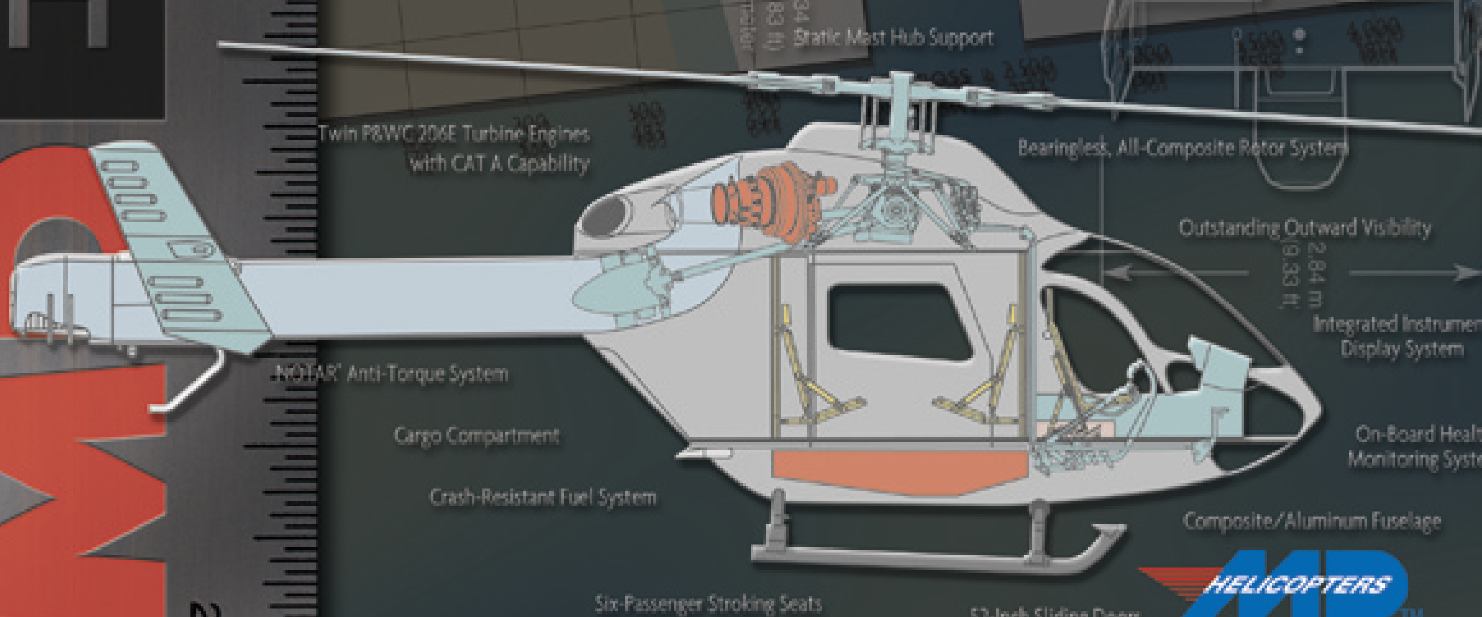
MD EXPLORER

Technical Description



MD HELICOPTERS™

MDEXPLORER

Technical Description

Marketing and Sales
4555 E. McDowell Road
Mesa, Arizona 85215-9797

Comments and/or questions may be directed to:

Sales: (480) 346-6300
Fax: (480) 346-6339
e-mail: helicoptersales@mdhelicopters.com

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This Technical Description is not subject to a revision service. It is the manufacturer's practice to continuously improve its products and therefore the right is reserved to make changes without notice in the design or manufacture of the MD EXPLORER® helicopter which may be considered necessary.

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MDEXPLORER

CONTENTS

CONTENTS

MDEXPLORER

CONTENTS

FIGURES

1.0 FEATURES AND BENEFITS

MD Helicopters, Inc. (MDHI) was guided throughout the design and development of the MD Explorer® helicopter by suggestions provided by an international industrial advisory group consisting of turbine helicopter operators/owners from all market segments. It was our common goal to produce a multipurpose twin-engine helicopter which set new standards for performance, affordability, dependability, and safety.

Initial certification under FAR Part 27, VFR day and night occurred in December 1994, along with the first deliveries. Joint Aviation Authorities (JAA) validation, which led directly to JAR Part 27 Type Certification in all 27 member countries, was awarded in July 1996. Category A certification, which incorporates 45 additional Part 29 design and performance regulations, supports deliveries of a JAR-OPS 3 performance Class 1 aircraft.

- NOTAR® ANTI-TORQUE SYSTEM provides lower pilot workload, significantly lower noise levels, increased safety in confined areas, and is less susceptible to service environment damage. It also eliminates traditional, high-maintenance tail rotor/fan gearboxes and drive shafts.
- CABIN SIZE. With the largest functional cabin in its light-twin class, the MD Explorer's cabin size equals that of medium-twin class helicopters. Integrated optional avionic systems are easily accessible. Large 52-inch (1.32 m) cabin door openings on both sides of aircraft allow unrestricted ingress/egress.
- VISIBILITY is enhanced by the use of MDHI's computer-aided human ergonomics cockpit design and unsurpassed transparency field of view.
- BEARINGLESS, COMPOSITE ROTOR SYSTEM, consisting of fewer parts than other fully-articulated systems, requires no lubrication. The system is uniquely integrated to provide unparalleled low vibration levels throughout the flight regime.
- CATEGORY A performance certification, consistent with JAR-OPS 3 Class 1 performance operations. (From a confined or elevated heliport, one engine may be lost and the remaining engine provides sufficient power reserves to enable the pilot to have the option of either continuing to fly or return to the point of take-off.) This designation for MD Explorer® with Category "A" certification is the MD 902.
- HIRF and lightning strike protection meet the latest FAR/JAR certification requirements.
- MAINTENANCE steps, platforms and hand-holds are built-in.
- NO MAGNESIUM is used anywhere on the airframe, transmission or engines. Composite airframe is resistant to corrosion in a hostile marine environment.

- INTEGRATED INSTRUMENTATION DISPLAY SYSTEM (IIDS) reduces the size, weight, and life cycle cost of power and airframe related instrumentation. All of the flight data is provided in both digital and analog for ease of instant pilot understanding. Rotor track and balance software is built in. The computer records all exceedances, and provides engine performance trend analysis. All recorded data can be easily downloaded by maintenance personnel.

- SEATING flexibility includes 3 aft-facing and 3 forward-facing energy absorbing passenger seats.

- COLLECTIVE-MOUNTED FADEC override controls provide the pilot with the option of direct mechanical control of the engine fuel control unit.

- “ON-CONDITION” main transmission.

- SINGLE-PILOT IFR (option) utilizing the state-of-the-art AlliedSignal Bendix/King EFIS 40 and KFC 900 autopilot.

- ENERGY ABSORBING undercarriage, along with the stroking crew and passenger seats, provides protection to 30 gs at 30 ft per second.

- HEAVY DUTY CARGO HOOK permits a 3,000-pound external load (optional).

2.0 **CATEGORY A OPERATIONS**.

The MD Explorer (902) is certified for Category A operations from clear airfields, heliports and elevated helipads.

2.1 **Category A Take-off:**.

The take-off must be performed in such a manner that in the event of a single engine failure the helicopter must be able to:

Prior to TDP, return to, and stop safely on the take-off area (rejected take-off).

After TDP, continue the take-off and climbout, and attain a configuration and airspeed that allows continued flight.

Take-off Decision Point (TDP):.

Clear airfield

The TDP is a point that occurs 8 seconds after the take-off procedure is initiated. The take-off light will display a yellow “NO-GO” indication for 8 seconds.

The green “GO” indicator illuminates after the TDP.

Heliport/Elevated helipad

The TDP is a point 100 ft HAT and approximately 300 ft behind the center of the heliport.

2.2 **Category A landing:**.

The landing must be performed in such a manner so that if the critical engine fails at any point in the approach path, the helicopter must be able to:

Prior to LDP, climb out and attain an airspeed that allows continued flight (balked landing).

After LDP, land and stop safely.

Landing Decision Point (LDP):.

The landing decision point is the last point in the approach and landing path at which a balked landing can be accomplished with the critical engine failed or failing and with the engine failure recognized by the pilot. This point is defined as 100 ft HAT and 35 KIAS.

Landing Distance:.

Clear airfield

The horizontal distance required to land and come to a complete stop from a point 50 feet above the landing surface.

Heliport/Elevated helipad

The horizontal distance required to land and come to a complete stop from a point 25 feet above the landing surface.

2.3 **Clear airfield, heliport and elevated helipad.**

Environmental operating conditions:.

Kinds of operations

This rotorcraft is certified in the normal helicopter category for day and night VFR Category A operations when the appropriate instruments and equipment required by the airworthiness and/or operating rules are approved, installed and are in operable condition.

Critical wind azimuth

Refer to Figure 1.

Weight altitude temperature limits

Open field: Maximum weight for Category A operations is 6250 lb or less as determined by Figure 2.

Heliport/Elevated helipad: Maximum weight for Category A operations is 6250 lb or less as determined by Figure 3.

Maximum altitude for Category A operations is 5650 H_D.

Power assurance checks:.

Each engine must pass a power assurance check prior to take-off .

Heliport/Elevated helipad requirements:.

Heliport/Elevated helipad restricted to a solid surface.

Minimum Heliport/Elevated helipad dimensions: 50 ft x 50 ft.

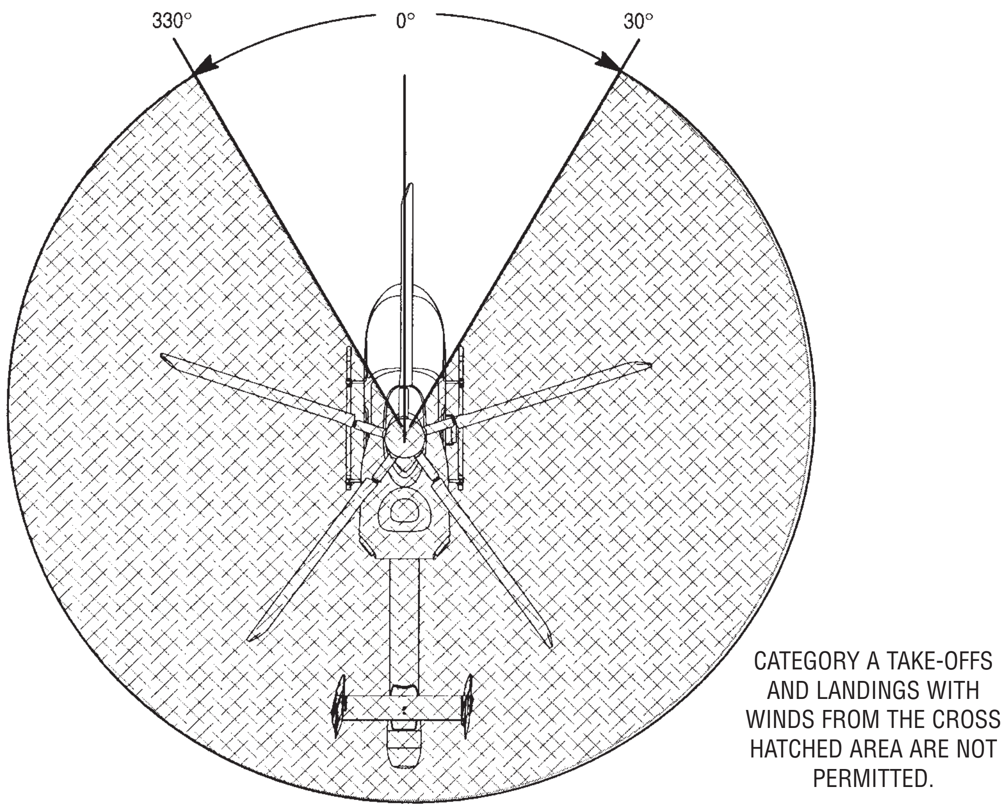


Figure 1. Takeoff and Landing Wind Azimuth Limitations.

Maximum take-off and landing weight limits:.

Description:

These charts show the maximum gross weight for a given temperature and altitude for Category A operations from a clear airfield (Ref. Figure 2) or Heliport/Elevated helipad (Ref. Figure 3).

Use of Chart:

The following example explains the correct use of the chart in Figure 2.

Example:

Wanted:	Maximum gross weight for Category A operations from a clear airfield.
Known:	Outside air temperature = 28°C
Known:	Pressure altitude = 2000 ft
Method:	Enter bottom of chart at 28°C. Move up to the 2000 ft line and then directly to the left to read 5700 lb.

Weight Altitude Temperature Limits – Clear Airfield

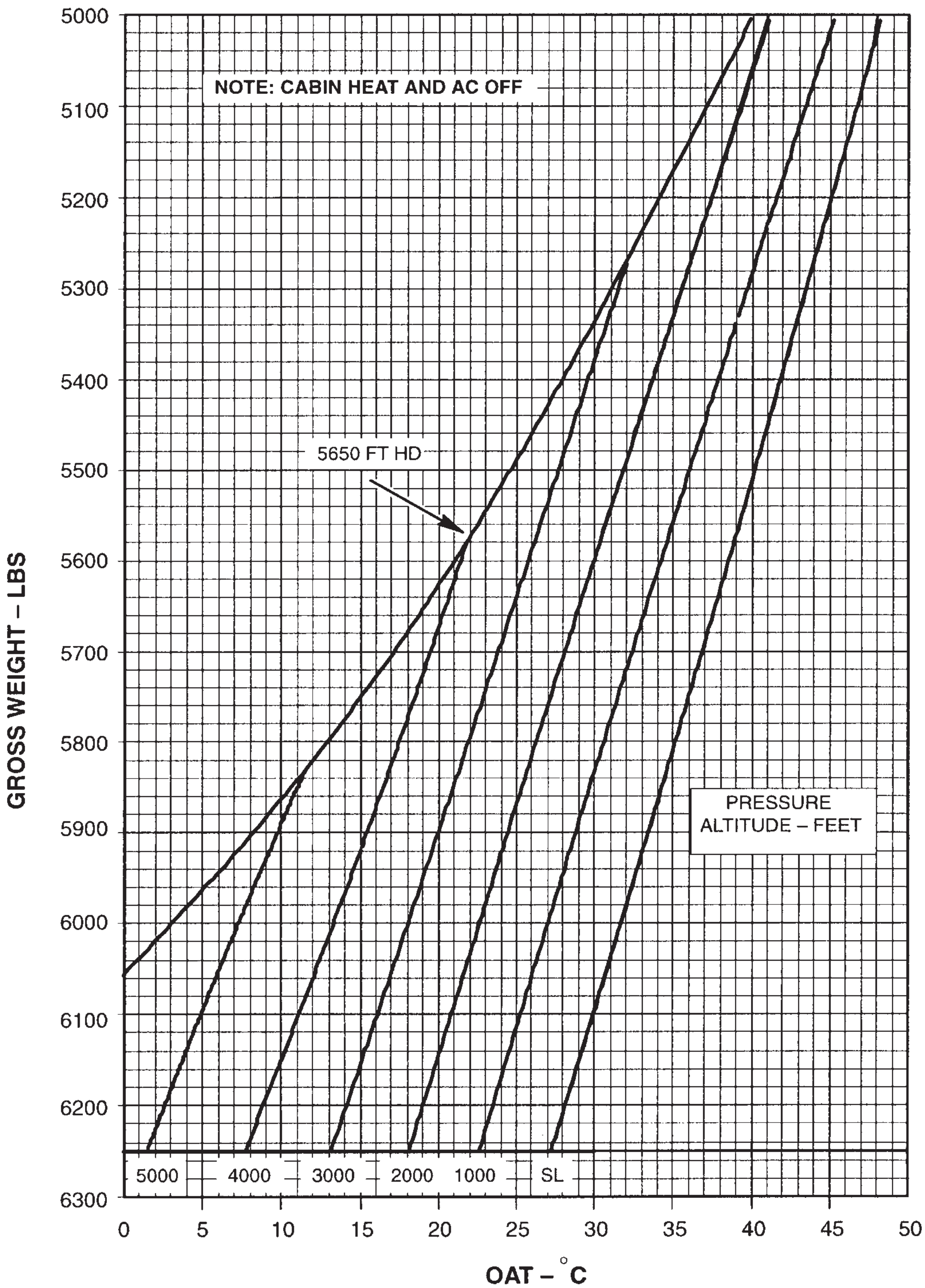


Figure 2. Weight Altitude Temperature Limits – Clear Airfield.

Weight Altitude Temperature Limits – Heliport/Elevated Helipad

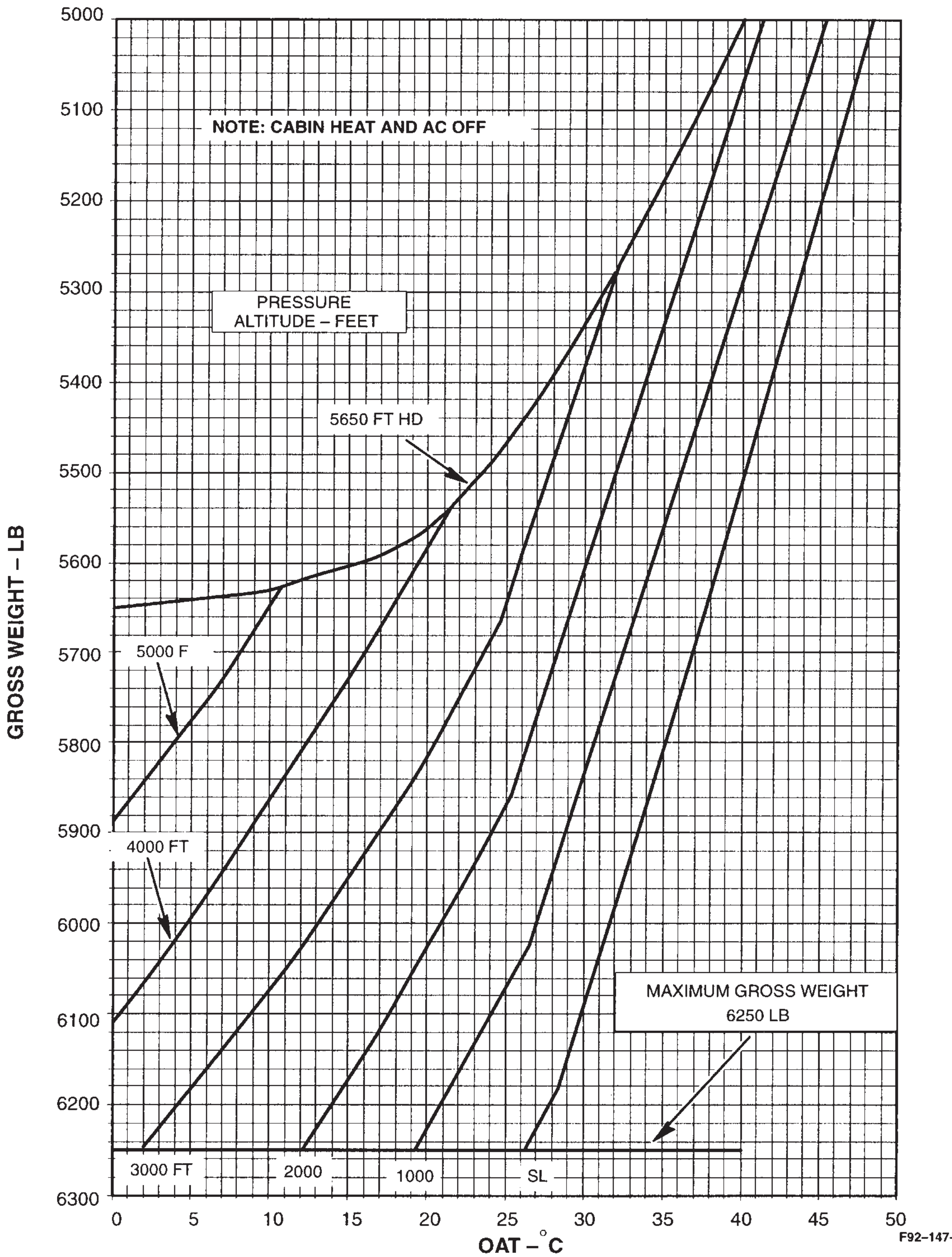


Figure 2.1. Weight Altitude Temperature Limits – Heliport/Elevated Helipad.

Takeoff Distance Required – Clear Airfield

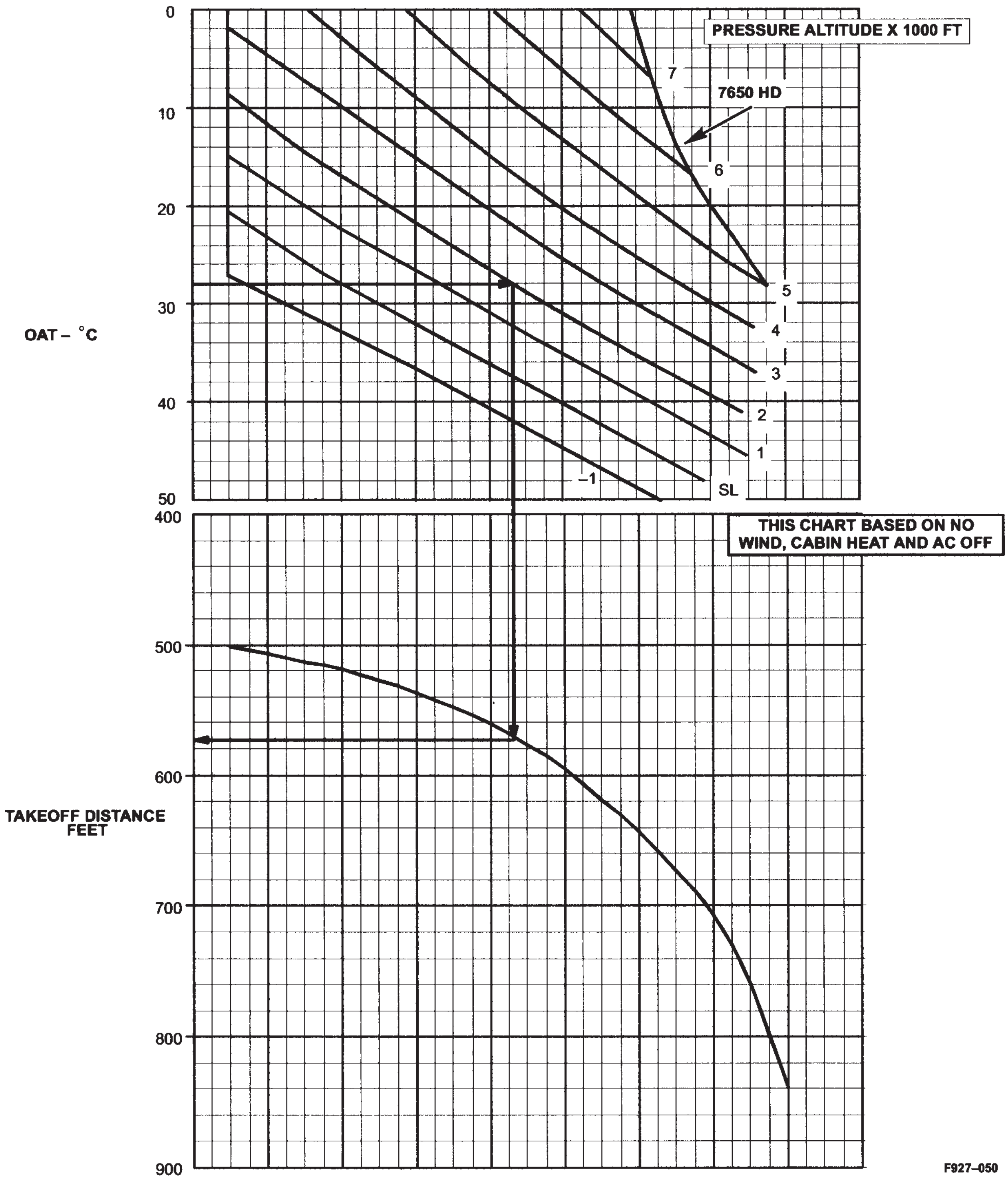


Figure 3. Rejected Takeoff Distance Required – Clear Airfield.

Distance Required to Clear a 35 ft Obstacle – Clear Airfield

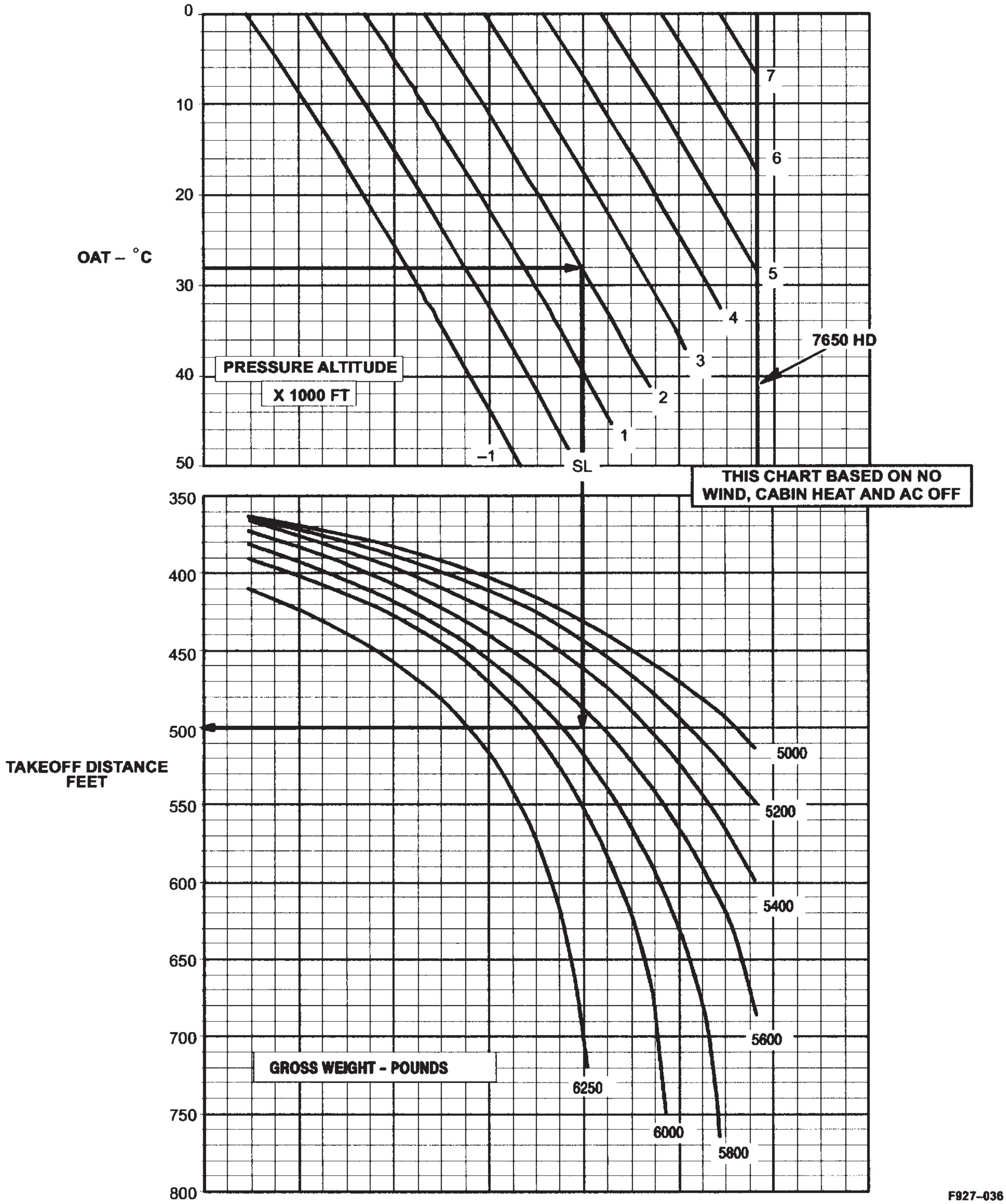


Figure 3.1 Distance Required to Clear a 35 ft Obstacle on Takeoff ,- Clear Airfield.

Distance Required to Clear a 35 ft Obstacle – Heliport/Elevated Helipad

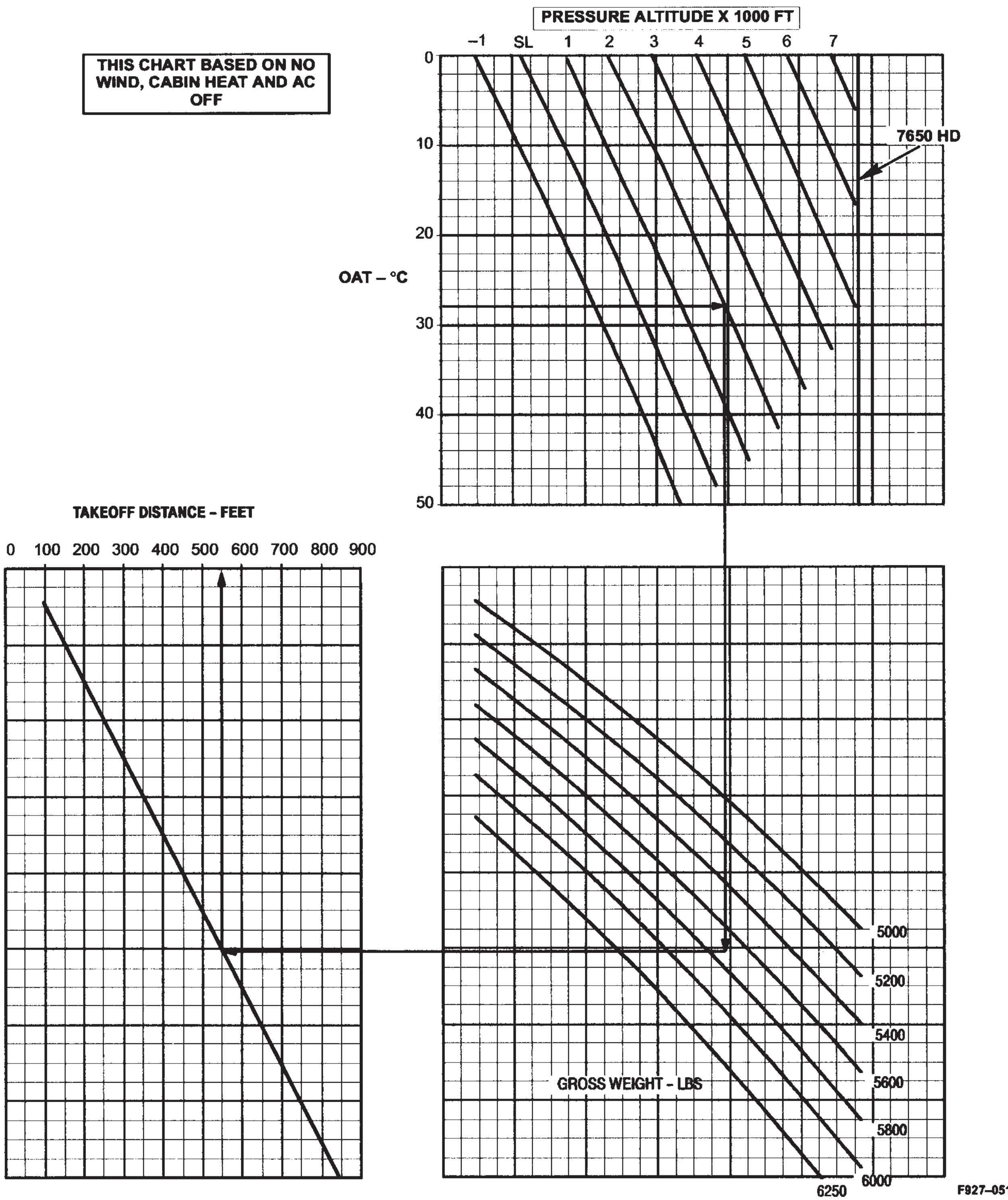
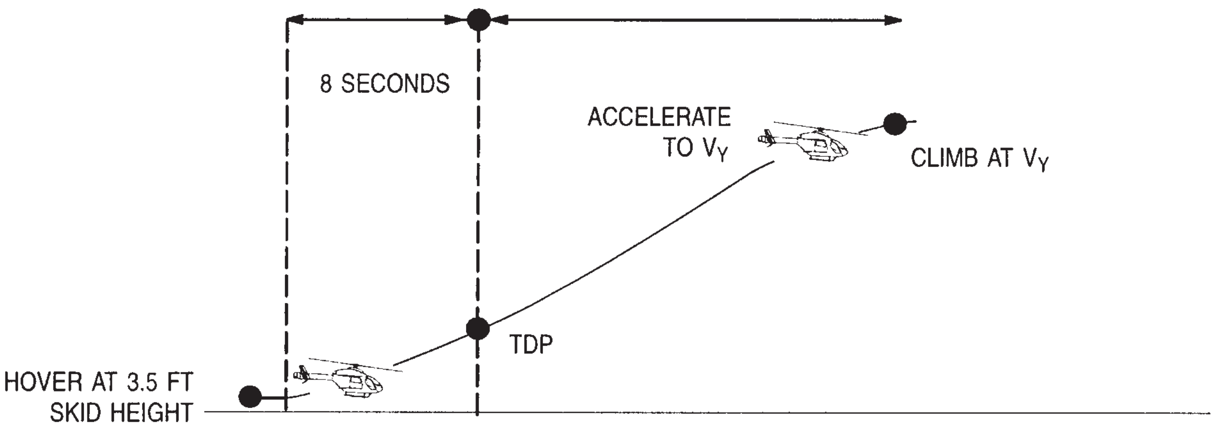


Figure 3.2. Distance Required to Clear a 35 ft Obstacle on Takeoff – Heliport/Elevated Helipad.

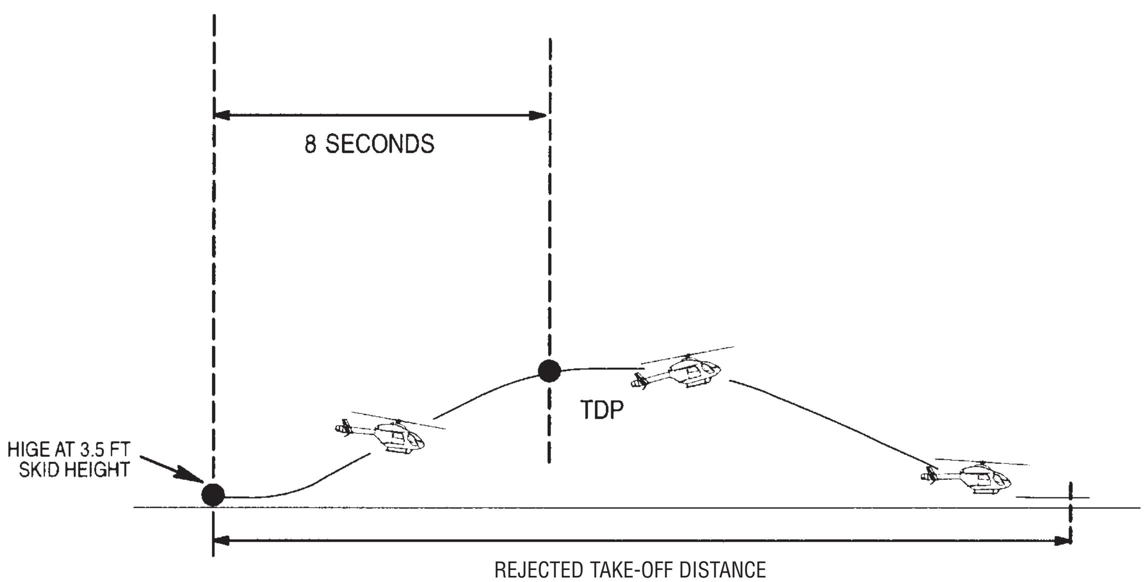
2.4 **Clear airfield take-off procedures:**.

Example of MD Explorer normal take-off and take-off path:



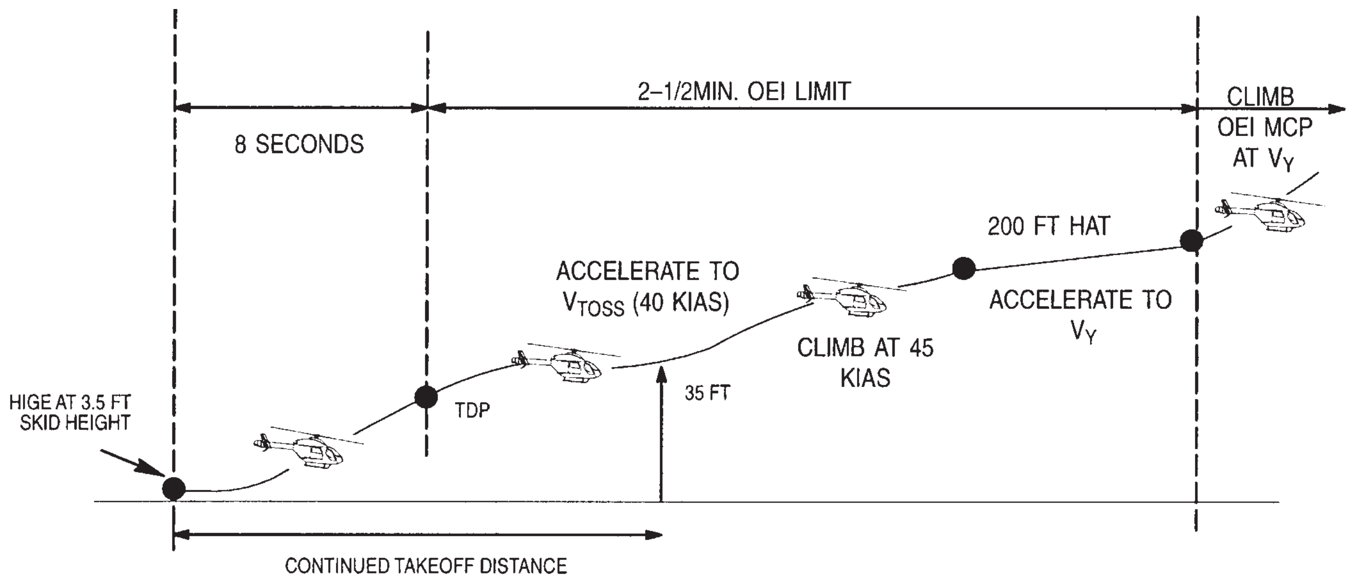
<u>Engine failure before TDP</u>.

Example of MD Explorer Category A rejected take-off:



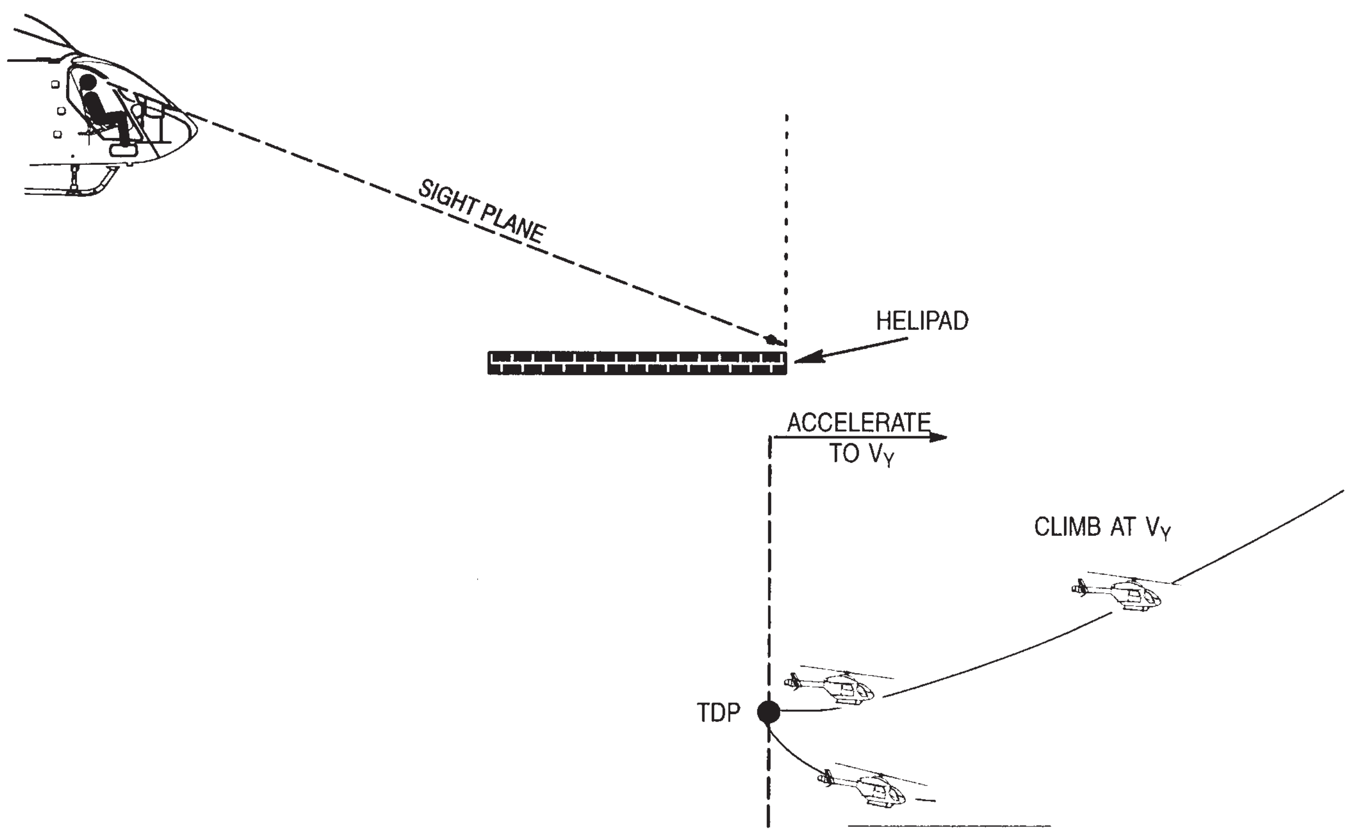
Engine failure after TDP.

Example of MD Explorer continued take-off:



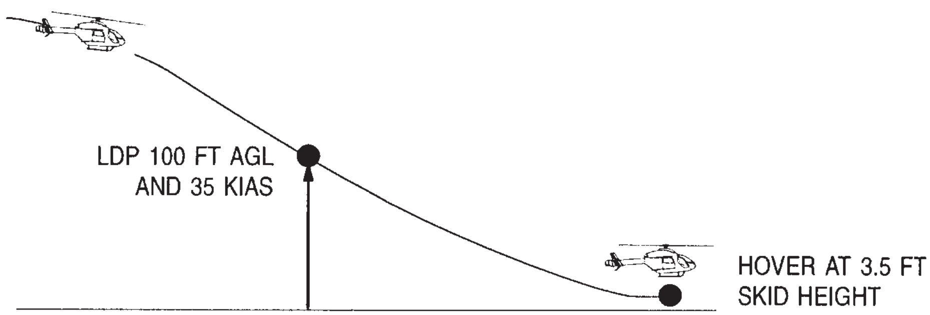
2.5 **Heliport/Elevated helipad take-off procedures:**.

Example of MD Explorer normal take-off profile - Heliport/Elevated Helipad



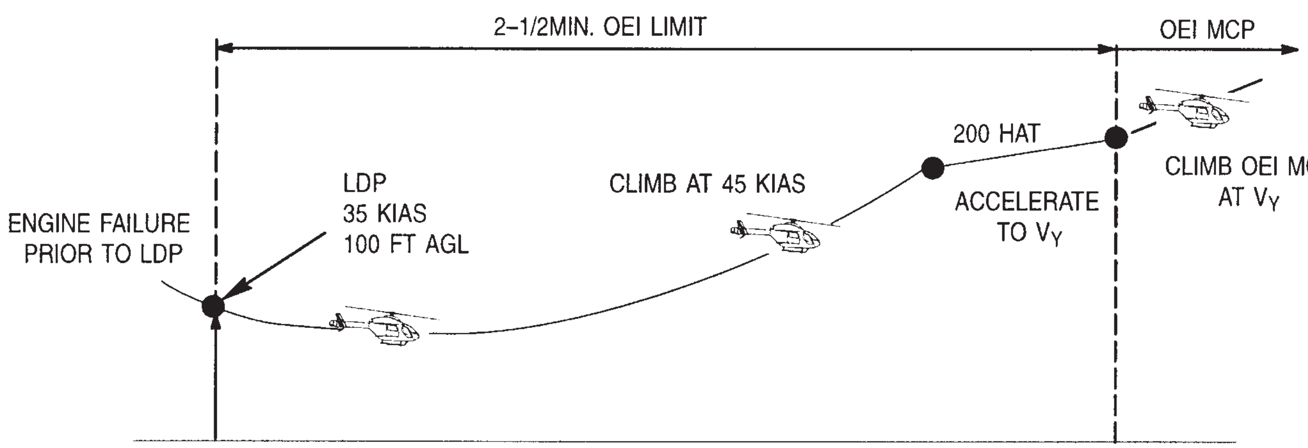
2.6 **Landing procedures - clear airfield, heliport and elevated helipad:**.

Example of MD Explorer normal landing profile



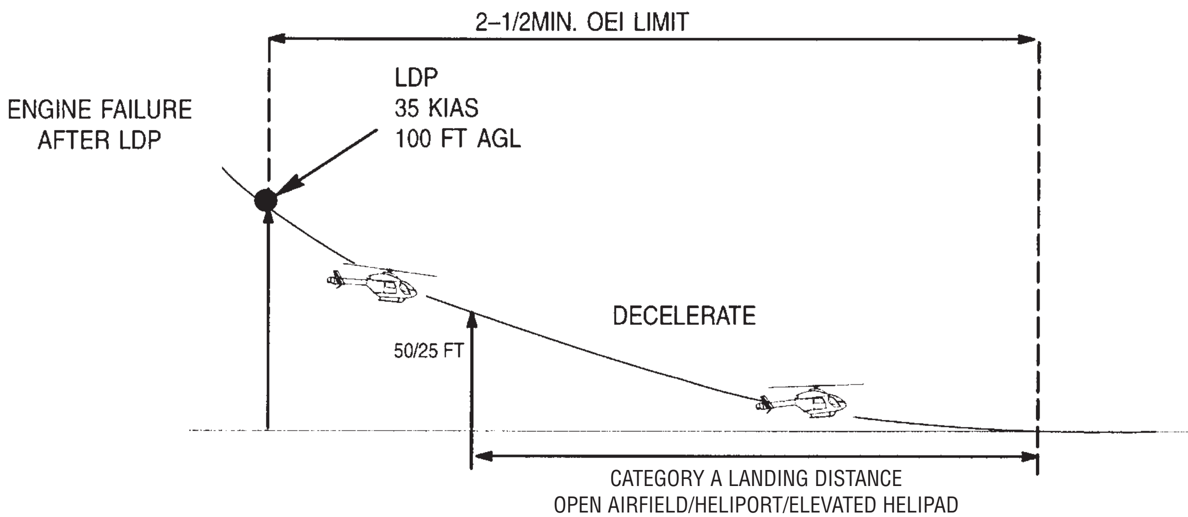
<u>Engine failure prior to LDP.</u>

Example of MD Explorer balked landing:



Engine failure after LDP.

Example of MD Explorer continued landing



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For any of the variety of missions required, MDHI has developed optional accessories to tailor the basic MD Explorer® helicopter to your exact needs. The accessories are designed as quick-change items to reduce your down-time and enhance your productivity.

3.0 **SYSTEM DESCRIPTION**

The MD Explorer® is an eight-place, twin-engine, multi-purpose helicopter. It has a bearingless, composite, fully-articulated rotor system, with the patented NOTAR® anti-torque system. The engines have a direct input to the transmission, with no combining gearbox. A single short shaft from the transmission drives the NOTAR® fan, and two quills drive the engine and transmission oil cooling system. The rotor is supported by a hollow static mast mounted to primary structure which absorbs all of the flight loads, allowing the ON-CONDITION transmission to provide torque only. The transmission is separated from the static mast by an acoustic isolator, thus reducing noise into the cabin and cockpit areas. There are only three wetted areas, which are checked daily through view ports. The hydraulic system is a dual system for reliability. The outer skin of the aircraft is composite, with no magnesium, allowing it to survive well in a hostile marine environment. The fuel cells are separated well away from the outer skin, enclosed by two deep keel beams, and all of the fuel lines incorporate frangible fittings. Powerplants, fuel, hydraulic, and electrical systems are monitored and displayed to the crew with an Integrated Instrumentation Display System. The IIDS provides both digital and analog read-outs for clarity, records all exceedances, does engine trend analysis, and incorporates a Chadwick-Helmuth Balance Monitoring System, (BMS) which allows rotor and NOTAR® fan balancing during revenue flights instead of dedicated maintenance actions. All of the crew and passenger seats are energy attenuating, and meet the new FAR/JAR 27.562 requirements. The landing gear is a non-retractable skid. Large, 52-inch sliding doors are on each side of the spacious cabin. The crew doors are hinged and an aft cabin hinged door allows for baggage or alternate loading.

3.1 **Specifications and certifications**.

The certification is in accordance with FAR Part 27 through amendment 27-26 dated April 5, 1990, and special condition for High Intensity Radiated Fields (HIRF) protection per FAR 21.16; FAR Part 36 Appendix H, Noise, effective on the date of Type Certificate and FAR Part 27, Amendment 27-33, Appendix C - “Criteria for Category A” (November 1997). The Federal Aviation Administration Type Certificate Number is H19NM, dated December 2, 1994. The FAA model designation is MD 900. The FAA/ICAO aircraft type designator is HU90.

3.2 **Rotor.**

3.2.1 **Main rotor head.**

The rotor head consists of two aluminum alloy sections which clamp together to retain the fiber-wound composite flexbeams. Each retention bolt supports the leading strap of one flexbeam, and the trailing strap of another. The hub rotates around a static (nonrotating) hollow mast support tube, which absorbs all of the flight loads. The hub is rotated by a drive shaft which rises from the transmission through the hollow support tube.

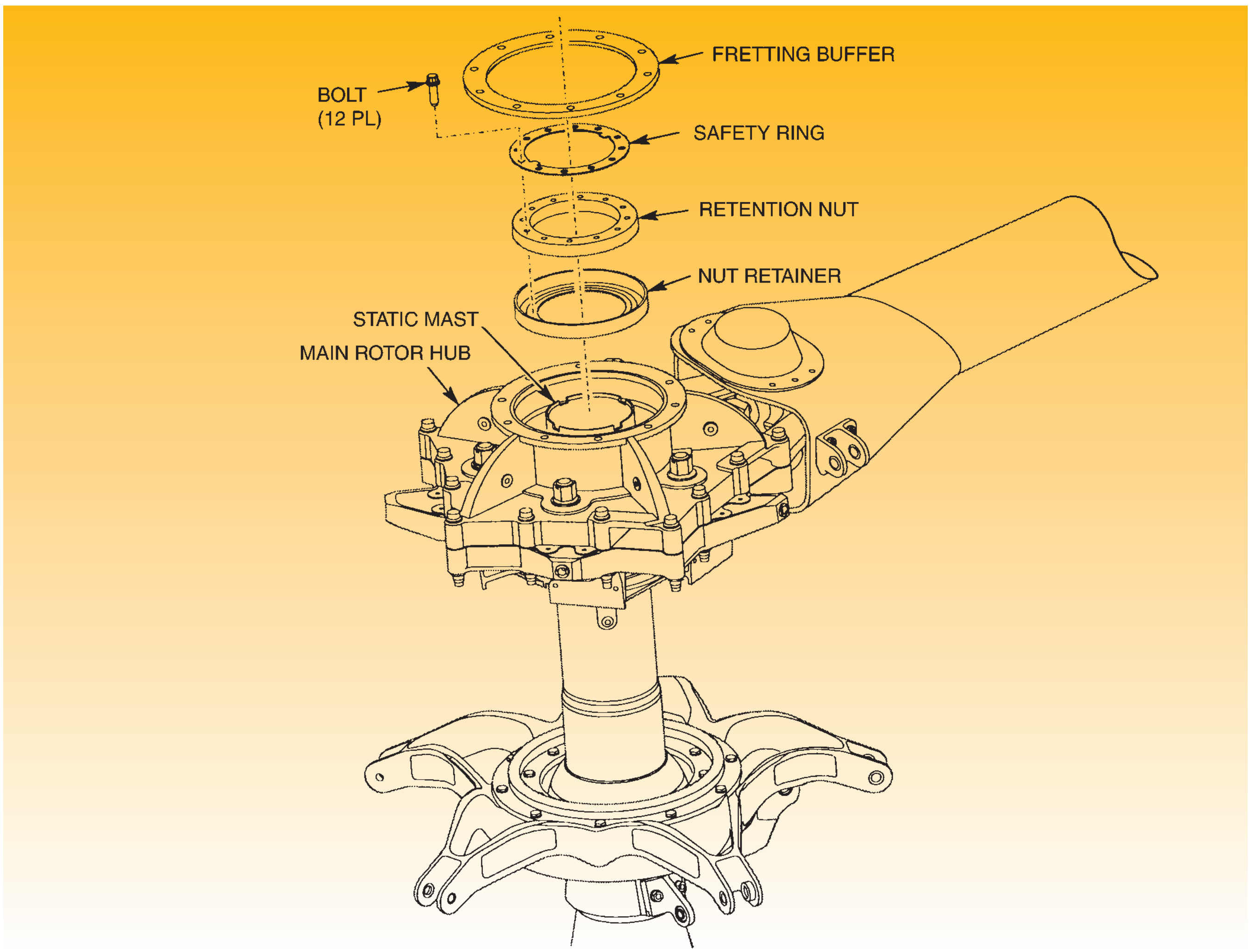

Figure 5. Main Rotor Head

3.2.2 **Main rotor blades.**

The five rotor blades are manufactured of fiber-wound composite material. Bearingless composite flexbeams attach the blades to the forged aluminum hub, and provide feathering and flapping motions. The lead-lag motions are absorbed by elastomeric dampers attached to the top and bottom of each pitchcase. The blade interior aft of the spar is filled with a honeycomb core for rigidity. Blade center of gravity of 27 percent is assured by the addition of aluminum/steel/tungsten weights (as required) in an adjustable weight pocket near the blade tip. The leading edges are erosion-protected by a titanium strip out to 84 percent radius, and by a nickel strip from that point out to the tip. An adjustable tab is located one-fourth span from the tip for fine tuning of the blade track. The blades are attached to the pitchcase and flexbeams with high torque bolts with expandable bushings. A grounding strap for each blade makes electrical contact at the root end and the hub for lightning protection.

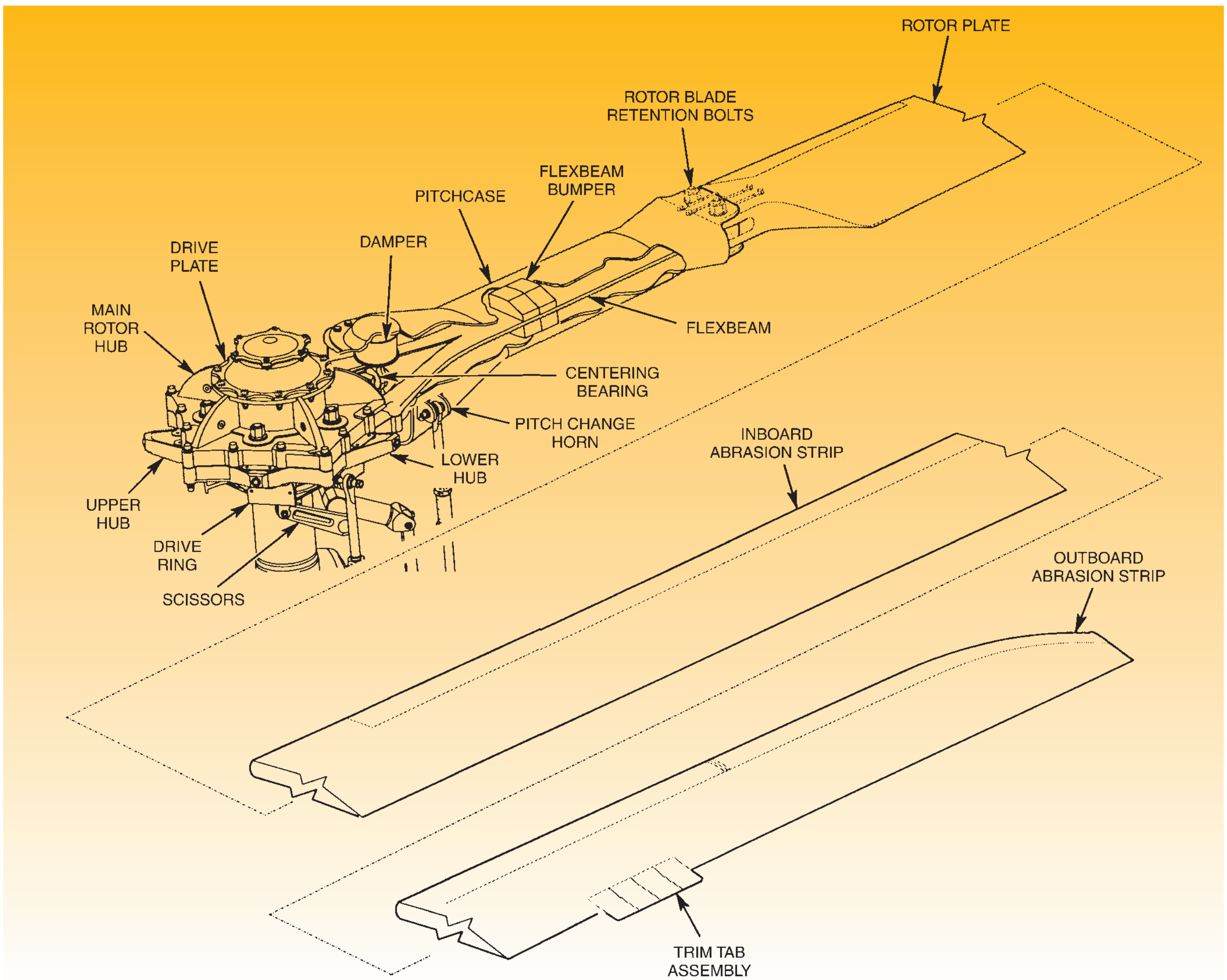

Figure 6. Main Rotor Blades

3.2.3 **Main rotor data.**

Number of blades	5	
Direction of rotation	Counter-clockwise, seen from above.	
Diameter	33.8 ft.	(10.3 m)
Blade chord	0.83 ft	(0.25 m)
Disk area	900 ft^2	(83.6 m^2)
Disk loading	6.94 lb/ft^2 at maximum weight	
Blade tip speed, 100% NR	695 FPS	
Rotor speed, 100% NR	392 RPM	

3.3 **Static support mast.**

The static support mast consists of a nonrotating hollow mast fixed rigidly to a mast support base. It is attached to the main structure of the helicopter by four “V” shaped struts. A pair of tapered roller bearings transfer all of the flight loads directly from the rotor hub into this mast tube and base. Two of the support struts may be removed to allow the removal/installation of the transmission, without disturbing the flight controls or the rotor blades.

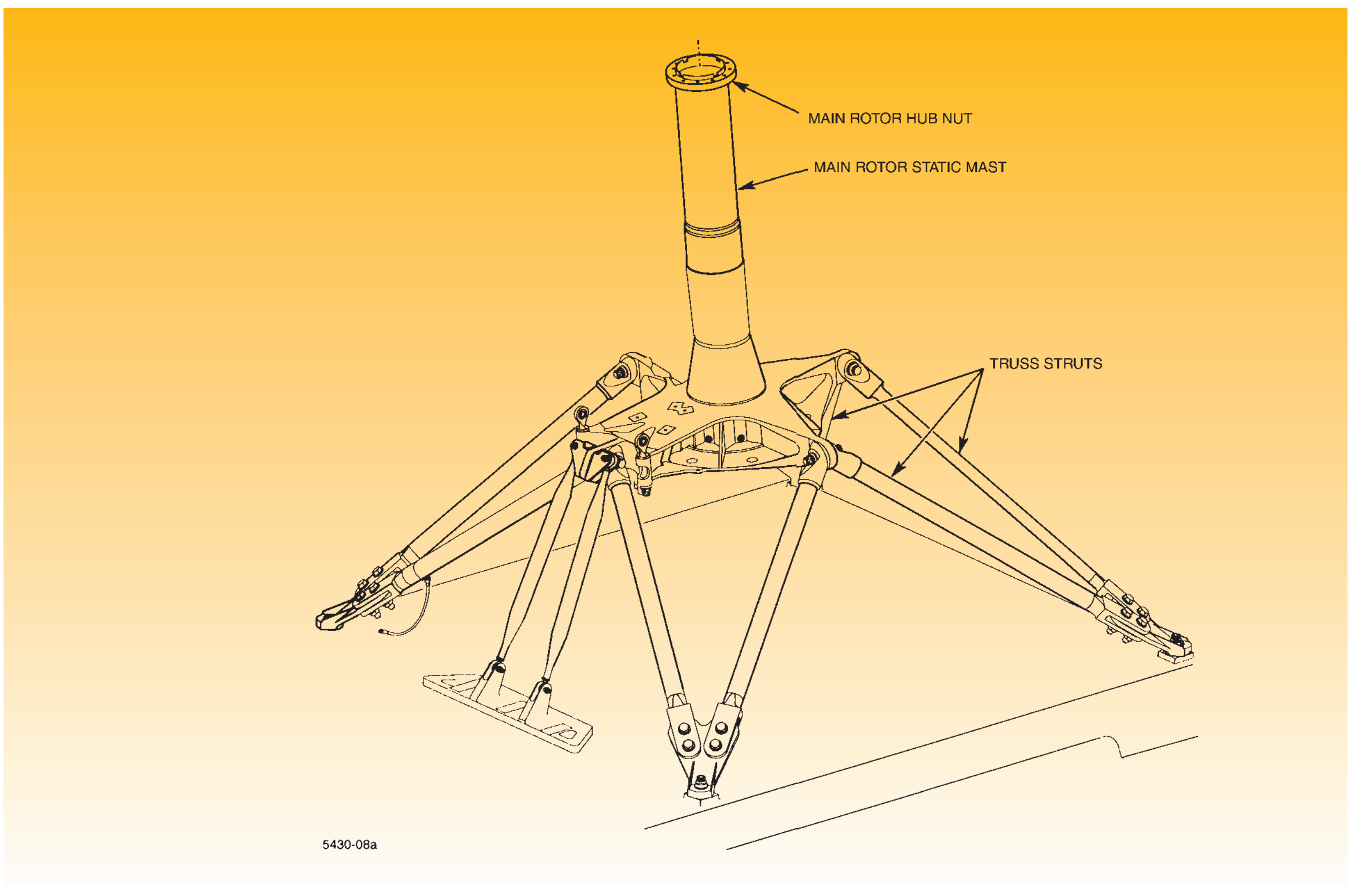

Figure 7. Static Support Mast

3.4 **Transmission.**

The transmission consists of an aluminum alloy casting (there is no magnesium anywhere on the aircraft) containing two gear reduction stages, an input combining stage, and an output planetary stage for transmitting engine torque to the rotor. It also drives the NOTAR® fan, the fans for the transmission and engine oil coolers, and the dual hydraulic pumps. The transmission does not carry any of the flight loads, and has a on-condition design.

An elastomeric isolator forms a vibration-reducing interface between the static mast base and the transmission, thereby reducing the noise and vibration levels in the cabin.

The transmission has the following ratings:

Take-off ....550 shp (per engine)
Maximum continuous...........................500 shp (per engine)
OEI, continuous...................................620 shp
OEI, 2.5 minute limit............................680 shp

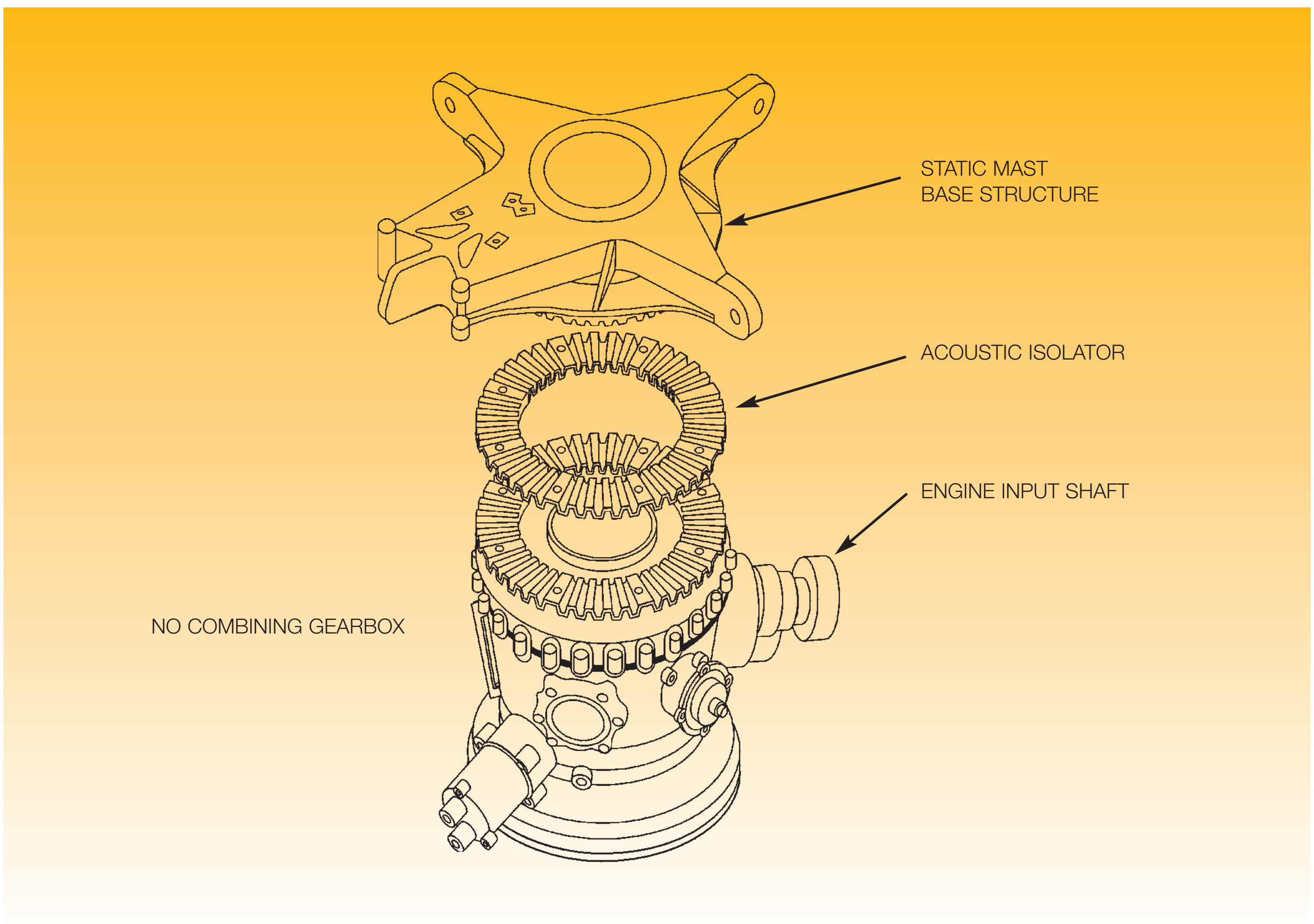

Figure 8. Transmission

3.5 **NOTAR® anti-torque system.**

3.5.1 **NOTAR® system operation.**

Using the natural characteristics of helicopter aerodynamics, the NOTAR® anti-torque system provides safe, quiet, responsive, FOD-resistant directional control. The enclosed variable-pitch composite blade fan produces a low pressure, high volume of ambient air to pressurize the composite tailboom. The air is expelled through two slots which run the length of the tailboom on the starboard (right) side, causing a boundary-layer control called the "Coanda Effect." The result is that the tailboom becomes a "wing," flying in the downwash of the rotor system, producing up to 70 percent of the anti-torque required in a hover. The balance of the directional control is accomplished by a rotating thruster.

In forward flight, the vertical stabilizers provide the majority of the anti-torque, however directional control remains a function of the jet thruster.

The NOTAR® anti-torque system eliminates all of the mechanical disadvantages of a tail rotor, including long drive shafts, hanger bearings, intermediate gearboxes and ninety-degree gearboxes.

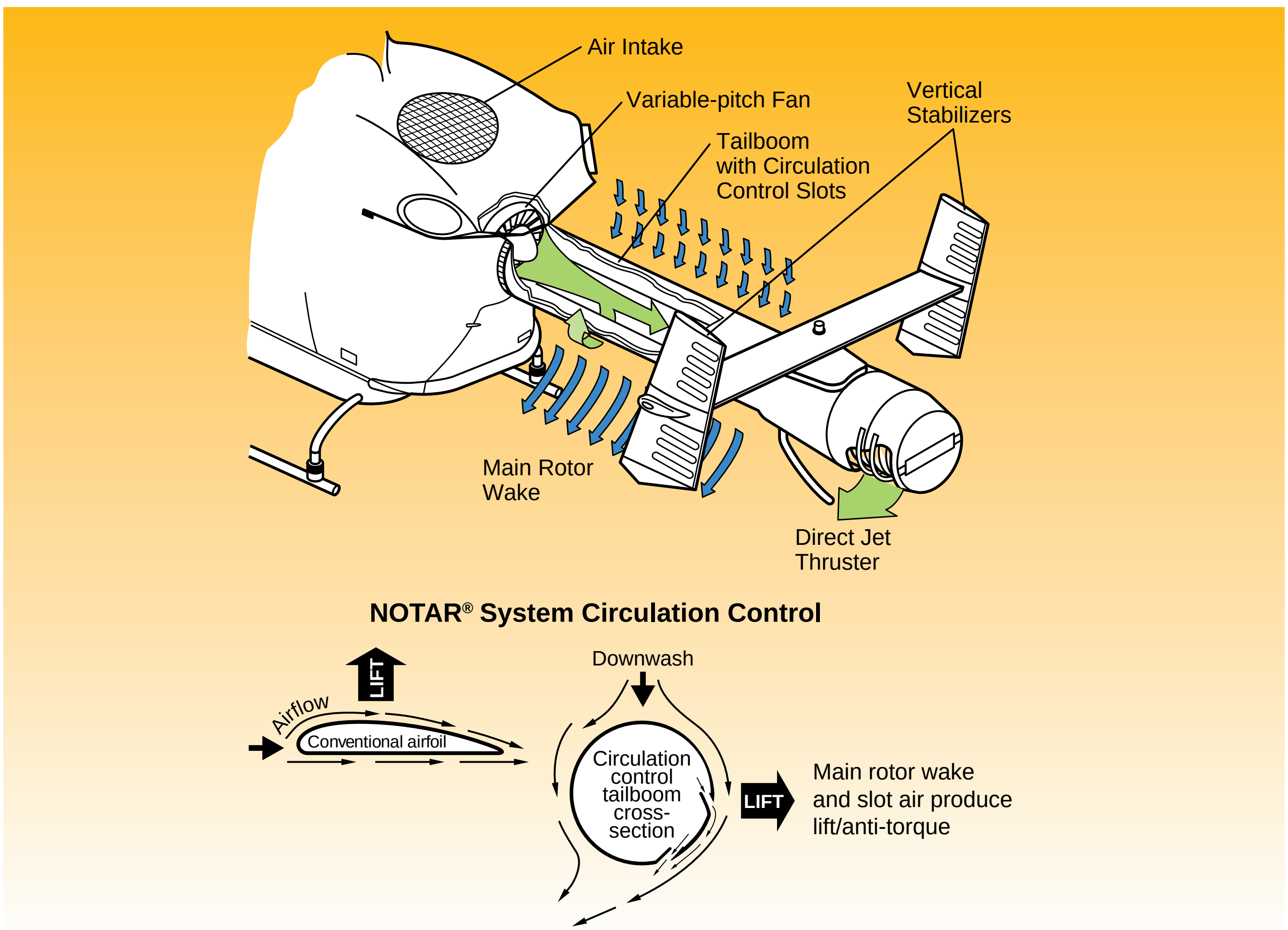

Figure 9. NOTAR® Anti-torque system is a trademark of The Boeing Company.

3.5.2 **NOTAR® fan data.**

Number of blades 13

Direction of rotation ....Counterclockwise, viewed looking forward

Diameter..1.83 ft (0.56 m)

Blade chord...0.325 ft (0.10 m)

Blade RPM, 100% NR 5,412

3.6 **Fuselage.**

The lower fuselage is composed of a composite shell and two deep composite keel beams that run the entire length of the aircraft. This structure is designed to absorb energy in an emergency landing by yielding progressively. Rising above the keel beams is a modified "A-frame" of aluminum, within which all of the passenger compartment is enclosed, and to which the crew stations are attached. The outer shell is a one-piece semi-monocoque composite structure, within which is embedded a very fine, expanded aluminum mesh ("AstroStrike") for lightning protection. All aluminum parts are coated with primer paint for protection, and all exposed aluminum parts are painted. "Wet" rivets and integral fiber-glass barrier strips are used to connect composite skins to the structural frame to prevent galvanic corrosion. Built-in steps, handholds and generous work platforms permit ease of daily pre-flight inspections.

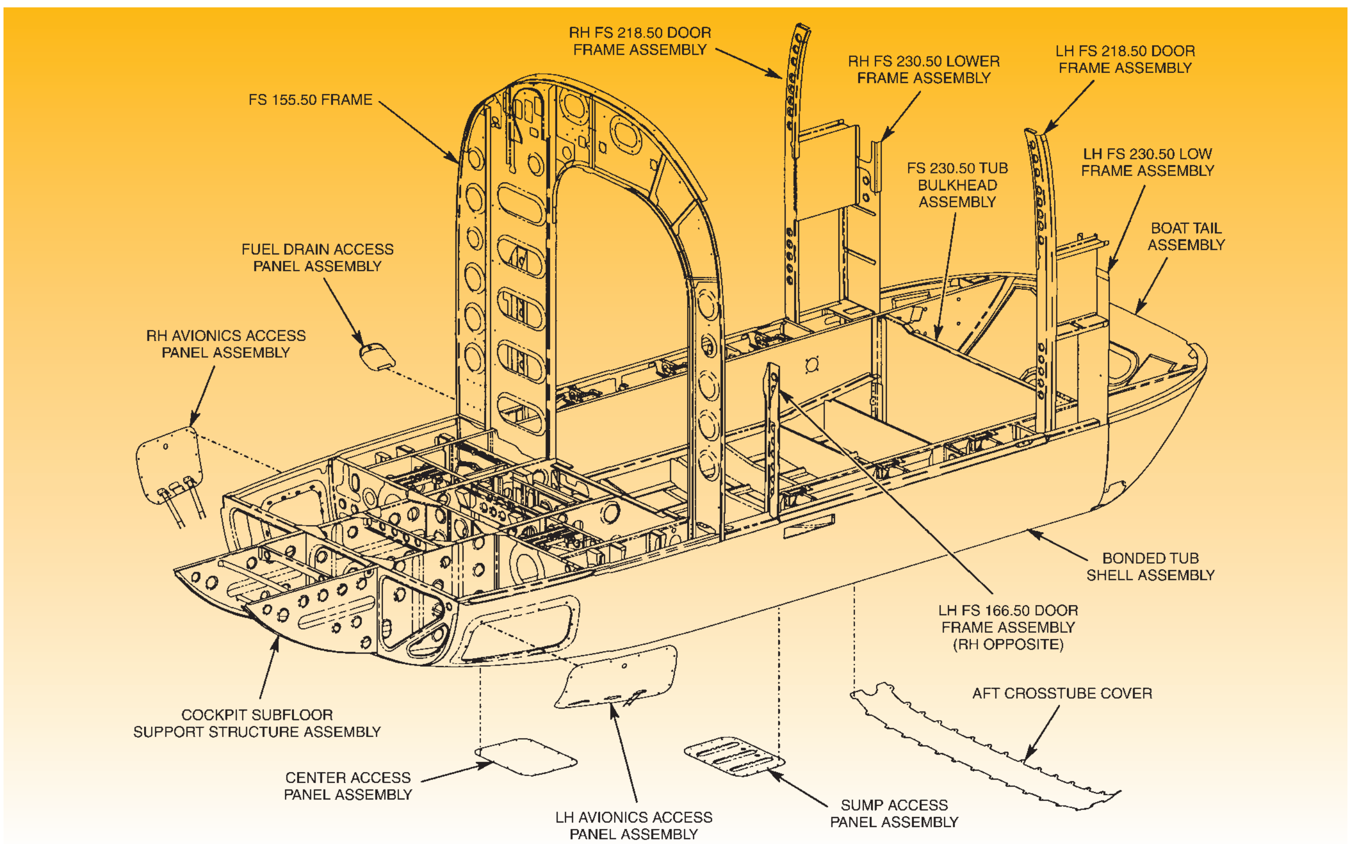

Figure 10. Lower Fuselage

For discussion purposes, the fuselage will be divided into these major subsections:

- Nose
- Cockpit
- Cabin
- Engine deck
- Doors

3.6.1 **Nose section.**

Beneath a high-visibility set of tinted crew transparencies is the battery compartment, which is located for convenience at about waist high.

3.6.2 **Cockpit.**

The spacious cockpit was designed to provide a side-by-side seating arrangement for the pilot (on the right-hand side) and a passenger/copilot on the left. A small panel, allowing greater VFR visibility, yet adequate for basic utility up to single pilot IFR instrumentation, is made possible because of the combining of many functions into the IIDS. The only overhead item is the rotor brake, with all other switches and controls forward of the pilot's shoulder, and within easy reach. The crew seats are of a "stroking" energy-absorbing style that meet the new FAR Part 27.562, with five-point restraints, and are adjustable fore and aft. The anti-torque pedals are also adjustable. Beneath the cabin two large bays are available for remote avionics. A uniquely-shaped cyclic control, which hinges below the floor, allows the pilot to move the control to any extreme and still keep his or her forearm resting on his or her thigh. The collective controls incorporate a magnetic "clutch" which holds the last position in which it was placed by the pilot, and have "throttle-like" FADEC overrides which allow the pilots the option of direct mechanical control of the fuel control if desired. The placement of the control closet directly behind the pilot allows a view of the full interior by looking over the left shoulder.

3.6.3 **Cabin compartment.**

Although the MD Explorer® is categorized as a "light twin" (FAR Part 27), the 172.5 cubic foot cabin volume and six passenger seats are the equivalent of heavier "medium twins" (FAR Part 29). The 57-inch wide cabin gives each passenger 19 inches (48.3 cm) of shoulder room. The individual "stroking" (energy absorbing) seats are mounted both to the ceiling and floor, and also meet the requirements of FAR Part 27.562. They also protect the occupants when subjected to loads resulting from decelerations of 30 g's vertical and 18.4 g's forward. The seats are interchangeable and can be folded up for additional cargo storage, or removed or installed without tools, in about three minutes. Floor-to-ceiling clearance is 49 inches (124.5 cm). Sliding doors on each side are 52 inches (132.1 cm) wide, and incorporate large, jettisonable windows which provide extraordinary outside visibility. An additional hinged cabin access door is located aft, under the tailboom, for baggage or alternative loading of even the largest litter in current use. The floor is flat, with 24 recessed cargo tie-downs, and maximum static load is 115 pounds per foot^2 (561.5 kg/m^2) to withstand 20 g's vertical in an emergency landing with 1,500 lb payload. Passengers have access to a thermostat control next to the right rear seat to adjust cabin heat. A passenger step is located on the right and left side. Easy access for daily inspection of the NOTAR® fan is provided just inside of the aft door, and a courtesy light is provided.

3.6.4 **Engine deck.**

The engine deck forms the roof of the cabin area, and acts as a firewall and sound attenuator. Retention supports for major mass items such as the two engines and transmission are rated at 17 g's vertically, well in excess of current FAA standards. Also located here are the dual hydraulic boost pumps, engine and transmission oil coolers, and the static mast support tubes. Cowlings are held open for hands-free inspection by pneumatic rods, which also prevent contact with the rotors should the closing mechanism be inadvertently left unlocked prior to flight.

3.6.5 **Doors.**

Two hinged doors are located next to the pilot and copilot/front passenger. These doors contain storage cases, and have individually adjustable fresh air ports. A pneumatic device holds the doors open, and protects against wind gust damage. The doors also may be removed for flight, and speed is then restricted to 100 knots.

A 52-inch (132.1 cm) sliding door on each side of the cabin provides easy entry and exiting and permits cargo and litter loading in full view of the pilot, away from engine exhaust and anti-torque devices. Large windows give passengers panoramic views, and are jettisonable for emergency egress. The doors may be secured open for flight, with speed restricted to 60 knots. The doors may be removed for flight with a speed limitation of 100 kts.

A trapezoidal hinged door is located under the tailboom for baggage or alternative litter loading into the main cabin area. This door may be removed for flight with no speed restrictions.

Keyed locks are on all door handles.

3.6.6 **Empennage**.

The empennage consists of the tailboom, horizontal and vertical fins, and NOTAR® controls (discussed in Section 3.5).

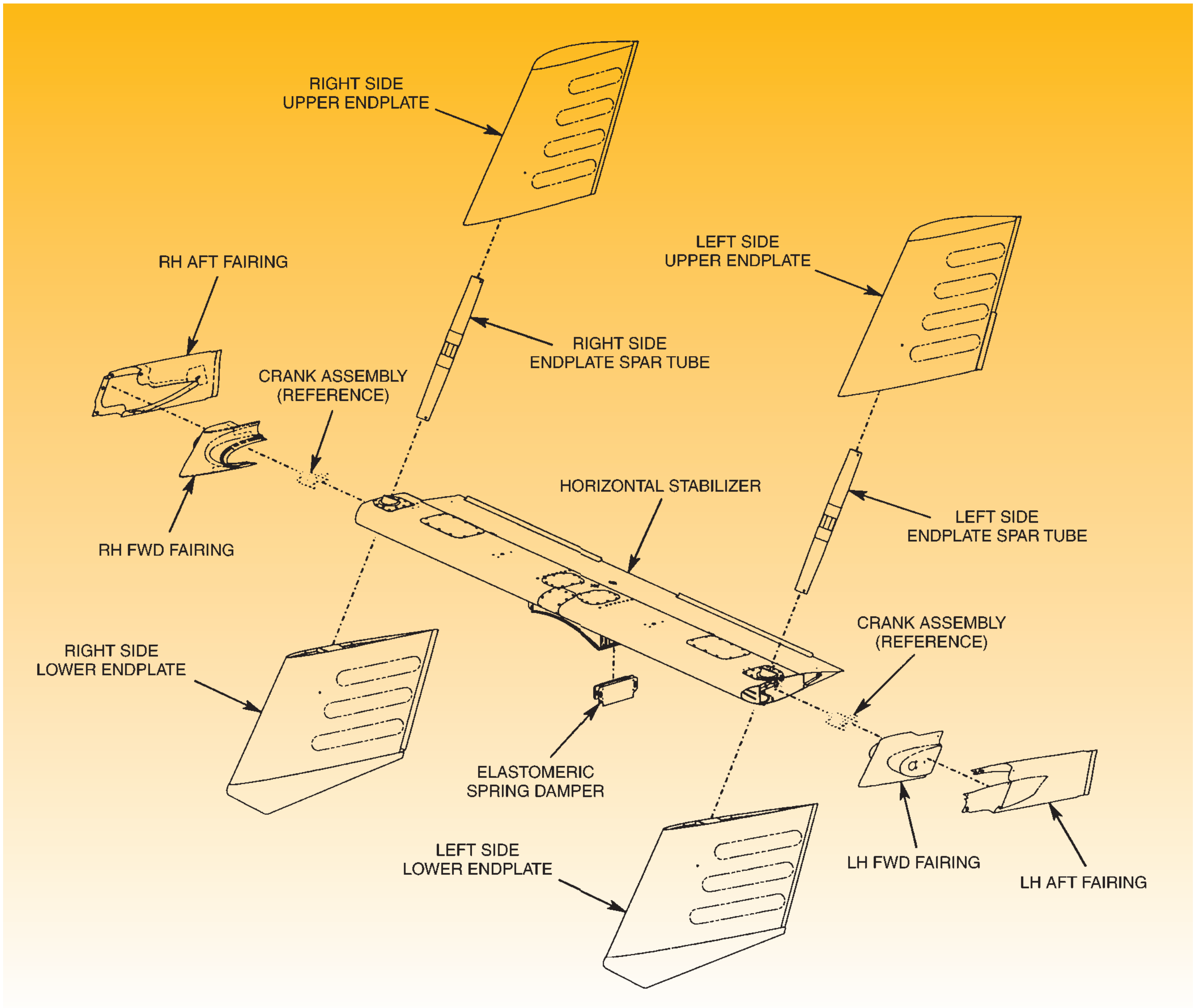

Figure 11. Empennage

Tailboom.

The tailboom is a composite tube which incorporates the NOTAR® slots along the right (starboard) side. It supports the horizontal stabilizer, the two articulated vertical fins, and the thruster. A tail skid is attached to protect the rotating cone.

Horizontal and vertical stabilizers.

The composite horizontal stabilizer is fixed, and supports two vertical fins, which are trimmed for normal cruise flight conditions. The horizontal stabilizer is mounted with an elastomeric isolator which minimizes vibration transferred to the airframe by wake turbulence.

Each composite vertical fin is driven by an independent, electromechanical, fly-by-wire actuator. Each actuator is controlled by an independent Vertical Stabilizer Control System (VSCS). This provides complete dual-redundancy for flight safety.

3.6.7 **Landing gear.**

The landing gear is an aluminum alloy, non-retracting set of skid tubes which are supported by fore and aft cross tubes. The aft cross-tube connection to the skid tubes is through an elastomeric spring to prevent ground resonance. Heavy-duty skid shoes protect the basic structure and extend the life. Attachment points are provided for ground handling wheels. The landing gear has exceeded the ability to withstand an 10.2 ft/sec drop at full gross weight per FAR 27.725.

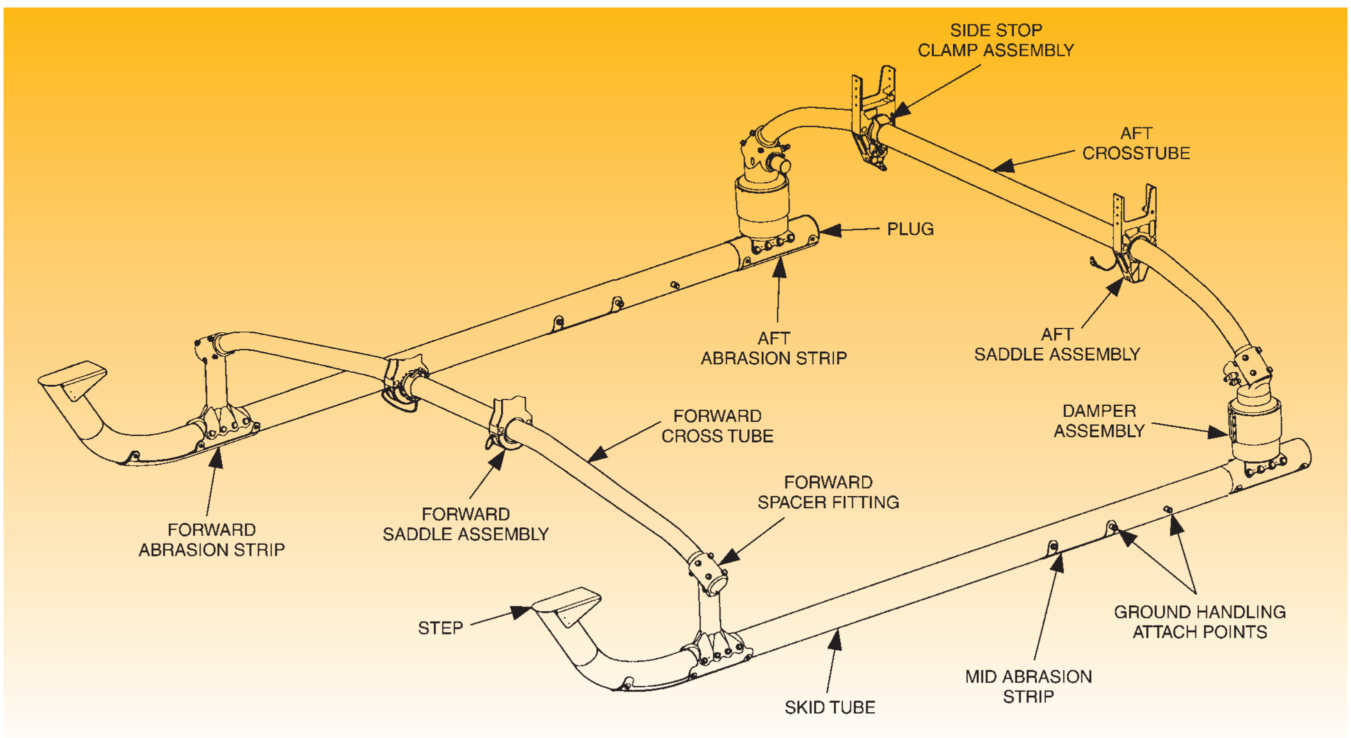

Figure 12. Landing Gear

3.7 **Flight control system.**

Flight control is achieved by aerodynamically tilting the tip path plane of the rotor by cyclically changing the pitch on the rotor blades, and by combining the NOTAR® anti-torque system with the variable pitch vertical stabilizers.

The main components are:

- Mechanical controls
- Dual hydraulic boost system
- Vertical fin VSCS

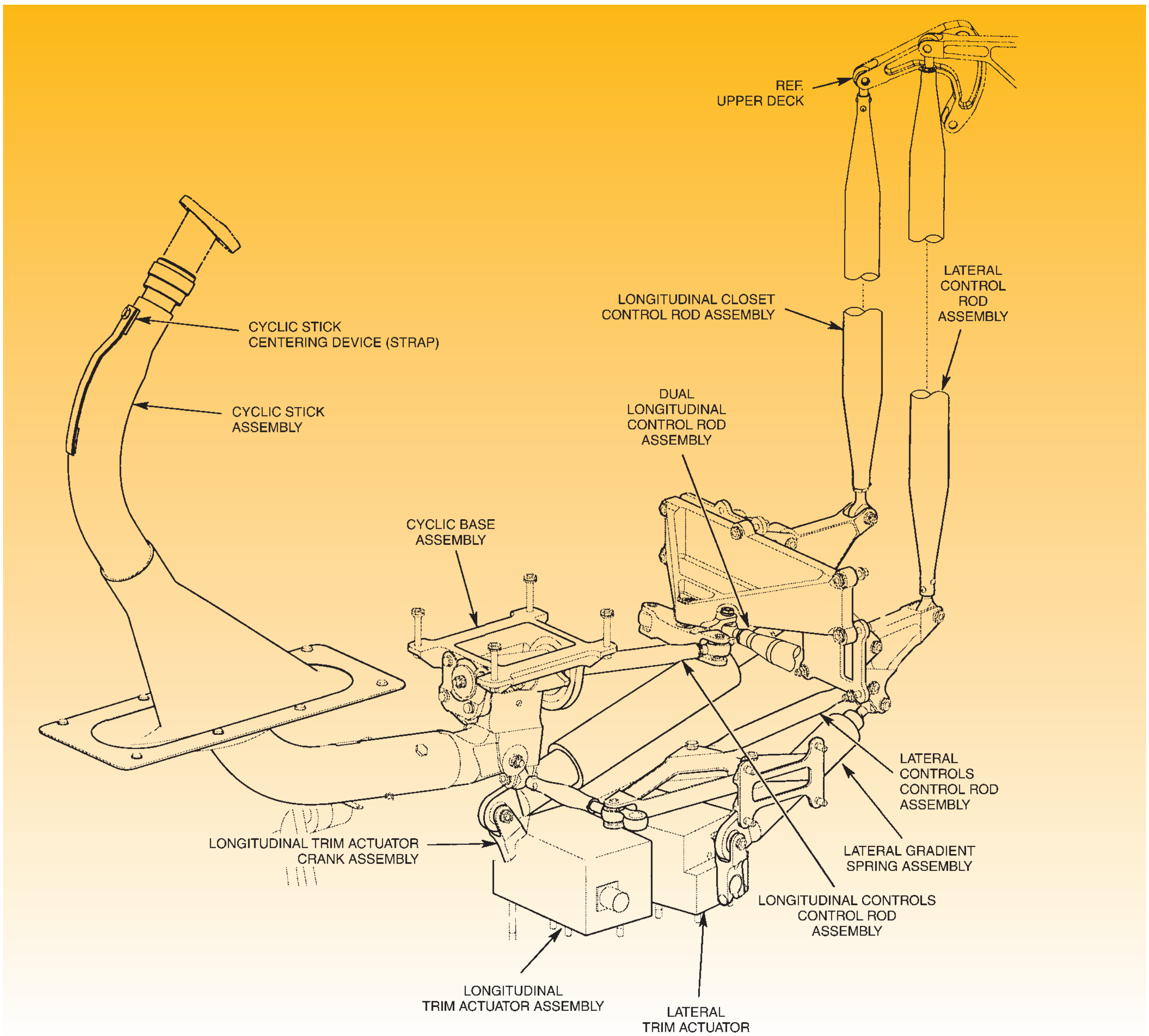

Figure 13. Flight Control System

3.7.1 **Mechanical rotor controls.**

The mechanical control system consists of the single cyclic control stick, the collective control stick, the anti-torque control pedals, and the FADEC override controls on the collective stick. Bell cranks and levers beneath and behind the pilot transfer control inputs to the hydraulic boost actuators which, in turn, make inputs to the stationary swashplate. The non-rotating swashplate then moves the rotating swashplate, which increases or decreases the pitch changes to the five rotor blades via a pitch change housing.

3.7.2 **Swashplate assembly.**

The swashplate assembly is the transition between the rotating rotors and the stationary control rod inputs. It consists of a lower nonrotating ring, which receives the boosted control inputs from the pilot cyclic and collective pitch sticks, and an upper rotating ring which transfers those inputs through pitch change links to each blade's pitch change housing.

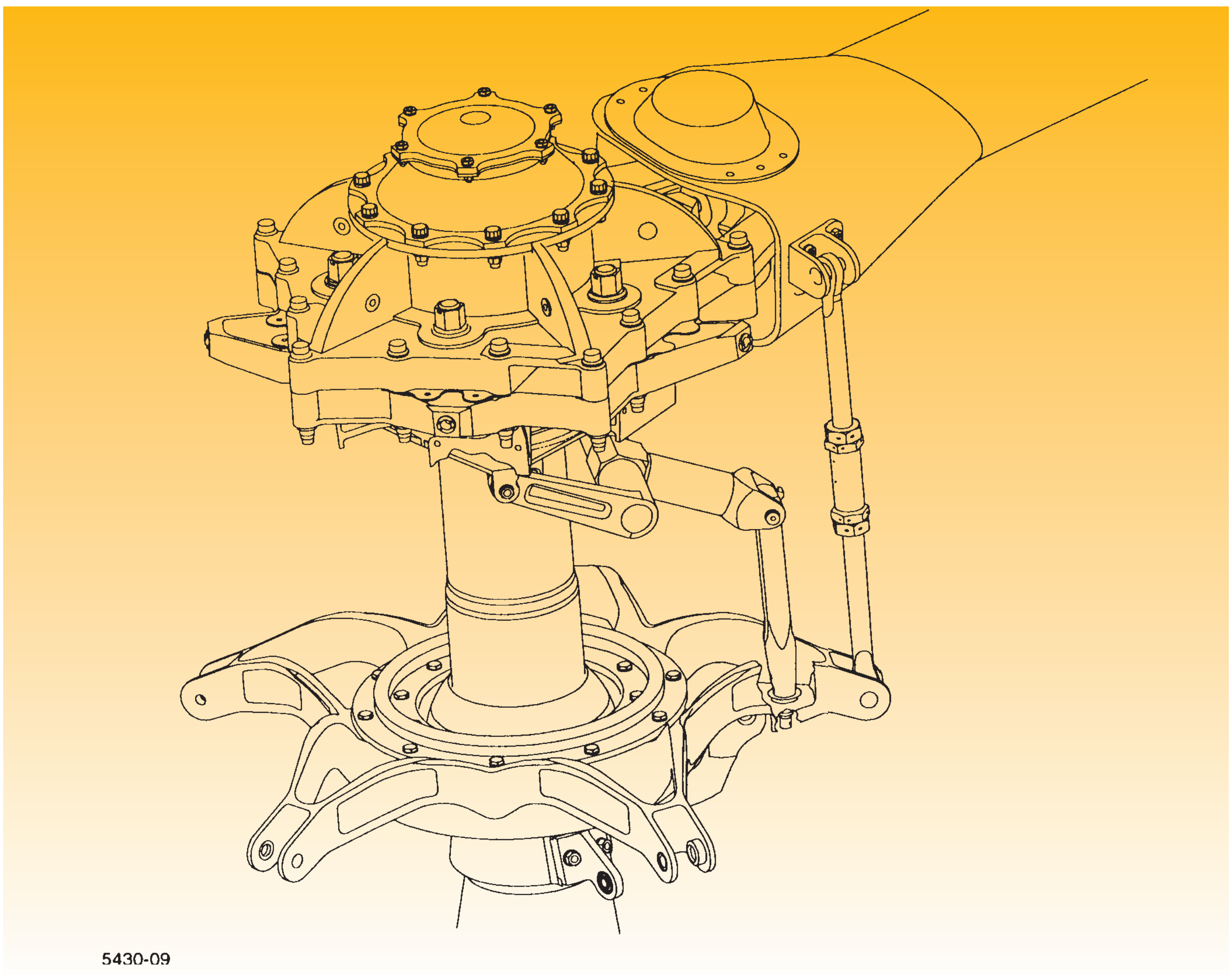

Figure 14. Swashplate Assembly

3.7.3 **Dual hydraulic controls.**

The dual hydraulic system operates at 500 psi, and supplies pressure to three dual circuit servoactuators for flight control operation. Should one system fail, the other is automatically increased to 1,000 pounds. Each system is independently capable of supplying the proper pressure to operate the MD Explorer's hydraulically-operated equipment. The primary system also supplies pressure to the single circuit directional servoactuator. The pump for each system is driven by, and mounted on, the transmlssion.

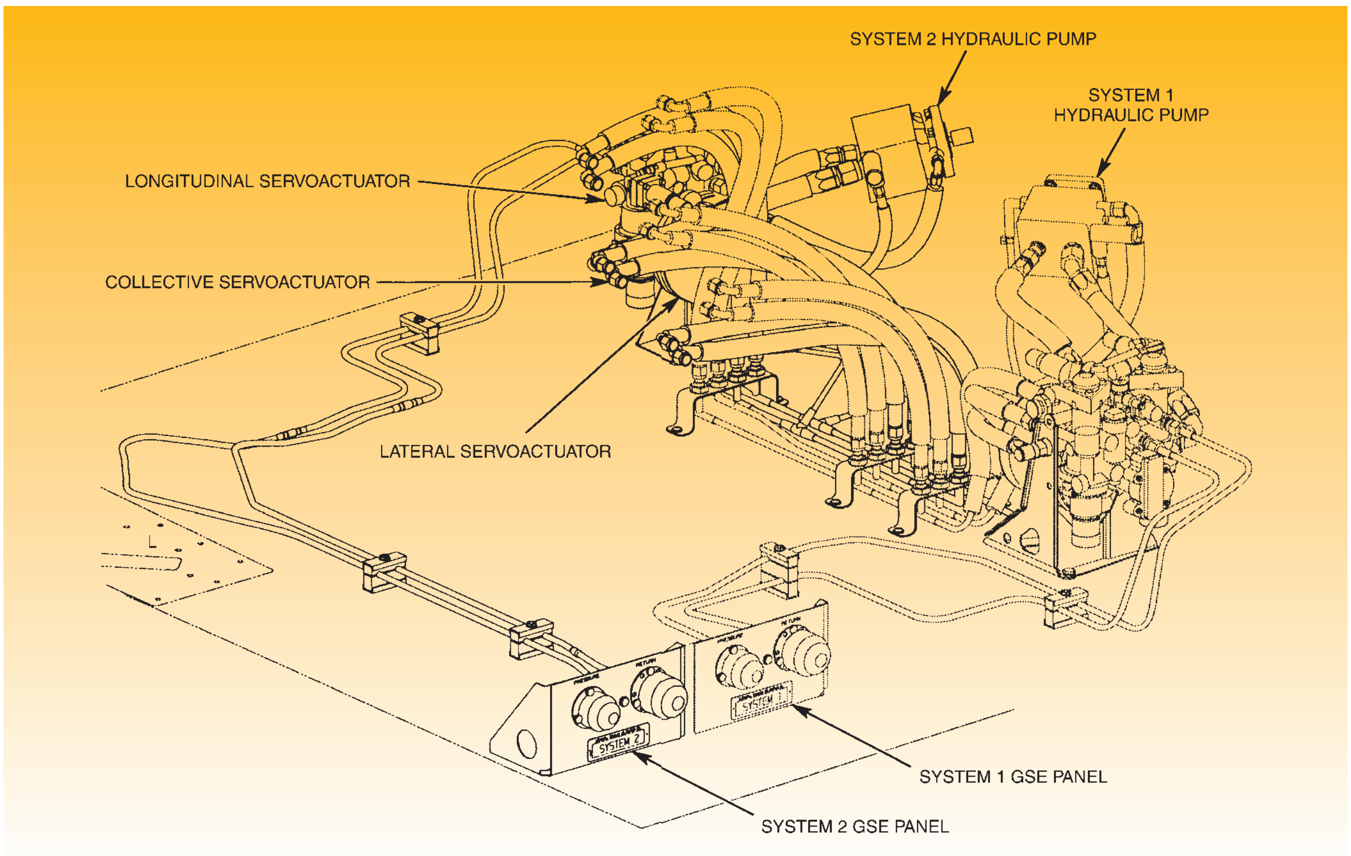

Figure 15. Dual Hydraulic System Components

3.7.4 **Mechanical NOTAR® controls**.

Pilot inputs to the pedals are transferred via levers and bellcranks to a single hydraulic boost which adjusts the variable pitch NOTAR® fan blades, as well as rotating the direct jet thruster to the desired opening position.

3.7.5 **Trim system.**

The cyclic controls incorporate force feel, which is provided by longitudinal and lateral spring cartridges in the control linkages. The trim system gives the pilot the ability to reduce the longitudinal and lateral stick forces to zero at any stick position using a multi-position switch on the cyclic grip. The switch signals electromechanical actuators attached to the spring cartridges. These actuators adjust the spring positions to change the force feel at the stick.

3.7.6 **Vertical stabilizer control system (VSCS).**

The VSCS is a dual redundant, fly-by-wire control system for the active, variable incidence vertical fins. Each fin is controlled by its own sensors, analog controller, and electro-mechanical actuator.

The system schedules fin incidence with collective pitch to provide optimum fin angles in forward flight (minimizing anti-torque power) and optimum fin angles for autorotation. It also incorporates stability augmentation functions including rate feedback to damp yaw oscillations and lateral acceleration feedback to augment turn coordination and to aid directional stability in descending flight. The augmentation functions can be turned off by the pilot using switches located on the center console. Meters on the instrument panel under the IIDS allow the pilot to monitor left and right fin positions.

3.8 **Propulsion system.**

The propulsion system is comprised of two main sections:

- Engines
- Fuel system

3.8.1 **Engine installation.**

The two Pratt & Whitney of Canada (PW206E) engines are mounted left and right, directly behind the transmission, and are arranged in a "V," at an angle of 25 degrees to the helicopter longitudinal axis. The drive shafts go directly into the transmission, which houses the one-way clutches.

NACA inlet.

As one of the new design features of the MD Explorer®, these air inlets provide additional ram air to the engines. These changes provide improved airspeed and lower specific fuel consumption, which result in greater range and endurance. If the optional particle separator is chosen, electric actuators automatically open the NACA inlet when the airspeed is greater than 47 knots.

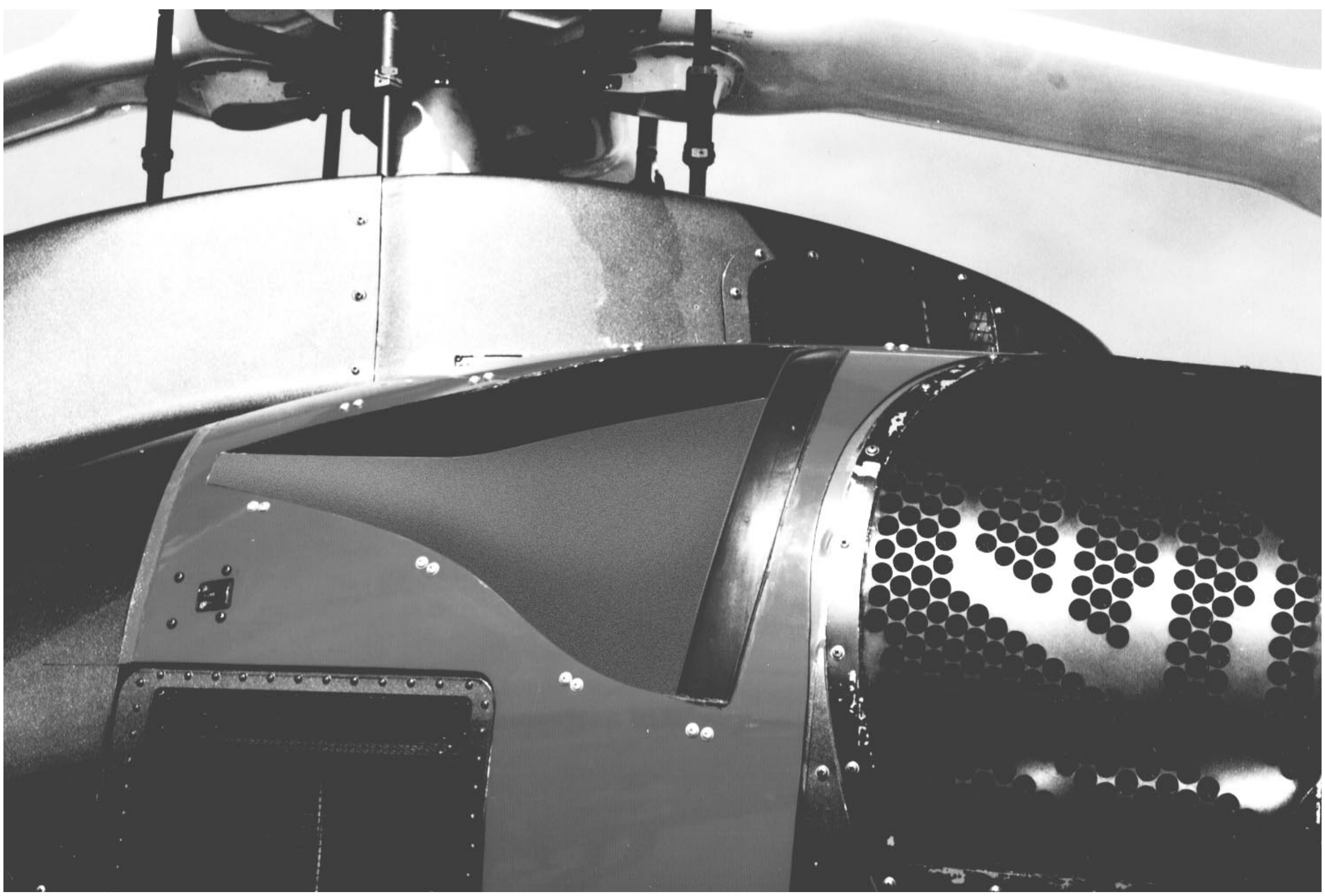

Figure 16. NACA Inlet

3.8.2 **Engine type and performance.**

The two PW207E turboshaft engines consist of a single power section connected to a gearbox which provides speed reduction and the accessory drive functions in one set of aluminum castings. There is no magnesium used. Air passes from the two airframe inlets to each engine individually. Each engine consists of a power section radial inlet, a single-stage centrifugal compressor, a Pratt & Whitney Canada patented pipe diffuser, a reverse-flow annular combustion chamber, a single-stage compressor turbine, a single-stage power turbine, which is connected to the gear box by a shaft through the center of the turbomachinery, and an axial flow exhaust.

The gearbox contains both the two-stage speed reduction output drive and accessory drives for starter/generator, fuel control, and engine oil pumps, as well as the alternator and hydraulic pump drives.

The power section is controlled by a single channel electronic control (FADEC), in which the software has been qualified to the critical level, with a hydromechanical back-up.

The engine cross-section drawing and performance is depicted in Figure 17.

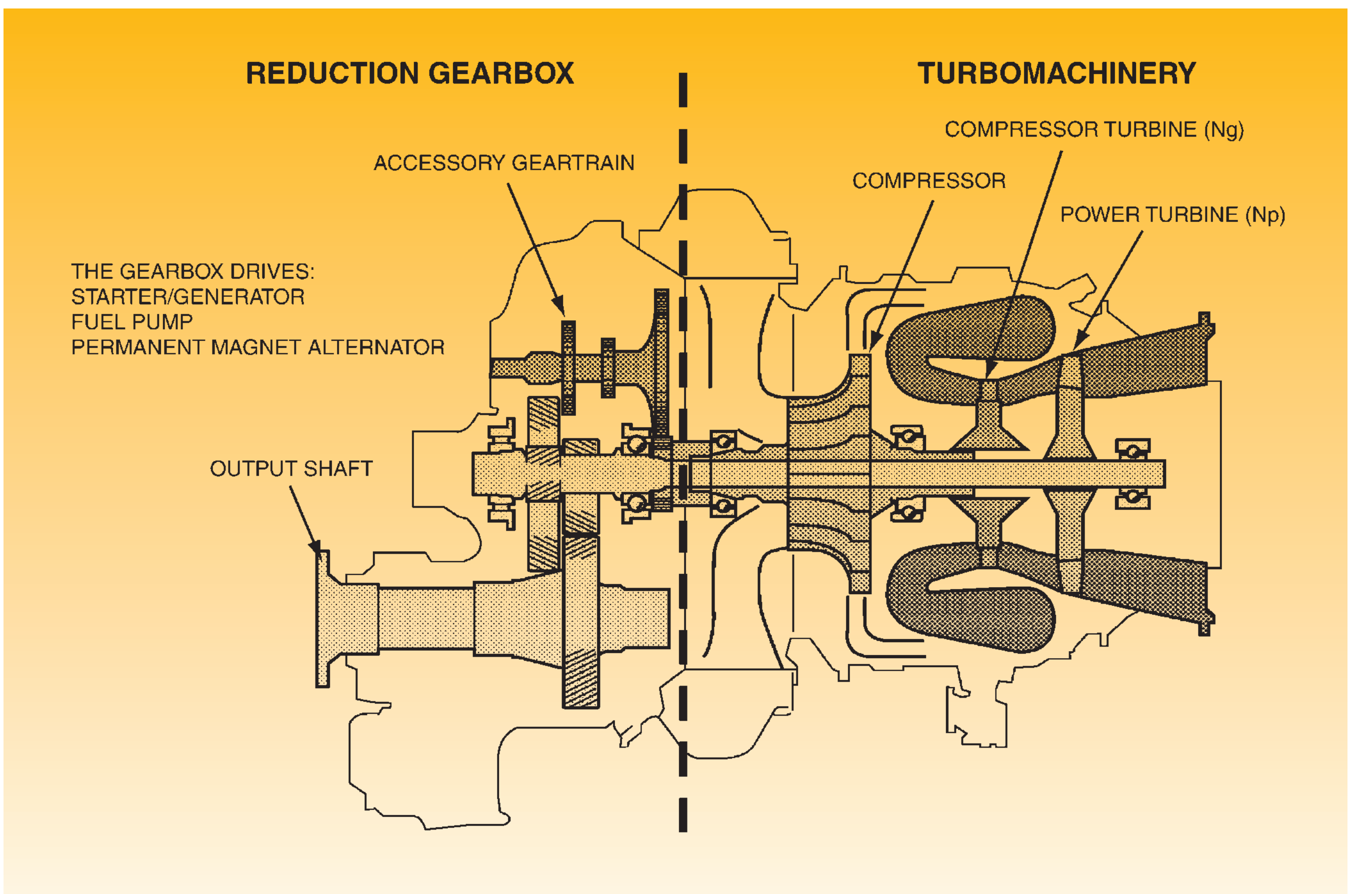

Figure 17. Engine Cross-Section

Uninstalled P&WC 207E Engine ratings (thermodynamic limits, sea level, ISA)

One engine inoperative (OEI)

2.5 minute OEI power ....800 shp

Maximum continuous....................710 shp

Take-off power (5 minutes)....................710 shp

Maximum continuous power ....625 shp

Engine ratings (mechanical limits)

2.5 minute OEI power....................700 shp

Maximum continuous....................550 shp

Take-off power (5 minutes)....................621 shp

3.9 **Fuel system.**

The fuel system stores, monitors, and distributes the fuel available to the engines. The system is designed for maximum safety by eliminating single-point failures that may result in fuel starvation. Fuel is carried in a bladder type fuel cell located below the removable passenger floor. The capacity of the cell is 159 U.S. gallons (600 L) of JET A fuel. A set of baffles reduces sloshing. Two submerged boost pumps (one for each engine) are driven by 24-28 Vdc, 4.5 ampere negative ground motors, and provide low-pressure fuel to the engines through lines that have self-sealing frangible valves to prevent fuel from leaking in the event of a hard landing. Rollover valves automatically close to prevent fuel loss through the vent system when a pitch or roll angle of 45 degrees is exceeded. The fuel bladder is compartmentalized into two sections, with one pump in each section. Each compartment retains a fuel reserve to provide sufficient fuel reserve for at least 20 minutes of flight following loss of fuel in the other compartment. A pump in each engine provides backup for the boost pump in the event of loss of boost pressure.

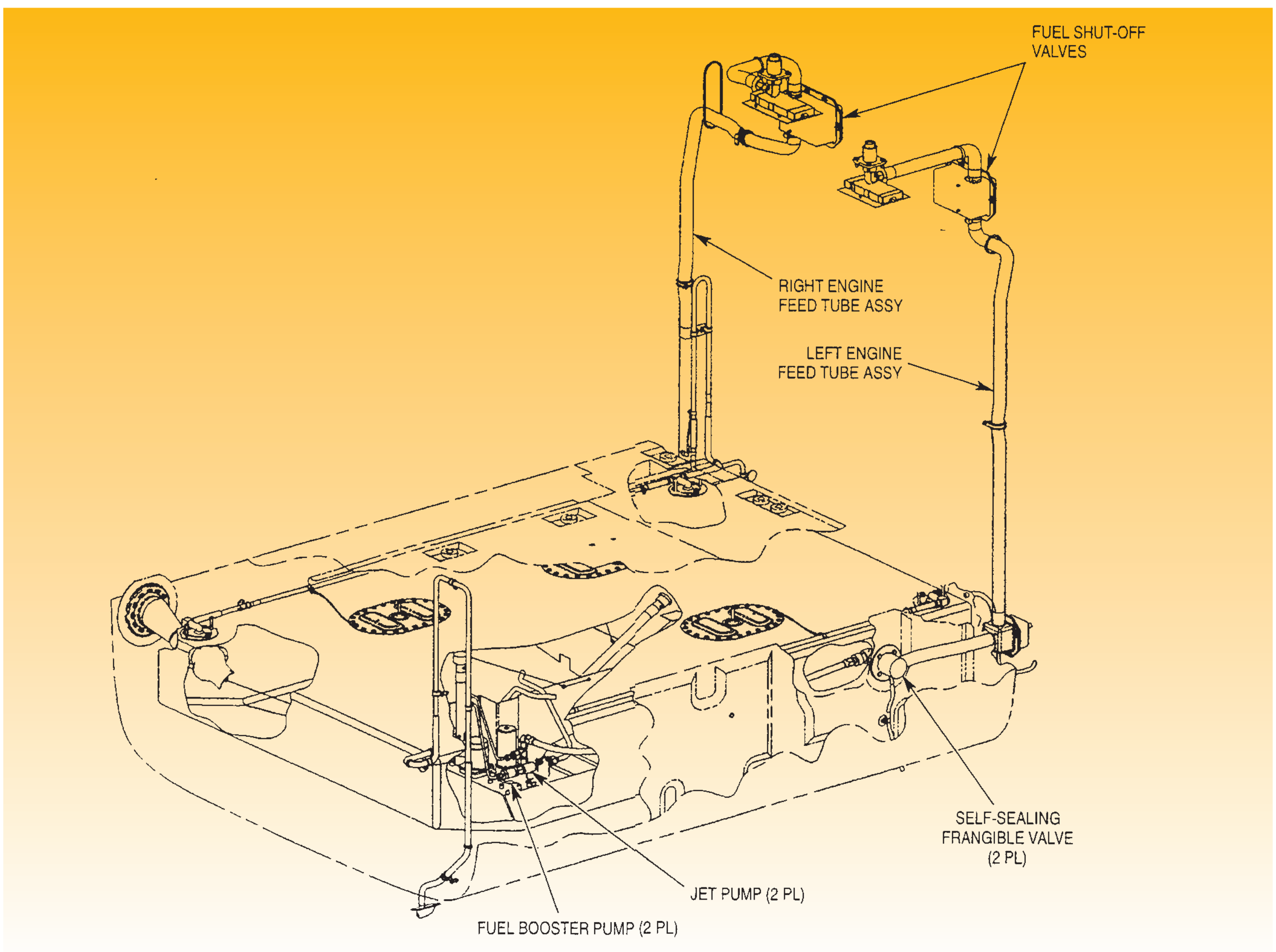

Figure 18. Fuel Distribution Subsystem

3.10 **Electrical system.**

The electrical system generates and distributes power for operation and control of the helicopter systems. The MD Explorer® systems operate on 28 Vdc power, and do not require ac power. The electrical systems consists of:

- Power generation subsystem
- Power distribution subsystem

3.10.1 **Power generation subsystem.**

The power generation subsystem provides electrical power to operate electrically powered equipment. Power is available to the MD Explorer® through three sources:

- External power
- Battery power
- Generator power

External power.

The external power receptacle is designed to accept a three-prong plug and is keyed to prevent incorrect plug alignment. The external power receptacle is located aft of the right chin window, easily visible to the pilot. When external power is applied, power is supplied to the battery bus, essential bus, and the left and right generator buses.

Battery power.

The battery provides power for ground start. It also acts as a back-up power source during flight by providing power to the battery bus and essential bus. The battery is located in the nose of the aircraft, and is a self-enclosed, 22-ampere-hour, 24-volt dc Nickel/Cadmium battery. The battery is recharged by the generators during flight, and is also recharged by external ground power.

Generator power.

The left and right starter/generators provide on-board dc power generation. They are the primary source of electrical power for the MD Explorer®, and each one is rated at 200A/28 Vdc. Each generator is controlled by its own Generator Control Unit (GCU). When the start cycle is complete and the generator switch is placed in the “ON” position, the GCU engages the Line Contactor, and generator power is then connected to the buses.

3.10.2 **Power distribution subsystem.**

The dc power distribution system distributes power from the generators to the essential and battery buses.

Essential bus.

The essential bus is located on the pedestal in the cockpit, and provides power to:

- Left generator control unit
- Right generator control unit
- Transmission fire indicator
- Left engine fire indicator
- Right engine fire indicator
- Left fuel shut-off valve
- Right cross-feed valve
- Right fuel shut-off valve
- Trim - Pitot heat #1
- Bleed air heat
- IIDS
- Fuel probes for quantity
- Instrument flood lights
- Left vertical stabilizer control system
- Right vertical stabilizer control system
- Audio panel #1
- Nav/Com #1

Battery bus.

The battery bus provides power to the battery bus circuit breaker panel, which controls:

- Left boost pump
- Right boost pump
- Left FADEC
- Right FADEC
- Fuel low warning
- Left FADEC override detent
- Right FADEC override detent
- “Off” gate
- Left ignition
- Right ignition
- Console lights
- Instrument lights
- Position lights
- Strobe lights
- Avionics master switch
- Rotor brake caution light
- Fire detection system
- Encoding altimeter
- Area lights (hover and landing)

3.10.3 **IIDS.**

The IIDS is the primary source of aircraft system performance and caution/warning messages. The unit is a black-faced display using a color liquid crystal display (LCD) to present both digital and analog information. Normal operating conditions are shown in green, caution areas in yellow, and warnings in red. It has adequate backlighting to be easily readable in bright sunlight and dims appropriately for night conditions.

The primary display consists of vertical bar displays and corresponding digital displays for the primary engine parameters of Np and Nr, torque, and EGT. The primary display also has an alphanumeric display which has a two-line, 16-character display that can show warnings, cautions, and advisory messages to the pilot.

The enclosed computer performs automatic engine trend analysis, records all exceedances, and does in-flight rotor and NOTAR® fan balance solutions.

The secondary display contains the caution/warning cluster, left and right engine health monitoring, a transmission parameter cluster, and a fuel system parameter cluster.

There is an output jack which is used to transfer data between the IIDS and an external computer (see Figure 16).

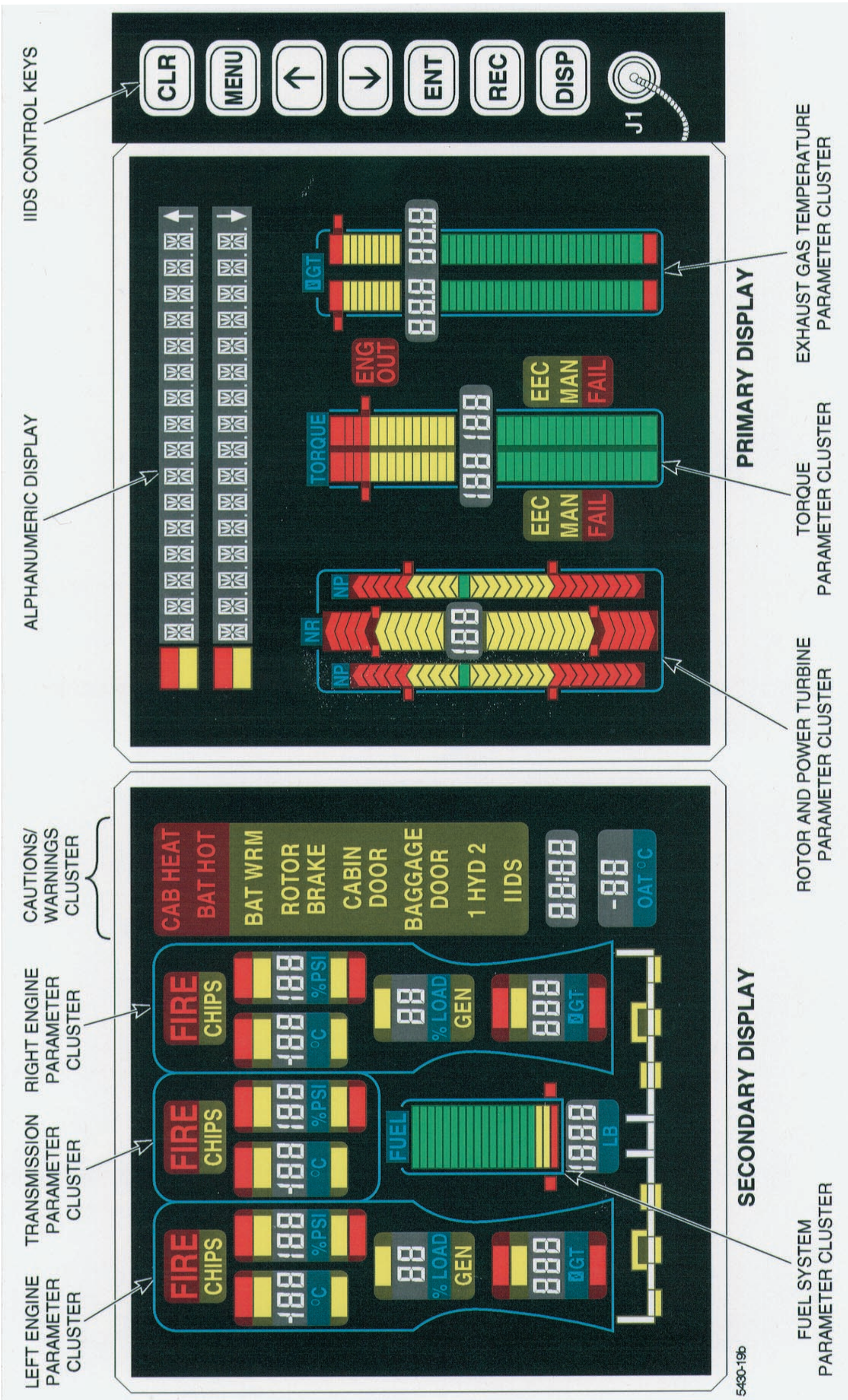

Figure 19. Integrated Instrumentation Display System (IIDS)

4.0 STANDARD EQUIPMENT

Airframe

AFT CABIN (BAGGAGE) ACCESS DOOR
HOVER AND APPROACH LIGHTS
JACK PAD INSTALLATION KIT
KEYED DOOR LOCKS FOR ALL DOORS AND ACCESS PANELS
PAINT 0 COLOR PRIMER ONLY EXPLORER
PASSENGER STEPS, RIGHT AND LEFT SIDE
POSITION LIGHTS AND STROBE LIGHTS (2)
TINTED CANOPY WINDOWS
TWO SLIDING CABIN DOORS WITH TINTED WINDOWS

Interior

AFT (BAGGAGE) CABIN UTILITY LIGHT
CABIN SOUNDPROOFING
CABIN STROKING SEATS(6), 3-PT HARNESS RESTRAINTS
CABIN UTILITY TRIM, BEIGE, WALL, CEILING, CARPET
COCKPIT AND CABIN 28-VOLT UTILITY OUTLETS
COCKPIT PNEUMATIC DOOR OPENERS
COCKPIT TRIM AND CARPETING, GRAY
COPILOT FLOOR-MOUNTED ICS SWITCH
CREW 5-POINT RESTRAINING HARNESSES
CREW STATION FIRE EXTINGUISHER
CREW STROKING SEATS (2), ADJUSTABLE
CREW WANDER UTILITY AND DOME LIGHT
FIXED WINDOW, BAGGAGE DOOR
FLUSH-MOUNTED CARGO TIE-DOWNS
HEADSETS (2), DAVID CLARK
HEATER/DEFOGGER SYSTEM
MEDICAL FIRST-AID KIT
ONE CABIN-STATION INTERCOM JACK
RAM AIR VENTILATION W/FAN AUGMENTATION
RFM STORAGE AND DISPLAY ENVELOPE FOR C OF A
ROTOR BRAKE, RIGHT HAND COMMAND
SINGLE PILOT, INVERTED “L”, INSTRUMENT PANEL
TWO CABIN THRESHOLD LIGHTS

STANDARD EQUIPMENT

Engine and Electrical

159 GALLON (600 L) FUEL SYSTEM
2 PRATT & WHITNEY 207E ENGINES, 640 SHP (477 KW)
27-AMPERE-HOUR, 24 VOLT NICAD BATTERY
ENGINE FIRE SUPPRESSION SYSTEM
ENGINE INLET SCREENS
ENGINE WASH KIT
EXTERNAL POWER RECEPTACLE
SINGLE-POINT GRAVITY REFUELING PORT

Rotor and Controls

DUAL HYDRAULIC BOOSTED CONTROL SYSTEM
FLIGHT CONTROLS, DUAL, RIGHT-HAND COMMAND
VERTICAL STABILIZER CONTROL SYSTEM (VSCS)

Flight and Engine Instruments

AIRSPEED INDICATOR
AMS 43, 3 PANEL ICS AUDIO CONTROL
ATTITUDE GYRO
AVIONICS MASTER SWITCH
BENDIX/KING KLX-135 GPS/COMM
ENCODING ALTIMETER
INTEGRATED INSTRUMENT DISPLAY SYSTEM (IIDS)
KT-70 S-MODE TRANSPONDER
MAGNETIC COMPASS
OUTSIDE AIR TEMPERATURE INDICATOR
PITOT TUBE, SINGLE

Miscellaneous

AIRFRAME LOGBOOK
BATTERY MANUAL
ENGINE LOGBOOK
ENGINE MAINTENANCE MANUAL
FOD COVERS FOR ENGINE AND UPPER DECK COVER
GROUND BASE MAINTENANCE COMPUTER SOFTWARE
GROUND BASE MAINTENANCE INTERFACE CABLE
ILLUSTRATED PARTS CATALOG
PITOT TUBE COVER
ROTOR BLADE TIE DOWNS
ROTORCRAFT MAINTENANCE MANUAL
ROTORCRAFT PILOT FLIGHT MANUAL

MDEXPLORER

OPTIONAL EQUIPMENT

Airspeed/Time	lb	kg
DUAL HEATED PITOT TUBE	2.4	1.1
SINGLE HEATED PITOT TUBE	0.3	0.1
KRA405 RADAR ALTIMETER W/ KNI416	10.5	4.8

Comm/Intercom	lb	kg
ENHANCED VFR SUITE	44.0	20.0
FLEXCOMM II W/ RT5000 WULFSBURG CONTROL HEAD	31.4	14.2
KFM985 FM TRANSCEIVER	3.0	1.4
KHF990-00 HF SYSTEM WITH BELLY MOUNTED ANT	22.5	10.2
NAT AA22-163, 220 WATT PA AND SIREN	21.4	9.7
NAT AA85 CABIN ICS, 6 PASSENGERS	3.3	1.5

COMM/NAV	lb	kg
EMER. LOC TRANS, ARTEX-100HM-406 w/GPS INTERFACE	6.9	3.1
KR87-16 ADF W KI227 (2ND SYSTEM)	7.5	3.4
HAND PUMP - DUAL HYDRAULICS RECHARGING	6.5	2.9

Electrical System	lb	kg
HEAVY DUTY BATTERY, SAFT 2778-2	11.6	5.3
INLET PARTICLE SEPARATOR	26.1	11.8

Environmental	lb	kg
AIR CONDITIONING - BELOW BAGGAGE FLOOR	85.0	38.6
AIR CONDITIONING - UPPER ENGINE DECK	72.0	32.7

Exterior Accessories	lb	kg
3000 LB CARGO HOOK RIGHT HAND	26.1	11.8
600 LB EXTERNAL PERSONNEL HOIST	172.1	78.1
MD900 WIRE STRIKE KIT	21.0	9.5
PROVISIONS 600 LB EXTERNAL PERSONNEL HOIST	34.1	15.5
PROVISIONS CARGO HOOK RH	2.3	1.0
PROVISIONS ULTRA 7000 SYSTEM MOUNT AND DISPLAYS	3.5	1.6
RAPPELLING KIT - 4 RINGS	25.0	11.3

OPTIONAL EQUIPMENT

Exterior Lights	lb	kg
LUMINATOR DUAL MODE, RETRACTABLE SEARCH LIGHT	6.3	2.9
RETRACTABLE LAND LIGHT, GRIMES W/IR FILTER	9.0	4.1
RETRACTABLE LANDING LIGHT, GRIMES	8.0	3.6
SX-16 SEARCHLIGHT, SIDE MOUNT	65.0	29.5
SX-5 SEARCHLIGHT, FORWARD, BELLY, LEFT SIDE	31.3	14.2
SX-5 SEARCHLIGHT, SIDE MOUNT	31.3	14.2

Fuel System	lb	kg
28 GAL (106 L) FARGO AUX FUEL TANK, BAGGAGE AREA	70.2	31.8
31 GAL (117 L) UNDERFLOOR, BAGGAGE AREA FUEL TANK	42.2	19.1
53 GAL (200 L) FARGO AUX FUEL TANK	95.2	43.2
55 GAL (208 L) FARGO AUX FUEL TANK, BAGGAGE AREA	95.2	43.2

Gear/Handling	lb	kg
EMERGENCY FLOATS, SKID GEAR	154.8	70.2
ENHANCED SECONDARY MOORING TIE-DOWNS	7.0	3.2
GROUND HANLDING WHEELS WITH HYDRAULIC PUMP	0.0	0.0
TOW BAR W/SWIVAL WHEELS	0.0	0.0

Interior Trim/Lights/Seats	lb	kg
BUSINESS SEATS, FISCHER, 4 CABIN	41.3	18.7
BUSINESS SEATS, FISCHER, 6 CABIN	91.7	41.6
INTERIOR, BUSINESS CABIN IN BEIGE	50.0	22.7
INTERIOR-COMMERCIAL IN BEIGE	50.0	22.7
LEATHER SEAT COVERS & SKIRTING, FISHER, 6 CABIN	10.0	4.5
NVG COMPATIBLE INTERIOR/EXTERIOR LIGHTING	7.0	3.2

Interior Accessories	lb	kg
AVIONICS REMOTE UNIT SHELF	12.0	5.4
COCKPIT UTILITY-MAP GOOSENECK LIGHT - NVG	3.1	1.4
COCKPIT UTILITY-MAP LUMINATOR LIGHT - NON-NVG	3.1	1.4
COCKPIT UTILITY-MAP LUMINATOR LIGHT - NVG	3.1	1.4
COPILOT INSTRUMENT - DUAL T PANEL	4.5	2.0
SINGLE PILOT CAT A IFR, 2 TUBE EFIS 40, L-PANEL	226.0	102.5
SINGLE PILOT CAT A IFR, 2 TUBE EFIS 40, T-PANEL	240.0	108.9

SINGLE PILOT CAT A IFR, 4 TUBE EFIS 40, T-PANEL	287.0	130.2
SINGLE PILOT CAT B IFR, 2 TUBE EFIS 40, L-PANEL	208.4	94.5
SINGLE PILOT CAT B IFR, 2 TUBE EFIS 40, T-PANEL	224.4	101.8
SINGLE PILOT CAT B IFR, 4 TUBE EFIS 40, T-PANEL	282.9	128.3
SMOKE DETECTOR, AFT BAGGAGE AREA	1.7	0.8
SOUND PROOFING KIT, JEC 7218-1	45.0	20.4

NAV Special	lb	kg
ARGUS 7000CE MOVING MAP DISPLAY	4.7	2.1
GARMIN 155 XL GPS	4.3	2.0
GARMIN 250 XL GPS/COMM	5.3	2.4
KLN-90B GLOBAL POSITIONING SYSTEM	9.1	4.1
KLX-135 DELETION	-3.5	-1.6
RYAN 9900-B TCAD SYSTEM	5.5	2.5
WEATHER RADAR, KING RDR 2000	27.3	12.4

Paint	lb	kg
HIGH VISABILITY MAIN ROTOR BLADE PAINT, 2 COLOR	3.5	1.6
PAINT 2 COLOR CUSTOM 2 EXPLORER	5.0	2.3
PAINT 3 COLOR BALBOA	5.0	2.3
PAINT 3 COLOR CUSTOM 3 EXPLORER	10.0	4.5
PAINT 3 COLOR MAGELLAN	5.0	2.3
PAINT 3 COLOR MARCO POLO	5.0	2.3
PAINT 4 COLOR BALBOA	10.0	4.5
PAINT 4 COLOR CUSTOM 4 EXPLORER	15.0	6.8
PAINT 4 COLOR MAGELLAN	10.0	4.5
PAINT 4 COLOR MARCO POLO	10.0	4.5
PAINT 5 COLOR CUSTOM 5 EXPLORER	20.0	9.1

OPTIONAL EQUIPMENT

Windows/Canopy	lb	kg
LEFT SIDE SLIDING CABIN WINDOW, AFT OPENING	2.3	1.0
LEFT SIDE SLIDING COCKPIT WINDOW	2.0	0.9
RIGHT SIDE SLIDING CABIN WINDOW, AFT OPENING	2.3	1.0
RIGHT SIDE SLIDING COCKPIT WINDOW	2.0	0.9
WINDSHIELD WIPERS/HARDCOAT CANOPY, CLEAR CANOPY	19.5	8.8
WINDSHIELD WIPERS/HARDCOAT CANOPY, TINTED CANOPY	19.5	8.8

5.0 **Performance Specifications (Imperial).**

		5,500 lb	6,000 lb	6,250 lb
Maximum Cruise Speed	KTAS Sea Level Standard	136 (157)	135 (155)	134 kt (154 mph)
	5,000 ft, ISA	139 (160)	136 (157)	135 kt (155 mph)
Maximum Permitted Speed	V_{ne} (KCAS) at Sea Level	140 (161)	140 (161)	140 kt (161 mph)
Maximum Range	Sea Level	262 (302)	259 (298)	257 nm (296 mi)
	5,000 ft, ISA	303 (349)	297 (342)	293 nm (337 mi)
Maximum Endurance	Sea Level	3.1	3.0	2.9 hr
	5,000 ft, ISA	3.4	3.3	3.2 hr
Maximum Rate-of-Climb	Sea Level Standard	2,760	2,420	2,270 ft/min
	ISA + 20 °C Day	2,740	2,390	2,230 ft/min
Maximum Operating Altitude	Density Altitude	20,000	20,000	20,000 ft
Service Ceiling	ISA @ 100 ft/min	20,000+	20,000+	18,600 ft
Hover In-Ground Effect (HIGE)	Standard Day	15,300	13,400	12,200 ft
	ISA + 20 °C Day	13,000	10,300	9,000 ft
Hover Out-of-Ground Effect (HOGE)	Standard Day	14,000	11,400	10,400 ft
	ISA + 20 °C	11,100	8,300	6,900 ft

Certification Limits:

Standard Weight	Normal Category	6,250 lb
	Maximum Internal	6,500 lb
	External Load	6,900 lb
Empty Weight	Standard Configuration	3,375 lb
	Industrial Configuration	3,226 lb
Useful Load	Normal Internal	2,875 lb
	Maximum Internal	3,125 lb
	External	3,525 lb
Cargo Hook Structural Rating		3,000 lb
Fuel Capacity		1078 lb (158.5 gal)

Powerplant: Two Pratt & Whitney Canada PW207E, rated at 477 kw (640 shp) each, derated for reliability and safety to: Take-off 410 kw (550 shp) Max Continuous Power 373 kw (500 shp)

MDEXPLORER

PERFORMANCE SPECIFICATIONS (METRIC)

Performance Specifications (Metric).

		2495 kg	2722 kg	2835 kg
Maximum Cruise Speed	KTAS Sea Level Standard	252	250	248 kph
	1524 m, ISA	258	252	250 kph
Maximum Permitted Speed	V_{ne} (KCAS) at Sea Level	259	259	259 kph
Maximum Range	Sea Level	485	480	476 km
	1524 m, ISA	561	550	543 km
Maximum Endurance	Sea Level	3.1	3.0	2.9 hr
	1524 m, ISA	3.4	3.3	3.2 hr
Maximum Rate-of-Climb	Sea Level Standard	14.0	12.3	11.5 m/s
	ISA + 20 °C Day	13.9	12.1	11.3 m/s
Maximum Operating Altitude	Density Altitude	6096	6096	6096 m
Service Ceiling	ISA @ 100 ft/min	6096+	6096+	5669 m
Hover In-Ground Effect (HIGE)	Standard Day	4663	4084	3719 m
	ISA + 20 °C Day	3962	3139	2743 m
Hover Out-of-Ground Effect (HOGE)	Standard Day	4267	3475	3170 m
	ISA + 20 °C	3383	2530	2103 m

Certification Limits:		
Standard Weight	Normal Category	2835 kg
	Maximum Internal	2948 kg
	External Load	3130 kg
Empty Weight	Standard Configuration	1531 kg
	Industrial Configuration	1463 kg
Useful Load	Internal	1304 kg
	Maximum Internal	1417 kg
	External	1599 kg
Cargo Hook Structural Rating		1361 kg
Fuel Capacity		489 kg (600 l)

Powerplant: Two Pratt & Whitney Canada PW207E, rated at 477 kw (640 shp) each, derated for reliability and safety to: Take-off 410 kw (550 shp) Max Continuous Power 373 kw (500 shp)

5.1 **Gross Weight Worksheet.**

	Example	Mission #1	Mission #2
Empty Weight	3,375 lb (1531 kg)		
Pilot	170 lb (77 kg)		
Fuel	1,078 lb (489 kg)		
Payload	1,877 lb (851 kg)		
Take-off GW	6,500 lb (2948 kg)		

5.1.1 **Weight statement summary.**

Standard weight empty*	3,375 lb.	(1531 kg)
Crew (1 pilot)	170 lb.	(77 kg)
Operational weight empty	3,545 lb.	(1608 kg)
Maximum standard fuel	1,078 lb.	(489 kg)
Additional payload	1,877 lb.	(851 kg)

Maximum take-off weight,

internal payloads	6,500 lb.	(2948 kg)

*For baseline configuration, refer to paragraph 4.0 (Please note that many items sold by other manufacturers as "options" are standard in the MD Explorer® [MD 902]).

Maximum take-off weight,

external payloads**	6,900 lb.	(3130 kg)

** "Industrial configuration" empty weight for maximum external loads may be obtained by removing the following standard baseline items:

Copilot seat	19.2 lb.	(8.7 kg)
6 passenger seats @ 13.8 lb each	82.8 lb.	(37.6 kg)
Interior, utility cabin trim	36.3 lb.	(16.5 kg)
2 cabin doors @ 16.2 lb each	32.4 lb.	(14.7 kg)
2 passenger steps	10.6 lb.	(4.7 kg)

Baseline weight removed	181.3 lb.	(82.2 kg)
Net "industrial" empty weight	3,194 lb.	(1449 kg)

Notes:

1. All weight in excess of 6,500 pounds must be jettisonable.
2. Maximum weight permitted on the cargo hook is 3,000 lb (1361 kg)
3. The above example is for comparative purposes only. The aircraft owners are responsible for analyzing their own weight summaries.

5.2.1 AEO HIGE, Hover-In-Ground Effect, Standard Engine Inlet

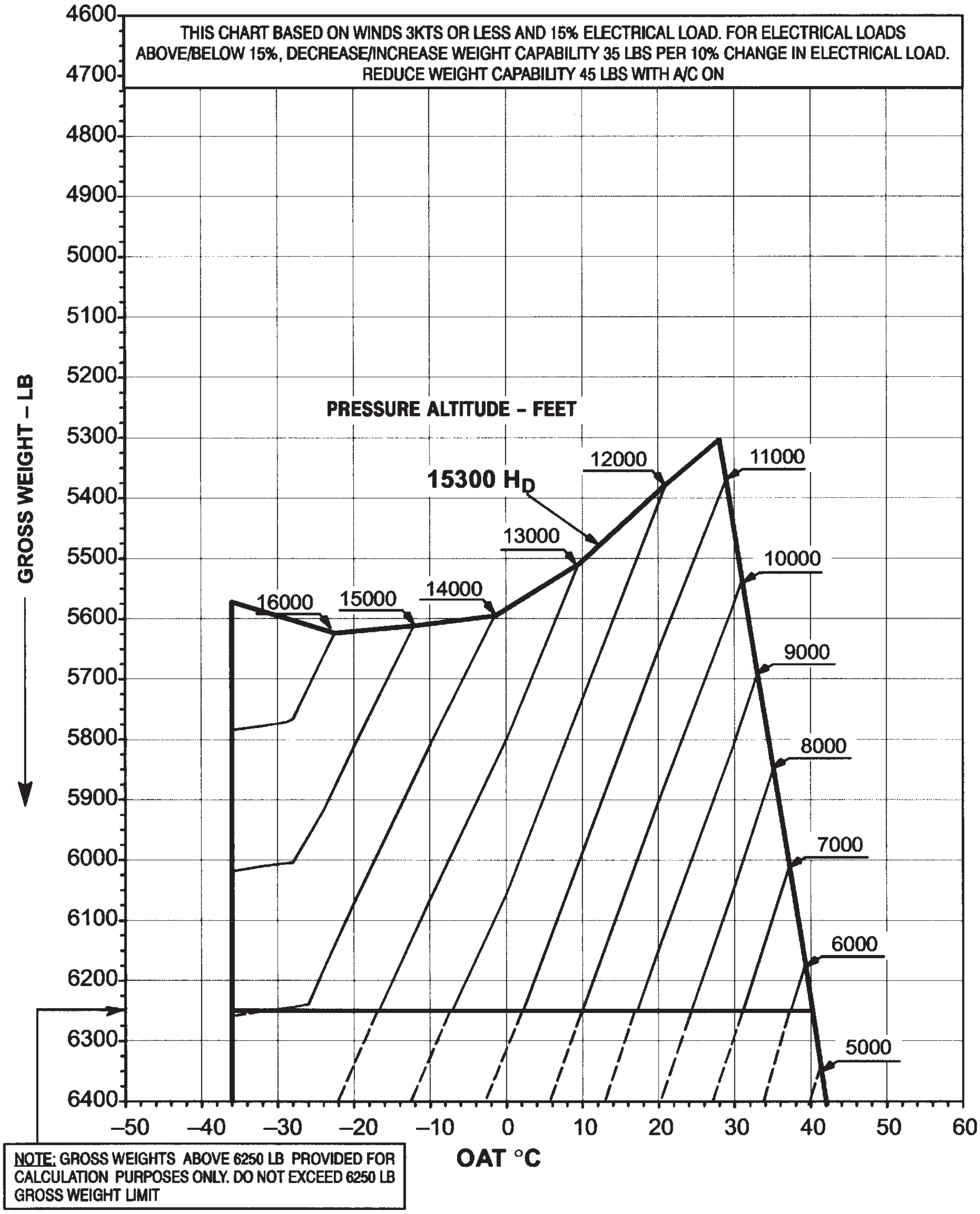

Figure 20. AEO HIGE, Standard Engine Inlet, Take-off Power, Cabin Heat Off

5.2.2 **AEO HOGE, Hover-Out-of-Ground Effect, Standard Engine Inlet**

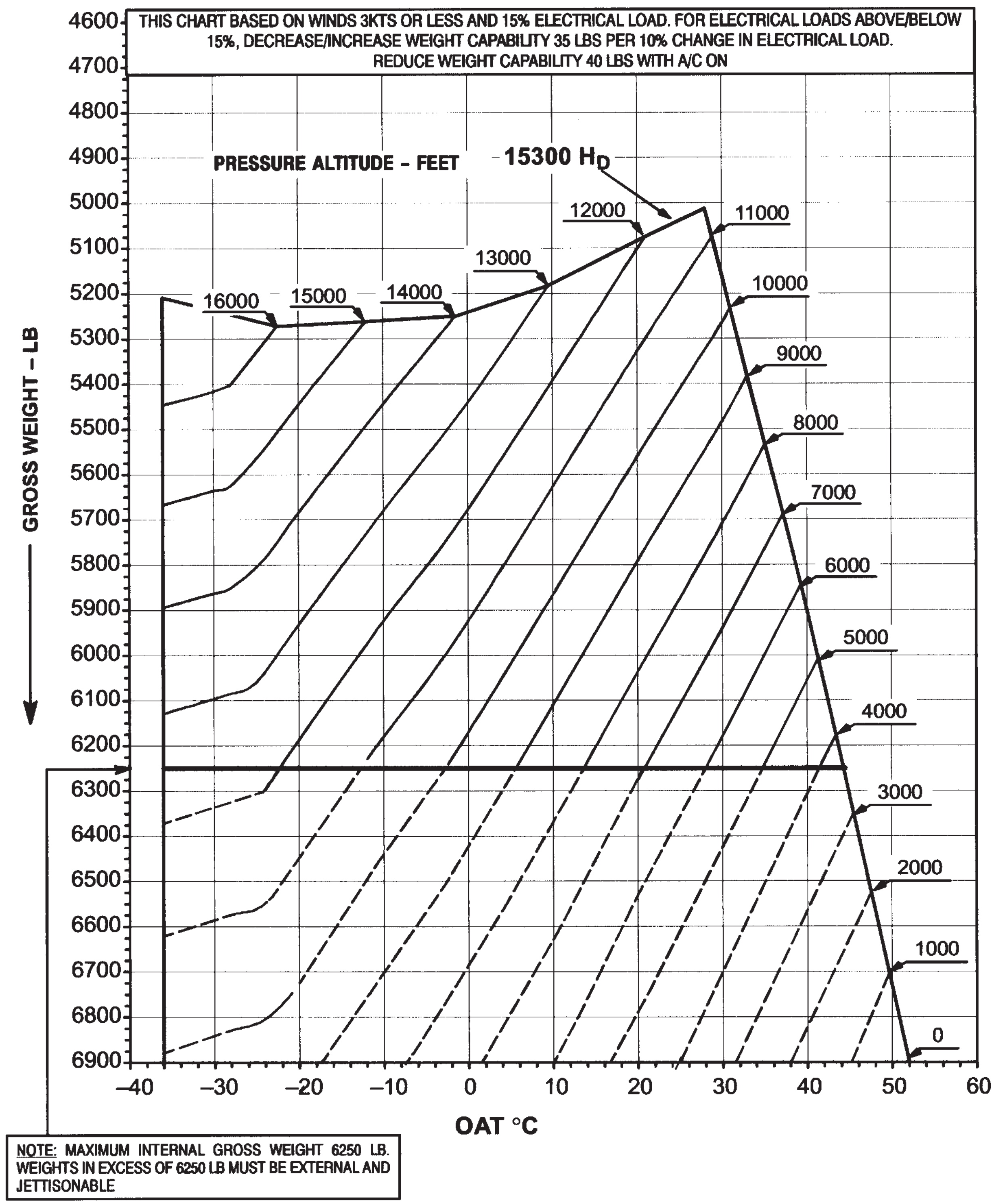

Figure 21. AEO HOGE, Standard Engine Inlet, Take-off Power, Cabin Heat Off

5.2.3 **AEO HIGE, Hover-In-Ground Effect, IPS Installed**

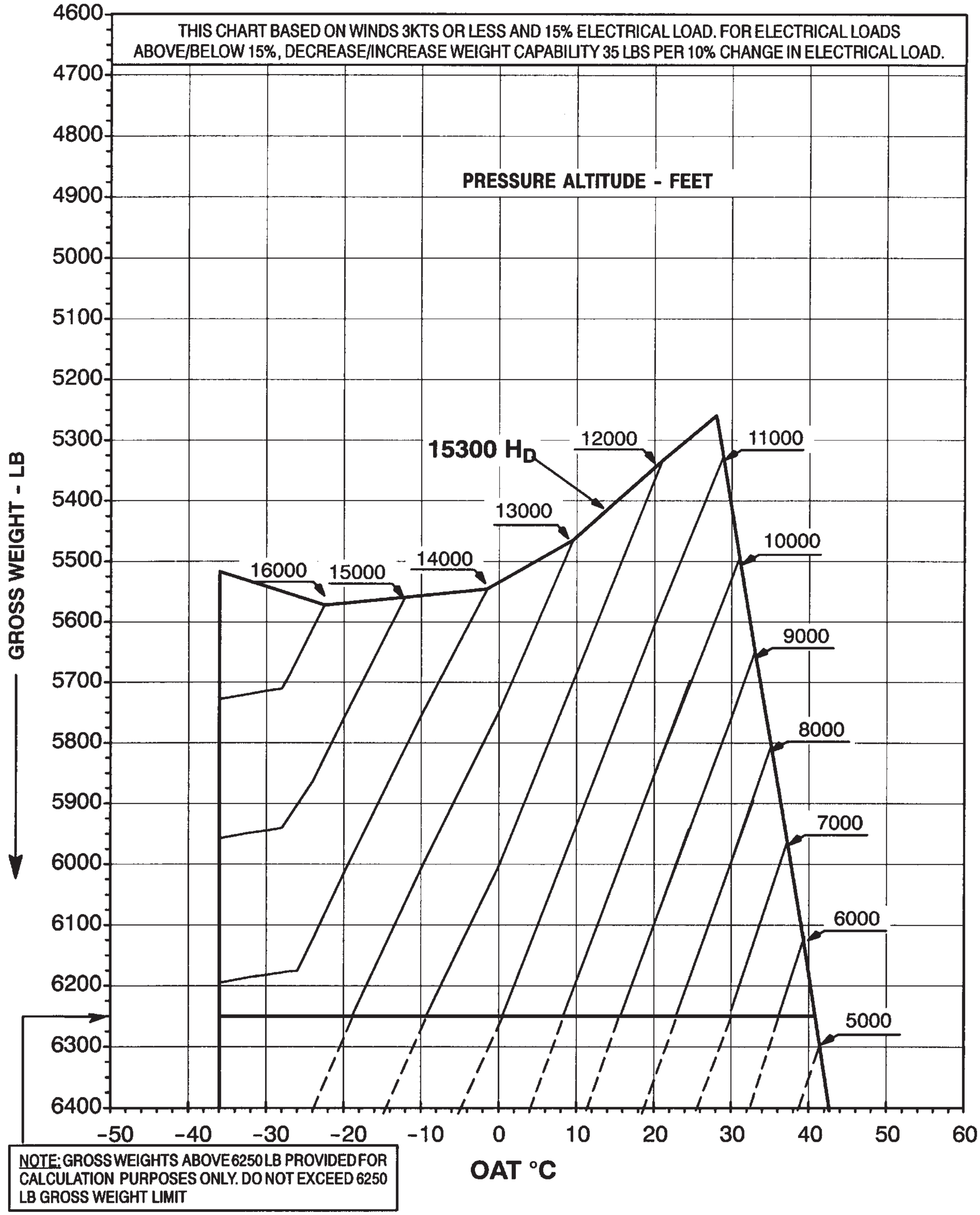

Figure 22. AEO HIGE, IPS Installed, Take-off Power, Cabin Heat Off

5.2.4 **AEO HOGE, Hover-Out-of-Ground Effect, IPS Installed**

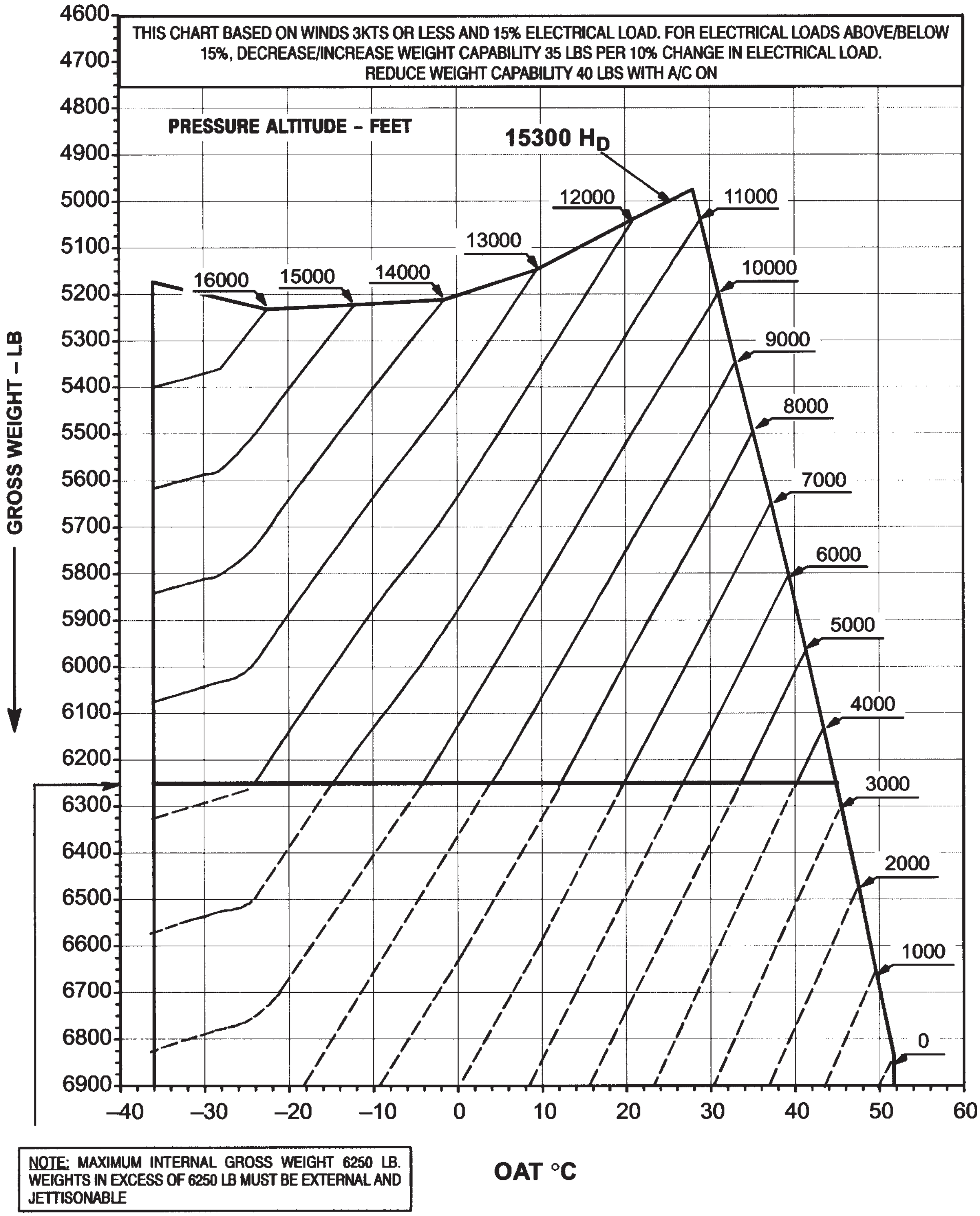

Figure 23. AEO HOGE, IPS Installed, Take-off Power, Cabin Heat Off

5.2.5 **OEI HOGE, Hover-Out-of-Ground Effect, Standard Engine Inlet**

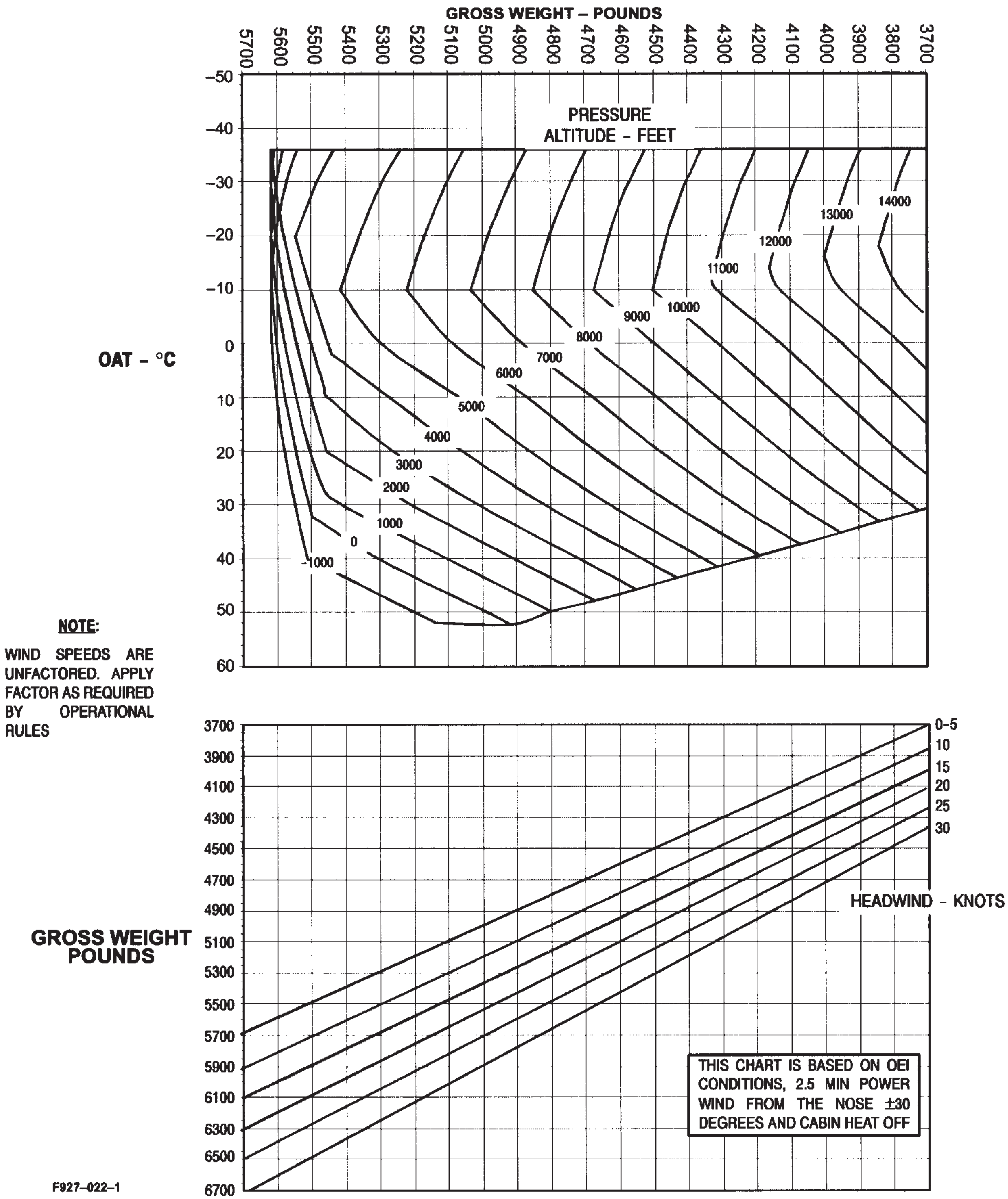

Figure 24. OEI HOGE, Standard Engine Inlet, 2.5 Minute OEI Power

5.2.6 OEI HOGE, Hover-Out-of-Ground Effect, IPS Installed

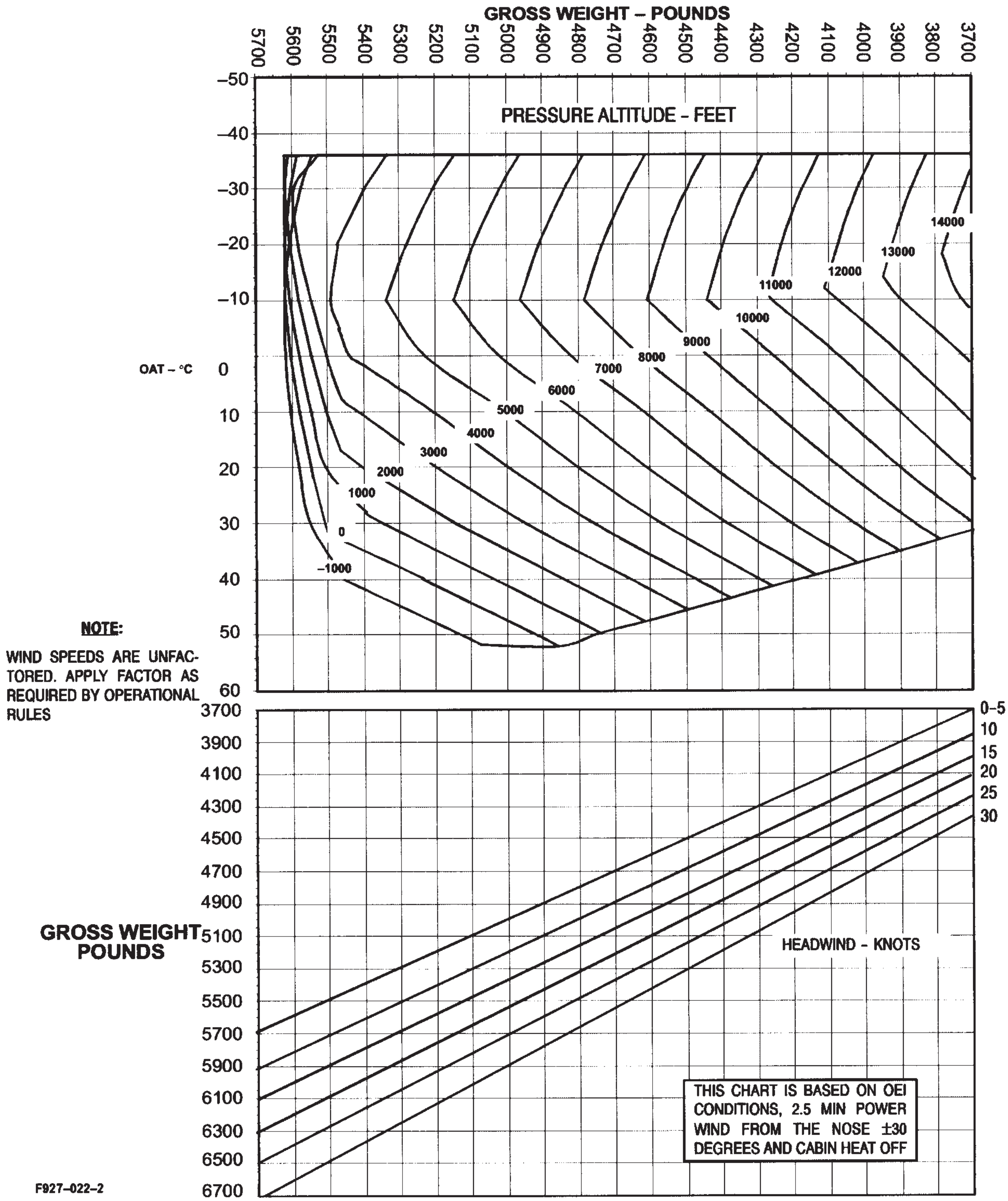

Figure 25. OEI HOGE, IPS Installed, 2.5 Minute OEI Power

5.3.1 **Speed for Best Range**

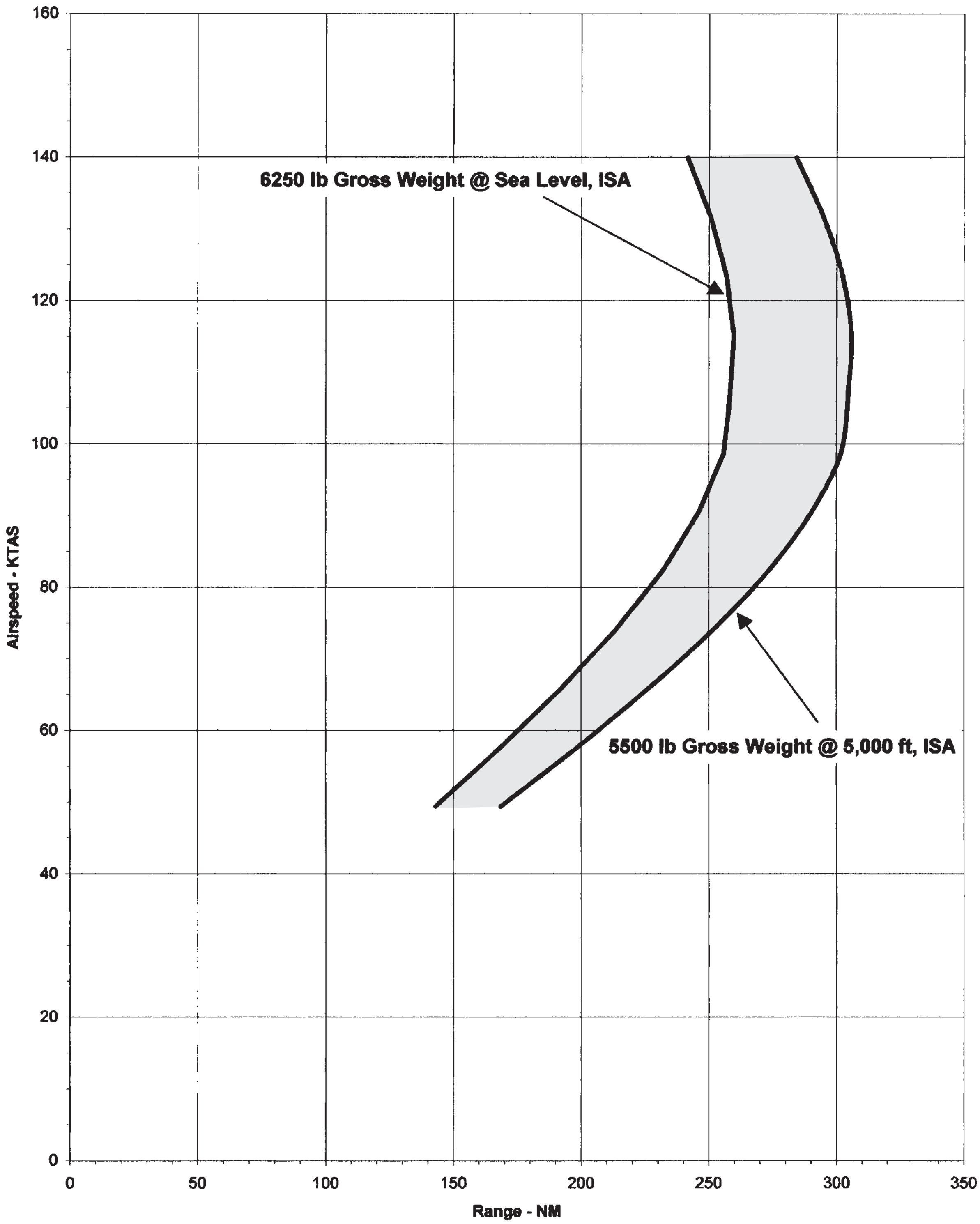

Figure 26, Speed for Best Range

5.3.2 **Speed for Best Endurance**

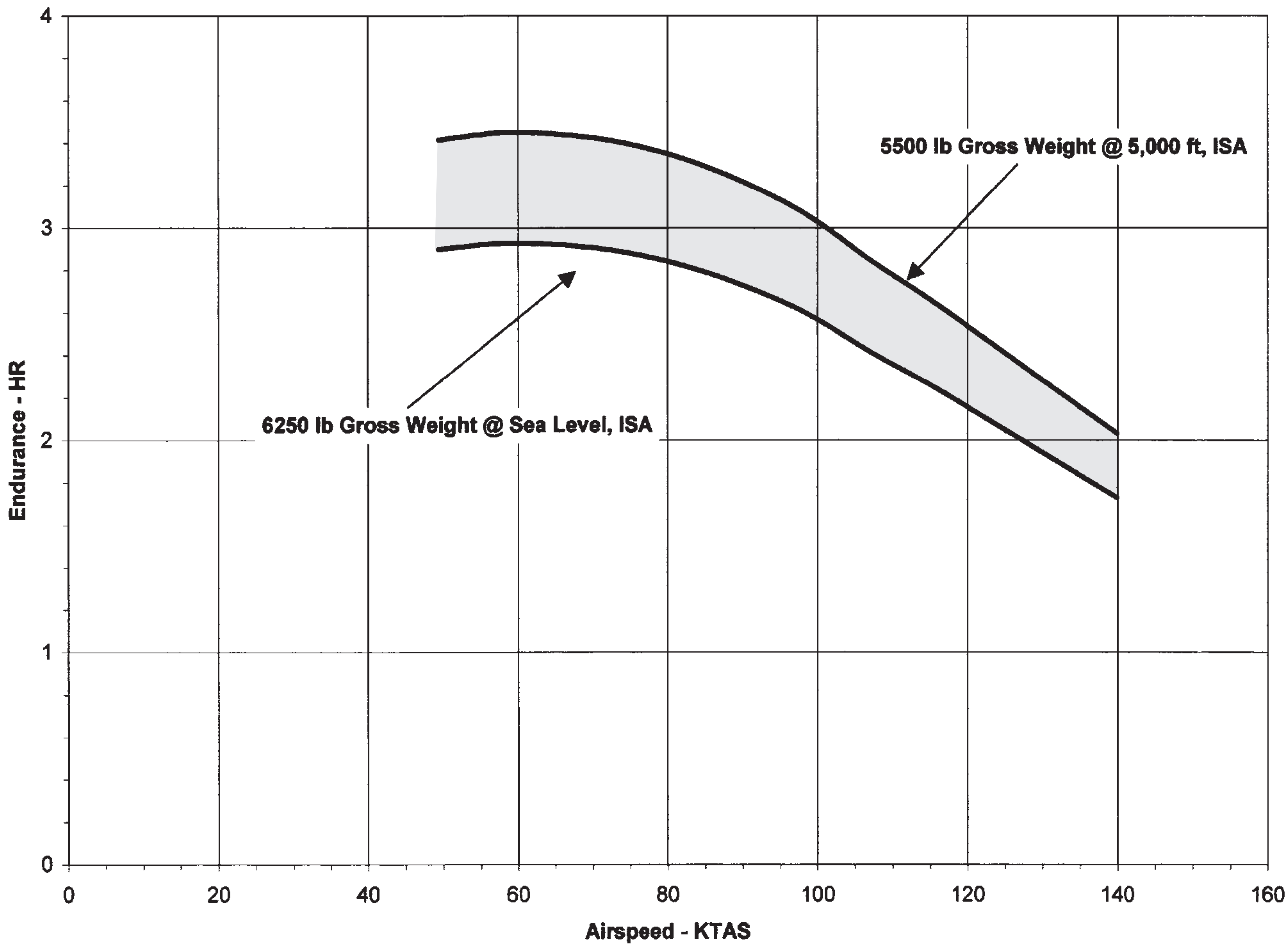

Figure 27, Speed for Best Endurance

5.3.3 **Fuel Flow, AEO, Sea Level, ISA (15°C)**

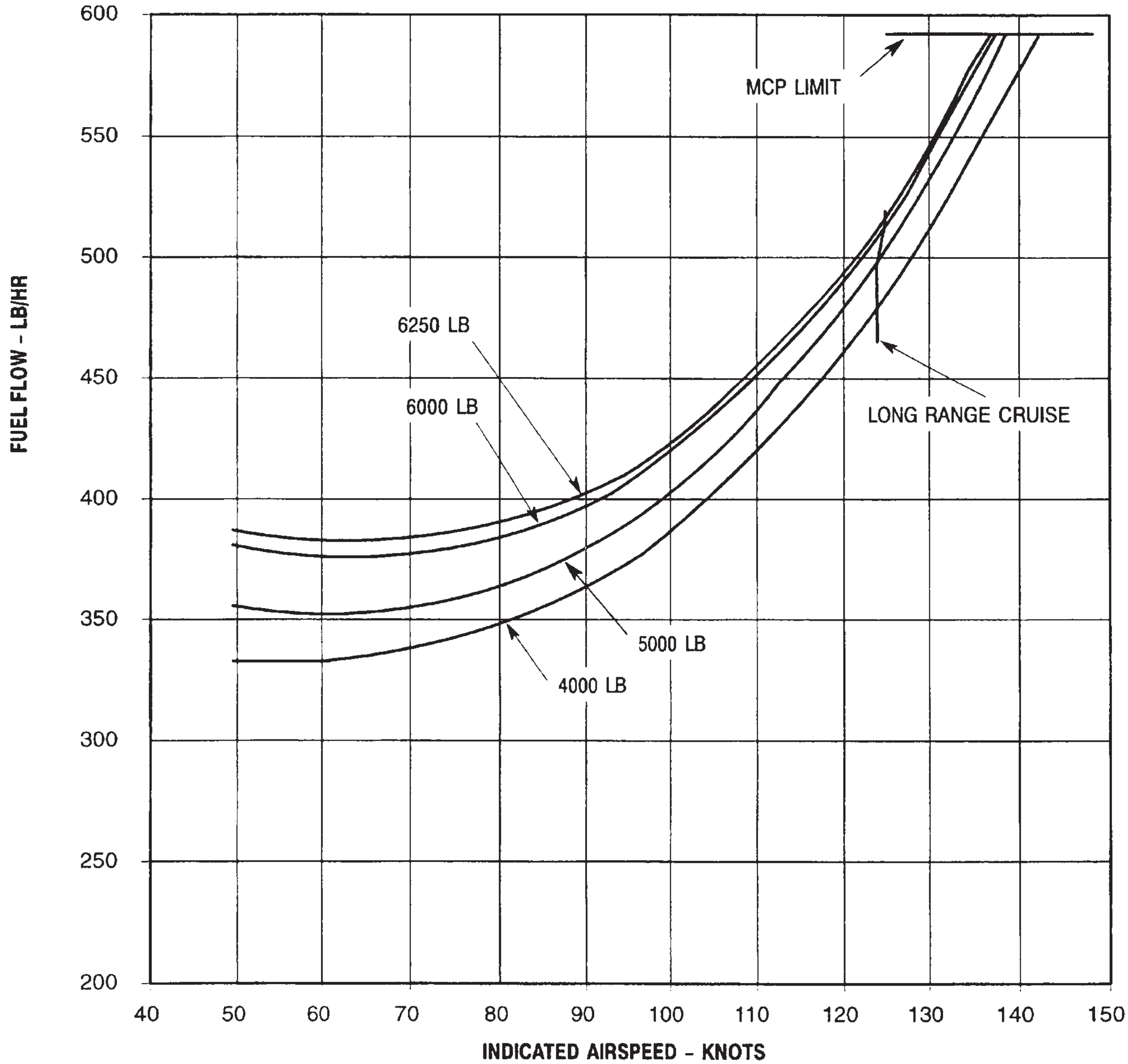

Figure 28. Fuel Flow, AEO, Sea Level, ISA (15°C)

5.3.4 **Fuel Flow, AEO, 4000 Feet H_P, ISA (7°C)**

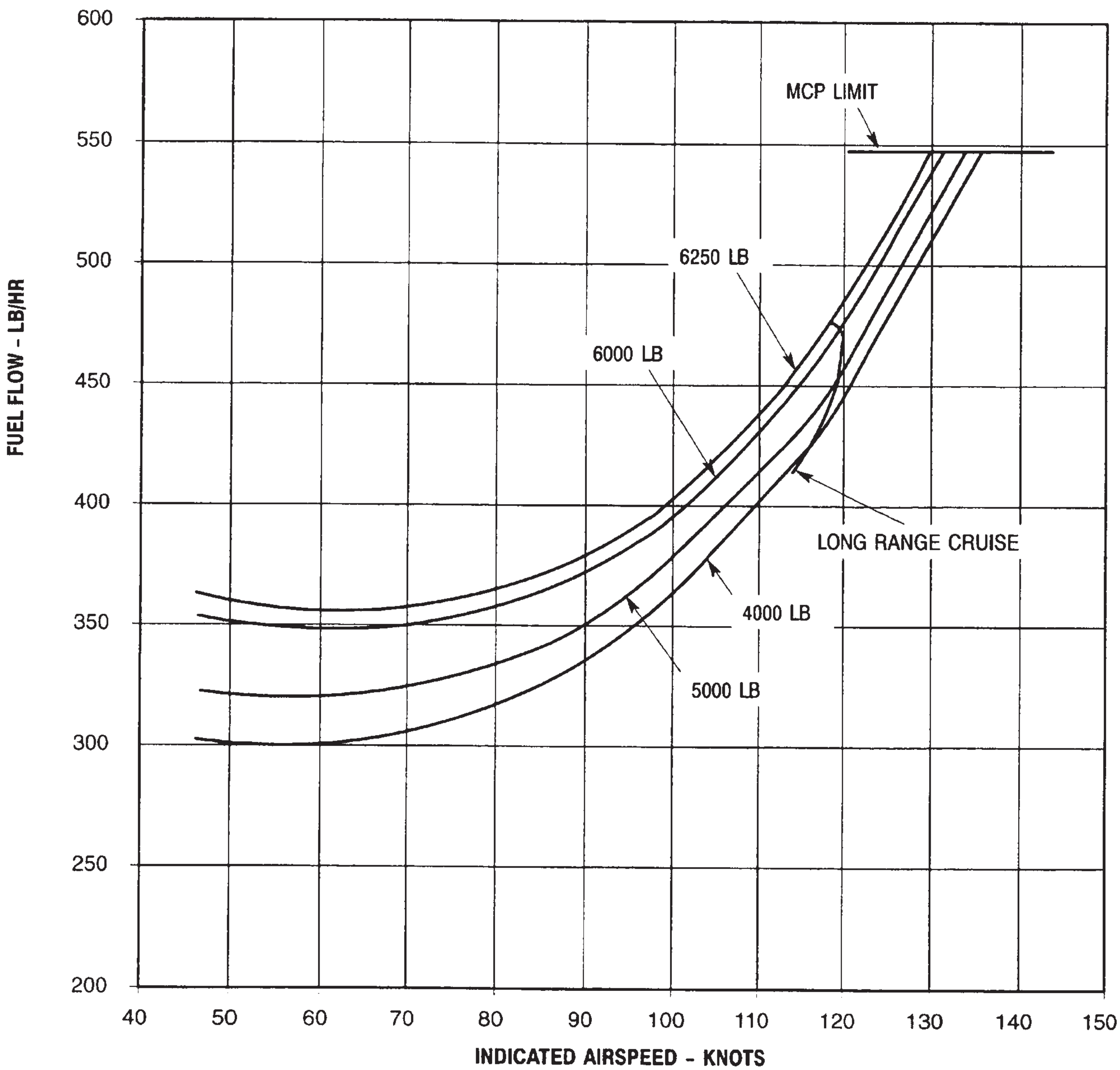

Figure 29. Fuel Flow, AEO, 4000 Feet H_P, ISA (7°C)

5.3.5 **Fuel Flow, AEO, Sea Level, ISA +20°C (35°C)**

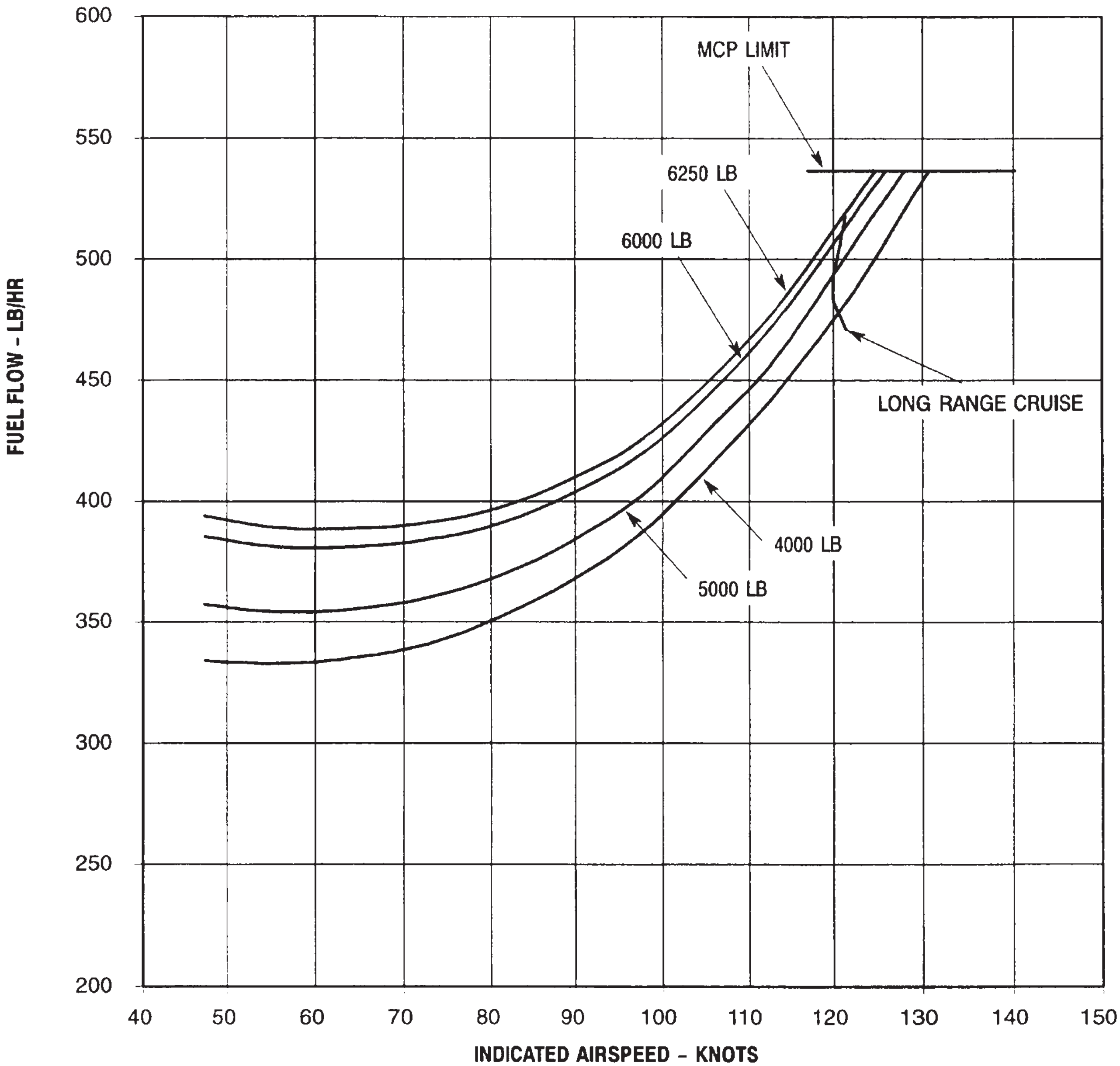

Figure 30. Fuel Flow, AEO, Sea Level, ISA +20°C (35°C)

5.3.6 **Fuel Flow, AEO, 4000 Feet H_P, ISA +20°C (27°C)**

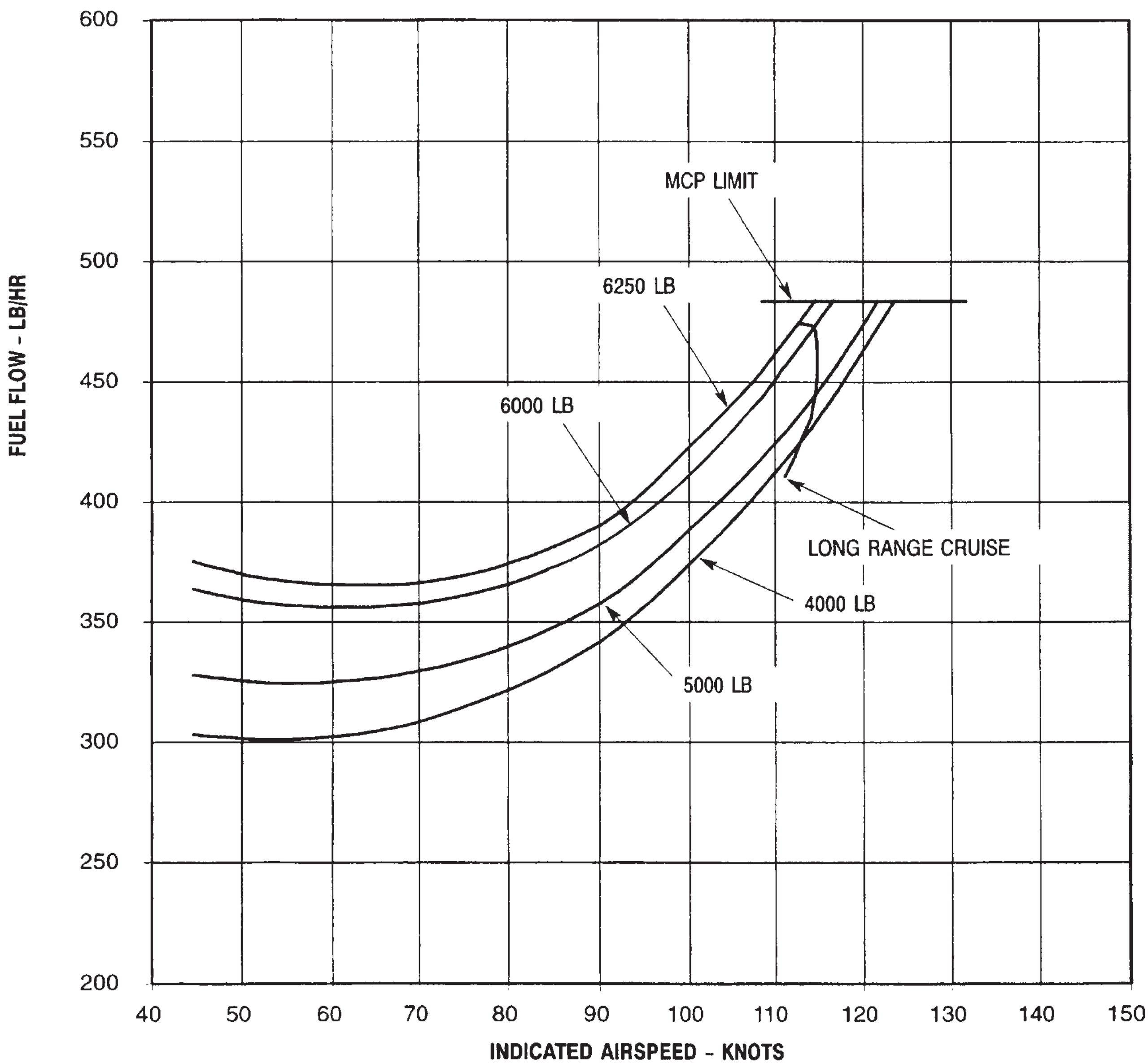

Figure 31. Fuel Flow, AEO, 4000 Feet H_P, ISA +20°C (27°C)

5.4 **Performance**

Key performance estimates of the MD Explorer are summarized in the following figures. Based on standard configuration.

5.4.1 **Payload – range.**

Gross weight - (empty weight) - (pilot weight) - (fuel weight) = payload.

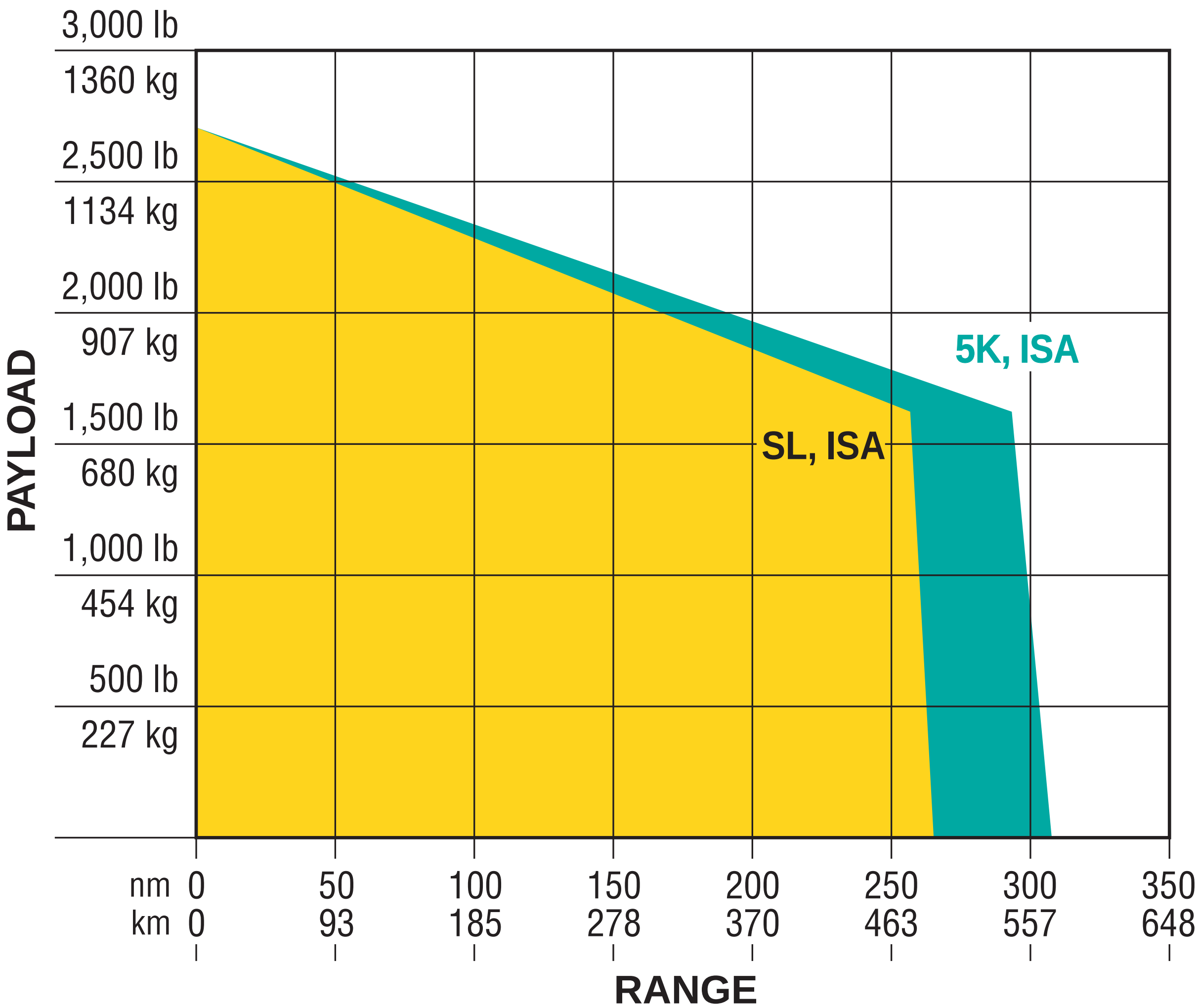

Figure 32. Payload - Range Capability

5.4.2 **Longitudinal center of gravity range.**

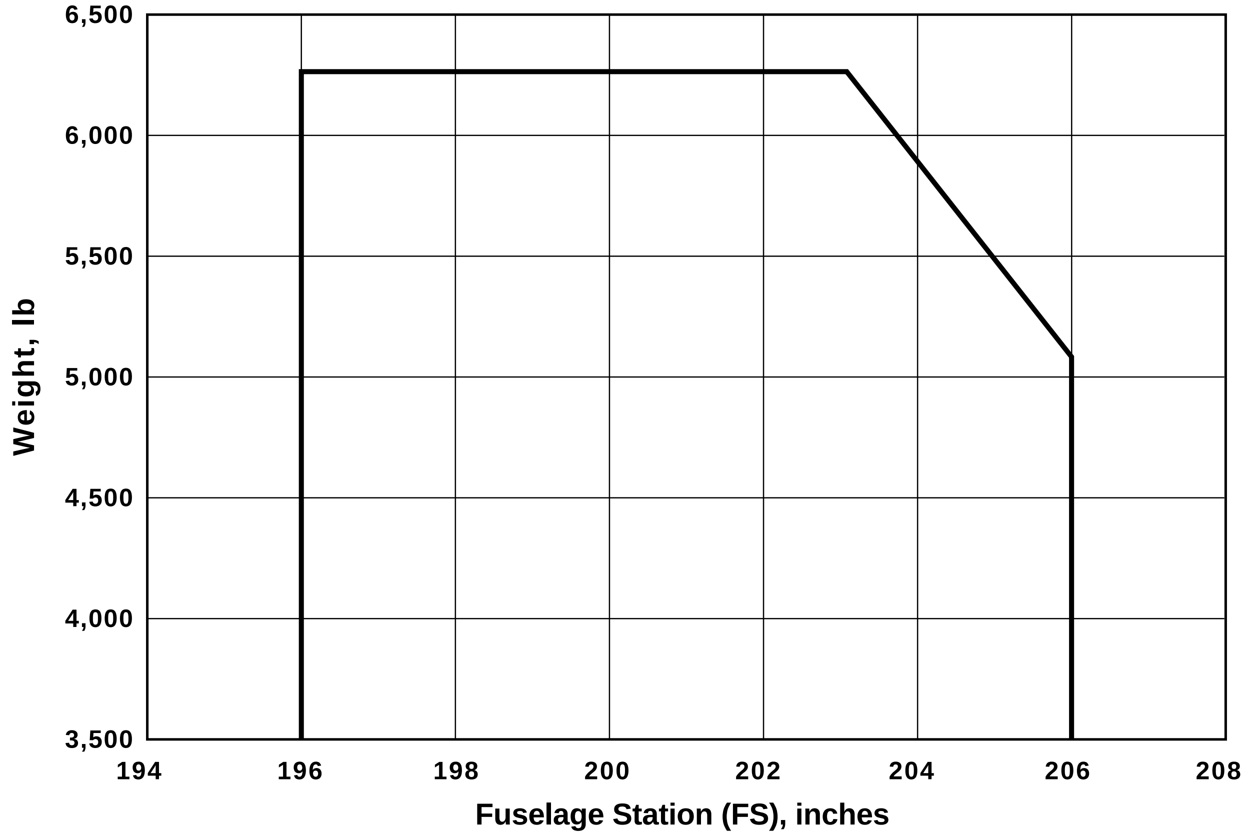

Figure 33. Longitudinal Center of Gravity Limits

5.4.3 **Height velocity diagram.**

There is no height-velocity diagram for operating the MD Explorer® between sea level and 7,000 feet density altitude for gross weights of 6,000 lb. or less. For weights above 6,000 pounds, refer to the Rotorcraft Flight Manual, figure 5-19.

5.5 **Miscellaneous.**

5.5.1 **Vibrations.**

Uniquely low vibration levels in all flight conditions are the result of a five-bladed flexbeam rotor system tuned to the fuselage and an elastomeric acoustic isolator mount between the transmission and support structure. In addition, independent control systems for the vertical stabilizers provide extremely smooth transitions to/from hover and forward flight.

5.5.2 **Temperature.**

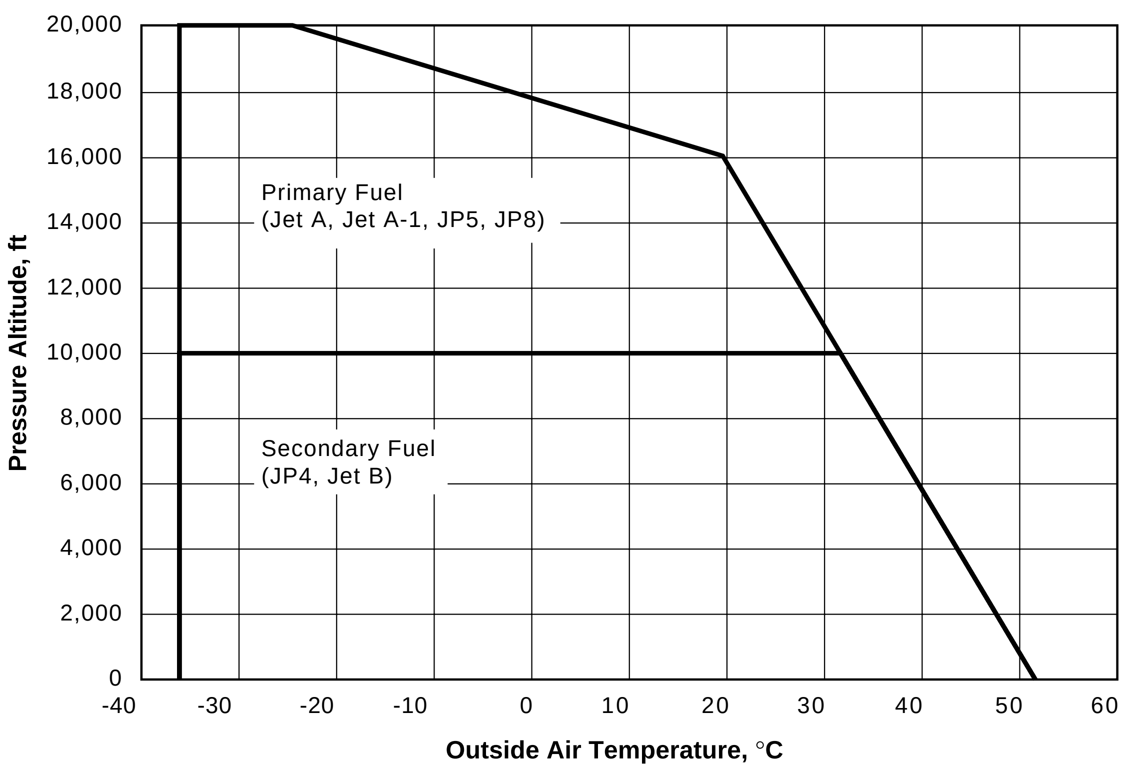

Figure 34. Ambient Temperature Envelope

5.5.3 **Noise.**

The FAR Part 36 Appendix H noise levels for the MD Explorer® clearly show that the MD Explorer® has the greatest compliance margin of any helicopter yet tested to both the ICAO and the FAA Stage II noise requirements.

Flight Regime	Measured Value	ICAO Requirement	Compliance Margin
Take-off	86.2 EPNdB	94.3	8.1
Level flyover	83.6 EPNdB	93.3	9.7
Approach/land	90.7 EPNdB	95.3	4.6
		Average =	7.5

By surpassing the stringent Appendix H requirement, the MD Explorer® maintains low sound levels in the aircraft's entire surrounding environment which are the result of flight conditions most noticeable to the public. Previous Appendix J requirement tests only measured limited spectrum sound levels only directly under the aircraft's flight path during the singular level flyover flight condition.

ESTIMATED DIRECT OPERATING COST

6.0 **Direct Operating Costs.**
Estimated Direct Operating Cost Per Hour
(Based upon year 2001 US $)

6.1 Fuel and Lubricants[1]:
Fuel @ $2.06* per gallon @ approx. 64 gallons per hour.............$131.584
Lubricants @ 3% of fuel...3.95
Total Fuel Cost ....**$ 135.79**

6.2 Airframe Maintenance and Spares[2]:
6.2.1 Maintenance labor costs:
Scheduled (.15 Manhours/Flight Hours) @ $58.00/Hour*...............$ 8.70
Unscheduled (.04 Manhours/Flight Hours) @ $58.00/Hour* 2.32
$ 11.02
6.2.2 Spares Cost:
Scheduled (Inspection) Parts: Used during periodic
inspection i.e. filters, seals, o-rings, etc. ....$ 5.64
On-Condition/Unscheduled Part 53.07
Reserves: Component Overhaul (TBO) 15.69
Reserves: Limited-Life Parts 64.32
Total Airframe Cost ....**$ 138.72**

6.3 Engine[3]:
6.3.1 Scheduled maintenance labor & parts $ 3.00
6.3.2 Reserve for engine overhaul, spares and accessories 109.80
Total Engine Cost ....**$ 112.80**

6.4 **Total Direct Operating Cost**[4] ....**$ 398.33**

* Fuel Cost and labor rate is based on Conklin & deBecker book, "The Aircraft Cost Evaluator" dated Spring 2000.

1 Average cost while operating under the following conditions:
Gross Weight: 10% less than maximum certified
Speed: Maximum Range Speed, 118 KIAS
Altitude: 1,000 feet on a standard day

2 Engine fleet maintenance costs provided by Pratt & Whitney and engines @ 1 cycle per hour.

3 Indirect costs such as insurance, hangar, salary, etc., are excluded.

Cost figures shown are extrapolated from a broad data base and are intended for example purposes only. Actual costs will vary, depending on local operating conditions, pricing and supplier practices. We encourage you to compare these figures with other manufacturers', using the same unit costs for fuel, labor, etc.

Figure 35. Estimated Direct Operating Cost Per Hour

TOTAL COST OF OPERATION WORKSHEET

6.5 **Direct Operating Costs Worksheet.**

Direct Operating Cost per Hour

- Fuel and Lubricants

Fuel @ $_______ per gallon @ approx._____ gallons per hour ....$ ________

Lubricants @ _____ % of fuel ....$ ________

Total Fuel Cost ....**$** ________ (A)

- Airframe Maintenance and Spares

Scheduled maintenance labor rate @ $_____ per hour

(Maintenance man-hour/flight hour=$_____) ....$ ________

Unscheduled maintenance labor rate @ $_____ per hour

(Maintenance man-hour/flight hour=$_____) ....$ ________

Scheduled (Inspection) Parts: ....$ ________

On-Condition/Unscheduled Part ....$ ________

Reserves: Component Overhaul (TBO) ....$ ________

Reserves: Limited-Life Parts ....$ ________

Total Airframe Cost ....**$** ________ (B)

- Engine

Scheduled maintenance labor rate @ $_____ per hour

(Maintenance man-hour/flight hour=$_____) ....$ ________

Unscheduled maintenance labor rate @ $_____ per hour

(Maintenance man-hour/flight hour=$_____) ....$ ________

Reserves for engine overhaul and spares ....$ ________

Total Engine Cost ....**$** ________ (C)

Total Direct Maintenance/Spares Cost (B+C)..$ ________

- **Total Direct Operating Cost** (A+B+C) ....**$** ________ (D)

Fixed Operating Cost

- Depreciation

Hull insurance ....$ ________

Liability insurance...$ ________

Pilot salary ....$ ________

Hangar rental ....$ ________

Total Annual Fixed Operating Cost ....**$** ________ (E)

Total Hours (_______) flown annually (F)

Total Fixed Operating Cost Per Hour (E÷F) ....**$** ________ (G)

Total Direct Operating Cost Per Hour (from above) ....**$** ________ (D)

- **Total Hourly Fixed Operating Cost** (D+G) ....**$** ________

7.0 DIMENSIONS.

7.1 Three-view drawing.

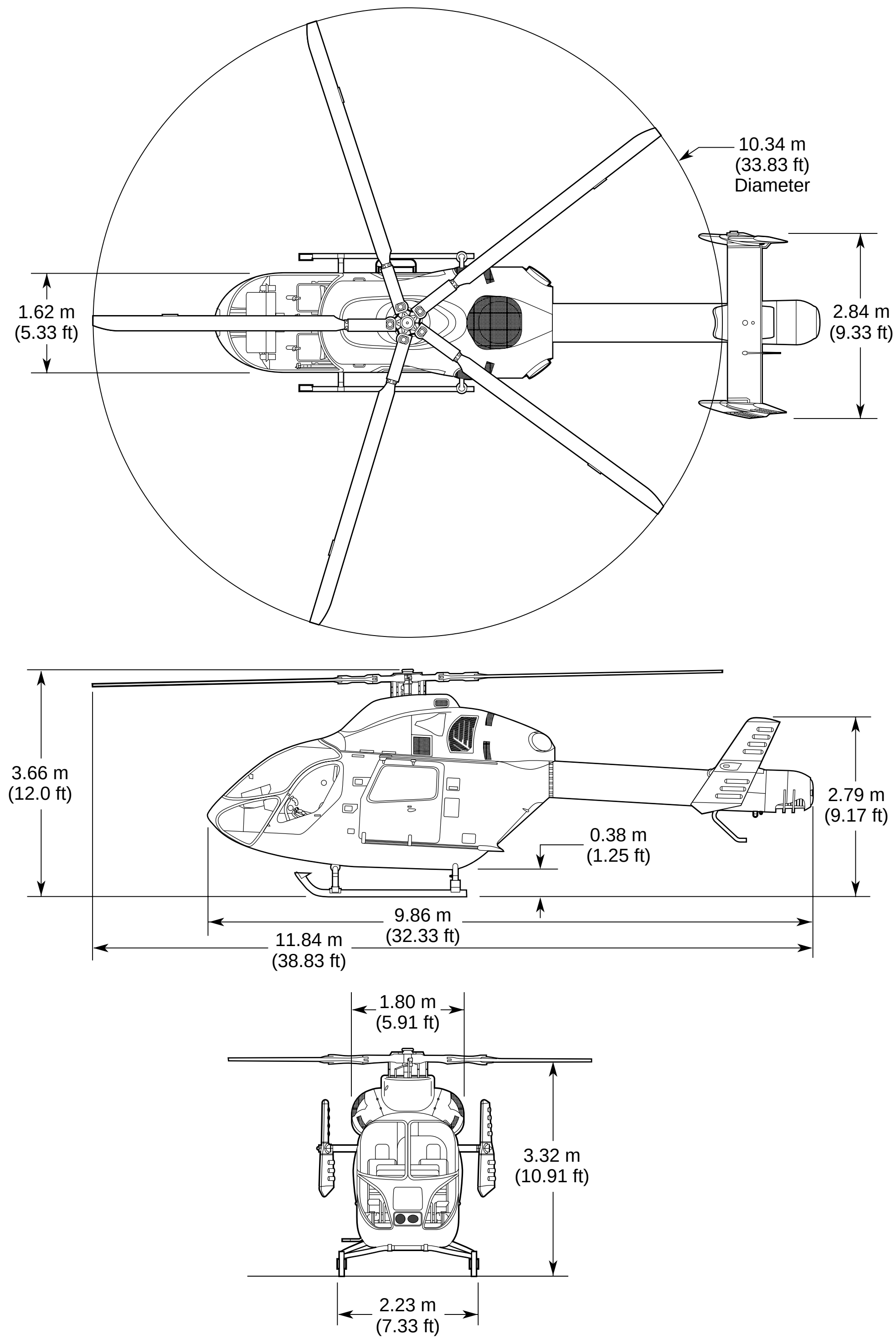

Figure 36. Three-View Drawing

7.2 **General Dimensions.**

Fuselage:		
Length	32.33 ft.	(9.86 m)
Width	5.33 ft.	(1.62 m)
Height	12.00 ft.	(3.66 m)
Ground clearance	1.25 ft.	(0.38 m)
Landing gear width	7.33 ft.	(2.23 m)
Crew compartment (approximate)	82.4 ft^3	(2.33 m^3)
Main cabin:		
Width	4.3 ft.	(1.45 m)
Length	6.3 ft.	(1.91 m)
Height	4.1 ft.	(1.24 m)
Useful floor area, cabin and baggage	41.0 ft^2	(3.81 m^2)
Volume:		
Cabin	124.0 ft^3	(3.51 m^3)
Baggage	48.7 ft^3	(1.38 m^3)
Total	172.7 ft^3	(4.89 m^3)
Overall dimensions:		
Rotor diameter	33.83 ft	(10.31 m)
Length, rotor turning	38.83 ft	(11.84 m)

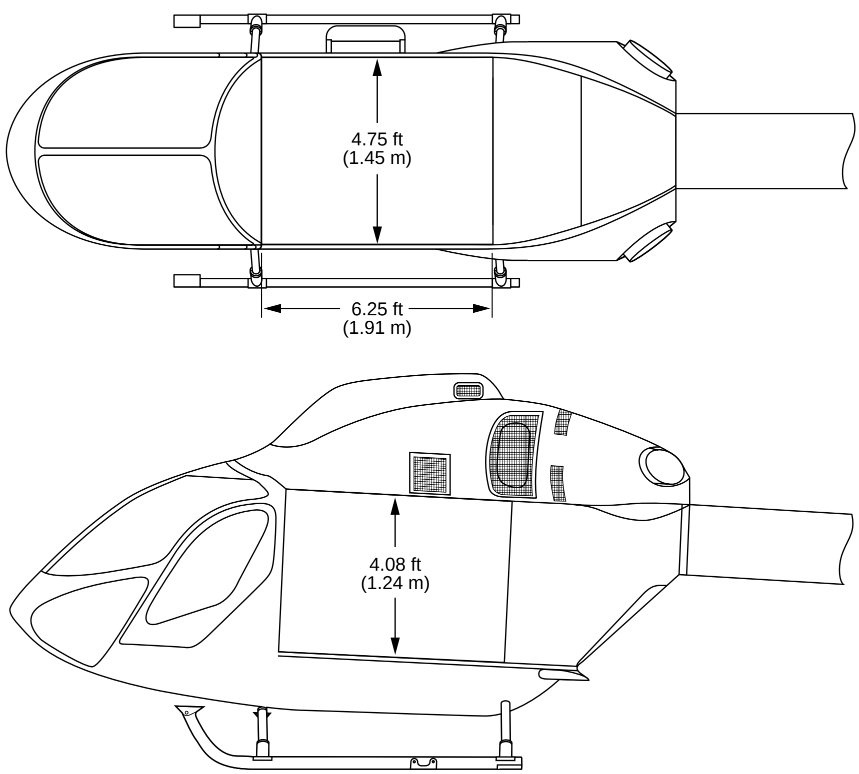

Figure 37. Main Cabin Dimensions

With the launch of the new helicopter company, MD Helicopters, Inc., announces its new Product Support Plan. Named *The MDHI Support Plan 2000*, it signifies MDHI's commitment to satisfy the operators of its products now and well into the next century.

8.0 **The MDHI Support Plan 2000**

MDHI is dedicated to a successful fielding of its new helicopters and to improve the support it currently offers operators of its commercial helicopters. The following items highlight how the MDHI helicopters will be the best-supported aircraft of its type anywhere in the world.

Operator Input

Input from many of our existing fleet operators has been actively solicited by our support team. We have created Customer Satisfaction Advisory Teams, composed of operators from all over the world who are chartered to work together with MDHI technical representatives to lower operating costs, and to improve our products and the way we support them. As a result of this improved level of two-way communication, many improvements suggested by our customers are being included in our production, publications, and maintenance procedures.

Training

MDHI offers pilot and maintenance training to our new customers at no extra charge. Customers will be trained at the MDHI Commercial Training Center by our staff of specially trained pilots and technical representatives. At the training center, we stress hands-on experience in both our flight and ground schools. The materials we use for our school are continually updated to reflect the latest product and maintenance developments by our technical staff. For each purchase of a new MD Explorer, 1 pilot transition course and 1 mechanic training course is included.

Initial Fielding

All new aircraft customers will be greeted at their facility by a Customer Support Technical Representative who is trained specifically on the operation and maintenance of MDHI helicopters. These Technical Representatives are backed up by a factory team of MDHI Product Support Engineers who can be called upon at any time to support specific technical issues or questions that may arise. The Technical Representatives will spend as much time with the customers as required to familiarize them with their new aircraft.

Regular Maintenance

Follow-up visits by our Customer Support Technical Representatives will be performed as required at the regularly scheduled maintenance periods. This provides the customer with the latest maintenance information, and provides the factory with feedback on the operation, reliability and maintainability of their new aircraft. In addition, we plan to offer all models maintenance and parts manuals on CD-ROM.

Direct Operating Costs

The operating costs of MDHI helicopters are planned to be clearly the lowest in their classes. The plan is to keep the parts costs down, maximize the reliability of the helicopter systems, and minimize maintenance hours. This is accomplished by “benchmarking” all of these areas against the existing fleet of MD 500® helicopters, already one of the most reliable turbine helicopter lines in the world. Every part, system and maintenance procedure has undergone scrutiny before being incorporated on new production aircraft.

Spare Parts

The MDHI recognizes the importance of timely deliveries of spare parts to our customers. A thorough review of spare parts utilization has been conducted with the intent to significantly improve turnaround time of AOG spares. Additionally, we will increase our activities in using customer advanced spares requirement notification to eliminate known spare part requirements. On-line spares ordering and statusing is in our near future. Additionally, we have established a MDHI Support Center in Europe, where a significant inventory of spare parts, exchange components and tools are maintained.

9.0 MD 900/902 TRAINING

The MDHI Commercial Training Center offers cost-effective factory designed training courses for MD900/902 pilots and maintenance crews. This training, given by senior instructors with extensive experience in our products, provides our customers/students with the detailed knowledge of our products that will increase safety, reduce insurance costs and result in more efficient operation of the aircraft. Training is customarily conducted at our facility in Mesa, but offsite training at the customer's facility can also be arranged. We can also arrange for pilot training in the customer's aircraft, as long as MDHI's insurance requirements are met before training begins.

Pilot Training

The transition flight training course is designed to familiarize a rated helicopter pilot with the operation of the MD900/902. This five-day course introduces the student to all the associated company publications as well as detailed explanations of all aircraft systems and daily/preflight procedures. The ground school, including the exam and exam review, requires 16 to 20 hours to complete. The student will be expected to pass an exam demonstrating basic knowledge of the aircraft. The flight training syllabus includes six hours of instructor time and is broken down into four flight lessons:

- Normal Operations
- Advanced Operations (maximum gross weight flight)
- Maintenance and Systems Operations
- Emergency/Malfunction Procedures

Recurrent pilot training consists of a two-day refresher course for any pilot who has previously attended the transition flight training course. Ground school includes a closed-book exam, review of AD's and notices, and a daily/preflight inspection review. A BFR (biennial flight review) can also be given in conjunction with this course at the customer's request and includes review of FAR Part 91 and an open book exam. Flight training consists of three hours of intensive emergency procedures review.

Maintenance Training

The Airframe Maintenance Course is designed to familiarize a licensed A & P mechanic with the maintenance and inspection of all major systems on the aircraft. This 2-week course will require the student to learn and demonstrate the skill and knowledge required to safely perform selected maintenance tasks on the MD900/902. The 80-hour syllabus is comprised of the following sections:

- Airframe
- Anti-torque system
- Flight control system
- Environmental control systems
- IIDS
- Powertrain
- Rotor system
- Hydraulics
- Electrical

MD HELICOPTERS, INC. ~ phone 1-480-346-6300 ~ fax 1-480-346-6339 ~ helicoptersales@mdhelicopters.com ~ **www.mdhelicopters.com**