



TECHNICAL DESCRIPTION



MD 902 EXPLORER

MD Helicopters, Inc.
Sales and Marketing
4555 E. McDowell Rd.
Mesa, AZ 85215
PH: 480.346.6474
FAX: 480.346.6339
www.mdhelicopters.com
sales@mdhelicopters.com

MISSION PROVEN, CHALLENGE READY

THIS PAGE INTENTIONALLY LEFT BLANK

TECHNICAL DESCRIPTION

MD 902 EXPLORER

MD Helicopters, Inc.
4555 E. McDowell Rd
Mesa, Arizona
CAGE: 1K VX4
DUNS: 054313767
www.mdhelicopters.com

This Technical Description includes information and intellectual property that is the property of MD Helicopters, Inc. (MDHI). It provides general information for evaluation of the design, equipment, and performance of the MD 902 helicopter. The information presented in this Technical Description does not constitute an offer and is subject to change without notice. This proprietary information, in its entirety, shall not be duplicated, used, or disclosed—directly or indirectly, in whole or in part—for any purpose other than for evaluation. MD Helicopters, Inc. reserves the right to revise this Technical Description at any time



REPORT NO.: MD14021407-902TD
NO. OF PAGES: 74

Use or disclosure of data in this Technical Description is subject to the restriction on the cover page of this document.

ATTACHMENTS: None

Revision	By	Approved	Date	Pages and/or Paragraphs Affected
New	RCP		14-Feb-14	All (Initial Issue)



Contents

- 1. FOREWORD 1**
- 2. KEY ADVANTAGES / FEATURES 3**
- 3. CERTIFICATION 9**
 - 3.1 CATEGORY A OPERATION..... 9
 - 3.2 CERTIFICATES..... 10
 - 3.3 DESIGNATION..... 10
 - 3.4 OPERATORS 10
- 4. DIMENSIONS, WEIGHT, AND CONFIGURATION..... 11**
 - 4.1 EXTERNAL DIMENSIONS..... 11
 - 4.2 INTERIOR DIMENSIONS 11
 - 4.3 WEIGHT 13
 - 4.4 CONFIGURATIONS 13
- 5. MD 902 TWIN-ENGINE HELICOPTER 15**
 - 5.1 SYSTEM DESCRIPTION 15
 - 5.2 STANDARD VISUAL FLIGHT RULE EQUIPMENT CONFIGURATION..... 17
 - 5.3 INSTRUMENT FLIGHT RULE REQUIRED EQUIPMENT..... 19
 - 5.4 OPTIONAL EQUIPMENT CONFIGURATION 20
 - 5.5 MAIN FUSELAGE ASSEMBLY 22
 - 5.6 EXTERIOR 23
 - 5.7 EXTERNAL LIGHTING 23
 - 5.8 INTERIOR 24
 - 5.8.1 Cockpit 24
 - 5.8.2 Cabin Compartment 25
 - 5.8.3 Baggage Compartment..... 27
 - 5.9 SYSTEMS 28
 - 5.9.1 Fuel System 28
 - 5.9.2 Turboshaft Engine 29
 - 5.9.3 Drive System 31
 - 5.9.4 Main Rotor..... 33
 - 5.9.5 Flight Control System..... 35
 - 5.9.6 Hydraulic System 36
 - 5.9.7 Fire Detection/Suppression System..... 37



5.9.8	Electrical System.....	39
5.9.9	Environmental Control System.....	41
5.9.10	Integrated Instrumentation Display System	41
5.9.11	Next-Generation Digital Electronic Flight Instrument System.....	44
6.	PERFORMANCE SPECIFICATIONS	47
6.1	ENVIRONMENTAL IMPACT.....	48
6.2	SAFETY.....	51
6.2.1	Crashworthiness.....	53
6.3	HUMAN SYSTEMS INTERFACE	53
7.	MAINTENANCE AND SERVICING.....	57
7.1	MAINTENANCE	57
7.2	SERVICING.....	60
7.3	HOURLY COST	64
8.	PRODUCT SUPPORT	65
8.1	TRAINING.....	65
8.1.1	Pilot Training	65
8.1.2	Transition Flight Training.....	65
8.1.3	Recurrent Flight Training.....	65
8.1.4	Maintenance Training.....	66
8.2	WARRANTY.....	66
8.2.1	Warranty Claims.....	66
8.3	SERVICE CENTERS.....	67
8.4	FIELD SERVICE.....	67



1. FOREWORD

This document presents basic technical description of the eight-place MD 902 Explorer helicopter built in Mesa, Arizona, USA. It is designed to provide high-level technical information of the helicopter, advantages/features, and configurations. For more detailed information an MD 902 Product Specification is available by contacting one of the Sales Team Members listed below.

Ideally suited for multi-mission capabilities ranging from VVIP/passenger transport, emergency medical services, to utility missions, the MD 902 has a large cabin with sliding cabin doors on each side, integrated safety features, reduced noise signature, and no tail rotor (NOTAR[®]). The MD 902 is certified for single-pilot operation under visual flight rules/visual meteorological conditions, and capable of operation under instrument flight rules. Powered by two dual-redundant Pratt and Whitney-Canada Model 207E turboshaft engines, the MD 902 features a bearing-less, composite, fully-articulated main rotor system, and NOTAR[®] anti-torque system. The NOTAR[®] system significantly improves safety and provides a major reduction in noise profile. The MD 902 is Federal Aviation Administration (FAA)/Joint Aviation Administration (JAA) certified with full Category A design standards to JAR-OPS 3 performance Class I, and is approved for use in over 50 worldwide countries.

MD Helicopter, Inc. Sales and Business Development

SALES

Phone: 480.346.6474
FAX: 480.346.6339
E-Mail: sales@mdhelicopters.com

BUSINESS DEVELOPMENT

Marc Brodeur
Vice President, Military & Commercial Sales
Phone: (480) 346.6532
Cell: (480) 622.3118
E-Mail: marc.brodeur@mdhelicopters.com



THIS PAGE INTENTIONALLY LEFT BLANK



2. KEY ADVANTAGES / FEATURES

Using inputs from an international turbine-engine helicopter owners and operators advisory group, MD Helicopters designed and developed the MD 902 Explorer (see Fold-Out page) to be a new performance standard for a multi-purpose twin-engine helicopter. The MD 902 is a twin turbine engine, rotary-wing aircraft. It has a cruising speed of 131 knots (246 kph / 152 mph), with a useful internal load at 6,500 pound maximum gross weight is 3,125 pounds (1,417 kg). Hover out of ground effect is 8,780 feet (2,676 m) and hover in ground effect is 10,650 feet (3,246 m). The rate of climb at maximum gross weight is 2,120 feet/min (10.7 m/sec). The maximum operating altitude is 14,000 feet (4,267 m) with a -40 to +52C (-40 to 126F) operating temperature range.

THE MD 902 EXPLORER ADVANTAGES / FEATURES

<i>Airframe</i>	
<ul style="list-style-type: none"> • Simple system design • Mature, field-proven systems and components • Large cabin/cabin entrance <ul style="list-style-type: none"> ○ 41 cubic feet (3.8 cubic meters) useable floor space ○ 173 cubic feet (4.9 cubic meters) total cabin volume ○ 52 inch (1.32 meter) cabin entrance opening • Innovative, fully-articulated, hinge-less, composite, main rotor blades provide improved flight control/dynamics and unparalleled low-vibration levels • Speed, agility, and load-capable • Single-pilot instrument flight rule rated • Certified to 14 CFR Part 27; VFR • Certified to 14 CFR Part 27; Criteria for Category A • Certified to JAR Part 27; JAR-OPS 3 performance; Class 1 aircraft • Certified to 14 CFR Part 21; High-intensity radiated fields protection • Approved/certified in over 50 countries worldwide 	<ul style="list-style-type: none"> • Composite fuselage and tail boom provides strength, light weight, corrosion control, and includes high-intensity radiated frequency/lightning-strike protection capability • Separate baggage compartment <ul style="list-style-type: none"> ○ 52 cubic feet (1.47 cubic meters) total baggage compartment volume • Flexible cabin seating/layout options • Quick attach/detach capable cabin utility seats • Twin, full-authority digital-electronic-controlled (FADEC) turboshaft engines • External power receptacle • Energy-attenuating landing gear • Integrated landing gear dampers • Main rotor system removal independent from main rotor transmission • Main rotor transmission removal independent from main rotor system • Proven record of high dependability • High availability



THE MD 902 EXPLORER ADVANTAGES / FEATURES

Integrated Safety Features

- | | |
|---|--|
| <ul style="list-style-type: none">• No tail rotor (NOTAR[®]) anti-torque system eliminates the spinning tail rotor, tail rotor gearbox, and tail rotor drive shaft• Designed for operator ease• High-strength composite airframe with A-frame structure designed to absorb energy in an emergency landing by yielding progressively• Crew and passenger seats are energy-attenuating and meet Federal Aviation Regulation (FAR)/Joint Aviation Regulation (JAR) 27.562 emergency landing dynamic requirements; 30g vertical and 18.4 g forward deceleration protection• No use of magnesium• Component assembly designed to prevent galvanic corrosion• Cabin doors slide out of the way to eliminate personnel obstruction hazard• Cabin sliding doors incorporate emergency quick-egress windows• Main rotor static mast/base designed to be fail-safe to 100-percent design load• Dual-redundant hydraulic system• Single, crash-resistant elastomeric fuel cell mounted between crash-resistant keel beams and bulkheads below the cabin floor• Fuel lines incorporate self-sealing frangible valves to prevent leaking in hard-landing/crash events• Fuel cell vent system rollover valves automatically close when aircraft exceeds a 45-degree pitch or roll angle• Tail boom end-mounted tail skid• Dual redundant turboshaft engines allow for one engine inoperative operation | <ul style="list-style-type: none">• Turboshaft engine fuel metering unit enclosure for fuel-containment• Turboshaft engine fuel drain to prevent combustor fuel accumulation• Integral powerplant, fuel, hydraulic and electric system monitoring and display through the integrated electronic flight instrument system• Engine/main rotor transmission fire detection/suppression system• Main rotor transmission and NOTAR[®] fan drive shafts incorporate anti-flail devices if a flexible joint failure were to occur• Hydraulic system pumps incorporate integral spline shear couplings designed to fail before the splined drive shafts• Hydraulic system filter automatic bypass if filter becomes restricted• Fuel filter automatic bypass if filter becomes restricted• Hydraulic system pressure and temperature indication• Crew-seat five-point restraints• Passenger seats provided with three- or four-point restraints• Caution/warning annunciators/audible warning tones• Wire harnesses are electro-magnetic interference shielded• Power generating system electrical system and wiring are separated to prevent essential bus power interruption due to any single-point failure• Essential electrical bus designed to prevent any single-point failure• External ground-plug connection |
|---|--|



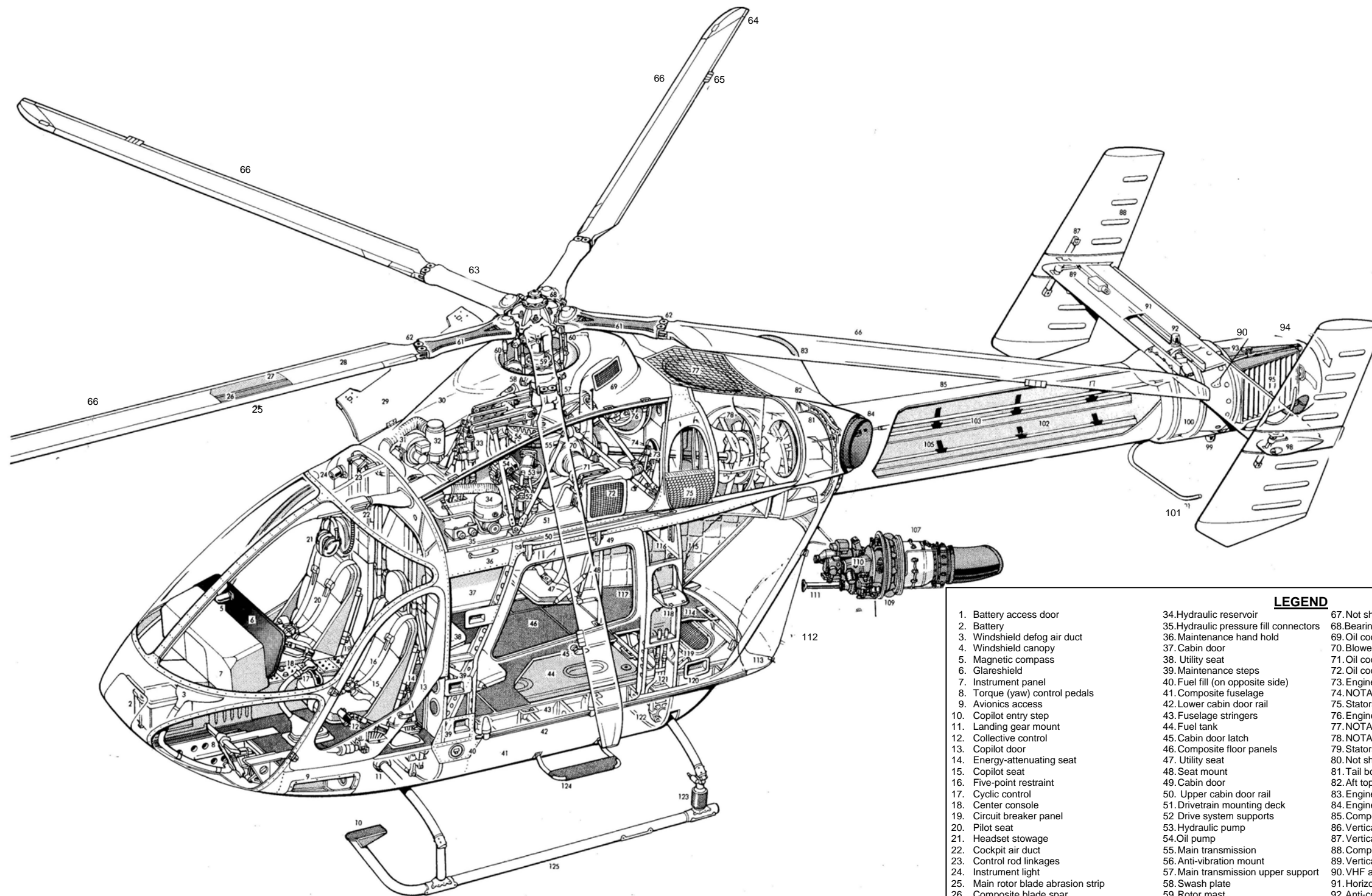
THE MD 902 EXPLORER ADVANTAGES / FEATURES

<i>Supportability Features</i>	
<ul style="list-style-type: none"> • Designed for ease of maintenance and supportability • Modular system design • Designed for reparability • Low direct operating costs • Maximum use of line replaceable units: <ul style="list-style-type: none"> ○ Engines ○ Avionics/communication ○ Flight controls ○ Main rotor blades ○ Main rotor drive shaft ○ Main rotor transmission ○ Main rotor transmission drive shaft ○ NOTAR[®] fan ○ Main rotor mast ○ Landing gear ○ Canopies ○ Doors ○ Door handles ○ Door windows ○ Seats ○ Seat restraints ○ Tail boom ○ Oil-cooler/blowers ○ Empennage ○ Tail boom skid • Built-in maintenance aids <ul style="list-style-type: none"> ○ Turboshaft engine composite access panels are hinged and captive ○ Footsteps and hand-holds located on each side for upper deck access without ground support equipment 	<ul style="list-style-type: none"> • Built-in Maintenance aids (Contd.): <ul style="list-style-type: none"> ○ Turboshaft engine hinged/captive composite access panels ○ Engine fuel and oil filter impending bypass indicators ○ Engine oil chip detector ○ Main rotor transmission chip detector/burner ○ Integrated engine compressor wash system ○ Engine oil filler cap/dipstick ○ Main rotor transmission filler cap ○ Engine, main rotor transmission, and hydraulic system oil level sight gage ○ Hydraulic system manual fill system ○ Integrated hydraulic system pressure fill system ○ Hydraulic system sampling valve ○ Hydraulic system external bleed valve ○ Hydraulic system pressure fill isolation valve ○ Built-in aircraft systems condition monitoring, exceedance, and engine trend analysis capability, downloadable by maintenance personnel ○ Main rotor and NOTAR[®] fan balance monitoring system ○ Landing gear ground handling wheel quick attach feature
<i>Human Systems Integration Features</i>	
<ul style="list-style-type: none"> • Unobstructed forward +160-degree vertical and 230-degree horizontal cockpit field of view • Adjustable anti-torque pedals to accommodate different sized 	<ul style="list-style-type: none"> • Flight controls designed for maximum movement with minimal crew input • Cabin access/observation from cockpit • Integrated cockpit and cabin entry steps • Integrated visual/audible warning



THE MD 902 EXPLORER ADVANTAGES / FEATURES

crewmembers <ul style="list-style-type: none"> • Cockpit designed to accommodate 25th to 95th percentile male/female flight crew • Ergonomic designed cyclic and collective controls 	indication for flight critical functions <ul style="list-style-type: none"> • Main rotor transmission acoustically isolated for cockpit/cabin noise reduction • Cabin sound proofing • Hydraulic-boosted flight controls
Engine	
<ul style="list-style-type: none"> • Dual redundant turboshaft engines allow for one engine inoperative operation • Engine hydro-mechanical backup in the event of FADEC failure • Externally accessible water wash system 	<ul style="list-style-type: none"> • Turboshaft engine fuel metering unit enclosure for fuel-/vapor-containment • Turboshaft engine fuel drain to prevent combustor fuel accumulation
Monitoring Instrumentation	
<ul style="list-style-type: none"> • Integrated instrument display system 	<ul style="list-style-type: none"> • Digital avionics suite in work
Environmental Impact	
<ul style="list-style-type: none"> • Certified to Part 36, Appendix H; Noise • Lowest noise profile of light twin-engine class helicopters 	<ul style="list-style-type: none"> • Closed-circuit fuel recirculation system to avoid fuel/vapor release



LEGEND			
1. Battery access door	34. Hydraulic reservoir	67. Not shown	100. Horizontal stabilizer mount
2. Battery	35. Hydraulic pressure fill connectors	68. Bearing-less rotor hub	101. Tail skid
3. Windshield defog air duct	36. Maintenance hand hold	69. Oil cooler exhaust	102. Low-pressure tail boom plenum
4. Windshield canopy	37. Cabin door	70. Blower	103. Coanda slots (2)
5. Magnetic compass	38. Utility seat	71. Oil cooler	104. Rotor down wash (not shown)
6. Glareshield	39. Maintenance steps	72. Oil cooler intake	105. Low pressure air split
7. Instrument panel	40. Fuel fill (on opposite side)	73. Engine mounts	106. Coanda lift force (not shown)
8. Torque (yaw) control pedals	41. Composite fuselage	74. NOTAR fan driveshaft	107. P&WC 207E turboshaft engine
9. Avionics access	42. Lower cabin door rail	75. Stators	108. Not shown
10. Copilot entry step	43. Fuselage stringers	76. Engine gearbox	109. Engine air intake
11. Landing gear mount	44. Fuel tank	77. NOTAR fan intake	110. Engine accessory gearbox
12. Collective control	45. Cabin door latch	78. NOTAR variable pitch fan	111. Power output shaft
13. Copilot door	46. Composite floor panels	79. Stators	112. Baggage compartment door
14. Energy-attenuating seat	47. Utility seat	80. Not shown	113. Fuselage strake
15. Copilot seat	48. Seat mount	81. Tail boom mount	114. Baggage compartment
16. Five-point restraint	49. Cabin door	82. Aft top fairing	115. Cabin lining and sound proofing
17. Cyclic control	50. Upper cabin door rail	83. Engine exhaust	116. Fuselage A-frame
18. Center console	51. Drivetrain mounting deck	84. Engine exhaust	117. Baggage compartment floor
19. Circuit breaker panel	52. Drive system supports	85. Composite tail boom	118. Maintenance step
20. Pilot seat	53. Hydraulic pump	86. Vertical stabilizer	119. Condenser air outlet
21. Headset stowage	54. Oil pump	87. Vertical stabilizer hinge post	120. Maintenance step
22. Cockpit air duct	55. Main transmission	88. Composite skin panels	121. Fuel feed pipe
23. Control rod linkages	56. Anti-vibration mount	89. Vertical stabilizer trim actuator	122. Landing gear mount
24. Instrument light	57. Main transmission upper support	90. VHF antenna	123. Landing gear damper
25. Main rotor blade abrasion strip	58. Swash plate	91. Horizontal stabilizer	124. Passenger step
26. Composite blade spar	59. Rotor mast	92. Anti-collision light	125. Landing gear skid
27. Foam-filled trailing edge	60. Blade pitch control rods	93. NOTAR tail thruster	
28. Composite skin panel	61. Composite flexbeams	94. Rotating thruster fairing	
29. Composite fairing	62. Blade root attachment joint	95. Louvered tail thruster	
30. Composite rotor head fairing (not shown)	63. Composite pitch case	96. Not shown	
31. Air conditioning equipment	64. Blade tip balance pocket	97. Vertical stabilizer	
32. Water separator	65. Trim tab	98. Navigation light	
33. Hydraulic actuators	66. Five blade rotor	99. Anti-collision light	

MD 902 Explorer.



THIS PAGE INTENTIONALLY LEFT BLANK

3. CERTIFICATION

The MDHI MD 902 is a commercial aircraft FAA type-certified under Code of Federal Regulations (CFR) Title 14, Part 27, visual flight rules (VFR) day and night occurred in December 1994. Joint Aviation Authorities (JAA) validation, which led directly to Joint Aviation Regulation (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.

The MD 902 is certified to 14 CFR Part 27 through amendment 27-26 dated April 5, 1990, and special condition for high intensity radiated fields (HIRF) protection per 14 CFR 21.16; Part 36 Appendix H, Noise, effective on the date of Type Certificate, and Part 27, Amendment 27-33, Appendix C - "Criteria for Category A" (November 1997).

The MD 902 is approved for use in over 50 countries worldwide.

3.1 Category A Operation

The MD 902 is certified for CFR Part 27, Appendix C, Category A operations from clear airfields, heliports, and elevated helipads when the appropriate instruments and equipment are installed and operable. The MD 902 demonstrated safe single-engine flight profiles to the FAA that met or exceeded aircraft strength requirements and safety design and construction criteria. The MD 902 was certified for Category A Rotorcraft Operations on August 8, 1996. The Category A MD 902 demonstrated engine takeoff performance that met the following:

- If one engine fails after the start of takeoff prior to the takeoff decision point, the MD 902 can return to the point of takeoff and stop safely (rejected takeoff)
- If one engine fails during takeoff and climb out after the takeoff decision point, the MD 902 can safely continue the takeoff and climb out
- If the takeoff and climb out is continued, a configuration and airspeed can be achieved that will allow for the safe return and landing at an elevated pad, a ship landing deck, or a clear landing area





- If one engine fails during landing approach prior to the landing decision point, the MD 902 can climb out and achieve an airspeed that allows continued flight (balked landing)
- If one engine fails during landing after the landing decision point, the MD 902 can land and stop safely.

Maximum altitude for MD 902 Category A operations is 10,000 feet density altitude. Category A operation at clear airfields, heliports, and elevated helipads are limited with winds from the side and aft of the aircraft (60 degrees from rotor center, forward). Heliport and elevated helipad operation is limited to operation with solid surfaces, minimum dimensions of 50 feet by 50 feet.

3.2 Certificates

Production, type, and supplemental type certificates are maintained by MDHI.

A standard airworthiness certificate (FAA form 8100-2), displayed in the aircraft is the FAA official authorization allowing for the operation of type-certificated aircraft. The airworthiness certificate is displayed in the aircraft and remains valid as long as the aircraft meets the approved type design, is in a condition for safe operation, and maintenance, preventive maintenance, and alterations are performed in accordance with Code of Federal Regulations Title 14, Part 21.

3.3 Designation

The FAA model designation is MD 900, and the International Civil Aviation Organization (ICAO) Type Designation is EXPL (former ICAO Type Designation number was HU90). The MDHI commercial designation is MD 902.

3.4 Operators

Over 130 MD 900-series helicopters are operating worldwide with combined operational hours of greater than 400,000 hours. More than fifty percent of the fleet is used in the Police / emergency medical services (EMS) role; other fleet operators perform search and rescue (SAR), very important person (VIP), utility, and military activities (including armed variants). The MD 900-series helicopter provides superior performance, best payload, and lowest operating costs of any light twin-engine helicopter.





4. DIMENSIONS, WEIGHT, AND CONFIGURATION

4.1 External Dimensions

The MD 902 external dimensions are provided in the following table and shown in the figure below.

MD 902 Explorer External Dimensions

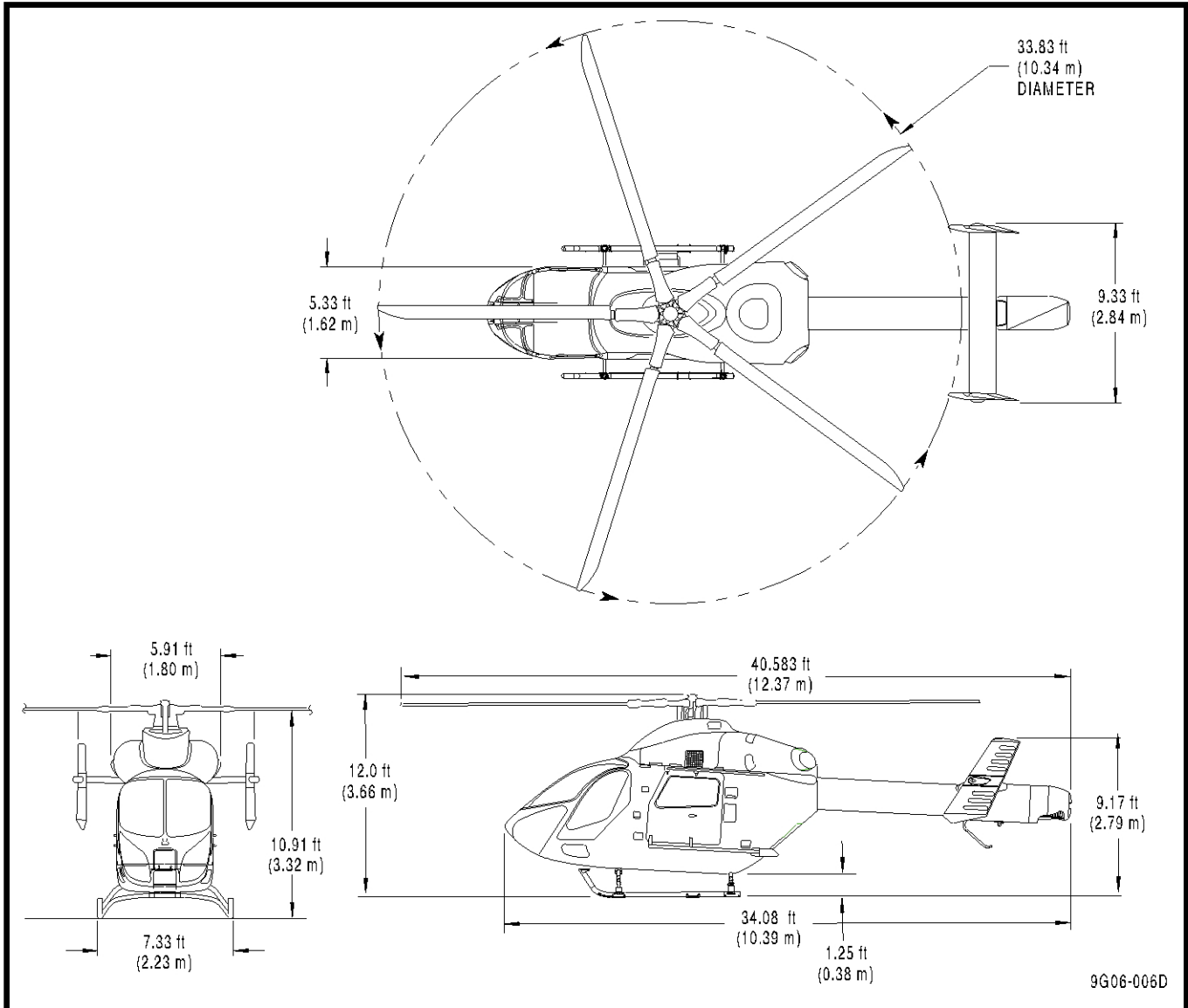
Parameter	Dimension, ft (m)
Fuselage Width (aft top)	5.91 (1.80)
Fuselage Length	18.25 (5.56)
Horizontal Stabilizer Width	9.33 (2.84)
Landing Skid Width	7.33 (2.23)
Ground to Rotor Height	10.92 (3.33)
Ground to Fuselage Bottom Height	1.25 (0.38)
Main Rotor Diameter	33.83 (10.31)

4.2 Interior Dimensions

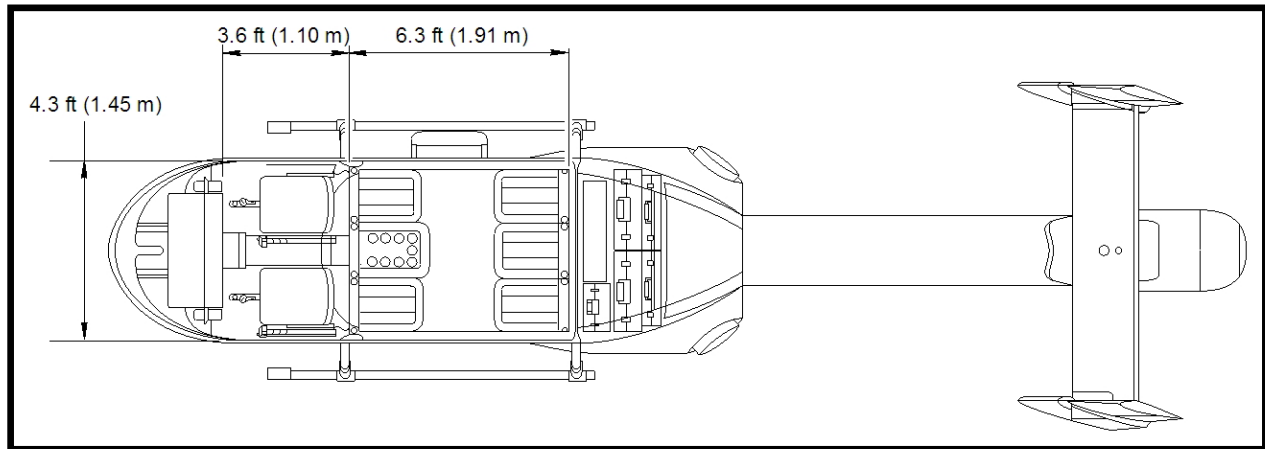
The MD 902 interior dimensions are provided in the following table and shown in the second figure below.

MD 902 Explorer Internal Dimensions

Parameter	Dimension, ft (m)
Crew Compartment Width	4.30 (1.45)
Crew Compartment Length	3.60 (1.10)
Passenger Compartment Width	4.30 (1.45)
Passenger Compartment Length	6.30 (1.90)
Passenger Door Height (not shown)	4.08 (1.24)
Passenger Door Width (not shown)	4.16 (1.27)



MD 902 Explorer External Dimensions



MD 902 Interior Dimensions

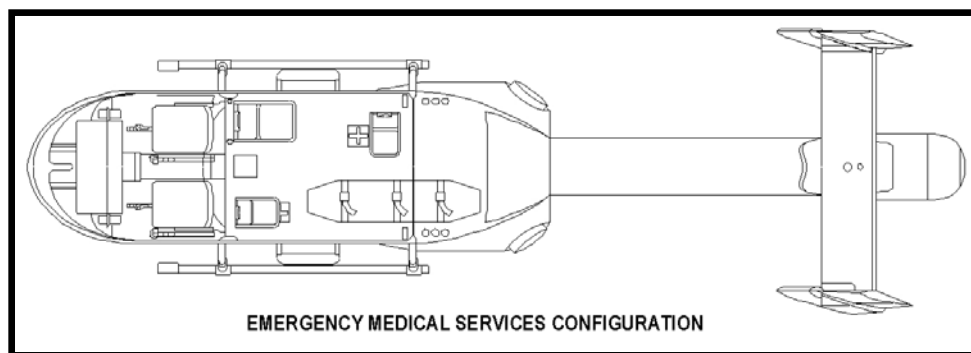
4.3 Weight

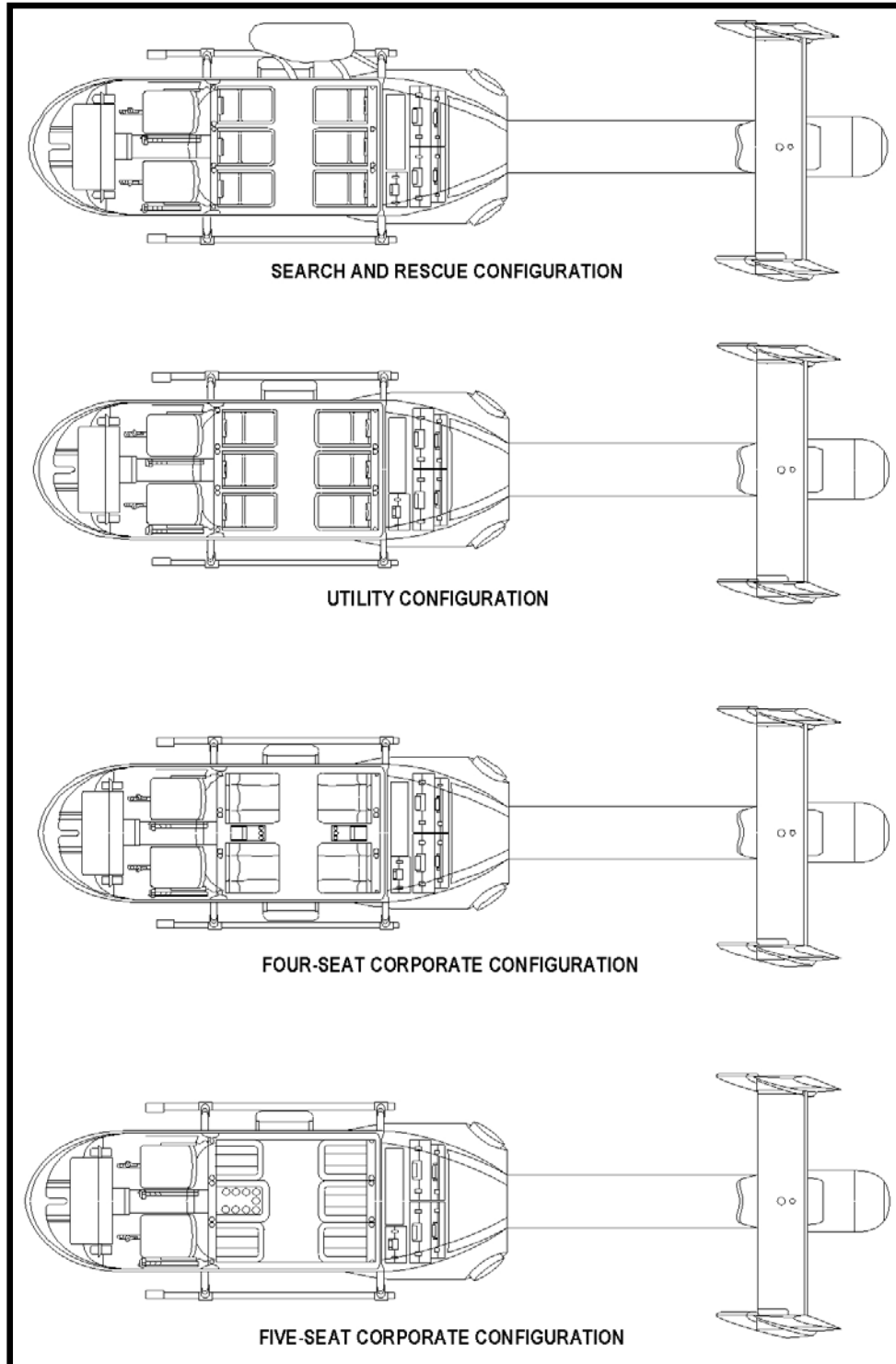
The MD 902 nominal empty weight is 3,375 pounds (1531 kg).

Operational weight limit range of the MD 902 is 3,500 pounds (1,588 kg) minimum to 6,500 pounds (2,948 kg). An option is available to increase the operational weight limit to 6,770 pounds (3,071 kg).

4.4 Configurations

The MD 902 can be configured for a variety of different configurations. Configuration examples are shown in the following views:





Optional Cabin Configurations are Available Including EMS, Search and Rescue, Utility, and VIP Passenger Transport



5. MD 902 Twin-Engine Helicopter

The MD 902 is a twin-engine rotary-wing aircraft certified for single-pilot operation under visual flight rules/visual meteorological conditions, and capable of operation under instrument flight rules. The MD 902 is fully certified for Category A operations from clear airfields, heliports, and elevated helipads

5.1 System Description

The MD 902 is an eight-place, twin-engine, multipurpose helicopter constructed of an aluminum frame with a composite outer structure. It has a bearing-less, 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 shafts drive the engine and transmission oil cooling system.

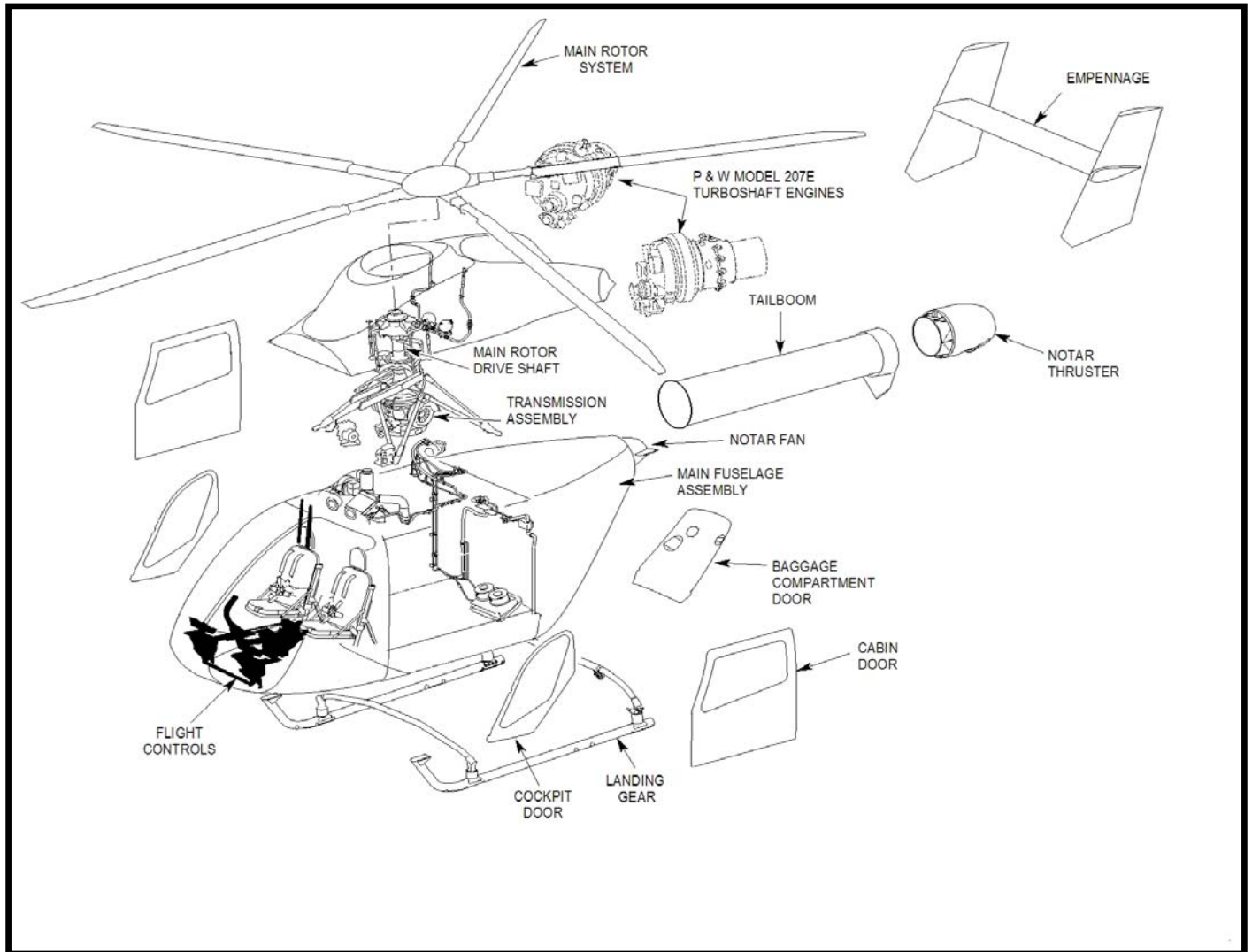
The main rotor is supported by a hollow static mast mounted to the primary structure that absorbs all of the flight loads, allowing the transmission to provide only torque. The transmission is separated from the static mast by an acoustic isolator, thus reducing noise into the cabin and cockpit areas.

There are only three wetted areas, which are checked daily through view ports. The hydraulic system is a dual-redundant system for reliability. The outer skin of the aircraft is composite, with no magnesium, providing strength, light weight, and all-weather capability. The outer skin also incorporates high-intensity radiated frequency/lightning-strike protection capabilities. The fuel cells are separated away from the outer skin, enclosed by two deep keel beams, and all of the fuel lines incorporate frangible fittings.

The main display for aircraft systems performance and monitoring is the integrated instrument display system (IIDS), a digital and analog information processing, storage, and display system on the MD 902 helicopter. The IIDS receives input signals from various aircraft system components for status display, limit checking and display (warning/caution indication), operation information, trend data, rotor and NOTAR[®] fan balance monitoring, and data logging.

All of the crew and passenger seats are energy attenuating, and meet the new Federal Aviation Regulation (FAR)/JAR 27.562 emergency landing dynamic requirements. The landing gear is a non-retractable skid. Large, 52 inch (1.32 m) sliding doors are on each side of the spacious cabin. The crew doors are hinged and a hinged door at the aft end of the fuselage allows for baggage or alternate loading.

A diagram of the major system components of the MD 902. System/component details are shown below.



MD 902 Explorer System/Component Details



5.2 Standard Visual Flight Rule Equipment Configuration

The MD 902 is configured with standard VFR equipment that is included with the basic aircraft procurement.

MD 902 Standard VFR Equipment

Airframe	
<ul style="list-style-type: none"> • Left-/right-hand sliding cabin doors • Baggage compartment door • Sliding cabin and cockpit door windows • Keyed door and access panel locks • Left and right side passenger steps • Anti-collision lights (2) • Position lights and strobe lights • Hover and approach lights • Single-point gravity refueling port • 159-gallon (602 liter) fuel system • Jack pad installation kit • Dual hydraulic-system manual-fill hand pump • Heater/defogger • Rain gutter set • Carbide skid shoes 	<ul style="list-style-type: none"> • Hydraulic system single-point pressure fill ports • Fuselage tub inspection panels • External power receptacle • Twenty-two amp, 24 Vdc NICAD battery • Main rotor and NOTAR[®] fan balance monitoring system • Vertical stabilizer control system • Air conditioning • One color standard paint • Left-/right-passenger steps • Vertical stabilizer control system • Ram air ventilation w/blower
Interior - Cockpit	
<ul style="list-style-type: none"> • Energy-attenuating crew seats with five-point restraint harness • Gray cockpit trim/carpeting • Twenty-eight volt utility outlets • Cockpit pneumatic door openers • Copilot floor-mounted intercom switch • Cockpit fire extinguisher • Crew wander utility and dome light • David Clark headsets (2) 	<ul style="list-style-type: none"> • Rotorcraft Flight Manual storage and Certificate of Airworthiness display envelope • Dual-redundant hydraulic-boosted flight control system • Dual right-hand command flight controls • Right-hand command rotor brake • Single-pilot inverted-L instrument panel
Interior – Cabin	
<ul style="list-style-type: none"> • Cabin soundproofing • Beige cabin utility trim (wall, ceiling, carpet) • Twenty-eight volt utility outlets • Flush-mounted cargo tie downs 	<ul style="list-style-type: none"> • Medical first-aid kit • One cabin station intercom jack • Two cabin threshold lights • Cabin temperature control



MD 902 Standard VFR Equipment

Baggage Compartment	
<ul style="list-style-type: none"> • Baggage area utility light 	<ul style="list-style-type: none"> • Baggage door fixed window
Engine	
<ul style="list-style-type: none"> • Twin FADEC Pratt & Whitney-Canada Model 207E Engines, 710 shaft horsepower (shp) (530 kiloWatt [kW]) turboshaft engines 	<ul style="list-style-type: none"> • Integrated water wash system • Engine fire detection/suppression system • Engine inlet screens
Monitoring Instrumentation	
<ul style="list-style-type: none"> • AMS-43 three panel intercom system audio control • Airspeed indicator • Avionics master switch 	<ul style="list-style-type: none"> • Outside air temperature indicator • Magnetic compass • Single pitot tube (VFR only) • Analog cockpit (to be replaced by a digital cockpit: Refer to Paragraph 5.9.11)
Miscellaneous	
<ul style="list-style-type: none"> • Integrated instrument display system laptop computer (IIDS, only) • Ground base maintenance computer software (IIDS, only) • Ground base maintenance interface cable (IIDS, only) • Ground handling wheels • Pitot tube cover (1) 	<ul style="list-style-type: none"> • Main rotor blade tie downs • Foreign object damage upper deck cover • Airframe, engine, and battery logbook • System/subsystem maintenance manuals and illustrated parts list • Rotorcraft flight manual



5.3 Instrument Flight Rule Required Equipment

The MD 902 can be configured for IFR operation by adding optional IFR-required equipment. The IFR required equipment is additionally-priced equipment that supplements the standard VFR supplied equipment.

MD 902 Optional IFR-Required Equipment

Airframe	
<ul style="list-style-type: none"> 27-ampere-hour, 24-volt NICAD battery 	<ul style="list-style-type: none"> Tinted canopy windows Inlet particle separators Automatic flight control system
Monitoring Instrumentation	
<ul style="list-style-type: none"> Two-tube Category A single pilot IFR (L-panel) Single pilot Cat A IFR, two tube EFIS 40, T-panel Single pilot Cat B IFR, two tube EFIS 40, T-panel Single pilot Cat A IFR, two tube EFIS 40, L-panel 	<ul style="list-style-type: none"> Emergency locator transmitter Encoding altimeter Dual Pitot tubes Altitude gyro Single pilot Cat A IFR, four tube EFIS 40, T-panel Single pilot Cat B IFR, four tube EFIC 40, T-panel
Miscellaneous	
<ul style="list-style-type: none"> Dual Pitot tube covers 	



5.4 Optional Equipment Configuration

Optional equipment for the MD 902 is available for additional cost, and is literally non-exhaustive.

MD902 Optional Equipment

<i>Airframe</i>	
<ul style="list-style-type: none"> • Dual heated pitot tubes • Cargo hook (3,000 lb) • External hoist (600 lb) • Wire strike protection kit • Universal nose mount • Left-/right-hand side mount • One-hundred knot cabin door hinges • Crew door jettison • Forward left-/right-hand belly retractable landing light • Center retractable landing light • Vertical stabilizer white strobe lights • Twenty-seven amp battery • Forty-four amp battery • Emergency water floats • Night sun searchlight (SX-16) • Starburst searchlight (SX-5) • TrakkaBeam searchlight (A800) • Retractable landing light (RH/LH mount) • 31-gallon auxiliary fuel tank • 62-gallon auxiliary fuel tank 	<ul style="list-style-type: none"> • Retractable landing light (center mount) • Fifty-three gallon (200 liters) Fargo auxiliary fuel tank (baggage area) • Sixty-two gallon (235 liters) Fargo auxiliary fuel tank (baggage area) • Locking auxiliary fuel tank filler cap • Locking main fuel tank filler cap • Emergency water floats with or without integrated life rafts • Bear paws • Windshield wipers/hard coat canopy tint w/clear chin canopies • Tinted canopies • Loud hailer/siren system • Left-/right-hand universal belly mount
<i>Interior - Cockpit</i>	
<ul style="list-style-type: none"> • Sliding cockpit door windows • Cockpit flashlight • Removable copilot controls • David Clark headsets (H10-56) • Enhanced VFR instrument suite 	<ul style="list-style-type: none"> • Copilot communication foot switch • Pilot / copilot gooseneck lights • Cockpit voice recorder • Night vision goggle compatible lighting



MD902 Optional Equipment

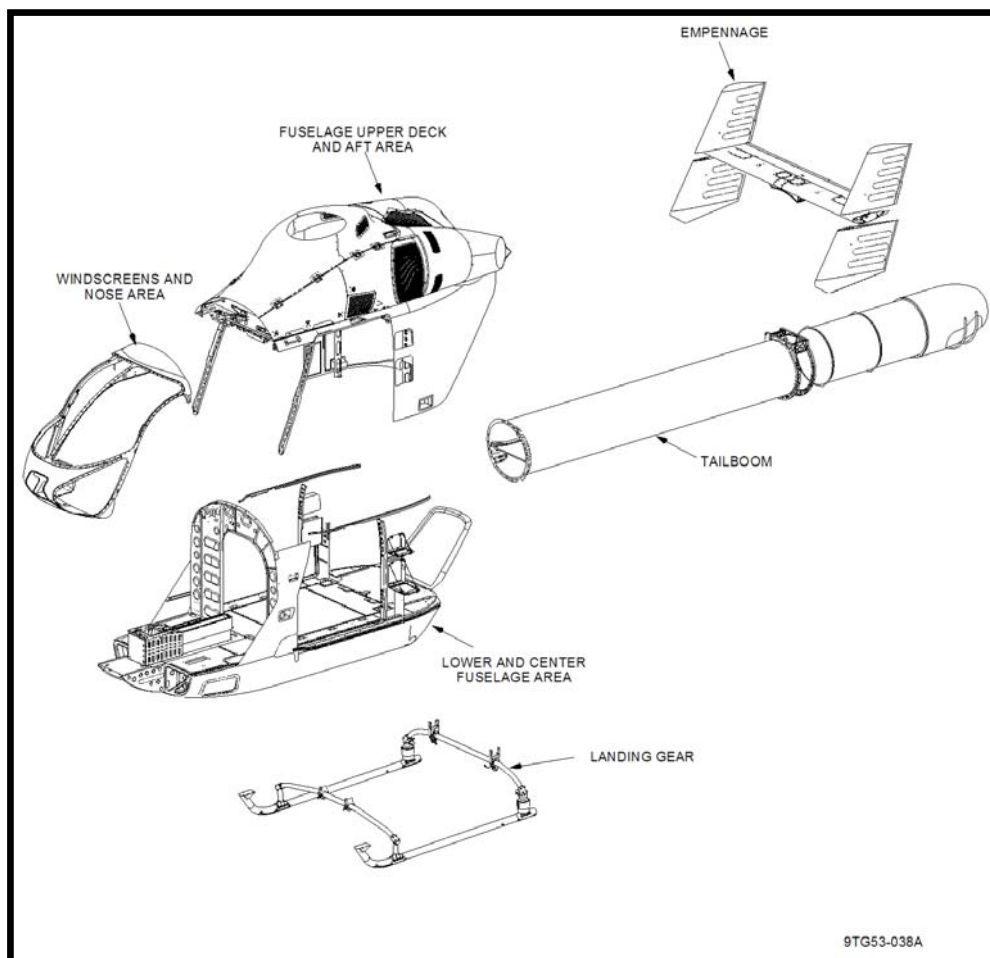
Interior – Cabin	
<ul style="list-style-type: none"> Leather VIP interior system Business interior system EMS interior system Loncoin floor covering Second fire extinguisher Sliding cabin door windows Cabin flashlights Second medical first-aid kit Aircell SAT/COM w/handset and cockpit dialer AA95 w/AA31 EMS/utility 6-place intercom system isolation panel Stroking passenger seats (6) with three-point restrain harness 	<ul style="list-style-type: none"> AA82 w/AA32 VIP 6-place intercom system isolation panel Wulfsberg flexcomm RT5000 w/C5000 control head Technisonic TDFM 6146 FM COM 3 Technisonic TF138 marine band transceiver Technisonic TF500 FM transceiver Digital audio system Bose Series A20 headsets AM/FM/MP3 CD player Cabin area floor mats
Baggage Compartment	
<ul style="list-style-type: none"> Baggage equipment shelf Baggage area floor mats 	<ul style="list-style-type: none"> Baggage area smoke detector
Engine	
<ul style="list-style-type: none"> Inlet particle separator 	
Monitoring Instrumentation	
<ul style="list-style-type: none"> Weather radar Garmin GTN-650 GPS/NAV/COM Garmin GTN-750 GPS/NAV/COM KX165 NAV/COM GTX33 transponder KT70 transponder KT73 transponder GTS800 traffic avoidance system KLN90 GPS GMX 200 MFD moving map (traffic/weather) GDL 69A satellite weather and XM radio includes GMX200 	<ul style="list-style-type: none"> MARK XXI EGPWS (Class B) with KMD-850 MARK XXI EGPWS (Class A) with KMD-850 HTAWS XM weather services/radio Traffic avoidance system Attitude heading reference system Standby attitude indicator Digital mapping system Forward looking infrared sensor Customer-requested equipment Emergency locator transmitter (ELT)
Miscellaneous	
<ul style="list-style-type: none"> High visibility main rotor blade paint Two-color exterior paint Three-color exterior paint 	<ul style="list-style-type: none"> Enhanced secondary mooring tie downs Tow bar with swivel wheels

5.5 Main Fuselage Assembly

The main fuselage outer shell is a one-piece semi-monocoque composite structure with an embedded very-fine expanded aluminum mesh for HIRF/lightning strike protection. All aluminum parts are coated with primer during assembly for protection, and all exposed aluminum parts are painted. Wet rivets and integral fiberglass barrier strips are used to connect composite skins to the structural frame to prevent galvanic corrosion. Built-in steps, handholds, and work platforms provide maintainability features for maintenance activity.

The main fuselage assembly, shown below, is a semi-monocoque construction having five major sections:

- Windscreen and nose (including the cockpit)
- Lower and center fuselage (including doors, cabin, and landing gear)
- Fuselage upper deck and aft area
- Tail boom
- Empennage.



MD 902 Explorer Main Fuselage Assembly Sections



The MD 902 empennage is a composite horizontal and vertical stabilizer assembly. The horizontal portion of the stabilizer is mounted to the tail boom with an elastomeric isolator that minimizes vibration transfer to the airframe due to wake turbulence. The vertical endplates are mounted to the horizontal stabilizer at each end, and are controlled using the vertical stabilizer control system (VSCS). The empennage is mounted to the aluminum and composite tail boom. The tail boom is connected to the aft top end of the fuselage assembly, and has the NOTAR[®] system thruster assembly attached at the end of the tail boom. The tail boom provides directional control of NOTAR[®] fan-generated airflow for anti-torque control through the airflow exit slots in the tail boom and the thruster assembly at the end of the tail boom.

The VSCS is a dual-redundant fly-by-wire control system that controls each vertical endplate using sensors, controllers, and electromechanical actuators. The VSCS optimizes endplate angles (in conjunction with collective pitch) to augment directional control and stabilization. Vertical stabilizer control system augmentation can be manually turned-off by the pilot. Vertical endplate position can be monitored by the pilot through instrument panel mounted indicators.

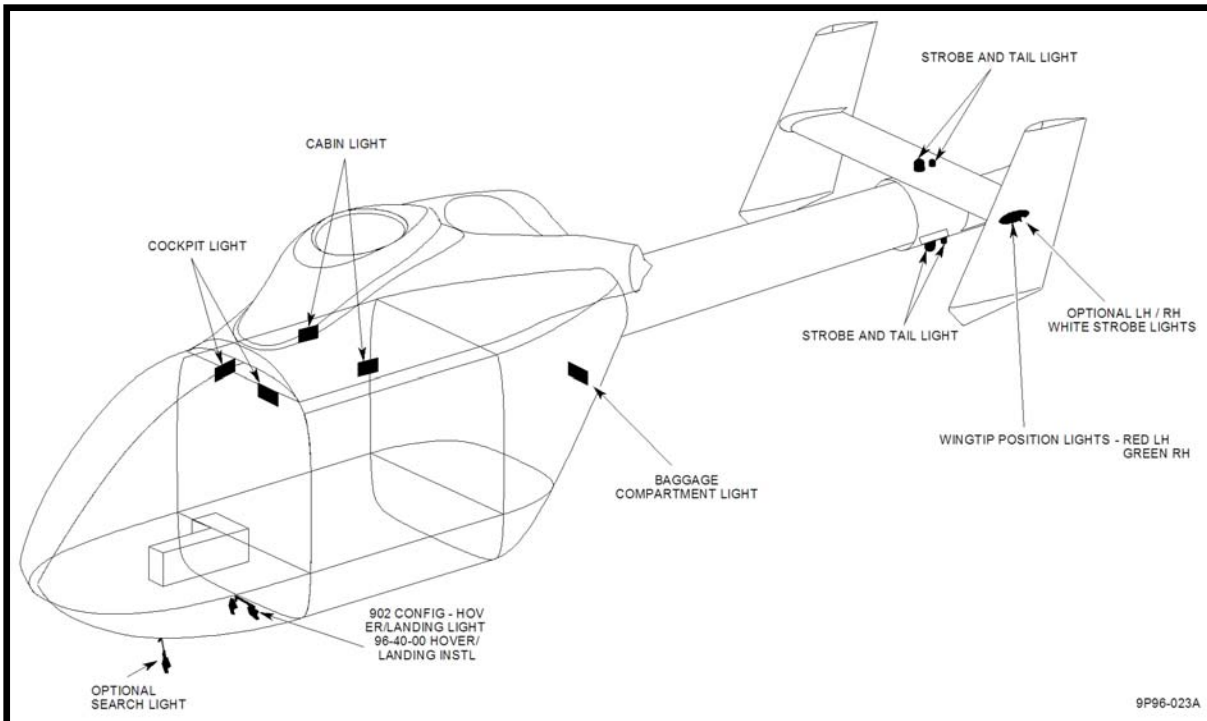
The landing gear is a set of non-retracting aluminum-alloy skid tubes supported by forward and aft cross tubes. The aft cross tube is connected to the skid tubes with elastomeric spring dampers that cushion landings and provide ground resonance stability. The landing gear exceeds CFR 27.725 requirements to withstand a 10.2 ft/sec (612 ft/min) drop at maximum gross weight. To extend the landing gear life and protect the skid tubes, heavy-duty carbide skid shoes are attached to the skid tubes.

5.6 Exterior

The MD 902 exterior can be painted a single color of the customer choice from available colors. Two or three colors can be painted on the exterior for an additional cost. The exterior provides mounting location for external antennas of optional customer-purchased avionics/communication equipment, external lighting, main rotor static mast, landing gear, and tail boom.

5.7 External Lighting

External lighting on the MD 902 consists of two red anti-collision strobe lights, four position lights (one green, one red, and two white), a hover light, and a landing light, as shown below. The two red anti-collision lights are pilot controlled using an on-off switch located on the lighting control panel. The four position lights are pilot controlled using an on-off switch located on the lighting control panel. The hover light is pilot controlled by using a three-position switch located on the collective stick switch panel, and is also illuminated when the landing light switch is activated. The hover light can be operated independent of the landing light. The landing light is pilot controlled using a three-position switch located on the collective stick switch panel.



MD 902 Explorer Internal and External Lighting Locations

5.8 Interior

The MD 902 interior consists of the cockpit area and cabin compartment area. The MD 902 is provided in the utility version which includes two energy-attenuating cockpit crew seats and six, energy-absorbing foldable, quick attach/detach removable cabin seats (three facing aft and three facing forward). The cockpit crew seats are equipped with five-point restraints and the cabin seats are equipped with four-point restraints.

5.8.1 Cockpit

The spacious cockpit is designed to provide side-by-side seating of the pilot and copilot. Command pilot position is located on the right-hand side of the aircraft. The aircraft may be operated by one pilot, and with removal of the copilot-position flight controls, additional passenger space is provided. Cockpit doors are composite manufacturer with hinges and latching mechanisms. Door latches include keyed locks for security. The cockpit doors include storage areas and can also be equipped with optional pneumatic door struts, and optional sliding windows. Cockpit doors may be removed for flight operations with corresponding operational speed restrictions.



The cockpit was ergonomically designed using human systems integration design principles. All controls are forward of the pilot and within easy reach. The only control not forward of the pilot location is the rotor brake control which is located above the pilot position, also within easy reach.

The energy-attenuating crew seats are tube-frame construction with padded upholstered material and quick release five-point restraints that are attached to the cockpit floor. Each cockpit crew seat is anthropometrically designed for a 25th percentile female to a 95th percentile male occupant, and anti-torque controls include spring-loaded quick detent pins with five-position adjustments to accommodate the 25th to 95th percentile female/male flight crew members. The crew seats have a combined vertical and horizontal fore and aft adjustment of three inches with seven positions. Seat adjustment controls are located at the center of the seat. Forward and aft seat adjustment also includes an automatic tilt feature that tilts the seat back from 18 degrees in the forward position, to 20 degrees in the rearward position. A seat belt inertia-reel lock is provided for pilot/copilot comfort.



A uniquely shaped cyclic control, which hinges below the floor, allows the pilot to move the control to any extreme, while maintaining a forearm-thigh resting position. The collective control incorporates a magnetic clutch that holds the last commanded position. The collective control can provide FADEC override control to allow the pilot to mechanically control the turboshaft engine hydro-mechanical fuel control. Since the control rods are contained in a control closet directly behind the pilot location, the cabin bulkhead can be left open in between the pilot and copilot to allow the pilot a full cabin view by looking over the left shoulder.

5.8.2 Cabin Compartment

Although the MD 902 is certified as a light twin (FAR Part 27), the 173.0 cubic foot (4.90 cubic meters) cabin volume and six passenger seats are the equivalent of heavier medium twin engine helicopters certified to FAR Part 29. The 57-inch (1.45 m) wide cabin gives each passenger 19 inches (48.3 cm) of shoulder room. The standard commercial and utility cabin configuration includes six foldable, energy-absorbing seats with four-point restraints that are mounted to the ceiling and floor, and meet the requirements of FAR Part 27.562. The seats are interchangeable and can be folded up for additional cargo storage, or replaced without tools, in about 3 minutes. Floor-to-ceiling clearance is 49 inches (124.5 cm). The energy-absorbing seats also protect the



occupants from 30g longitudinal dynamic acceleration and 4g upward, 16g fore/aft, 8g lateral, and 20g downward static values.

Sliding doors on each side are 52 inch (132.0 m) wide by 49 inch (1.24 m) tall, and incorporate large windows that provide extraordinary outside visibility, and have a jettison feature for personnel emergency egress. An additional aft fuselage baggage compartment door is located under the tail boom for baggage, and can be optionally configured for alternative loading capabilities.



The cabin floor is flat with 24 recessed cargo tie-downs. The maximum static load is 115 pounds per square foot (561.5 kg/m²) to withstand 20 g's vertical in an emergency landing with a 1,500-pound payload.

Passengers have access to a thermostat control next to the right rear seat to adjust cabin heat. Easy access for daily inspection of the NOTAR[®] fan is provided just inside of the aft door, and a courtesy light is provided.

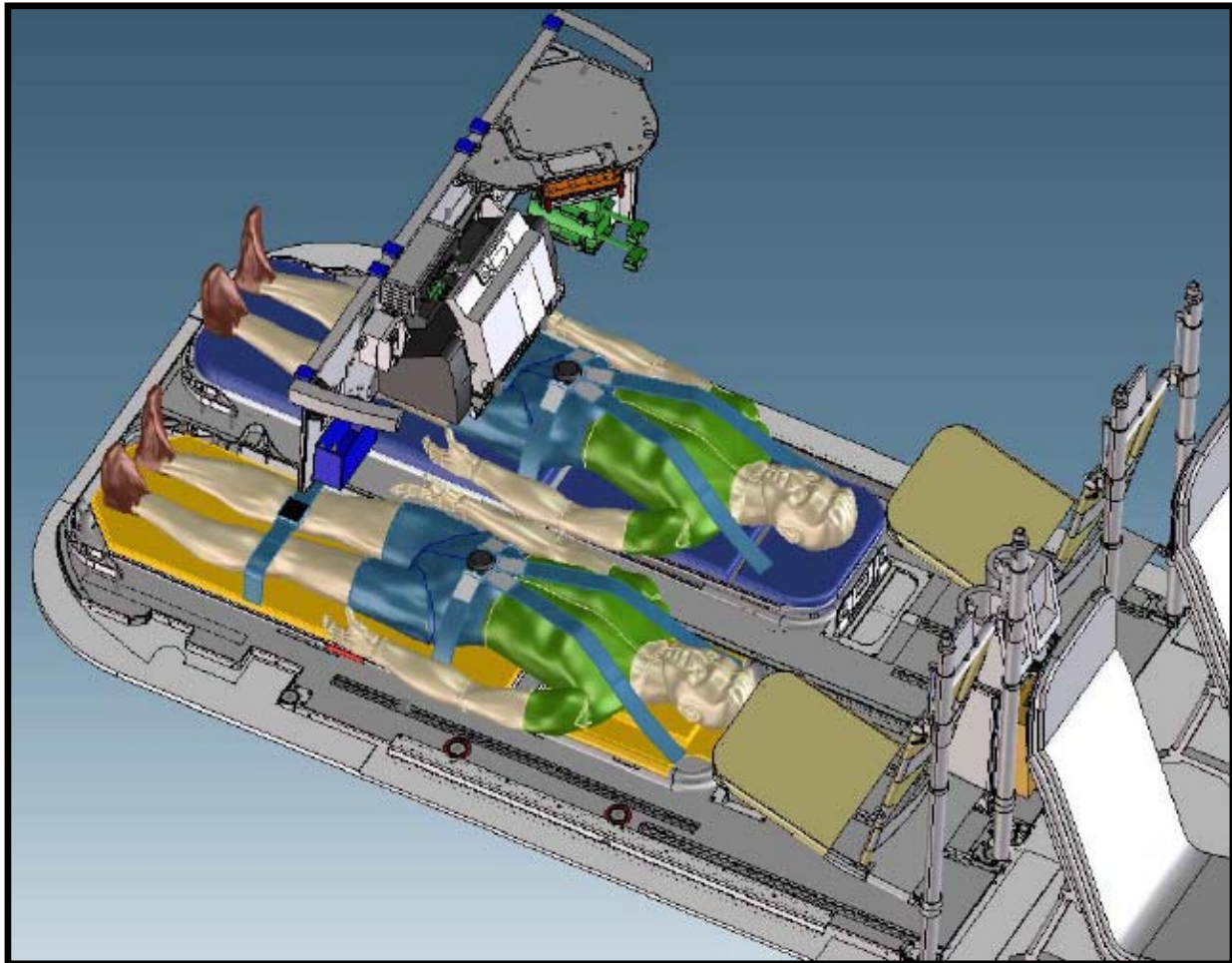
Commercial interior trim includes door trim panels, bulkhead and side trim panels, cabin roof insulation, cabin roof trim panels, baggage closeout panel, carpeting, and passenger air service panels with a reading light. The cabin is also equipped with a 28 Vdc outlet, headset jack, and area lights in the roof panel at each cabin door entry.

The utility interior trim includes door trim panels, bulkhead and side trim panels, cabin roof insulation, cabin roof trim panel, and floor carpeting. An area light is provided in the roof panel at each cabin door entry.

Optional corporate, VIP, and emergency medical services (EMS) interiors are available in a variety of configurations (one or two litter). The corporate and VIP interior (four-, five-, or six-seat) configurations include options such as custom, leather-covered seating/interior, custom cabinetry, stereo components, display screens, digital video disc players, passenger air-service panels and communication equipment as requested. A stand-alone, self-contained EMS system or separate EMS components are also available options.



One-Litter EMS Configuration.



Two-Litter Modular EMS platform.

5.8.3 Baggage Compartment

The aft fuselage boat tail includes a baggage compartment enclosed with a 25 inch (63.5 centimeters) by 32 inch (81.28 centimeters) composite baggage compartment door. Located under the tail boom, the baggage compartment provides 52 cubic foot (1.47 cubic meters) volume and can be outfitted with optional equipment such as carpeting, lighting, and smoke detector. The baggage compartment area can optionally be configured for alternative loading capabilities.



The MD 902 Explorer Baggage Compartment Area Can be Configured for Alternative Loading Capabilities

5.9 Systems

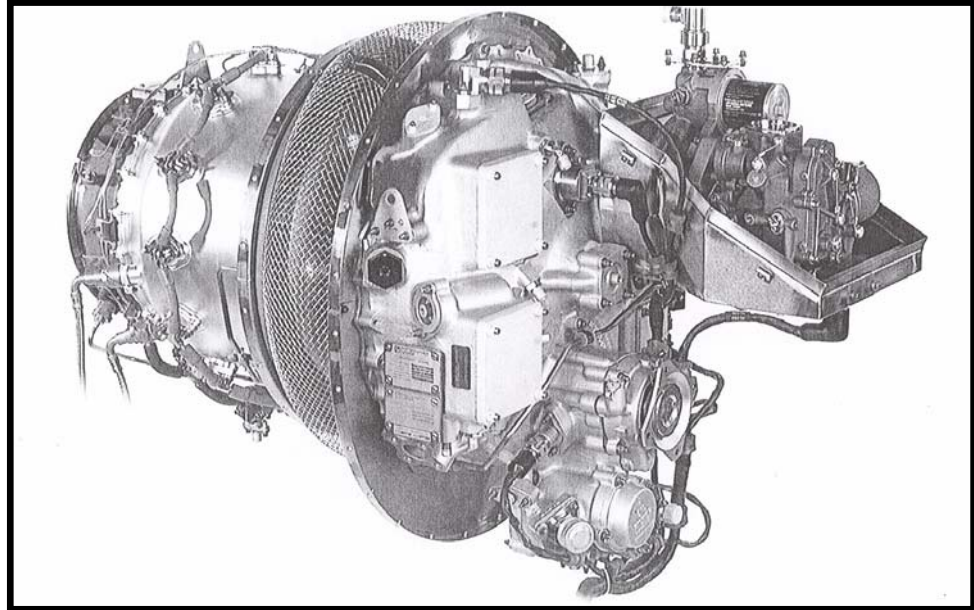
5.9.1 Fuel System

The single crash-resistant elastomeric fuel cell is contained between crash-resistant keel beams and bulkheads. 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 fuel cell is 159 U.S. gallons (602 liters) of Jet A fuel. A set of baffles reduces sloshing. Two submerged boost pumps (one for each engine) are driven by a 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.

5.9.2 Turboshaft Engine

The MD 902 includes two upper-deck-mounted Pratt & Whitney-Canada (P&WC) Model 207E turboshaft engines mounted directly behind, left and right of the main rotor transmission. They are mounted at a 25-degree angle to the helicopter

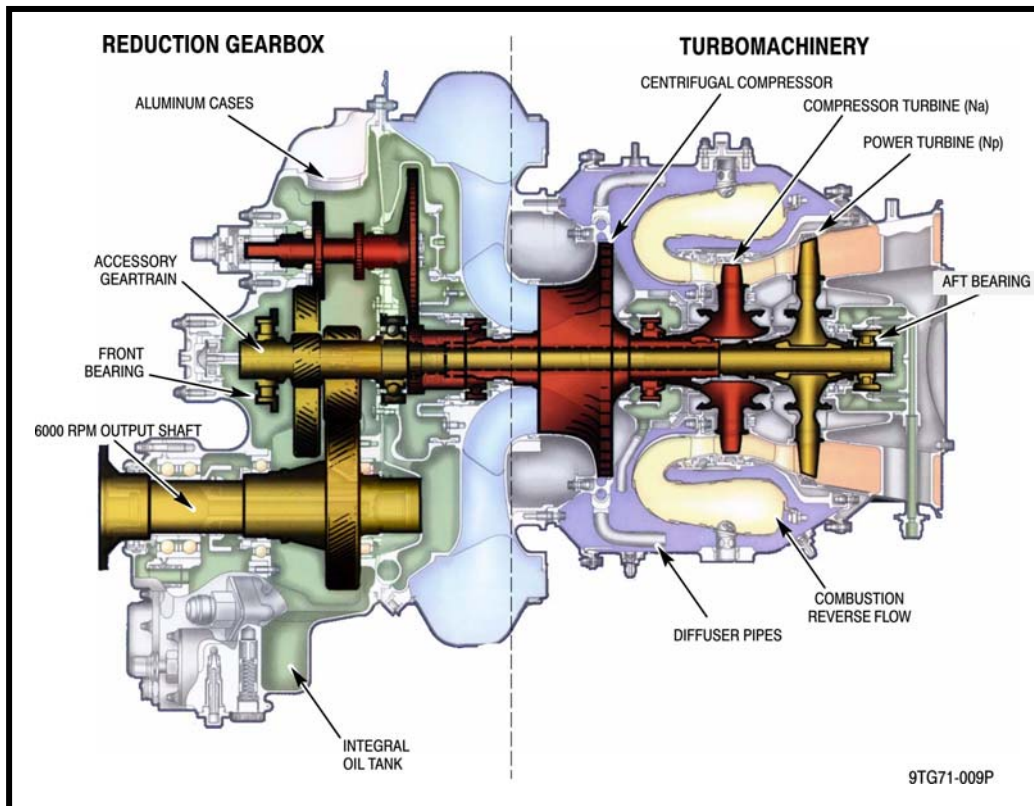


P&WC Model 207E Turboshaft Engine

longitudinal axis forming a V-pattern for flight dynamics. The engine is covered at the upper deck by composite cowlings that have pneumatic actuators that hold the cowlings open for maintenance activity. Engine air entry is provided through NACA air inlets that provide additional ram air to the engines. These air inlets provide improved airspeed and lower specific fuel consumption, resulting in greater range and endurance. An optional inlet particle separator incorporates electric actuators that automatically open the NACA inlet when the airspeed is greater than 47 knots.

The two P&WC Model 207E turboshaft engines have a takeoff power rating of 710 shp (530 kW). A typical P&WC Model 207E turboshaft engine is shown below. The P&WC Model 207E turboshaft engine is capable of producing 550shp (410 kW) takeoff power and 500 shp (373 kW) maximum continuous power.

The turboshaft engines consist of a single-stage centrifugal compressor, a single-stage compressor turbine, a single-stage power turbine, a reverse-flow annular combustion chamber, and a reduction gearbox. A typical P&WC Model 207E turboshaft engine cross section is shown below. Control of the turboshaft engines is accomplished through a FADEC. Hydro-mechanical fuel metering unit (FMU) backup is also provided in the event of a FADEC failure. The FMU is enclosed by a fuel-containment-housing for fuel/vapor containment safety considerations.



P&WC Model 207E Turboshaft Engine Cross Section

The power turbine drives an output shaft through a two-stage reduction gearbox located at the front of the engine which drives all engine-driven accessories (i.e., air conditioning compressor, fuel pump, FMU, oil pump, starter-generator, permanent magnet alternator, etc.). Engine control sensors are also located on the reduction gearbox to monitor low-pressure spool speed (N_g or N_1), power turbine spool speed, and engine torque sensor. The reduction gearbox also provides mounting locations for an integral oil tank, the oil temperature sensor, oil pressure sensor, oil pressure port, chip detector, oil filter, and oil filter impending bypass indicator. The engine oil tank has a total capacity of 1.35 U.S. gallons (5.12 liters) and is provided with a filler cap/dipstick and oil level sight glass. Turboshaft engine power through the reduction gearbox is provided through drive shafts attached to the main rotor transmission.

A built-in turboshaft engine compressor water wash system is integrated with the turboshaft engine installation. Turboshaft engine pressurized compressor wash system activation is accomplished through the central compressor wash system ports located on the engine wash panel. The Turboshaft engine compressor wash panel is located on top of the aircraft and on the right-hand side engine inlet wall, adjacent to the right engine access door. Turboshaft engine compressor wash system consists of stainless steel tubing routed such that a wash nozzle is located over each engine inlet. The ports located on the engine wash panel are standard aerospace fittings with lanyard secured protective covers.



5.9.2.1 Engine Control

Engine power management and speed control is accomplished by the FADEC. Electrical power for engine start is provided by the battery bus, through the throttle control relay and detent module to the start relay, FADEC, ignition unit, and igniters. The start relay also provides power from the battery bus to the starter/generator. Each engine has an independent FADEC that monitors and implements all control functions automatically or by pilot manual input. Normal-flight engine control is provided through console mounted power management control switches for each engine. Each switch can be used to select four modes of operation; two modes are used for normal operation, one mode is for shut down, and one mode is used for training. For normal operation:

- Idle – to start the engine, the switch is moved from off to the idle position. Upon engine ignition, the FADEC provides starting fuel flow and engine acceleration to ground idle (65-percent N_P)
- Fly – for flight operation, the switch is moved from the idle to fly position. This position selection provides FADEC automatic operation to control the engine N_P speed at 100-percent rpm regardless of engine power setting
- Off – to shut down the engine, the switch is moved to the off position which commands the FADEC to shut fuel off and shut the engine down.

For training operation:

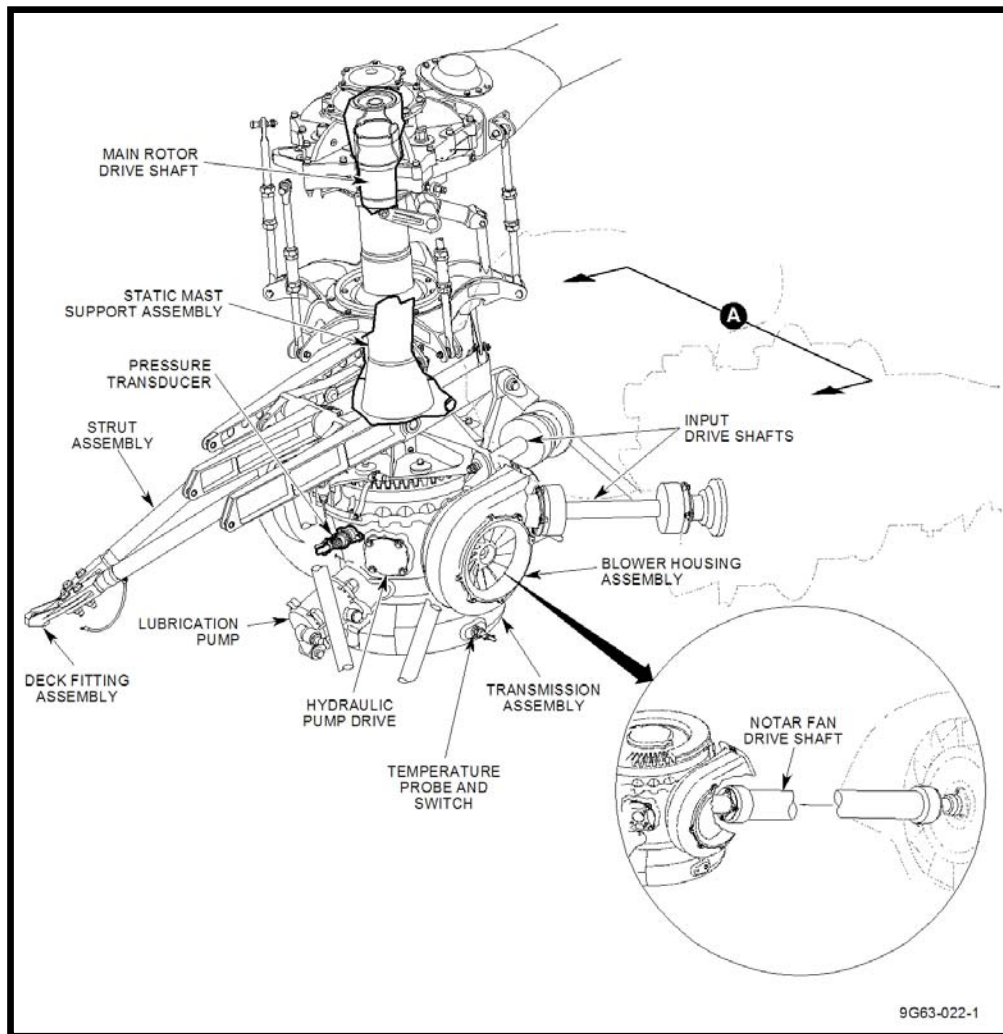
- Train – moving the switch to the train position simulates a one engine inoperative (OEI) condition by resetting the engine governed speed to 92-percent N_P . If the opposite engine experiences a failure or inadvertent switch to idle, or both engines are placed in the train position, the FADEC will automatically revert the engine to 100-percent N_P .

If a FADEC failure should occur, engine control reverts to manual back-up operation using the hydro-mechanical fuel control.

5.9.3 Drive System

The drive system, shown on the following page, consists of:

- Main rotor static mast/base – Non-rotating and rigidly mounted to the mast support structure. It provides support for the main rotor transmission, main rotor drive shaft and main rotor. Two of the support struts may be removed to allow main rotor transmission replacement without disturbing the flight controls or rotor blades.
- Main rotor driveshaft – Transmits torque to the main rotor. Lifting loads are prevented from being imposed on the main transmission, eliminating thrust loading of transmission parts.
- Main rotor transmission – Mounted to the bottom of the main rotor static mast, the main rotor transmission is lubricated by a self-contained air-cooled lubrication system. The main rotor transmission is acoustically isolated from the airframe using acoustic isolator segments between the transmission and static mast base, and mounting bolt elastomeric bushings. It does not carry any of the flight loads. Sensors attached to the main rotor transmission provide gear train speed and magnetic chip detection to the flight crew.



MD 902 Explorer Drive System

The chip detector also incorporates the capability to burn off small chip debris. The main rotor transmission also has provisions for oil fill capability and a sight gage located on the right aft side of the transmission.

- **Overrunning clutch** – An overrunning clutch is attached between each engine and main rotor transmission input drive shaft. The overrunning clutch has no external controls and disengages automatically during auto-rotation and engine shutdown. It contains a sprag-clutch type unit that disengages automatically when N2 speed is less than the corresponding main rotor speed.
- **Main rotor transmission input drive shafts** – Each engine is connected to the overrunning clutch at the main rotor transmission with flexible diaphragm couplings at each end. To



prevent secondary damage in the event of flexible diaphragm coupling failure, the input drive shafts include anti-flail devices.

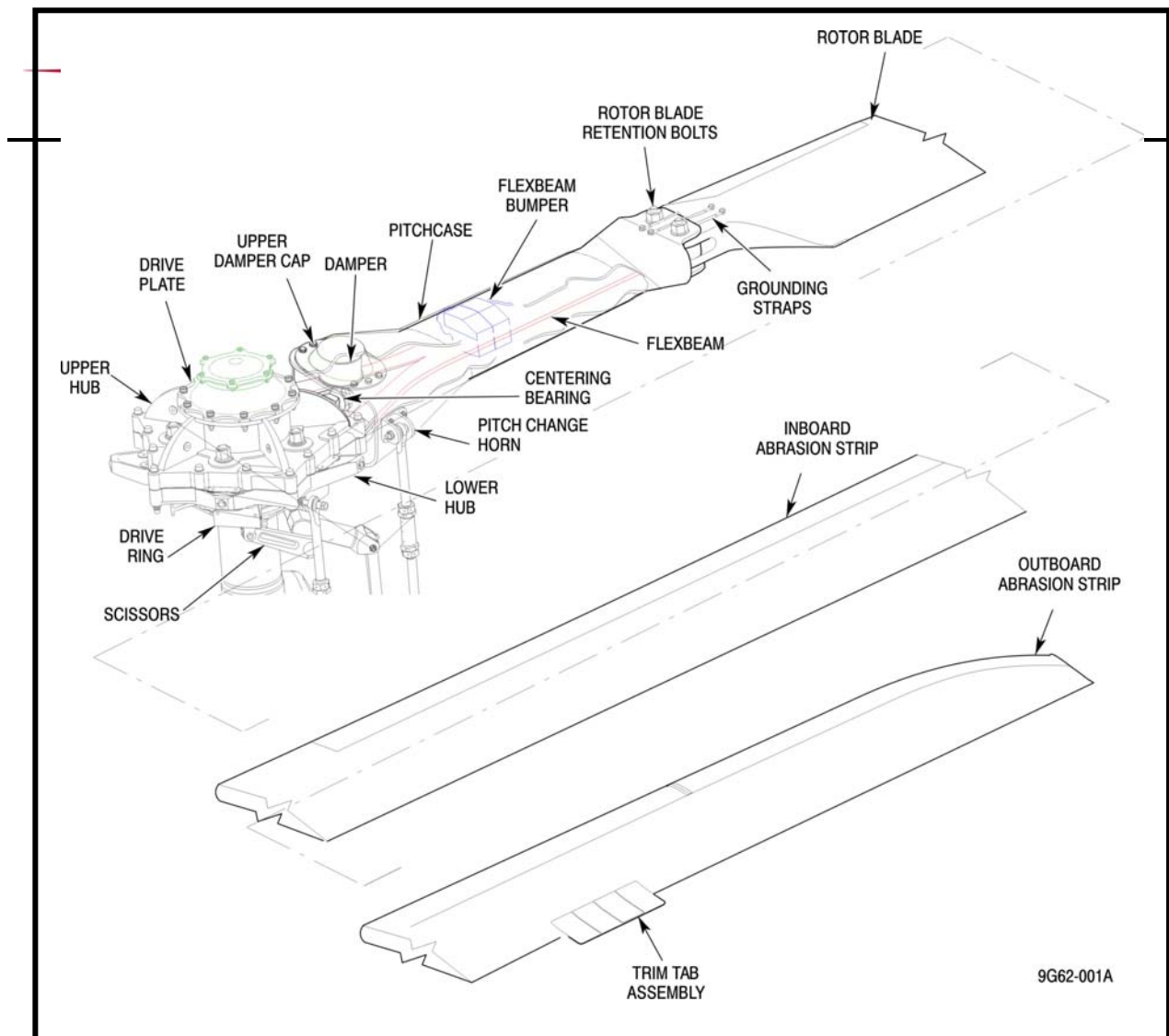
- NOTAR[®] fan drive shaft – The main rotor transmission drives the NOTAR[®] fan assembly through the NOTAR[®] fan drive shaft. The NOTAR[®] fan drive shaft is connected with flexible diaphragm couplings at each end. To prevent secondary damage in the event of flexible diaphragm coupling failure, the NOTAR[®] fan drive shaft includes anti-flail devices.
- Oil cooler – The oil coolers are two section coolers with an upper and lower part. The upper part is used to cool the transmission lubricating oil and the lower part is used to cool the engine lubricating oil. Each oil-cooler section is protected by a thermal/pressure relief valve that provides oil cooler flow when temperature exceeds 190F and pressure relief if differential pressure exceeds 60 pounds per square inch. Ambient air is drawn through the oil cooler by the oil cooler blower to cool the lubricating oil.
- Oil-cooler/blower – Oil-cooler/blowers attached to, and driven by, the main rotor transmission provide ambient air cooling flow through the two oil coolers. The oil cooler blowers are direct driven by the main rotor transmission.
- Rotor brake – A rotor brake is mounted on the NOTAR[®] drive shaft drive flange. The rotor brake is a hydraulically operated single-disc two-cylinder brake caliper that clamps onto the rotor and causes the NOTAR[®] fan drive shaft, main rotor transmission, main rotor drive shaft, and main rotor to stop rotating.

5.9.4 Main Rotor

The main rotor, shown below, consists of a five-blade, fully-articulated hinge-less flex beam. At 100-percent rotational speed (N_R), the main rotor turns at 392 revolutions per minute (695 feet per second tip-speed). Located approximately over the helicopter's center of gravity, the main rotor provides lift through collective pitch changes, and lateral and longitudinal control through cyclic pitch changes. The main rotor system is constructed of hardened aluminum alloy, steel, and composite materials.

The rotor hub assembly mounts the rotor system to the static mast and is attached to the drive shaft. The rotor hub rotates around a static hollow mast support tube that absorbs all of the flight loads.

Tapered roller bearings transfer all of the flight loads directly from the rotor hub into the static support mast, which is a non-rotating hollow mast fixed rigidly to a mast support base attached to the main structure of the helicopter by four V-shaped struts. Two of the support struts can be removed to allow the removal / installation of the transmission without disturbing the flight controls or the rotor blades.



MD 902 Explorer Main Rotor System

The flex beams connect to the rotor blades and are surrounded by the pitch case. The pitch case is a hollow, elliptically shaped tube that surrounds the flex beam and is attached to both the flex beam and the blade at the outboard end. The pitch case provides flap wise, chord wise, and torsional stiffness to the inboard end of the blade and transmits feathering control motions to the rotor blade. The pitch case is attached to the hub at the inboard end by elastomeric snubber/dampers.

The main rotor blade is constructed of fiberglass/epoxy with a hollow leading edge spar and Nomex honeycomb-filled trailing edge. The outboard 14 inch (36 cm) of the blade planform has a parabolic swept back taper. Near the tip, two pockets in the bottom of the rotor blade are provided for installing blade balance weights. Grounding brushes are incorporated for lightning strike and static electricity build-up protection.



5.9.5 Flight Control System

Flight controls integrate pilot inputs from the cyclic, collective, and anti-torque systems. The cyclic and collective control stick inputs are mechanically linked to the upper flight controls for longitudinal, lateral, and vertical control, and include hydraulic boost for pilot assistance.

The collective control system controls the vertical movement of the helicopter, the cyclic control system controls the attitude of the helicopter, and the anti-torque pedal inputs are transmitted to the NOTAR[®] fan and direct jet thruster for directional (yaw) control.

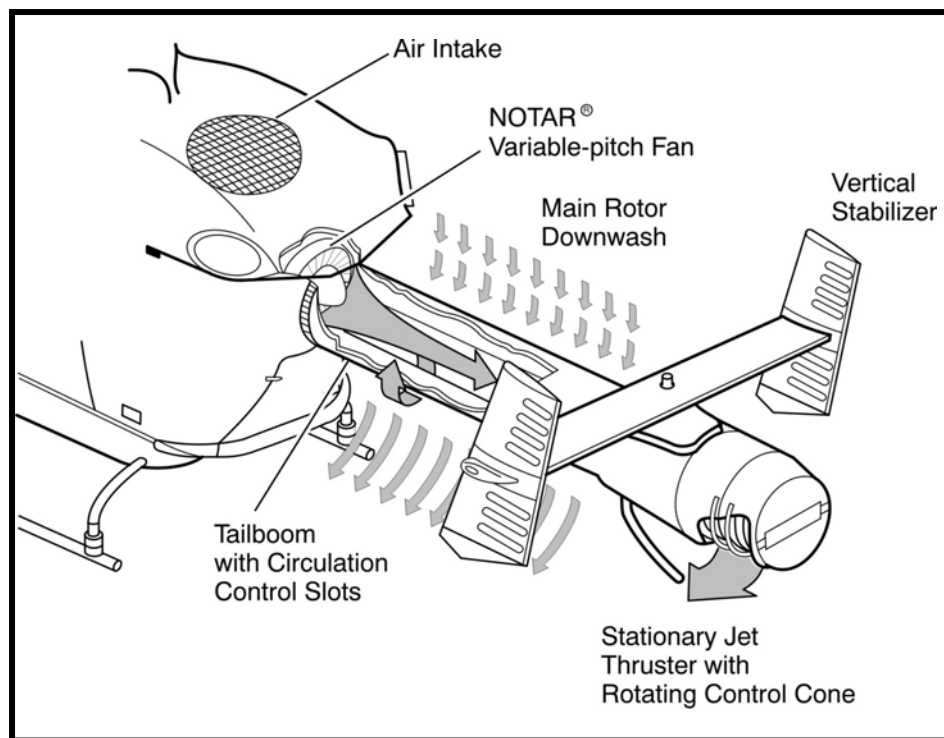
Trim actuators are used to reduce the aerodynamic flight loads transmitted to the cyclic during operation. Trim actuators compensate for imbalance conditions such as crosswinds and uneven aerodynamic load distributions on the rotor system during hover and flight. Trim actuator settings are determined by the flight crew using the cyclic trim switch.

5.9.5.1 Anti-Torque System

The NOTAR[®] anti-torque system (below) provides safe, quiet, responsive, foreign object damage resistant directional control. The enclosed variable-pitch composite-blade fan produces a low pressure, high volume airflow to pressurize the composite tail boom. The air is expelled through two slots that run the length of the tail boom on the right side. This causes a boundary-layer control that results in the tail boom acting as a wing, flying in the downwash of the rotor system, and producing up to 60-percent of the anti-torque required in a hover. The balance of the direction control is accomplished by a rotating direct jet thruster on the end of the tail boom. Two adjustable foot pedals provide anti-torque directional control inputs to control the NOTAR[®] fan blades and direct jet thruster. The pedals have a friction mechanism to allow the mechanic to vary the effort required to push the pedals for pilot comfort.

The NOTAR[®] system eliminates the mechanical disadvantages of a tail rotor, including long drive shafts, hanger bearings, and gearboxes. It reduces the overall helicopter vibrations, resulting in lowered pilot fatigue and increased passenger comfort.

Due to the design of the NOTAR[®] system which eliminates the spinning tail rotor, potential incidents caused by an exposed tail rotor are eliminated. The NOTAR[®] system not only has proven safety margin, it also provides up to a 50-percent reduction in noise over comparable helicopters.



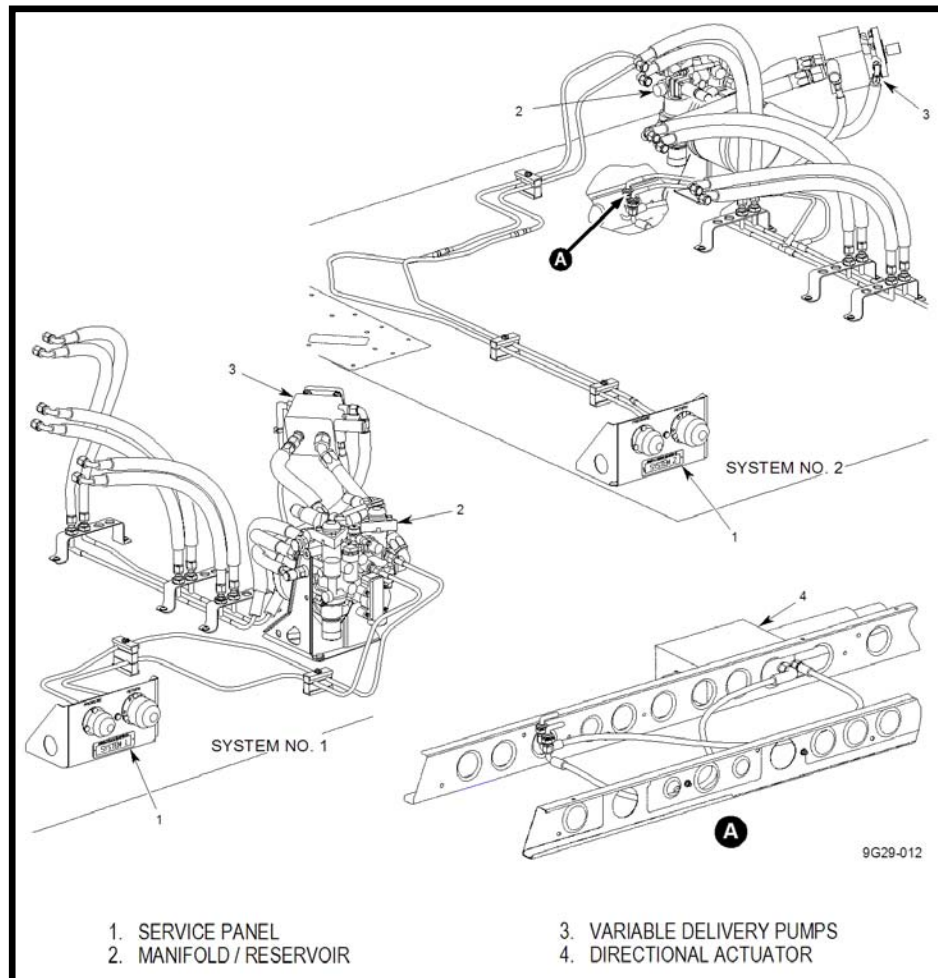
MD 902 Explorer NOTAR® Anti-Torque System

5.9.6 Hydraulic System

The hydraulic system (shown on the following page) supplies pressurized hydraulic fluid to flight control actuators. The hydraulic system consists of a dual-redundant system for reliability. The hydraulic system is also designed to allow manual or pressure-fill capability. The hydraulic system consists of:

- **Hydraulic pumps** – Dual-redundant hydraulic pumps supply pressurized hydraulic fluid to the hydraulic system. Integral spline shear couplings, which are designed to fail before the splined drive shafts, are incorporated to protect the hydraulic pumps and main rotor transmission. The hydraulic pumps also include compensator circuits designed to maintain the system pressure and compensate for any pressure degradation.
- **Manifold/reservoir** – Each manifold/reservoir receives fluid from the pump and provides pressurized hydraulic fluid through the system and to the control actuators, maintains system pressure, maintains the operating fluid level, and receives returned hydraulic fluid from the system.
- **Hydraulic plumbing lines** – The hydraulic plumbing lines include a combination of stainless steel tubing and fire resistant flexible hoses to transfer pressurized hydraulic fluid through the hydraulic system. A central hydraulic service connection panel is located on the left forward side of the fuselage upper deck.

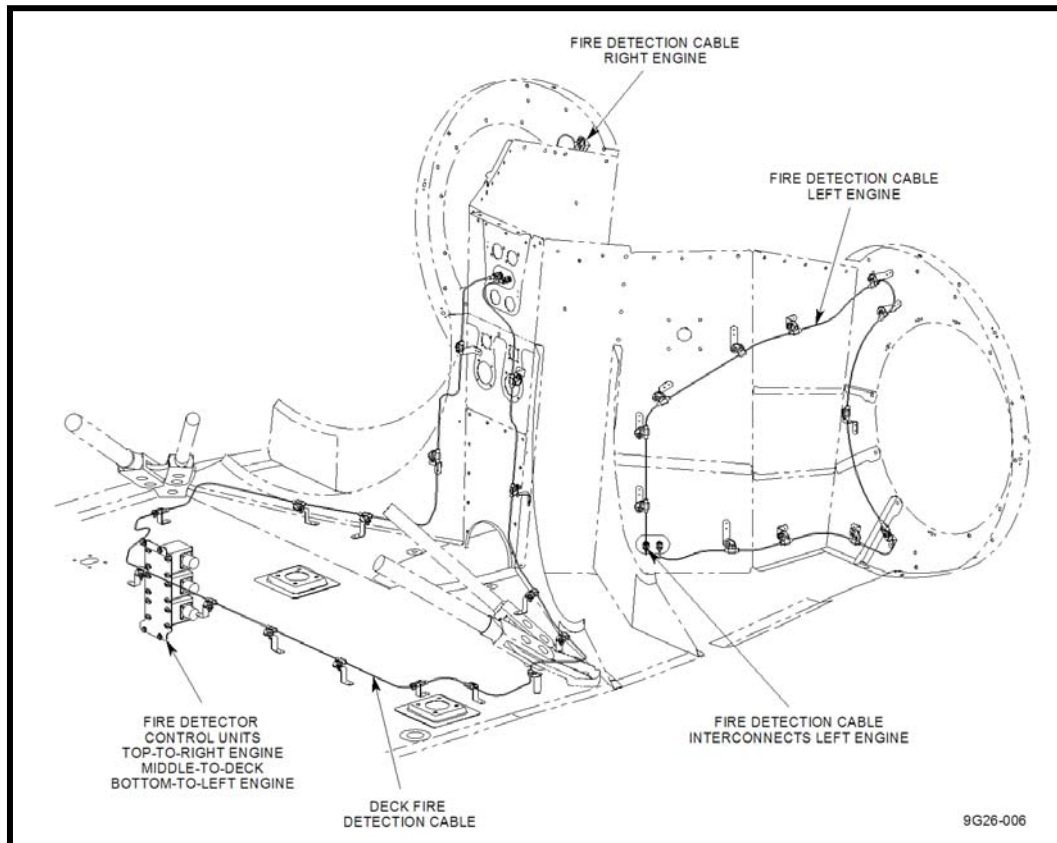
- Hydraulic fluid servicing connectors – Provides central, quick-connect-type, maintenance servicing location.
- Hydraulic hand pump – An external, manual hydraulic hand pump provides a method to fluid-service the hydraulic system when the pressurized quick-disconnect fill port servicing is not available. The hydraulic hand pump includes a manually-operated selector valve for system servicing selection, an extendable, folding pump handle, a sight glass for fluid level indication, and a reservoir drain plug.



MD 902 Explorer Hydraulic System

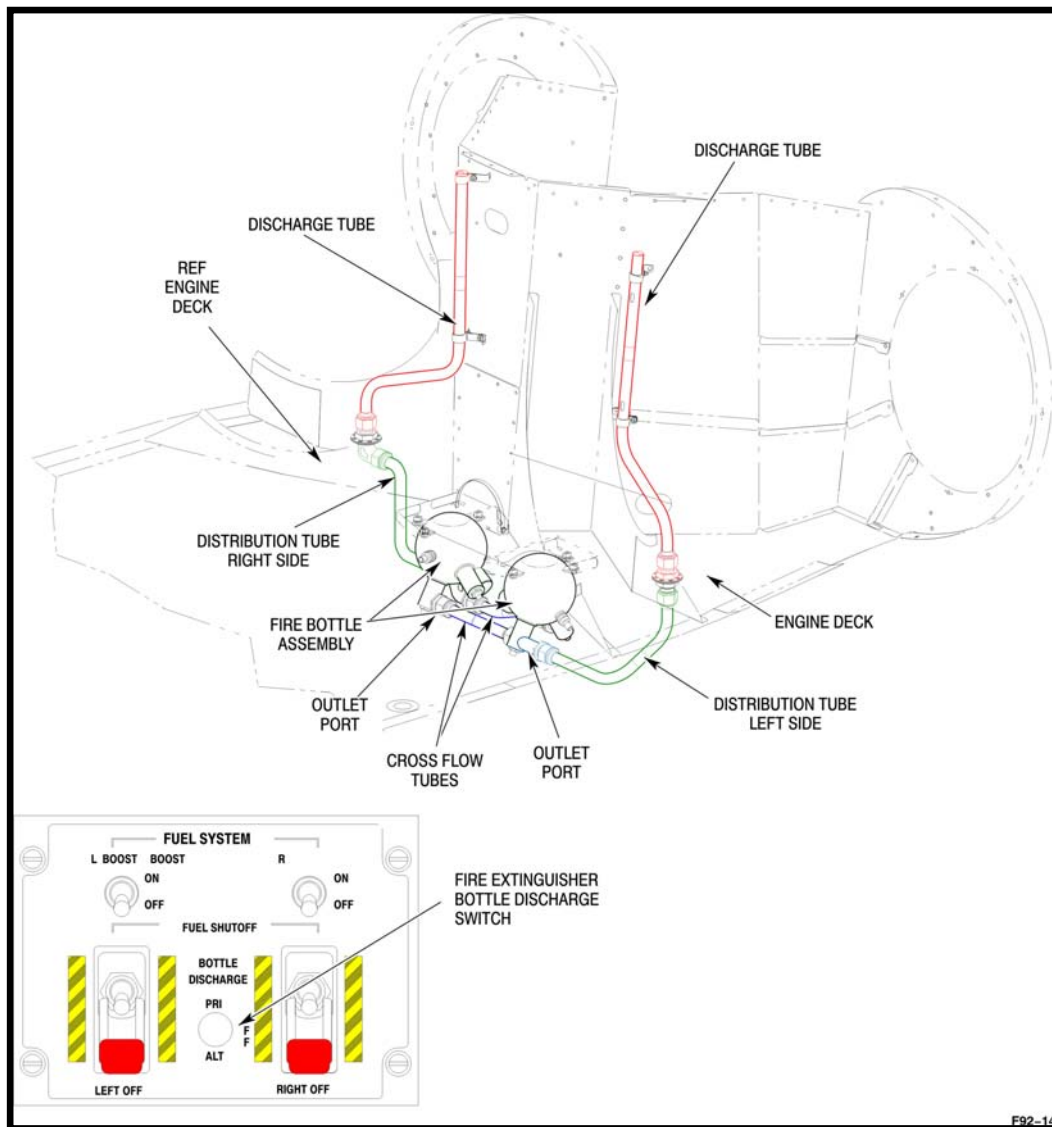
5.9.7 Fire Detection/Suppression System

An engine and main rotor transmission fire detection system (below) is included in the fuselage upper deck and aft area under and aft of the main rotor transmission and on the engine firewall in each engine bay. The fire detection system provides a means of detecting high temperature conditions and provides fire/overheat visual warnings to the cockpit. The fire detection system incorporates built-in test features that detect non-operating or malfunction conditions and provides failure detection indication to the cockpit.



MD 902 Explorer Turboshaft Engine and Main rotor Transmission Fire Detection System

In the event of an engine fire, a two-bottle fire extinguishing system (shown on the following page) is included in the fuselage upper deck and aft area for the engine compartment. Pressurized fire bottles provide Halon 1301 through stainless steel plumbing lines to the engine bay. Fire extinguishing system activation is manually accomplished from the cockpit by selecting electrical switches that activate fire-bottle embedded squibs to release the Halon 1301 at 700 psig. Manual switch selection of the second fire extinguishing bottle is accomplished from the cockpit similar to the first fire extinguishing bottle activation. Both fire bottles have external pressure indication gauges and low-pressure sensors to provide cockpit indication of a low-pressure fire extinguishing bottle condition.



MD 902 Explorer Turboshaft Engine and Main Rotor Transmission Fire Extinguishing System.

5.9.8 Electrical System

The electrical system generates and distributes power for operation and control of the helicopter systems. The MD 902 systems operate on 24-28 Vdc power, and do not require ac power. The electrical systems consist of a power generation subsystem and a power distribution subsystem.

On board power generation/distribution is provided through two methods; engine-powered starter/generators powering the essential bus and battery power powering the battery bus. The starter/generators provide 28 Vdc, 200-ampere power to the aircraft essential bus system. The



starter/generators are manually actuated by toggle-switches located on the electrical master panel after start-up, and are controlled by the generator control units.

The MD 902 battery provides power for ground start and backup power during flight. The battery provides power to the battery and essential bus system. The standard, 24 Vdc, 22-ampere hour Nickel-Cadmium battery is located in nose of the aircraft behind a battery access door for ease of maintenance. A 27- or 44-amp battery is an available option. The starter/generators provide battery charging during flight and the external ground power connection provides battery charging on the ground.

MD 902 Explorer Power Distribution Subsystem Consists of an Essential and Battery Bus

Essential Bus	Battery Bus
<ul style="list-style-type: none"> • Left generator control unit • Right generator control unit • Left engine fire indicator • Right engine fire indicator • Transmission fire indicator • Right cross-feed valve • Left fuel shutoff valve • Right fuel shutoff valve • Quantity fuel probes • Bleed air heat • Pitot heat • Left vertical stabilizer control system • Right vertical stabilizer control system • Instrument flood lights • Audio panel No. 1 • Navigation/communication No. 1 • Electronic flight instrument system 	<ul style="list-style-type: none"> • Left fuel boost pump • Right fuel boost pump • Fuel-low warning annunciator • Left FADEC • Right FADEC • Left FADEC override detent • Right FADEC override detent • Left ignition • Right ignition • Rotor brake caution annunciator • Fire detection system • Console lights • Instrument flood lights • Position lights • Hover and landing lights • Strobe lights • Avionics master switch • Encoding altimeter

The MD 902 has an external power receptacle designed to accept a three-prong plug. The receptacle is keyed to prevent incorrect installation, and is located aft of the right chin canopy within the pilot line of sight. External power input provides power to the battery and essential bus systems and the left and right generator buses. With incorporation of the higher-ampereage battery option, the external power receptacle is located in the rear baggage compartment area.

Power distribution is provided through the wiring harnesses to the electrical buses. The essential bus is located in the cockpit center console, and all other buses are located in the electrical load center which is mounted on the baggage compartment ceiling.



The wire harnesses have shielding to minimize electro-magnetic interference (EMI). Separation of cables and relocation of relays and contacts to the power distribution center also helps EMI. The electrical system and wiring maintain separation of the power generating systems. Wiring for each power generating system is physically separated on each side of the aircraft and does not pass through a single connector at any point on the aircraft. This prevents power to the essential bus being interrupted due to any single-point failure. Power to the redundant systems also is routed through separate harnesses and connectors.

5.9.9 Environmental Control System

The environmental control system consists of:

- Heat/defog system
- Fresh air vent system
- Air conditioning system.

The heat/defog system provides heated air to defog the windscreens and heat the cockpit and cabin areas. Engine heated bleed air is used to provide heated air to the windscreen or aircraft interior. The heat/defog system is pilot actuated through an electrical on/off switch. When activated, a flow control shutoff valve opens to allow engine heated bleed air to enter the aircraft ducting. Heated air flow is manually controlled using mechanical control cables to adjust heated airflow to the cockpit or cabin areas.

The fresh air vent system provides outside airflow into the cockpit and cabin areas. Outside air enters the fresh air ducts and is available to the cockpit and cabin areas by manual adjustment of gaspar assemblies that provide flow volume up to 20 cubic feet per minute. The cockpit has four gaspar assemblies and the cabin area has six. An integral two-speed vent fan can sustain fresh air flow at up to 180 cubic feet per minute. Vent fan control is provided from the cockpit.

The air conditioning system is a vapor-cycle type system that provides conditioned air to cool the cockpit and cabin areas. Air conditioned air is routed through the fresh air vent system gaspar assemblies. The cockpit has four gaspar assemblies and the cabin area has six. Air conditioning control is provided by from the cockpit.

5.9.10 Integrated Instrumentation Display System

The integrated instrumentation display system (IIDS) is the main display for MD 902 aircraft systems performance and monitoring. The IIDS, a 28 Vdc center-mounted digital and analog information processing, storage, and display system, receives input from various system components for status display, limit checking and display (warning/caution indication), operation information, trend data, rotor, and NOTAR[®] fan balance monitoring, and data logging. Audible warnings are also provided to the pilot headset (in addition to visual indication) for:

- Low rotor speed (airborne indication when either engine is inoperative and rotor speed is less than 95-percent, or when both engines are inoperative and rotor rpm is less than 85 percent)
- Engine failure



- Fire detection
- Cabin heat disable
- Battery hot
- FADEC failure.

The IIDS interfaces with, and monitors, the following aircraft systems:

- Fuel - Quantity, level, pressure, left/right fuel solenoid valve position, fuel flow, low fuel, filter impending bypass
- Powerplant (left/right engine) - Engine failure, torque, oil pressure, low oil pressure, oil temperature, Ng speed, exhaust gas temperature, chip detection, FADEC critical fault
- Fire Extinguishing - Fire detection, fire extinguisher low pressure
- Power train - Transmission low oil pressure, oil temperature, chip detection, main rotor speed (low/high), main rotor brake activation
- NOTAR[®] system - NOTAR[®] azimuth sensor/reference, NOTAR[®] vibration
- Flight Control (VSCS) - Left/right stabilizer failure
- Hydraulic - Left/right hydraulic temperature/pressure
- Environmental Control System – Bleed-air leak, cabin heat disable
- Electrical System - Left/right generator out, load, battery hot, battery discharge, battery temperature
- Internal IIDS functionality - Balance monitoring system, fault indication/logging, time of day
- Airframe – Outside air temperature, pitot tube heat failure, cabin door open, baggage door open, weight on cargo hook, cargo hook open, IPS condition, NACA door position.

The IIDS also has built-in test features, and stored data can be downloaded through a display-panel-mounted computer cable connector.

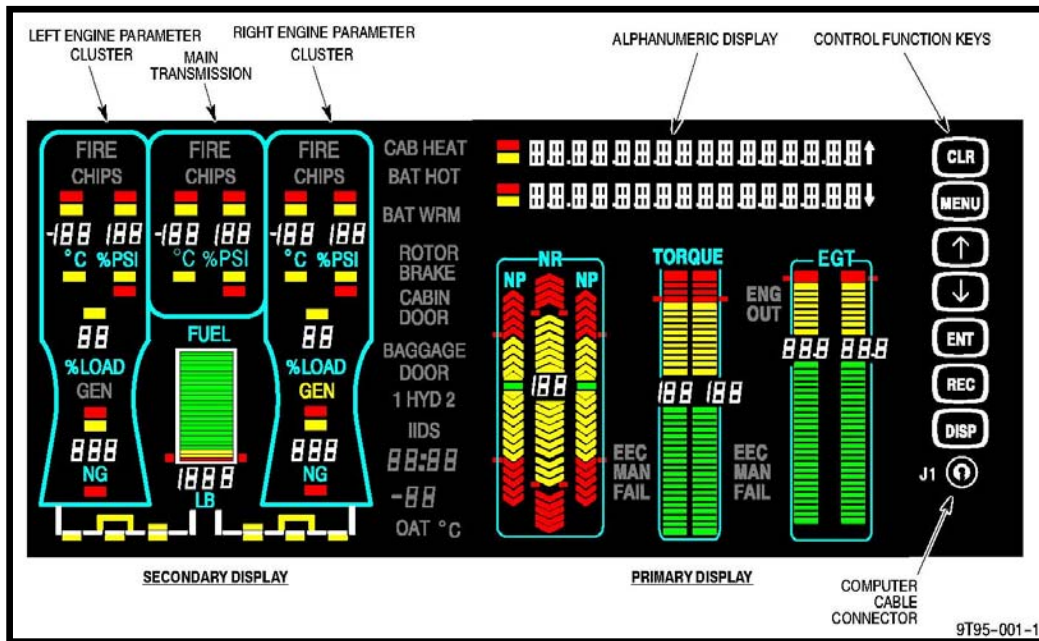
5.9.10.1 Integrated Instrumentation Display System Display Panel

The IIDS front-mount display panel is a fixed-format, color, liquid-crystal display that presents digital and analog systems information. The display is back-lighted, intensity adjustable, and readable in sunlight conditions. Seven control-function keys are used to control IIDS data function, access menus/submenus, enter data, retrieve logged data, and perform aircraft systems condition monitoring and balance monitoring system functions.

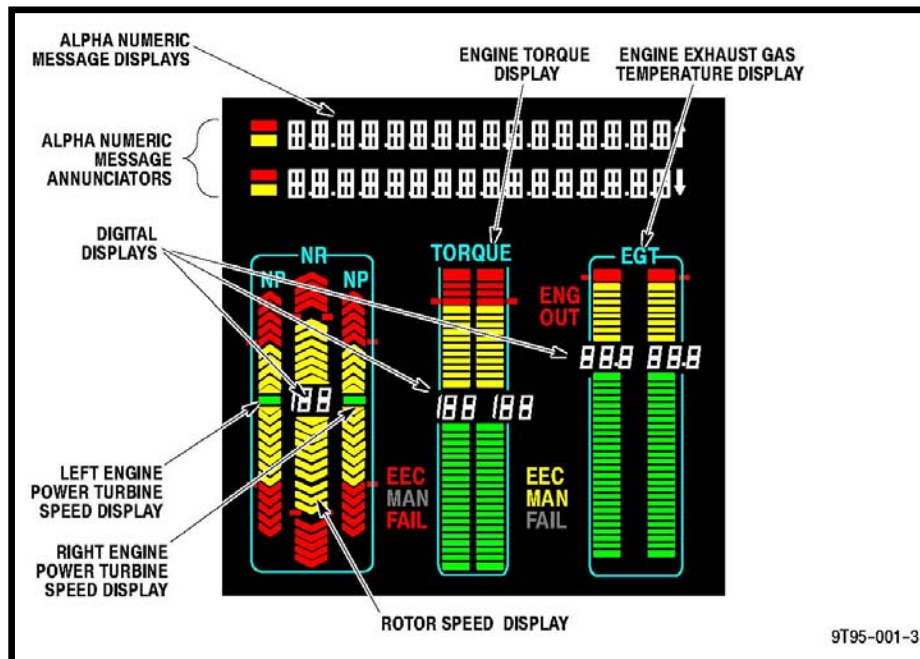
5.9.10.1.1 Integrated Instrumentation Display System Primary Display

The primary display provides system status indication for both engine power turbine (N_P) speed, torque, EGT, main rotor speed (N_R), as well as a two-line alpha numeric display. The primary display also provides warning and caution annunciation. Normal operating conditions are displayed in green, caution conditions in yellow and warning conditions in red.

The alpha-numeric display has two sixteen-character lines providing warning, caution, and advisory messages to the pilot (these are displayed in white). To the left of the alpha-numeric display are red (warning conditions) and yellow (caution conditions) annunciators.



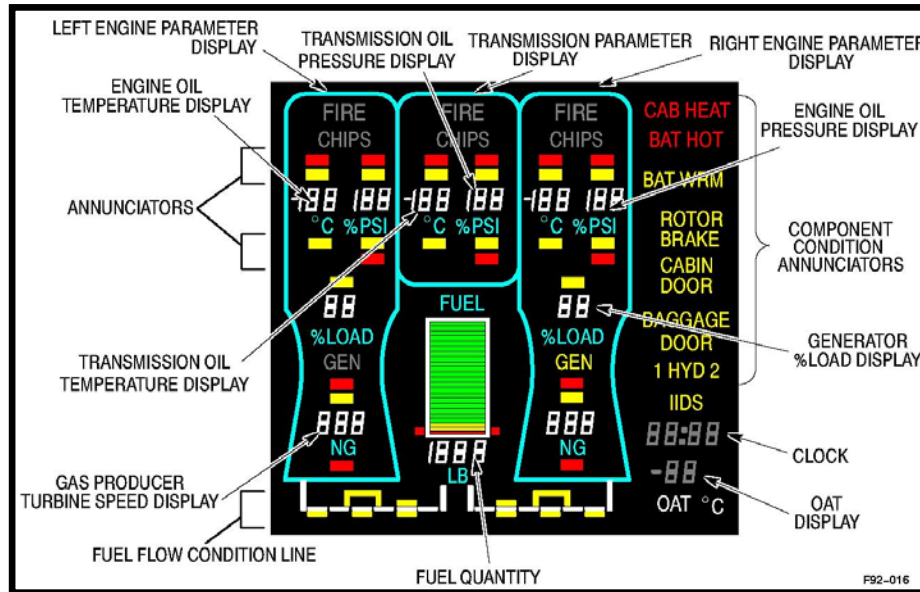
The MD 902 Explorer IIDS Display Panel



MD 902 Explorer IIDS Primary Display Panel

5.9.10.1.2 Integrated Instrument Display System Secondary Display

The secondary display can be configured by the pilot as either continuous – continual display of all information – or by exception – display information when monitored item performance is within 10 percent of exceedance.



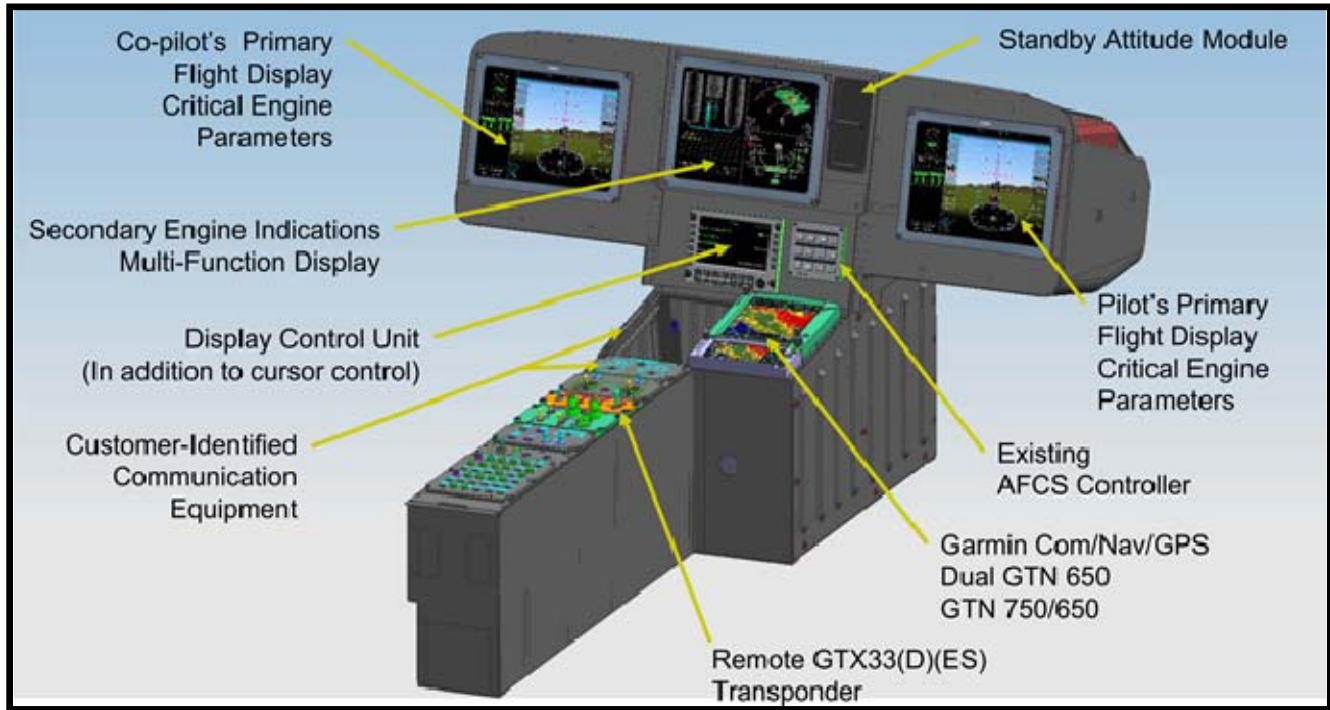
MD 902 Explorer IIDS Secondary Display Panel

5.9.11 Next-Generation Digital Electronic Flight Instrument System

The next-generation digital electronic flight instrument system (EFIS), which will be implemented into the MD 902, incorporates the functions of separate attitude direction indicator, horizontal situation indicator, airspeed, altitude, vertical speed, and turn coordination instruments. The EFIS can be configured with either a single or dual primary flight display and a multi-function display, which includes an engine indicating and caution advisory system (EICAS) display.

The EFIS provides expanded situational awareness, incorporating engine information, charts, navigation and mapping, weather, terrain, and synthetic vision display. It will be certified for single pilot operation, day and night operations, VFR/IFR operations, Category 1 instrument approach procedures, localizer performance with vertical guidance approach, and Category A operations.

The pilot will be able to interface directly with the display system via cursor control located on the pilot and copilot cyclic grips. The system has built-in redundancies eliminating any potential for single-point failures.



MD 902 Explorer Next-Generation Digital Electronic Flight Instrument System



THIS PAGE INTENTIONALLY LEFT BLANK



6. PERFORMANCE SPECIFICATIONS

The MD 902 aircraft has a standard-configuration empty weight of 3,373 pounds (1,531 kg). The maximum takeoff gross weight is 6,500 pounds (2,948 kg) with a weight increase option to 6,700 pounds (3,071 kg). Ratings are for the MD 902 with two P&WC Model 207E turboshaft engines rated at 710 shp (530 kW) each, derated to take-off power – 550 shp (410 kW), maximum continuous power – 500 shp (373 kW).

MD 902 Explorer Performance Specifications

Parameter	Condition	Rating, Pounds (lb)				
		5,500 lb	6,000 lb	6,250 lb	6,500 lb	6,770 lb
Maximum Cruise Speed, Kt (mph)	KTAS Sea Level ISA	136 (157)	135 (155)	134 (154)	131 (152)	100 (115)
	KTAS 5,000 ft, ISA	139 (160)	136 (157)	135 (155)	131 (152)	--
Maximum Permitted Speed, Kt (mph)	V _{NE} (KCAS) at Sea Level	140 (161)	140 (161)	140 (161)	134 (154)	100 (115)
Maximum Range, nm (mi)	Sea Level, ISA	262 (302)	262 (298)	257 (296)	317 (364)❶	302 (348)❶
	5,000 ft, ISA	303 (349)	297 (342)	293 (337)	328 (377)❶	325 (374)❶
Maximum Endurance, hr	Sea Level, ISA	3.1	3.0	2.9	3.4❶	3.4❶
	5,000 ft, ISA	3.4	3.3	3.2	3.7❶	3.5❶
Maximum Rate-of-Climb (TOP-AEO), ft/min	Sea Level Standard	2,760	2,420	2,270	2,120	1,970
	ISA +20C Day	2,740	2,390	2,230	2,080	1,925
Maximum Operating Altitude, ft	Density Altitude	20,000	20,000	20,000	14,000	3,000
Service Ceiling, ft	ISA @ 100 ft/min	20,000	20,000	38,000	14,000	3,000
Hover-in-Ground Effect (HIGE), ft	Standard Day	15,300	13,400	12,200	10,650❷	3,000
	ISA +20C Day	13,000	10,300	9,000	9,400❷	3,000
Hover-Out-of-Ground Effect (HOGE), ft	Standard Day	14,000	11,400	10,400	8,780	3,000
	ISA +20C Day	11,100	8,300	6,900	7,480	3,000



MD 902 Explorer Performance Specifications

Parameter	Condition	Rating, Pounds (lb)				
		5,500 lb	6,000 lb	6,250 lb	6,500 lb	6,770 lb
Certification Limits						
Standard Weight, lb	Maximum Internal Takeoff Weight				6,500	6,770
	Maximum External Gross Weight				6,900	6,900
Maximum Takeoff and Landing Density Altitude, ft				12,000	5,000	3,000
Empty Weight, lb	Standard Configuration				3,375	3,375
	Industrial Configuration				3,226	3,226
Useful Load, lb	Maximum Internal				3,125	3,395
	Maximum Internal Plus External				3,525	3,525
Cargo Hook Structural Rating, lb					3,000	3,000
Fuel Capacity, lb (gal)	Usable				1,309 (194.4)	1,308 (192.4)
	Total				1,327 (195.1)	1,327 (195.1)
NOTES: ❶ Auxiliary tank – total fuel load of 1,308 lb, no reserves ❷ HIGE operations are currently limited by the takeoff and landing limit of 5,000 ft density altitude.						

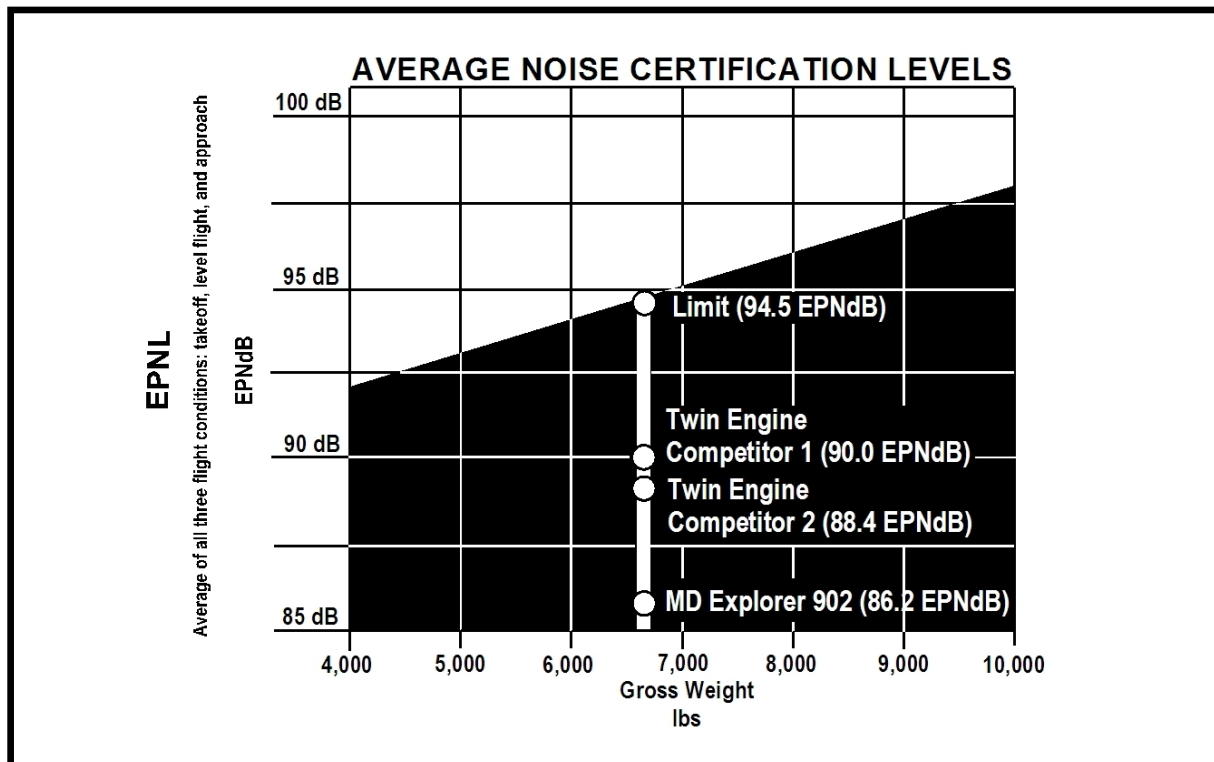
6.1 Environmental Impact

The MD 902 noise levels are below the FAA Part 36, Appendix H and ICAO noise requirements and have the greatest compliance margin of any twin engine helicopter currently built. The following table provides the decibel values of three MD 902 flight profiles. The figure below provides a noise level comparison (effective perceived noise level [EPNL], in decibels [dB]) for three helicopter models and the International Civil Aviation Organization (ICAO) limit.



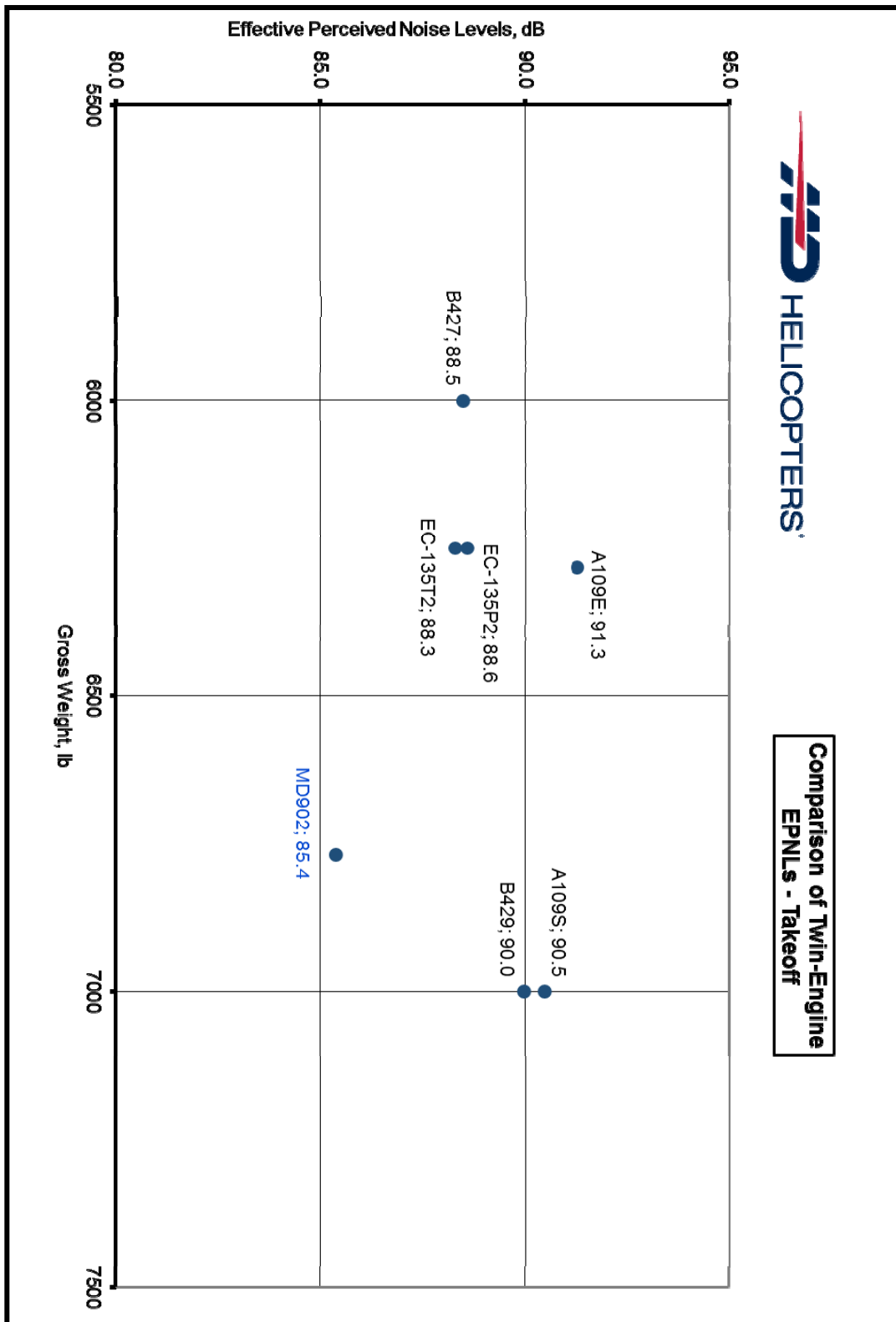
MD 902 Explorer Operational Noise Levels for Three Flight Profiles

Flight Profile	Measured value, EPNdB	ICAO Limit	Compliance Margin
Takeoff	85.4	94.5	8.9
Level Flyover	83.5	93.3	9.8
Approach/Landing	89.6	95.3	5.6



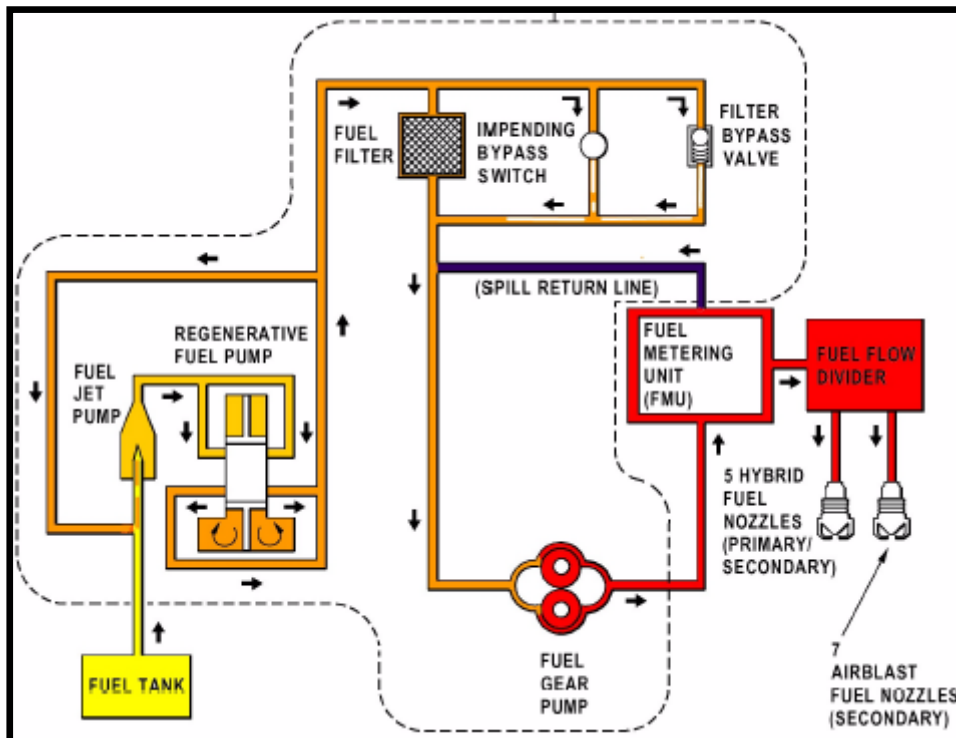
**Twin-Engine Helicopter Average Noise Certification Level (EPNL, dB)
ICAO-Limits Comparison**

Primarily due to the NOTAR[®] design, the MD 902 provides up to a 50-percent reduction in noise over comparable helicopters. The figure below provides a comparison of takeoff effective, perceived noise levels (EPNLs) of competitor twin-engine aircraft using European Aviation Safety Agency (EASA) data. This figure shows the MD 902 takeoff EPNLs are far below comparable twin-engine aircraft EPNLs. Similar EPNL values are achieved for the approach noise profile.



The MD 902 Helicopter has the Lowest Takeoff Effective Perceived Noise Levels of Comparable Light Twin-Engine Helicopters

A closed-loop fuel system is incorporated to control fuel/vapor exposure to the environment. In addition, the fuel tank lines incorporate self-sealing frangible valves to prevent fuel from leaking in the event of a hard landing, and roll over valves that automatically close to prevent fuel lost through the vent system when a pitch or roll angle of 45-degrees is exceeded.

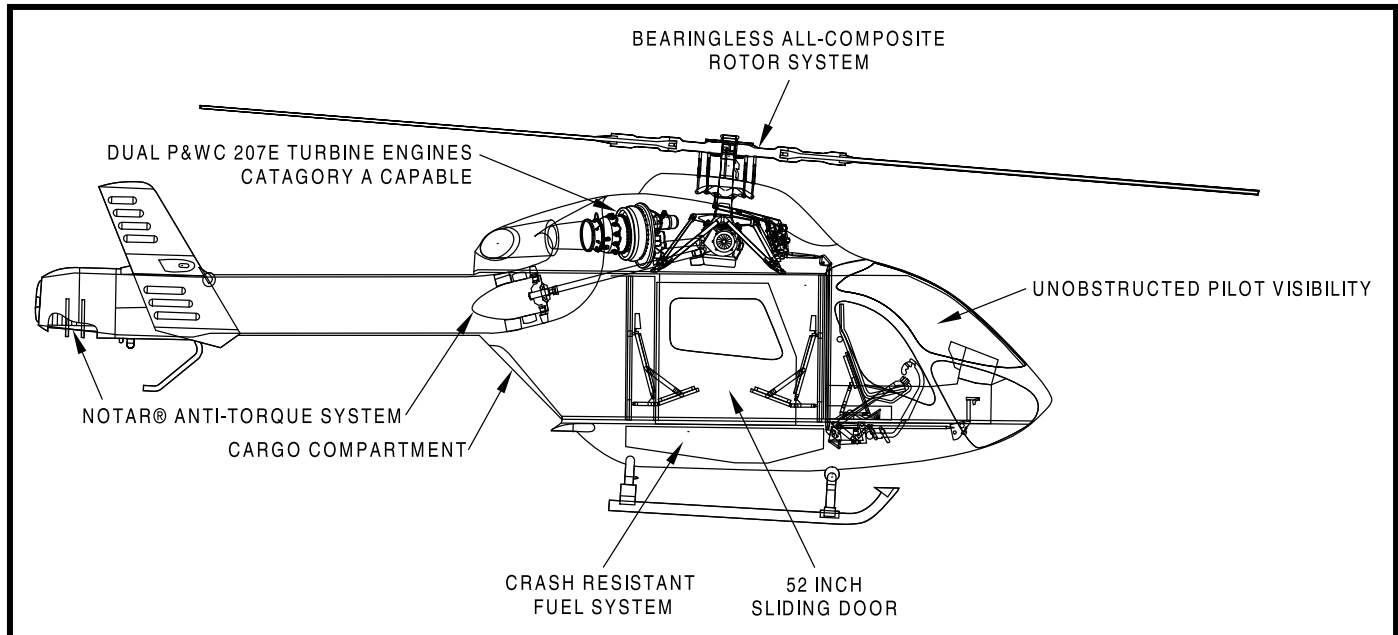


MD 902 Explorer Self-Contained Fuel System

6.2 Safety

The MD 902 incorporates safety features not offered with other helicopter designs as shown in the figure below. The MD 902 cabin is large for the light-twin engine class of helicopters. The cabin is accessed through two 4.33 ft (1.32 m) sliding cabin doors having emergency egress windows. The emergency egress windows also incorporate sliding windows for added ventilation. A large baggage compartment is also provided. Energy absorbing, stroking seats meet stringent FAA Part 27.561, 27.562, and 27.563 requirements. The design of the MD 902 helicopter has no tail rotor and eliminates the typical spinning tail rotor that can cause severe injury or death. Due to the design of the NOTAR[®] system which eliminates the spinning tail rotor, potential incidents caused by an exposed tail rotor are eliminated. Twenty-one percent of helicopter accidents are attributable to the tail rotor. The NOTAR[®] design also reduces pilot workload. Additional inherent safety features include:

- Twin engines (Category A performance)
- Static mast design with transmission retention, eliminates vibration transfer to the cabin



The MD 902 Explorer Incorporates Inherent Safety Features Different from Traditional Helicopter Designs

- Static mast, hub, and transmission are mounted on titanium struts preventing direct contact between transmission and upper deck; reducing vibration and increasing passenger safety
- High-intensity-radiated-field (HIRF) protected fuselage
- Unobstructed pilot visibility for situational awareness
- Part 27 crashworthy airframe
- Part 27 Passenger energy-attenuating seats
- Part 27 crash resistant fuel system
- Fuel cell positioned between twin deep-keel beams
- Landing gear provides 20-percent of total aircraft energy absorption
- Helicopter is less sensitive to wind direction
- Main rotor height of 10-feet, providing ground crew and passenger added safety
- MD 902 has the smallest footprint of the light-twin class helicopters
- The NOTAR® system improves safety:
 - Elimination of tail rotor strikes
 - No dramatic center of gravity shift with loss of conventional tail rotor gearbox
 - Reduced pilot workload; Pilot can concentrate on piloting
 - Less sensitive to wind direction
 - Enhanced safety in confined areas
 - No drive shafts, hangar bearings, or 90-degree gearboxes
 - Significantly foreign object damage tolerant
 - Flyable with fan drive loss.



6.2.1 Crashworthiness

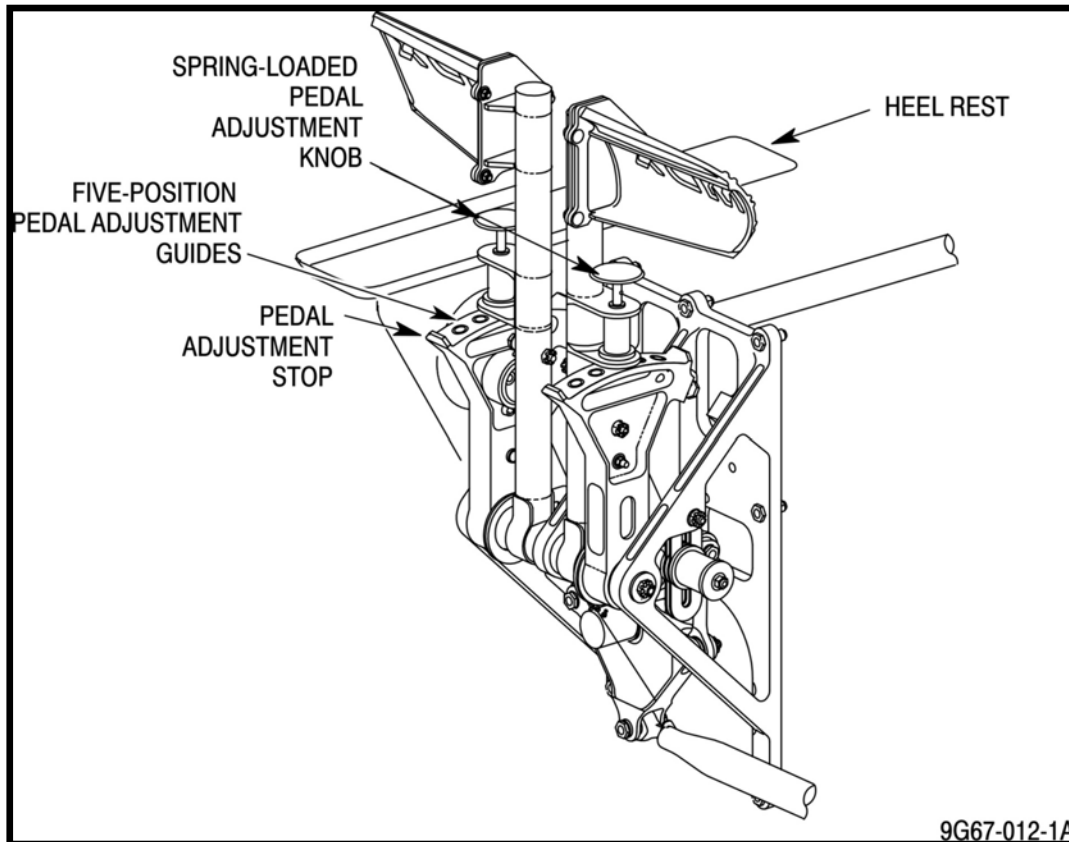
The MD 902 has inherent safety features for occupant safety and crash worthiness for impacts up to 30g at 30 feet per second. Fuel cells are separated away from the outer skin, rupture resistant and are enclosed by two deep keel beams. All fuel lines incorporate frangible fittings that fail-sealed in a crash event. Extra fire retardant materials are installed between the engine and passenger compartments. The composite aircraft structure has been manufactured with material that absorbs/disburses lightning-strike energy, and the aircraft is high-intensity radiated frequency protected. The aircraft incorporates energy-attenuating crashworthy crew and passenger seats with attached five-point seat restraints for the flight crew and three or four-point seat restraints for the passengers. All seating meets FAR/JAR 27.562 emergency landing dynamic requirements.

6.3 Human Systems Interface

The MD 902 incorporates anthropometric design features that are compatible with 25th to 95th percentile male or female crewmembers. Sizing parameters for the 25th and 95th percentile male and female are provided in the table below. The anti-torque pedals, shown in the figure on the following page, include spring-loaded quick detent pins with five-position adjustments to accommodate the 25th to 95th percentile female/male flight crew members. Each cockpit crew seat is anthropometrically designed for a 25th percentile female to a 95th percentile male occupant, and has a combined vertical and horizontal fore and aft adjustment of three inches with seven positions. Seat adjustment controls are located at the center of the seat. Forward and aft seat adjustment also includes an automatic tilt feature that tilts the seat back from 18 degrees in the forward position, to 20 degrees in the rearward position. A seat belt inertia-reel lock is provided for pilot/copilot comfort.

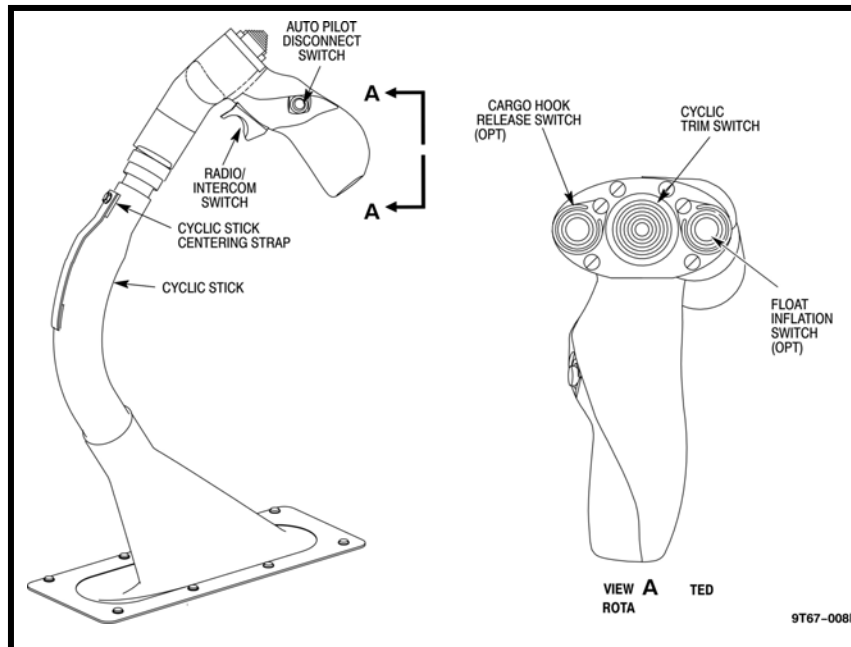
Anthropometric Sizing Parameters

Parameter	25th Percentile Female	95th Percentile Female	25th Percentile Male	95th Percentile Male
Weight, lb (kg)	119.3 (54.1)	164.5 (74.6)	142.6 (64.7)	201.8 (91.5)
Height, in. (cm)	62.4 (158.5)	68.5 (174.0)	67.0 (170.1)	73.9 (187.7)
Elbow – Hand Grip Reach, in. (cm)	12.5 (31.7)	14.1 (35.8)	13.7 (34.8)	15.4 (39.1)
Thumb Tip Reach, in. (cm)	27.9 (70.8)	31.4 (79.7)	30.4 (77.2)	34.2 (86.9)
Functional Leg Reach Length, in. (cm)	39.2 (99.6)	43.2 (109.7)	43.5 (110.5)	46.0 (116.8)

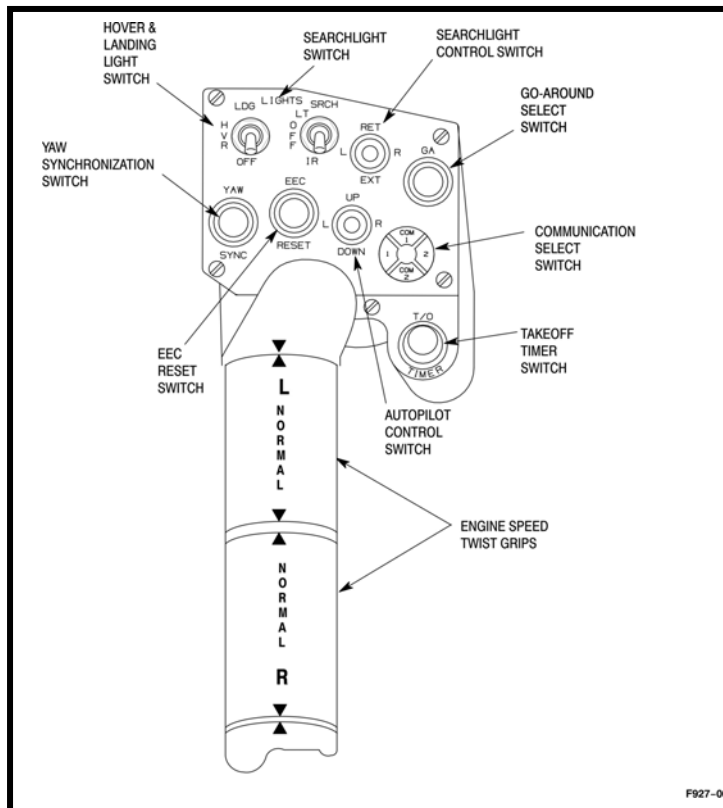


MD 902 Explorer Anti-Torque Pedals have Multi-Position Pedal Adjustments

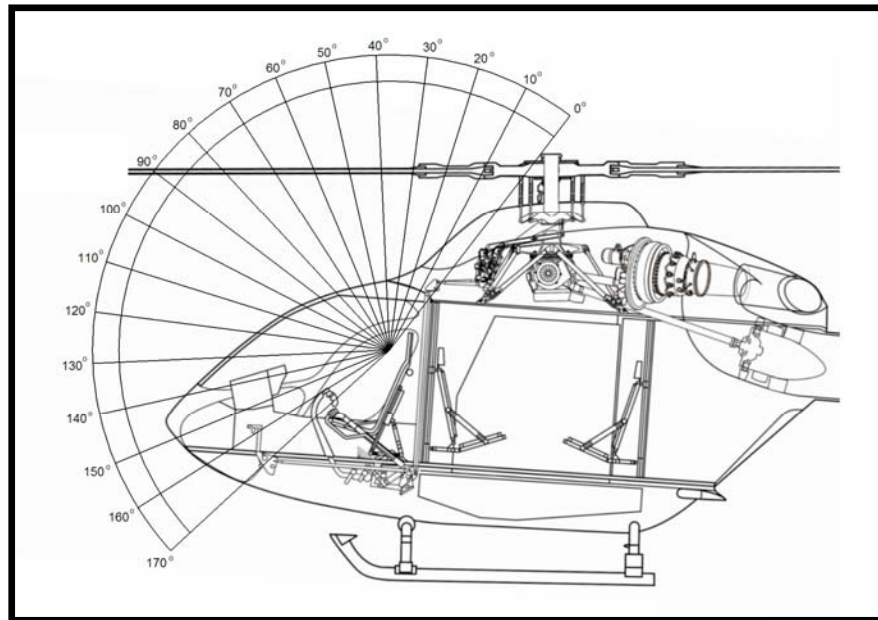
A uniquely shaped cyclic control, which hinges below the floor, allows the pilot to move the control to any extreme, while maintaining a forearm-thigh resting position. The collective control incorporates a magnetic clutch that holds the last commanded position. Cyclic and collective controls are shown below. Canopy design meets human systems integration design requirements for windows, canopies, and windshields. The canopy design provides more than a 160-degree unobstructed vertical field of vision for the pilot and copilot and a 230-degree unobstructed, overlapping, horizontal field of vision for the pilot and copilot. These are shown in the figures below.



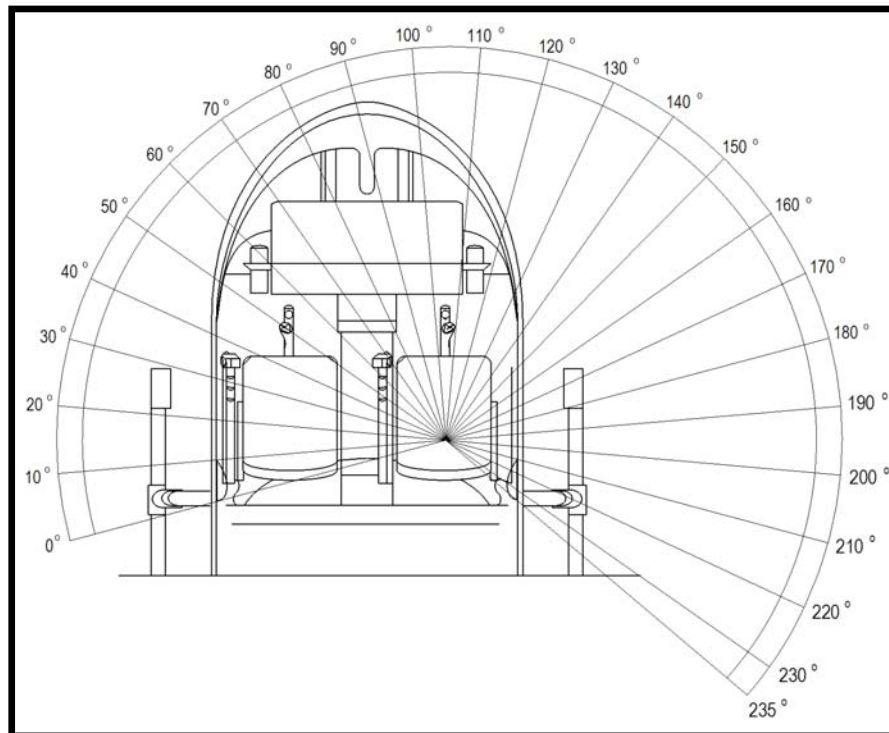
MD 902 Explorer Cyclic Offers a Unique Design for Pilot Ease of Use



MD 902 Explorer Collective Provides Closely-Grouped Pilot Controls



The MD 902 Explorer Provides more than a 160-Degree Vertical Unobstructed View for the Pilot and Copilot.



The MD 902 Explorer Provides a 230-Degree Horizontal Unobstructed View for the Pilot and Copilot (View is Top-Down).



7. MAINTENANCE AND SERVICING

The MD 902 helicopter was designed for ease of supportability and low-cost operation. Helicopter systems and components are easily accessed and can be maintained at the lowest maintenance level possible. The helicopter was designed for both a high level and ease of replacement of line replaceable units (LRUs). The helicopter can be maintained at the line-/shop-maintenance level using common hand tools, with easy to understand technical publications. The MD 902 helicopter spare parts are readily available, and are commercially-available off the shelf components.

7.1 Maintenance

The MD 902 design provides for the maximum maintenance support at the lowest maintenance level. The MD 902 can be maintained using a combination of line and shop maintenance support. Components such as engine, avionics, interior components, air-conditioning, etc., are considered LRUs. Line replaceable units (and any sub-component shop replaceable units [SRUs]) can be removed and replaced easily and modularly, as necessary, and at the lowest maintenance level allowed.

Typical for small- to mid-sized helicopter systems are fixed time between overhaul (TBO) intervals for the engine, transmission, main rotor, and flight controls. Within these items are also life-limited components that must be monitored and replaced at the end of life hours. When required, components requiring further maintenance action can be removed and forwarded to the appropriate-level shop.

The MD 902 helicopter airframe uses an on-condition maintenance concept, which allows scheduled inspections/checks. To be compliant with commercial regulatory requirements, an MD 902 continued airworthiness inspection program was developed by MDHI. This program provides for schedule inspections, and also includes life-limited component replacement. To remain compliant with commercial regulatory requirements, operators can develop their own inspection program for commercial-regulatory approval or can select the MDHI developed airframe periodic inspection program (APIP) or airframe segmented inspection program (ASIP). The APIP and ASIP details are provided in the MD 902 rotorcraft maintenance manual. The MD 902 is designed to be maintained at the line-level for the life of the helicopter.

Airframe-related inspection intervals occur every:

- 50 hours
- 100 hours
- 300 hours
- 400 hours
- 500 hours
- 600 hours
- 1000 hours
- 1200 hours



- 2000 hours
- 5000 hours
- One year
- Two year
- 5 year
- Special time-phase inspections.

The engine also has life-limited components, a fixed TBO, and inspection interval. Life-limited parts, inspection intervals, and overhaul intervals are listed in the following table.

MD 902 Explorer Life-Limited Parts, Inspection Intervals, and Overhaul Intervals

Component	Life-Limit, Hours	Inspection Interval, Hours	Overhaul Interval, Hours
AIRFRAME			
Control Cable Attach Bracket	--	300	--
Elastomeric Spring Damping	2,000	2,000	--
Empennage Bellcrank	2,700	--	--
Fire Extinguisher Cartridge	10 Years	--	--
Fuselage	--	5,000	--
Tail Boom	--	5,000	--
ENGINES			
Engine	--	--	4,000
Starter/Generator	--	300	1,200
ENVIRONMENTAL CONTROL SYSTEM			
Compressor Reduction Gearbox	--	600	--
FLIGHT CONTROLS			
Detent Module Assembly	--	--	18,750
Lateral Gradient Spring Assembly	10,000	--	--
Longitudinal Gradient Spring Assembly	10,000	--	--
Trim Actuators	-	300	--
FUEL SYSTEM			
Auxiliary Fuel Transmitter	--	300	--
Fuel Cell	--	100	--
Fuel Transfer System	--	100	--
HYDRAULIC SYSTEM			
Hydraulic Pump Assembly	--	--	4,000
Dual Servo-actuator Hydraulic Unit	--	--	2,500
LANDING GEAR			
Landing Gear Damper Assembly	5,000	--	--
MAIN ROTOR			
Bellcrank Lateral Mixer	13,000	--	--



MD 902 Explorer Life-Limited Parts, Inspection Intervals, and Overhaul Intervals

Component	Life-Limit, Hours	Inspection Interval, Hours	Overhaul Interval, Hours
Blade Assembly	11,460	--	--
Blade Retention Bolt	10,750	--	--
Centering Bearing	--	50	--
Collective Drive Link Assembly	3,307	--	--
Damper	4,095	--	--
Drive Ring	2,890	1,000	--
Droop Stop Striker Plate	10,000	1,000	--
Droop Stop Support	1,580	1,000	--
Flex Beam	--	50	--
Hub Liner	20,000	--	--
Hub Plate	10,000	--	--
Hub Retention Nut	10,000	--	--
Lower Damper Cap	10,000	500	--
Lower Hub Assembly	10,750	--	--
Main Rotor Assembly	--	100	--
Non-rotating Swashplate Assembly	1,800	--	--
Rotating Swashplate Assembly	7,285	--	--
Spherical/Slider Self-Aligning Plain Bearing	12,807	--	--
Swashplate Angular Contact Ball Bearing	--	2,000	2,000
Upper Bearing	--	400	--
Upper Damper Cap	10,000	--	--
Upper Hub Assembly	10,000	300/1000	--
NOTAR® ASSEMBLY			
Fan Blade Assembly	3,800	100	--
Fan Hub	5,000	100	--
Fan Pitch Assembly	--	600	--
Fan Pitch Bearing	--	600	--
Fan Shaft Coupling	10,000	--	--
Fan Support Assembly	10,000	600	--
Fan Support Shaft Bearing	--	600	--
Pitch Plate	3,527	--	--
Tension-Torsion Strap	2,500	300 /1,200	--
TRANSMISSION AND DRIVE ASSEMBLY			
Aft Truss Deck Fitting Assembly	19,990	--	--
Acoustic Isolator	--	1,000	--
Blower Impeller	6,885	--	--
Chip Detector	--	100	--



MD 902 Explorer Life-Limited Parts, Inspection Intervals, and Overhaul Intervals

Component	Life-Limit, Hours	Inspection Interval, Hours	Overhaul Interval, Hours
Input Drive Shaft	--	300 /1,200	--
Left-Hand Mid-Aft Truss Strut Assembly	24,158	--	--
Main Rotor Drive Plate	--	100	--
Main Rotor Drive Shaft	1,450	300	--
NOTAR [®] Fan Drive Shaft	--	300 /1,200	--
Static Mast	--	300	--
Transmission Assembly	--	600	3,000
3-Micron Lubrication Pump Filter	--	300	--
75-Micron Oil Filter	--	600	--

The MD 902 is an experienced, fielded product that has proven availability and durability:

- Operations in the United Kingdom have achieved 99-percent operational availability
- High operational time aircraft have achieved nearly 15,000 hours operation
- Fleet total time exceeds 350,000 hours
- The MD 902 has a 30-year useful life
- Composite fuselage design provides fatigue and adverse-condition environmental protection
- The NOTAR[®] design eliminates maintenance requirements of traditional tail rotor designs.

7.2 Servicing

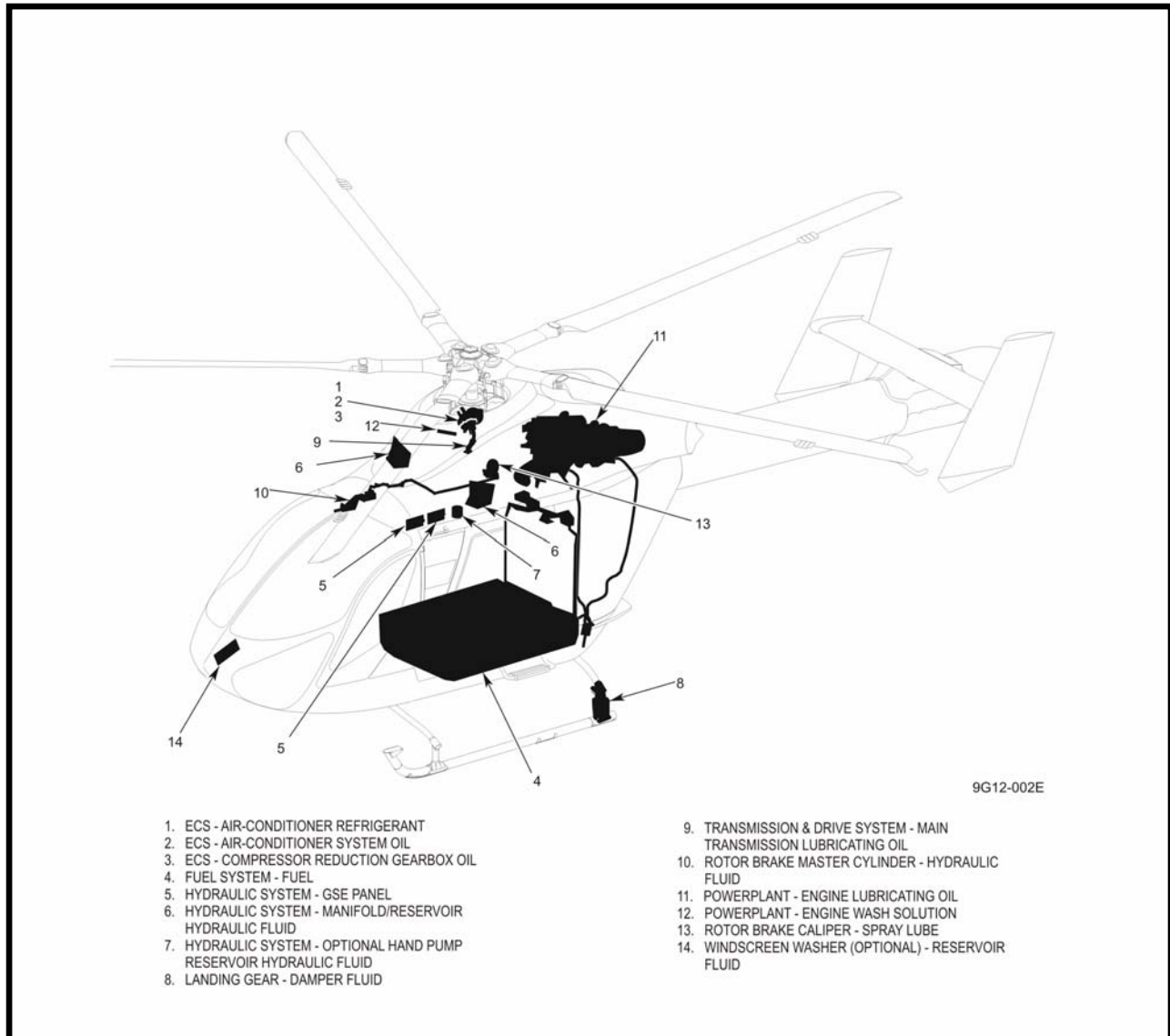
The MD 902 was designed for ease of maintenance, incorporating built-in features that eliminate ground support equipment and aid servicing. These features include:

- Spring-loaded and fold-out doors that provide steps to the engines and main rotor head (refer to the figure below)
- Quick access panels
- Integrated diagnostics
- Integrated engine wash system
- Integrated hydraulic pressure fill port
- Manual, external hydraulic fill ports for service without support equipment.

The MD 902 helicopter design also includes common, commercially-available compounds. Servicing locations are shown in figure below, and are performed in accordance with the corresponding equipment maintenance manuals. Servicing intervals are detailed in the MD 902 Rotorcraft Maintenance Manual. Capacities and compounds used to service the MD 902 are listed in table on the following page.



The MD 902 Explorer has Built-in Steps to Provide Access to the Engines and Main Rotor Head Without External Ground Support Equipment



MD 902 Explorer Servicing Location Points



MD 902 Explorer Fluid Capacities and Specifications

Component	Compound	Capacity	Specification	Notes
Engine	Lubricant	1.3 gallons (5.1 liters)	MIL-PRF-7808G/ MIL-PRF-23699C	❶, ❷
Main Rotor Transmission	Lubricant	10.0 quarts (9.5 liters)	Mobil SHC 626	--
Rotor Brake	Hydraulic Fluid	1.2 pints (0.6 liter)	MIL-PRF-83282	--
Rotor Brake Caliper	Spray Lubricant	As Required	N/A	--
Hydraulic Reservoir	Hydraulic Fluid	2.2 quarts (2.1 liters)	MIL-PRF-83282	--
Landing Gear Damper	Hydraulic Fluid	2.3 ounces (70cc)	MIL-H-5606	--
Windscreen Washer Reservoir	Distilled Water	2.0 quarts (1.9 liters)	--	❸
	Isopropyl Alcohol	1.0 quart (0.95 liter)	--	❹
Battery	Distilled Water	As Required	MS36300	--
Air Conditioning Refrigerant	R-143A	2.5 pounds (1.1 kg)	--	--
Air Conditioning System Oil	Hermetic Oil RG20, RS20, DHPR	4.5-5.5 ounces (140-160cc)	--	--
Compressor Reduction Gearbox Oil	Lubricating Oil	1.0 ounces (30cc)	MIL-PRF-23699C	--
Fuel Cell	Fuel	175.6 gallons (664.7 liter)	ASTM-D-1655 (Jet A, Jet A-1, Jet B, JP-1, RP-3) MIL- DTL-5624 (JP- 4/JP-5)	❺

NOTES:

- ❶ Refer to P&WC Operation and Maintenance Manual for approved oils.
- ❷ Oil specification type mandated by ambient temperature. Refer to P&WC Operation and Maintenance Manual.
- ❸ Distilled water for operations above 32F (0C).
- ❹ Distilled water with a 50-percent, by volume, mixture of isopropyl alcohol for operations equal to or below 32F (0C).
- ❺ Refer to P&WC Operation and Maintenance Manual for complete fuel specifications.



7.3 Hourly Cost

Current, estimate, direct operating cost per operating hour data has been gathered and is provided in the table below. This data indicates that the MD 902 has the lowest operating cost of similar competitor aircraft. This cost data is based on “current-year” 2021 U.S. dollars

MD 902 Explorer Estimated Direct Operating Cost Per Operating Hour

Activity	Cost, U.S. Dollars	Total
Fuel and Lubricants^①		
Fuel Consumption – 65 gallons per hour with fuel cost - \$4.26 per gallon	\$276.90	
Lubricants – 3-percent of fuel cost	\$8.31	
		\$285.21
Airframe Maintenance and Spares^②		
<u>Maintenance Labor Cost:</u>		
Scheduled (0.4 man-hour per flight hour - \$106.00 per hour)	\$42.40	
Unscheduled (0.16 man-hour per flight hour - \$106.00 per hour)	\$16.93	
		\$59.36
<u>Spares Cost:</u>		
Scheduled Inspection – Periodic Inspection	\$9.05	
On-Condition/Replacement/Unscheduled	\$161.30	
Reserves – Component Overhaul (Time Between Overhaul)	\$190.70	
Reserves – Life-Limited Parts	\$146.55	
		\$507.60
Engine^③		
Scheduled Maintenance	\$24.86	
Reserves – Overhaul, Spares, Accessories	\$187.65	
Reserves – Unscheduled Maintenance	\$13.72	
		\$226.23
TOTAL DIRECT OPERATING COST^④		\$1078.40

NOTES:

- ① Final cost and labor rate is based on U.S. average cost while operating under the following conditions:
 Gross Weight: 10 percent less than the maximum certified
 Speed: Maximum range speed is 118 kias
 Altitude: 1,000 ft (304 m) on a standard day.
- ② Overhaul costs are based on participation in factory exchange program.
- ③ Engine fleet maintenance cost is provided by P&W and are based on one cycle per hour.
- ④ Indirect costs (i.e., insurance, hanger, salary) are not included.

Actual costs will vary, depending on local operating conditions, pricing, and supplier practices.



8. PRODUCT SUPPORT

MD Helicopters, Inc. is dedicated to a successful fielding, training, warranty support, and customer support of MDHI aircraft. MD Helicopters, Inc. has worldwide service centers and field service representatives available for localized support.

8.1 Training

The MDHI commercial training center offers cost-effective factory designed training courses for MDHI aircraft pilots and maintenance crews. This training, conducted by senior instructors with extensive product experience, provides customers/students with the detailed knowledge of MDHI products that will increase safety, reduce insurance costs, and result in more efficient operation of the aircraft. Training is conducted at the MDHI facility in Mesa, Arizona. Training using customer aircraft can also be arranged provided insurance, meeting MDHI requirements, is available.

8.1.1 Pilot Training

Flight transition pilot, maintenance test pilot, and recurrent pilot training are available from MDHI. Flight transition pilot training for one pilot is included as part of each MDHI helicopter purchase. The MD 902 incorporates features that provide for added pilot training, such as one-engine inoperative training, which is commanded by placing an engine control switch in the TRAIN position placing the selected engine in standby mode. Built-in safety features are incorporated to compensate for engine events or in the event both engine control switches are accidentally moved to the TRAIN position.

8.1.2 Transition Flight Training

The transition flight training course is designed to familiarize a rated helicopter pilot with operation of the MDHI aircraft. The transition flight training course is a five-day course that 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 requires 16 to 20 hours to complete, including examination and examination review. The student is expected to pass the examination, demonstrating basic knowledge of the aircraft. The transition flight training syllabus includes six hours of instructor time and is provided in four flight lessons:

- Normal operations
- Advanced operations (maximum gross weight flight)
- Maintenance and systems operations
- Emergency/malfunction procedures.

8.1.3 Recurrent Flight Training

Additional, optional, recurrent pilot training is available for existing MD 902 pilots. Recurrent pilot training provides a pilot review of MD 902 helicopter systems and operations, and uses flight review, proficiency checks, or other checks to review rules, maneuvers, and procedures to demonstrate existing pilot skills. Training is conducted over a three-day period and consists of



ground school and two to three hours of flight time. Ground school training includes a review and discussion of airworthiness directives and notices, helicopter systems, pilot flight manual review, preflight inspection, followed by an open-book exam.

8.1.4 Maintenance Training

The airframe maintenance course familiarizes a licensed aircraft and powerplant mechanic with the maintenance and inspection of aircraft major systems. Training adheres to original equipment manufacturer standards and includes an overview of supporting maintenance documentation, service bulletins, service letters, and maintenance logbook. All training materials, required to conduct maintainer training, (instructional materials, handouts, presentations, training guides/aids, tests/exercises) are returned to each trainee. Hands-on training using MDHI- or customer-furnished equipment will be provided as necessary to supplement the classroom instruction. Training instruction and technical information are conducted in the English language. Course syllabus includes:

- Airframe
- Anti-torque system
- Flight control system
- Environmental control system
- Power train
- Rotor system.

Maintainer training for one maintainer is provided as part of the helicopter purchase.

8.2 Warranty

The MD 902 commercial helicopters are covered by a commercial warranty which is administered by MDHI Mesa, Arizona. Supplier products (e.g., turboshaft engine, avionics, etc.) are separately warranted through the product supplier.

The MDHI Commercial Warranty is a materials and workmanship type warranty that begins upon customer helicopter/spare parts acceptance/delivery. The customer will perform prompt repair or replacement of helicopter specific discrepant hardware. For warranty claims pertaining to aftermarket spare parts and components, the customer, at their option (with prior approval), either:

- Return the non-conforming or defective part or component for credit or refund; or
- Request correction or replacement of the affected part or component. Associated shipping costs shall be shared by the customer and the vendor.

8.2.1 Warranty Claims

All warranty claims begin with completion of an MDHI service and operations report (SOR) document. The completed SOR document is submitted to MDHI field services for technical accuracy and completeness review and to determine if additional action is needed. When the review is completed, the SOR is forwarded to the MDHI warranty/repair department for



determination of warranty claim status. The circumstances of the failure, aircraft and component time, date of submittal and nature of the claim, and other factors, are evaluated in accordance with the current published MDHI warranty. The MDHI Customer Service Department has the overall responsibility for managing the Warranty and Exchange Program. The limited commercial warranty (CSP-A-2) and SOR forms can be accessed through the MDHI website.

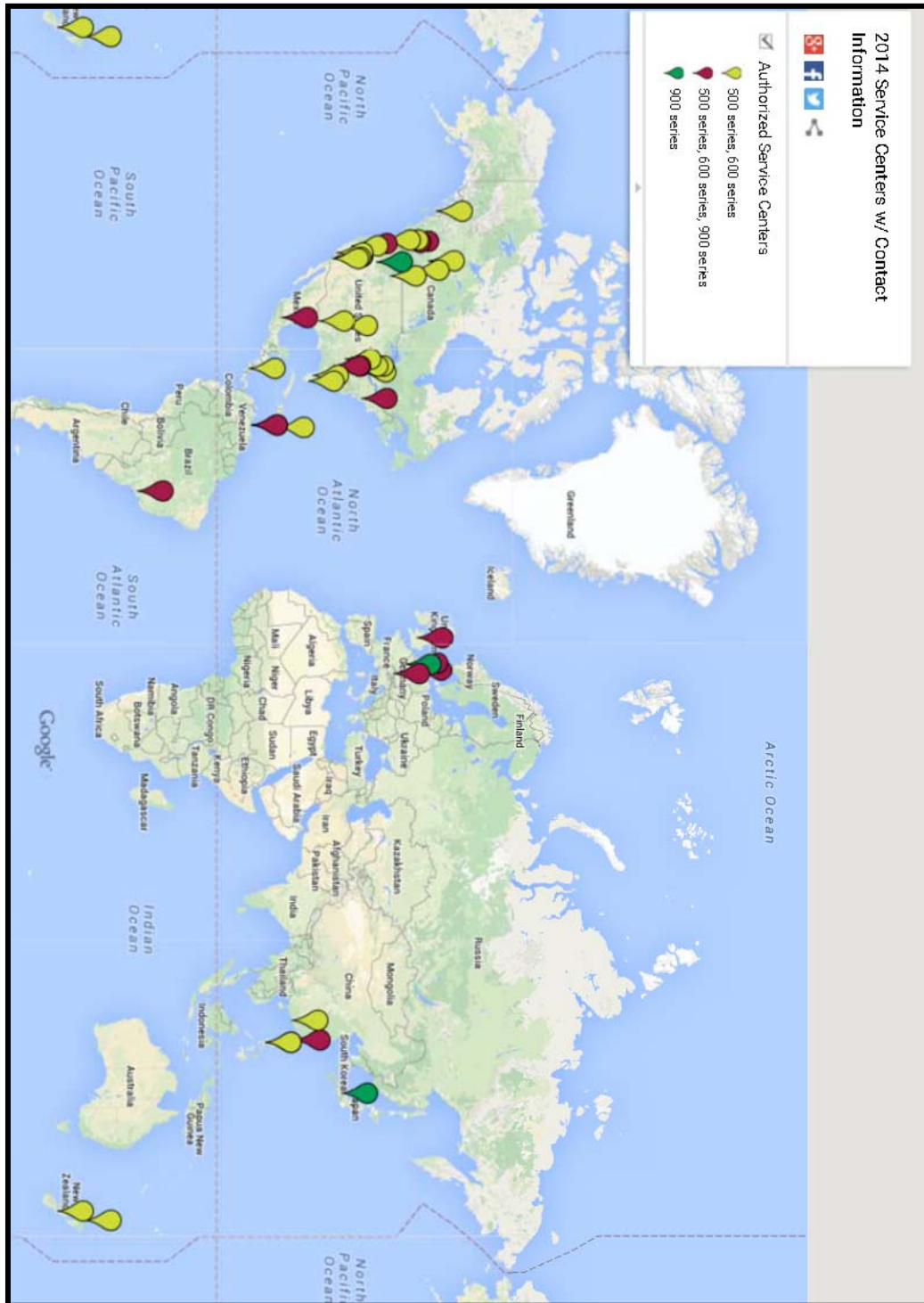
8.3 Service Centers

MD helicopters, Inc. has approved service centers located worldwide. The figure below shows MD Helicopters, Inc. worldwide approved service centers locations. Detailed service center information is provided on the MD Helicopters customer support section of the MDHI website.

8.4 Field Service

Dedicated Field Service Representatives are available to support fielded MDHI products. Field Service Representatives are available for the following locations:

- Asia/India/Australia/New Zealand
- Eastern North America
- Middle East/Africa
- Mexico/Central America/South America
- Russia/Commonwealth of Independent States
- Western North America.



MD Helicopters, Inc. Worldwide Service Center Locations