" table. Check the moment/constant figure opposite reference 10 by means of Chart E to ascertain that the indicated cg is within allowable limits.

l. Reference 11 - If changes in amount of distribution of load are required, indicate necessary adjustments by proper entries in the "Corrections" table in lower left corner of the form as follows:

(1) Enter a brief description of the adjustment made in the column marked "Item."

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	AIRPLANE TYPE	FROM	HOME STATION
10-7-69	OH-58A		
MISSION/TRIP/FLIGHT/NO.	**SERIAL NO.**	**TO**	**PILOT**
OBSERVATION	SAMPLE ONLY		

REMARKS

THIS FLIGHT TO HAVE JP-4 FUEL

PILOT AND COPILOT ARMORED VEST ARE INCLUDED IN BASIC WEIGHT.

EXAMPLE ONLY

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	[1] INDEX OR MOM/ 100
1	BASIC AIRPLANE *(From Chart C)*				1669	1964
2	OIL (1.5 Gal.)				11	20
3	DISTRIBUTION OF LOAD					
	COMPT.	CREW NO.	CREW WEIGHT	BAGGAGE / CARGO AND MISC.		
	B	2	380		380	247
4	OPERATING WEIGHT				2060	2231
5	AMMUNITION: COMPT.	ROUNDS	CALIBER			
	C	1000	7.62MM		65	69
	C	1000	7.62MM		65	71
6	BOMBS, ROCKETS, ETC.: FORWARD					
	AFT					
	EXTERNAL					
	ROCKETS					
7	FUEL: BUILT IN (70 Gal.)				455	531
	BOMB BAY (Gal.)					
	EXTERNAL (Gal.)					
8	WATER INJ. FLUID (Gal.)					
9	JATO OR RATO					
10	TAKEOFF CONDITION *(Uncorrected)*				2645	2902
11	CORRECTIONS *(If required)*					
12	TAKEOFF CONDITION *(Corrected)*				2645	2902
13	TAKEOFF C. G. IN ~~% M. A. C. OR~~ IN.				109.7	
14	LESS EXPENDABLES: JATO OR RATO					
	BOMBS					
	AMMUNITION				130	140
	FUEL				325	386
15	ESTIMATED LANDING CONDITION				2190	2376
16	ESTIMATED LANDING C. G. IN ~~% M. A. C. OR~~ IN.				108.5	

CORRECTIONS *(Ref. 11)*

COMPT.	ITEM	CHANGES (+ or −) WEIGHT	[1] INDEX OR MOM/
TOTAL WEIGHT REMOVED		−	−
TOTAL WEIGHT ADDED		+	+
NET DIFFERENCE *(Ref. 11)*			

LIMITATIONS

[2] GROSS WT. TAKEOFF *(lb.)* 3000		[2] GROSS WT. LANDING *(lb.)* 3000	
[3] PERMISSIBLE C. G. TAKEOFF	FROM 106		TO (~~% M. A. C.~~ or IN.) 113
[4] PERMISSIBLE C. G. LANDING	FROM 105.2		TO (~~% M. A. C.~~ or IN.) 114.2

[1] *Enter constant used.*
[2] *Enter values from current applicable T. O.*
[3] *Applicable to gross weight (Ref. 12).*
[4] *Applicable to gross weight (Ref. 15).*

COMPUTED BY *(Signature)*

WEIGHT AND BALANCE AUTHORITY *(Signature)*

PILOT *(Signature)*

DD FORM SEPT 54 365F

AV 053034

Figure 12-3. Sample DD Form 365F

(2) Add all the weight and moment decreases and insert the totals in the space opposite "Total Weight Removed."

(3) Add all the weight and moment increases and insert the totals 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 spaces opposite reference 11.

m. Reference 12 - Enter the sum of or the difference between, reference 10 and reference 11. Recheck to ascertain that these figures do not exceed allowable limits.

n. Reference 13 - By referring to the cg table on Chart E determine the take-off cg possible. Enter this figure in the space provided opposite "Take-Off CG".

o. Reference 14 - Estimate the weight of ammunition (not including weight of cases and links if retained), fuel and any other items which may be expended before landing. Enter figures together with moment/constant in the spaces provided.

p. Reference 15 - Enter the difference in weights and moment/constant between reference 12 and the total of reference 14.

q. Reference 16 - By again referring to the cg table on Chart E, determine the estimated landing cg position. Enter the figure opposite "Estimated Landing CG."

Note

Do not consider reserve fuel, as expended when determining "Estimated Landing Conditions."

r. Check the landing cg figure with permissible cg figures in limitations block. The landing cg must be within the range of the figures shown.

s. The necessary signatures must 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.

13-2. All essential information for aircraft loading is contained in this chapter.

SECTION II INTRODUCTION

13-3. INTRODUCTION.

13-4. The purpose of this chapter is to provide information to accomplish safe loading of the helicopter in the armed configuration.

13-5. SEATING ARRANGEMENT.

13-6. Figure 13-1 shows the seating arrangement of the OH-58A.

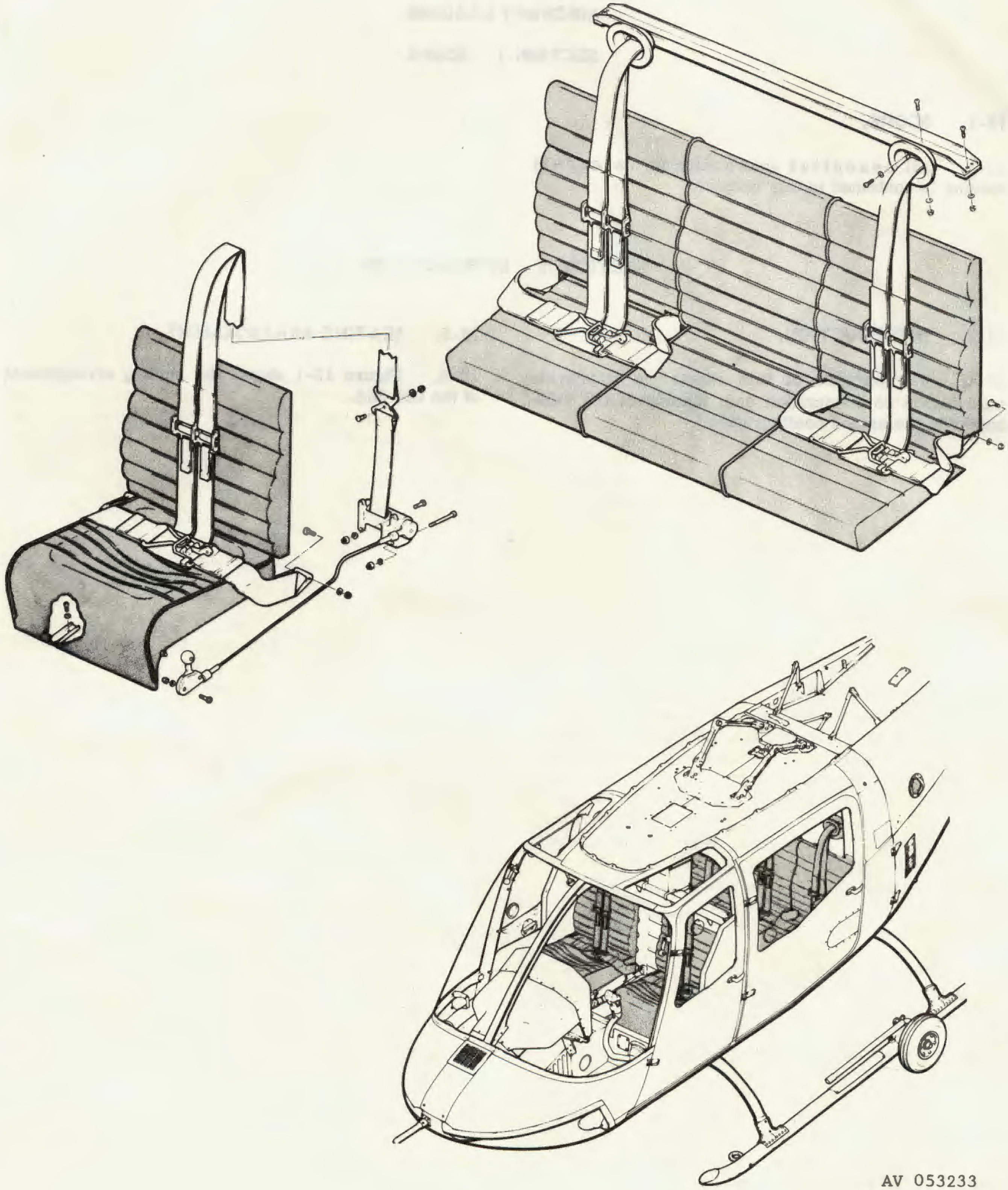


Figure 13-1. Seating arrangement

CHAPTER 14

PERFORMANCE DATA

SECTION I SCOPE

14-1. PURPOSE.

14-2. The charts contained in this Chapter reflect the necessary data required for pre-flight and in-flight mission planning. The necessary explanatory text for use of the data presented is also contained herein.

14-3. The performance charts are presented in graphic or profile form. Charts are based on flight test data, calculated data or estimated data as indicated on the chart.

SECTION II INSTRUCTION FOR CHART USE

14-4. AIRSPEED CALIBRATION CHART.

14-5. The airspeed calibration chart (figure 14-1) is used to convert calibrated to indicated airspeed and vice versa. Calibrated airspeed (CAS) is indicated airspeed (IAS) as read from the instrument corrected for instrument error, plus the installation correction. Enter the IAS scale at 100 knots and move vertically to the cruise curve, then project horizontally to the CAS scale and read 97 knots.

14-6. DENSITY ALTITUDE CHART.

14-7. Density altitude is an expression of the density of the air in terms of height above sea level; hence, the less dense the air, the higher the density altitude. For standard conditions of temperature and pressure, density altitude is the same as pressure altitude. As temperature increases above standard for any altitude, the density altitude will also increase to values higher than pressure altitude. Figure 14-2 expresses density altitude as a function of pressure altitude and temperature.

EXAMPLE:

If the ambient temperature is minus 10°C and the pressure altitude is 7000 feet, the density altitude is 5700 feet.

14-8. COMPONENT LIFE MAXIMUM SPEED CHART.

14-9. Component lift maximum speed, Vne, is presented in figure 14-3 in indicated and calibrated airspeed as a function of density altitude at gross weights of 3000 pounds or less. For a given set of atmospheric conditions, the component life maximum speed is the speed beyond which the fatigue life of the aircraft's critical components can be seriously impaired. It should be noted that pressure altitude must be converted to density altitude before the component life maximum speed chart may be properly used.

EXAMPLE:

Pressure altitude	5000 feet
OAT	10°C

1. Enter the density altitude chart (figure 14-2) at 10°C, move vertically to a pressure altitude of 5000 feet, and project horizontally to read a density altitude of 5700 feet.

2. Enter the component life maximum speed chart (figure 14-3) at a density altitude of 5700 feet, move horizontally to the indicated airspeed line, and project vertically to read an indicated airspeed of 115.5 knots. Using the same procedure, the calibrated airspeed is obtained as 112 knots.

14-10. POWER AVAILABLE CHART.

14-11. Atmospheric conditions of OAT and pressure altitude have an effect on the capability of the engine to produce power. Data for power available at two power settings is shown: Take-off Power Available (figure 14-4) and Normal Power Available (figure 14-5). OAT and pressure altitude effects on power available are shown on the charts.

14-12. It should be noted that the power output capability of the engine can exceed the structural limit of the transmission under certain conditions. The limits shown on the charts (317 shp for take-off and 270 shp for normal power) should be observed to prevent exceeding the power limitations imposed by the transmission and engine gearbox.

EXAMPLE:

OAT	-5°C
Pressure Altitude	9000 feet
Power Setting	Take-Off Rated Power

1. Enter the pressure altitude scale of figure 14-4 at 9000 feet.

2. Move horizontally to intersection of minus 5°C temperature line.

3. Project vertically to either the shaft horsepower or torquemeter pressure scale and read 240 shp or 70 psi power available.

14-13. FUEL FLOW CHART.

14-14. The fuel flow chart (figure 14-6) shows the fuel flow for a given altitude and power setting. Fuel flow for standard day conditions at take-off and normal rated power are shown as dashed lines.

EXAMPLE:

Pressure altitude	9000 feet
Torquemeter pressure	40 psi

1. Move along the 40 psi line to an altitude of 9000 feet.

2. Project back horizontally to the fuel flow scale and read 110 pounds per hour.

14-15. TORQUE AND POWER REQUIRED TO HOVER.

14-16. The power required to hover out-of-ground effect and in-ground-effect at two-and four-foot skid height is shown in figures 14-7 and 14-8. Power required in shaft horsepower or torque pressure is plotted as a function of density altitude and gross weight.

EXAMPLE:

Pressure altitude	6000 feet
OAT	20°C
Skid height	OGE
Gross weight	2300 pounds

1. Determine density altitude for the given conditions by referring to the density altitude chart (figure 14-2). For a pressure altitude of 6000 feet and OAT of 20°C the density altitude is 8000 feet.

2. Enter the gross weight scale of figure 14-8 at 2300 pounds and move horizontally to the 8000 foot density altitude line.

3. Move vertically to the appropriate scale to read a shaft horsepower of 193 or a torque pressure of 56.5 psi.

14-17. HOVERING CEILING CHARTS.

14-18. The hovering ceiling charts show maximum pressure altitudes for which hover is possible as a function of gross weight and OAT. Figure 14-9 shows in ground effect hovering ceilings at two-foot and four-foot skid heights. Figure 14-10 shows hovering ceiling out of ground effect with headwind and vertical rate of climb corrections.

14-19. These charts are used to determine the maximum gross weight at which hovering is possible for the given conditions of pressure altitude and OAT.

EXAMPLE:

Pressure altitude	6000 feet
OAT	20°C
Skid height	OGE
Headwind	5 knots
Vertical rate of climb	100 feet per minute

1. Enter the ceiling grid of figure 14-10 at a pressure altitude of 6000 feet and move horizontally to an OAT of 20°C.

2. The maximum gross weight is then read as 2610 pounds.

3. A headwind correction is applied by entering the headwind grid at 2610 pounds and moving vertically up to the zero baseline. Move down, paralleling the flow lines to the 5 knot line. By projecting vertically to the gross weight scale, the corrected gross weight of 2800 pounds is read.

4. A vertical rate of climb correction is applied by entering the grid at 2610 pounds and moving vertically up to the zero baseline. Move down, paralleling the flow lines to the 100 foot per minute line. By projecting vertically to the the gross weight scale, the corrected gross weight of 2550 pounds is read.

14-20. CLIMB PERFORMANCE CHARTS.

14-21. The climb performance charts are used to determine, maximum rate of climb, and time, distance, and fuel to climb at take-off rated power (figure 14-11) and normal rated power (figure 14-12). Climb performance is shown as a function of gross weight and altitude for standard day atmospheric conditions. These charts do not include warmup and take-off fuel. This amount of fuel should be added to the climb fuel to determine the total fuel required to reach cruise altitude. Turbine outlet temperature limits are 749°C and 693°C for takeoff and normal power respectively. Climb airspeed is 54 KTAS.

EXAMPLE: (Figure 14-13.)

Take-off pressure altitude	2000 feet
Cruise pressure altitude	8000 feet
Gross weight	2400 pounds
Power setting	Normal rated power

1. To determine initial rate of climb after take-off, enter the rate of climb plot along the 2400 pound gross weight line and interpolate between the sea level and 5000 foot altitude lines to 2000 feet and move horizontally to read 1420 feet per minute rate of climb.

2. To determine the time required for the climb, enter the gross weight scale at 2400 pounds and move vertically to an altitude of 2000 feet. Next move horizontally to the time curve and move vertically to read a time of 1.0 minutes. Repeat this procedure for an altitude of 8000 feet and read a time of 6.0 minutes. The time required for the climb from 2000 feet to 8000 feet is therefore (6.0 - 1.0) = 5.0 minutes.

3. Distance and fuel are determined by entering the gross weight scale at 2400 pounds, and following the procedure described above to read a distance of (5.0 - 1.0) = 4.0 nautical miles, and a fuel weight of (18.0 - 4.0) = 14 pounds.

Note

Warm-up and take-off fuel of six pounds (two minutes at normal rated power) is to be added for total fuel to climb to cruise altitude.

14-22. SERVICE CEILING CHARTS.

14-23. Service ceiling is the altitude at which the rate of climb is 100 feet per minute. Two service ceiling charts are included, figure 14-13 for maximum rate of climb speed, VKTAS = 54 knots, and figure 14-13 for a high speed climb, VKTAS = 80 knots. From these charts the service ceiling may be determined for combinations of temperature and gross weight.

EXAMPLE:

Power setting	Normal rated power
Gross weight	2475 pounds
OAT	25°C
Climb airspeed	54 KTAS

1. Using figure 14-13, which corresponds to the desired climb airspeed, enter the gross weight scale at 2475 pounds and move vertically to a temperature of 25°C. This will require interpolating between the 20°C and 30°C temperature lines.

2. Project horizontally to the altitude scale to read a service ceiling of 12,600 feet.

14-24. AUTOROTATIONAL DESCENT CHART.

14-25. The autorotational descent chart (figure 14-15) shows the variation of rate of descent with rotor rpm and indicated airspeed. Autorotational descent performance, when expressed as a function of rotor rpm or indicated airspeed is essentailly unaffected by density altitude and gross weight. Airspeeds for minimum rate of descent and best glide distance of 42 knots and 74 knots respectively are shown on this chart.

14-26. SPECIFIC RANGE CHARTS.

14-27. The cruise chart (figures 14-16 and 14-17) and maximum permissible speed charts (figures 14-18 and 14-19) are used in conjunction to present specific range and fuel flow information as a function of gross weight, pressure altitude, OAT, and airspeed for the clean and armed configuration. The cruise charts may be used for all temperature conditions, because range for this aircraft is not significantly affected by temperature. Maximum speeds, however, are affected by temperature, and consequently figures 14-18 and 14-19 show maximum speeds for a temperature range from minus 40°C to plus 40°C. Two examples of the use of these charts are shown. The first involves determining specific range at long range cruise (LRC) airspeed and at maximum endurance airspeed at a given cruise altitude. The second example involves long range cruise at an optimum cruise altitude.

EXAMPLE 1: (Figure 14-16)

Gross weight at start of cruise	2600 pounds
OAT during cruise	20°C
Cruise pressure altitude	8000 feet
Cruise airspeed condition	LRC and maximum endurance
Configuration	Clean

1. Enter the gross weight scale of the cruise chart (figure 14-16) at 2600 pounds and move horizontally to an altitude of 8000 feet.

2. Project vertically to the nautical miles per pound scale and read 0.707. This is for long range cruise.

Note

The long range cruise is 99 percent of the maximum range on the high speed side.

3. The LRC airspeed is determined by projecting vertically along the 0.707 nautical miles per pound line to the LRC line of the airspeed curve and moving horizontally to read 105 knots on the true airspeed scale.

4. To determine if the LRC airspeed exceeds limits, enter the maximum permissible speed curves for 20°C and 2600 pounds gross weight. Move along the gross weight to the given altitude then project vertically to read a maximum speed of 95 KTAS.

5. In this case the LRC speed must be decreased to 95 KTAS to stay within limits. This is accomplished by moving vertically from the 0.707 intersection with the LRC line and paralleling the flow lines until 95 KTAS is reached. The new range is then read as 0.714 nautical miles per pound.

6. Fuel flow is determined by projecting vertically to 95 KTAS on the fuel flow grid and moving horizontally to read 133 pounds per hour.

7. Maximum endurance airspeed is determined by projecting vertically from 0.707 nautical miles per pound intersection with the LRC line, paralleling the flow lines until the maximum endurance line is reached. The maximum endurance airspeed is read as 50 KTAS and the corresponding range as 0.502 nautical miles per pound.

8. Fuel flow is determined by projecting vertically to the 50 KTAS line of the fuel flow plot, moving horizontally and reading 100 pounds per hour.

EXAMPLE 2: (Figure 14-17)

Gross weight at Start of cruise	2800 pounds
OAT	-20°C
Cruise altitude	Optimum
Cruise airspeed condition	LRC
Configuration	Armed

1. Enter the gross weight scale of the cruise chart at 2800 pounds and move to the highest altitude line on the grid. This altitude is the optimum altitude and in this case is 10,001 0 feet.

Note

Since the optimum cruise altitude increases with decreasing gross weight, it may not always be possible to cruise at the optimum altitude due to lack of oxygen or other limitations.

2. Project vertically to the range scale and read 0.667 nautical miles per pound.

3. LRC airspeed is determined by moving vertically to the LRC baseline and projecting horizontally to read 102 KTAS. By referring to the maximum permissible speed plot, figure 14-18, for an OAT of minus 20°C, this airspeed is seen to be within the limit 107 KTAS.

4. Fuel flow is determined by projecting vertically to 102 KTAS on the fuel flow grid and moving horizontally to read 153 pounds per hour.

AIRSPEED CALIBRATION

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal

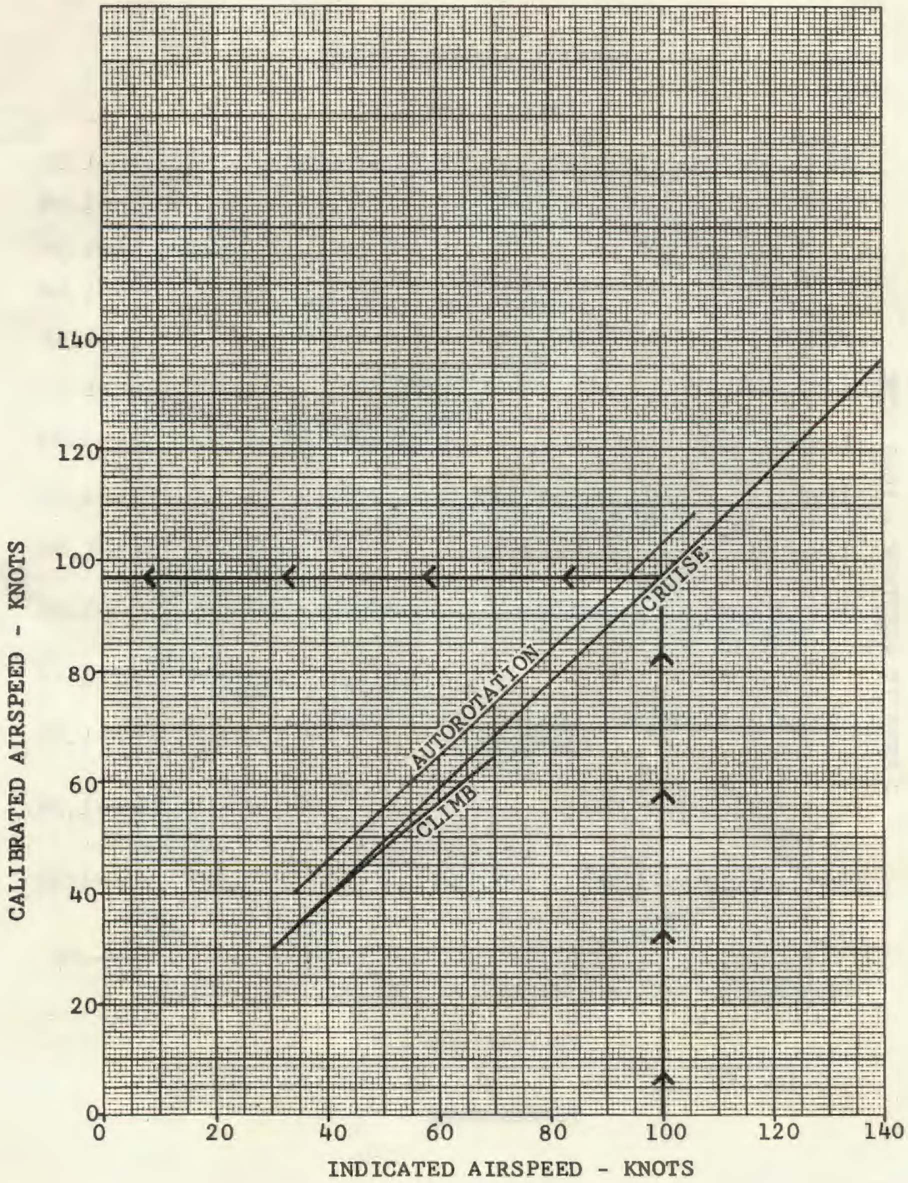
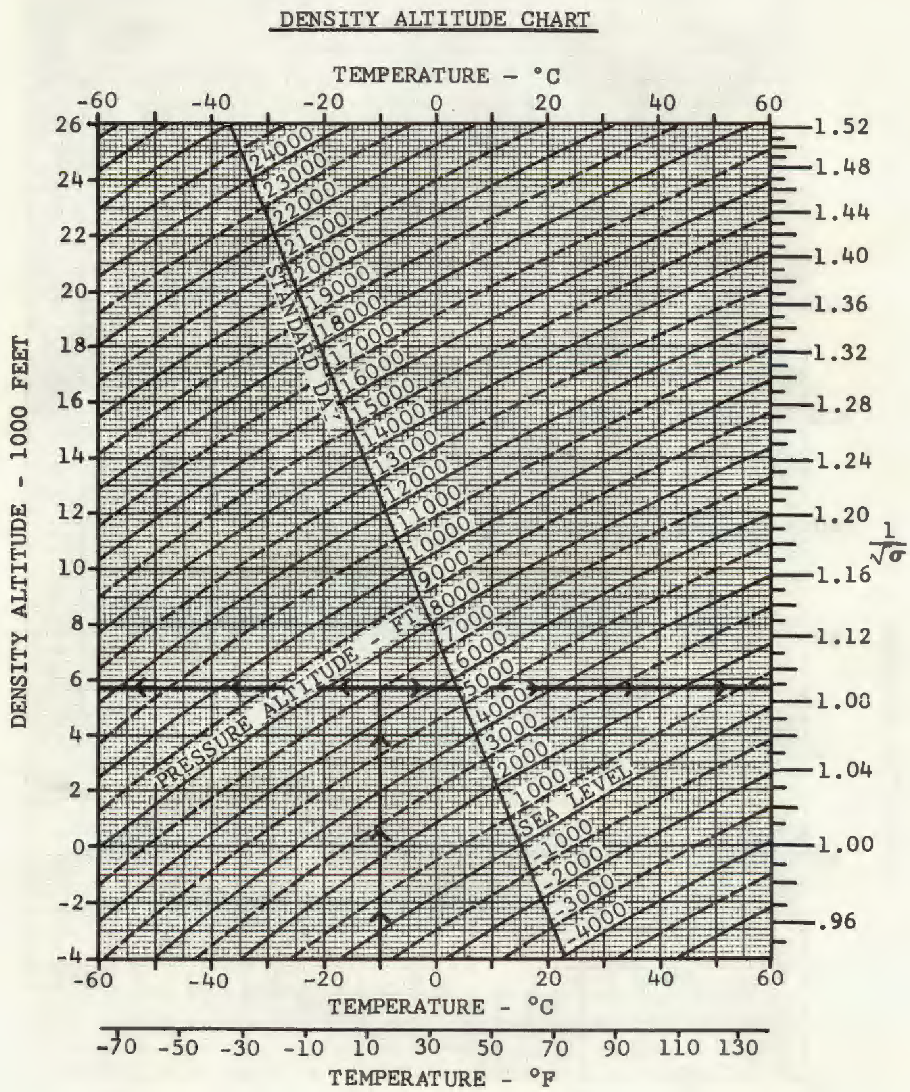


Figure 14-1. Airspeed calibration chart

DENSITY ALTITUDE CHART

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053036

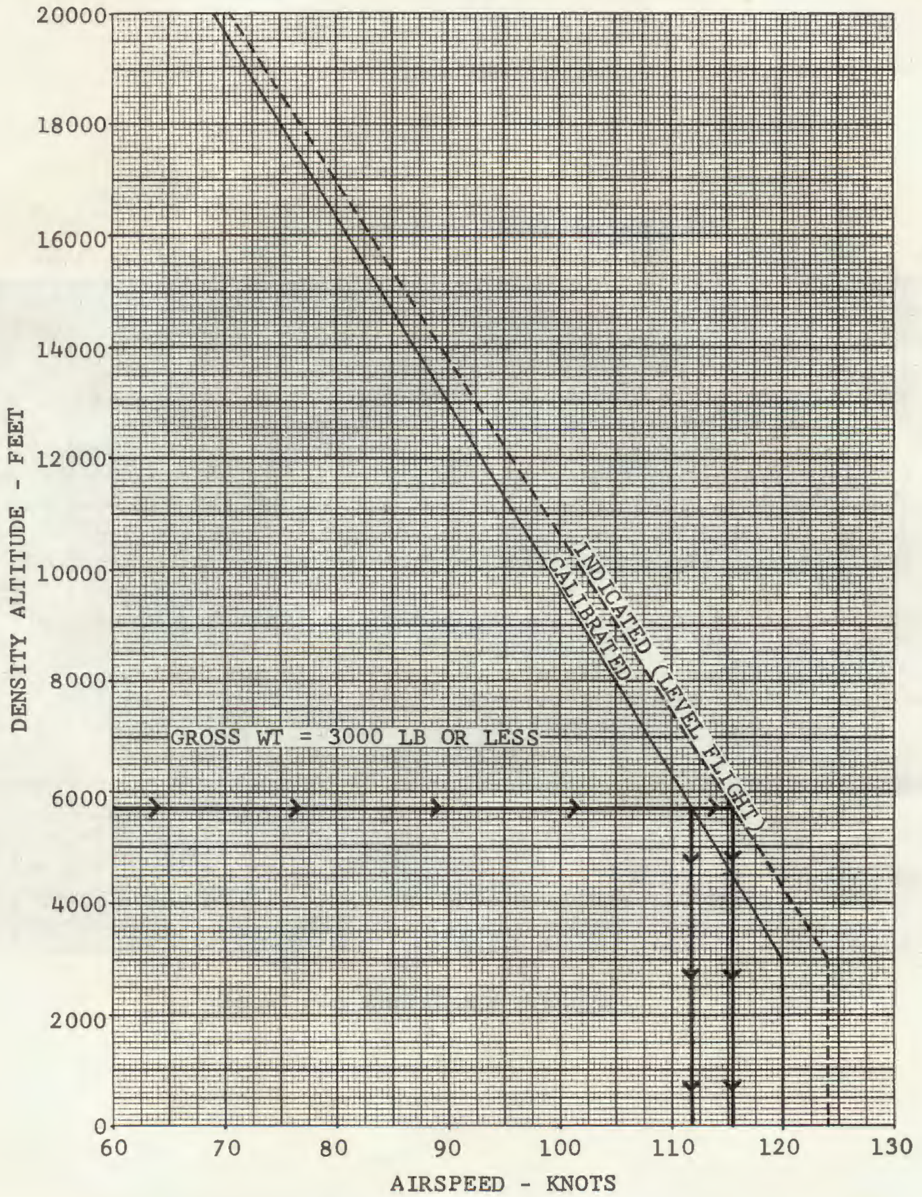
Figure 14-2. Density altitude chart

COMPONENT LIFE-MAXIMUM SPEED

6180 RPM - STANDARD DAY

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053037

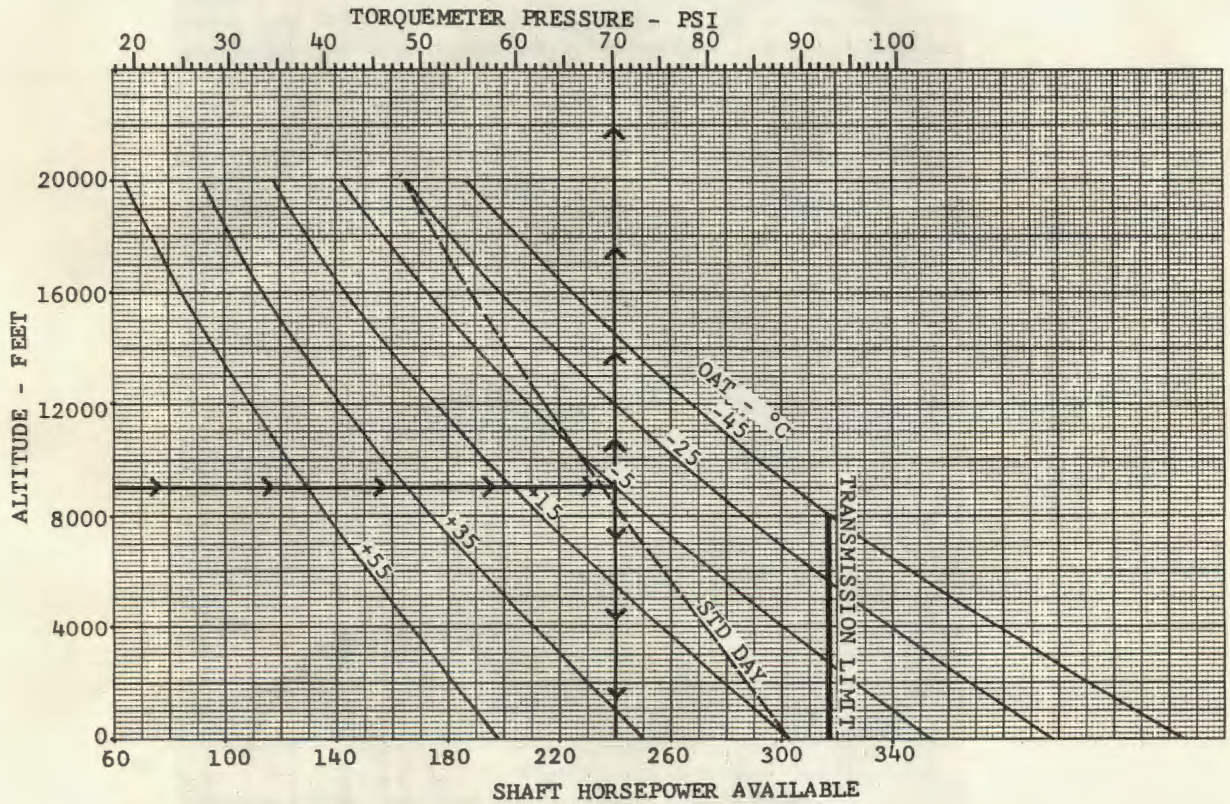
Figure 14-3. Component life chart - maximum speed

POWER AVAILABLE

MILITARY POWER
PARTICLE SEPARATOR INSTALLED
6180 RPM

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053038

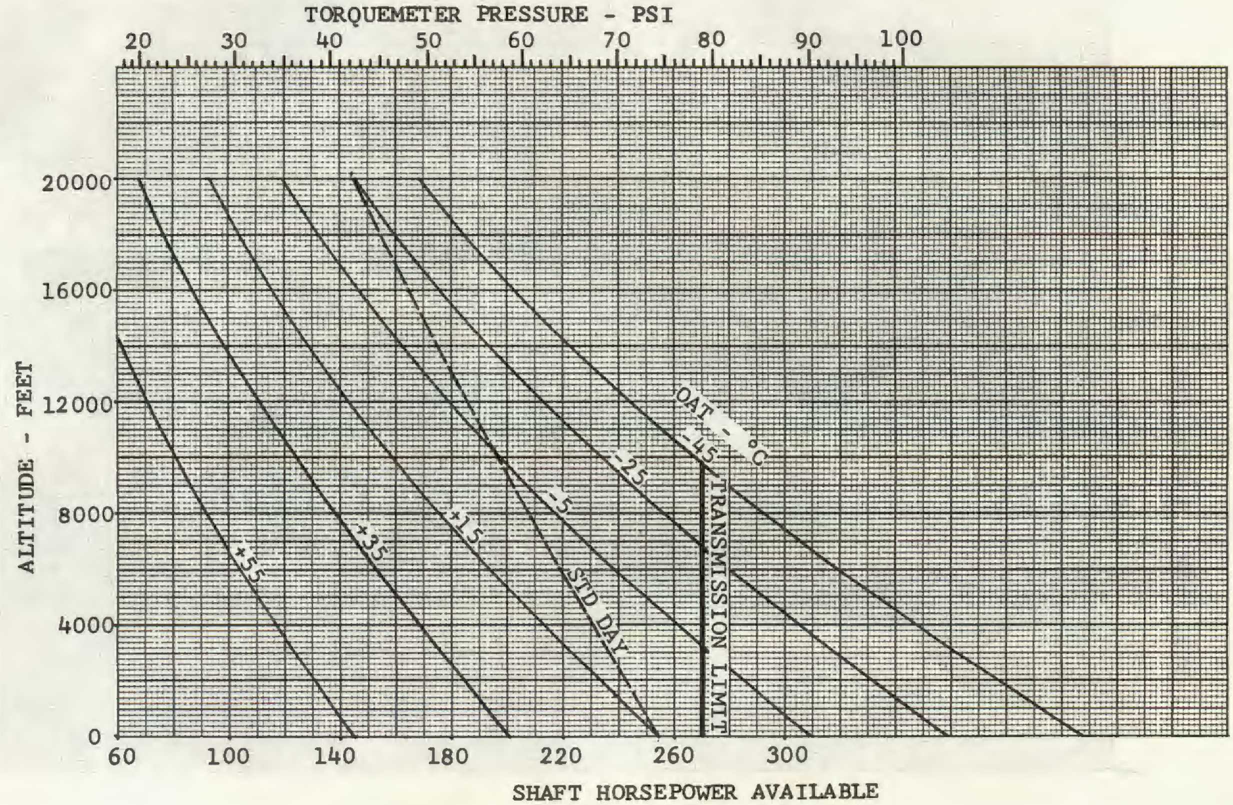
Figure 14-4. Power available chart - take-off power

POWER AVAILABLE

NORMAL POWER
PARTICLE SEPARATOR INSTALLED
6180 RPM

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053039

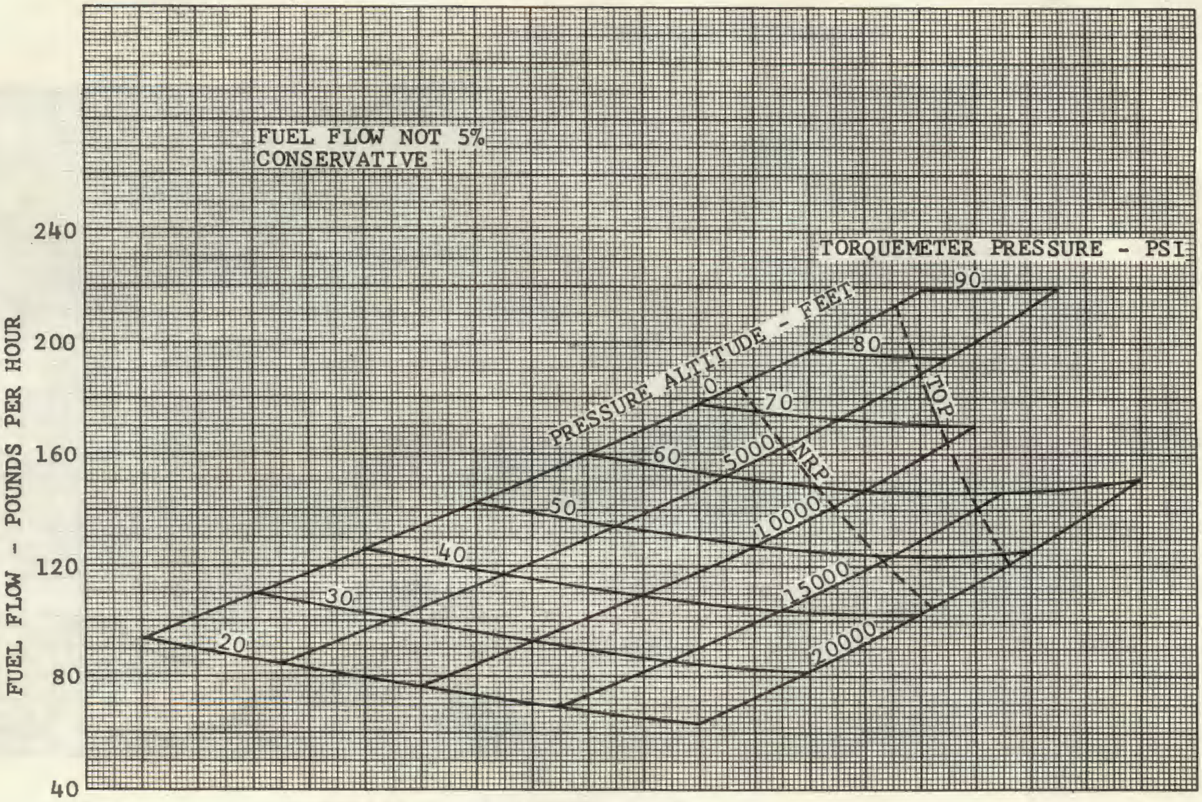
Figure 14-5. Power available chart - normal power

FUEL FLOW-6180 RPM

PARTICLE SEPARATOR INSTALLED

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053041

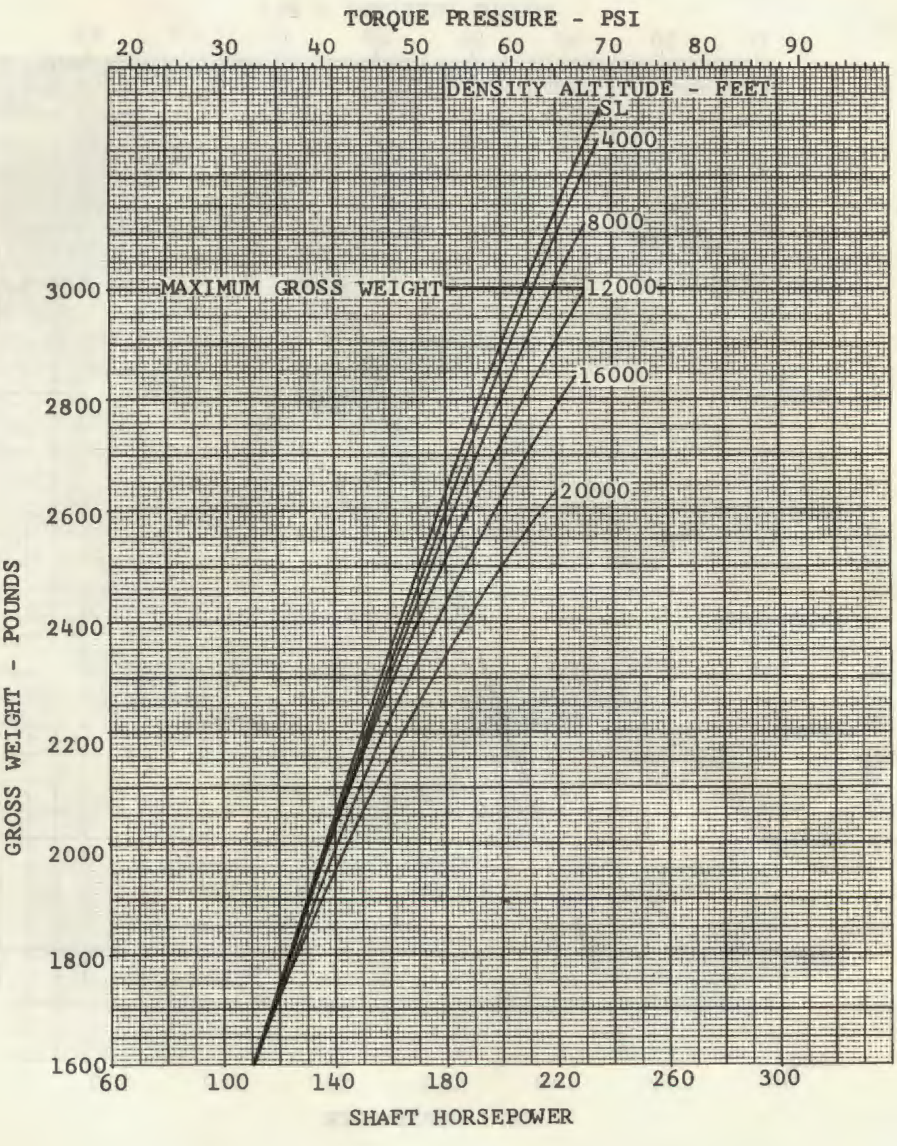
Figure 14-6. Fuel flow chart

TORQUE AND POWER REQUIRED TO HOVER

IN-GROUND EFFECT
2 FOOT SKID HEIGHT

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053042

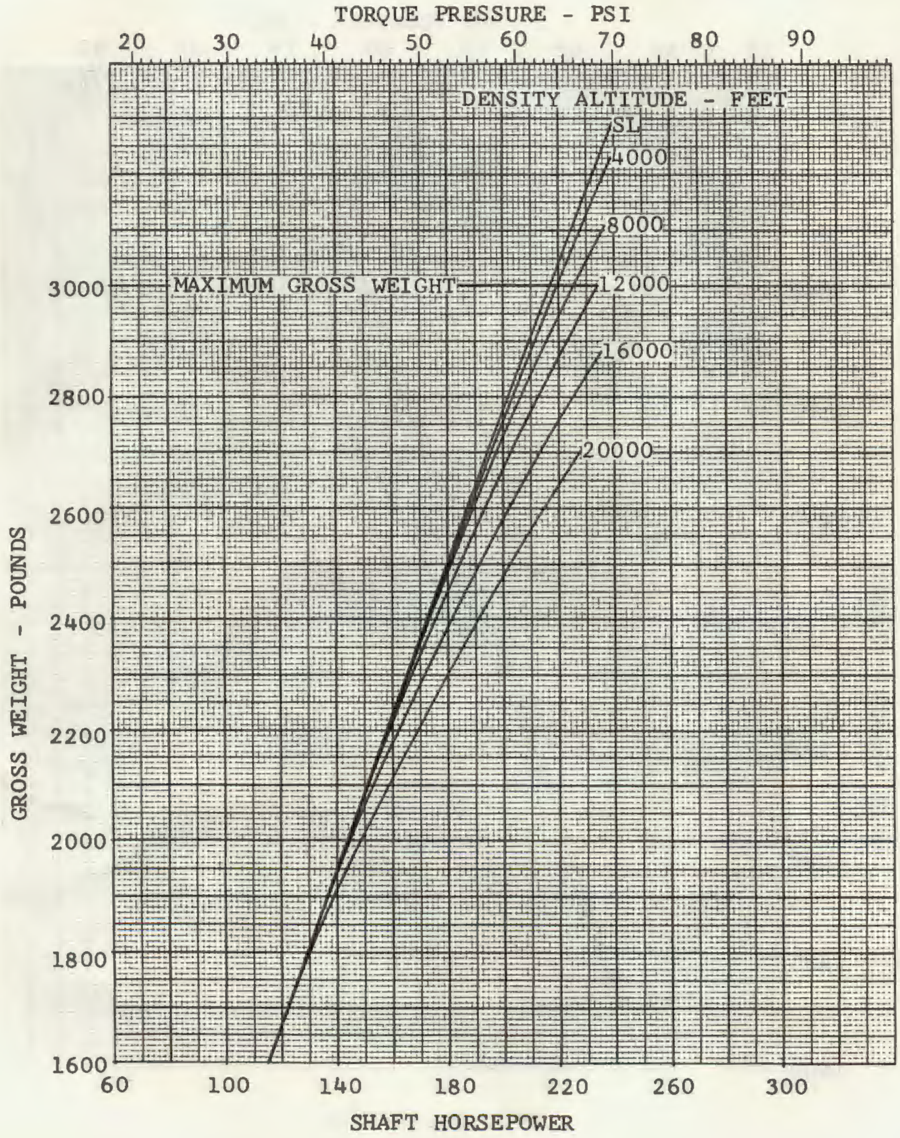
Figure 14-7. Torque and power required to hover chart - In ground effect (Sheet 1 of 2)

TORQUE AND POWER REQUIRED TO HOVER

IN-GROUND EFFECT
4 FOOT SKID HEIGHT

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053043

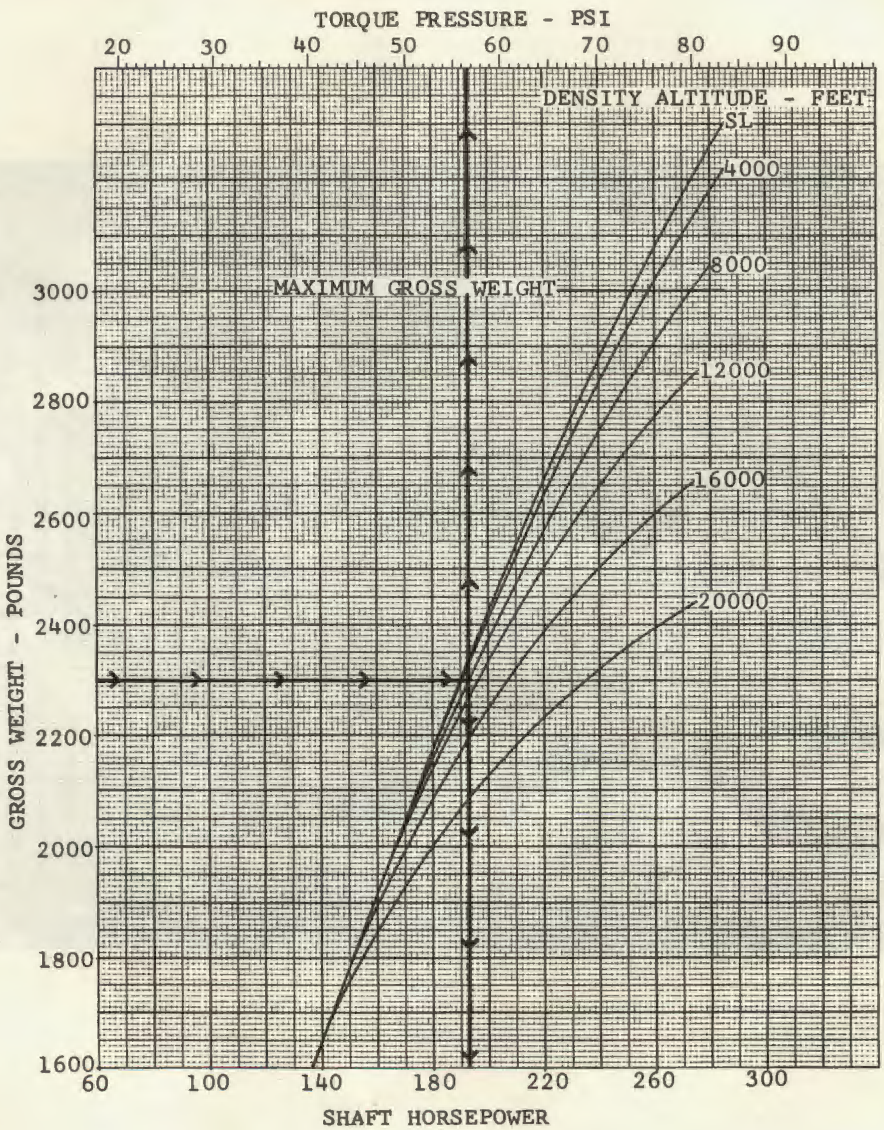
Figure 14-7. Torque and power required to hover chart - In ground effect (Sheet 2 of 2)

TORQUE AND POWER REQUIRED TO HOVER

OUT-OF-GROUND EFFECT

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053044

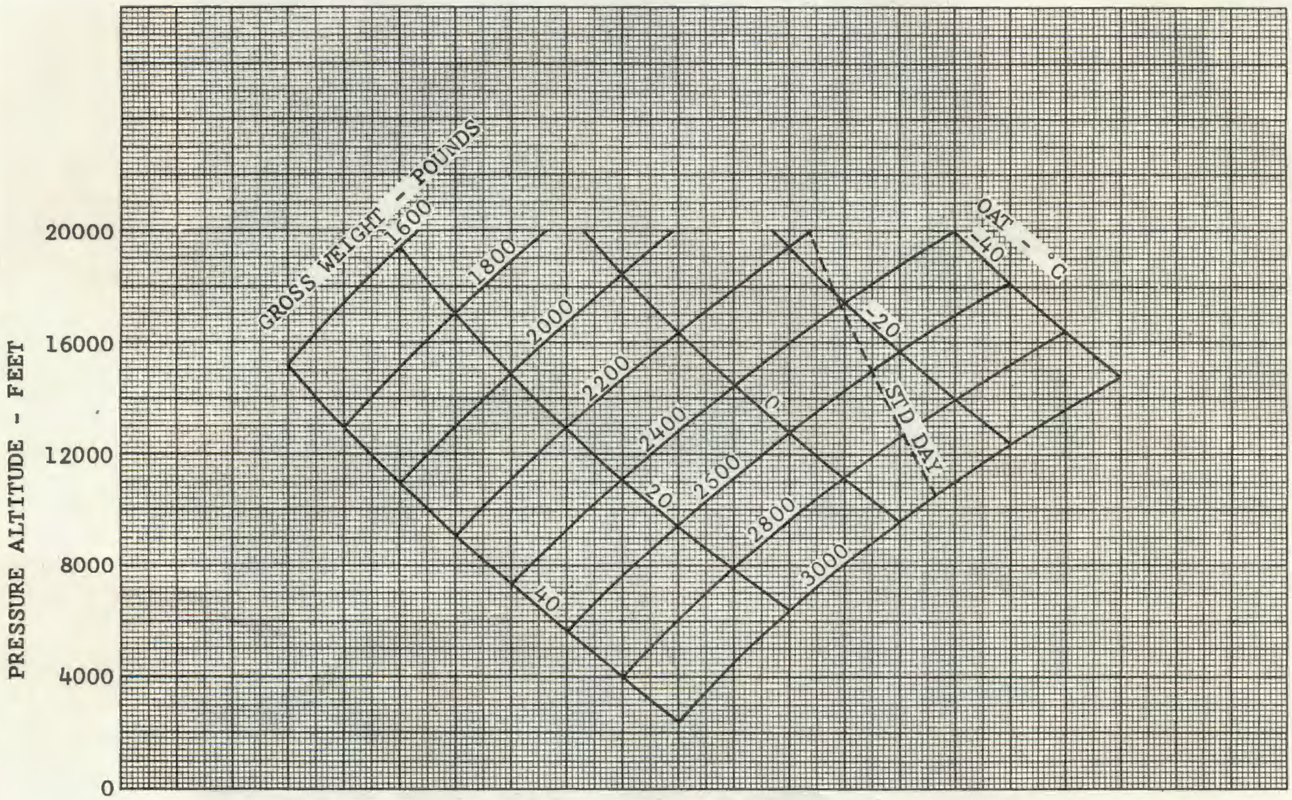
Figure 14-8. Torque and power required to hover chart - out of ground effect

HOVERING CEILING

IN-GROUND EFFECT - 2 FOOT SKID HEIGHT
PARTICLE SEPARATOR INSTALLED

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053045

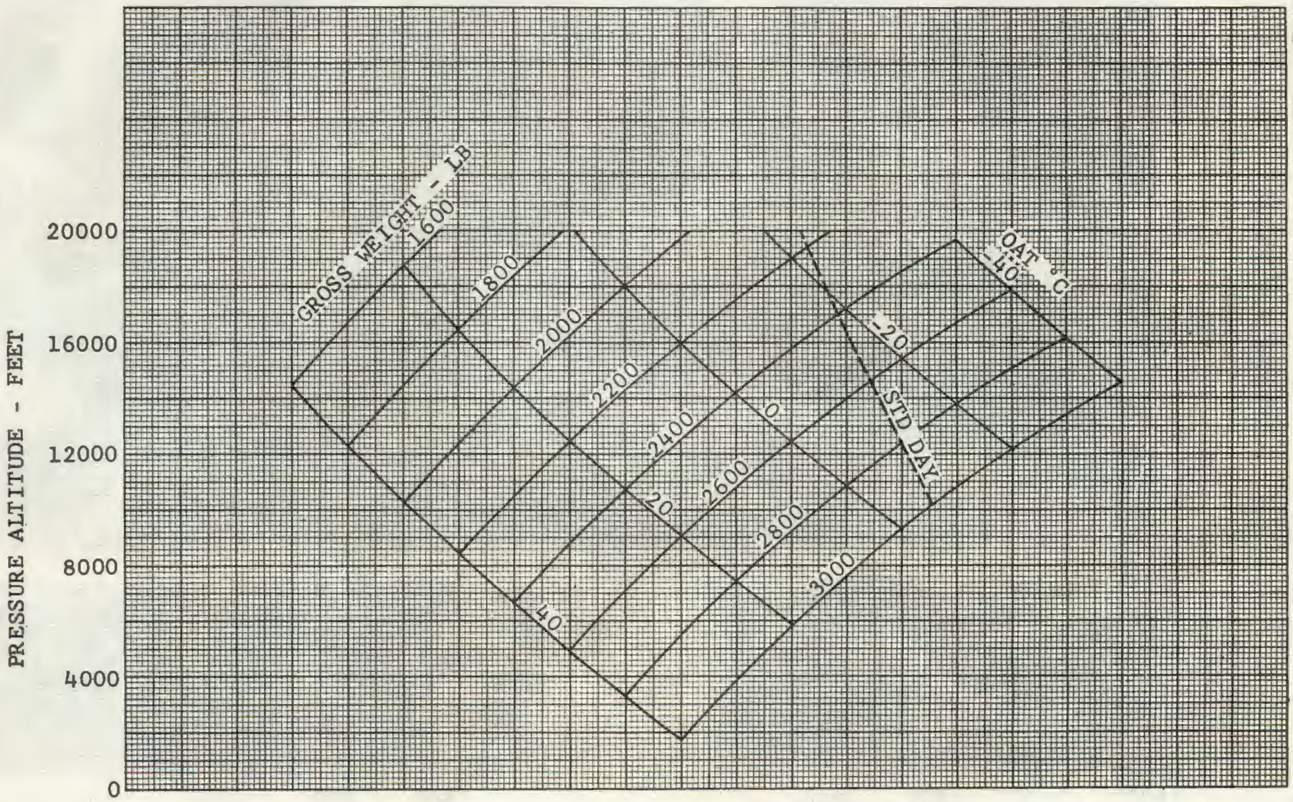
Figure 14-9. Hovering ceiling chart - in ground effect (Sheet 1 of 2)

HOVERING CEILING

IN-GROUND EFFECT - 4 FOOT SKID HEIGHT
PARTICLE SEPARATOR INSTALLED

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



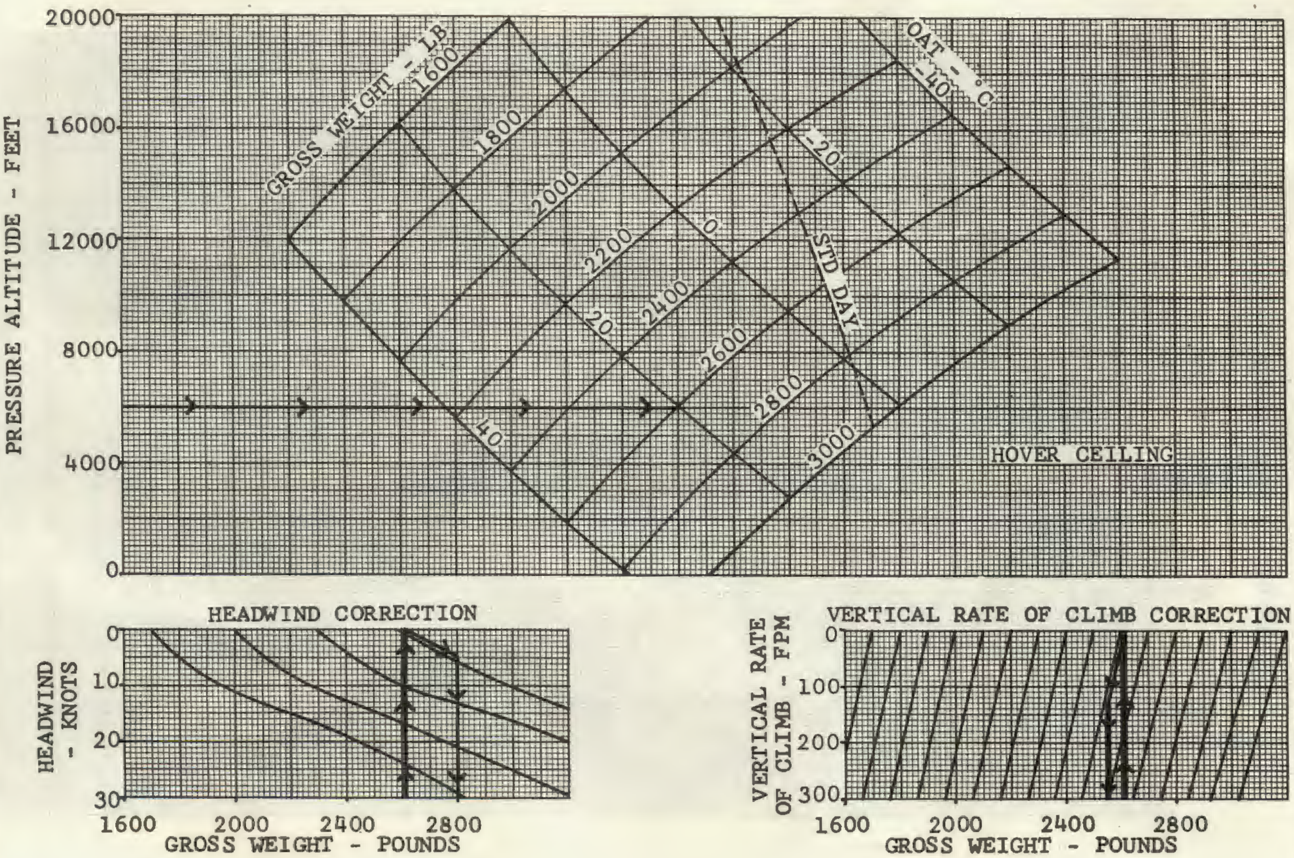
AV 053046

Figure 14-9. Hovering ceiling chart - In ground effect (Sheet 2 of 2)

HOVERING CEILING
OUT-OF-GROUND EFFECT
PARTICLE SEPARATOR INSTALLED

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



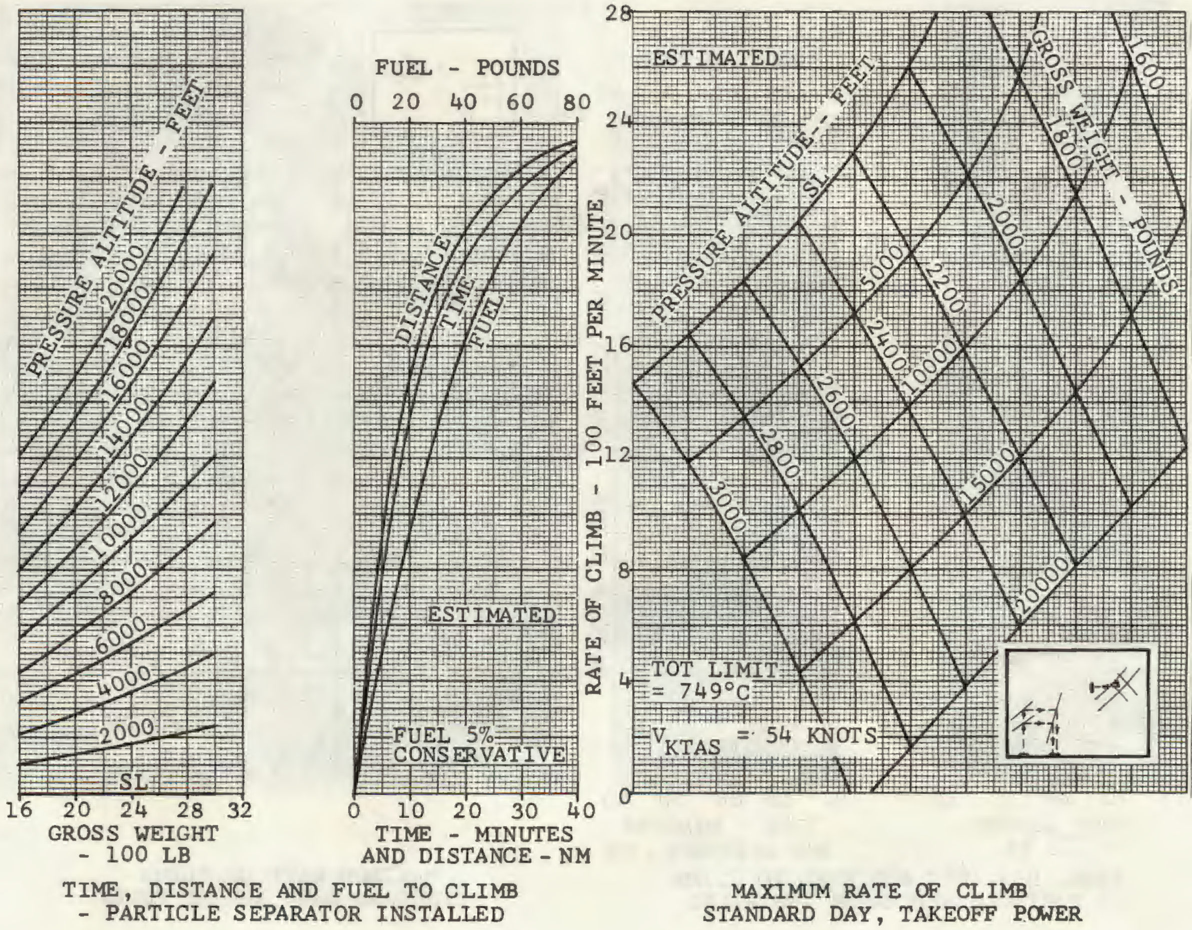
AV 053047

Figure 14-10. Hovering ceiling chart - out of ground effect

CLIMB PERFORMANCE
(MAXIMUM RATE OF CLIMB)
MILITARY POWER
STANDARD DAY

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



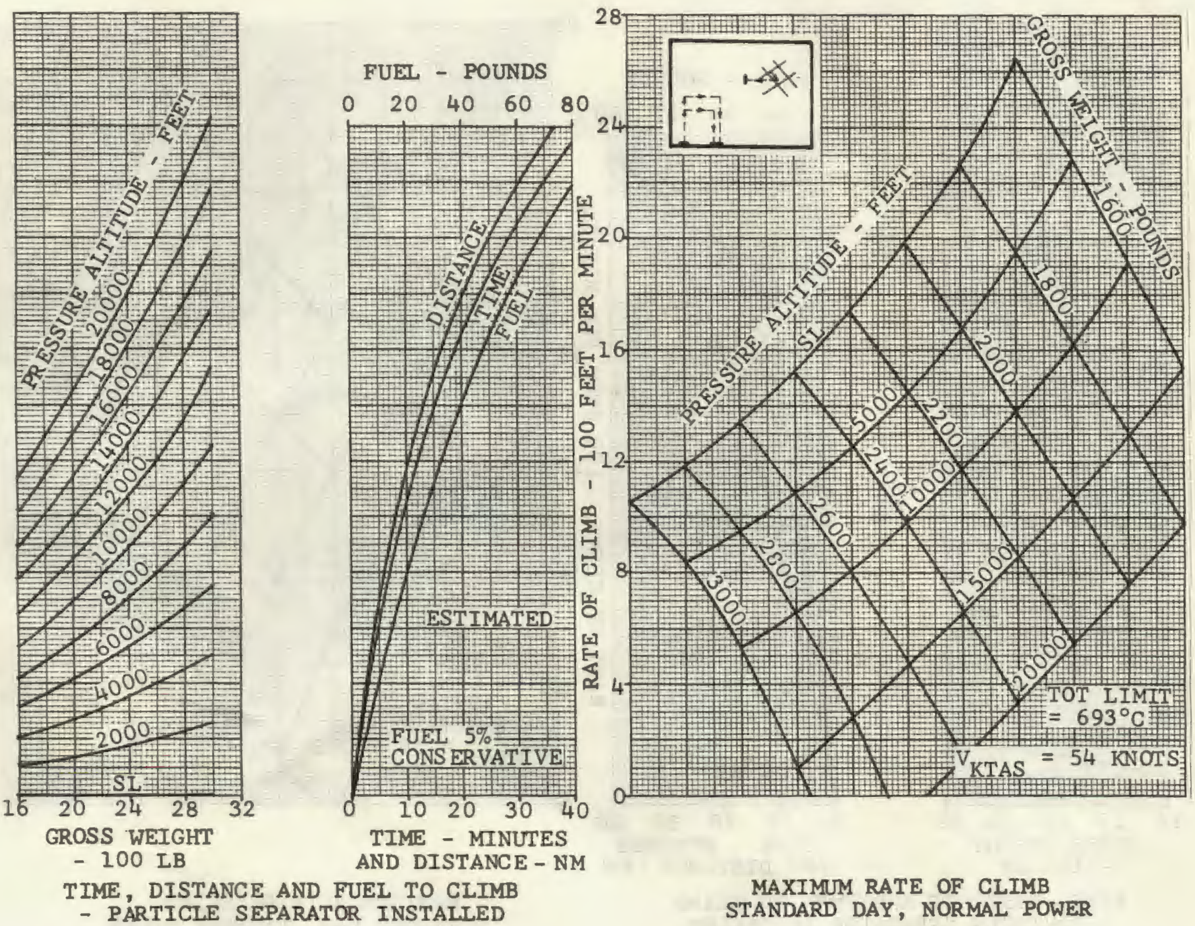
AV 053048

Figure 14-11. Climb performance chart - take-off power

CLIMB PERFORMANCE
(MAXIMUM RATE OF CLIMB)
NORMAL POWER
STANDARD DAY

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



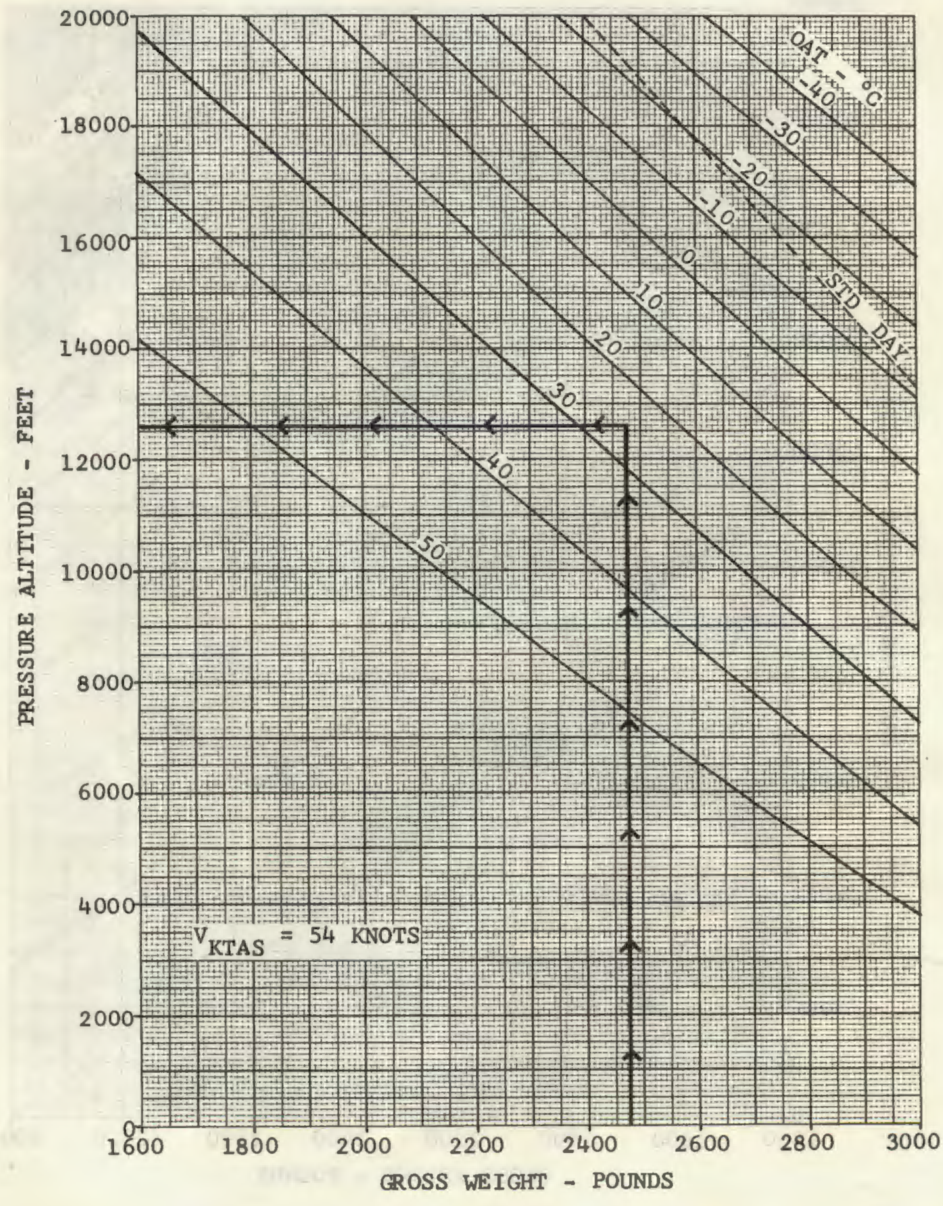
AV 053049

Figure 14-12. Climb performance chart - normal power

SERVICE CEILING
NORMAL POWER (54 KTAS)
6180 RPM - ALL CONFIGURATIONS

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053050

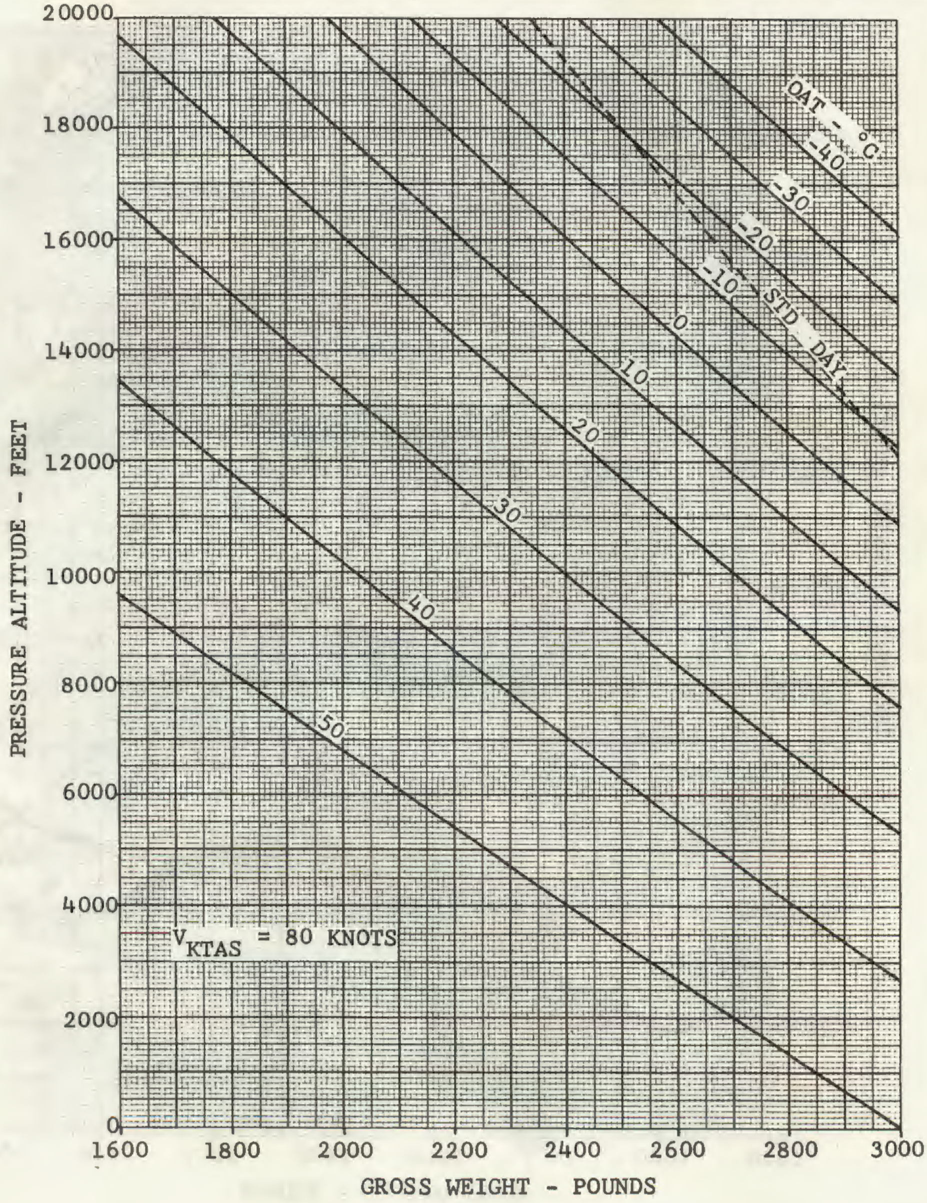
Figure 14-13. Service ceiling chart - 54 knots

SERVICE CEILING

NORMAL POWER (80 KTAS)
6180 RPM - ALL CONFIGURATIONS.

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



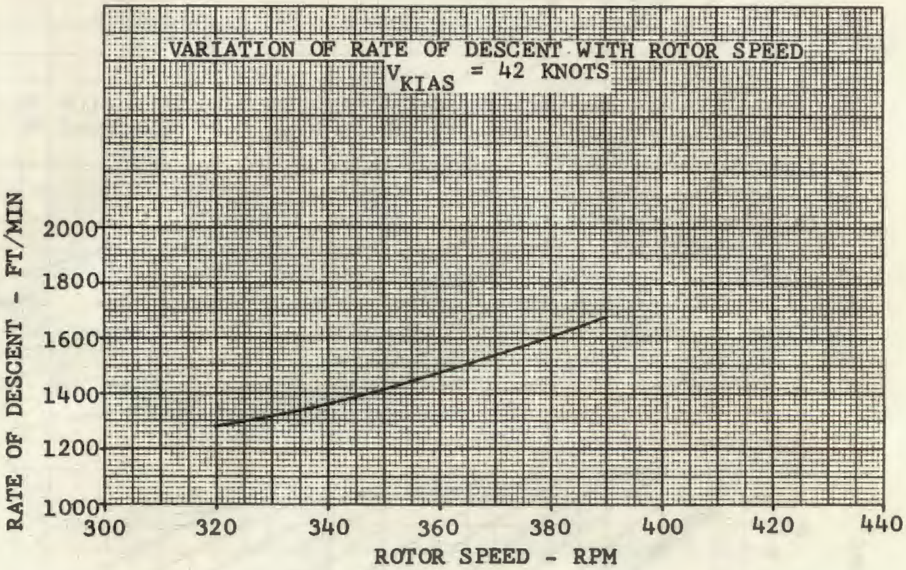
AV 053051

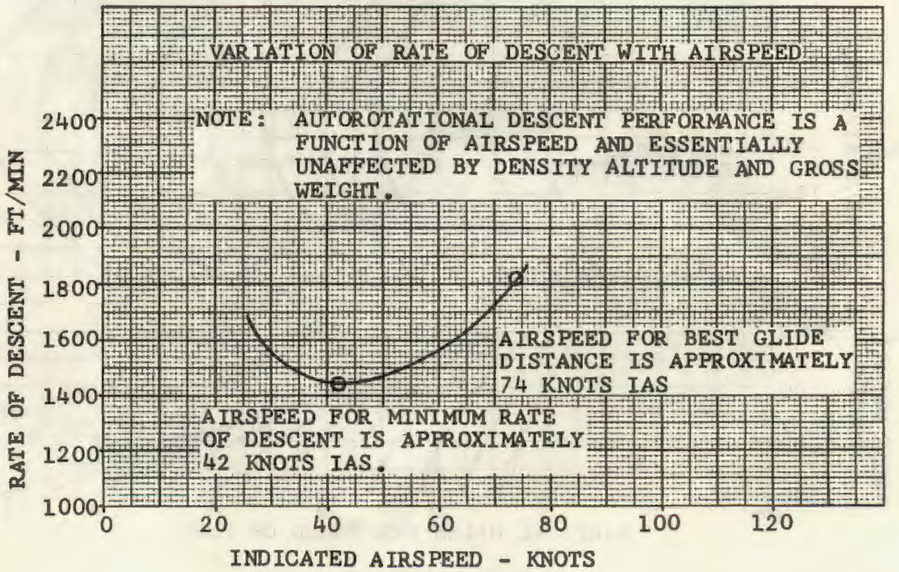
Figure 14-14. Service ceiling chart - 80 knots

AUTOROTATIONAL DESCENT

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal





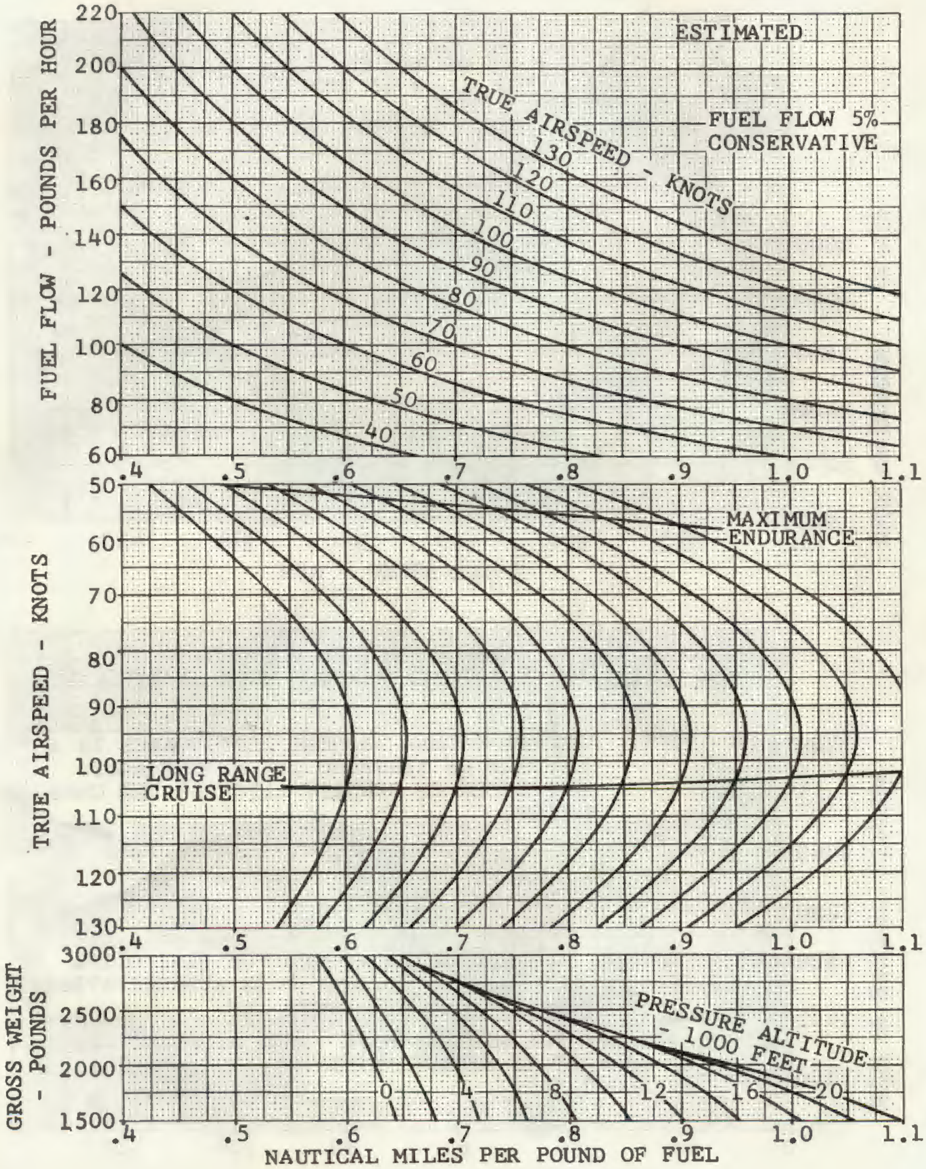
AV 053052

Figure 14-15. Autorotation descent

SPECIFIC RANGE
(NAUTICAL MILES PER POUND OF FUEL)
CRUISE SPEED
6180 RPM

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



CLEAN CONFIGURATION

AV 053053

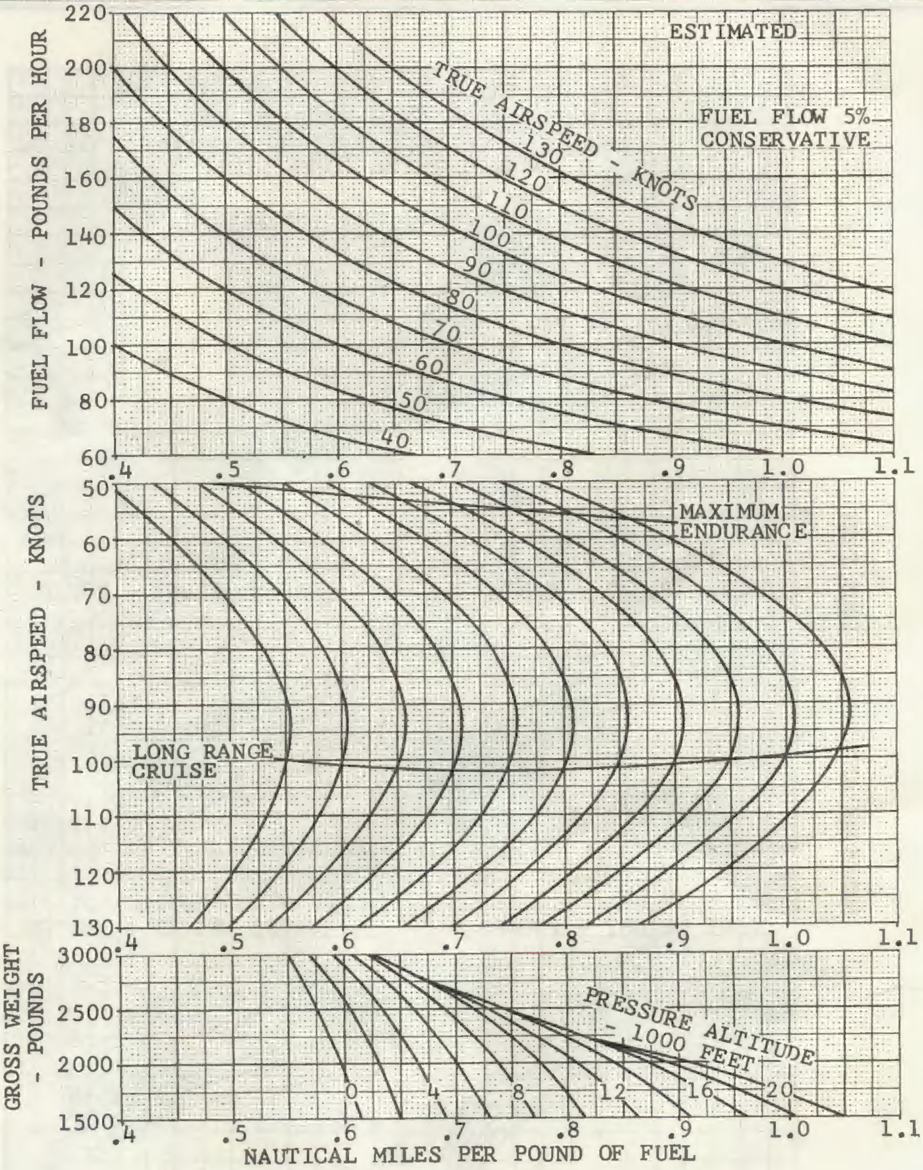
Figure 14-16. Specific range chart - cruise speed

SPECIFIC RANGE
(NAUTICAL MILES PER POUND OF FUEL)

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

CRUISE SPEED
1680 RPM

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



ARMED CONFIGURATION

AV 053040

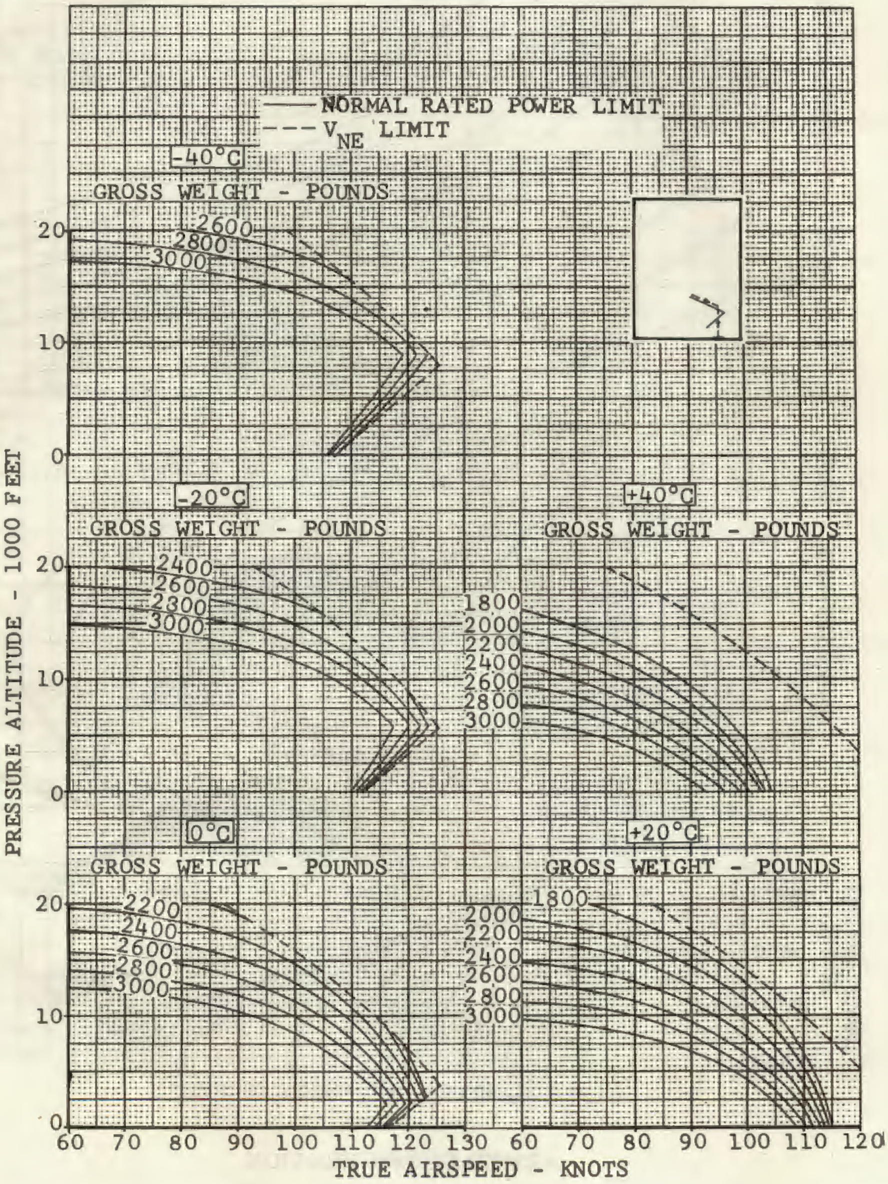
Figure 14-17 Specific range chart - cruise speed

SPECIFIC RANGE
(NAUTICAL MILES PER POUND OF FUEL)

CLEAN CONFIGURATION
MAXIMUM PERMISSIBLE SPEED
6180 RPM

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053054

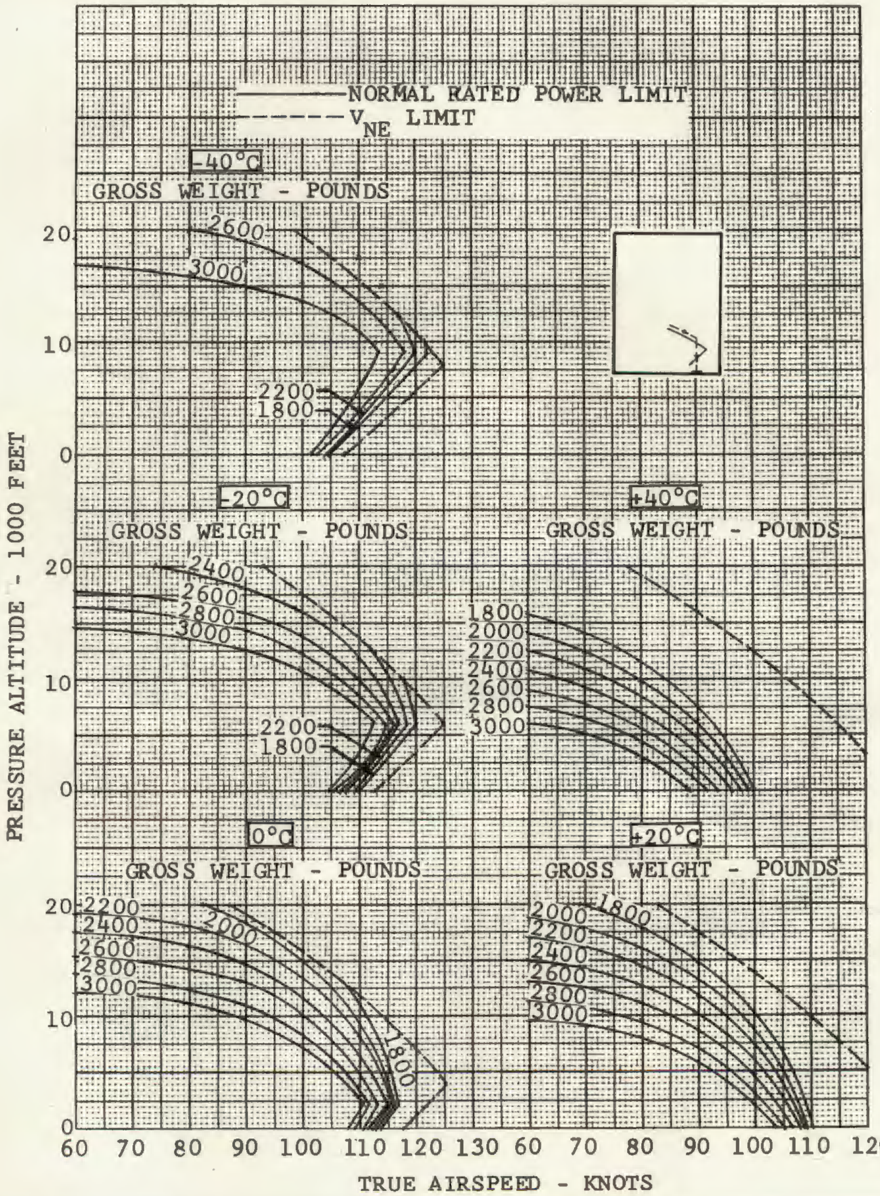
Figure 14-18. Specific range chart - maximum speed - clean

SPECIFIC RANGE
(NAUTICAL MILES PER POUND OF FUEL)
ARMED CONFIGURATION

MAXIMUM PERMISSIBLE SPEED
6180 RPM

Model(s): OH-58A
Data as of: January, 1969
DATA BASIS: ESTIMATED from Flight Test on Bell Model 206A Modified

Engine(s): T63-A-700
Fuel Grade: JP-4
Fuel Density: 6.5 Lb/Gal



AV 053055

Figure 14-19. Specific range chart - maximum speed - armed

APPENDIX A

REFERENCES

Note

The following references of the issue in effect at the date of this publication are required for use by operational personnel in performance of their duties.

Maintenance Forms

DD Form 365 Series	Weight and Balance Record
DA Form 2407	Maintenance Request
DA Form 2408	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
AR 95-2	Flight Regulations for Army Aircraft
AR 95-16	Weight and Balance Army Aircraft
AR-55	Nuclear Weapon Jettison
AR 310-1	Military Publications (General Policies)
AR 310-3	Military Publications (Preparations and Processing)
AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes
AR 385-25	Safety Studies and Reviews of Atomic Weapon Systems
AR 385-40	Accident Reporting and Records
AR 385-62	Firing Guided Missiles and Heavy Rockets for Training, Target Practice and Combat
AR 385-63	Regulations for Firing Ammunition
AR 700-1300-8	Malfunctions Involving Ammunition and Explosives (Reports Control Symbol ORD-43)
AR 746-2300-1	Colors and Marking of Vehicles and Equipment
AR 750-5	Organization Policies
AR 750-8	Command Maintenance Management Inspections
DA PAM 310-1	Index of Administrative Publications
DA PAM 310-2	Index of Blank Forms
DA PAM 310-4	Bulletins, Lubrication Orders and Technical Manuals
TB 55-9150-200-25	Engine and Transmission Oils and Additives for Army Aircraft
TB AVN 23-16	Test Flight and Maintenance Operational Checks of Army Aircraft
TM 1-215	Attitude Instrument Flying
TM 1-225	Navigation for Army Aviation
TM 3-220	Decontamination
TM 9-207	Operation and Maintenance of Ordnance Material in Extreme Cold Weather 0° to -65°F
TM 9-247	Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Material

Maintenance Forms

TM 9-273	Lubrication of Ordnance Material
TM 6920-210-14	Targets, Target Material, and Training Course Lay-Outs
TM 9-1305-200	Small Arms Ammunition
TM 38-750	The Army Equipment Record System and Procedures
FM 5-25	Explosives and Demolition
FM 21-6	Techniques of Military Instruction
FM 31-70	Basic Cold Weather Manual
SM 9-5-1340	FSC Group - Ammunition and Explosives
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies and Equipment Used by the Army
TM 9-1005-298-12	Operator and Organizational Maintenance Manual - Helicopter, 7.62 Millimeter Machine Gun, High Rate, XM27E1 Armament Subsystem
TM 11-5826-227-20	Operation Instruction AN/ARN-89 Direction Finder Set
TM 11-5821-261-20	Operation Instruction AN/ARC-116 Radio Set
TM 11-5821-260-20	Operation Instructions AN/ARC-115 Radio Set
TM 11-5821-259-20	Operation Instructions AN/ARC-114 Radio Set

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