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PILOT TRAINING MANUAL

PTM-D212-725

Single Engine Conversion

BELL 212 MODELS

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DE #02

REVISION RECORD

Revision No.	Issue Date	Description	Date Inserted	Inserted By
0	10.05.11	New Issue		
1	10.05.26	Revised Hover Ceiling Graphs		
2	10.07.26	Corrected Figure 2-26, 2-28, 2-30, 2-34, 2-35, 4-7 add 2-32, 2-36		

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CHAPTER 1 – INTRODUCTION

1. INTRODUCTION

1.1. Purpose

The content of this Pilot Training Manual is to be incorporated into existing company training manuals.

If the pilot is Bell 205/212 qualified/trained it is recommended that they:

1) Review this Pilot Training Manual
2) Review FMS-D212-725-1 Latest Revision
3) Take the Familiarization Exam in Chapter 6 of this Training Manual
4) Perform a 1 hour familiarization flight in the Eagle Single aircraft before carrying passengers

If the pilot is qualified/trained on other rotorcraft it is recommended that they:

1) Review this Pilot Training Manual
2) Review FMS-D212-725-1 Latest Revision
3) Take the Familiarization Exam in Chapter 6 of this Training Manual
4) Perform a 1 hour familiarization flight in the Eagle Single aircraft with a qualified Bell 205, Bell 212 or Eagle Single pilot before carrying passengers

1.2. Use of the Manual

1.2.1. General

This Chapter provides a general description of the contents and use of this PTM and the Eagle "Single" Helicopter.

1.2.2. Use of the Manual

This manual is divided into Chapters. Refer to the desired Chapter and the Table of Contents to locate the specific subject.

1.2.3. Updates

All changes will be recorded in the Revision Record at the front of this manual.

1.2.4. Terminology

Warnings, cautions, and notes are used throughout this manual to emphasize important and critical instructions as follows:

WARNING

AN OPERATING PROCEDURE, PRACTICE, ETC., WHICH, IF NOT CORRECTLY FOLLOWED, COULD RESULT IN PERSONAL INJURY OR LOSS OF LIFE.

CAUTION

AN OPERATING PROCEDURE, PRACTICE, ETC., WHICH NOT STRICTLY OBSERVED, COULD RESULT IN DAMAGE TO, OR DESTRUCTION OF, EQUIPMENT.

NOTE

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

1.2.5. Use of Procedural Words

The concept of procedural word usage and intended meaning which is used throughout this manual is as follows:

“Shall” is used only when application of a procedure is mandatory.
“Should” is used only when application of a procedure is recommended.
“May” and “need not” is used only when application of a procedure is optional.
“Will” is used only to indicate futurity, never to indicate a mandatory procedure.

1.2.6. Description

This training manual provides a description of the major airframe and engine systems installed in the Eagle Single. This information is intended as an instructional aid only; it does not supersede, nor is it meant to substitute for any of the operating manuals. Material presented has been prepared from the basic design data. All subsequent changes in aircraft appearance or system operation will be discussed during pilot training and subsequent revisions to this manual.

2. General Description

2.1. Helicopter Description

The "Eagle Single", which is a modified Bell 212, helicopter (Figure 2-1) consists of two major assemblies: The forward fuselage and tailboom. The forward fuselage is semi-monocoque and reinforced shell construction with transverse bulkheads and metal and fiberglass covering. Two longitudinal main beams provide the primary structural support.

A hinged door on either side of the forward area permits direct access to crew area and a large sliding door permits access to the cargo/passenger area. Additionally, a hinged cargo door is located immediately ahead of the sliding door. This door increases the width of access to the cargo/passenger area. Seating is provided for the pilot and forward passenger/copilot in the crew area (cockpit) and up to 9 passengers in the cargo/passenger (cabin) area.

The engine deck, located above and aft of the passenger/cargo area, is designed to accommodate the engine, firewalls, and air management system.

The tailboom is of semi-monocoque construction which provides support for a vertical fin, aerodynamically actuated elevator, tail rotor and tail rotor drive system, tail skid, and cargo compartment.

The powerplant is a Honeywell T5317A/B/BCV single gas turbine engine. The engine is a shaft turbine design with a two-stage, free-type power turbine and a two-stage gas producer turbine that drives a combination axial centrifugal compressor. Five major sections of the engine are air inlet, compressor, diffuser, combustor and exhaust. The maintenance and overhaul instructions for the basic engine are found in the applicable Honeywell publications.

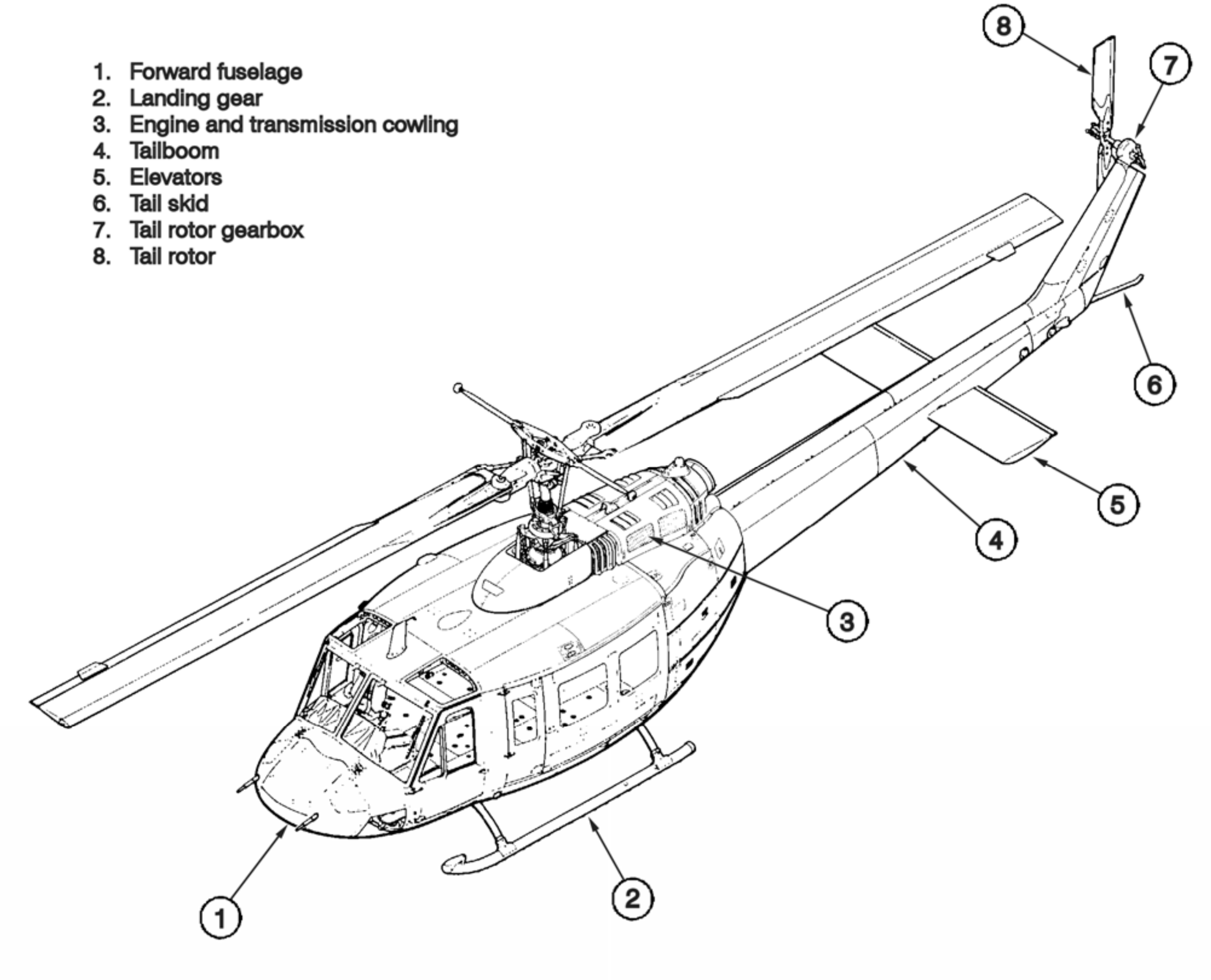


Figure 2-1 - Major Sections - Eagle Single

2.2. Principal Dimensions

Principal exterior dimensions are shown in Figure 2-2. All height dimensions must be considered approximate due to variations in loading and landing gear deflection

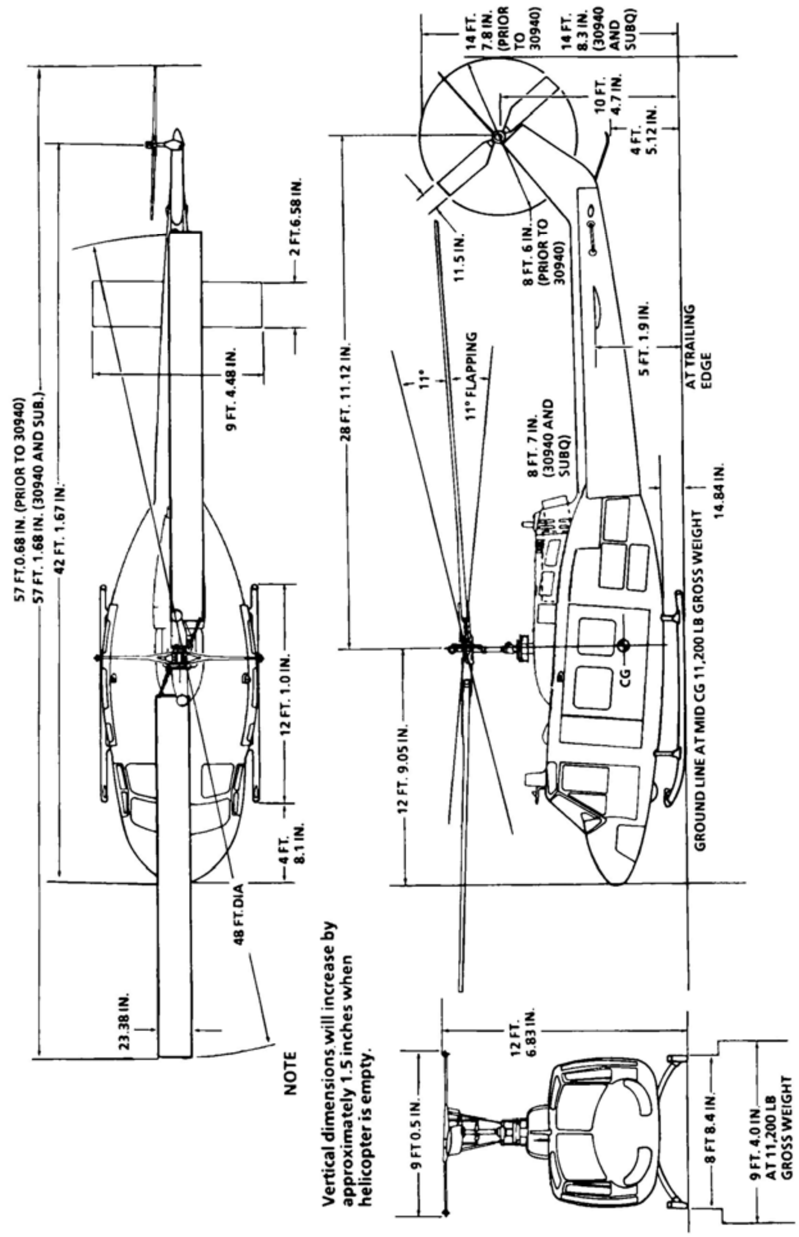


Figure 2-2 - Principal Exterior Dimensions

Principal interior dimensions, to include cargo compartment, are shown in Figure 2-3.

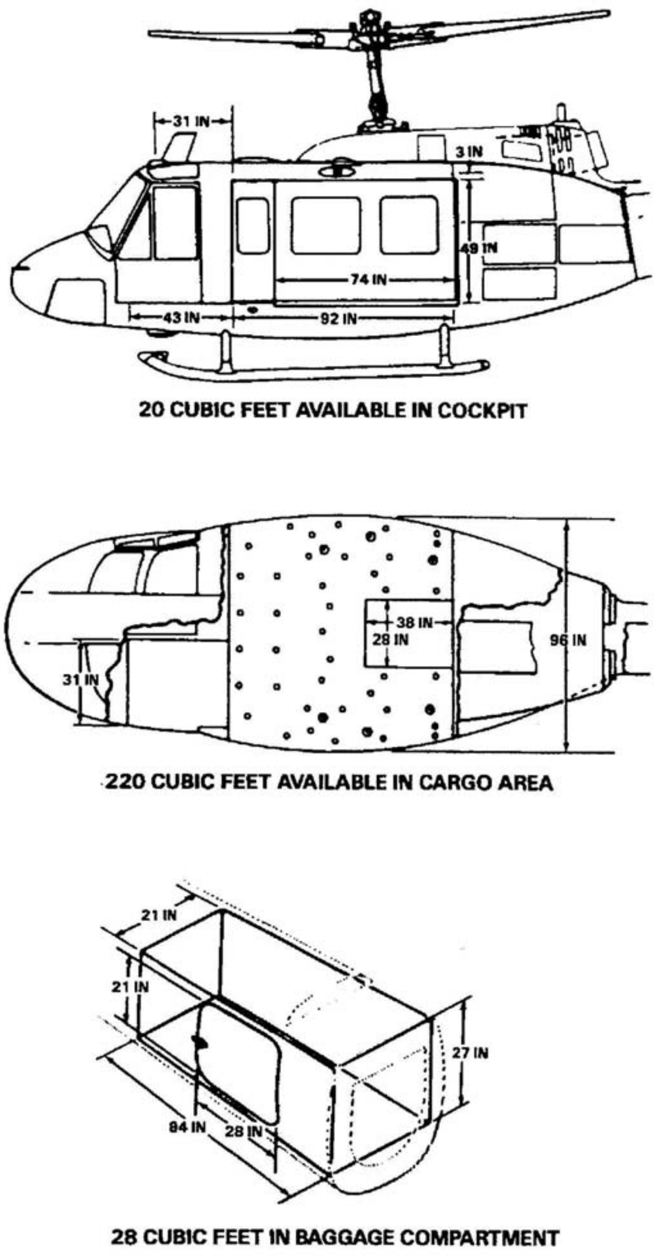


Figure 2-3 - Principal Interior Dimensions

2.2.1. Location References

Locations on and within helicopter can be determined in relation to fuselage stations, waterlines, and buttock lines measured in inches from known reference points.

2.2.2. Fuselage Stations

Fuselage stations (FS or STA) are vertical planes perpendicular to, and measured along, longitudinal axis of helicopter. Station zero is reference datum plane and is 20.0 inches (508 millimeters) aft of most forward point on cabin nose.

2.2.3. Waterlines

Waterlines (WL) are horizontal planes perpendicular to, and measured along, vertical axis of helicopter. Waterline zero is a reference plane located 7.44 inches (189 millimeters) below lowest point on fuselage.

2.2.4. Buttock Lines

Buttock lines (BL) are vertical planes perpendicular to, and measured to left and right along, lateral axis of helicopter. Buttock line zero is a plane at longitudinal centerline of helicopter.

2.3. General Arrangement

Fuselage forward section contains nose compartment for electrical and avionics equipment, crew compartment, and passenger/cargo compartment. Center section incorporates transmission compartment and pylon support structure. Aft section houses the engine and oil coolers, and has compartments for avionics, bleed air heater, and optional equipment components.

Tailboom is attached to aft end of fuselage and supports tail rotor and drive train, vertical fin, horizontal stabilizer/elevator, and tall skid. A cargo compartment is located in forward end of tailboom.

2.4. Crew Compartment

Crew compartment or cockpit occupies forward part of cabin. Pilot station is on right side and copilot/forward passenger station is on left.

A door on either side permits direct access to crew compartment. Glass windshields and clear acrylic windows in crew doors, roof, and lower nose area allow good visibility from crew compartment.

2.4.1. Crew Seats

Pilot and copilot seats are equipped with shoulder harnesses with inertia reels. Adjustment handles, located beneath right side of each seat, can be pulled to adjust seats 4.0 inches (10.2 centimeters) vertically and 4.5 inches (11.4 centimeters) longitudinally.

2.4.2. Crew Seat Restraint System

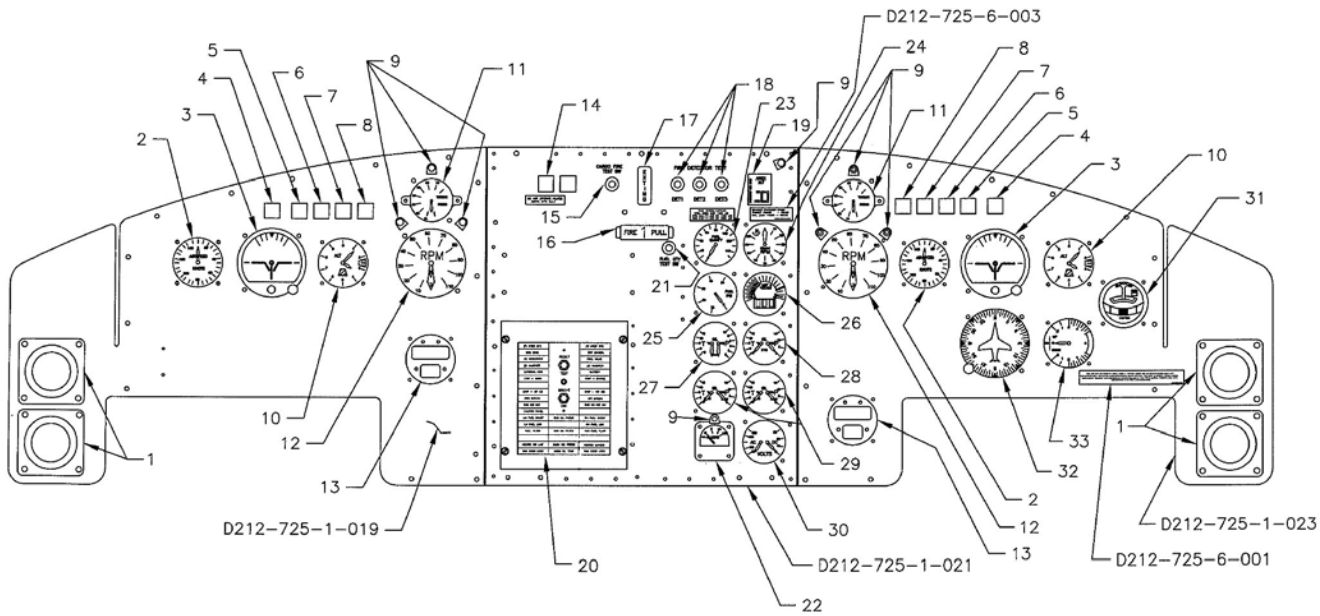
Each crew seat is equipped with lap seatbelt and a dual shoulder harness with inertia reel which locks in event of rapid deceleration.

2.4.3. Instrument Panel

The instrument panel extends across front of cockpit and is tilted slightly to provide better viewing of instruments by flight crew. Pilot flight and navigational instruments are on right; propulsion, fuel, hydraulic, and electrical systems instruments are in center; and optional copilot flight and navigational instruments are on left. All instruments have integral or post white lighting. Warning and caution lights are sunlight readable. Figure 2-4 thru 2-7 show typical instrument panel layouts.

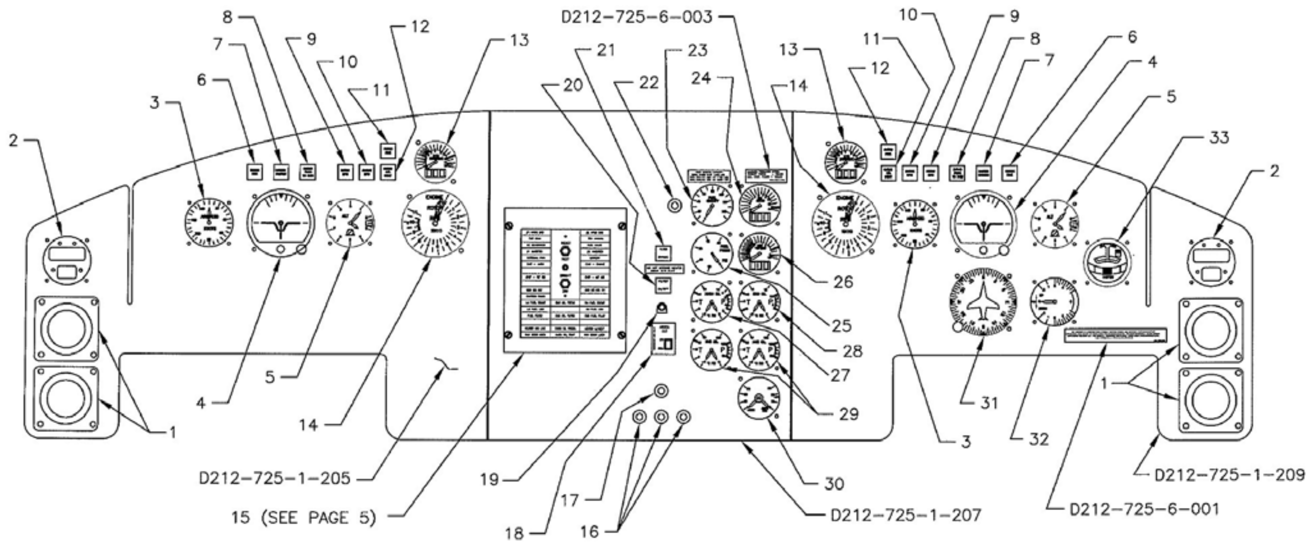
Figure 2-4 – RH Pilot's Instrument Panel - Typical

Figure 2-5 – LH Pilot's Instrument Panel - Typical



1 - Air Vent
2 - Airspeed Indicator
3 - Attitude Indicator
4 - Master Caution Light
5 - Engine RPM Light
6 - Rotor RPM Light
7 - Baggage Fire Light
8 - Cargo Release Armed Light
9 - Post Light
10 - Altimeter
11 - Torque Pressure Indicator
12 - Dual Tachometer
13 - Clock
14 - Heater Light
15 - Baggage Fire Test Switch
16 - Fire 1 Handle
17 - Fire Extinguisher Switch
18 - Fire Test Switch
19 - ELT Test Switch
20 - Master Caution Panel
21 - Fuel Quantity Test Switch
22 - Loadmeter
23 - Fuel Quantity Indicator
24 - Gas Producer Tachometer
25 - Fuel Pressure Indicator
26 - EGT/MGT Indicator
27 - Trans. Oil Temp./Press. Indicator
28 - Engine Oil Temp./Press. Indicator
29 - Hydraulic Oil Temp./Press. Indicator
30 - Dual Voltmeter
31 - Turn and Bank Indicator
32 - Direction Gyro
33 - Vertical Speed Indicator

Figure 2-6 – Instrument Panel (G1) - Typical



1 - Air Vent
2 - Clock
3 - Airspeed Indicator
4 - Attitude Indicator
5 - Altimeter
6 - Engine Fire Switch Light
7 - Master Caution Light
8 - Fire Extinguisher Switch Light
9 - Rotor RPM Light
10 - Engine RPM Light
11 - Cargo Fire Light
12 - Cargo Release Armed Light
13 - Torque Pressure Indicator
14 - Dual Tachometer
15 - Master Caution Panel
16 - Fire Test Switch
17 - Cargo Fire Switch
18 - ELT Test Switch
19 - Heater Light
20 - Heater Switch
21 - Filter Bypass Switch Light
22 - Fuel Quantity Test Switch
23 - Fuel Quantity Indicator
24 - Gas Producer Tachometer
25 - Fuel Pressure Indicator
26 - MGT Indicator
27 - Trans. Oil Temp./Press. Indicator
28 - Engine Oil Temp./Press Indicator
29 - Hydraulic Temp./Press Indicator
30 - Voltmeter/Ammeter
31 - Directional Gyro
32 - Vertical Speed Indicator
33 - Turn and Bank Indicator

Figure 2-7 – Instrument Panel (G2) - Typical

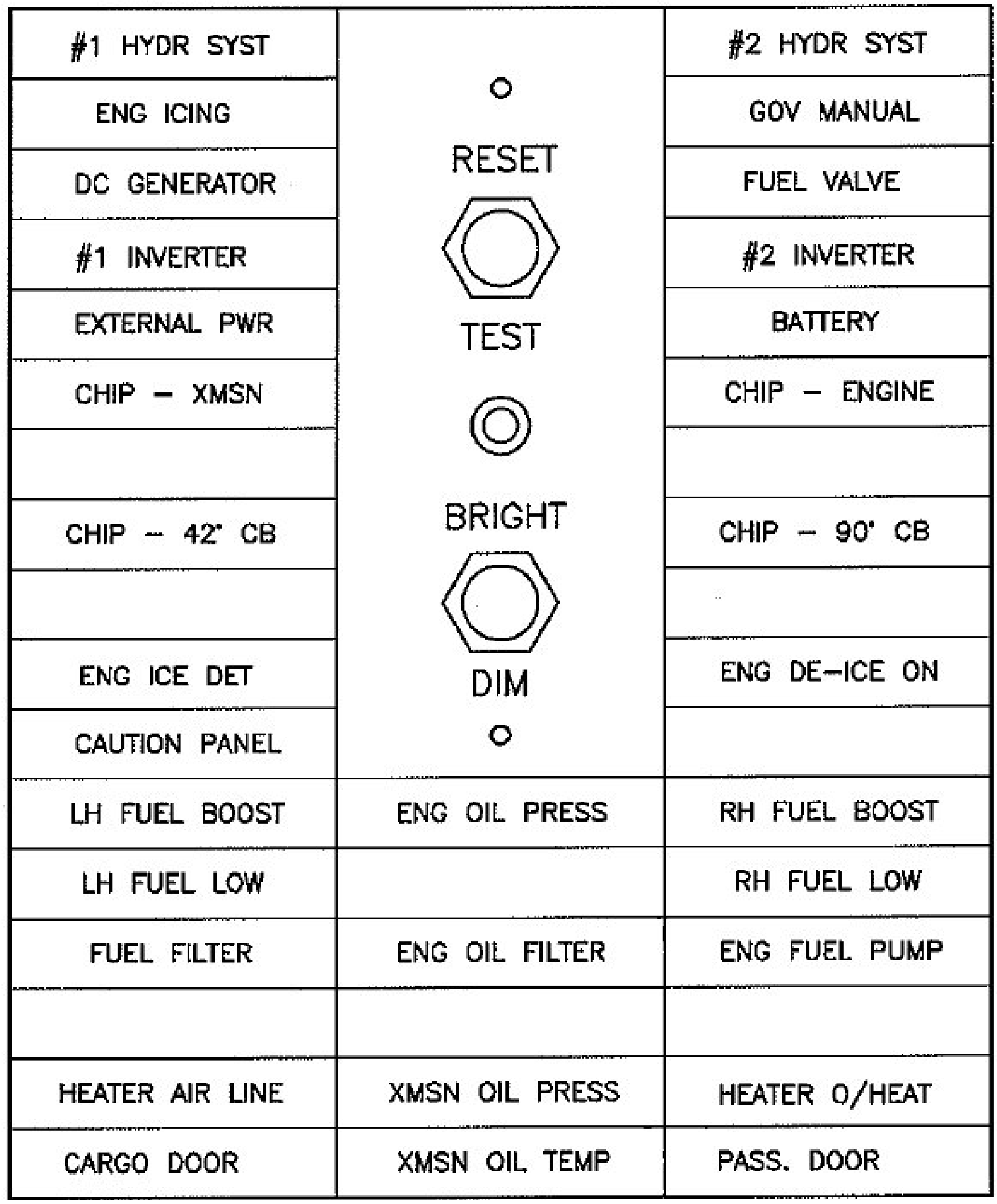


Figure 2-8 – Master Caution Panel - Typical

2.4.4. Overhead Console

Overhead console is centered on cabin ceiling and contains electrical system switches and circuit breakers. Figures 2-9 thru 2-10 show typical overhead console layouts.

Three types of switches are used in overhead console:
Rheostat.
Four position rotary.
Positive latch.

Console has integral white lighting controlled by CONSOLE LT switch.

Figure 2-9 – Overhead Panel - Typical

Figure 2-10 – CB Panel - Typical

2.4.5. Pedestal

Pedestal is located between crew seats and supports avionics control panels and engine and flight control system switches.

2.5. Passenger/Cargo Compartment

Aft area of cabin contains a space of 220 cubic feet (6.2 cubic meters) for carrying passengers or internal cargo.

A sliding door and hinged panel on each side of cabin provides full, direct access to passenger/cargo compartment. Acrylic windows in doors allow outside viewing from any seat.

2.5.1. Passenger Seats

Passenger seats are arranged in a row of four seats facing aft, another row of five seats facing forward, and a pair of seats facing outboard from each side of pylon support structure. All seats are equipped with lap seatbelts.

2.5.2. Tie Downs and Equipment Fittings

Tiedown rings and studs are recessed into cabin deck for securing internal cargo, passenger seats, and other optional equipment kits such as internal hoist, litters, etc. Additional studs are incorporated into cabin roof for attachment of optional equipment kits.

Deck mounted tiedown fittings have airframe structural capacity of 1250 pounds (567 kilograms) vertical and 500 pounds (227 kilograms) horizontal per fitting.

Provisions for installation of cargo tiedown fittings are incorporated in aft cabin bulkhead and transmission support structure. Each tiedown point has an airframe structural capacity of 1250 pounds (567 kilograms) at 90 degrees to bulkhead and 500 pounds (227 kilograms) in any direction parallel to bulkhead.

2.5.3. Cargo Compartment

Cargo compartment is located in forward end of tailboom and has a capacity of 28 cubic feet (0.8 cubic meters). Compartment can carry up to 400 pounds (181 kilograms) of baggage or other cargo, which can be secured using tiedown fittings provided.

Access door is on right side of tailboom and is provided with a key lock for security of compartment contents.

Two interior lights illuminate when door is open. CARGO DOOR LOCK caution light, on caution panel, illuminates when door is open or is not properly latched.

A smoke detector is installed in compartment and is connected to CARGO FIRE warning light located on instrument panel.

2.6. Rotor Systems

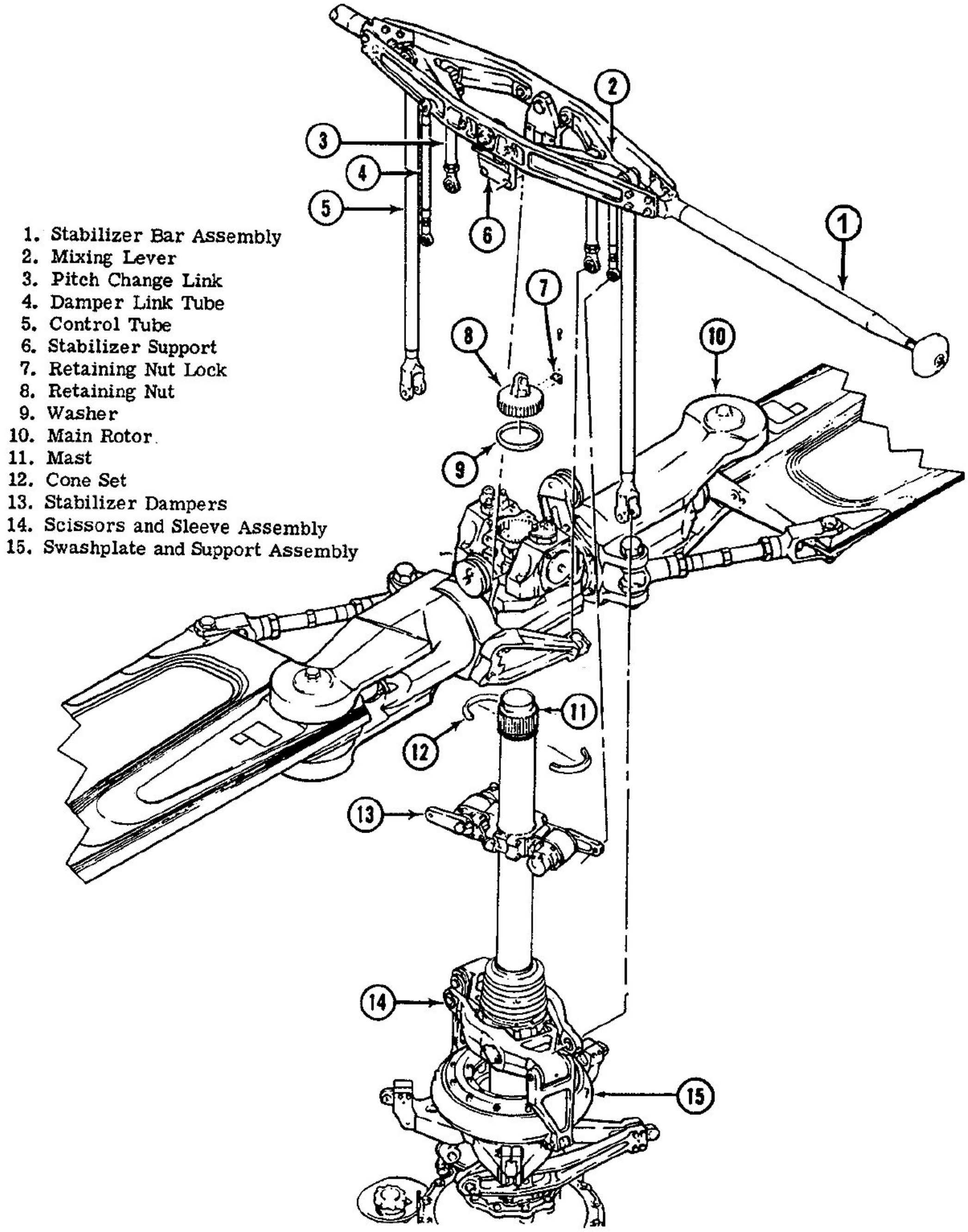


Figure 2-11 - Main Rotor System

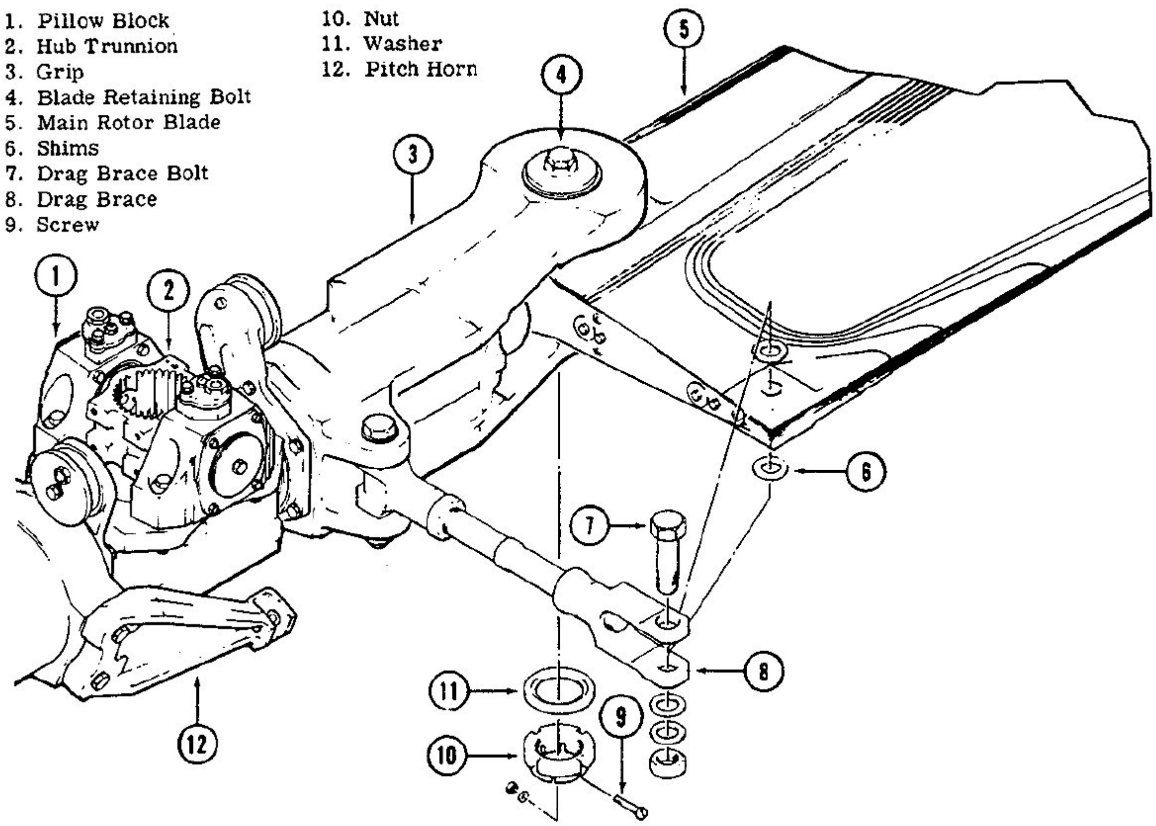


Figure 2-12 - Main Rotor System Detail

2.6.1. Main Rotor

Main rotor is 48 feet in diameter and is a two bladed, semi-rigid flapping type, employing pre-coning and under-slinging. Rotor head assembly consists of two all metal bonded blades, yoke and spindle assembly, trunnion assembly, tension-torsion straps, pitch change horns, blade grips, and drag braces. Each blade is connected to a common yoke by a blade grip and pitch change bearings with tension straps to carry centrifugal forces.

Main rotor assembly is attached to mast with a bearing mounted trunnion, allowing rotor to flap. Trunnion is secured to mast by splines and nut cap fitting that incorporates provisions for cable attachment used in hoisting helicopter. Blade pitch change is accomplished by movement of collective and a series of controls terminating at blade grip horn. Upward movement of collective increases angle of attack of rotor blades and causes helicopter to ascend. Downward movement of collective decreases angle of attack of rotor blades allowing helicopter to descend. Tilting of rotor is accomplished by movement of cyclic, resulting in a corresponding change in plane of rotation of rotor.

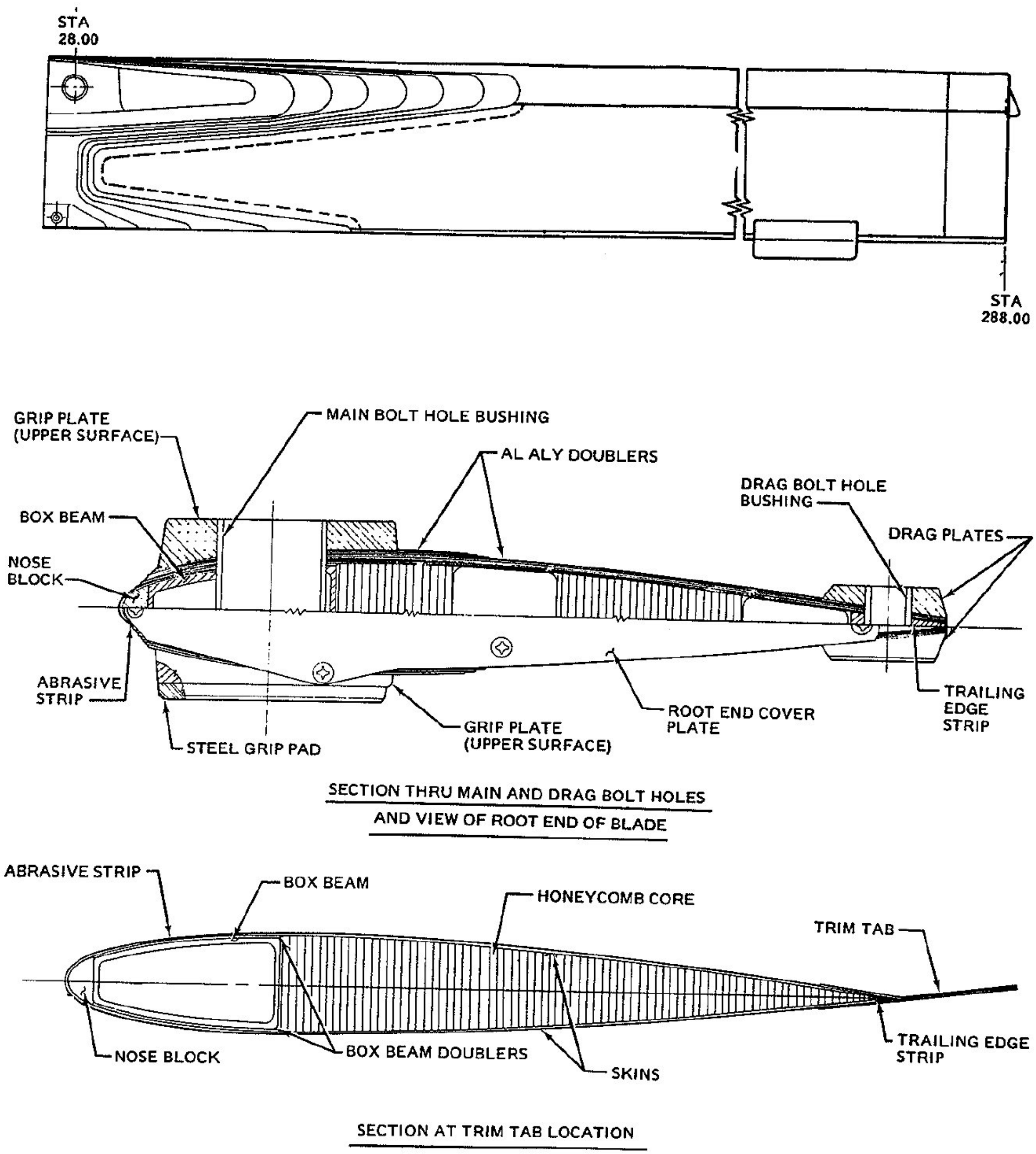


Figure 2-13 - Main Rotor Blade Detail

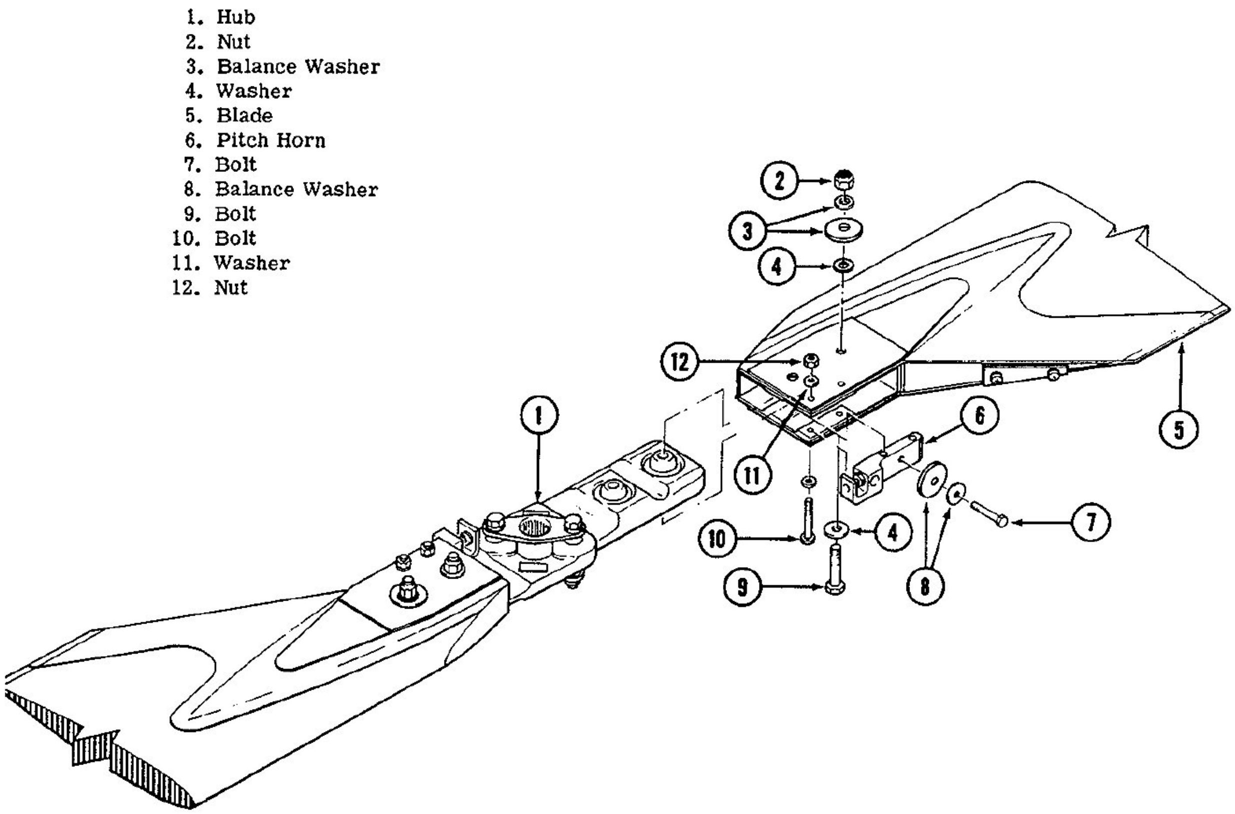


Figure 2-14 - Tail Rotor Hub and Blade

2.6.2. Tail Rotor

Tail rotor is a two bladed system mounted on right side of vertical fin. It is a rigid delta hinged type, employing pre-coning and under-slinging. Each blade is connected to a common yoke by means of a grip and pitch change bearing. Blade and yoke assembly is mounted on tail rotor gearbox shaft by means of a delta hinge trunnion to minimize rotor flapping. Blade pitch is changed by movement of anti-torque pedals to control or maintain heading. Blade pitch change provides torque control and change of directional heading.

1. Bolt
2. Cap
3. Nut
4. Washer
5. Bearing
6. Washer
7. Crosshead
8. Pitch Link
9. Counterweight Link
10. Shield
11. Retaining Nut
12. Counterweight Support
13. Bolt
14. Bolt
15. Bushing
16. Pitch Horn
17. Barrel Nut and Retainer
18. Hub and Blade Assembly
19. Sleeve
20. Pitch Change Tube
21. Gear Box Output Shaft
22. Split Cone Set

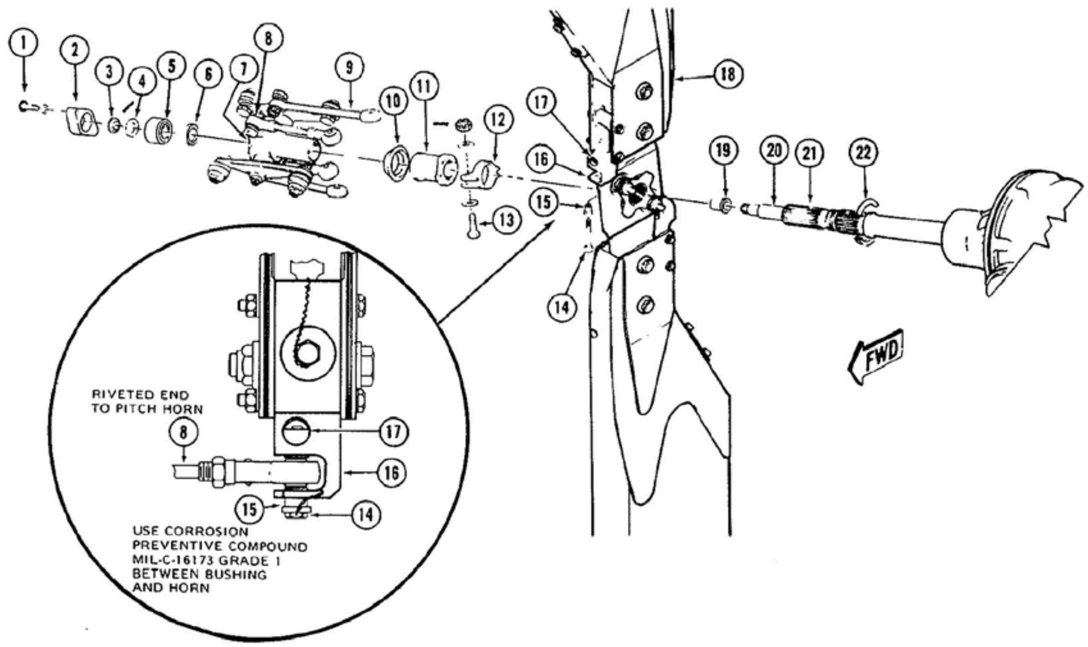


Figure 2-15 - Tail Rotor Installation

2.6.3. Rotor System Indicators

Rotor system indicators consist of dual tachometer, rotor RPM caution light, and rotor RPM audio warning signal.

2.6.3.1 Dual Tachometer

The dual tachometer indicates, in percent, main ROTOR RPM (N_R) on inner scale and ENG RPM (N_2) of the engine on outer scale.

2.6.3.2 Rotor rpm caution light

The main rotor RPM caution lights are mounted on the top of the instrument panel. The lights will illuminate to alert pilots that main rotor RPM (N_R) is above or below limits.

2.6.3.3 Rotor rpm audio warning

An audio warning signal will sound in pilot and copilot headsets, simultaneous with illumination of RPM caution light, when main rotor RPM (N_R) decreases below minimum limit.

2.7. Transmission

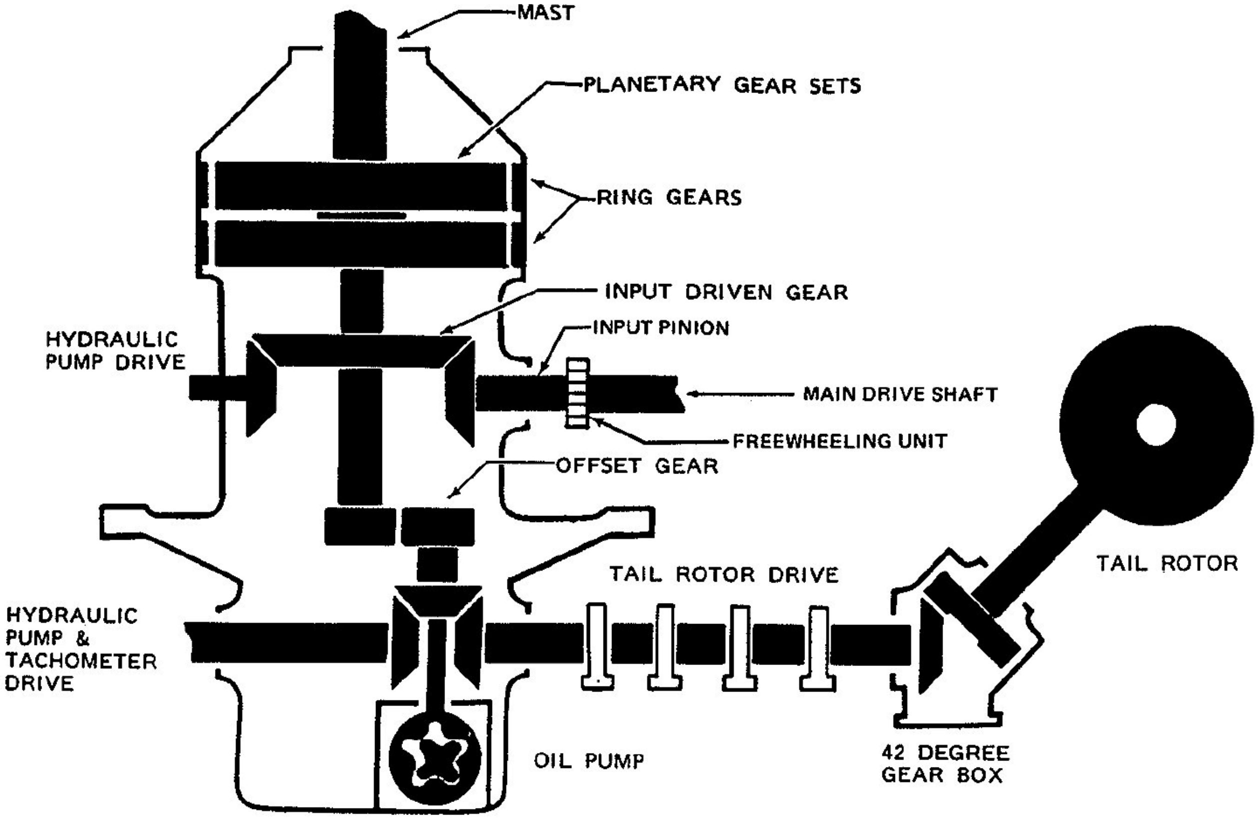


Figure 2-16 - Main Rotor Transmission Schematic

Transmission is located directly forward of power plant and is supported by isolation mounts attached to fuselage pylon structure. Transmission is connected to and driven by power plant through a main driveshaft. Transmission provides a drive angle change and speed reduction. Transmission driven accessories include a rotor tachometer generator, two hydraulic pumps, an oil pump, and rotor brake.

Transmission may have two debris collectors, one under mast bearing and one under planetary gears, to prevent secondary transmission damage. Transmission may also have a triple zone chip detection system, one in each debris collector and one in sump case.

A gage on the instrument panel allows the flight crew to monitor transmission oil temperature and pressure. Caution lights are provided to warn of high oil temperature, low pressure, and metal particles in the oil. Three remote indicators are located on the right side of the pedestal.

2.7.1. Transmission Oil System

An integral lubrication system circulates oil under pressure throughout transmission. A gear driven pump forces oil out of sump, through a filter, and through external lines to cooler. When oil is cooled and returns to transmission, oil passes through another filter before entering a pressure manifold for circulation throughout transmission. During startups, cooler is bypassed until oil is warm. A pressure relief valve is included in system. Oil level sight gages are located on sump case.

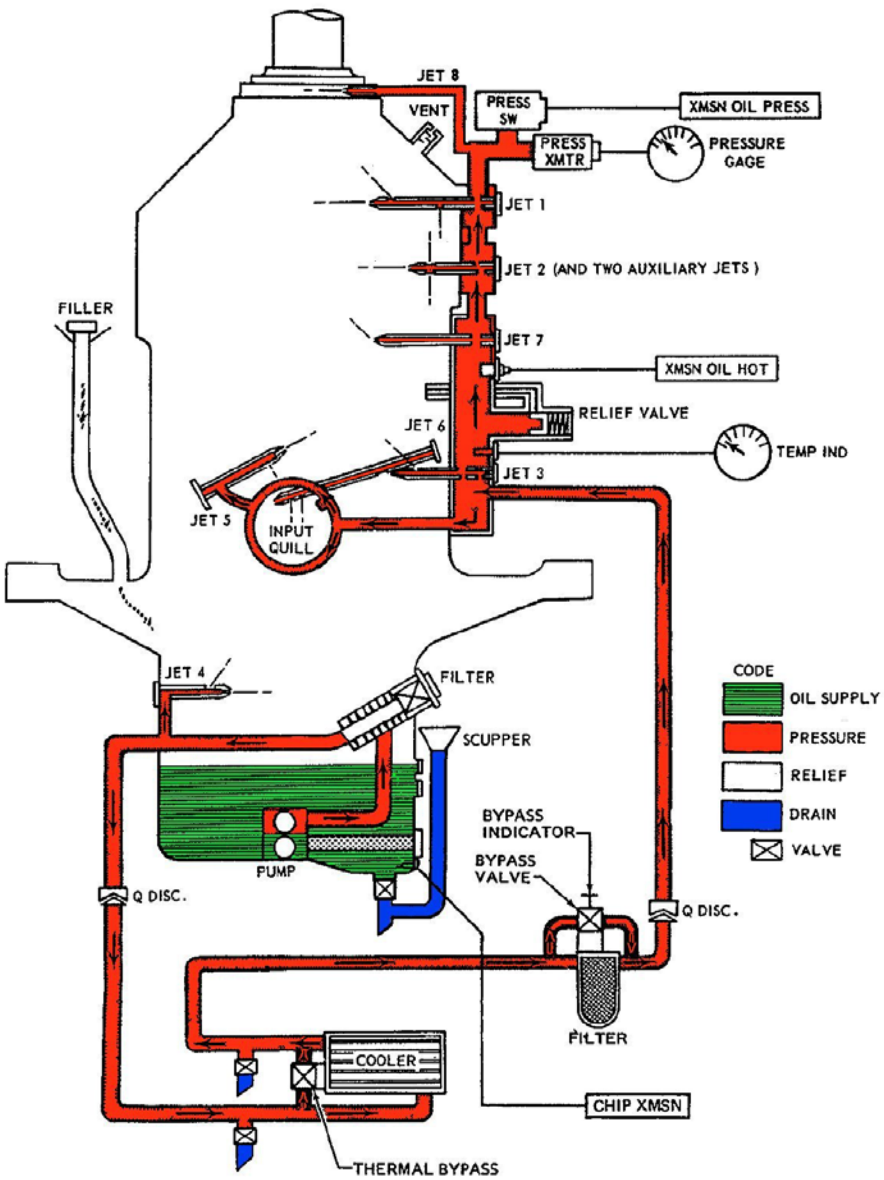


Figure 2-17 - Main Rotor Transmission Oil System Schematic

2.7.2. Transmission Indicators

Transmission indicators include an oil temperature and pressure gage, oil temperature and pressure warning lights, and chip detector caution light.

2.7.2.1 Transmission Oil Temperature and Pressure Gage
Transmission oil temperature and pressure gage is a dual instrument that simultaneously displays oil temperature in degrees Celsius on left scale and oil pressure in PSI on right scale.

2.7.2.2 Transmission Oil Warning Lights
XMSN OIL TEMP warning light will illuminate when transmission oil temperature exceeds 110°C and XMSN OIL PRESS warning light will illuminate when transmission oil pressure falls below 30 psi.

2.7.2.3 Transmission Oil Chip Detector Caution Light
XMSN CHIP caution light will illuminate if any of three transmission chip detectors sense metal particles in transmission oil.

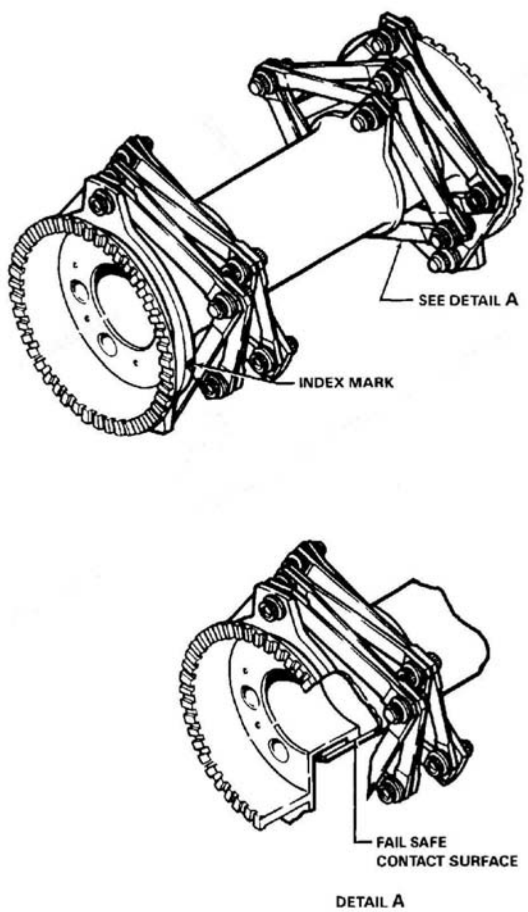


Figure 2-18 - Main Driveshaft

2.8. Power Plant

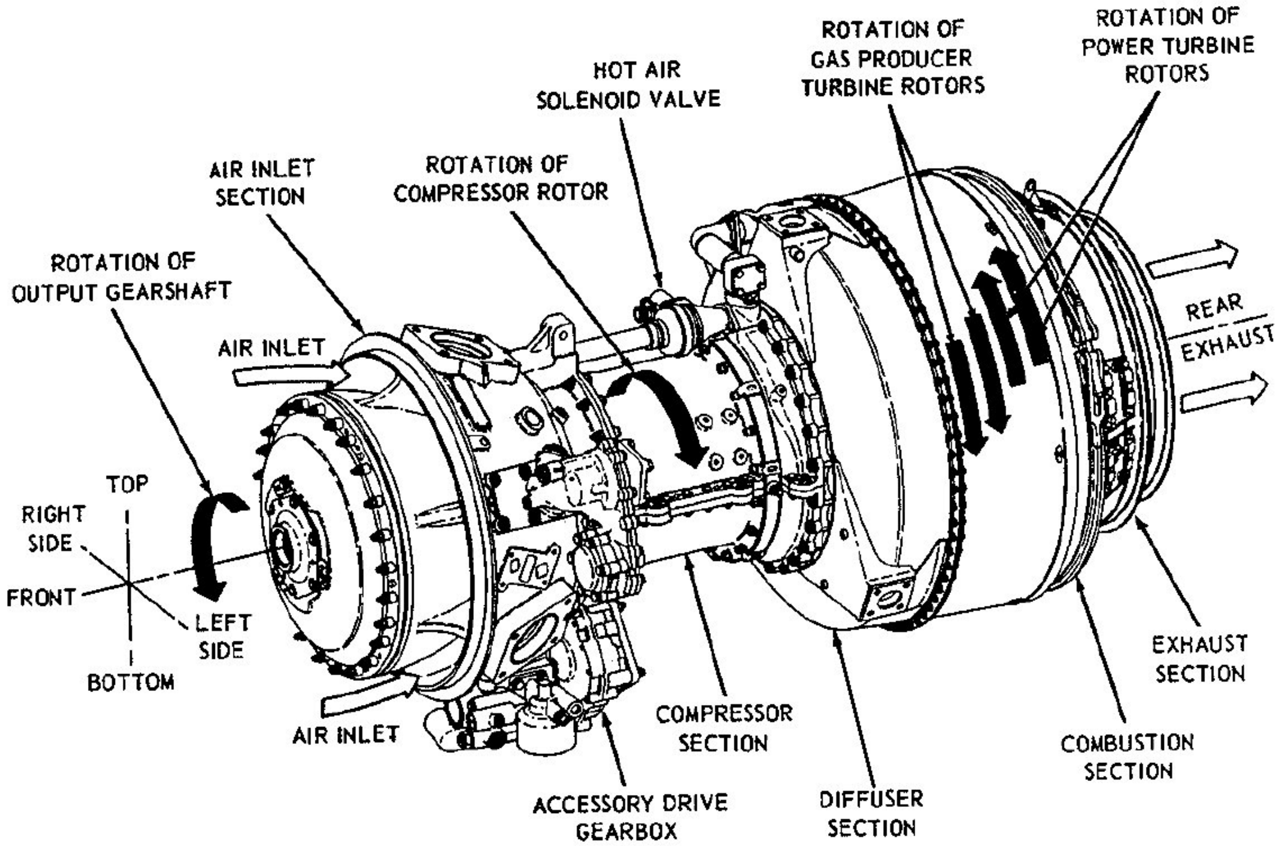


Figure 2-19 - Powerplant

The power plant is a Honeywell T53-17A or T53-17B or T53-17BCV which consists of a free turbine power section that connects directly to the transmission through a free-wheeling unit. The engine has a lubrication system, starter-generator, and fuel control.

2.8.1. Engine Controls

Engine controls include gas producer control system, droop compensator control system, governor switches and various subsystem control switches.

2.8.1.1 Gas Producer Control System

Gas producer control system provides control of gas producer RPM (N_1) of the engine. Twist grip throttles, located on pilot and copilot collective, are connected to gas producer fuel control (which automatically regulates fuel flow) of the engine.

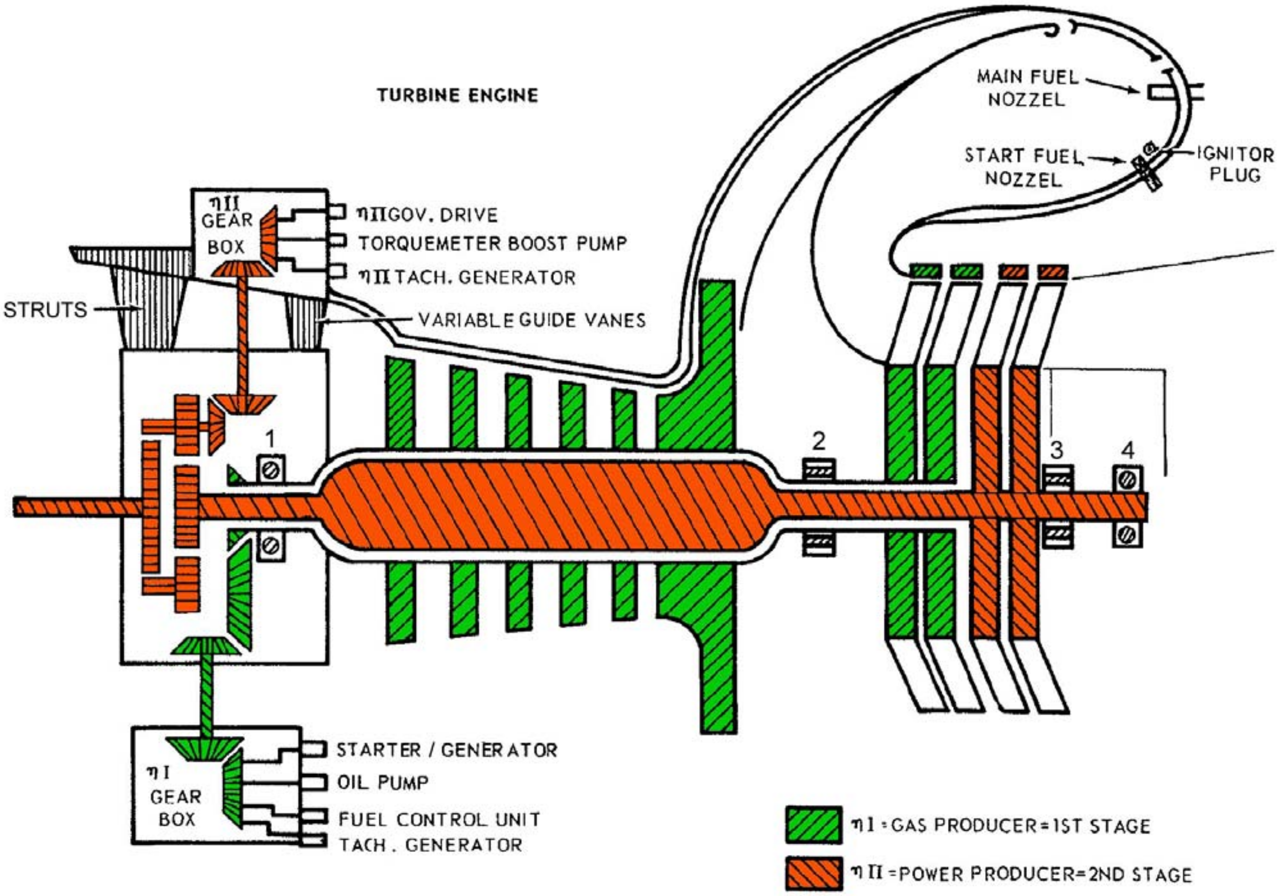


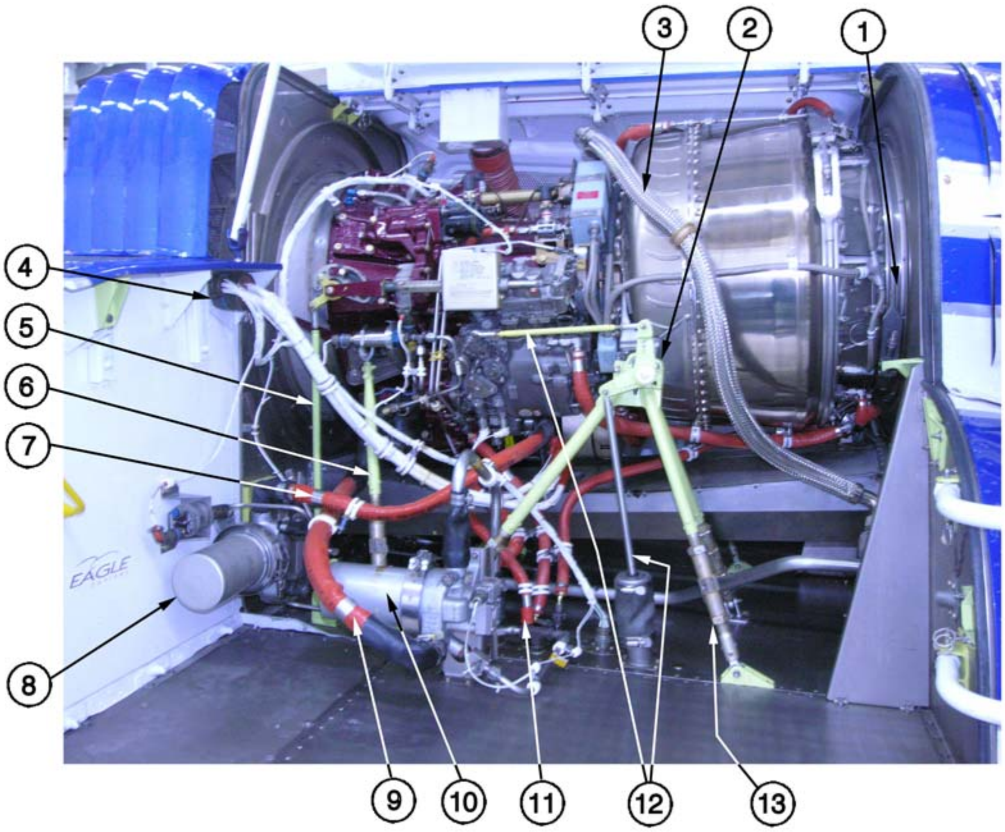
Figure 2-20 - N1/N2 Engine Sections

2.8.1.2 Droop Compensator Control System

Droop compensator control system schedules power turbine governor to maintain N_2 RPM within a specified range. A mechanical connection, into a collective system bellcrank, provides automatic scheduling (droop compensation) when changes in collective occur.

2.8.1.3 Governor Switch

Governor switch, located on pedestal, is a two position switch labeled ENGINE GOV AUTO and MANUAL. When in AUTO, automatic fuel control unit (N_1) is automatically controlled and when in MANUAL, the pilot controls N_1 rpm with the throttle.



1. V-Band Coupling (AFT)
2. Pillow Block
3. Bleed Air Hose
4. Starter-Generator and Engine Electrical Connectors
5. Governor and Cambox Control Rods
6. Forward Support Tube
7. Fuel Control Inlet Hose
8. Fuel Filter
9. Oil Pump Outlet Hose
10. Oil Filter
11. Starter Drive Seal Drain Hose
12. Fuel Control Rods
13. Tripod

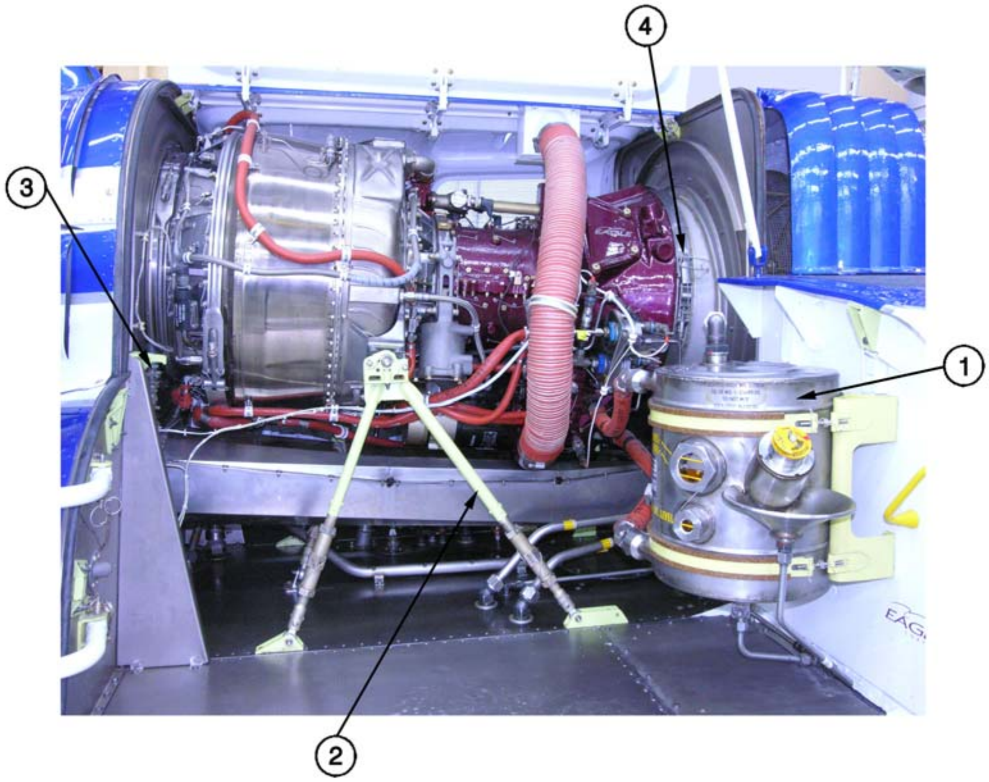
Figure 2-21 – Engine Compartment - LH Side Typical

2.8.1.4 IDLE STOP REL Switch

IDLE STOP REL switches, located on both collectives, are two position, momentary button switches used to activate idle stop solenoid for the engine. When pressed, idle solenoid is retracted and the throttle can be rolled below idle stop.

2.8.1.5 RPM INCR DECR Switch (N_2)

RPM INCR DECR switches, located on pilot and copilot collectives, are three position, momentary on switches. INCR (increase) DECR (decrease) positions controls an electric linear actuator in droop compensator control linkage and provides adjustment of speed selector lever on the engine power turbine governor.



1. Oil Tank
2. Bipod
3. EGT/MGT Firewall Connector
4. V Band Coupling (FWD)

Figure 2-22 – Engine Compartment - RH Side Typical

2.8.2. Engine Indicators

Engine indicators include a torquemeter, dual tachometer, gas producer gage, EGT/MGT gage, oil temperature and pressure gages, engine out warning lights, governor caution light, oil pressure caution light, and chip detector caution light.

2.8.2.1 Torquemeter

For aircraft S/Ns 30687, 30931, 30576, 30817 and 30599, the torquemeter displays, in PSI, torque from the engine. For all aircraft except S/Ns 30687, 30931, 30576, 30817 and 30599, the torquemeter displays, in percent, torque from the engine.

2.8.2.2 Dual Tachometer

The dual tachometer simultaneously displays, in percent, ROTOR RPM (N_R) (inner scale) and ENG RPM (N_2) (outer scale).

2.8.2.3 Gas Producer Gage
Gas producer (GAS PROD) RPM (N_1) gage displays engine gas producer in percent of rated RPM.

2.8.2.4 EGT/MGT Gages
Exhaust Gas Temperature (T53-17A) or Measured Gas Temperature (T53-17B/BCV) are displayed in degrees Celsius.

2.8.2.5 Oil Temperature and Pressure Gages
The engine oil temperature and pressure gage simultaneously displays oil temperature in degrees Celsius on left scale and oil pressure in psi on right scale.

2.8.2.6 Engine RPM Warning Lights
Two red ENG RPM warning lights (Pilot and Copilot's) located on the top of the instrument panel, illuminate to alert the crew that the N_2 is below 89 ± 1%. Additionally the low engine audio will be triggered at this same rpm.

2.8.2.7 Governor Caution Light
The GOV MANUAL caution light illuminates to alert pilot that respective governor switch is in MANUAL and pilot must control gas producer rpm with throttle.

2.8.2.8 Oil Pressure Caution Light
OIL PRESSURE caution light illuminates to alert crew that the engine oil pressure is below operating limits.

2.8.2.9 Chip Detector Caution Light
ENG CHIP caution light illuminates to alert crew that the engine chip detector has detected metal particles in engine oil.

2.9. Fuel System

1. Pressure transmitter
2. Manifold valve
3. Filler cap
4. Shutoff valves
5. Main fuel filter
6. Governor bleed lines
7. Vent lines
8. Fuel quantity probes
9. Center cell door
10. Crossover assemblies
11. Capped auxiliary fuel inlet
12. Sump assembly
13. Sump drain valve
14. Cell divider flapper valve
15. Forward drain valve
16. Forward interconnect valve
17. Ejector pump
18. Quantity gage probe
19. Cell vent line
20. Aft interconnect valve
21. Defuel valve
22. Fuel manifold drain line

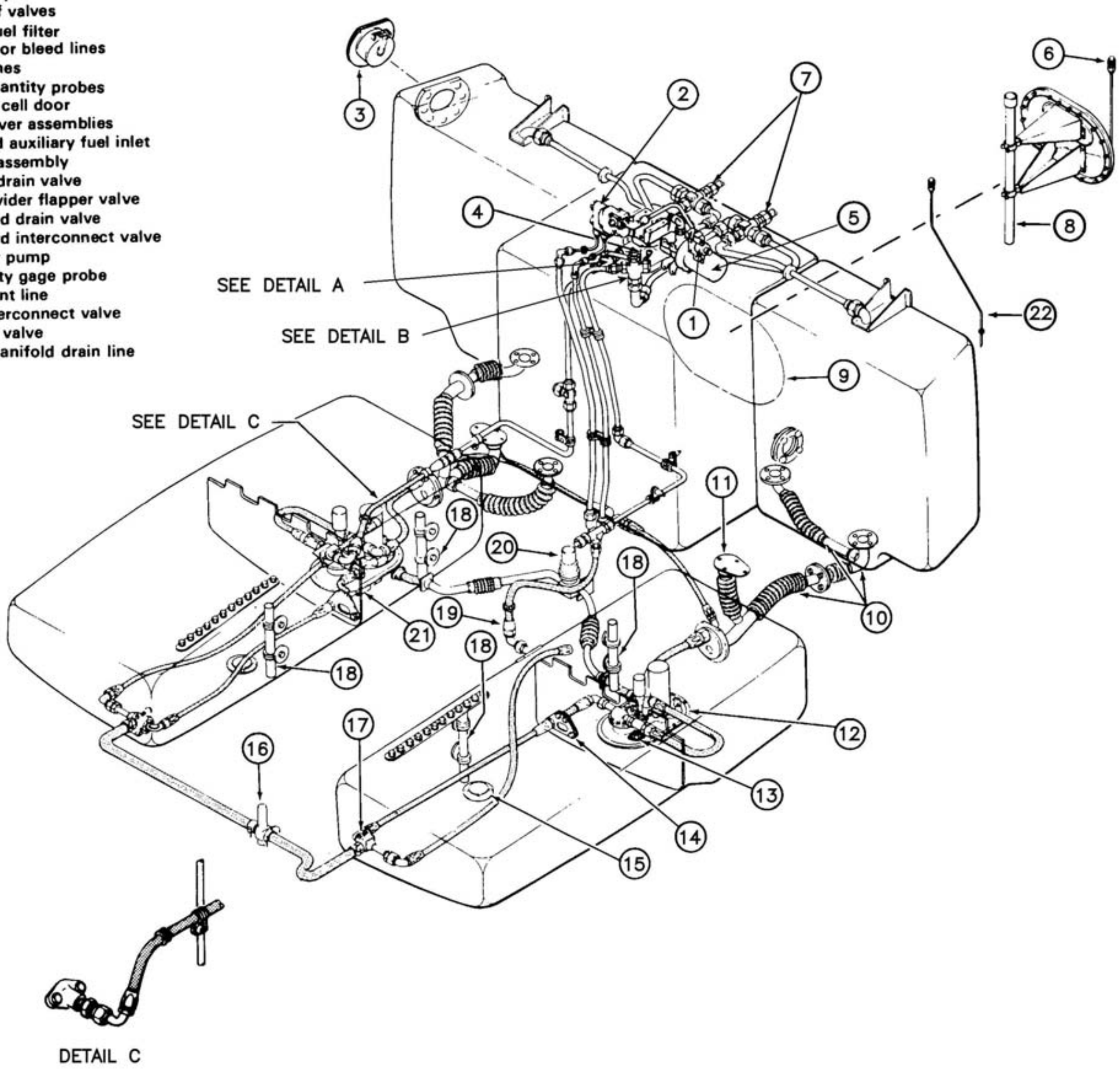


Figure 2-23 - Fuel System Pictorial

Fuel is contained in five interconnected fuel cells (Figure 2-23), three aft of passenger compartment and two under passenger compartment floor. Two cells under floor are continuously supplied by gravity feed from three aft cells. If boost pump in either cell fails, there are two crossfeed tubes (1 forward and 1 aft) to allow fuel to transfer from the non-functioning tank to the functioning tank.

Each lower cell is separated into a forward and aft compartment by a baffle. Aft compartment contains a sump assembly equipped with an electrically operated boost pump, breakaway valve, flow activated switch, drain valve, defueling valve, and low level float switch. A fuel quantity probe is installed in each compartment. A flapper valve, in baffle, allows front to back flow and a hose assembly with an ejector type pump ensures this flow regardless of helicopter attitude. The interconnect valves, in line between forward compartments of both fuel cells and another between aft compartments is fixed opened to permit crossflow between cells when fuel level becomes low.

Three aft cells are aligned across fuselage. Each outboard cell feeds lower cell on same side. Interconnect lines are installed between outboard cells and center cell.

Fuel system filler port is located on right side of helicopter with an electrical ground receptacle for fuel nozzle located nearby.

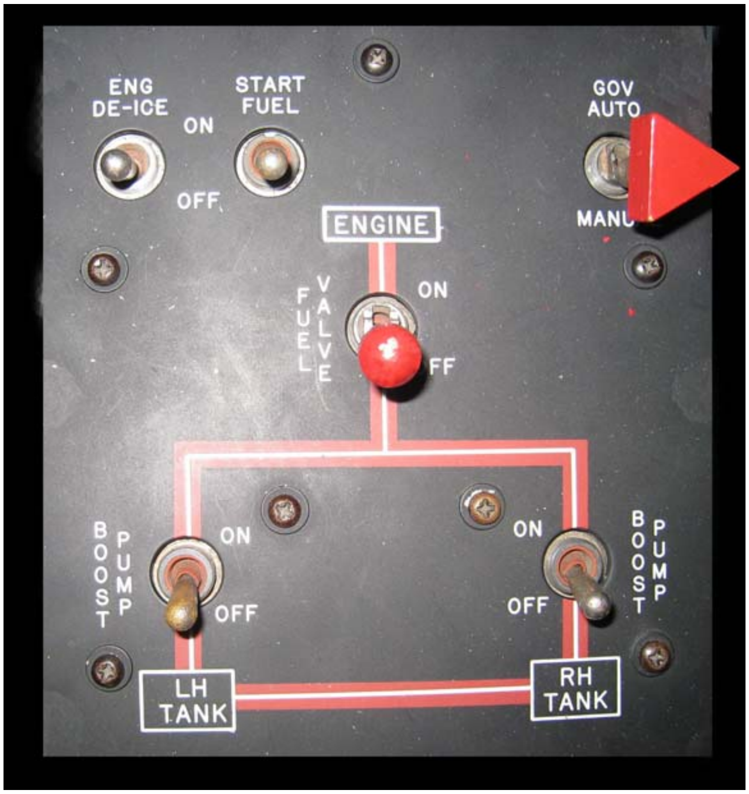


Figure 2-24 – Fuel Panel - Typical

2.9.1. Fuel System Controls

Fuel system controls consists of a fuel valve switch and boost pump switches.

2.9.1.1 Fuel Valve Switch
The ENGINE FUEL switch, located on pedestal, is a two position switch labeled ON and OFF that controls fuel flow from fuel tanks to engine. ON position provides power to fuel valve and arms ignition system. When switch is OFF, power is removed and sump drain switches are powered so fuel sample can be taken from sump drain.

2.9.1.2 Boost Pump Switches
#1 BOOST PUMP and #2 BOOST PUMP switches, located on pedestal, are two position switches labeled ON and OFF. When in ON position, power is supplied to fuel cell mounted boost pumps and when in OFF position, power is removed from pumps.

2.9.2. Fuel System Indicators

Fuel system indicator includes fuel quantity indicator, fuel boost caution lights, fuel filter caution light, fuel low caution lights, and fuel valve caution light.

2.9.2.1 Fuel Quantity Indicator
S/Ns 30687, 30931 and 30576, Fuel quantity Indicator, located on instrument panel, displays total fuel quantity, left system quantity, and right system quantity depending on position of FUEL QTY SEL switch located to left of indicator. Fuel quantity is displayed in pounds x 100.

On all other S/Ns the FUEL QTY SEL switch has been removed and the FUEL QUANTITY INDICATOR only displays total fuel

2.9.2.2 Fuel Boost Caution Lights
#1 FUEL BOOST and #2 FUEL BOOST caution lights illuminate to alert crew that respective fuel boost pump pressure is low or pump has failed.

2.9.2.3 Fuel Filter Caution Lights
ENG FUEL FILTER caution light illuminates to alert crew that respective fuel filter is partially clogged.

2.9.2.4 Fuel Low Caution Lights
#1 FUEL LOW and #2 FUEL LOW caution lights illuminate to alert crew that fuel available to respective engine is low (approximately 140 pounds remaining).

2.9.2.5 Fuel Valve Caution Lights
ENG FUEL VALVE caution light is normally illuminated during transit, and extinguish when valve position is same as that of switch. A fault is indicated if it does not extinguish.

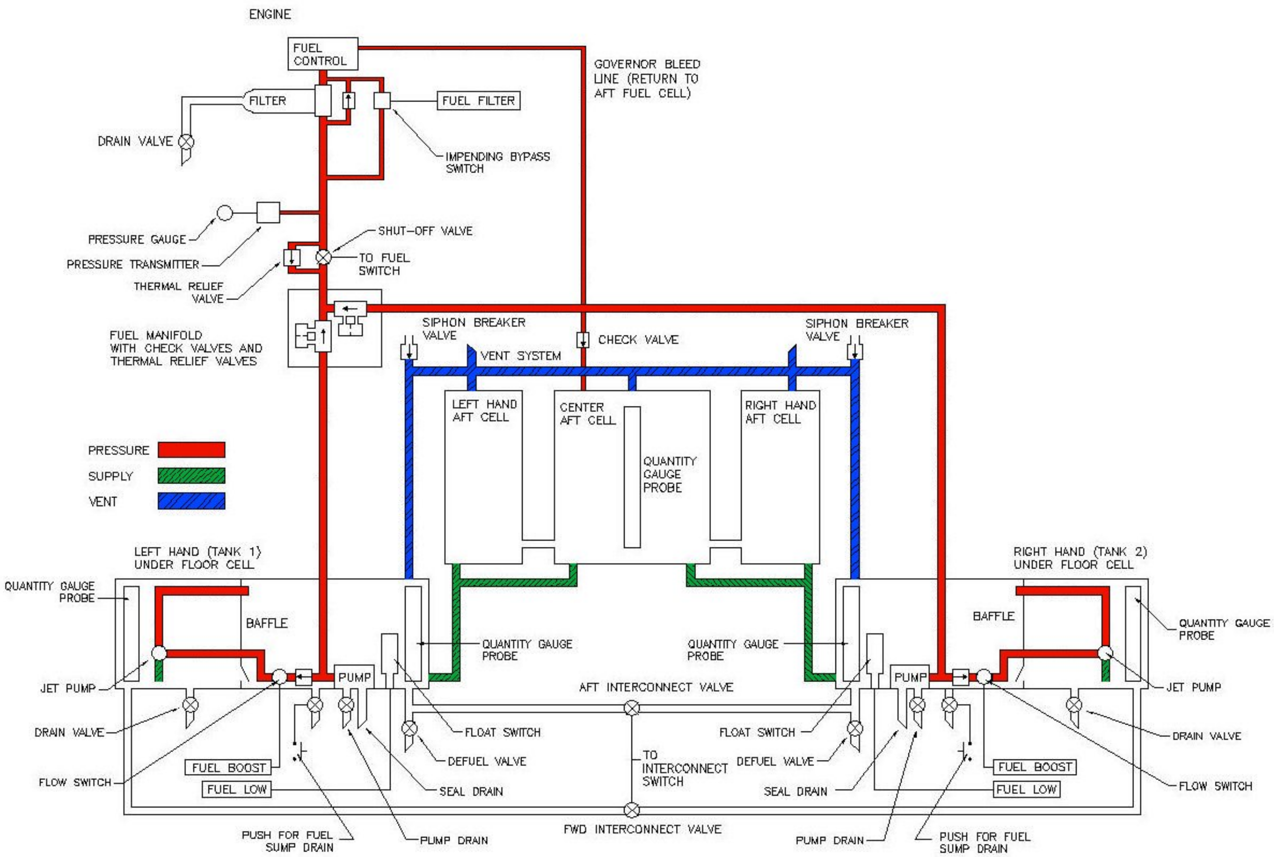


Figure 2-25 - Fuel System Pictorial Schematic

2.10. Electrical Systems

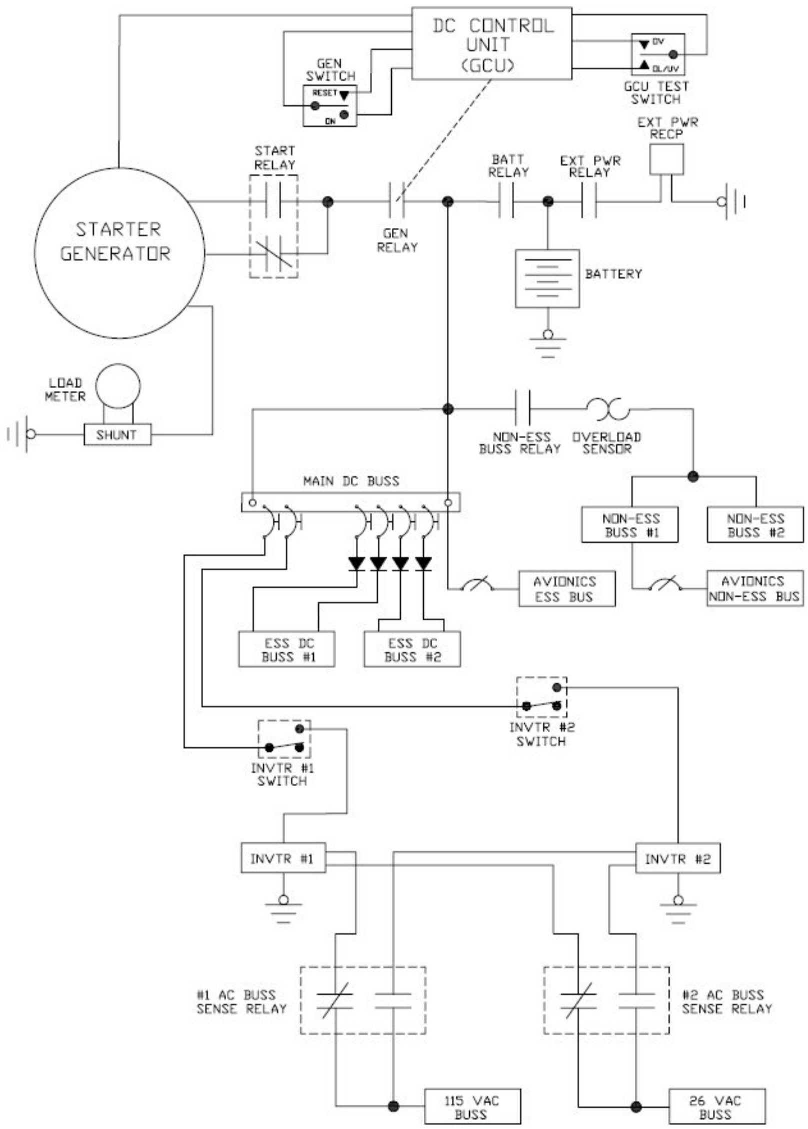


Figure 2-26 - Electrical System Schematic

2.10.1. DC Electrical System

Primary DC electrical power is supplied by a single 28 volt, 300 Amp, starter/generator. The power is distributed to the main DC buss. The main DC buss then provides power through the essential buss feeder circuit breakers to both the essential and nonessential busses. The nonessential buss is connected to the system through the nonessential buss relay and the nonessential buss load sensor. In the event that loads become too great, the load sensor will open the circuit and disconnect the nonessential buss from the system, leaving only the essential buss connected. The nonessential buss may be re-activated by placing the NON-ESS BUSS switch into the MANUAL position. A backup source of emergency power, in the event the starter/generator becomes inoperative, is provided by a 24 volt, 42 ampere hour lead-acid battery. Power for engine starting is provided by the battery or and external 28 VDC power source. Refer to Figure 2-26 for the electrical system schematic.

2.10.2. AC Electrical System

A secondary source of power, used to operate the equipment that requires alternating current is supplied by two 250 Volt-amp, single phase, solid state inverters.

For aircraft S/Ns 30687, 30931, 30576, 30817 and 30599, Inverter #1 normally feeds both the 115 VAC and the 26 VAC requirements of the helicopter, with Inverter #2 as a backup. In the event of inverter #1 failure, inverter #2 will automatically take over, provided the INV 2 switch is in the AUTO/ON position. An inverter blower will only operate when inverter #2 is supplying AC power to the busses.

For all aircraft except S/Ns 30687, 30931, 30576, 30817 and 30599, Inverter #1 will normally feed the 115VAC buss and Inverter #2 will normally feed the 26 VAC buss, provided INV2 switch is in the AUTO/ON position. In the event of a failure of either inverter, the other inverter will automatically supply power to the lost buss. Both inverters have internal cooling fans which operate when the inverter is powered.

Refer to Figure 2-26 for the electrical system schematic.

2.10.3. Electrical System Controls

Electrical system controls consist of one battery switch, a generator switch, nonessential bus switch, and two inverter switches.

2.10.3.1 Battery Switch

The battery switch, located on the overhead console, is a two position switch labeled OFF and ON. When the switch is selected to ON, the battery relay is closed and power is supplied to the main DC buss.

2.10.3.2 Generator Switch

The generator switch located on overhead console, is a three position switch labeled RESET, OFF, and ON. The switch controls flow of current to the main DC bus. When the switch is ON, generator output circuit is completed to reverse current relay and main DC bus. The switch is spring loaded to return to OFF when placed in RESET and released. RESET position is used to attempt to restore generator power to system. If the GENERATOR caution light illuminates, indicating system malfunction, switch should be placed in RESET momentarily, then moved to ON. If caution light extinguishes, system has returned to normal. OFF position removes generator output.

2.10.3.3 Nonessential Bus Switch

The NON-ESS BUS switch, located on the overhead console, is a two position switch labeled NORMAL and MANUAL which controls the nonessential buss relay. In the NORMAL position, if the generator fails or loads to the buss become excessive, the nonessential buss relay will open and power will be disconnected from the nonessential buss. When in the MANUAL position, the nonessential buss will be powered from the main DC buss regardless of generator operation.

2.10.3.4 Inverter Switches

The INV 1 and INV 2 switches, located on overhead console, are two position switches labeled ON and OFF. When in ON position, power is supplied to respective inverter. When in OFF position, power is removed from respective inverter.

2.10.4. Electrical System Indicators

Electrical system indicators include a DC loadmeter and an AC/DC voltmeter, warning light, and caution lights.

2.10.4.1 DC Loadmeter

The DC loadmeter, located on instrument panel, displays electrical current loading for the generator.

2.10.4.2 AC/DC Voltmeter

The AC/DC voltmeter, located on instrument panel, display electrical output of the inverter and generator in volts.

2.10.4.3 Battery Caution Light

BATTERY caution light illuminates to alert pilot that battery relay is open and BATTERY switch is in ON position.

2.10.4.4 DC Generator Caution Light

The GENERATOR caution light illuminates to alert crew that the generator is not operating.

2.10.4.5 Inverter Caution Lights

INVERTER 1 and INVERTER 2 caution lights illuminate to alert crew that respective inverter is not operating.

2.10.4.6 External Power Caution Light

EXTERNAL POWER caution light illuminates when external power receptacle door is open.

2.11. Hydraulic Systems

Figure 2-27 – Hydraulics Panel - Typical

Two separate hydraulic systems are used to assist cyclic, collective, and antitorque flight controls. Each system contains a reservoir, pump, integrated valve and filter assembly, accumulator, and check valves.

Each integrated valve and filter assembly contains a system pressure filter and a system return filter. In event any of these filters becomes partially clogged, a button on filter housing will pop out to give an indication of filter bypass. This button will also activate a switch which will cause a remote hydraulic filter bypass indicator, in lower right area of nose section, to switch from green to red or black to white. Remote bypass indicator can be seen on preflight check through right chin bubble.

Hydraulic pumps are driven by transmission and have different rated capacities. System 1 pump delivers a greater volume of fluid to operate anti-torque flight control servo actuator.

Cyclic and collective flight control servoactuators are each powered by both hydraulic systems, such that if either system fails, remaining system will operate servoactuators. Antitorque servoactuator is powered by system 1 only.

2.11.1. Hydraulic System Controls

HYDR SYS NO. 1 and HYDR SYS NO. 2 switches, located on pedestal, are two position switches labeled OFF and ON. When in ON position, hydraulic power is provided to flight control servo actuators and when in OFF position, hydraulic power is removed.

2.11.2. Hydraulic System Indicators

Hydraulic system indicators include dual temperature and pressure gage for each system and a caution light.

CHAPTER 2 – GENERAL DESCRIPTION

Helicopters serial number 30504 through 30596 incorporate a gage for temperature as well as for pressure for each system.

2.11.2.1 Hydraulic Temperature and Pressure Gages

Hydraulic temperature and pressure gages, mounted on instrument panel, display hydraulic oil temperature in degrees Celsius on left scale and hydraulic oil pressure in psi on right scale. On helicopters serial number 30504 through 30596 a gage is included for temperature as well as pressure for each hydraulic system.

2.11.2.2 Hydraulic System Caution Lights

HYDRAULIC caution light will illuminate to alert crew that hydraulic oil pressure has dropped below 650 psi or hydraulic oil temperature has exceeded 88°C.

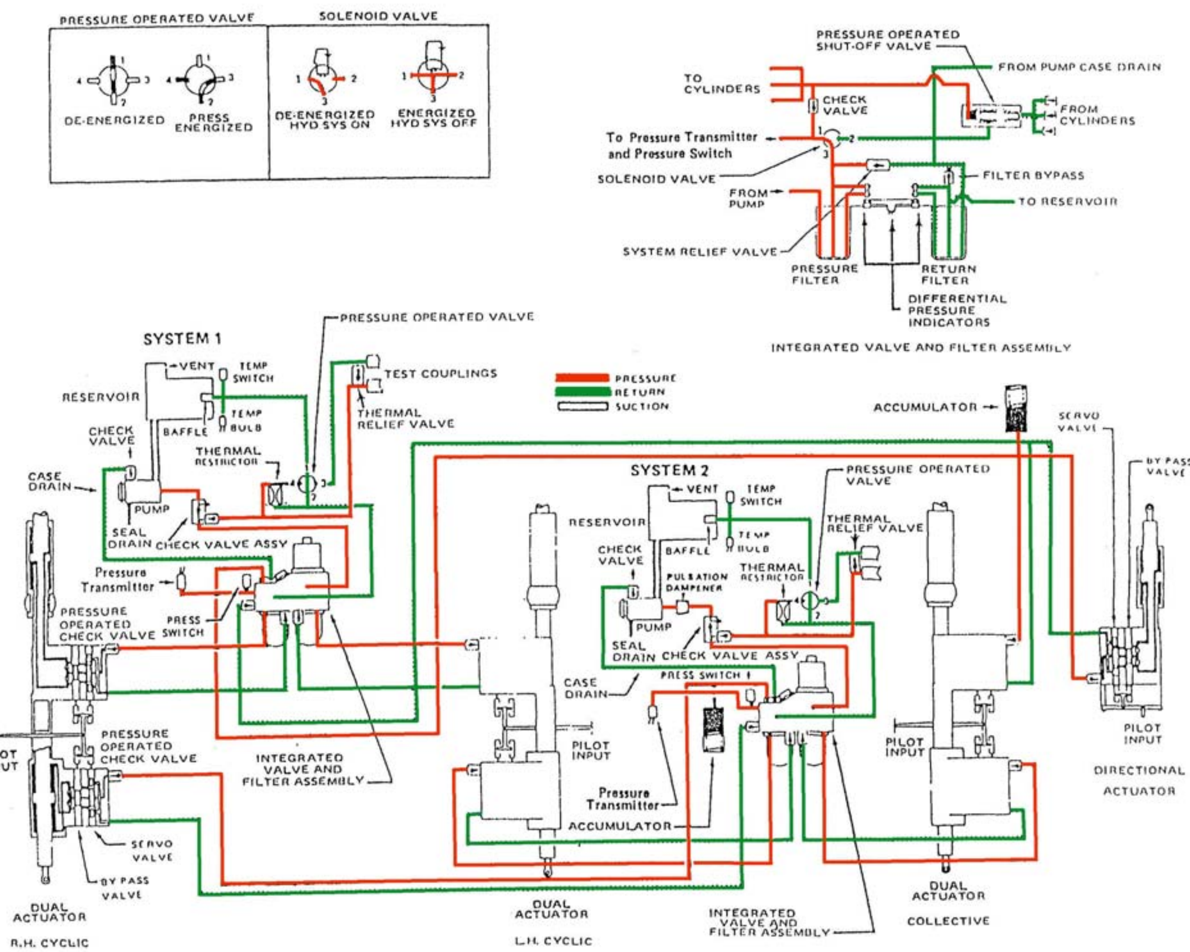


Figure 2-28 - Dual Hydraulic System

2.12. Flight Control System

1. Bolt
2. Spring
3. Control Tube
4. Boot
5. Universal
6. Cylinder Support
7. Hydraulic Cylinder
8. Bellcrank
9. Control Tube (2)
10. Control Tube
11. Boot
12. Universal
13. Support
14. Hydraulic Cylinder
15. Bellcrank
16. Control Tube
17. Magnetic Brake
18. Force Gradient
19. Control Tube
20. Magnetic Brake
21. Force Gradient
22. Control Tube
23. Bellcrank
24. Control Tube
25. Pilot Cyclic Stick
26. Tube and Lever Assembly
27. Control Tube
28. Mixing Lever
29. Control Tube
30. Input Lever

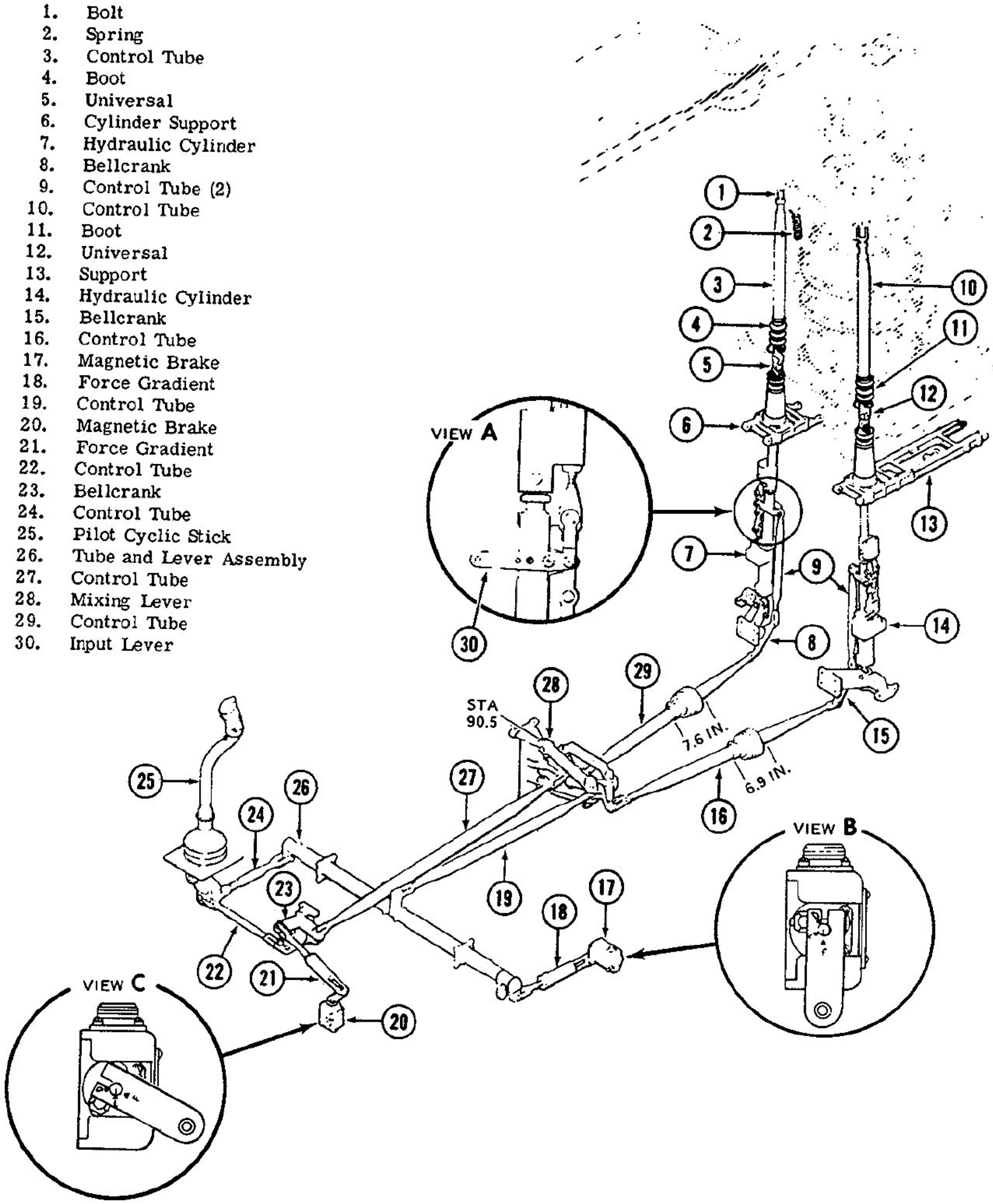


Figure 2-29 - Cyclic Control System

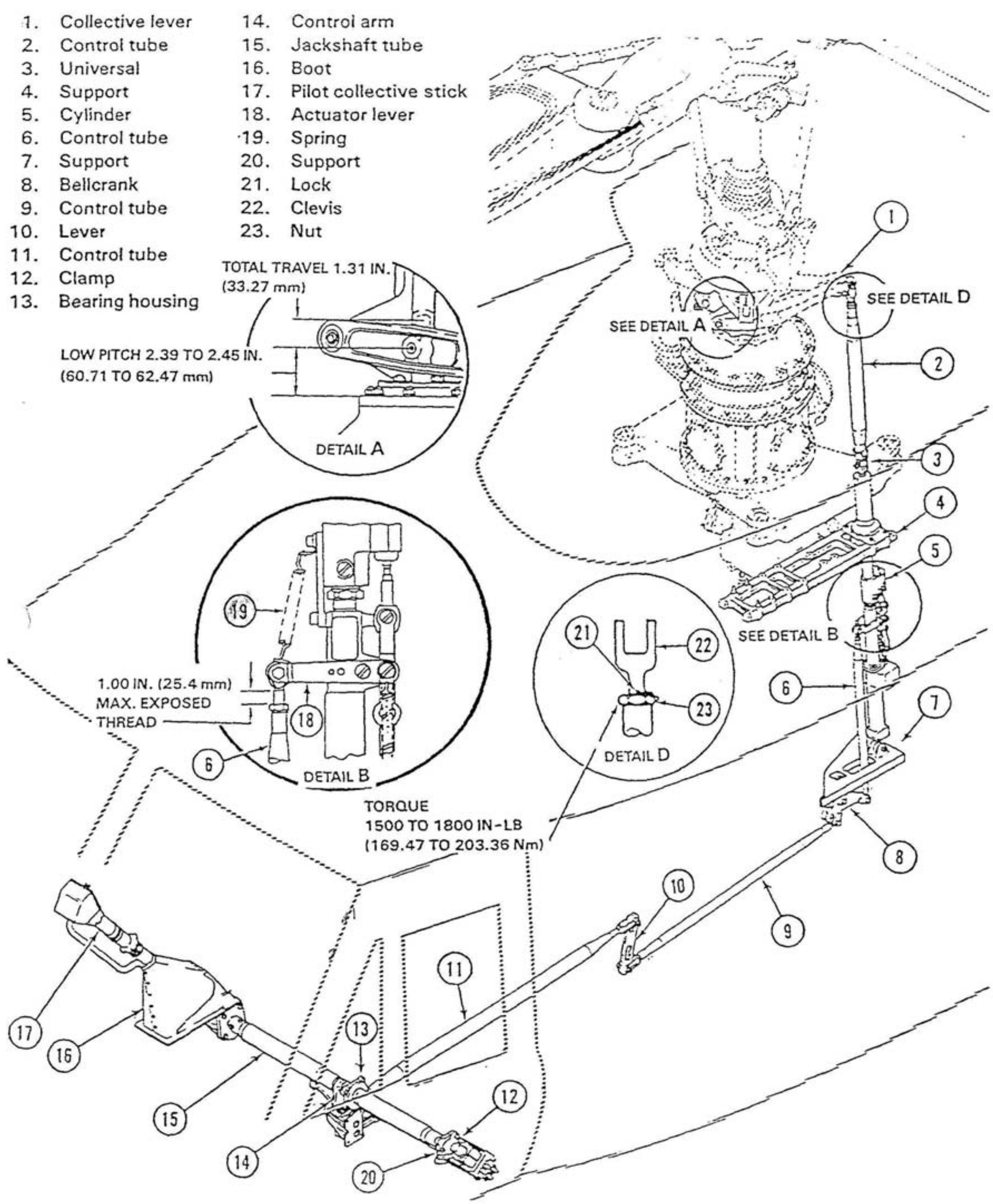


Figure 2-30 - Collective Control System

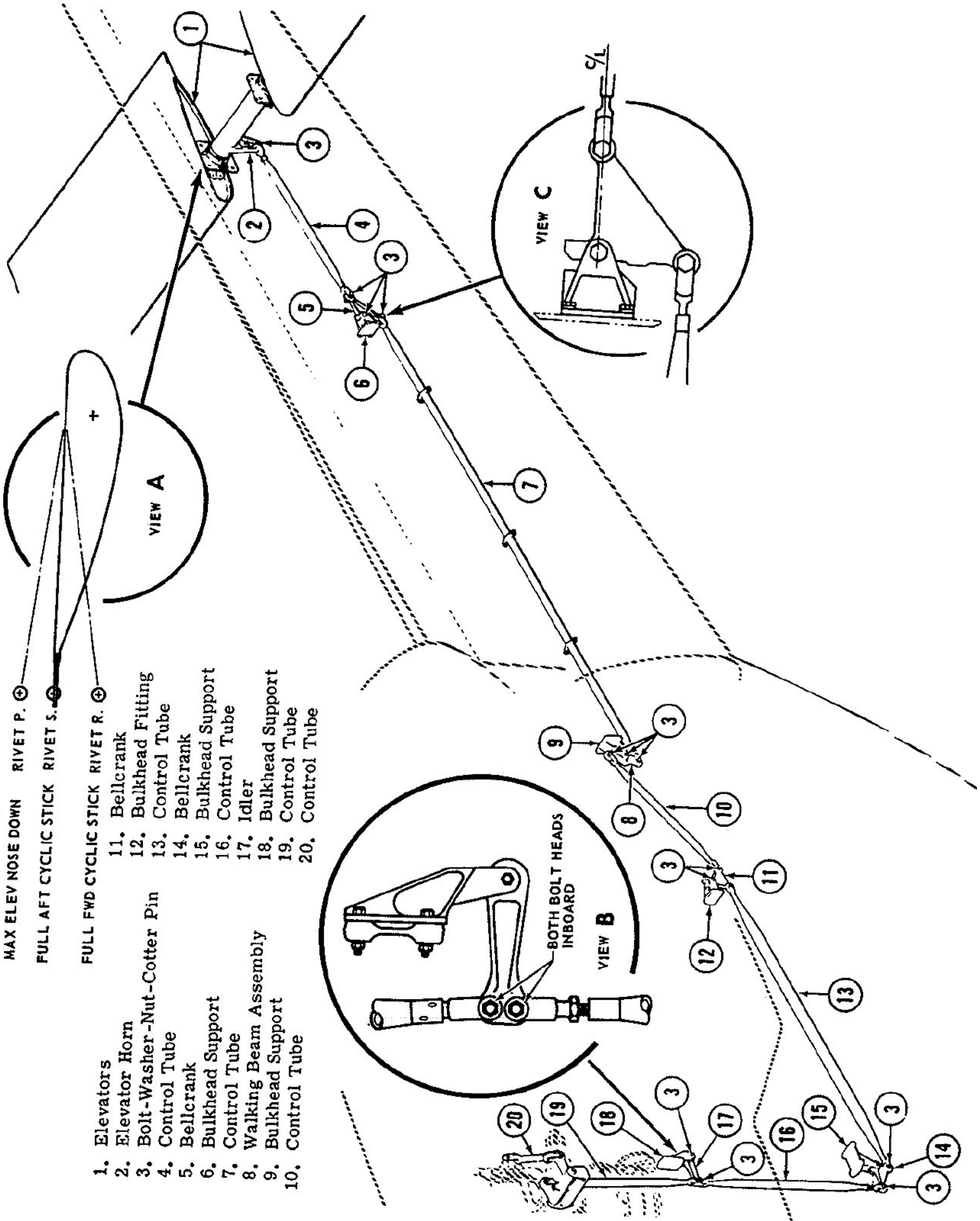


Figure 2-31 - Synchronized Elevator Control System

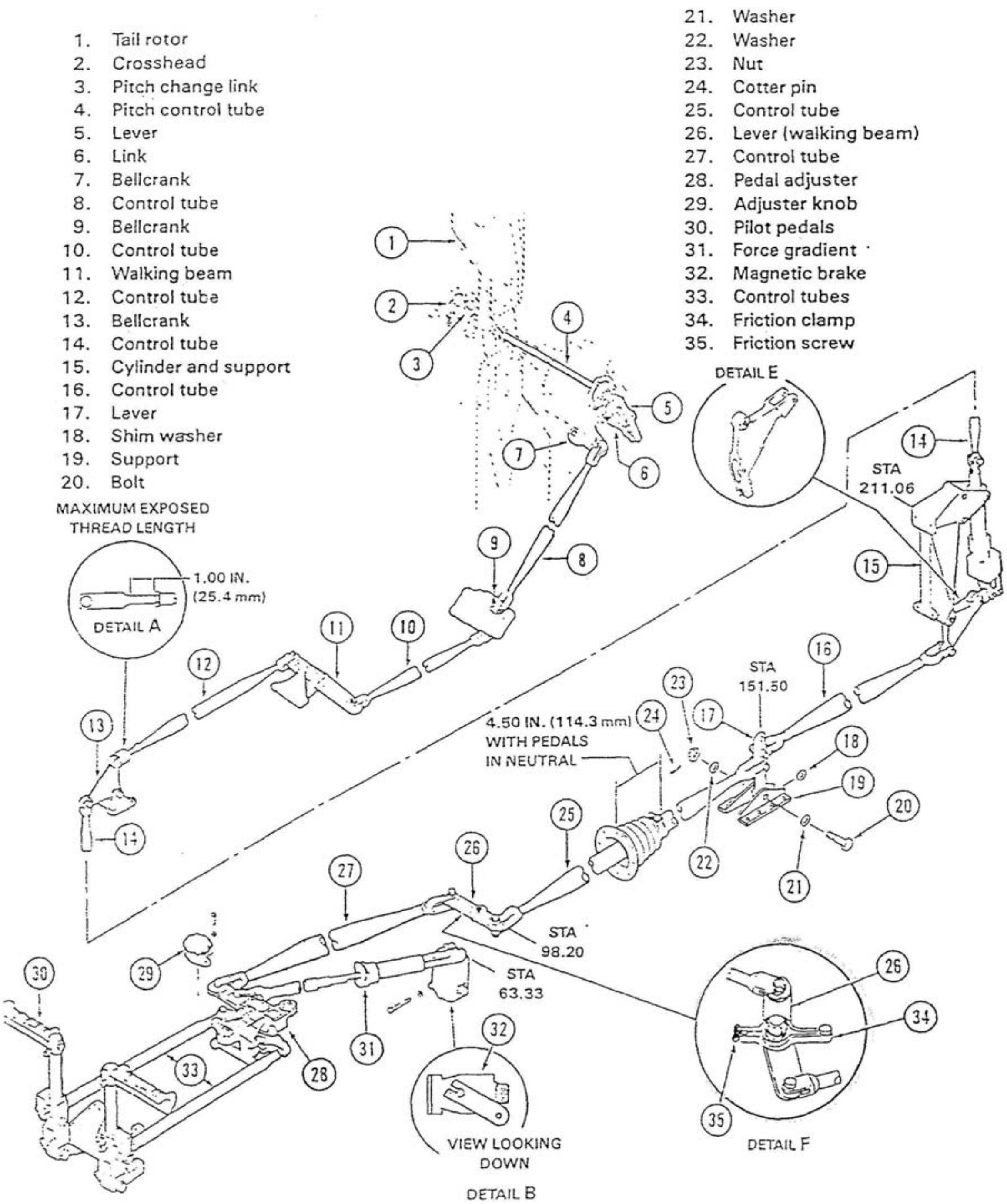


Figure 2-32 - Anti Torque Control System

CHAPTER 2 – GENERAL DESCRIPTION

Flight control system, consisting of cyclic, collective, and antitorque controls is used to control helicopter attitude, altitude, and direction of flight. Flight controls are hydraulically boosted to reduce pilot effort and to counteract control feedback forces,

Control inputs from cyclic, collective, and antitorque pedals are transmitted by push-pull tubes and bellcranks to hydraulic flight control servoactuators. Two cyclic flight control servo actuators are connected to swashplate, located above transmission. Swashplate converts fixed controls to rotating controls and actuates alternating cyclic pitch inputs to main rotor. Synchronized elevator is connected by control tubes and mechanical linkage to fore and aft cyclic control at swashplate. Fore and aft movement of cyclic produces a change in synchronized elevator attitude, thus increasing controllability and lengthening CG range.

Collective flight control servo actuator is connected to collective lever at swashplate support. Collective lever actuates collective sleeve, which moves mixing lever up and down to induce collective pitch into blades.

Antitorque flight control servo actuator is located in aft fuselage compartment near tailboom attachment area. Tail rotor fixed controls are connected to rotating controls through a bearing in crosshead assembly which slides along tail rotor output shaft to provide pitch change control.

Antitorque control pedals can be adjusted fore and aft by pressing and rotating a knob located on floor just forward of each crew seat,

2.12.1. Force Trim System

Cyclic and antitorque controls incorporate a force trim system to provide artificial control reaction forces when controls are manually moved from their reference positions.

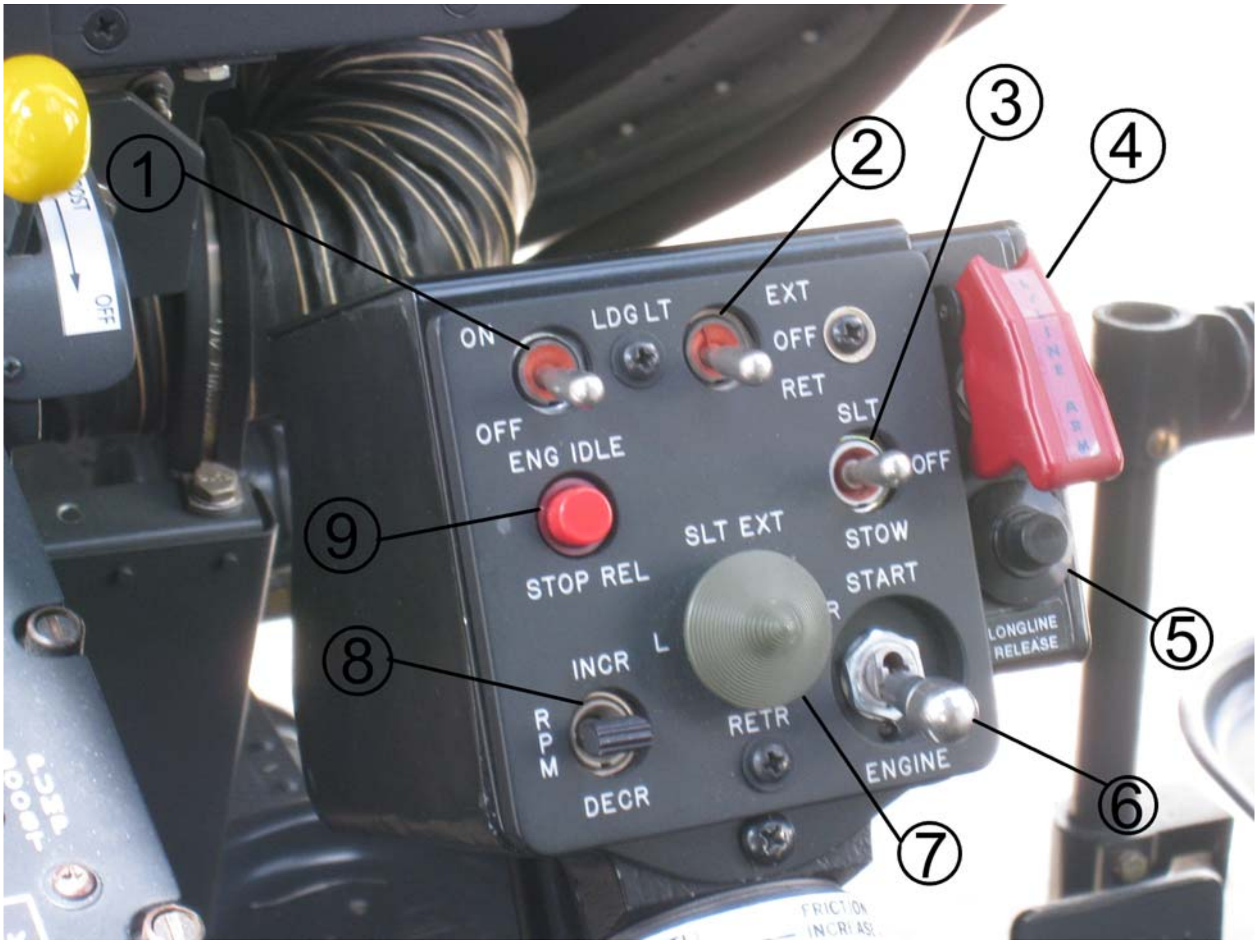
Force trim components include spring-loaded force gradient cartridges connected in series with rotary trim actuators to fore/aft and lateral cyclic control and to antitorque control. When engaged, trim actuators become locked in position by internal magnetic brakes. Manual movement of controls then actuates force gradients which provide desired control resistance.

2.12.2. Force Trim Controls

Force trim system is activated by FORCE TRIM switch located on pedestal. A FORCE TRIM release switch, located on cyclic, can be pressed to de-energize system momentarily, allowing pilot to position cyclic and pedals for long term pitch, roll, and yaw corrections. Upon releasing switch, magnetic brakes are reenergized and will lock trim actuators in new reference positions existing at moment switch is released.

2.12.3. Pilot Collective Head

A typical Pilot Collective head layout is shown in Figure 2-33.



1 - Landing Light On/Off Switch
2 - Landing Light Extend/Retract Switch
3 - Search Light On/Off/Stow Switch
4 - Long Line Arm Switch
5 - Long Line Release Switch
6 - Engine Start Switch
7 - Search Light Control Switch
8 - Governor RPM Increase/Decrease Switch
9 - Engine Idle Stop Release Switch

Figure 2-33 – RH Pilots Collective - Typical

2.12.4. LH Collective Head

A typical LH collective head layout is illustrated in Figure 2-34.

1 - Long Line Release Switch
2 - Ling Line Arm Switch
3 - Governor Increase/Decrease Switch
4 - Engine Idle Release Switch

Figure 2-34 – LH Collective - Typical

2.13. Pitot-Static System

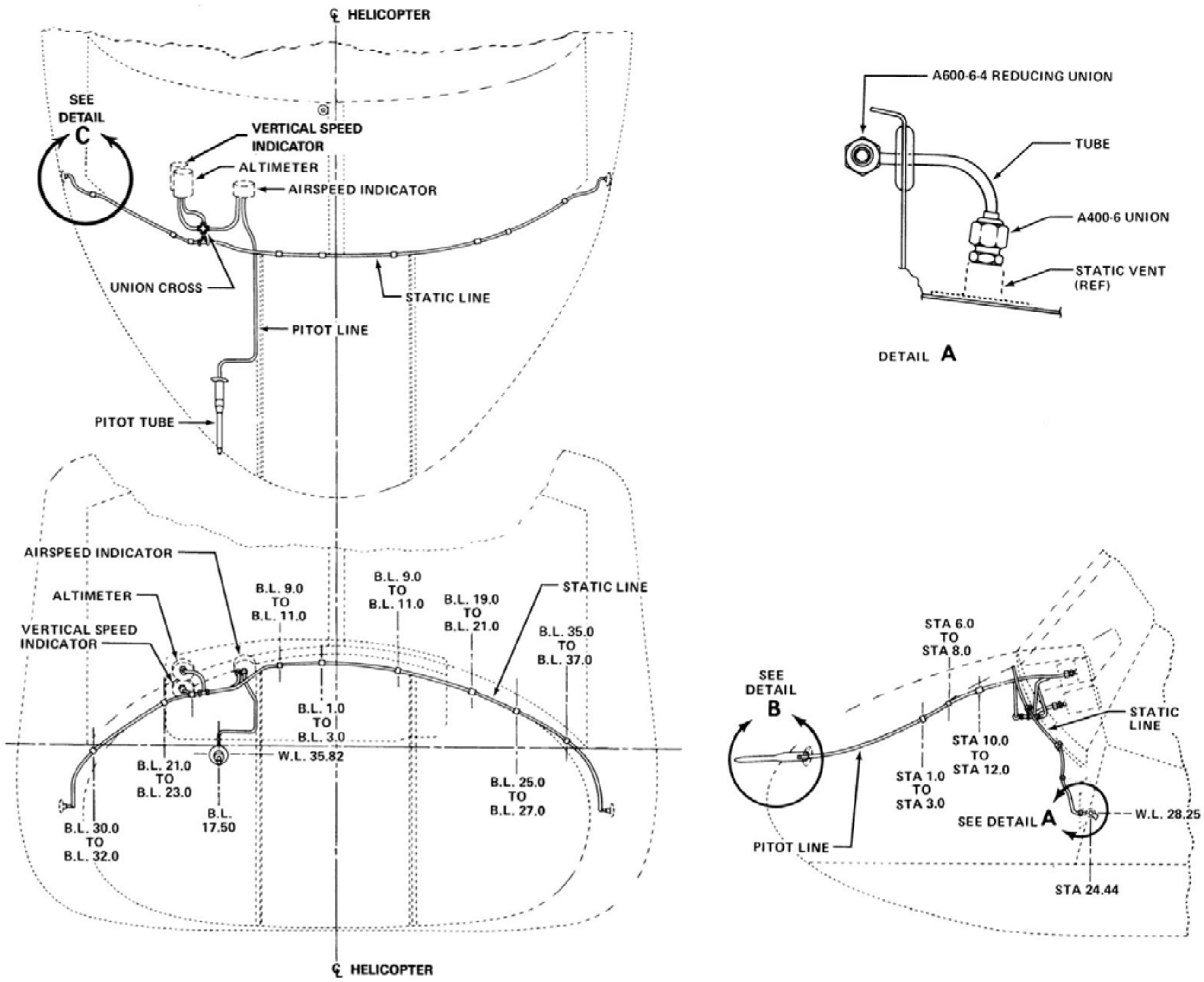


Figure 2-35 - Pitot-Static System - Primary

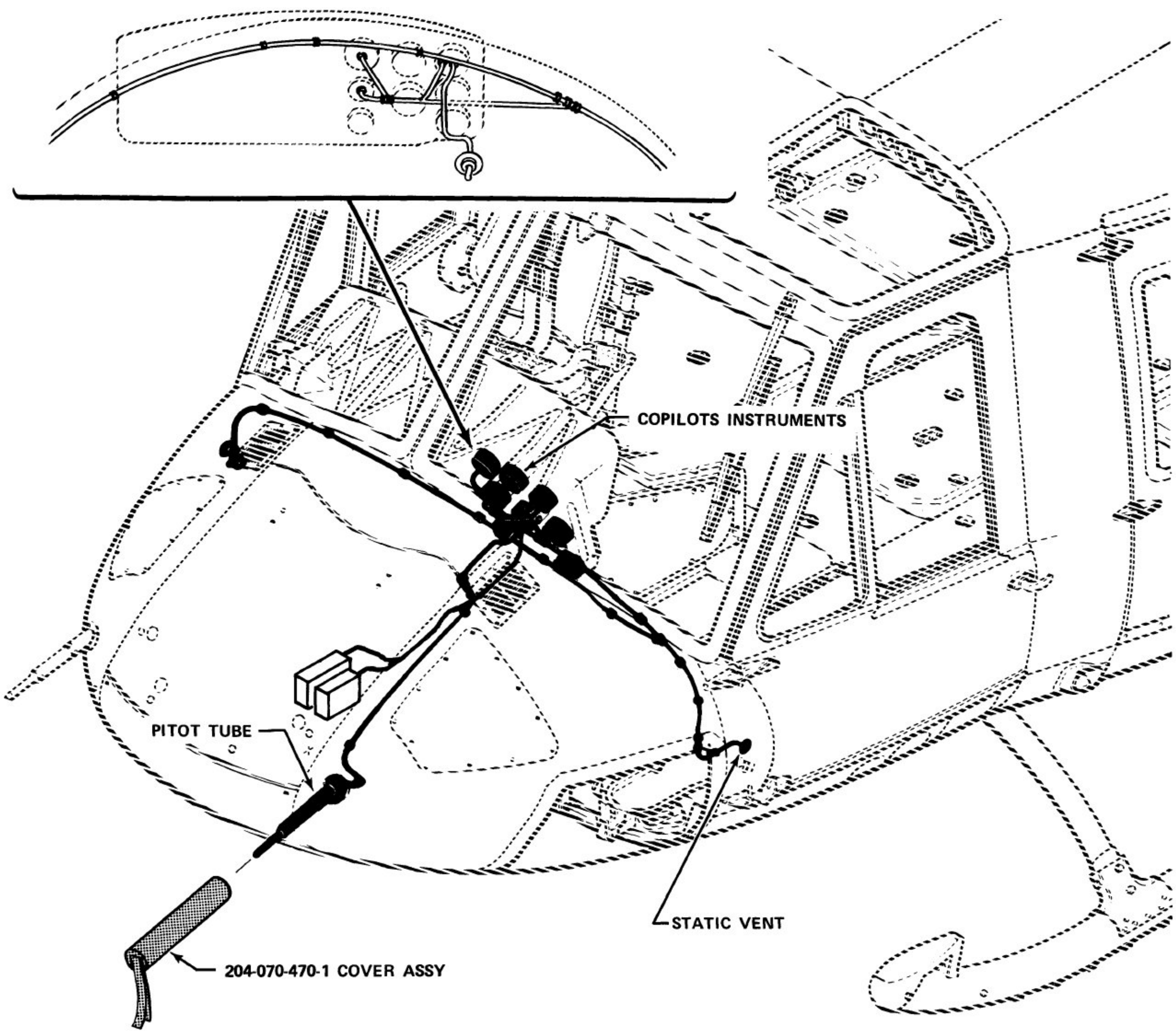


Figure 2-36 - Pitot-Static System - Optional

Pitot system consists of an electrically heated pitot tube connected to airspeed indicator. A second, independent pitot system is installed when optional copilot instrument kit is installed.

Static system consists of static ports and tubing necessary to connect ports to airspeed indicator(s), altimeter(s), and vertical speed indicator(s). Two static ports are located just forward of crew doors.

2.14. Heating System

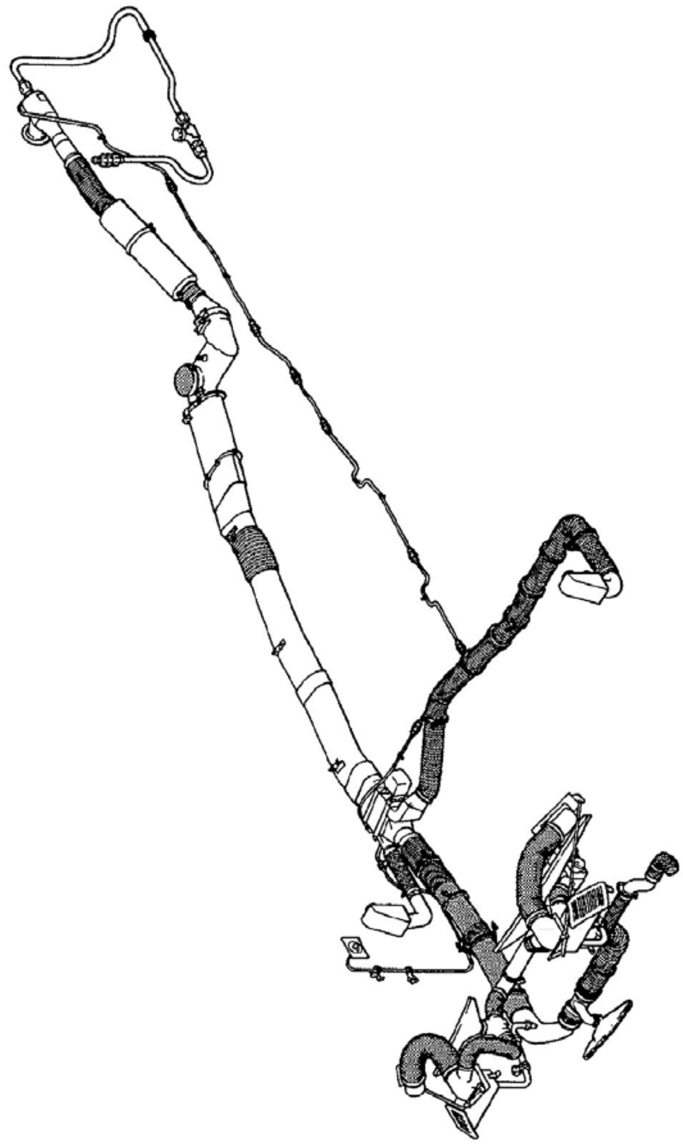


Figure 2-37 - Bleed Air Heating and Defrosting System

Cabin heating system, which includes windshield defrost system, uses bleed air from engine compressor section as source of heat. A mixing valve, which is controlled by a thermostat, mixes heated air with outside air to obtain desired temperature.

When windshield defrost is selected, heated air is diverted from doorpost and pedestal heater outlets to windshield nozzles.

2.15. Ventilating System

Ventilating system delivers outside air to outlets by instrument panel and also to windshield nozzles to defog windshield and provide fresh air ventilation. Overhead ventilation system delivers outside air through overhead nozzles to crew and passenger compartments.

2.16. Lighting Systems

2.16.1. Interior Lighting

Two multipurpose cockpit/map lights are mounted overhead in crew compartment. Either white or red light can be selected and light may be adjusted from spot beam to flood type illumination. These lights may be removed from their mounts for increased utility.

Three dome lights, with intensity adjustments, are mounted in passenger compartment. Dome lights illuminate red or white and are controlled by a switch, labeled AFT DOME LT OFF and BRT and rheostat, labeled WHITE, OFF, and RED, located on overhead console.

Two lights in cargo compartment are automatically illuminated when door is opened and nonessential DC bus 2 is energized.

Other interior lighting circuits include instrument panel lights (COPLT INSTR LT, ENG INSTR LT, PILOT INSTR LT), instrument secondary lights (SEC INSTR LT), overhead console lights (CONSOLE LT), and pedestal lights (PED LT) controlled by rheostats in overhead console,

Four self illuminating, beta lights are mounted over windows in passenger/cargo doors to identify emergency exits,

2.16.2. Exterior Lighting

Exterior lighting circuits include landing light, searchlight, position lights, anti-collision lights, and utility (step) lights. Landing light and searchlight are controlled by switches located on pilot collective. Remaining lights are controlled by switches located on overhead console.

2.17. Windshield Wipers

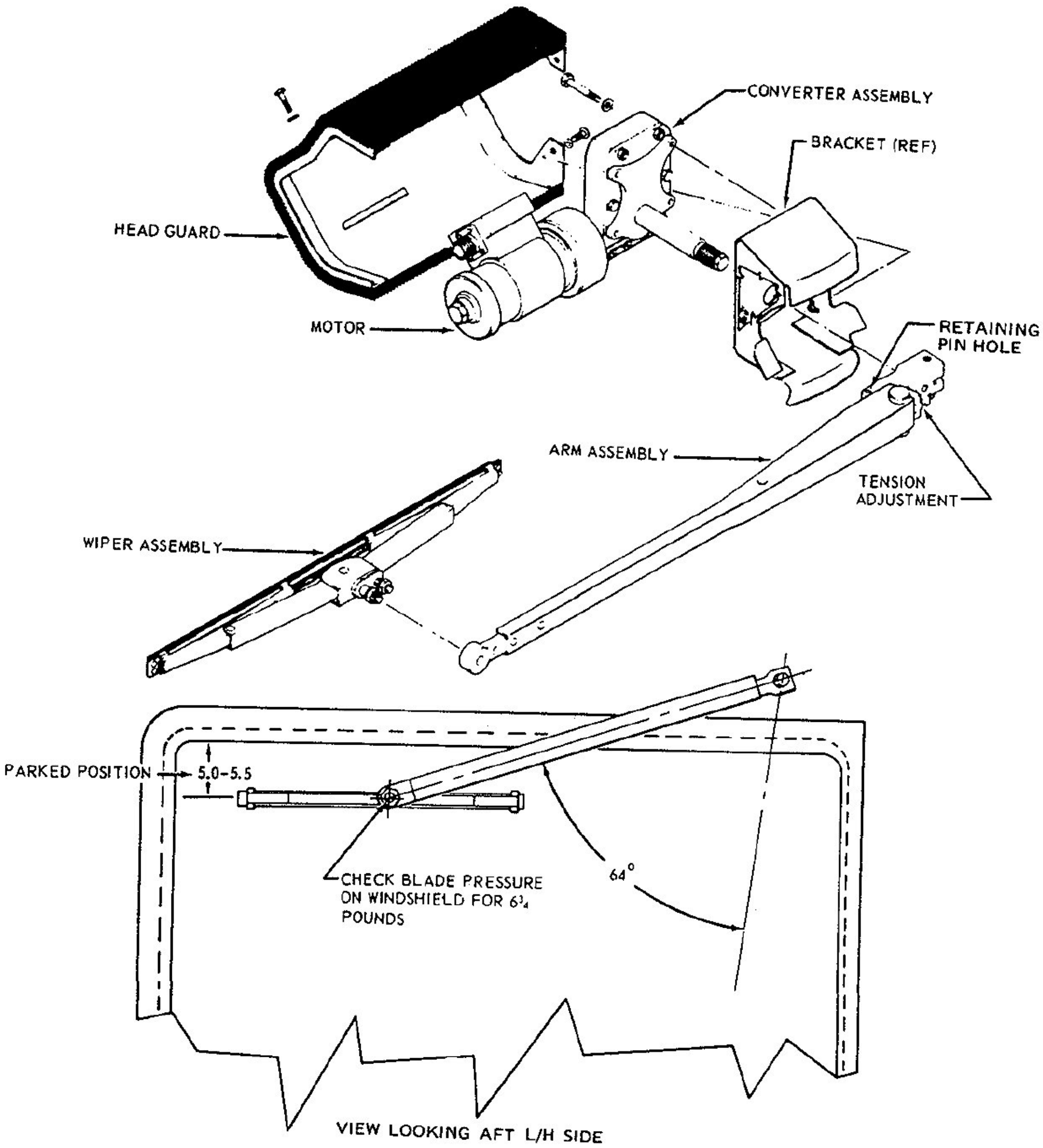


Figure 2-38 - Windshield Wiper System

Electrically powered windshield wipers are mounted above windshields. Switches (WIPER SEL and WIPERS), located on overhead console, allow independent control of windshield wipers.

2.18. Rotor Brake System (If installed)

Rotor brake incorporates dual hydraulic systems which are independent of flight control hydraulic systems. Primary components include a dual master cylinder located on forward cabin roof, a brake disc with dual brake cylinders mounted on transmission, and associated hydraulic tubing. Two ROTOR BRAKE warning lights, on caution panel, are activated by micro switches in brake housing to warn pilot that brake is not fully released or the linings are not fully retracted,

Rotor brake application is limited to ground operation after the engine has been shut down and rotor rpm has decreased to 40%. Brake handle should be returned to full up detent position after blades stop. After securing main rotor blades, rotor brake may be locked to stabilize rotor during windy conditions.

2.19. Emergency Equipment

2.19.1. Fire Detection

A set of three infrared fire detectors are strategically mounted in the engine compartment.

For aircraft S/Ns 30687, 30931, 30576, 30817 and 30599, a fire condition will cause the FIRE PULL handle to illuminate.

For all aircraft except S/Ns 30687, 30931, 30576, 30817 and 30599, a fire condition will cause the guarded ENG FIRE light to illuminate at each pilot station.

A smoke detector is mounted at forward end of cargo compartment ceiling. Smoke in cargo compartment will cause CARGO FIRE warning light, located on instrument panel, to flash intermittently.

2.19.2. Engine Fire Extinguishing System

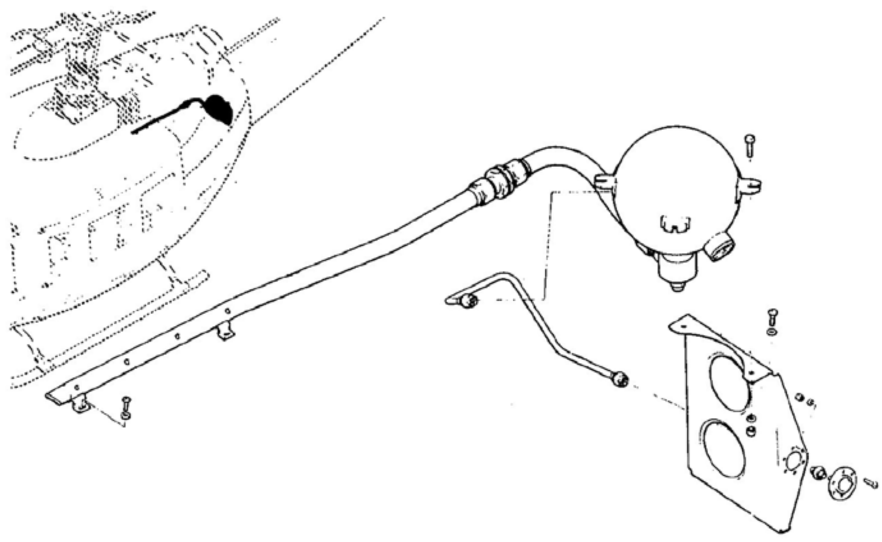


Figure 2-39 - Engine Fire Extinguisher System

A fire extinguishing bottle is mounted in aft fuselage.

For aircraft S/Ns 30687, 30931, 30576, 30817 and 30599, pulling FIRE PULL handle de-energizes the heater bleed air valve and arms the fire extinguishing system. The EXTING switch may be used to discharge the bottle.

For all aircraft except S/Ns 30687, 30931, 30576, 30817 and 30599, pressing either ENG FIRE switch-light de-energizes the heater valve, arms the fire extinguishing system and illuminates the EXTING switch-light at each pilot station. Pressing either illuminated EXTING switch-light will discharge the fire bottle.

In either case, the fuel valve is not affected when the extinguishing system is armed.

2.19.3. Portable Fire Extinguishers

Two portable fire extinguishers are mounted in cabin, one on cabin floor to right of pilot seat and other on doorpost aft of copilot seat.

2.19.4. First Aid Kit

A portable first aid kit is attached to left side of pedestal by hook and pile fasteners.

2.19.5. Emergency Exit – Door Jettison

If crew doors cannot be opened, door jettison can be accomplished by pulling jettison handles located on each crew door doorpost.

2.19.6. Emergency Exit – Window Jettison

If cabin sliding doors or hinged panels cannot be opened, emergency escape is possible by pushing on lower corners of windows in sliding doors to jettison windows.

2.19.7. Jettison Panels

Escape panels on helicopters so equipped, may be jettisoned by removing plastic cover, turning D handle (inside or outside) and pushing panel out,

3. HANDLING AND SERVICING

3.1. Ground Handling

Ground handling of helicopter consists of towing, parking, securing, and mooring. Refer to Dart ICA-D212-725 for more detailed ground handling information.

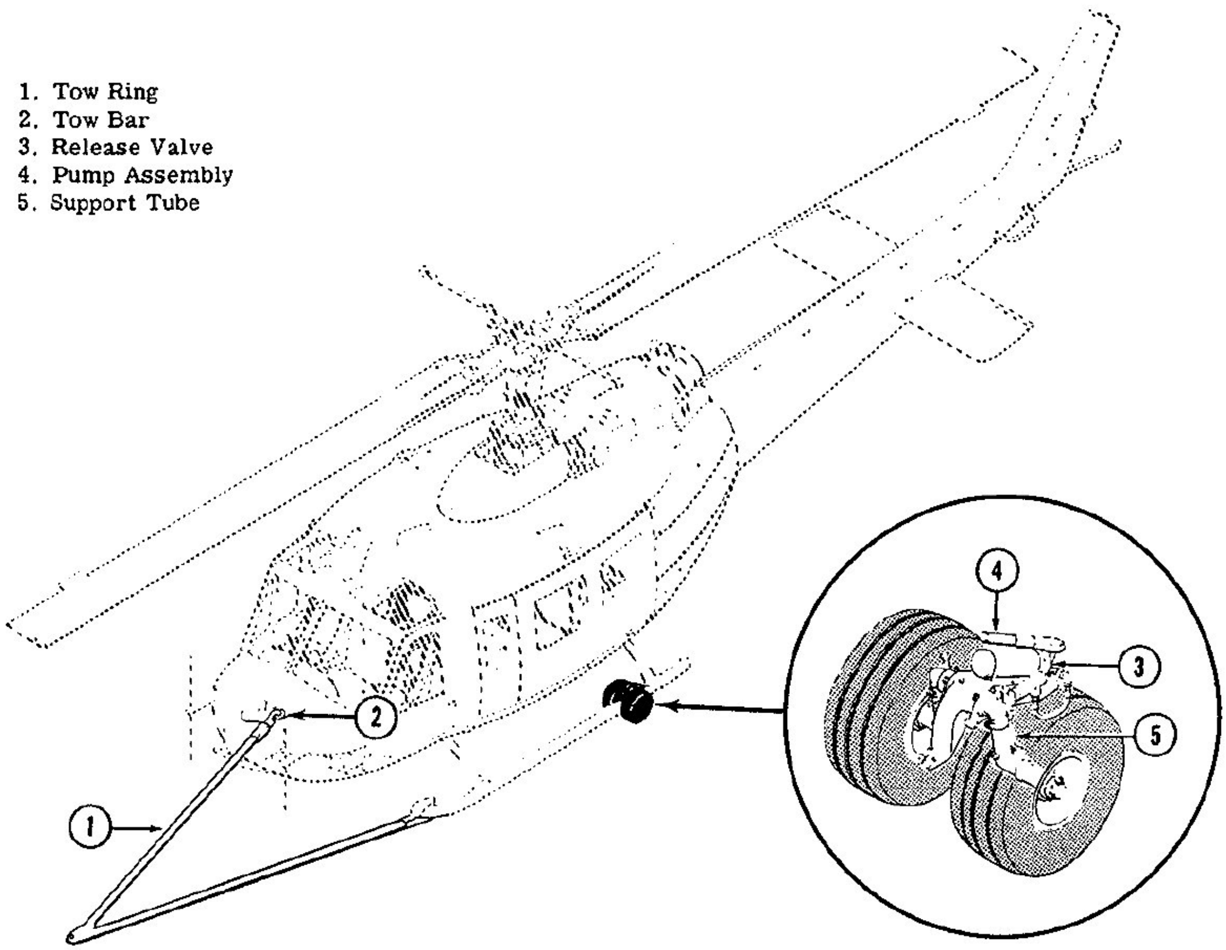


Figure 3-1 - Towing

3.2. Towing

Helicopter may be towed at walking speeds for very short distances using ground handling wheels and a standard tow bar.

Prior to movement, clear towing area of support equipment such as work stands, power units, fire extinguishers, etc., and disconnect static ground wire.

CHAPTER 3 – HANDLING AND SERVICING

CAUTION

TOWING HELICOPTER ON UNPREPARED SURFACES OR ACROSS HANGAR DOOR TRACKS, ETC., AT GROSS WEIGHT IN EXCESS OF 9500 POUNDS (4309 KILOGRAMS) CAN CAUSE PERMANENT SET IN AFT CROSS TUBE.

IF HELICOPTER IS MOVED BY HAND, DO NOT PUSH ON ANY PART THAT COULD RESULT IN DAMAGE TO HELICOPTER, I.E., ANTENNAS, OPEN DOORS, ROTORS, ETC.

Station one person at tail skid to maintain helicopter in level position during towing.

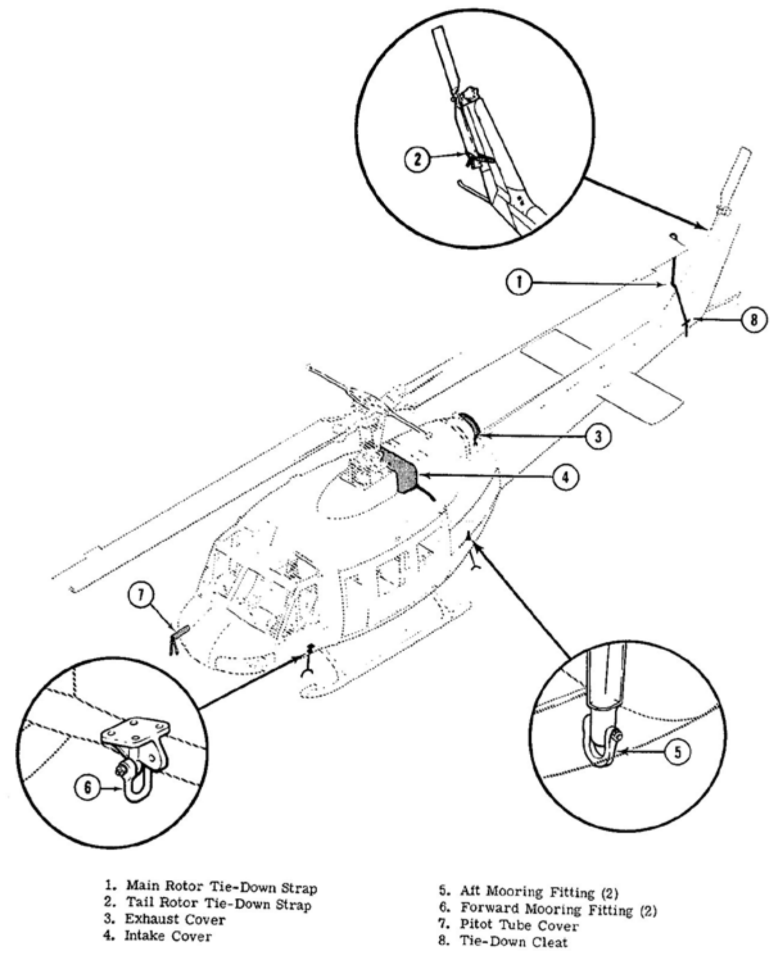


Figure 3-2 - Tie Down Detail

Figure 3-3 – Engine Cowls - Typical

3.3. Parking and Securing

Position helicopter in desired parking area on level surface when possible. Remove ground handling wheels and attach static ground wire to receptacle on lower, right, aft fuselage. Ensure all switches are in OFF position. Install approved tie downs on main and tail rotor blades.

For extended parking, disconnect battery, lock rotor brake, and close doors and windows, install protective covers on pitot tubes, engine air inlets, and exhaust stack.

3.3.1. Tie Downs – Main Rotor

Tie down main rotor blades when any of following conditions exist:

- Thunderstorms are in local area or forecasted.

- Winds in excess of 20 knots or a gust spread of 15 knots exist or is forecast.
- Helicopter is parked within 150 feet of hovering or taxiing aircraft that are in excess of 11,600 pounds (5262 kilograms) GW.
- Helicopter is to be parked overnight.

Main rotor tiedown is attached to blade and tiedown is then secured to tail boom. When secure, tie downs should be free of slack or under slight tension, but not under sufficient tension to appreciably flex main rotor blade.

3.3.2. Tie Down – Tail Rotor

Tail rotor tiedown is red and is stenciled in white letters – REMOVE BEFORE FLIGHT. To tie down tail rotor assembly, rotate main rotor until tail rotor blades are aligned with vertical fin and main rotor blades are aligned with centerline of helicopter. Tie down main rotor first, then secure tail rotor to vertical fin with tiedown strap.

3.3.3. Cover – Engine Inlet

Engine inlet cover is made from red cloth with 2 red streamers stenciled in white letters – REMOVE BEFORE FLIGHT. The cover is attached with snaps to engine and transmission cowling.

3.3.4. Cover – Engine Exhaust

A cover is installed on the engine exhaust stack and is tied with a nylon cord in cover. Covers have red streamers on each side stenciled in white letters – REMOVE BEFORE FLIGHT.

3.3.5. Cover – Pitot Tube

Pitot tube covers are flame resistant and are attached with a red streamer stenciled in white letters – REMOVE BEFORE FLIGHT. Cover pitot tubes and tie cord to secure to pitot tubes.

3.3.6. Mooring

Mooring is securing helicopter to prevent damage during periods of high winds or turbulent weather. Helicopter should be moored, if parked in open, when forecast wind velocity is 45 knots (52 mph) or higher. If forecast wind velocity exceeds 75 knots (86 mph), helicopter should be hangared or evacuated to a safe area.

If helicopter is parked in open, helicopter should be positioned on a paved ramp between suitably spaced tiedown rings and should be headed in direction from which highest forecast winds are expected. Main and tail rotors should be properly secured with tie downs immediately after shutdown, during windy conditions, to minimize rotor flapping. Protective covers should be installed and fuel tanks should be serviced to maximum capacity with prescribed fuel to add weight to helicopter.

Fuselage mooring shackles should be secured to ramp tiedown points with rope, cable, or manufactured tiedown assemblies. If suitably spaced ramp tie downs are not available, helicopter should be parked on an unpaved surface and secured to subsurface mooring anchors or deadman anchors.

All ground support equipment and other objects which might be blown by wind should be properly secured. After winds subside, helicopter should be checked for damage.

3.4. Fuels

Fuels conforming to following commercial and military specifications are approved:
ASTM D-l655, Type A, A-1, or B.
MIL-T-5624, Grade JP-4 or JP-5.
MIL-T-83133, Grade JP-8.

Refer to limitations in Section 1 of FMS-D212-725-1 for ambient temperature limits.

Fuel listings (Table 3-1 through 3-3) are provided for convenience of operator. It shall be responsibility of operator and his fuel supplier to ensure fuel conforms to one of approved specifications above.

Consult engine manufacturer for alternate or emergency fuels.

Table 3-1 – Commercial Type A and A-1 Fuels
(OAT Above -29°C/-20°F)

Fuel Vendor	Type A Product Name	Type A-1 Product Name
American Oil and Supply	American Jet Fuel Type A	American Jet Fuel Type A-1
ARCO (Atlantic Richfield)	Arcojet A	Arcojet A-1
Boron Oil	Jet A Kerosene	Jet A-1 Kerosene
British-American	B-A Jet Fuel JP-1	
British Petroleum	B.P. Jet A	BP. AT.K.
Caltex Petroleum		Caltex Jet A-1
Chevron	Chevron Jet A-SO	Chevron Jet A-1
Cities Service	Citgo Turbine Type A	
Continental	Conoco Jot-SO	Conoco Jet-GO
Exxon Co. U.S.A.	Exxon Turbo Fuel A	Exxon Turbo Fuel A-1
Exxon international		Esso Turbo Fuel A-1
Gulf Oil	Gulf Jet A	Gulf Jet A-1
Mobil Oil	Mobil Jet A	Mobil Jet A-1
Phillips Petroleum	Philjet A-So	
Pure Oil	Purejet Turbine Fuel Type A	Purejet Turbine Fuel Type A-1
Shell Oil	AeroShell Turbine Fuel 640	AeroShell Turbine Fuel 650 Chevron Jet Fuel A-1
Standard Oil of British Columbia	Chevron Jet Fuel A-50	
Standard Oil of California	Chevron Jet Fuel A-50	Chevron Jet Fuel A-1
Standard Oil of Indiana	American Jet Fuel Type A	American Jet Fuel Type A-1
Standard Oil of Kentucky	Standard Turbine Fuel A-50	Standard Turbine Fuel A-1
Standard Oil of New Jersey	Standard Jet A	Standard Jet A-1
Standard Oil of Ohio	Jet A Kerosene	Jet A-1 Kerosene
Standard Oil of Texas	Chevron Jet Fuel A-so	Chevron Jet Fuel A-1
Texaco	Texaco Avjet A	Texaco Avjet A-1
Union Oil	76 Turbine Fuel	

Table 3-2 – Commercial Type B Fuels
(For Any OAT)

Fuel Vendor	Type B Product Name
American Oil and Supply	American Jet JP-4
ARCO (Atlantic Richfield)	Arcojet B
British-American	B-A Jet Fuel JP-4
British Petroleum	B.P. A.T.G.
Caltex Petroleum	Caltex Jet B
Chevron	Chevron Jet B
Continental	Conoco JP-4
Exxon Co. U.S.A.	Exxon Turbo Fuel 4
Exxon international	Esso Turbo Fuel 4
Gulf Oil	Gulf Jet B
Mobil Oil	Mobil Jet B
Phillips Petroleum	Philjet JP-4
Shell Oil	AeroShell Turbine Fuel JP-4
Standard Oil of California	Chevron Jet Fuel B
Standard Oil of Indiana	American JP-4
Standard Oil of Kentucky	Standard Turbine Fuel B
Standard Oil of New Jersey	Standard Jet B
Standard Oil of Texas	Chevron Jet Fuel B
Texaco	Texaco Avjet B
Union Oil	Union JP-4

3.4.1. Fuel System Servicing

Total capacity is 219.6 U.S. gallons (831.3 liters).

Usable fuel is 216.8 U.S. gallons (820.6 liters) for helicopter serial numbers prior to 35049 and 218.6 U.S. gallons (827.4 liters) for helicopter serial numbers 35049 and subsequent.

Fuel system contains five interconnected fuel cells which are serviced through a single filler port on right side of aft fuselage. A grounding jack is provided adjacent to fueling port.

Electric sump drain valves are located in lower cells and are activated by pushbutton switches located on each side of aft fuselage. BATTERY switch must be in ON position (or external power applied) and FUEL switches must be off to electrically activate sump drains.

3.5. Oils

Approved oils and vendors are listed for convenience of operator.

An appropriate entry shall be made in helicopter logbook when oil has been added to the engine, transmission, 42° (intermediate) gearbox, or 90° (tail rotor) gearbox. Entry shall show type and brand name of oil used to prevent inadvertent mixing of oils.

3.5.1. Engine Oils

Certain oils (Tables 3-3 through 3-4) which conform to following specifications are approved for use in the engine:

MIL-L-7808E (and subsequent suffixes) (NATO 0-148).
MIL-L-23699 (any suffix) (NATO 0-156).

Engine oils shall meet engine manufacturer's approval in all cases. Consult engine manufacturer for use of oil brands not listed herein.

CAUTION

DO NOT MIX BRANDS OR TYPES OF OILS. IF OILS BECOME MIXED, SYSTEM SHALL BE DRAINED AND FLUSHED.

Refer to Section 1 of FMS-D212-725-1 for ambient temperature limits.

Table 3-3 – Engine Oils (For any OAT)
MIL-L-7808 (NATO 0-148)

Oil Vendor	MIL-L-7808 Product Name
Exxon Co. U.S.A.	Exxon Turbo Oil 2389
Exxon International	Esso Turbo Oil 2389
Mobil Oil	Mobil Avrex S Turbo 256

Table 3-4 – Engine Oils (For OAT above -40°C/-40°F)
MIL-L-23699 (NATO 0-156)

Oil Vendor	MIL-L-23699 Product Name
Burmah-Castrol	Castrol 5000
Exxon Co. U.S.A.	Exxon Turbo Oil 23 80
Exxon international	Esso Turbo Oil 2300
Mobil Oil	Mobil Jet II
	Mobil Jet Oil (RM-254A)
NYCO S.A.	Turbonycoil 525-2A
Shell Oil	AeroShell Turbine Oil 5000
Stauffer Chemical	Stauffer Jet II

3.5.2. Engine Servicing

Engine oil capacity is 3.25 U.S. gallons (12.3 liters).

The engine's oil system has a filler and oil level sight glass. The sight glass is on aft side of the external oil tank, with access through aft right engine cowl.

Refer to engine maintenance manual for servicing instructions and oil filter change procedures.

3.5.3. Transmission, Intermediate and Tail Rotor Gearbox Oils

Oils listed in Tables 3-5 through 3-7 are approved for use in transmission, intermediate gearbox, and tail rotor gearbox. These oils conform to following specifications:
MIL-L-7808E (and subsequent suffixes)
(NATO 0-148).

MIL-L-23699 (any suffix) (NATO 0-156).
Turbine oil 555.

CAUTION

DO NOT MIX OILS OF DIFFERENT SPECIFICATIONS. IF OILS BECOME MIXED, SYSTEM SHALL BE DRAINED AND FLUSHED.

Refer to Section 1 of FMS-D212-725-1 for ambient temperature limits.

Table 3-5 – Transmission, Intermediate and Tail Rotor Gearbox Oils (For any OAT)

MIL-L-7808 (NATO 0-148)

Oil Vendor	Turbine Oil 555 Product Name
American Oil and Supply	American PQ Lubricant 6899
	American PQ Turbine Oil 8365
	American PQ Turbine Oil 9900
Bray Oil	Brayco 880H
Burmah-Castrol (UH) Ltd.	Castrol 399
Exxon Co. U.S.A.	Exxon Turbo Oil 2389
	Exxon Turbo Oil 2391
Exxon international	Esso Turbo Oil 2389
	Esso Turbo Oil 2391
Hatco Chemical	Hatco 1278
Mobil Oil	Mobil RM-184A
	Mobil RM-201A
	Mobil RM-248A
	Mobil Avrex S Turbo 256
NYCO S.A.	Turbonycoil 160
NYCO International	NII 160
Royal Lubricants	Royco 808H
Shell International	AeroShell Turbine Oil 308
Stauffer Chemical	Stauffer Jet I

Table 3-6 – Transmission, Intermediate and Tail Rotor Gearbox Oils (For OAT above -40°C/-40°F)

MIL-L-23699 (NATO 0-156)

Oil Vendor	MIL-L-23699 Product Name
American Oil and Supply	American PQ Turbine Lubricant C-3788
	American PG Turbine Lubricant 3889
	American PG Turbine Lubricant 3893
	American PQ Turbine Lubricant 6423
	American PG Turbine Lubricant 6700
	American PG Turbine Lubricant 9598
Bray Oil	Brayco 899
	Brayco 899G
	Brayco 899M
Burmah-Castrol (UH) Ltd.	Castrol 5000

Table 3-6 – Transmission, Intermediate and Tail Rotor Gearbox Oils (For OAT above -40°C/-40°F)
MIL-L-23699 (NATO 0-156)

Oil Vendor	MIL-L-23699 Product Name
Castor Oils	Castrol 205
Emery Industries	Emgard Synthesized Turbine Lubricant (2949 or 2952)
Exxon Co. U.S.A.	Exxon Turbo Oil 2380
Exxon international	Esso Turbo Oil 2380
Hatco Chemical	Hatcol 1639
	Hatcol 1680
	Hatcol 3211
	Hatcol 3611
Mobil Oil	Mobil Jet Oil II
	Mobil RM-139A
	Mobil RM-147A
	Mobil RM-246A
	Mobil RM-247A
	Mobil RM-249A
	Mobil RM-254A
	Mobil RM-270A
NYCO S.A.	Turbonycoil 525-2A
	Turbonycoil 599
	NYCO 599A
	NYCO 599B
PVO International	STO-5700
Royal Lubricants	Royce Turbine Oil 500
	Royco 899 (C-915)
	Royco 899B (D-759-3)
	Royce 899C (D-758)
	Royco 899HC
	Royco 899 E-1
	Royco 899 E-2
Shell Oil	AeroShell Turbine Oil 500
Stauffer Chemical	Stauffer Jet II (6924)
	Stauffer STL (E-7306)

Table 3-7 – Transmission, Intermediate and Tail Rotor Gearbox Oils (For OAT above -40°C/-40°F)
Turbine Oil 555

Oil Vendor	Turbine Oil 555 Product Name
Royal Lubricants	Royco Turbine Oil 555
Shell International	AeroShell Turbine Oil 555

3.5.4. Transmission, Intermediate and Tail Rotor Gearbox Servicing

Transmission oil capacity is 11.0 U.S. quarts (10.4 liters).
Intermediate gearbox oil capacity is 0.2 U.S. quart (0.19 liter).
Tail rotor gearbox oil capacity is 0.4 U.S. quart (0.38 liter).

Transmission filler is located on upper right side of transmission and is accessible when forward pylon fairing is opened. Oil level sight glasses may be viewed through a window in right side of pylon support structure in cabin.

Intermediate and tall rotor gearboxes also incorporate oil level sight glasses. These oil levels should be verified by gently shaking tailboom laterally to agitate oil. This will ensure a false indication is not presented by a stained sight glass. Intermediate gearbox filler cap is accessible when gearbox fairing is removed.

NOTE

MIL-L-23699 and Turbine Oil 555 are not approved for use in ambient temperatures below -40°C (-40°F). When changing to an oil of a different specification, system shall be drained and flushed. Refer to BHT-212-MM for procedures for draining oil and cleaning or replacing filters.

3.6. Hydraulic Fluids

Hydraulic fluids listed in Table 3-8 conform to MIL-H-5606 (NATO H-515) and are approved for use in flight control hydraulic systems and rotor brake.

Table 3-8 – Hydraulic Fluids

MIL-H-5606 (NATO H-515)

Fluid Vendor	MIL-H-5606 Product Name
American Oil and Supply	PQ 2863
	PQ 2890
	PQ 2903
	PQ 2905
	PQ 2950
	PQ 3808
	PQ 4140
	PQ 4328
Bray Oil	Brayco 756E, 756ES, 756F
	Brayco 757B
	Brayco Micronic 756ES
Castor Oils	Castrol Hyspin A
Chevron U.S.A.	Chevron Aviation Hydraulic Fluid D (PED 5225)
Mobil Oil	Mobil Aero HFD
MZF Associates	25606
Penreco	Petrofluid 4146
	Petrofluid 4606
	Petrofluid 4607
Rohm and Haas	PA4394
Royal Lubricants	Royco 756C (C730-4)
	Royco 756D, 7546E
	DS-437
Shell International	AeroShell Fluid 41
Stauffer Chemical	Stauffer Aero Hydroil 500
	Aircraft Hydraulic Oil 15

Table 3-8 – Hydraulic Fluids

MIL-H-5606 (NATO H-515)

Fluid Vendor	MIL-H-5606 Product Name
Texaco	TL-10711A

3.6.1. Hydraulic System Servicing

Reservoir capacity (each) is 2.6 U.S. quarts (2.5 liters).

Two hydraulic reservoirs are located on top of fuselage, forward of transmission and under forward pylon fairing. Sight glass is provided to determine quantity of hydraulic fluid in each reservoir.

Service each hydraulic system as follows:
Open forward pylon fairing.
Remove cap and fill reservoir until sight glass is full of hydraulic fluid.
Secure cap and close fairing.
Refer to BHT-212-MM for filter change procedures.

3.7. Rotor Brake Servicing

System capacity is 1.0 U.S. pint (0.47 liter).

Rotor brake reservoir (if installed) is mounted in right side of cabin roof between overhead windows. Brake is serviced through a filler cap located on top of cabin roof.

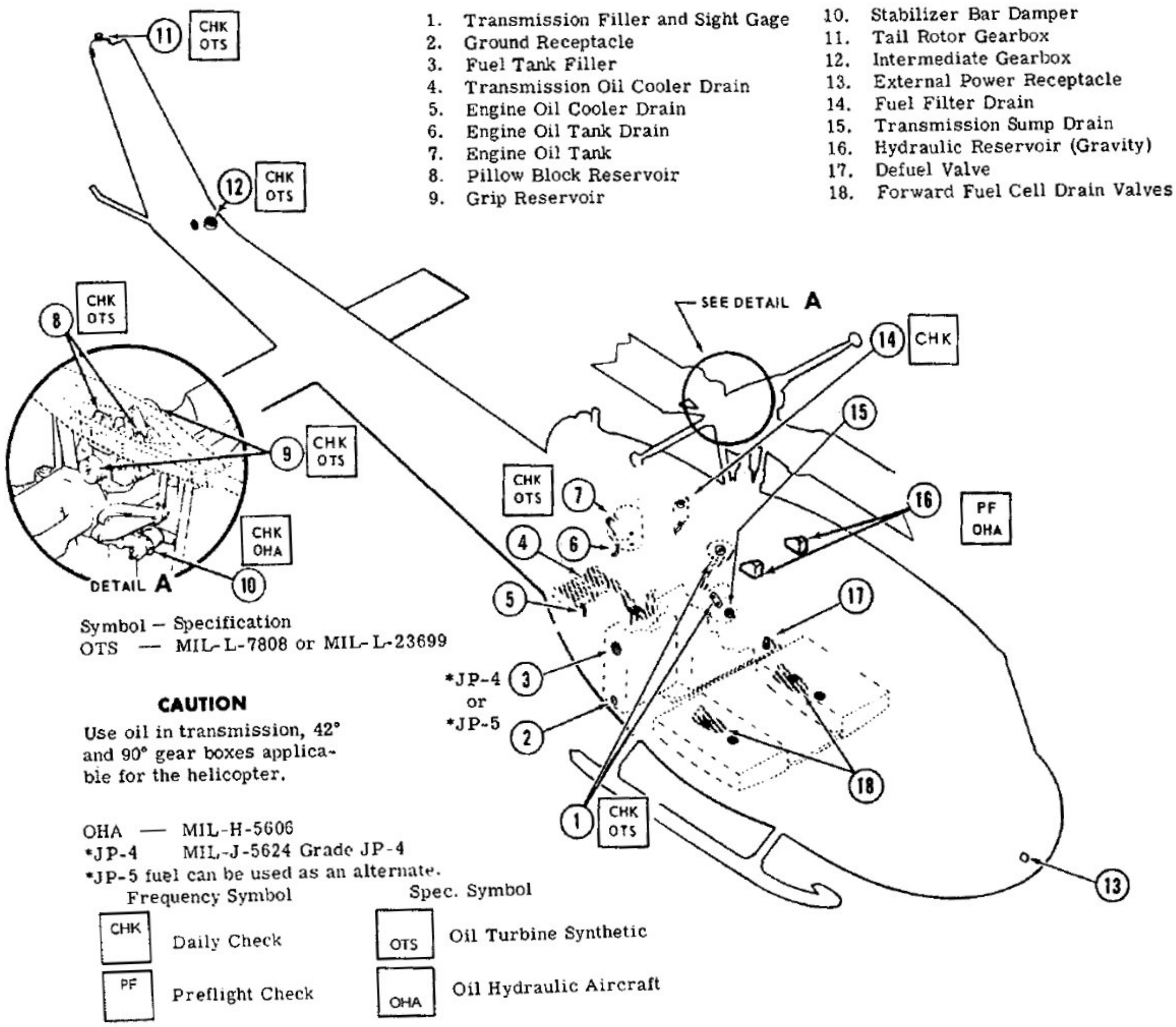


Figure 3-4 - Servicing

3.8. Main Rotor Hub Servicing

Oils conforming to following specifications are approved for use in main rotor blade grips and trunnion pillow blocks:

MIL-L-7808E (and subsequent suffixes) (NATO 0-148)
MIL-L-23699 (any suffix) (NATO 0-156)
MIL-L-46152 (SAE 10W30 multi-viscosity)

NOTE

Main rotor blade grips and pillow blocks modified for grease lubrication require MIL-G-81322. Refer to BHT Technical Bulletin No. 212-81-56.

Main rotor blade grip capacity (each) is 1.0 US. quart (0.9 liter).

4. LIMITATIONS

4.1. Introduction

Note

Compliance with limitations in this section is required by appropriate operating rules

Minimum and maximum limits and normal and cautionary operating ranges for helicopter and subsystems are indicated by instrument markings and placards. Instrument markings and placards represent aerodynamic calculations that are substantiated by flight test data.

Anytime an operating limit is exceeded, an appropriate entry shall be made in the helicopter logbook. The entry shall state which limit was exceeded, duration of time, extreme value attained, and any additional information essential in determining maintenance action required.

4.2. Basis of Certification

This helicopter is certified under FAR Part 29, Category B.

4.3. Types of Operation

The basic configured helicopter is approved as a ten-place helicopter with one pilot and nine passengers; or an eleven place helicopter with two pilots and nine passengers. The basic helicopter is certified for operation in day or night VFR non-icing conditions.

4.4. Flight Crew

Note

Minimum cockpit (FS 47.0) weight is 170 Lbs (77.1 Kg).

Minimum flight crew consists of one pilot who shall operate helicopter from the right crew seat.

Left crew seat may be used for an additional pilot for VFR day and night operations when approved dual controls and copilot instrument kits are installed.

Note

Refer to applicable operating rules for internal cargo operations.

4.5. Configuration

4.5.1. Required Equipment

Heated Pitot Static System
Pilot Windshield Wiper
Force Trim System

4.5.2. Optional Equipment

Refer to appropriate Flight Manual Supplement(s) for additional limitations, procedures, and performance data required for optional equipment installed.

4.5.3. Doors Open/Removed

Helicopter may be flown with doors open or removed only with Bell Helicopter standard interior installed. Door configuration shall be:

Both crew doors removed

Both sliding doors locked open or removed with both hinged panels installed or removed.

In all cases, door configuration shall be symmetrical

Note

Opening or removing doors shifts the helicopter center of gravity and reduces V_{NE}.

4.5.4. Passengers

With passenger seat kit installed per Figure 4-1, 4-2 or 4-3, the helicopter is certified for operations as a nine-passenger aircraft.

The above loading does not apply if cargo or a combination of cargo and passengers are being transported. It shall be the responsibility of the pilot to ensure that the helicopter is properly loaded so the entire flight is conducted within the limits of gross weight and center of gravity charts (Figure 4-5)

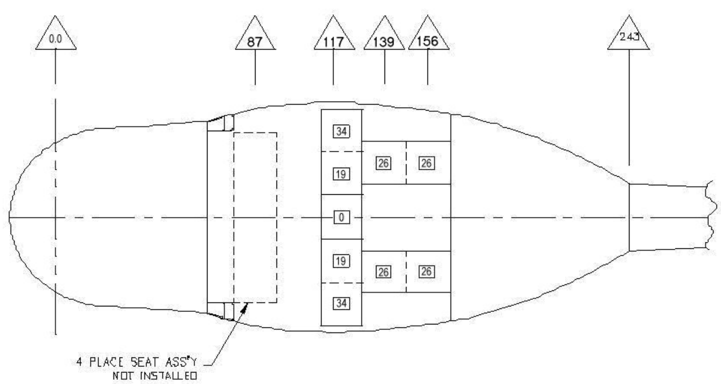


Figure 4-1 – Nine-place passenger loading configuration 1

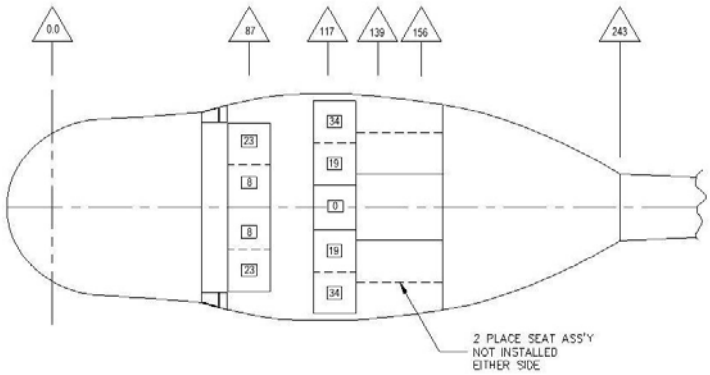


Figure 4-2 – Nine-place passenger loading configuration 2

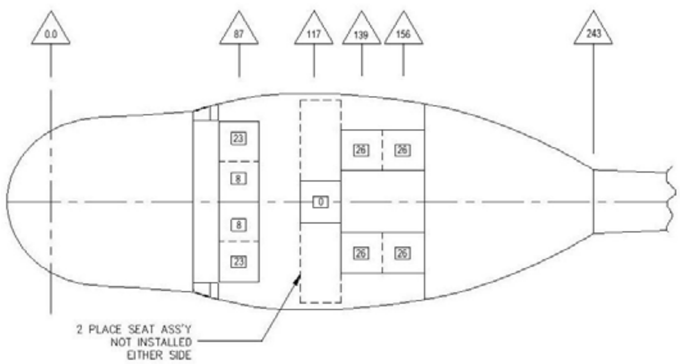


Figure 4-3 – Nine-place passenger loading configuration 3

4.5.5. Cargo

4.5.5.1 Internal Cargo Configuration

Allowable deck loading for cargo is 100 pounds per square foot (4.9 kilograms/100 square centimeters). Deck mounted tiedown fittings are provided and have an airframe structural capacity of 1250 pounds (567.0 kilograms) vertical and 500 pounds (226.8 kilograms) horizontal per fitting. Provisions for installation of cargo tiedown fittings are incorporated in aft cabin bulkhead and transmission support structure and have an airframe structural capacity of 1250 pounds (567.0 kilograms) at 90 degrees to bulkhead and 500 pounds (226.8 kilograms) in any direction parallel to bulkhead. Cargo shall be secured by an approved restraint method that will not impede access to cargo in an emergency. All cargo and equipment shall be securely tied down when operating with aft cabin doors open or removed.

4.5.5.2 Cargo Compartment

Cargo compartment maximum allowable loading is 400 pounds (181.4 kilograms), not to exceed 100 pounds per square foot (4.9 kilograms/100 square centimeters).

4.6. Weight and Center of Gravity

4.6.1. Weight

Maximum GW is 11,200 pounds (5080.3 kilograms).

Refer to weight-altitude-temperature limitations for takeoff, landing and in ground effect maneuvers chart (Figure 4-4).

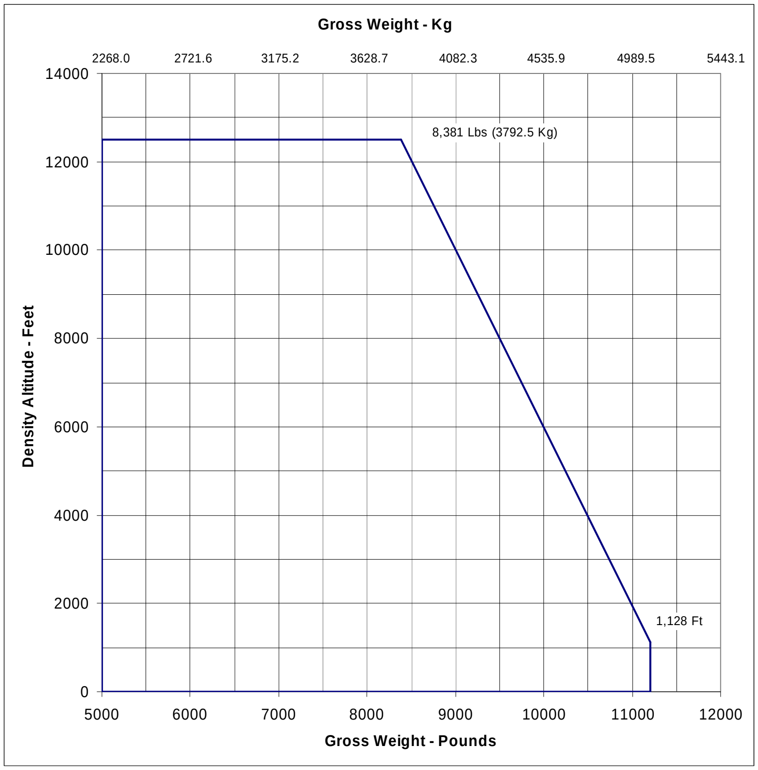


Figure 4-4 – Weight-Altitude-Temperature (WAT) Chart

4.6.2. Center of Gravity

4.6.2.1 Longitudinal Center of Gravity
Longitudinal CG limits are from station 130.0 to 144.0

Longitudinal CG operational range is variable (Figure 4-5), depending upon GW, and shall be computed from weight and balance data.

Note

Station 0 (datum) is located 20 inches (508 millimeters) aft of most forward point of cabin nose.

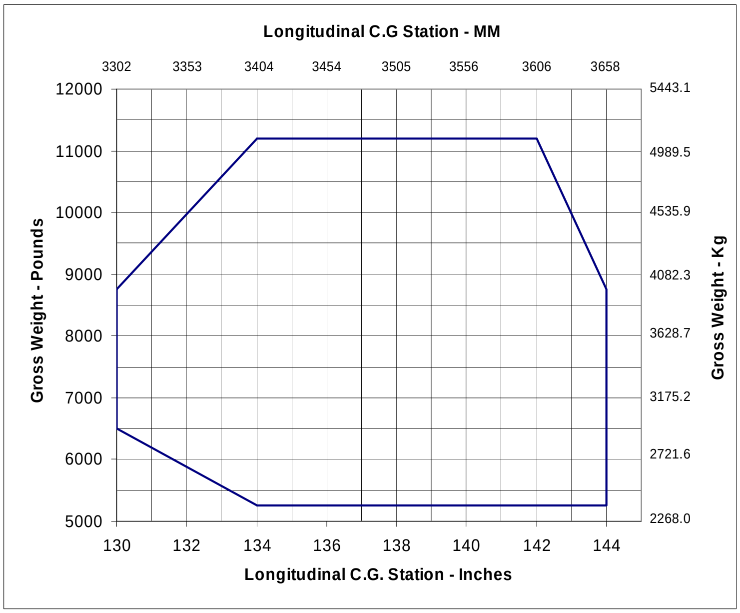


Figure 4-5 – Gross weight vs Center of Gravity Chart

4.6.2.2 Lateral Center of Gravity

Lateral CG limits are 4.7 inches (119.4 millimeters) left and 6.5 inches (165.1 millimeters) right of fuselage centerline.

4.7. Airspeed

7500 pounds (3402 kilograms) GW – V_{NE} 125 KIAS.

10,500 pounds (4763 kilograms) GW – V_{NE} 105 KIAS.

10,500 pounds (4763 kilograms) and above GW – V_{NE} 80 KIAS.

Engine torque greater than 49 PSI (88%) – V_{NE} 80 KIAS.

Doors open/off operation – V_{NE} 100 KIAS unless V_{NE} Placard (Figure 4-6A) is more restrictive.

V_{NE} decreases linearly from 125 knots to 105 knots (Refer to Placards and Decals, Figure 4-6A).

V_{NE} decreases 3 knots per 1000 feet above 3000 feet H_D.

Maximum allowable tailwind is 20 knots when operating above 10,500 Lbs.
Maximum allowable tailwind is 30 knots when operating below 10,500 Lbs.
Maximum allowable crosswind is 30 knots.

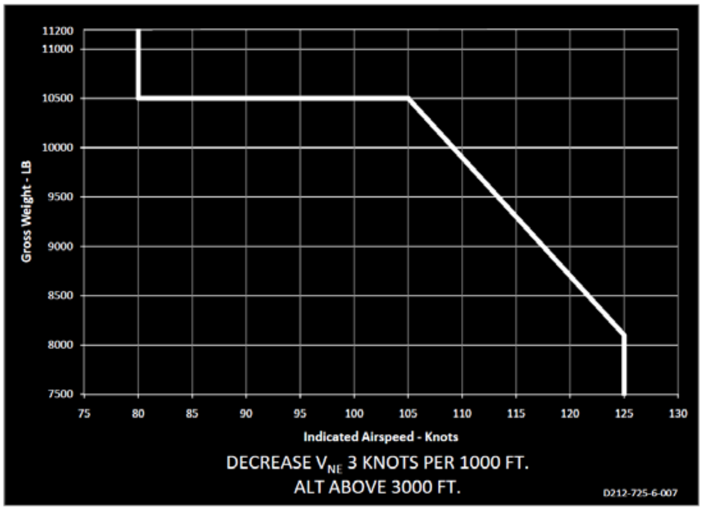


Figure 4-6A – V_{NE} Placard

FUEL SYSTEM CAPACITY
TOTAL BASIC SHIP 1400 LB.
WITH 044 KIT 1700 LB
WITH 045 KIT 2600 LB.
D212-725-6-009

Figure 4-6B – Fuel Capacity Placard

4.8. Altitude

Maximum operating – 20,000 H_P.
Refer to applicable operating rules for high altitude oxygen requirements.
Restart in flight is not recommended unless 3000 ft AGL.

4.9. Maneuvering

4.9.1. Prohibited Maneuvers

Aerobatic maneuvers are prohibited.

4.9.2. Climb and Descent

Maximum allowable rate of climb is 2,000 feet per minute

4.9.3. Slope Landings

Slope landings are limited to side slopes no greater than 10 degrees

4.10. Power Limits for Take Off

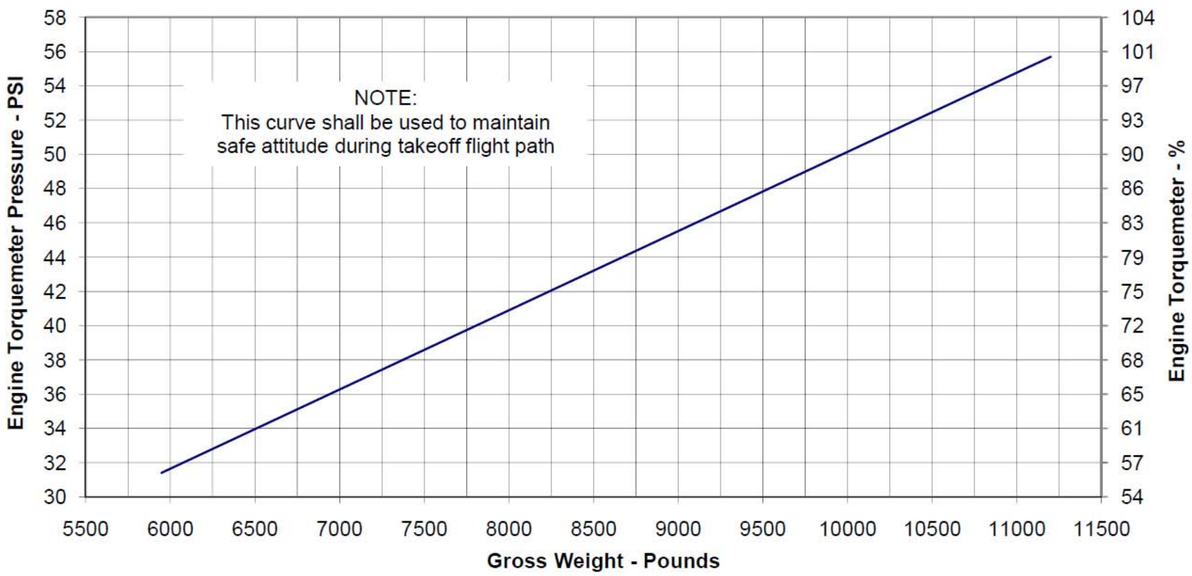


Figure 4-7 – Power Limits for Takeoff

Note

The POWER LIMITS FOR TAKEOFF Chart is based on power required to hover in-ground-effect plus an additional increment of power. The limitations are imposed to preclude the possibility of unsafe nose down attitude during the takeoff flight path. These limits shall be observed until 65 knots and at least 35 feet above the ground are obtained, after which ENGINE POWER LIMITATIONS FOR FLIGHT may be used.

4.11. Ambient Temperature

Maximum sea level ambient air temperature for operation is +49°C (+120°F) decreases with altitude at standard lapse rate (2°C per 1000 feet H_P). For S/N 30687, 30576, 30817 and 30599 (G1), minimum ambient air temperature at all altitudes is -54°C (-65°F). For all other S/N (G2) minimum ambient air temperature at all altitudes is -30°C (-26°F). Refer to Weight-altitude-temperature limitations for takeoff, landing and in ground effect maneuvers chart (Figure 4-4). G1 is generation 1 aircraft with AC instruments. G2 is generation 2 aircraft with DC instruments.

Engine de-icing shall be turned ON for flight in visible moisture at temperatures below +4.4°C (+40°F).

The maximum ambient temperature for use of engine de-icing is +4.4°C (+40°F).

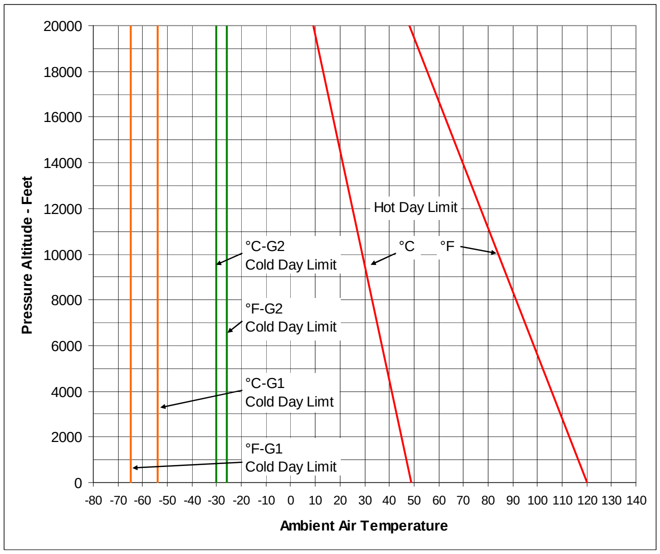


Figure 4-8 – Pressure Altitude vs Ambient Air Temperature Chart

4.12. Electrical

4.12.1. Battery

The aircraft must be equipped with a lead-acid battery.

4.12.2. Ground Power Unit

28 VDC ground power units for starting shall be rated at a minimum of 500 amps and a maximum of 1000 amps.

4.12.3. Starter

Three energized periods allowed per hour.

Limit starter energizing time to:

35 seconds – ON
3 minutes – OFF
35 seconds – ON
30 minutes – OFF
35 seconds – ON
30 minutes – OFF

4.12.4. Loadmeter

Maximum – 0.50 (150 AMP) red radial

Note

Generator loading above 0.50 (150A) prohibited in flight. Momentary loads above 0.50 (150A) are allowed for battery recharging during ground run only.

4.13. Power Plant

Honeywell T5317 A/B/BCV

4.13.1. Gas Producer (N_1) RPM

Maximum continuous	101%
Takeoff power (5 minutes)	101 to 105%
Maximum	105%

4.13.2. Power Turbine (N_2) RPM

Minimum continuous	97% rpm
Continuous	97 to 100% rpm
Maximum	100% rpm

4.13.3. Torquemeter Pressure (%)

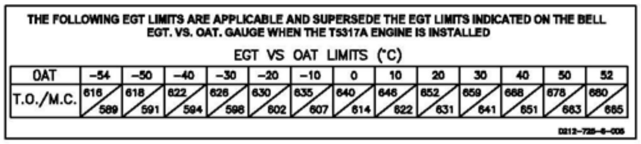
Continuous operation	12 to 49.0 PSI (0 to 88%)
Takeoff power (5 minutes)	49.0 to 55.7 PSI (88 to 100%)
Maximum	55.7 PSI (100%)

4.13.4. Exhaust Gas Temperature vs OAT Limitations (T5317A Only)

Note:

EGT of 680°C should not be exceeded during the starting and acceleration cycle. Consult Engine Manual, Operation and Maintenance Instructions, if 680°C temperature is exceeded.

Allowable EGT limits vary with outside air temperature. The variable EGT limits are shown on the OAT vs EGT Limits placard (see Figure 4-9). This placard indicates EGT limits for maximum continuous power and take off power. The EGT limits applicable are to be determined by reading the OAT gauge and referring to the EGT limits indicated on the OAT vs EGT Limits placard for the outside air temperature indicated. This placard does not supersede the ambient air temperature limitations in section 4.11.



THE FOLLOWING EGT LIMITS ARE APPLICABLE AND SUPERSEDE THE EGT LIMITS INDICATED ON THE BELL EGT. VS. OAT. GAUGE WHEN THE T5317A ENGINE IS INSTALLED

EGT VS OAT LIMITS (°C)

OAT	−54	−50	−40	−30	−20	−10	0	10	20	30	40	50	52
T.O./M.C.	616/589	618/591	622/594	626/598	630/602	635/607	640/614	646/622	652/631	659/641	668/651	678/663	680/665

D212-725-6-005

Figure 4-9 – OAT vs EGT Limits Placard
(P/N D212-725-6-005)

4.13.5. Measured Gas Temp (T5317B/BCV Only)

4.13.5.1 Normal Operation:

Continuous 400 to 820°C

Maximum continuous 820°C

Takeoff (5 minutes) 820 to 863°C
Maximum takeoff 863°C

4.13.5.2 Starting Limits

Normal 400 to 863°C

5 second limit 863 to 926°C

Maximum 926°C

4.13.6. Fuel Pressure

Minimum 4 PSI

Continuous 4 – 35 PSI

Maximum 35 PSI

4.13.7. Oil Pressure – Engine

Minimum 25 to 80 PSI

Continuous 80 to 100 PSI

Maximum 100 PSI

4.13.8. Oil Temperature – Engine

Maximum 93°C

4.14. Transmission

4.14.1. Transmission Oil Pressure

Minimum for idle	30 PSI
Idle range	30 to 40 PSI
Continuous operation	40 to 70 PSI
Maximum	70 PSI

4.14.2. Transmission Oil Temperature

Continuous operation	15 to 110°C
Maximum	110°C

4.15. Rotor

4.15.1. Rotor RPM (N_R) – Power On

Minimum	97%
Continuous	97 to 100%
Maximum	100%

4.15.2. Rotor RPM (N_R) – Power Off

Minimum	91%
Maximum	104.5%

4.16. Hydraulic

Both hydraulic systems shall be operative prior to takeoff.

4.16.1. Hydraulic Oil

Hydraulic fluid type MIL-H-5606 (NATO H-515) shall be used at all ambient temperatures.

4.16.2. Hydraulic Pressure

Minimum	600 PSI
Caution range	600 to 900 PSI
Normal operating	900 to 1100 PSI
Maximum	1100 PSI

4.16.3. Hydraulic Temperature

Maximum 88°C

4.17. Fuel and Oil

For further information on all fluids see section 2 of the Manufacturer's Data.

4.17.1. Fuel

Turbine fuel ASTM 1655, Type B, or MIL-T-5624, Grade JP-4, may be used at all ambient temperatures

Turbine fuel ASTM 1655, Type A or A-1, MIL-T-5624, Grade JP-5, or MIL-T-83133, Grade JP-8, limited to ambient temperatures -29°C (-20°F) and above. Maximum viscosity for T5317A is 12 centistokes. Maximum viscosity for T5317B is 6 centistokes.

Note

Engine start may not be successful at ambient temperatures below -12.2°C (+10°F) or altitudes above 8000 feet pressure altitude using fuel conforming to ASTM 1655, Type A or A-1 (JP-5 or JP-8).

4.17.2. Anti-Icing Additive

When operating in temperatures below +40°F (+4°C), all fuel used in this helicopter shall contain an anti-icing additive meeting the specification requirements of PFA-55MB. Concentration of this additive in fuel in a loaded fuel tank shall not be less than 0.035% nor more than 0.15% by volume. The minimum concentration of the additive in the fuel with which the helicopter is to be refueled should be at least 0.06% by volume to assure a loaded fuel tank concentration of at least 0.035%

4.17.3. Oil – Engine

Oil conforming to MIL-L-7808E (and subsequent) may be used at all ambient temperatures.

Oil conforming to MIL-L-23699 may be used at all ambient temperatures above -40°C (-40°F) engine only

4.17.4. Oil – Transmission, Intermediate and Tail Rotor Gearboxes

Oil conforming to MIL-L-7808 (NATO 0-148) may be used at all ambient temperatures.

Oil conforming to DOD-L-85734AS (Turbine 555) and MIL-L-23699 (NATO 0-156) may be used at all ambient air temperatures above -40°C (-40°F).

Note

DOD-L-85734S or MIL-L-23699 is recommended.

4.18. Rotor Brake

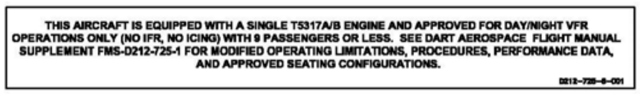
Engine starts with rotor brake engaged are prohibited. Rotor brake application is limited to ground operations and shall not be applied until the engines have been shut down and ROTOR RPM has decreased to 40% or less.

4.19. Heater

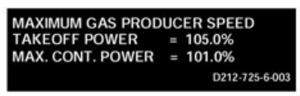
Heater shall not be operated when OAT is above 21°C (69.8°F)

4.20. Additional Placards

Refer to Figure 4-10 for Placards and Decals.



Limitations Placard
(P/N D212-725-6-001)



Gas Producer (N_1) Speed Placard (P/N D212-725-6-003)

DO NOT OPERATE HEATER ABOVE 21 DEG C OUT AIR TEMP

CARGO FIRE TEST SWITCH

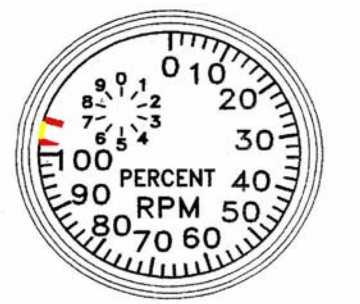
Typical

Panel aft end of overhead console

Figure 4-10 – Additional Placards

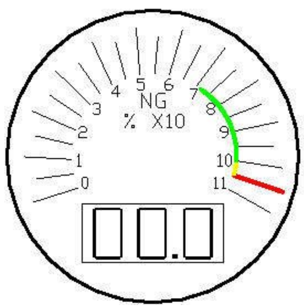
4.21. Instrument Markings

Gas Producer Tachometer (for aircraft with AC powered instrument system)



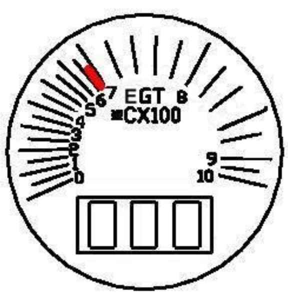
Gas Producer Tachometer
101% Maximum Continuous
101 to 105%
105% Maximum Takeoff Power

Gas Producer Tachometer (for aircraft with DC powered instrument system)



Gas Producer Tachometer
72 to 101% Maximum Continuous
101 to 105%
105% Maximum Takeoff Power

Exhaust Gas Temperature (EGT) (T53-17A Engine)

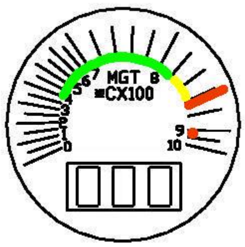


Maximum 680°C

Figure 4-11 – Instrument Markings (Sheet 1 of 6)

CHAPTER 4 – LIMITATIONS

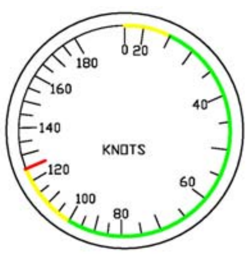
Measured Gas Temperature (MGT) (T53-17B/BCV Engine)



Normal Operations
- 400 to 820°C Continuous
- 820 to 863°C Takeoff (5 minutes)
- 863°C Maximum

Starting Limits
- 400 to 863°C Normal
- 863 to 926°C Caution (5 seconds)
- ● 926°C Maximum

Airspeed Indicator



Airspeed
- 0 to 25 knots
- 25 to 100 knots
- 100 to 125 knots
- 125 knots

Fuel Pressure

Fuel Pressure
- 4 PSI
- 4 to 35 PSI
- 35 PSI

Figure 4-11 – Instrument Markings (Sheet 2 of 6)

Engine Oil Temperature and Pressure (for aircraft with AC powered instrument system)

Engine Oil Temperature
- 15°C
- 15 to 93°C
- 93°C

Engine Oil Pressure
- 25 PSI
- 25 to 80 PSI
- 80 to 100 PSI
- 100 PSI

Engine Oil Temperature and Pressure (for aircraft with DC powered instrument system)

Engine Oil Temperature
- 15°C
- 15 to 93°C
- 93°C

Engine Oil Pressure
- 25 PSI
- 25 to 80 PSI
- 80 to 100 PSI
- 100 PSI

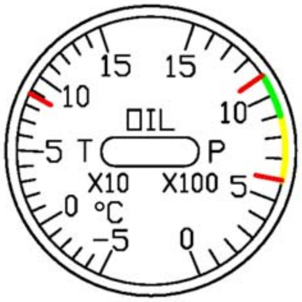
Transmission Oil Temperature and Pressure

Transmission Oil Temperature
- 15 to 110°C
- 110°C

Transmission Oil Pressure
- 30 PSI
- 30 to 40 PSI
- 40 to 70 PSI
- 70 PSI

Figure 4-11 – Instrument Markings (Sheet 3 of 6)

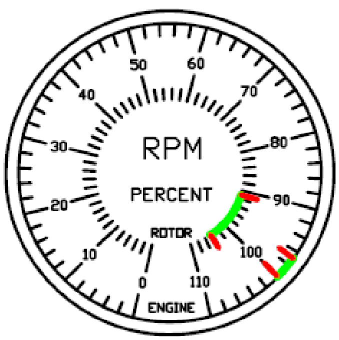
Hydraulic Fluid Temperature and Pressure Indicator



Hydraulic Fluid Temperature
- 88°C

Hydraulic Fluid Pressure
- 600 PSI
- 600 to 900 PSI
- 900 to 1100 PSI
- 1100 PSI

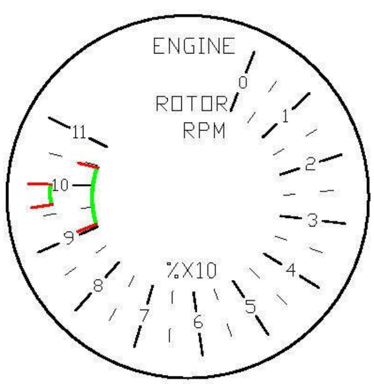
Dual Tachometer (for aircraft with AC powered instrument system)



Engine Tachometer
- 97.0%
- 97.0 to 100%
- 100%

Rotor Tachometer
- 91.0%
- 91.0 to 104.5%
- 104.5%

Dual Tachometer (for aircraft with DC powered instrument system)

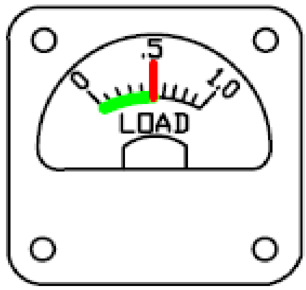


Engine Tachometer
- 97.0%
- 97.0 to 100%
- 100%

Rotor Tachometer
- 91.0%
- 91.0 to 104.5%
- 104.5%

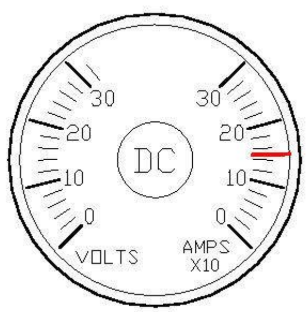
Figure 4-11 – Instrument Markings (Sheet 4 of 6)

Generator Loadmeter (for aircraft with AC powered instrument system)



Generator Loadmeter
0.0 to 0.5 – Continuous
0.5 – Maximum

Volt/Ammeter (for aircraft with DC powered instrument system)



Volt/Ammeter

150 – Maximum

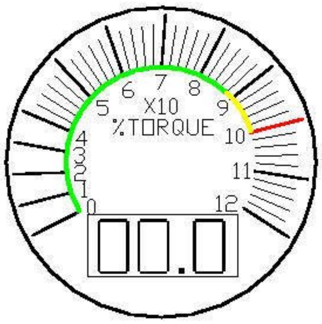
Torquemeter (for aircraft with AC powered instrument system)

Torquemeter
12.0 to 49.0 PSI
49.0 to 55.7 PSI
55.7 PSI

Note: 49.0 PSI may be exceeded provided airspeed is below 80 knots

Figure 4-11 – Instrument Markings (Sheet 5 of 6)

Torquemeter (for aircraft with DC powered instrument system)



Torquemeter

- 0 to 88 %
- 88 to 100 %
- 100 %

Note: 88 % may be exceeded provided airspeed is below 80 knots

Figure 4-11 – Instrument Markings (Sheet 6 of 6)

5. PERFORMANCE

5.1. Engine Operation Check Charts

A Maximum Power Check chart (Figure 5-1) is provided to aid the pilot in determining engine condition based on the relation of altitude/temperature and maximum power (maximum torquemeter pressure).

If this check is satisfactory, published Flight Manual performance can be equaled or bettered depending on how much the installed engine is better than the theoretical “specification engine” on which the published performance is based. Check can easily be made by using normal cockpit instruments, and the methods described herein.

As an alternative to the Maximum Power Check chart (Figure 5-1), Power Assurance Check charts (Figure 5-2 and 5-3) are provided to determine if the engine can produce installed power required to meet the published performance data. Figure 5-2 applies to the T5317A engine and Figure 5-3 applies to the T5317B/BCV engine. The power assurance check shall be performed at a hover.

A power assurance check should be performed daily. Additional checks should be made if unusual operating conditions or indications arise.

If engine does not meet requirements of power assurance check, published performance may not be achievable. The cause should be determined as soon as practical. Refer to Engine Maintenance Manual.

5.2. Maximum Power (Torquemeter Pressure) Check

The purpose of this check is to determine whether or not the installed engine will deliver torquemeter pressure (power) equal to or greater than a minimum specification engine. Since the minimum specification engine is capable of delivering 1500 horsepower, and the engine as installed in the helicopter is de-rated to 1290 horsepower, care must be taken not to exceed the power limitation (55.7 PSI torquemeter pressure). This “full throttle” power check, in order to be conclusive, must be made at conditions of altitude and temperature at which full throttle will produce no more than 55.7 PSI torquemeter pressure. This check should be accomplished in the following manner:

De-ice OFF, Cabin heat OFF

Initiate a climb at best climb speed and 100 percent N_2

Maintain climb and increase collective (not to exceed 55.7 PSI of torque) until the N_2 speed drops to 98 percent with the governor RPM switch “Beeped” to full increase.

Read and record the following

	Example
Pressure altitude	6000 ft
Ambient air temperature	30°C
Torquemeter pressure	53.2 PSI

CHAPTER 5 – PERFORMANCE

Gas producer speed (N_1) 96.6%

Enter chart (Figure 5-1) at pressure altitude (Point A), proceed horizontally to ambient air temperature (Point B), and then proceed vertically down and read chart torquemeter pressure (Point C). Example: 52.0 PSI

Since the observed maximum torquemeter pressure of the example (53.2 PSI) is no less than the chart maximum torquemeter pressure (52.0 PSI) the maximum torquemeter pressure available is satisfactory.

The recorded N_1 RPM shall be plus or minus 0.5 percent of the placarded Maximum Gas Producer Speed for Takeoff Power. (This is N_1 topping.)

If this check is satisfactory, it can be concluded that the installed engine is at least as good as a minimum specification engine and that full power can be obtained. If this check is not satisfactory, there is reason to believe that the engine has deteriorated to the extent that published performance may not be obtained. If this occurs, the cause of the deterioration should be determined.

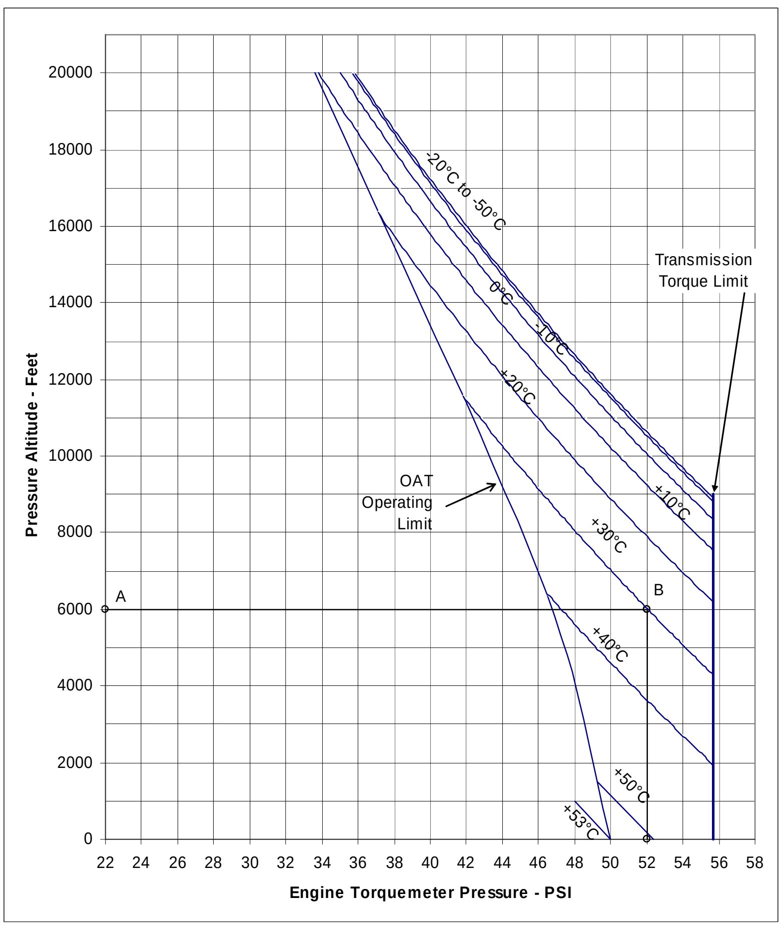


Figure 5-1 – T53-17A/B/BCV – Maximum Power Check Chart

5.3. Power Assurance Checks

5.3.1. Sample Problem (T53-17A Engine):

Stabilize the helicopter headed into the wind at a hover with De-ice OFF and cabin heat OFF; the following is an example:

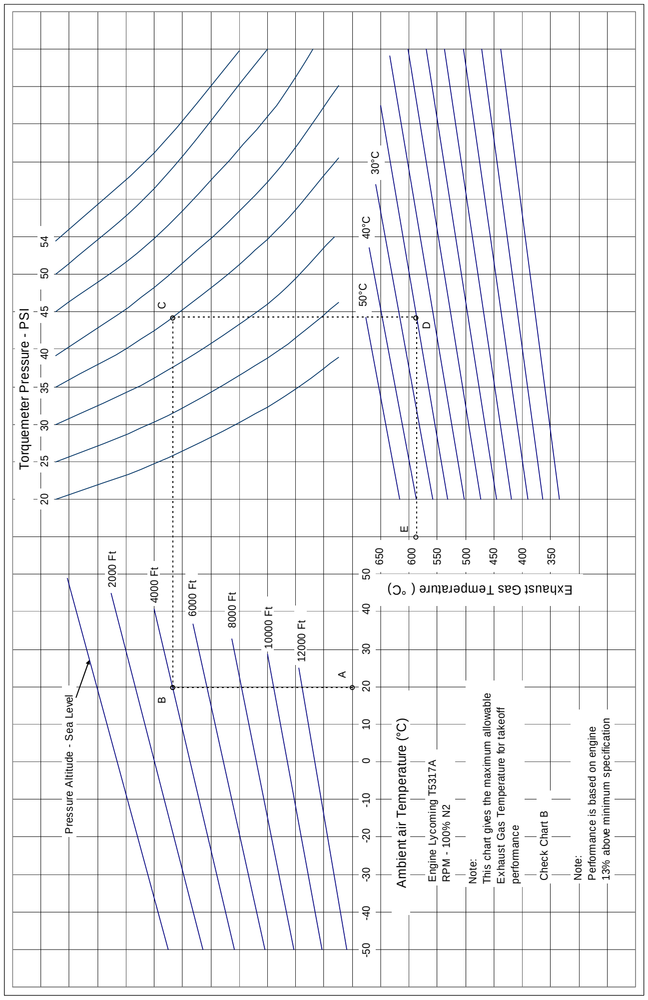
	Example
Pressure altitude	4000 ft
Selected torquemeter pressure	35 PSI
Engine RPM (N_2) adjust to	100%
Read and record the following values	
Ambient air temperature	20°C
Exhaust gas temperature	575°C

Enter chart (Figure 5-2) at OAT (Point A). Proceed vertically to pressure altitude (Point B). Proceed horizontally to torquemeter pressure (Point C).

Example:

Figure 5-2 Minimum Specification EGT – 585°C

Since the actual exhaust gas temperature (575°C) is not greater than the charted exhaust gas temperature (585°C), the relation between power and exhaust gas temperature is satisfactory.



Takeoff Power

Figure 5-2 – T53-17A – Power Assurance Check

5.3.2. Sample Problem (T53-17B/BCV Engine):

Stabilize the helicopter headed into the wind at a hover with De-ice OFF and cabin heat OFF; the following is an example:

	Example
Pressure altitude	1000 ft
Selected torquemeter pressure	43.5 PSI
Engine RPM (N_2) adjust to	100%
Read and record the following values	
Ambient air temperature	0°C
Exhaust gas temperature	680°C

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Enter chart (Figure 5-3) at torque value (Point A). Proceed horizontally to pressure altitude (Point B). Proceed vertically to OAT value (Point C), then proceed horizontally to minimum specification MGT (Point D).

Example:

Figure 5-3 Minimum Specification MGT – 700°C

Since the actual measured gas temperature (680°C) is not greater than the charted measured gas temperature (700°C), the relation between power and measured gas temperature is satisfactory.

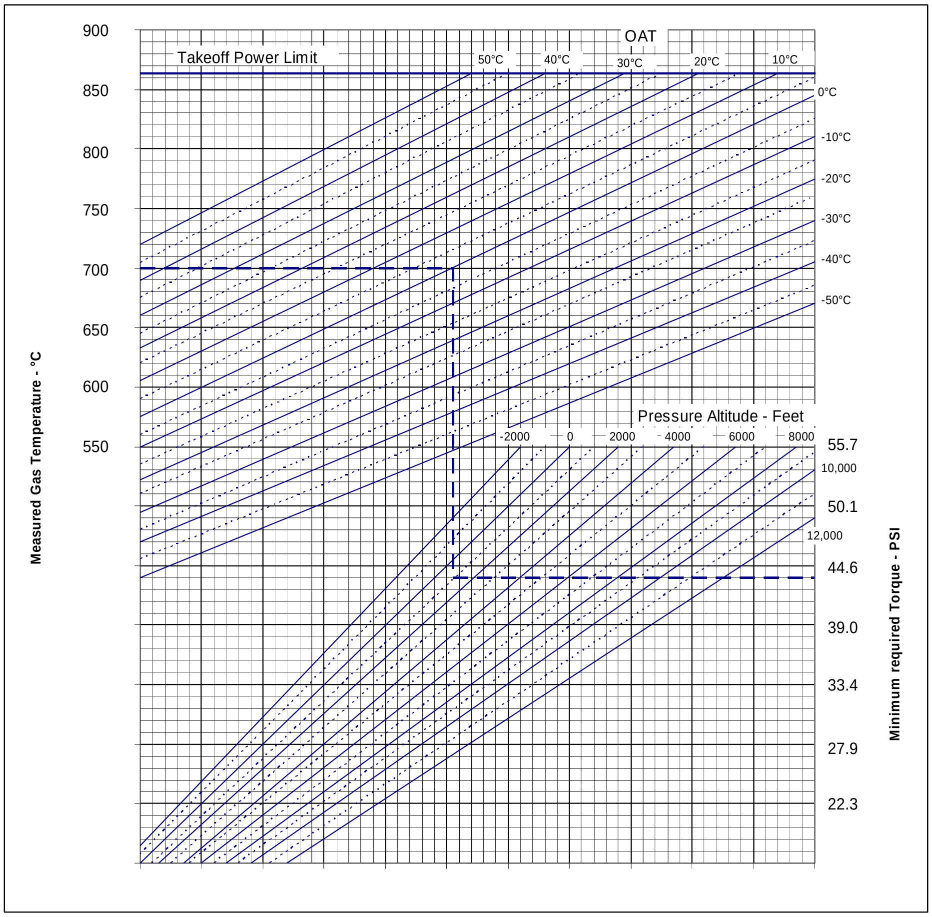

Figure 5-3 – T53-17B/BCV – Power Assurance Chart – Ground/Hover

5.4. Hover Ceiling Charts

The Hover Ceiling charts (See Figure 5-6 Sheets 1 – 8) present hover performance IGE and OGE (allowable gross weight) for conditions of pressure altitude and outside air temperature (OAT). For actual gross weight limitations during takeoff and landing, refer to Density Altitude – Gross Weight Limit for

Takeoff and Landing, Section 4. The 204-704-037-003 particle separator kit is not approved as part of this modification.

5.5. Takeoff Distance

The Takeoff Distance Charts provide takeoff distances required to clear a 50 foot obstacle in a zero wind condition, using a takeoff flight path which will avoid the critical areas of the Height-Velocity Diagram for Smooth, Level, Firm Surfaces (Figure 5-14). Takeoff is initiated from a 4 foot hover.

5.6. Rate of Climb – Maximum

5.6.1 The Rate of Climb – Maximum charts predict the approximate rate of climb at all allowable density altitudes for the Eagle Single in two different configurations:

5.6.1.1 The first configuration, all bleed air systems are off, maintains 55.7 PSI engine torque until the altitude or OAT increases the MGT to 863°C takeoff limit or the EGT takeoff limit found on the OAT vs EGT limits placard. If the climb is continued the engine torque will decrease.

Note

Takeoff power is limited to 5 minutes.

5.6.1.2 The second configuration, engine de-ice on, maintains maximum continuous power which is limited by engine torque (49 PSI) at low altitude. As altitude or OAT increases the flight crew will be limited to the maximum continuous MGT or 820°C or the maximum continuous EGT which is found on the OAT vs EGT limits placard.

5.6.1.3 To determine rate of climb at a particular OAT and pressure altitude:

1. Determine which chart is to be utilized
2. Convert the pressure altitude and OAT to density altitude utilizing the Density Altitude chart (Figure 5-13)
3. Enter the appropriate climb chart at the desired density altitude and proceed horizontally to the planned gross weight.
4. At the planned gross weight proceed vertically down to the lower axis and read the predicted rate of climb.

5.7. Landing Distance

The Landing Distance charts provide the landing distances required to clear a 50 foot obstacle for all outside air temperatures, pressure altitudes and gross weights.

5.8. Height Velocity

The HV diagram represents the factors of airspeed and height above ground, which represent a critical area of helicopter operation during takeoff and landing. Refer to, Figure 5-14, HV Diagram. The HV Diagram was developed using a smooth, level, firm surface. The HV diagram is only valid when the WAT limitations (Figure 4-4) are not exceeded.

Prior to takeoffs made in accordance with the H-V diagram proceed as follows:
Refer to Weight-Altitude-Temperature (WAT) Chart, Figure 4-4, for gross weight limit.
Determine the wind direction and speed. Downwind takeoffs are not recommended because published takeoff distances will not be achieved.

Determine torque required for hover at skid height of 4 feet. Refer to Figure 4-7: Power Limits for Takeoff.

5.9. Operation vs Allowable Wind

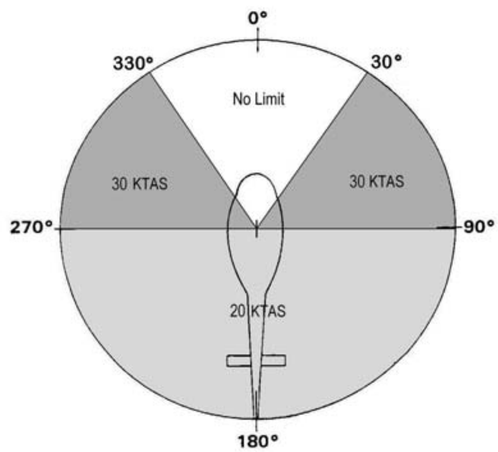

Figure 5-4 – Operation vs Allowable Wind Above 10,500 Lbs

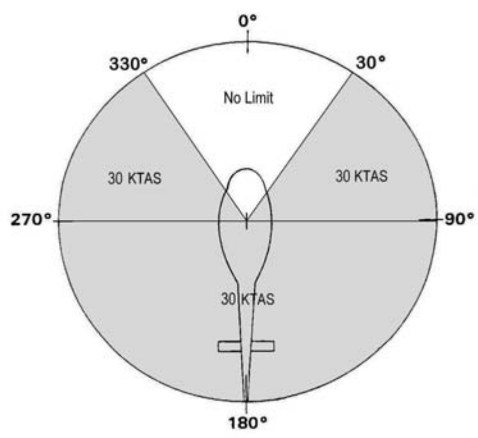

Figure 5-5 – Operation vs Allowable Wind 10,500 Lbs and Below

5.10. Airspeed System Calibration

Indicated airspeed (KIAS) correct for position and instrument error equals calibrated airspeed (KCAS). Determine corrected airspeed from Figure 5-8 and 5-9.

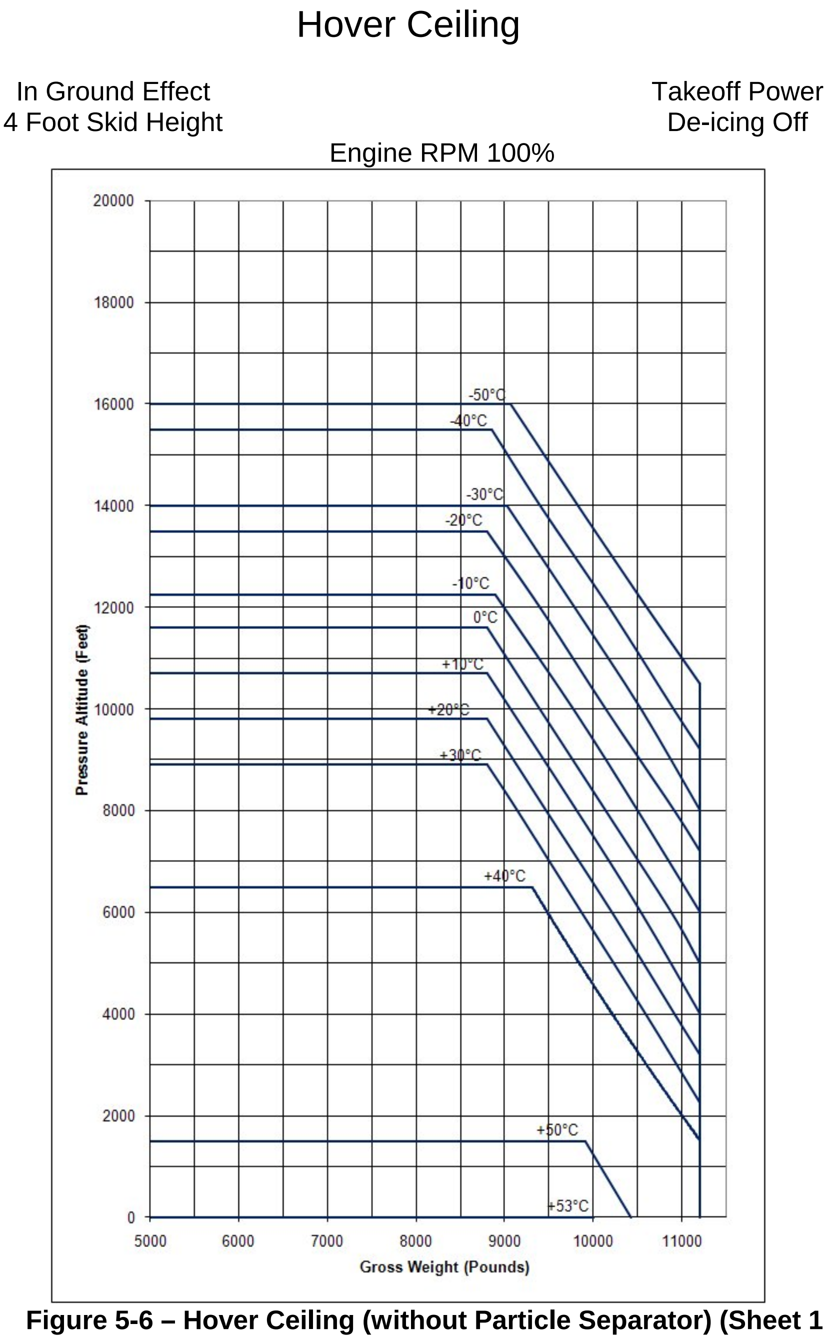

Figure 5-6 – Hover Ceiling (without Particle Separator) (Sheet 1 of 8)

Hover Ceiling

In Ground Effect
4 Foot Skid Height

Takeoff Power
De-icing On

Engine RPM 100%

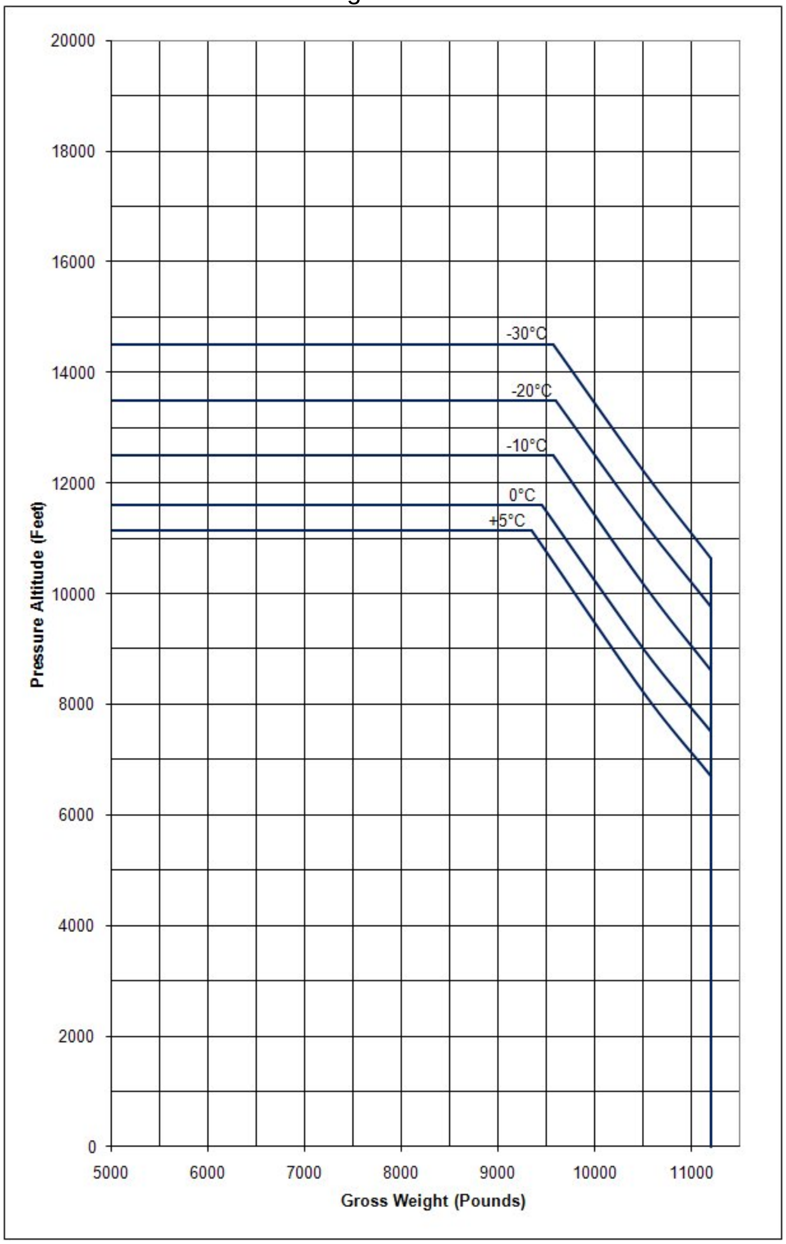

Figure 5-6 – Hover Ceiling (without Particle Separator) (Sheet 2 of 8)

Hover Ceiling

In Ground Effect
4 Foot Skid Height

Max. Cont. Power
De-icing Off

Engine RPM 100%

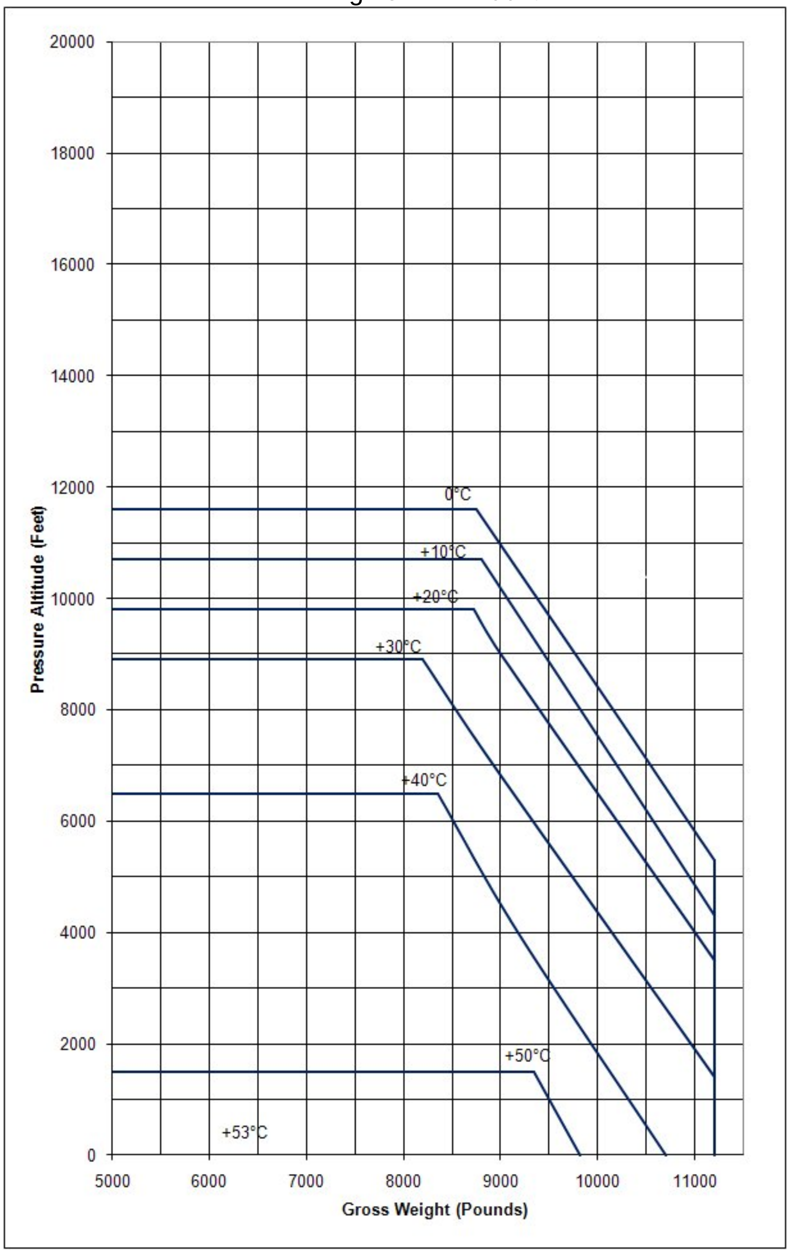

Figure 5-6 – Hover Ceiling (without Particle Separator) (Sheet 3 of 8)

Hover Ceiling

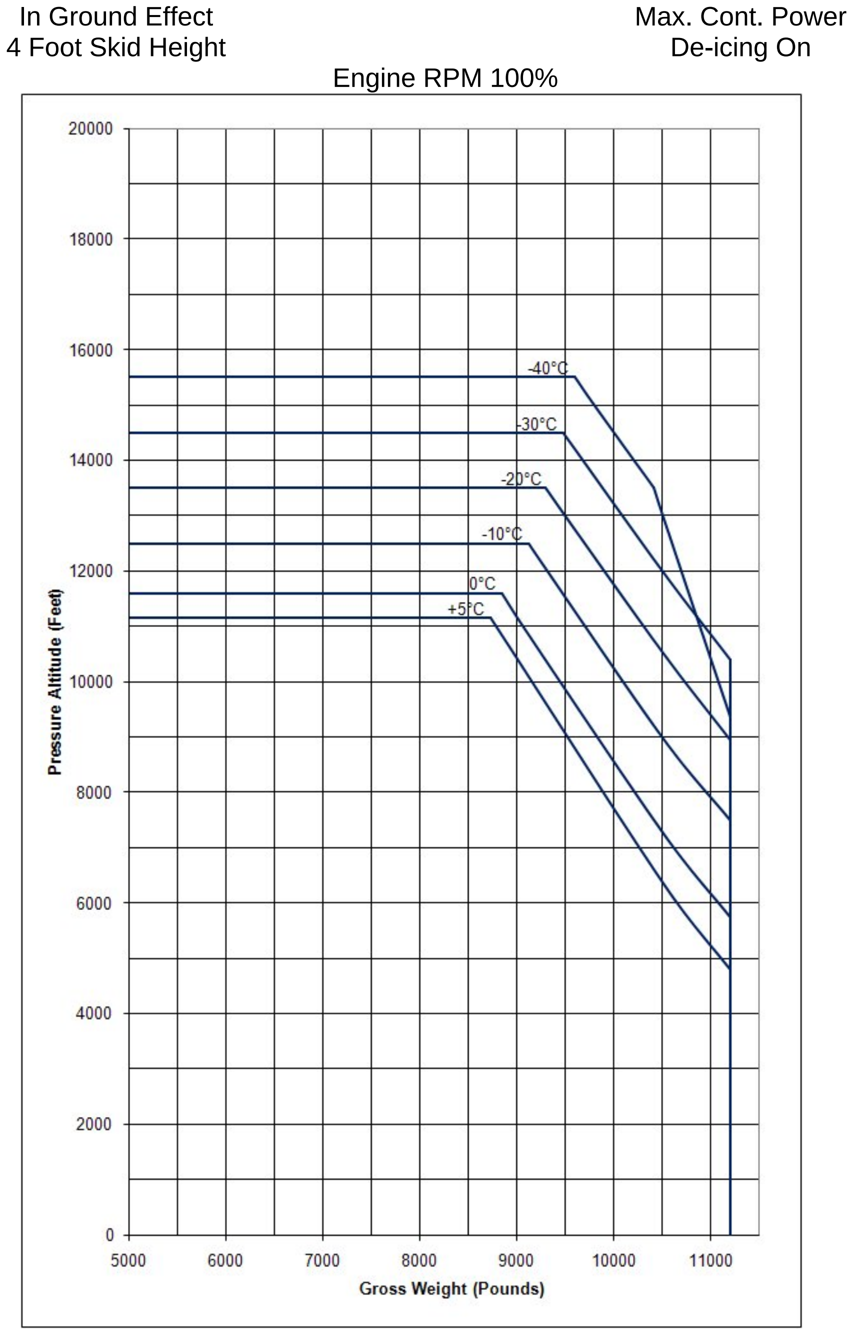

Figure 5-6 – Hover Ceiling (without Particle Separator) (Sheet 4 of 8)

Hover Ceiling

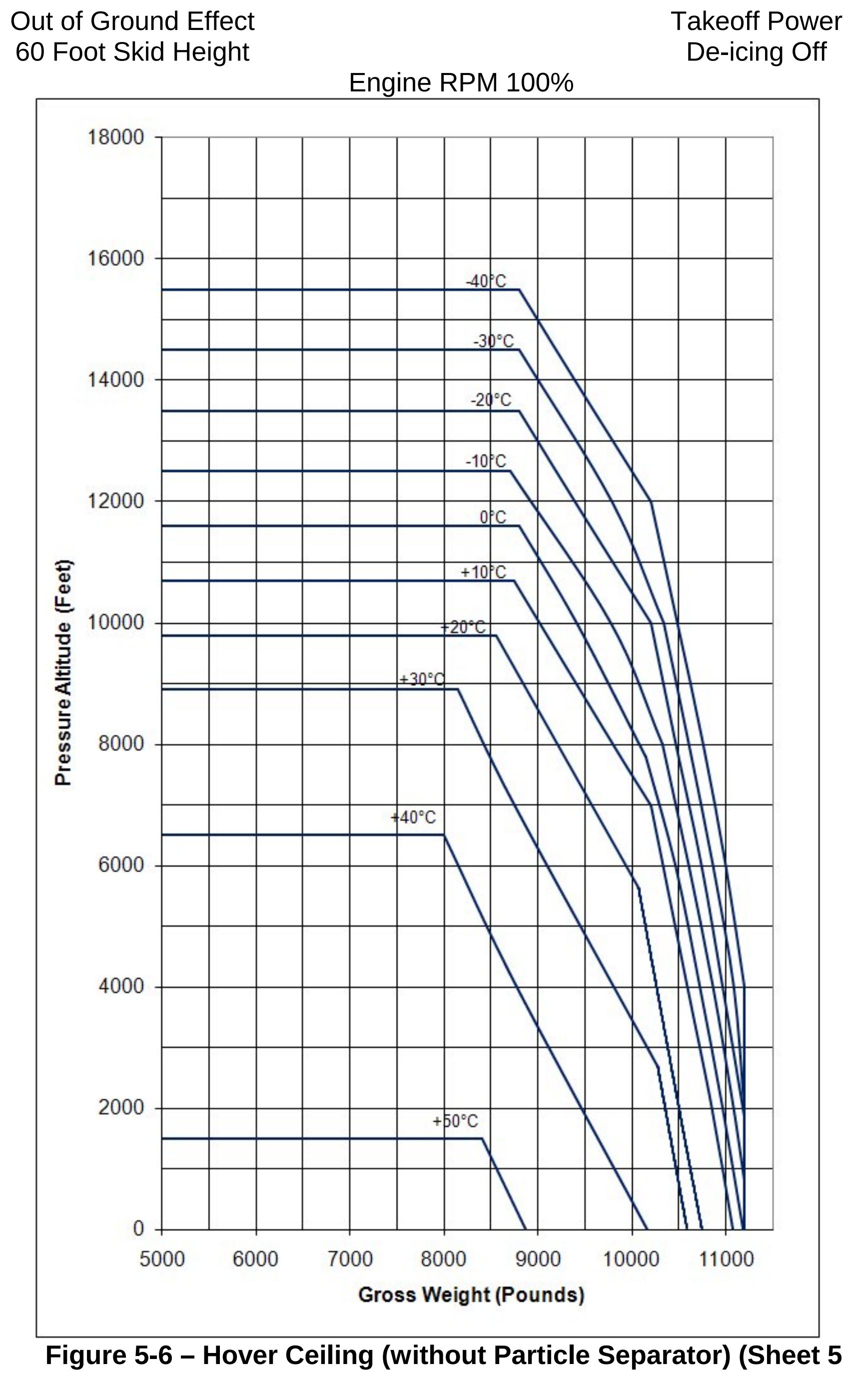

Figure 5-6 – Hover Ceiling (without Particle Separator) (Sheet 5 of 8)

Hover Ceiling

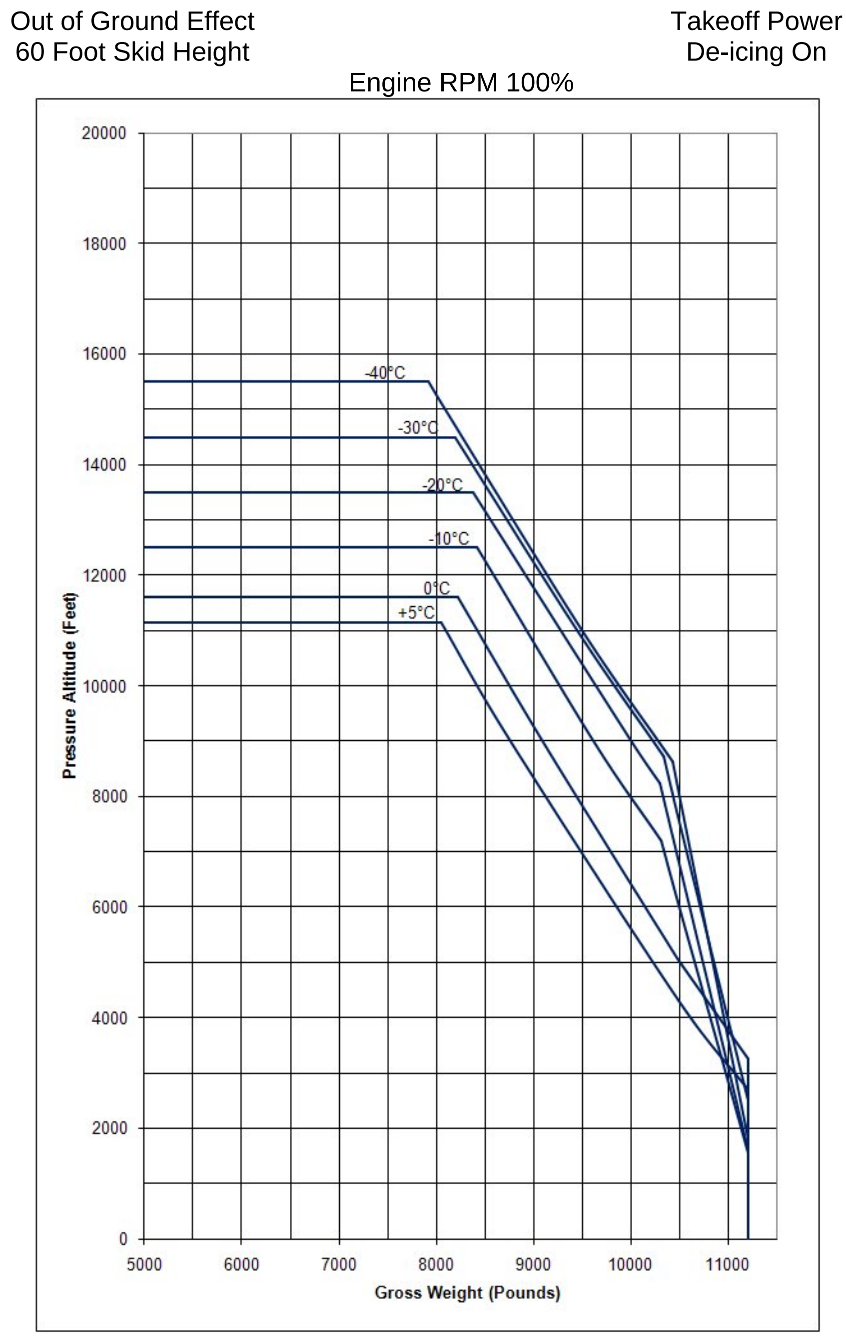

Figure 5-6 – Hover Ceiling (without Particle Separator) (Sheet 6 of 8)

Hover Ceiling

Out of Ground Effect
60 Foot Skid Height

Max. Cont. Power
De-icing Off

Engine RPM 100%

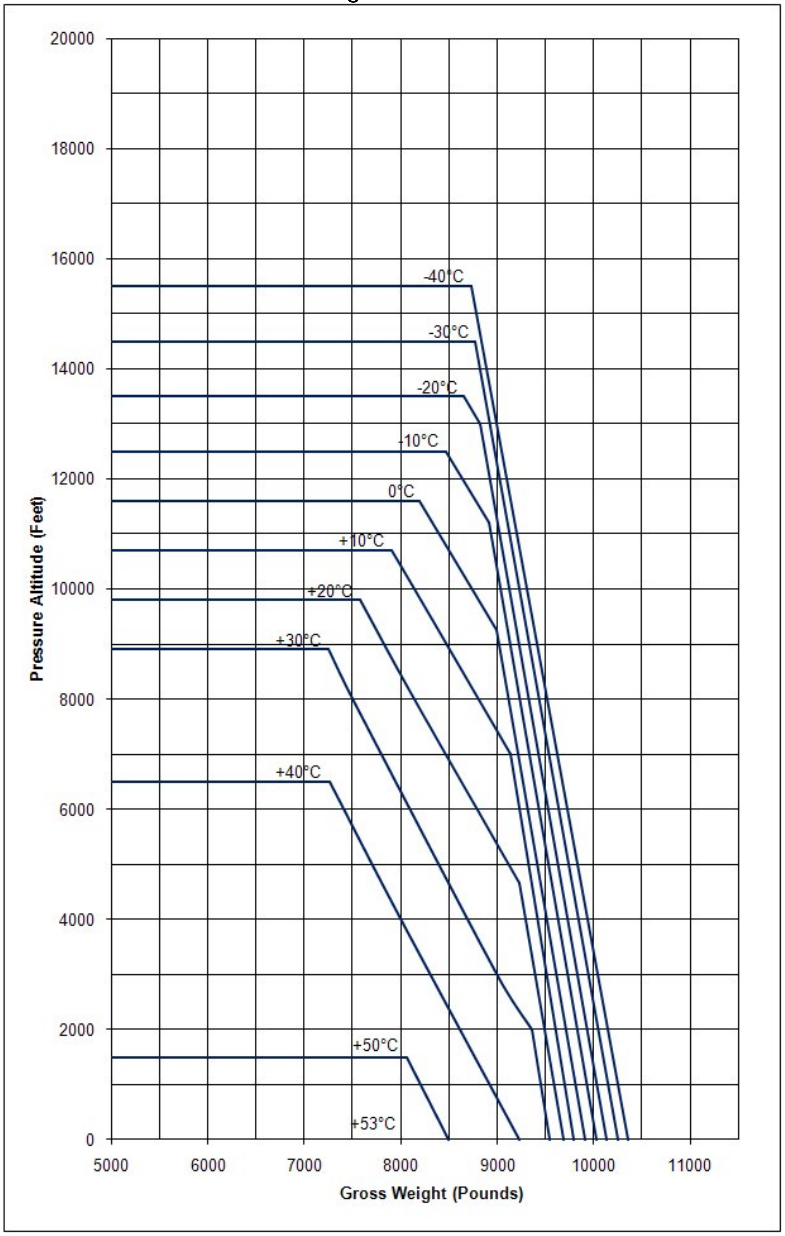

Figure 5-6 – Hover Ceiling (without Particle Separator) (Sheet 7 of 8)

Hover Ceiling

Out of Ground Effect
60 Foot Skid Height

Max. Cont. Power
De-icing On

Engine RPM 100%

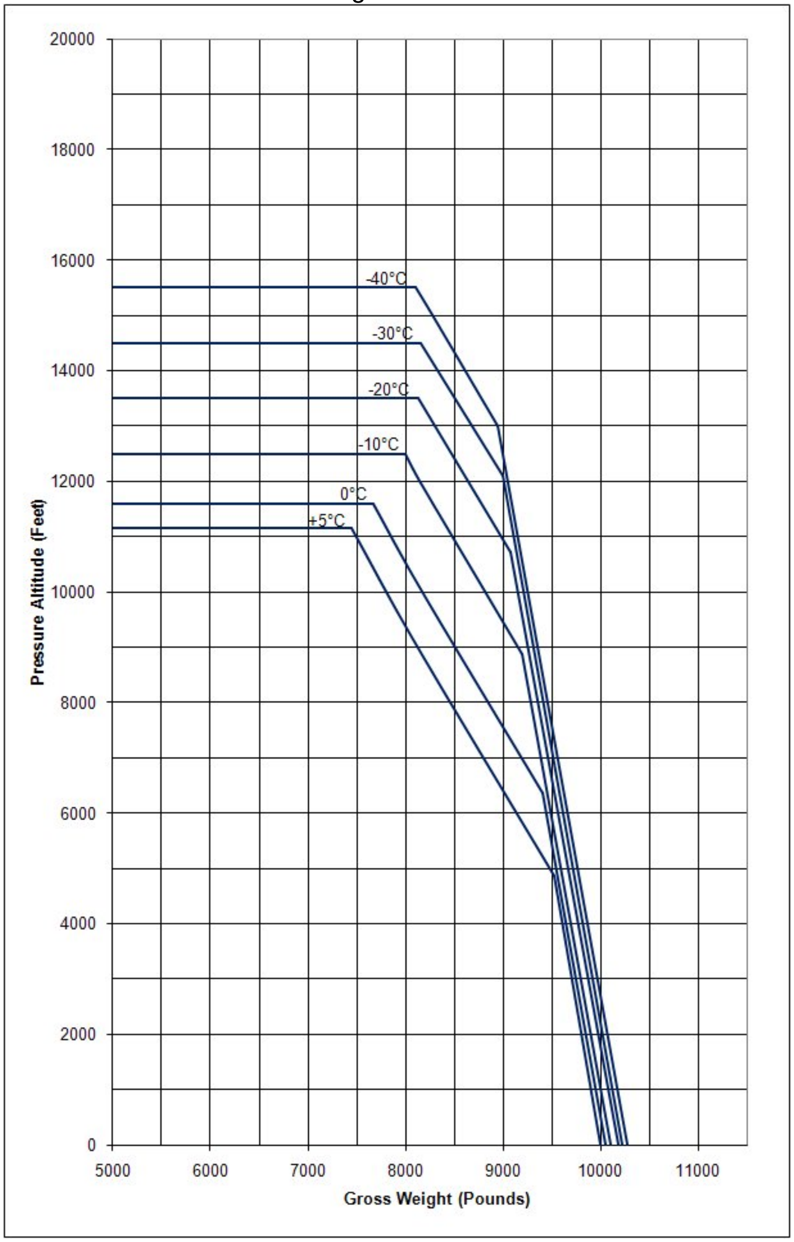

Figure 5-6 – Hover Ceiling (without Particle Separator) (Sheet 8 of 8)

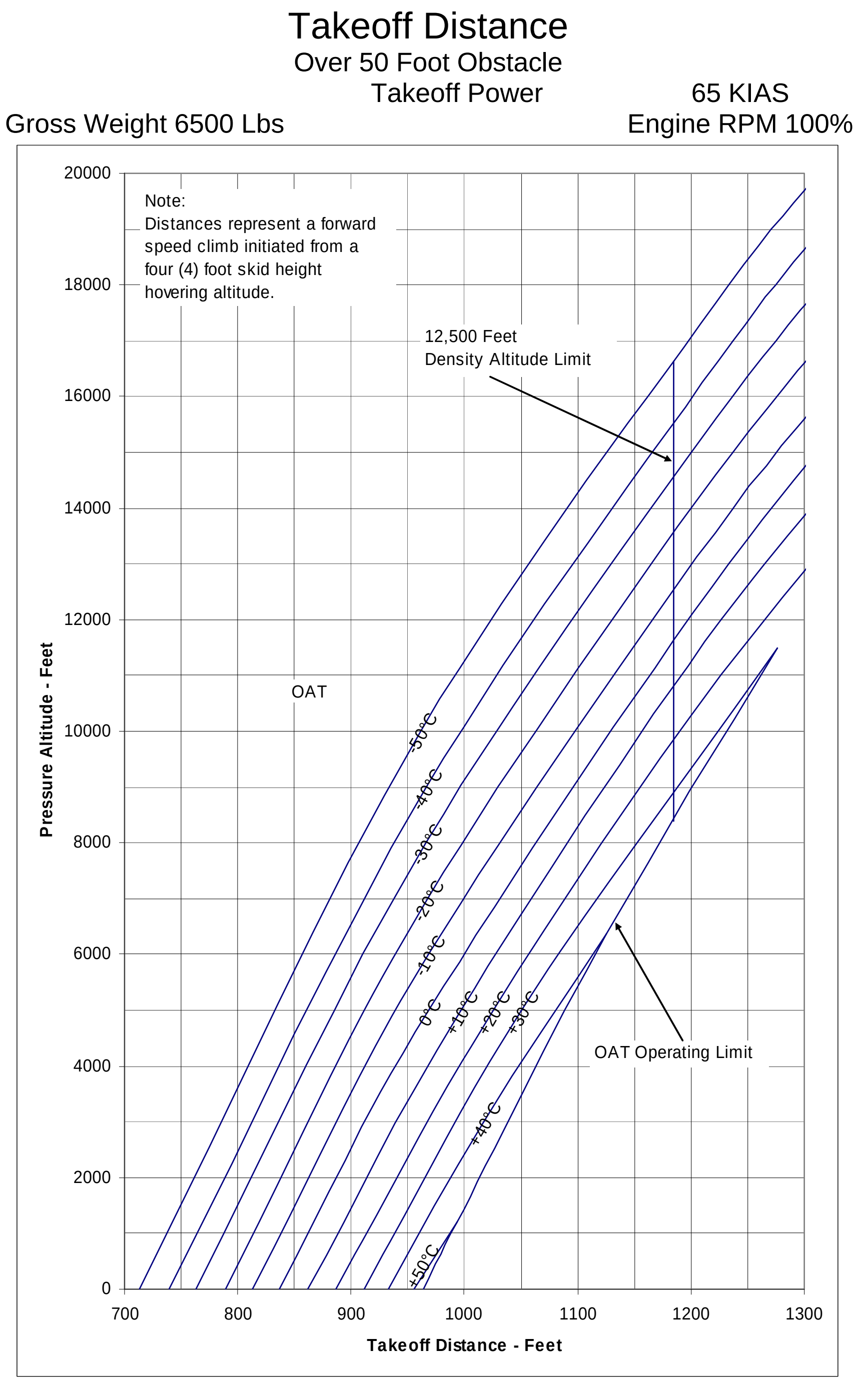

Figure 5-7 – Takeoff Distance (Sheet 1 of 12)

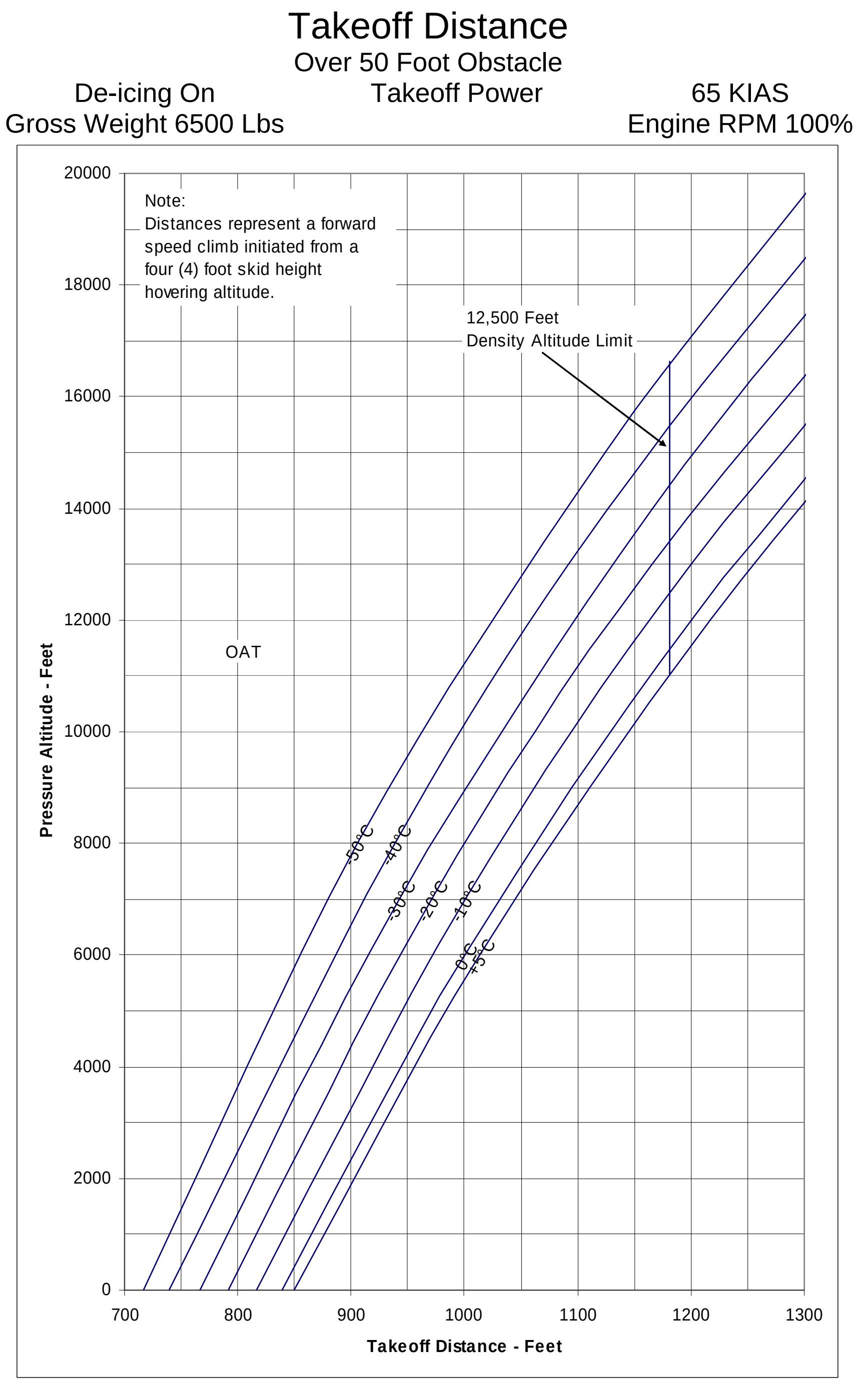

Figure 5-7 – Takeoff Distance (Sheet 2 of 12)

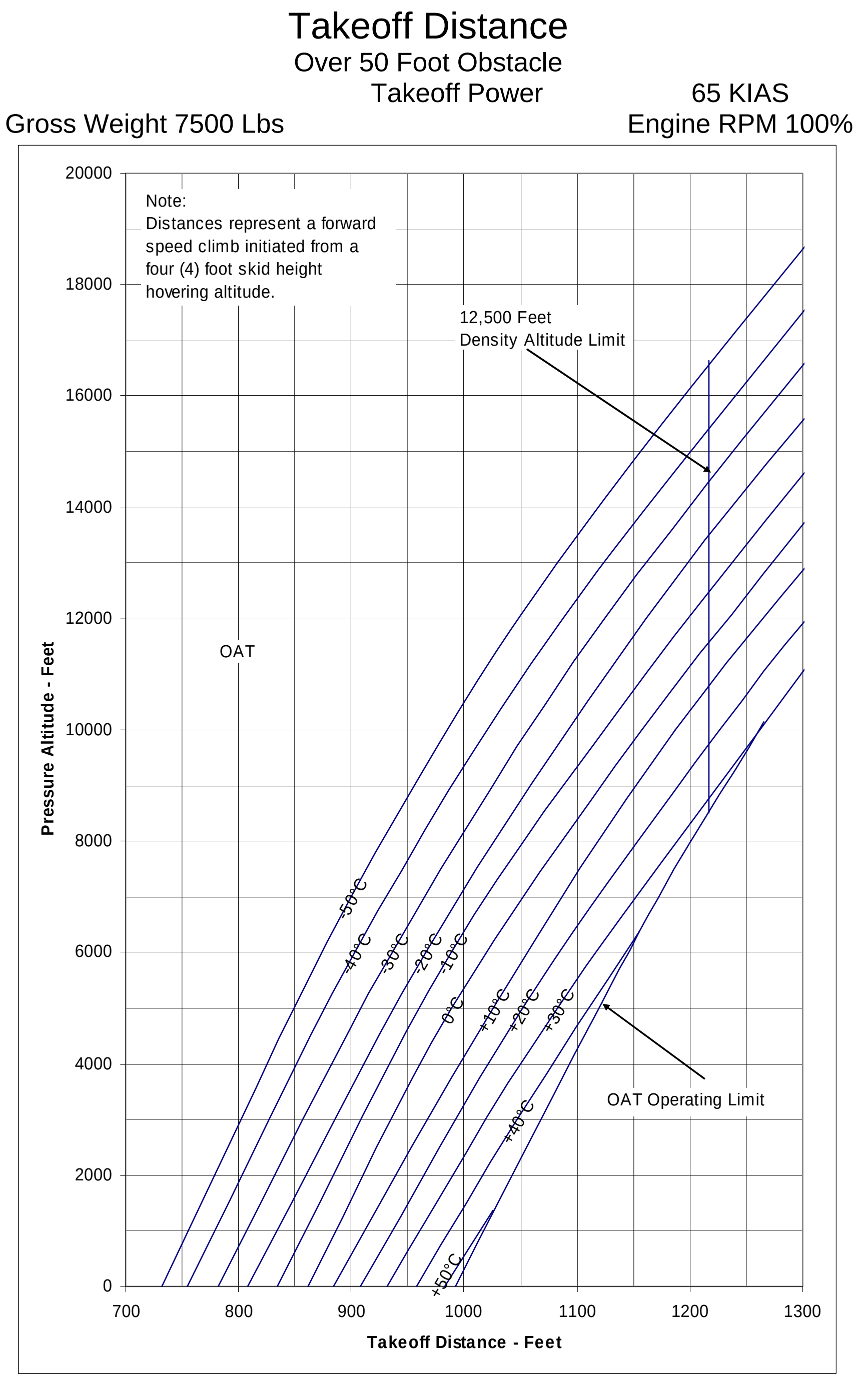

Figure 5-7 – Takeoff Distance (Sheet 3 of 12)

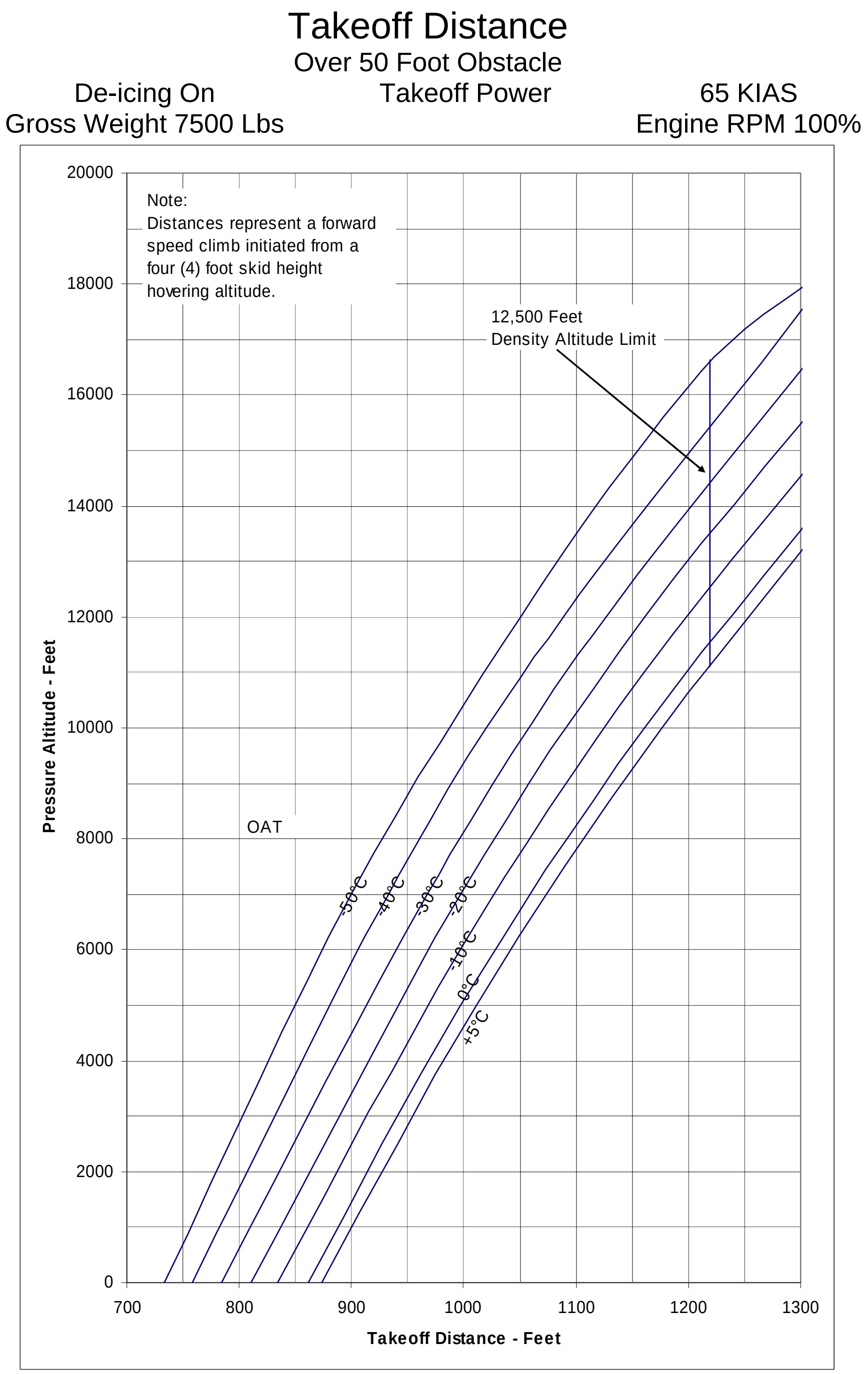

Figure 5-7 – Takeoff Distance (Sheet 4 of 12)

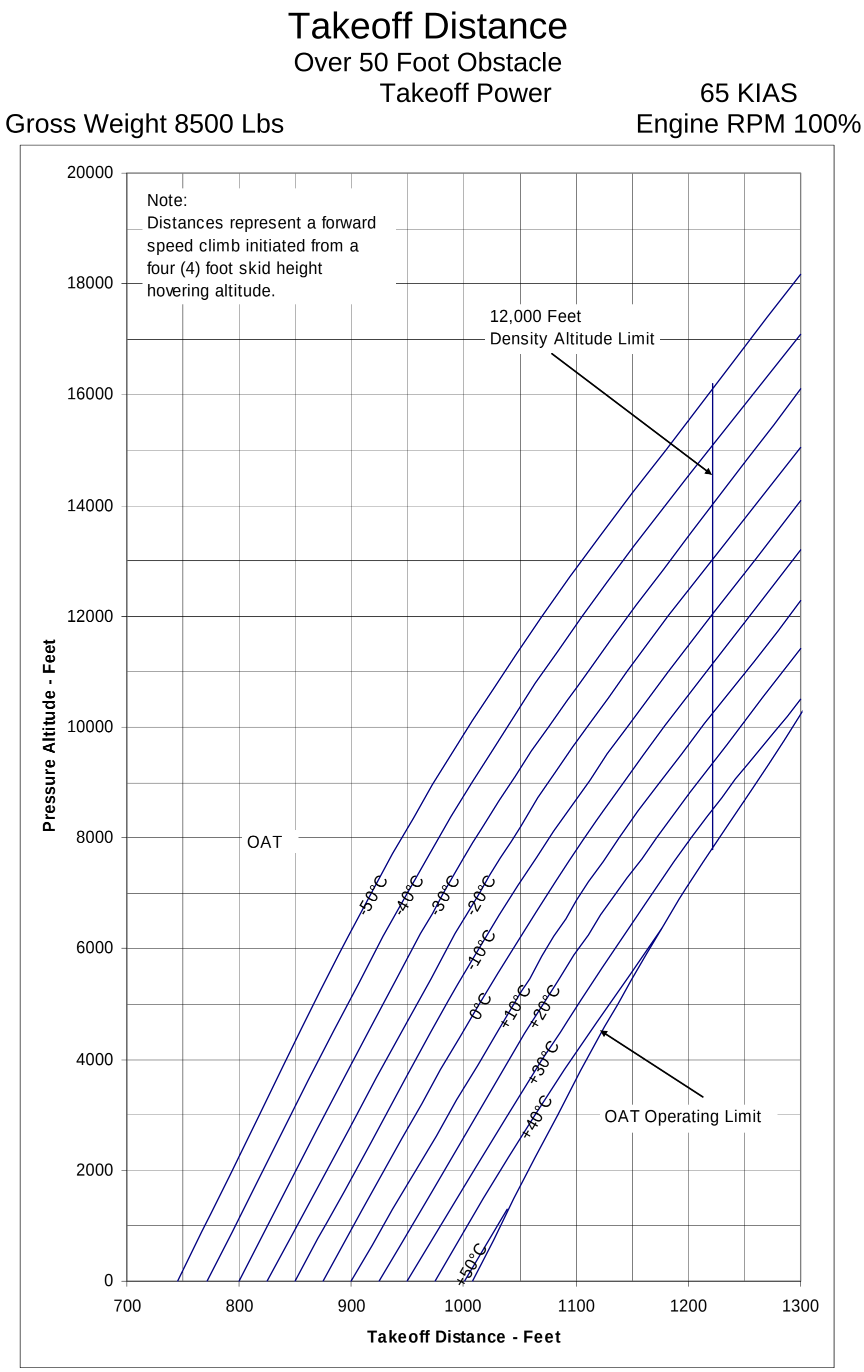

Figure 5-7 – Takeoff Distance (Sheet 5 of 12)

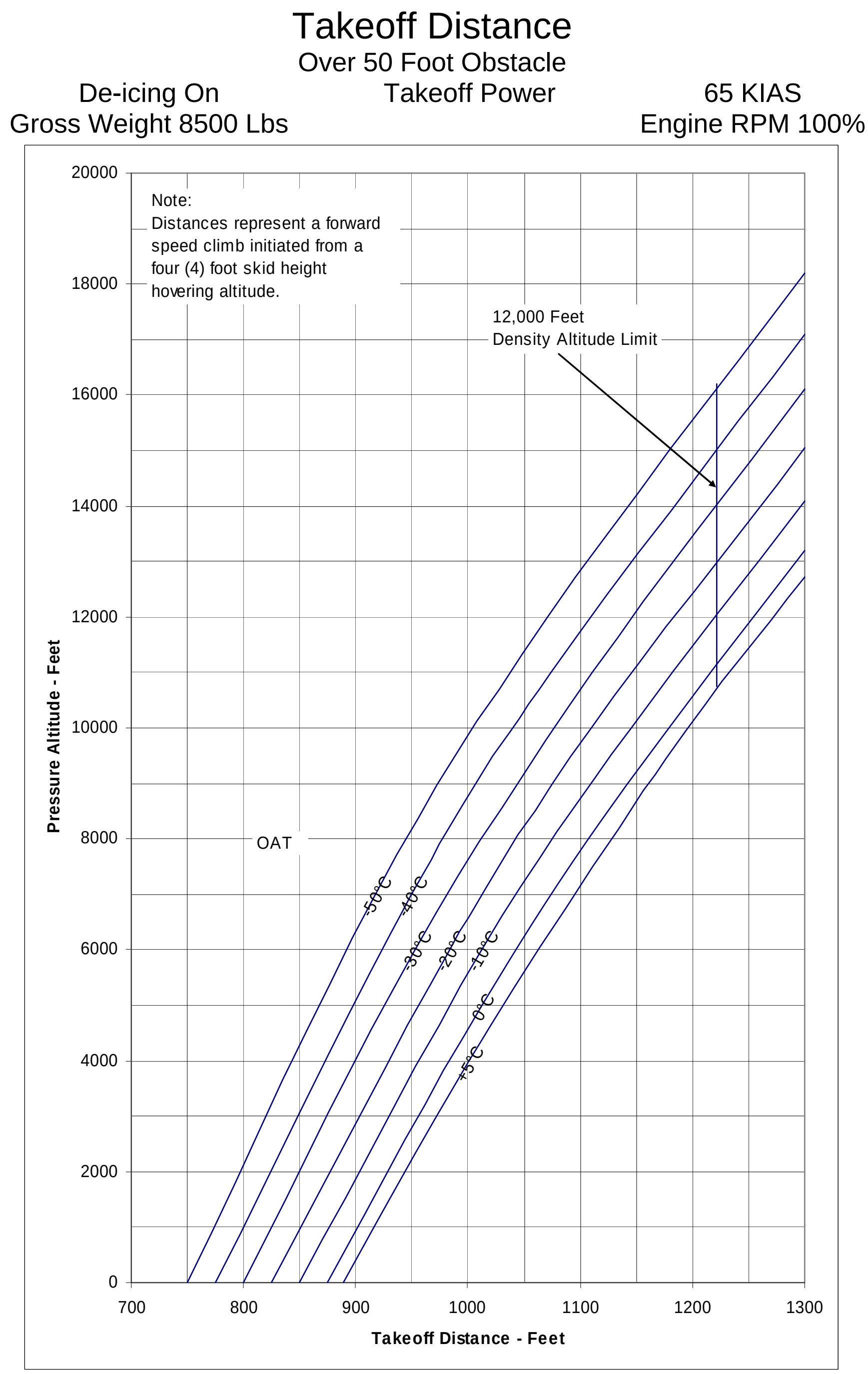

Figure 5-7 – Takeoff Distance (Sheet 6 of 12)

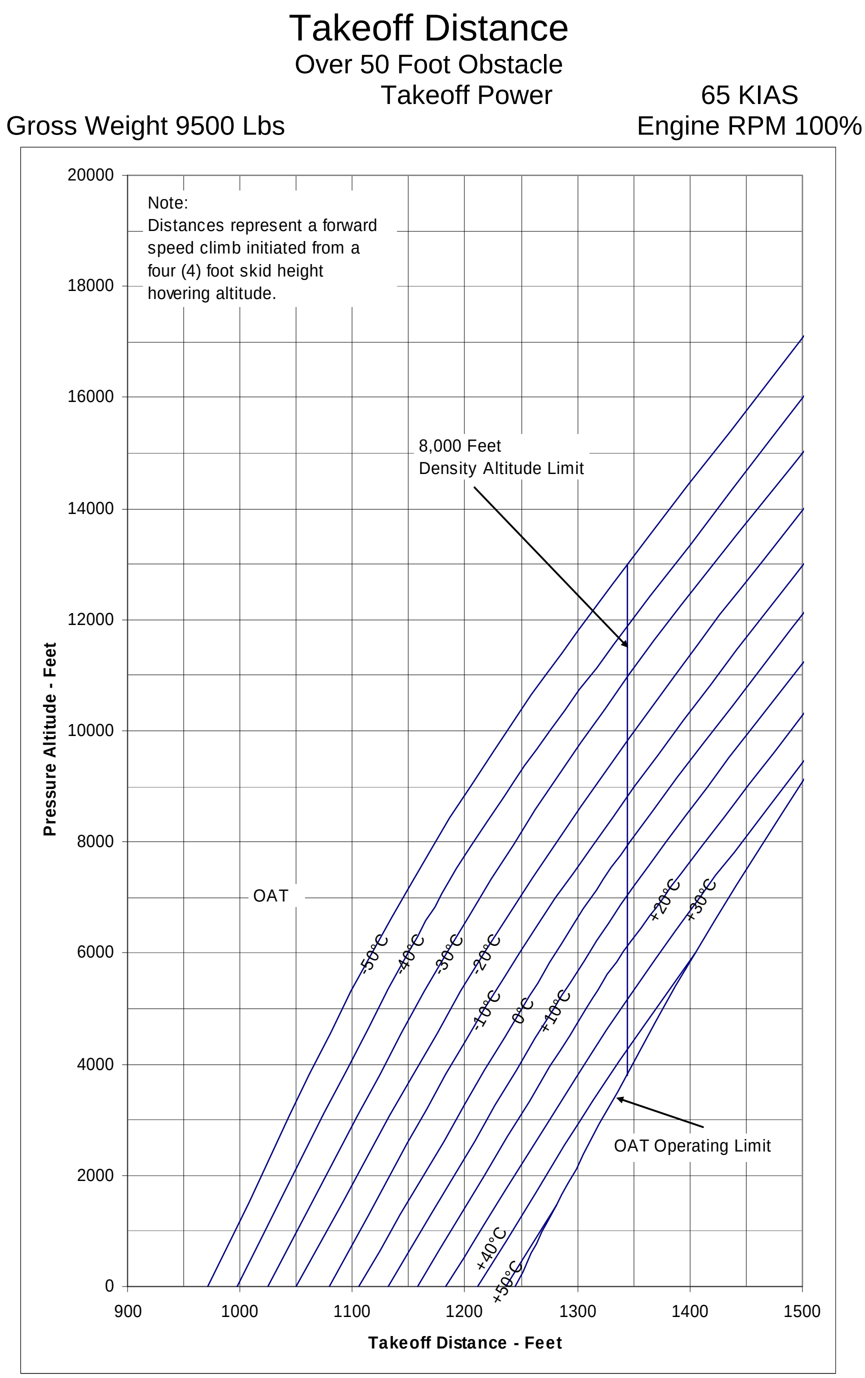

Figure 5-7 – Takeoff Distance (Sheet 7 of 12)

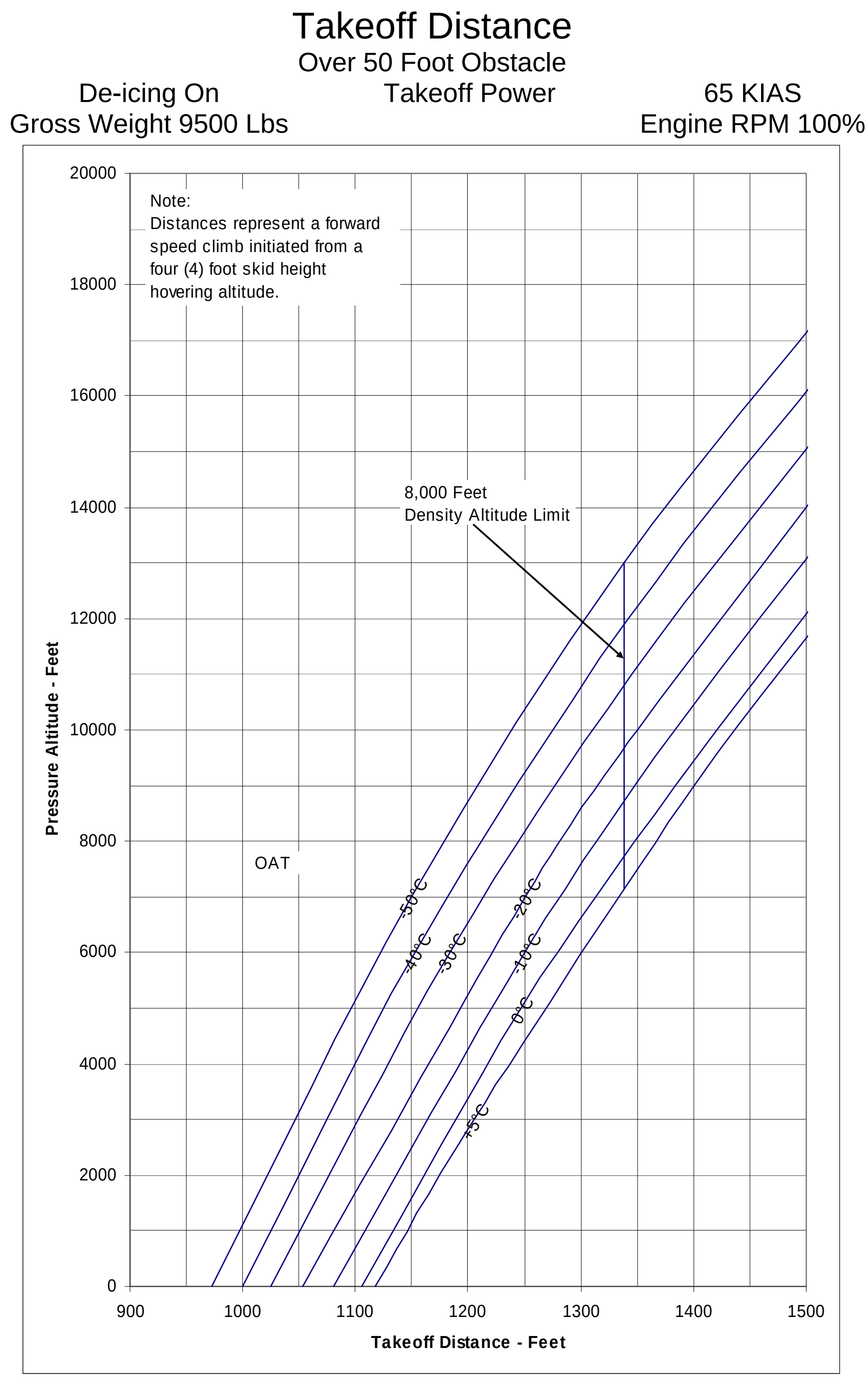

Figure 5-7 – Takeoff Distance (Sheet 8 of 12)

Takeoff Distance

Over 50 Foot Obstacle

Takeoff Power

65 KIAS

Gross Weight 10,500 Lbs

Engine RPM 100%

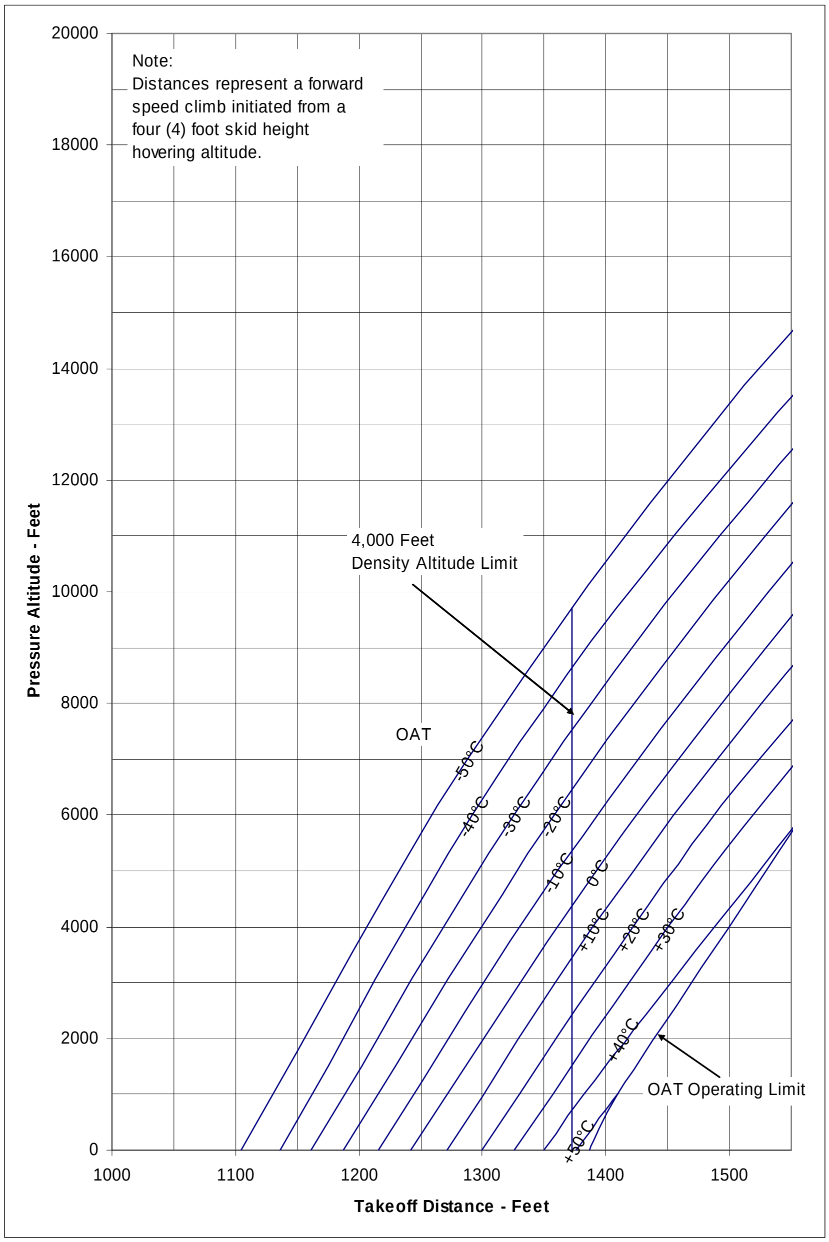

Figure 5-7 – Takeoff Distance (Sheet 9 of 12)

Takeoff Distance

Over 50 Foot Obstacle

De-icing On | Takeoff Power | 65 KIAS
Gross Weight 10,500 Lbs | Engine RPM 100%

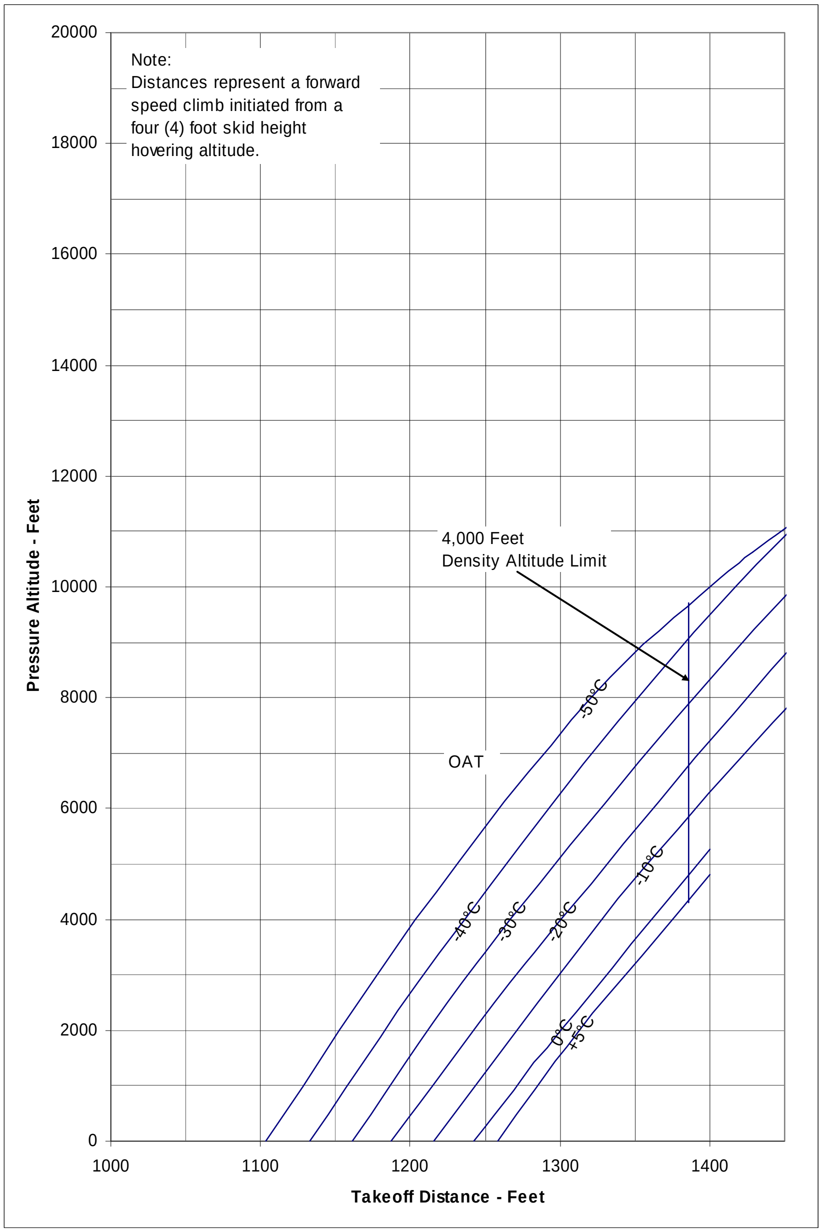

Figure 5-7 – Takeoff Distance (Sheet 10 of 12)

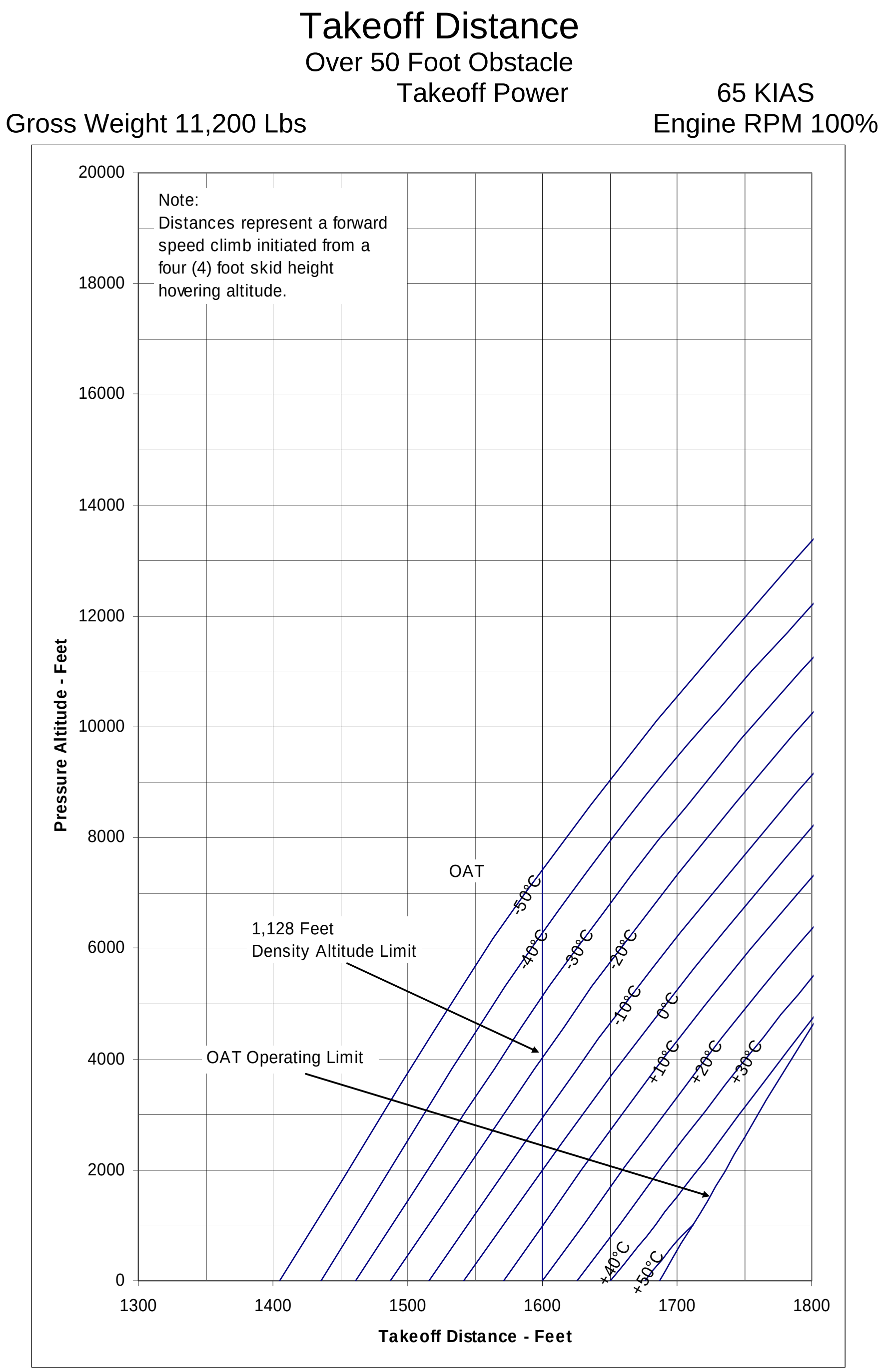

Figure 5-7 – Takeoff Distance (Sheet 11 of 12)

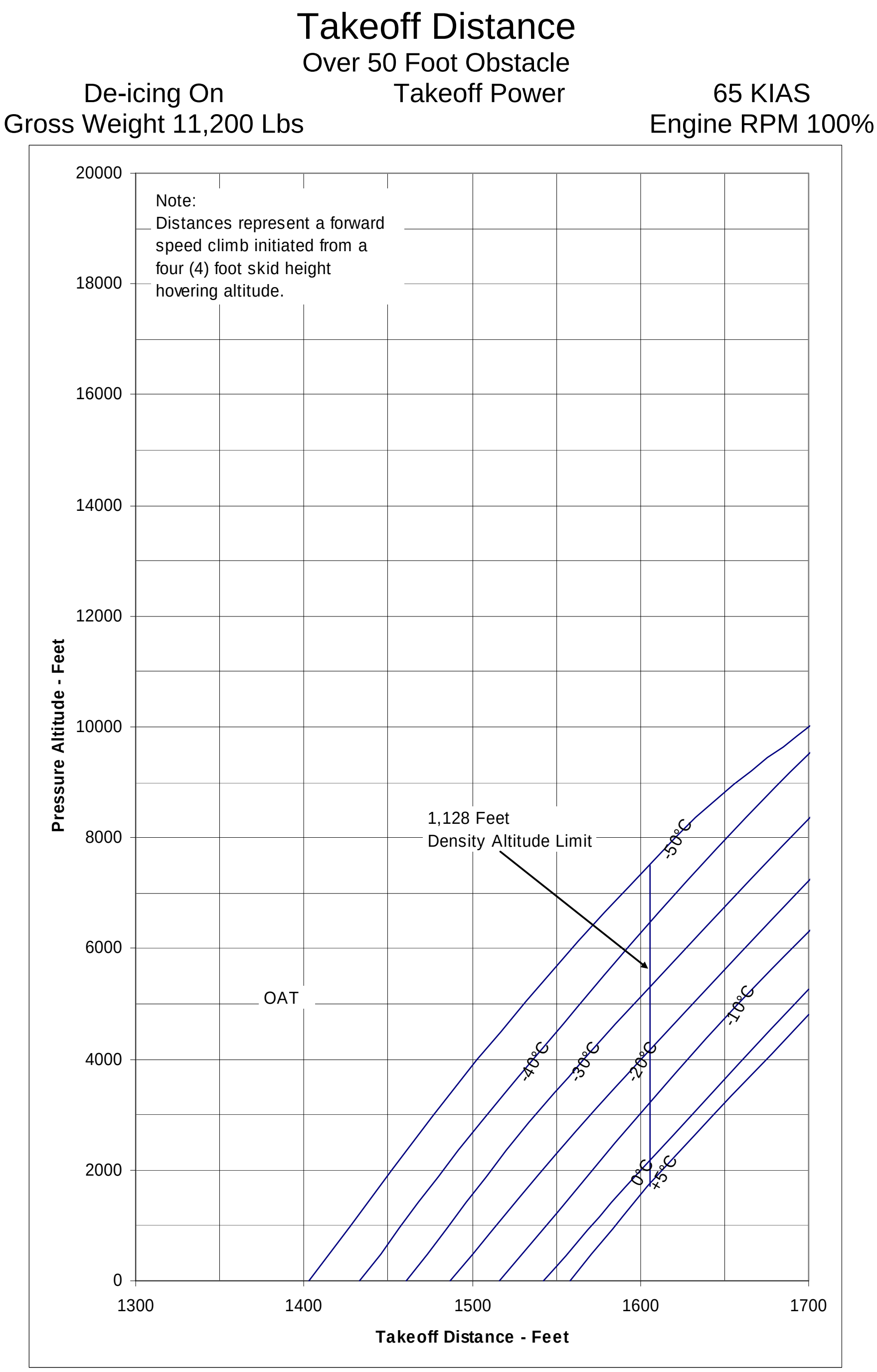

Figure 5-7 – Takeoff Distance (Sheet 12 of 12)

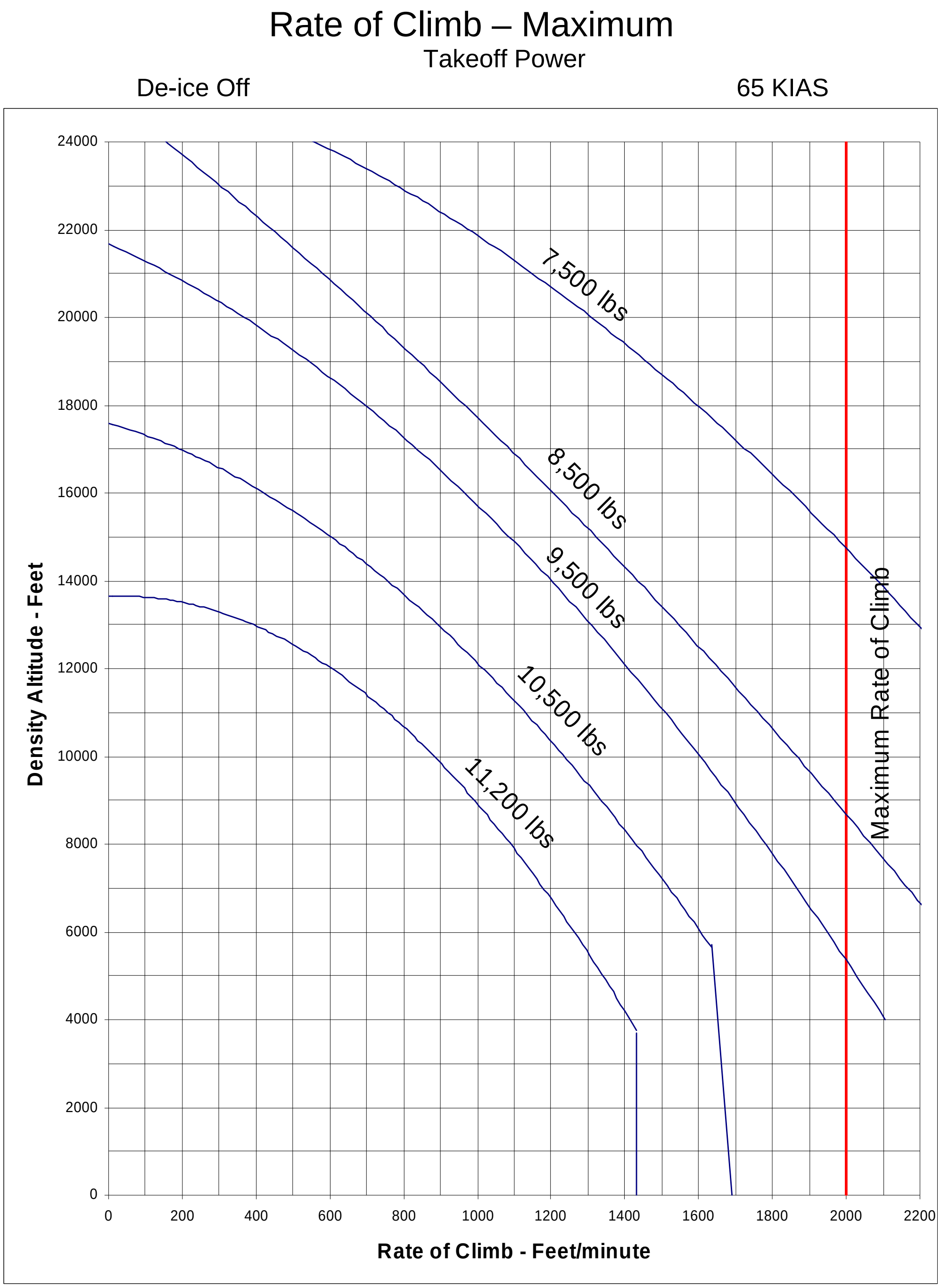

Figure 5-8 – Rate of Climb – Maximum (Sheet 1 of 2)

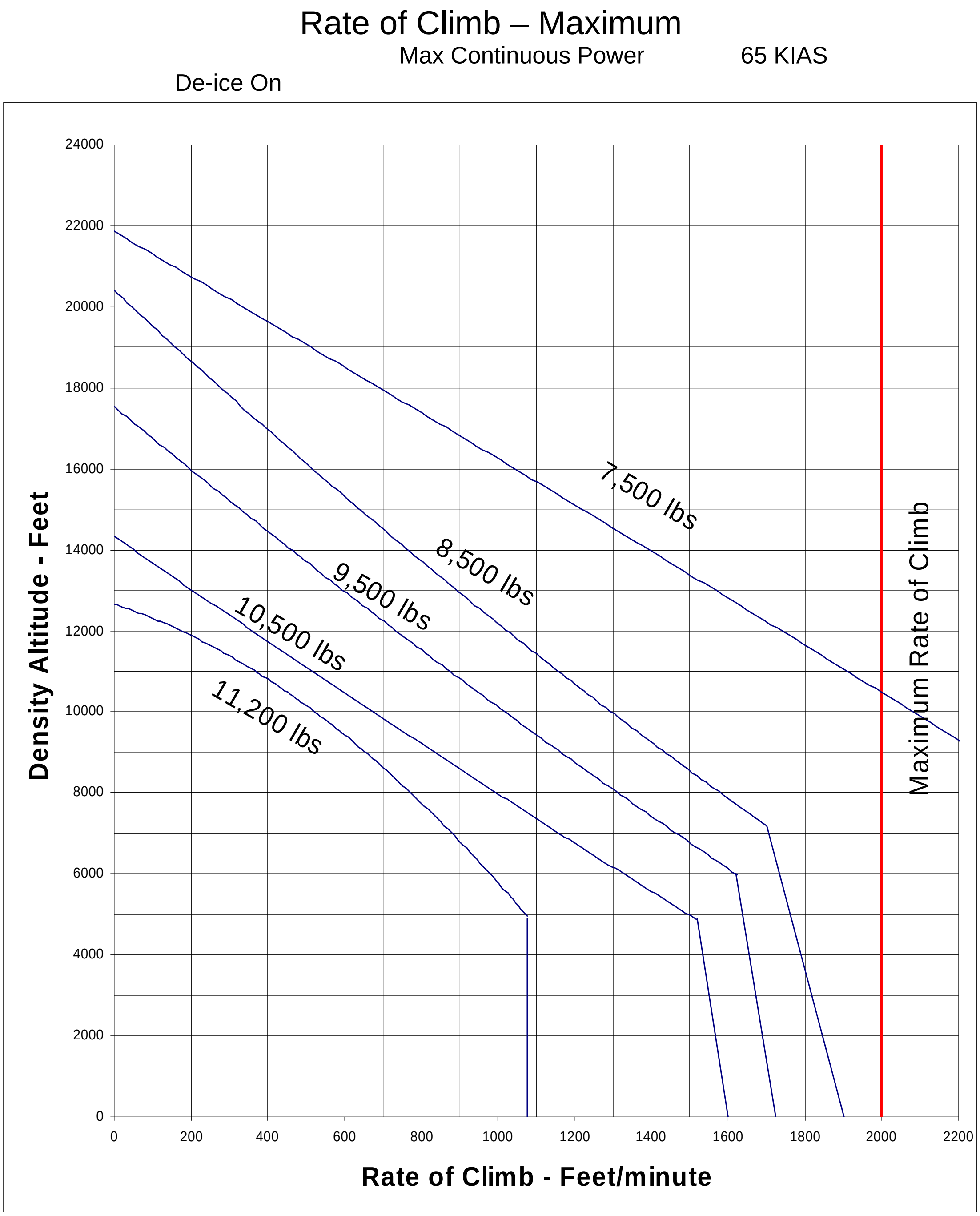

Figure 5-8 – Rate of Climb – Maximum (Sheet 2 of 2)

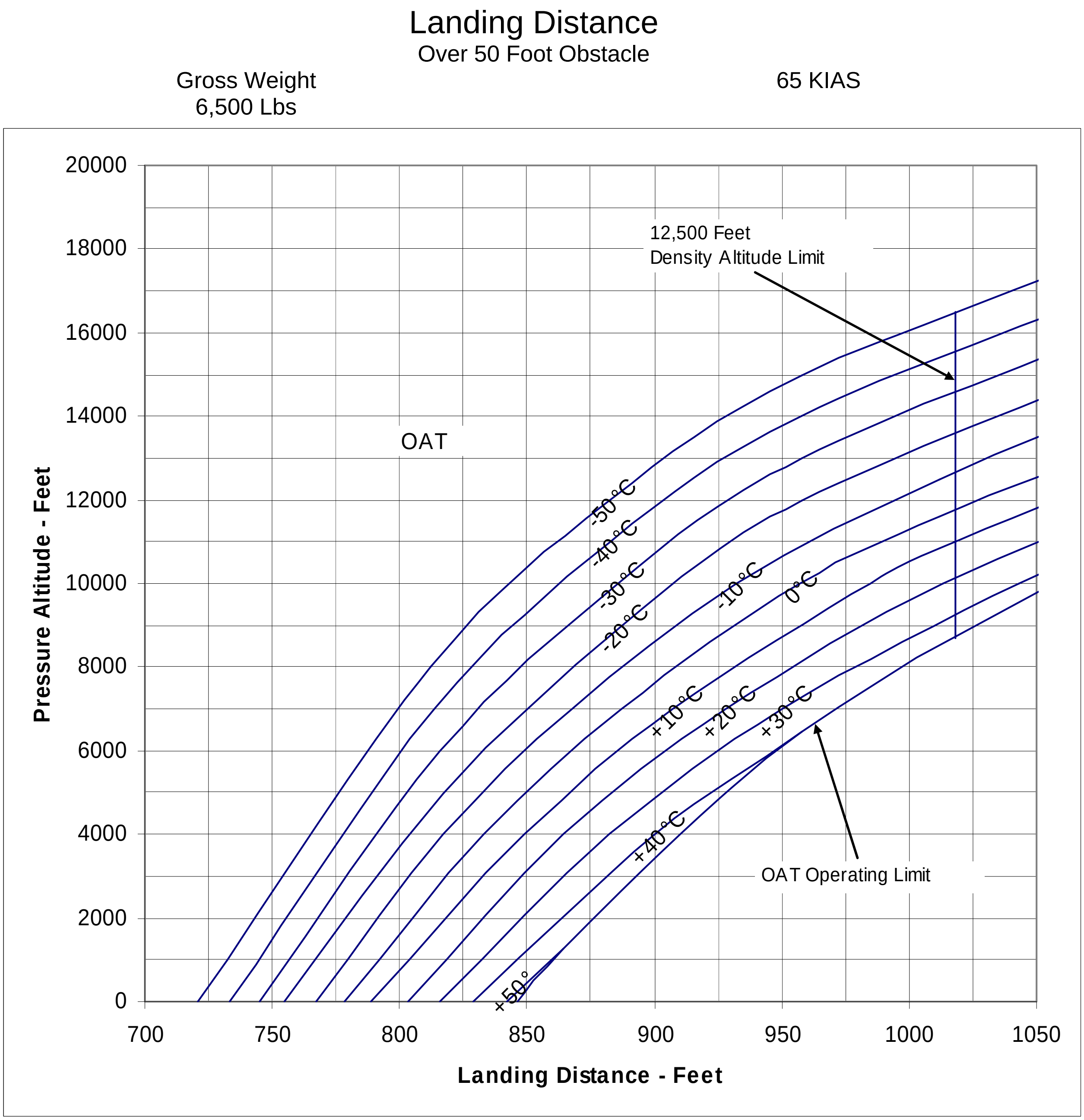

Figure 5-9 – Landing Distance (Sheet 1 of 6)

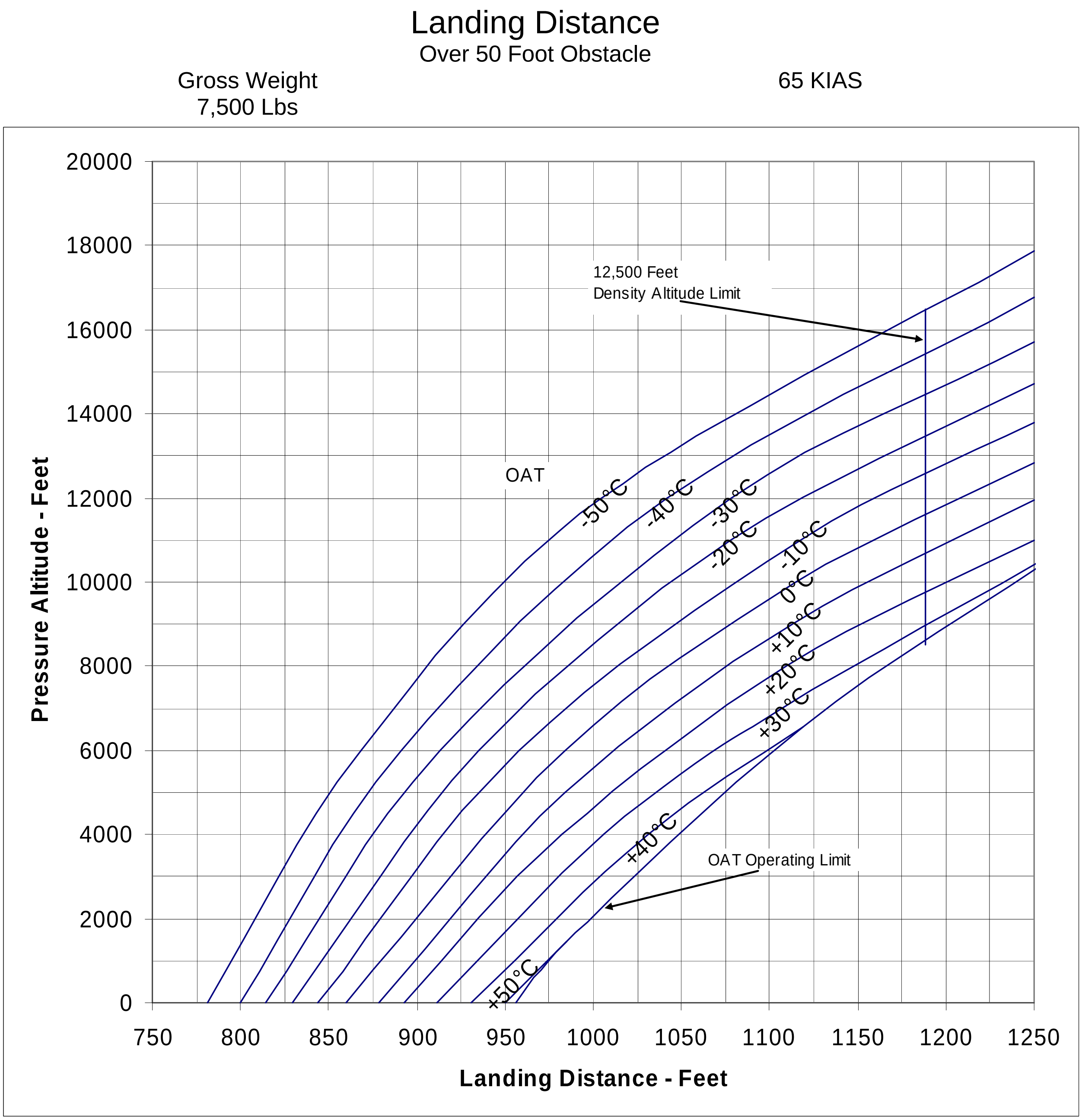

Figure 5-9 – Landing Distance (Sheet 2 of 6)

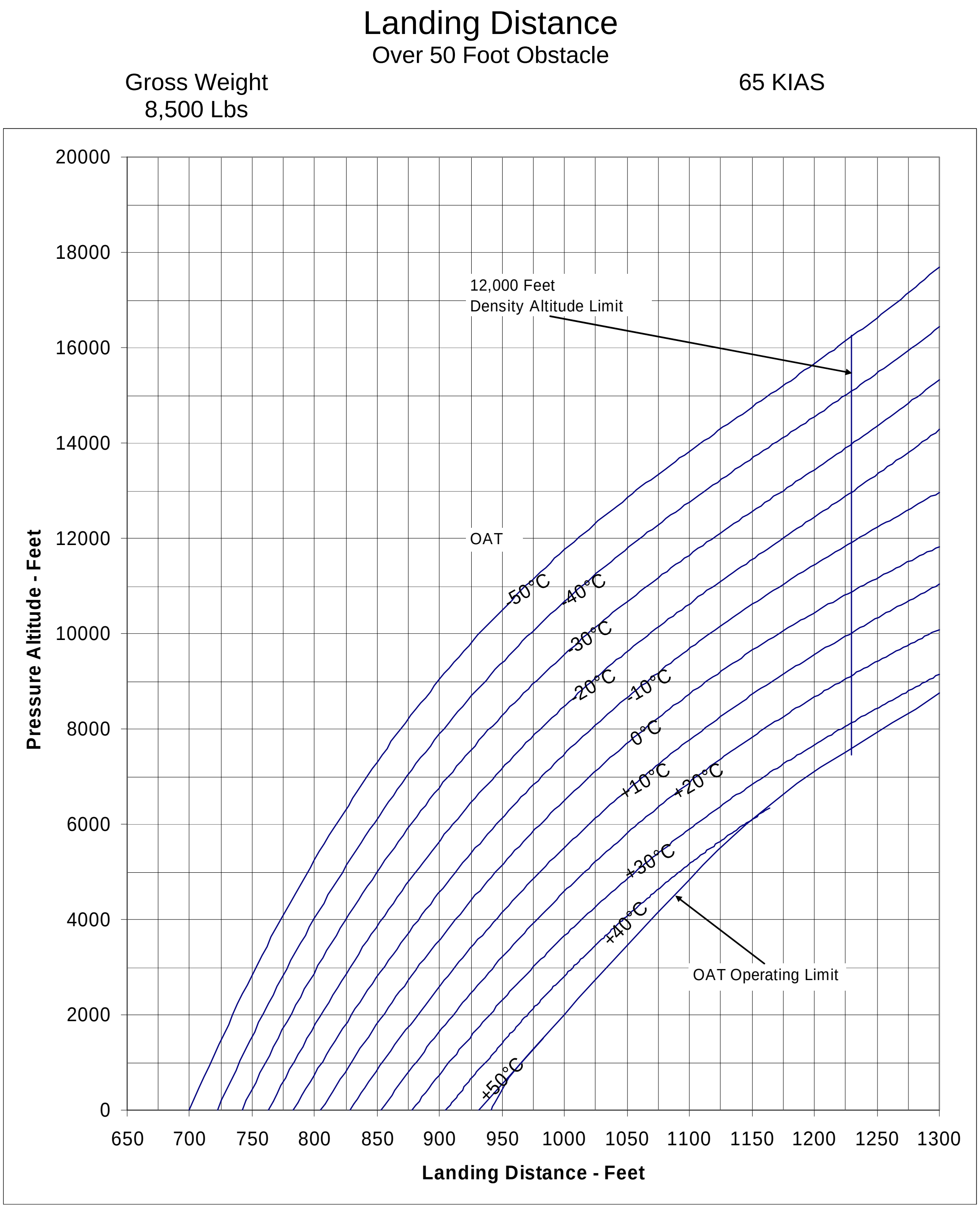

Figure 5-9 – Landing Distance (Sheet 3 of 6)

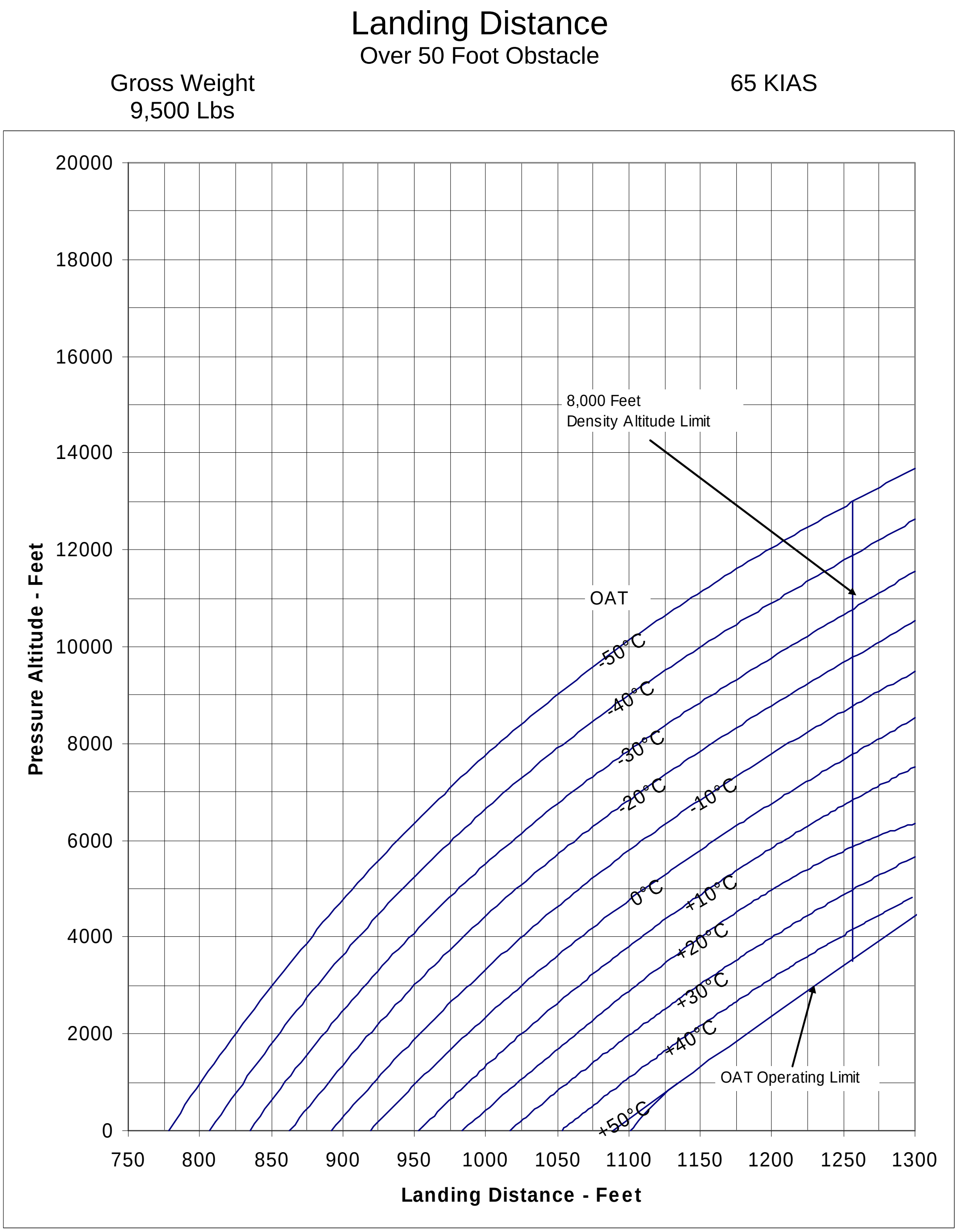

Figure 5-9 – Landing Distance (Sheet 4 of 6)

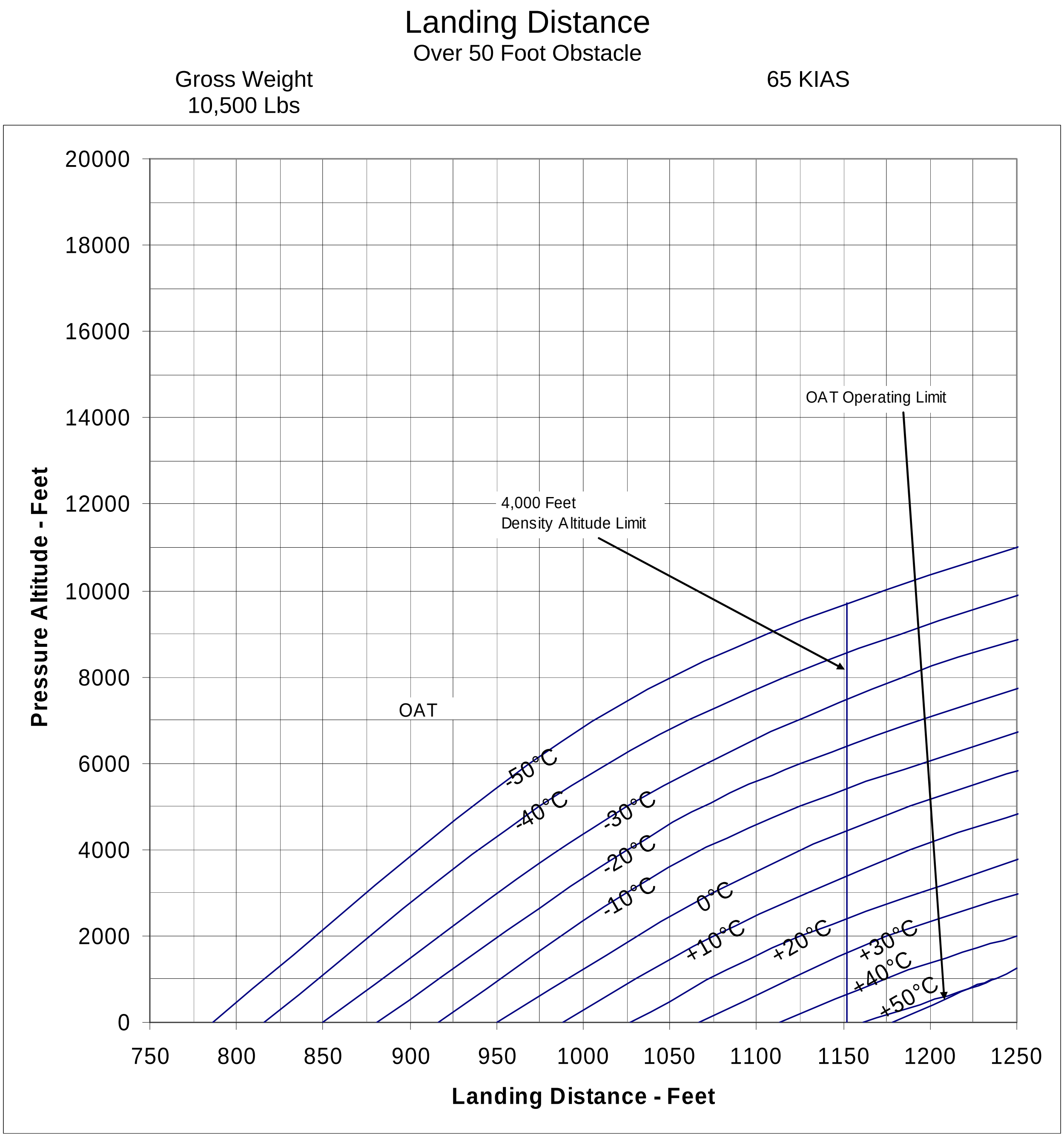

Figure 5-9 – Landing Distance (Sheet 5 of 6)

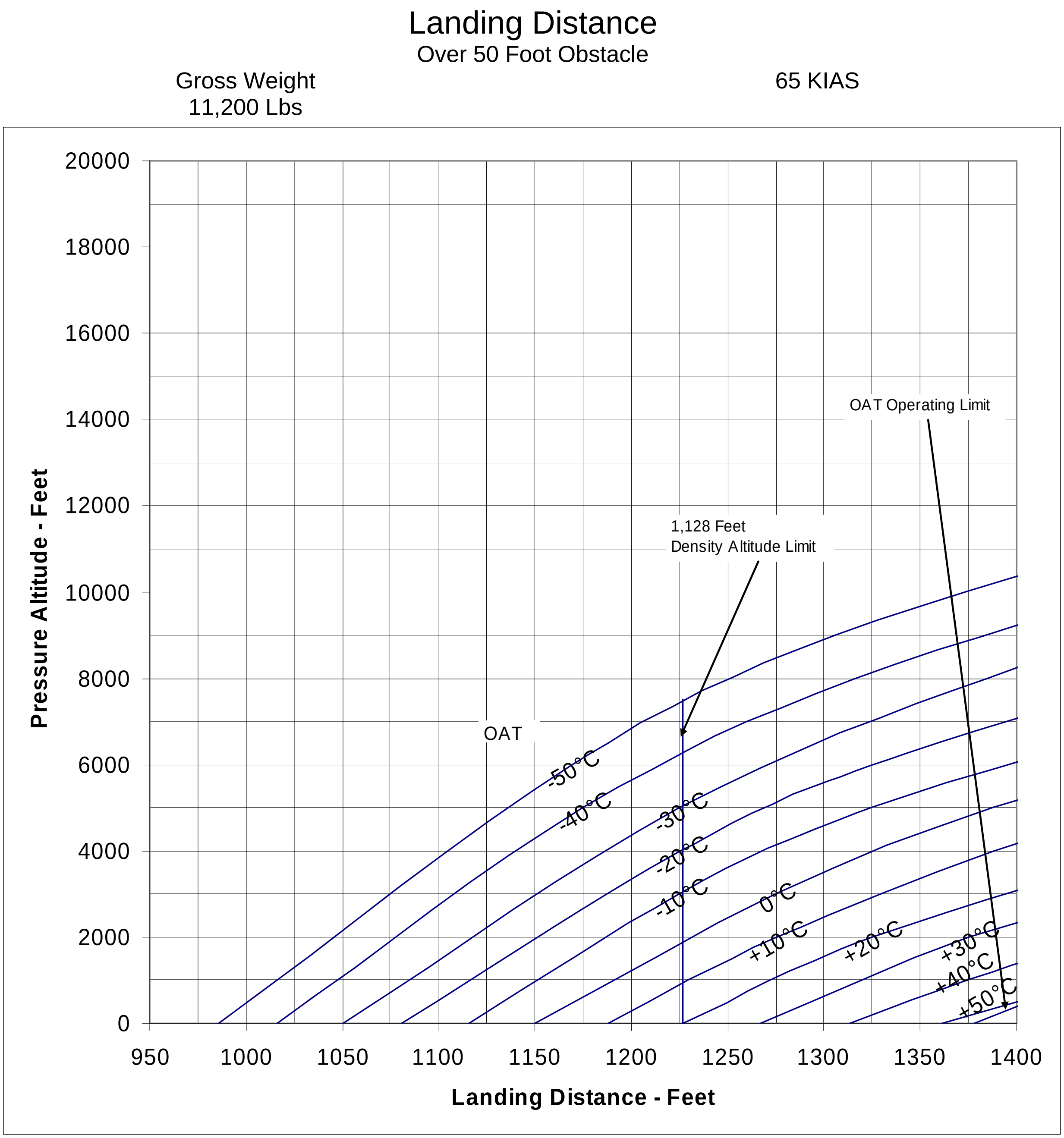

Figure 5-9 – Landing Distance (Sheet 6 of 6)

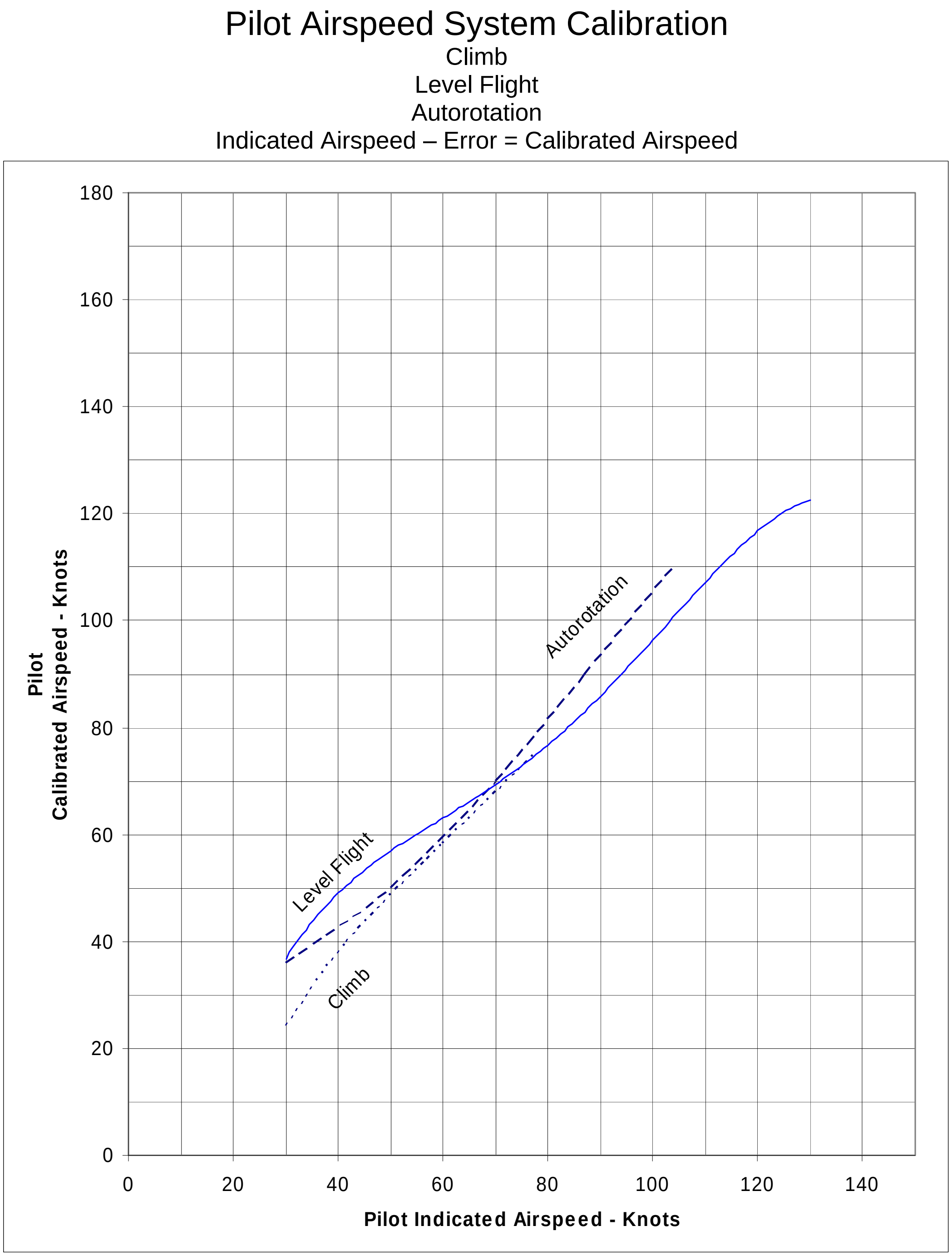

Figure 5-10 – Pilot Airspeed System Calibration

Copilot Airspeed System Calibration

Climb
Level Flight
Autorotation
Indicated Airspeed – Error = Calibrated Airspeed

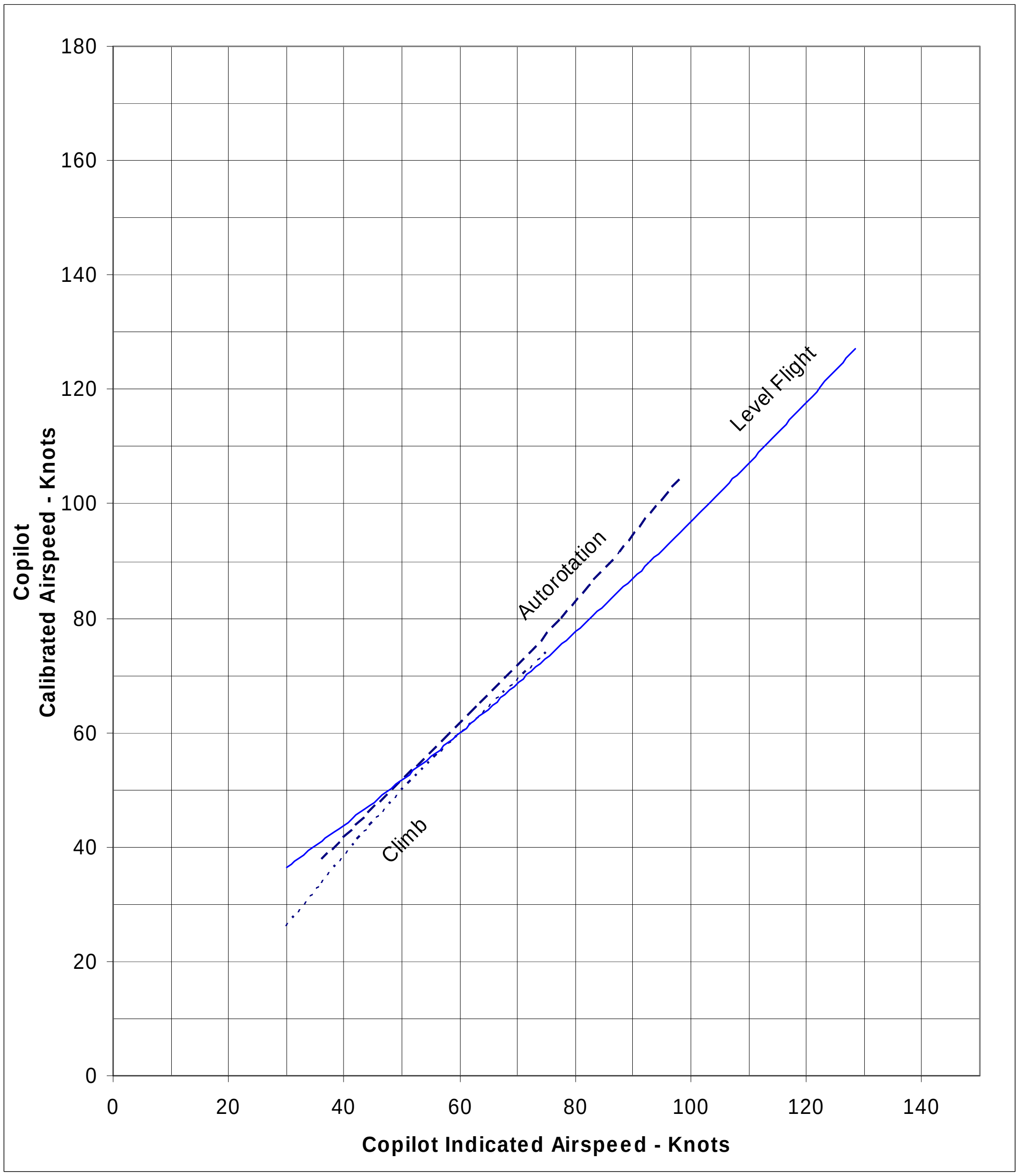

Figure 5-11 – Copilot Airspeed System Calibration

Autorotative Glide Distance

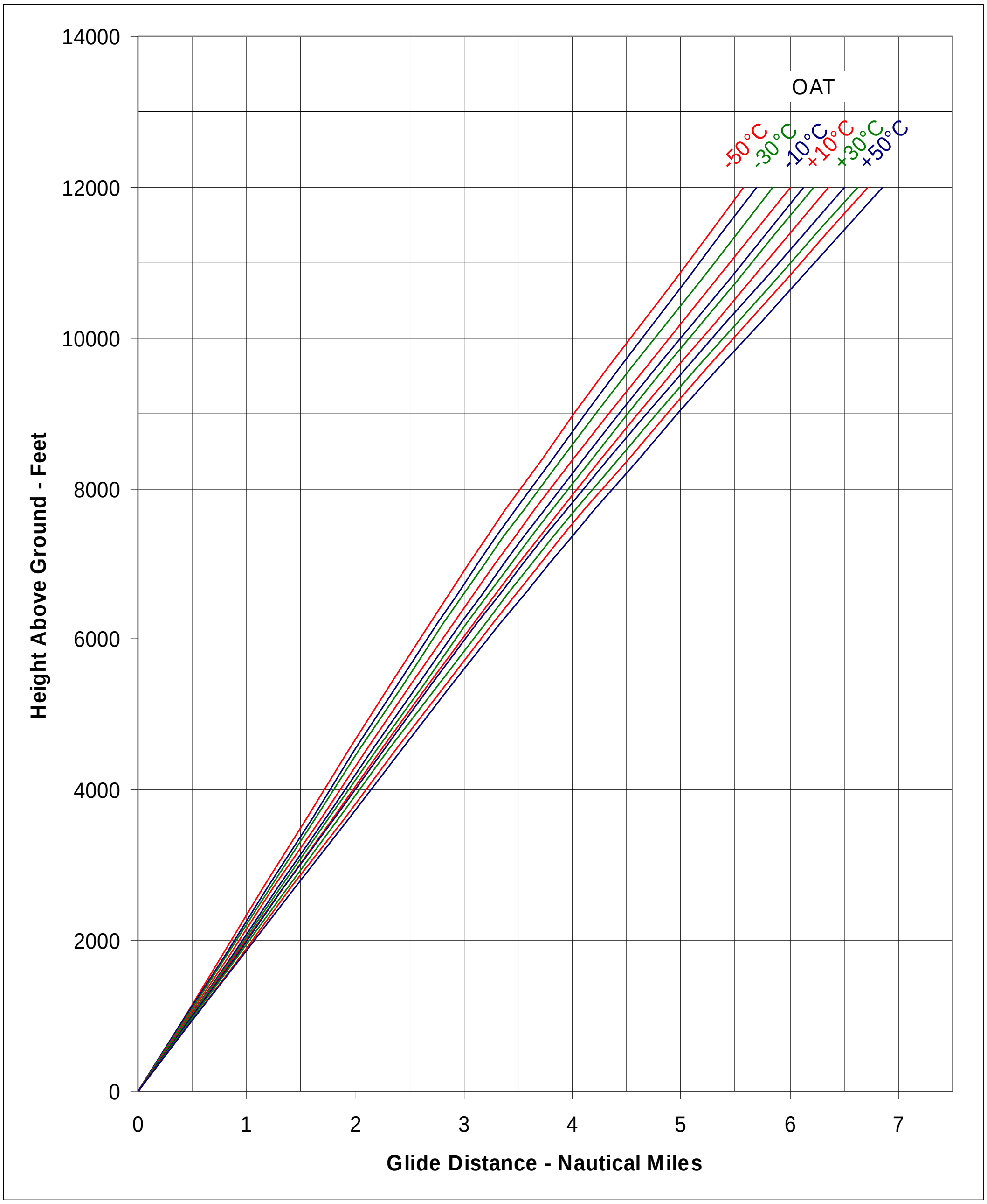

Figure 5-12 – Glide Distance

Density Altitude – Pressure Altitude

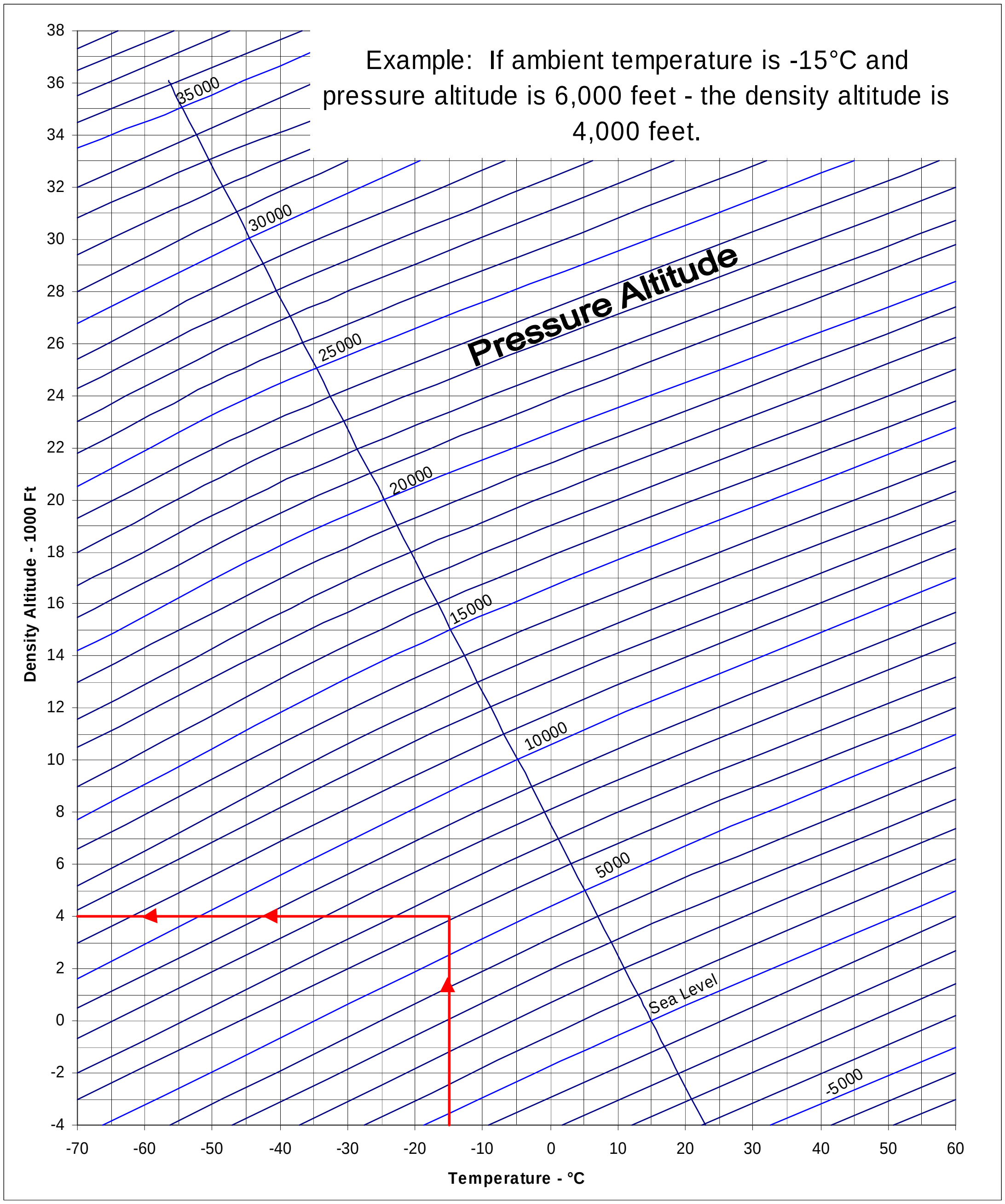

Figure 5-13 – Density Altitude – Pressure Altitude

Height Velocity Chart

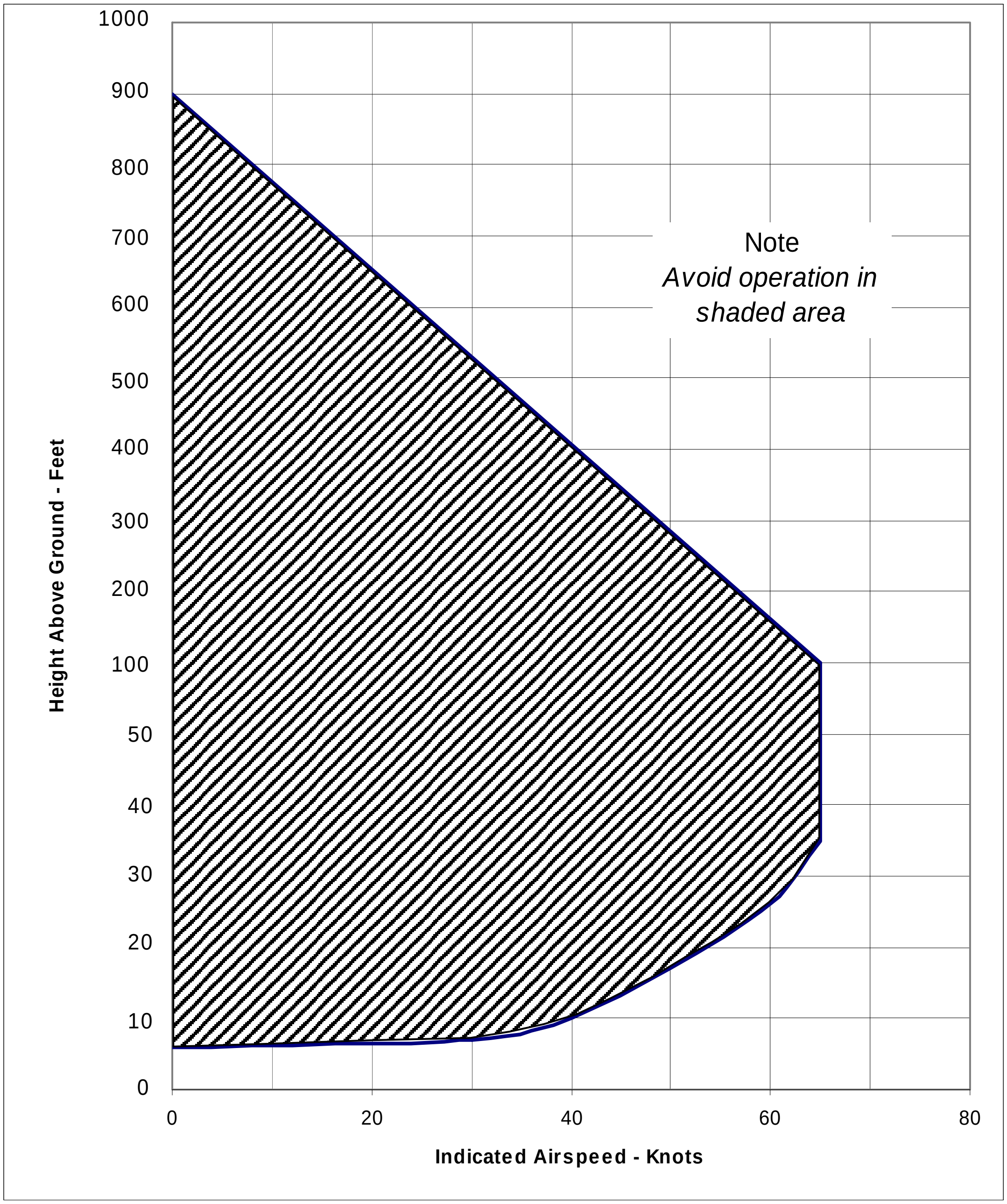

Figure 5-14 – Height Velocity Chart

6. Eagle Single Familiarization Exam

6.1. Suggested Exam

1. The manual for the Eagle Single is a flight manual supplement for the basic Bell 212 Flight Manual, however

a) The Bell 212 Flight Manual is your governing manual.
b) All relevant information from the basic Bell 212 Flight Manual has been incorporated into this FMS therefore, there is no need to refer to the basic Bell 212 Flight Manual.
c) Only the Limitations and Emergency Procedures section is relevant in the Eagle Single Manual.
d) The FMS in the back of the Bell 212 Flight Manual is the only relevant Manual.

2. The basic configured helicopter is approved as

a) Ten place helicopter with one pilot and nine passengers
b) An 11 place helicopter with two pilots and nine passengers
c) Certified for operation in day or night VFR non-icing conditions
d) all the above

3. Helicopter may be flown with doors open or removed only with Bell Helicopter standard interior installed. Door configuration shall be:

a) Both crew doors removed.
b) Both sliding doors open or removed with both hinged panels installed or removed.
c) Door configuration shall be symmetrical.
d) All the above.

4. At a Density Altitude of 8000 feet what is your max weight for takeoff, landing and in ground effect maneuvers?

a) 9000 lbs
b) 9500 lbs
c) 10000 lbs
d) 9600 lbs

5. Longitudinal CG limits are from station:

a) 134.0 to 144.0
b) 130.0 to 144.0
c) 132.0 to 143.0
d) 144.0 to 142.0

CHAPTER 6 – SUGGESTED EXAM

6. What is the max allowable tailwind when operating above 10,500 lbs?

a) 30 knots
b) 15 knots
c) 20 knots
d) 25 knots

7. Restart in flight is not recommended below:

a) 2000 ft
b) 1500 ft
c) 3000 ft
d) 3500 ft

8. The Height Velocity diagram is only valid:

a) When the WAT limitations are not exceeded
b) On Tuesdays
c) Above 20 Knots Airspeed
d) Below 800 ft

9. The power limits for takeoff shall be observed until:

a) Aircraft has cleared 50 ft obstacle height.
b) 65 knots and at least 35 feet above the ground are obtained.
c) 45 knots and at least 45 ft above the ground.
d) There are no speed and altitude limits for takeoff.

10. The maximum ambient temperature for use of engine de-icing?

a) 4.4°C
b) 2.2°C
c) 4°C
d) 5°C

11. Starter limits are:

a) 35 sec on, 3 min off, 35 sec on, 30 min off, 35 sec on, 30 min off.
b) 30 sec on, 3 min off, 30 sec on, 3 min off, 30 sec on, 30 min off.
c) 45 sec on, 3 min off, 45 sec on, 30 min off, 45 sec on, 30 min off.
d) 50 sec on, 3 min off, 50 sec on, 3 min off, 50 sec on, 30 min off.

12. Torquemeter pressure limits at Takeoff Power are:

a) 45.2 psi to 55.7 psi.
b) 49.0 psi to 55.7 psi.
c) 48.5 psi to 54.7 psi.
d) 50.0 psi to 55.5 psi.

13. What are your take-off and Max Continuous EGT limits on a 20°C day?

a) 652, 631
b) 650, 641
c) 640, 622
d) 630, 607

14. What is your 5 sec MGT limit during start on the T53-17B engine?

a) 590 to 680°C.
b) 850 to 880°C.
c) 863 to 926°C.
d) 400 to 863°C.

15. At what temperature is the use of Jet A fuel limited to?

a) -300°C and above.
b) -40°C and above.
c) -29°C and above.
d) -25°C and above.

16. At what ambient temperature and below must anti-icing additive be added to jet fuel?

a) +5°C.
b) 0°C.
c) +4°C.
d) -2°C.

17. When is it recommended to turn off the start fuel switch during a start?

a) 400°C or 25%N1.
b) 420°C or 23%N1.
c) 400°C or 26%N1.
d) 390°C or 25%N1.

18. When checking Gov from auto to Manual do not allow N1 to go below:

a) 50% N1.
b) 45% N1.
c) 55% N1.
d) 52% N1.

19. What is the correct Gov RPM range?

a) 96% to 101% N2
b) 95% to 100% N2
c) 97% to 100% ±1% N2.
d) 97% to 100% N2

20. What is your min DC voltage on a start when cranking though 10% N1?

a) 14 Volts.
b) 16 Volts.
c) 20 Volts.
d) 17 Volts.

21. At what N1 should the main rotor be turning?

a) 10% N1.
b) 15% N1.
c) 25% N1.
d) 20% N1.

22. At ground idle what should your gas producer tach indicate?

a) 61 ±1 N1 RPM.
b) 71 ±1 N1 RPM.
c) 65 ±1 N1 RPM.
d) 70 ±1 N1 RPM.

23. How long should the starter be engaged on a hot start/shutdown?

a) until EGT/MGT decreases to 150°C.
b) until EGT/MGT decreases by 150°C.
c) until EGT/MGT reaches 0°C.
d) until EGT/MGT decreases by 200°C.

CHAPTER 6 – SUGGESTED EXAM

24. If either fuel boost pump fails when could fuel exhaustion occur?

a) at 100 lbs indicated on fuel quantity indicator.
b) at 60 lbs indicated on fuel quantity indicator.
c) at 150 lbs indicated on fuel quantity indicator.
d) at 75 lbs indicated on fuel quantity indicator.

25. What results from the loss of the number one hydraulic system?

a) Pedal forces will increase.
b) Nothing happens.
c) You lose hydraulic to collective.
d) You lose pedals and collective.

26. What is the procedure with an engine fuel pump caution light illuminated?

a) Land as soon as possible.
b) Descend below 4600 ft.
c) Land as soon as practical.
d) Continue flight and monitor instruments.

27. What is the max wind allowable between azimuth 270° and 330° above 10,500 lbs?

a) No limit.
b) 25 knots.
c) 30 knots.
d) 20 knots.

28. What is the OGE hover ceiling at TO power with anti-ice off and no particle separator for a gross weight of 9500 lbs on a 10°C day?

a) 8000' PA
b) 8000' DA
c) 9000' DA
d) 9000' PA

29. What is your takeoff distance over a 50 foot obstacle with a gross weight of 9500 lbs at 4000' PA and an OAT of 10°C?

a) 1000 ft.
b) 1250 ft.
c) 1300 ft.
d) 1150 ft.

30. For helicopter serial numbers prior to 35049 what is the most critical fuel amount in liters for the most forward flight condition and the most aft flight condition using Jet A fuel?

a) 274.8 liters & 820.7 liters
b) 297.1 liters & 827.4 liters
c) 72.6 liters & 216.8 liters
d) 78.5 liters & 218.6 liters

31. What actions occur when the FIRE 1 PULL handle is pulled on Eagle Single s/n 30817?

a) The heater bleed air valve closes and the fire bottle is armed.
b) The heater deck valve is closed, the fire bottle is armed and the fuel valve is closed.
c) Nothing happens.
d) The fire bottle is armed.

32. When does the hydraulic caution light illuminate?

a) When hydraulic pressure has dropped below 600 psi.
b) When the hydraulic temp has exceeded 90°C.
c) When hydraulic pressure has dropped below 650 psi or the hydraulic temp has exceeded 88°C.
d) When hydraulic pressure has exceeded 1100 psi or when hydraulic temp has dropped below 0°C.

33. While in the hover you record the following numbers for the T53-17B engine:
    8000' PA,
    50.1 PSI TQ,
    100% N2,
    +10°C,
    800°C MGT.
    Plot on the appropriate chart and select one of the options below.

a) Engine fails by 40°C.
b) Engine passes by 40°C.
c) Engine fails by 10°C.
d) Engine passes by 10°C.

34. Which boost pump runs from the hot battery buss?

a) #2
b) #1
c) Neither
d) Both

CHAPTER 6 – SUGGESTED EXAM

35. How many pounds per square foot is the cabin deck cargo limit?

a) 120 lbs per sq/ft.
b) 100 pounds per sq/ft.
c) 80 pounds per sq/ft.
d) 150 pounds per sq/ft.

36. Slope landings are limited to:

a) 10° nose up.
b) 8° nose down.
c) 10° sideward.
d) There are no limits.

37. What is the max continuous N1 RPM?

a) 101%
b) 100%
c) 105%
d) 55.7%

38. The proper procedure for turning the generator on is:

a) Gen. on before start.
b) Gen. on at 70% N1
c) Gen. on right after start.
d) Gen reset then on at 71% plus or minus 1% N1.

39. Complete the table below. Calculate the takeoff weight of Eagle Single s/n 35050 with the load shown

Item	Weight	Arm	Moment	Lat. Arm	Lat. Moment
Aircraft Empty Weight	6141.90	143.84	883477.99	0.29	1800.00
Pilot and Fwd Pax	340.00			0.0	
5 Forward Facing Pax	850.00			0.0	
Cargo (Tailboom Compartment)	400.00			0.0	
Full Fuel	1486.00				
Take Off Weight and C of G					

Is the Aircraft Loaded within the Center of Gravity limits?

a) Yes
b) No

CHAPTER 6 – SUGGESTED EXAM

40. With reference to Eagle Single s/n 35050. What is the minimum ambient temperature at which this aircraft can be operated?

a) -54°C
b) -30°C
c) +49°C decreasing at a rate of 2° per 1000 feet Hp
d) -65°C

6.2. Suggested Exam Answer Key

1) b
2) d
3) d
4) b
5) b
6) c
7) c
8) a
9) b
10) a
11) a
12) b
13) a
14) c
15) c
16) c
17) a
18) b
19) c
20) a
21) b
22) b
23) b
24) b
25) a
26) a
27) c
28) d
29) b
30) a
31) a
32) c
33) b
34) b
35) b
36) c
37) a
38) d
39) b
40) b

39) Table

Item	Weight	Arm	Moment	Lat. Arm	Lat. Moment
Aircraft Empty Weight	6141.90	143.84	883477.99	0.29	1800.00
Pilot and Fwd Pax	340.00	47.00	15980.00	0.0	0.0
5 Forward Facing Pax	850.00	117.00	99450.00	0.0	0.0
Cargo (Tailboom Compartment)	400.00	261.00	104400.00	0.0	0.0
Full Fuel	1486.00	152.6	226763.60	0.0	0.0
Take Off Weight and C of G	9217.9	144.29	1330071.5	0.20	1800.00