TECHNICAL DESCRIPTION

MD 520N HELICOPTER

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MISSION PROVEN, CHALLENGE READY

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REPORT NO.: MD14030410-520NTD
NO. OF PAGES: 52

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ATTACHMENTS: None

Revision	By	Approved	Date	Pages and/or Paragraphs Affected
New	BAH		04-Mar-14	All (Initial Issue)

Contents

1. FOREWORD

This document presents basic technical description of the five-place MD Helicopters, Inc. (MDHI) MD 520N 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 520N Product Specification is available by contacting one of the Sales Team Members listed below.

The MD 520N turbine engine allows easy configuration conversion from a five-place personnel transport to a utility helicopter. The 450-shp Rolls-Royce Model 250-C20R/2 turbine-engine-powered MD 520N includes a fully articulated five-blade main rotor system and the no tail rotor (NOTAR®) anti-torque system for reduced pilot-workload and external noise levels..

The MD 520N is certified for single pilot operation under visual flight rules / visual meteorological conditions.

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2. KEY ADVANTAGES AND FEATURES

The MDHI MD 500E is a single turbine engine, rotary-wing aircraft. It has a cruising speed of 123 knots (229 kph / 142 mph), with a useful internal load at maximum gross weight is 1,764 pounds (800 kg). Hover out of ground effect is 9,400 feet (2,865 m) and hover in ground effect is 12,800 feet (3,901 m). The rate of climb at maximum gross weight is 1,913 feet (9.7 m/sec). The maximum operating altitude is 20,000 feet (6,097 m) with a -40 to +52C (-40 to 126F) operating temperature range. The MD 520N employs an advanced NOTAR® anti-torque system which reduces pilot workload, external noise levels, and significantly improves safety in confined areas due to no spinning tail rotor.

THE MD 520N Advantages / Features

Airframe	
• Simple system design • Mature, field-proven systems and components • Separate cockpit and cabin • 2+2 or 2+3 seating capability • Speed, agility, and load-capable • Certified to 14 CFR Part 27; VFR • Approved / certified in over 50 countries worldwide	• External power receptacle • Integrated landing gear dampers • Fully articulated main rotor blades • 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
Integrated Safety Features	
• No tail rotor (NOTAR®) anti-torque system eliminates the spinning tail rotor, tail rotor gearbox, and tail rotor drive shaft • Designed for operator ease • Main rotor static mast / base designed to be fail-safe to 100-percent design load • Three-dimensional truss-type structure with integral roll bar • Energy-absorbing airframe with occupant seat crush boxes for 20g shock resistance • Extended, energy-attenuating landing gear • Dual, crash-resistant elastomeric fuel cells mounted between crash-resistant keel beams and bulkheads below the cabin floor	• Main rotor transmission and NOTAR® fan drive shafts incorporate anti-flail devices if a flexible joint failure were to occur • Tail boom end-mounted tail skid • Shoulder / seat belts attached to primary structure • Engine mounted low and at the rear • Fuel filter automatic bypass if filter becomes restricted • Crew-seat four-point restraints • Passenger seats provided with three-point restraints • Caution / warning annunciators / audible warning tones

THE MD 520N Advantages / Features

Supportability Features	

• Designed for ease of maintenance and supportability
• Modular system design
• Designed for reparability
• Low direct operating costs
• Maximum use of line replaceable units:
  ○ Engine
  ○ Avionics / communication
  ○ Flight controls
  ○ Main rotor blades
  ○ Main rotor drive shaft
  ○ Main rotor transmission
  ○ NOTAR® fan
  ○ Main rotor transmission drive shaft
  ○ Main rotor mast
  ○ Landing gear
  ○ Canopies
  ○ Doors
  ○ Door handles
  ○ Door windows
  ○ Seat restraints
  ○ Tail boom
	• Maximum use of line replaceable units (Contd.):
	  ○ Oil-cooler / blower
	  ○ Empennage
	  ○ Tail boom skid
	• Built-in Maintenance aids:
	  ○ Engine fuel and oil filter impending bypass indicators
	  ○ Engine oil chip detector
	  ○ Main rotor transmission oil chip detectors
	  ○ Integrated engine compressor wash system
	  ○ Engine oil filler cap / dipstick
	  ○ Main rotor transmission filler cap
	  ○ Engine and main rotor transmission, oil level sight gage
	  ○ Footsteps located on each side for upper deck access without ground support equipment
	  ○ Landing gear ground handling wheel quick attach feature

Human Systems Integration Features	
• Unobstructed forward 160-degree vertical and 220-degree horizontal cockpit field of view • Cockpit designed to accommodate 25th to 95th percentile male / female flight crew	• Integrated cockpit and cabin entry steps • Integrated visual / audible warning indication for flight critical functions
Engine	
• Fuel efficient, field-proven, turboshaft engine	• Externally accessible water wash system
Monitoring Instrumentation	
• Caution / warning annunciator panel located at the top of the instrument panel	• Digital upgrade pending
Environmental Impact	
• Low noise profile with NOTAR® anti-torque system	

3. CERTIFICATION

The MDHI MD 520N is a commercial Federal Aviation Administration (FAA) Type Certified aircraft under Code of Federal Regulations (CFR) Title 14, Part 27. The MD 500N was initially certified on September 1991. The MD 520N (500N) is also a European Aerospace Safety Administration (EASA) Type Certified helicopter.

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 CFR Title 14, Part 21.

The FAA designation for this model is 500N, and the International Civil Aviation Organization (ICAO) Type Designation is MD52. MD Helicopters, Inc. commercial designation is MD 520N.

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4. DIMENSIONS, WEIGHT, AND MISSION CONFIGURATION

4.1 External Dimensions

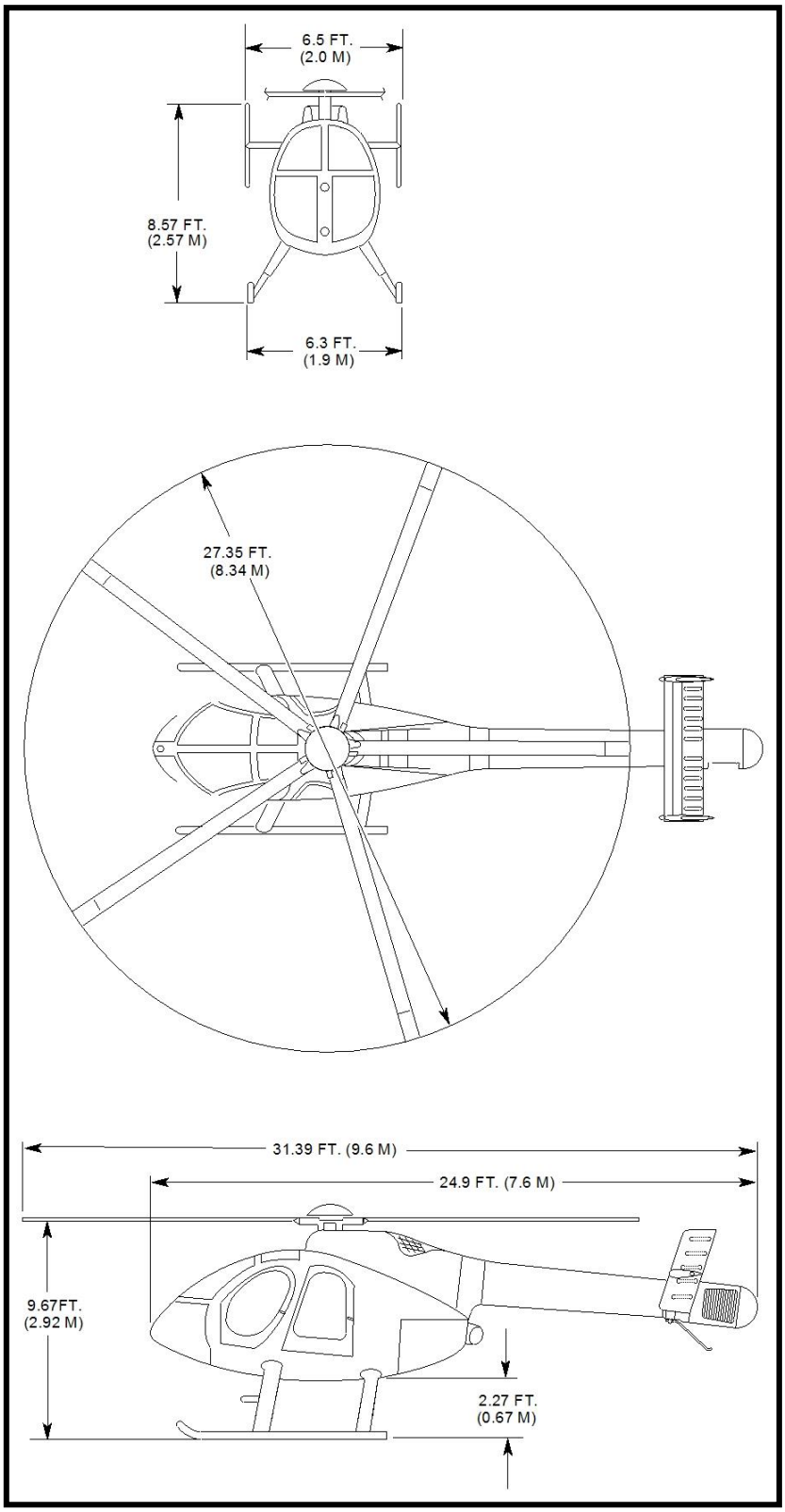
The MD 520N external dimensions are provided in the following table and shown in the figure below.

Parameter	Dimension, ft (m)
Fuselage Width	4.60 (1.40)
Fuselage Length	24.90 (7.60)
Horizontal Stabilizer Width	6.60 (2.00)
Landing Skid Width	6.30 (1.90)
Ground to Rotor Height	8.80 (2.70)
Ground to Fuselage Bottom Height	1.40 (0.40)
Main Rotor Diameter	27.40 (8.40)

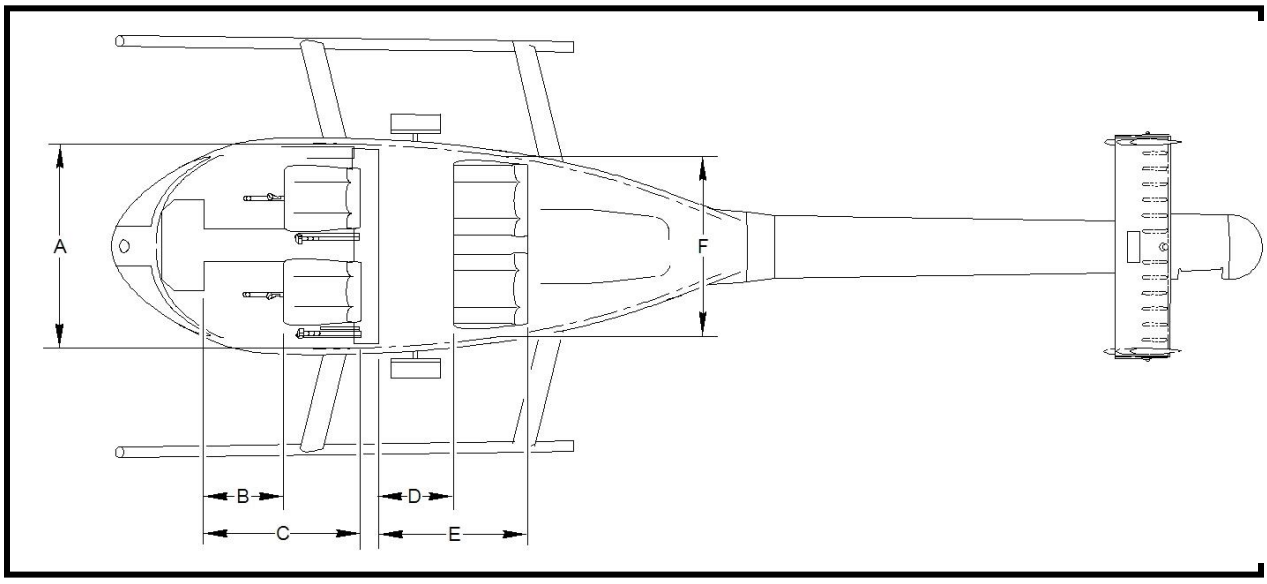
4.2 Internal Dimensions

The MD 520N internal dimensions are provided in the following table and shown in the second figure below.

Parameter	Second Figure Reference Location	Dimension, in. (cm)
Crew Compartment Width	A	49.00 (124.5)
Crew Seat to Instrument Panel	B	18.50 (47.00)
Crew Compartment Depth	C	37.50 (95.30)
Passenger Seat to Front Bulkhead	D	19.00 (48.30)
Passenger Compartment Depth	E	29.00 (73.70)
Passenger Compartment Width	F	44.50 (113.00)



MD 520 External Dimensions



MD 520N Internal Dimension Locations

4.3 Weight

Using the Rolls-Royce Model 250-C20R/2 turboshaft engine, the MD 520N nominal empty weight is 1,585 pounds (719 kg).

4.4 Configurations

Typical mission applications for the MD 520N helicopter are aerial survey, photography assignments, agricultural, firing fighting, air rescue, police air support, and numerous other missions within the paramilitary, construction, petroleum, and forestry industries.

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5. MD 520N SINGLE-ENGINE HELICOPTER

The MD 520N is a single-turbine-engine, rotary-wing aircraft. It has a fully articulated five-blade main rotor, and uses the NOTAR® anti-torque system. The MD 520N is certified for single-pilot operation under visual flight rules / visual meteorological conditions.

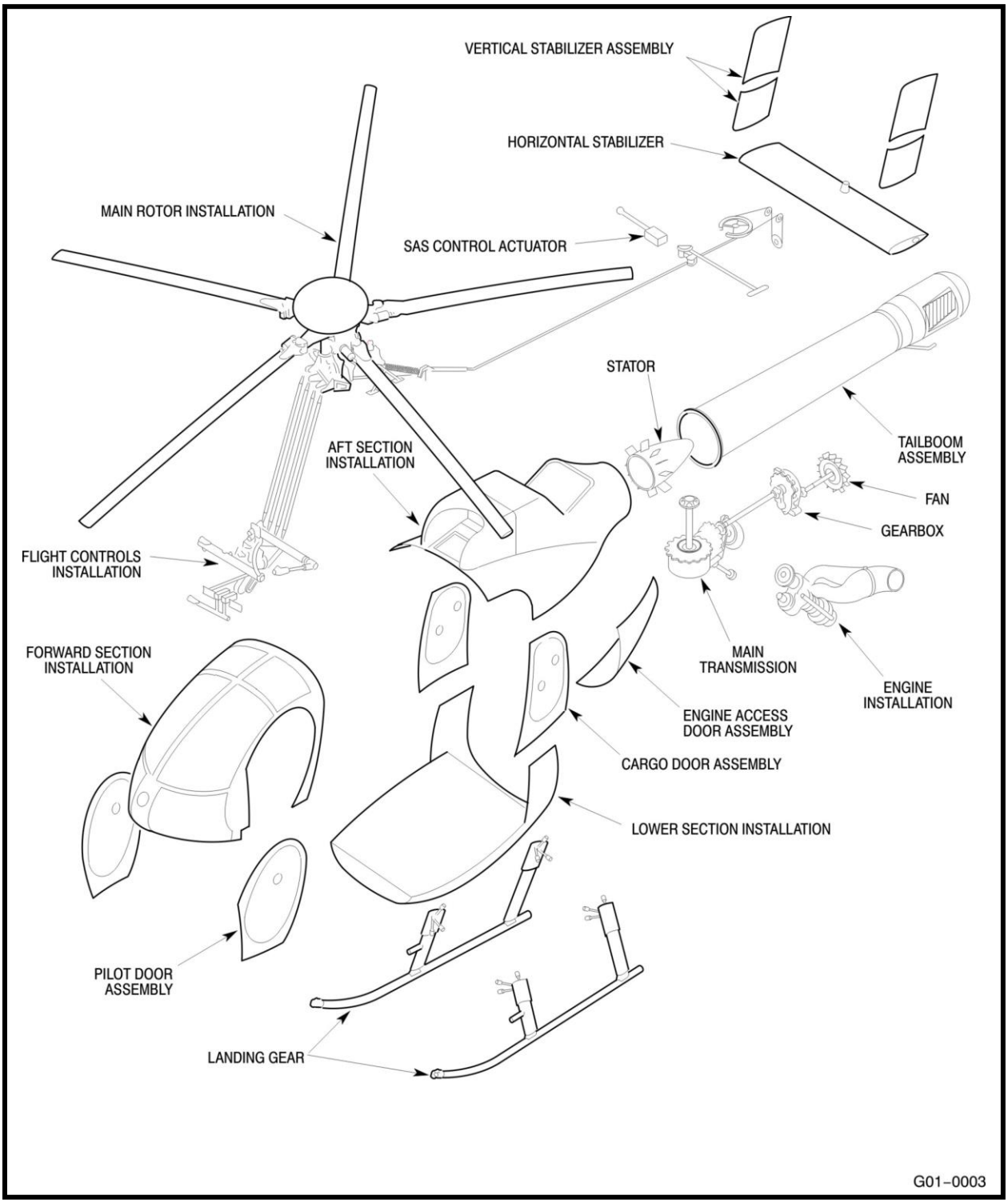
5.1 System Description

MD Helicopters, Inc. MD 520N is a five-place, single-turbine-engine, multipurpose helicopter. The fuselage is constructed primarily of aluminum alloy while the NOTAR® anti-torque system components are primarily of carbon epoxy composite. Power from the 420 shaft horsepower (shp) Rolls-Royce Model 250-C20B turboshaft engine is transmitted through the engine drive shaft to the main rotor transmission, and from the main rotor transmission through a drive shaft to the NOTAR® system fan. The NOTAR® system fan produces a low-pressure, high-volume airflow to pressurize the composite tail boom. Pressurized air is expelled through two slots which run the length of the tail boom on the right side, causing 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. A one-way clutch between the engine and main rotor transmission permits main-rotor freewheeling of the rotor system during autorotation. The 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 airframe consists of faired sections that provide clean aerodynamic lines. This contributes to good handling qualities, low vibration levels, and high-speed flight capability. The airframe structure is designed to be energy-absorbing while maintaining rotor hub integrity. A rigid, three-dimensional truss-type structure increases crew and passenger safety by means of its roll-over structure design.

The MD 520N incorporates an empennage consisting of a composite horizontal and vertical stabilizer assembly located at the end of tail boom just forward of the jet thruster. A tail skid is mounted to the bottom, end, of the tail boom. The horizontal portion of the stabilizer is mounted 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 yaw stability augmentation system (Yaw-SAS).

A diagram of the major system components of the MD 520N is shown on the following page.



The MD 520N Major System Components

5.2 Standard Equipment

The MD 520N is configured with standard equipment that is included in the basic aircraft procurement.

MD 520N Standard Equipment

Airframe	
• Extended landing gear • Rapid door removal hinges (cockpit and cabin) • Tinted canopy windows • Tinted door windows • Rain gutter set • Keyed locks (4) • Fuselage mounting points • External power receptacle • Jack fittings • Carbide skid shoes	• One-color exterior paint • Passenger steps • Dual left-hand command flight controls • Anti-collision lights (2) • Landing light, nose mounted • Position lights (2) • 85-amp starter-generator • 64-gallon (242 liter) fuel system • Battery heavy duty 17 amp-hour battery • Yaw stabilization augmentation system (Yaw-SAS) • NOTAR® anti-torque system
Interior - Cockpit	
• Left hand rotor brake • Heater defogger system • Crew seats with four-point harness restraint • Vinyl and fabric cushions • Vinyl interior trim panels • Cockpit light	• Crew compartment floor carpet • Map case • Fire extinguisher • First aid kit • Fresh air ventilation system • Instrument lighting
Interior - Cabin	
• Passenger seats with three-point harness restraint • Vinyl and fabric cushions • Vinyl interior trim panels • Cabin compartment floor carpet	• Cabin convenience light • Cabin soundproofing • Cargo tie-down fittings • Cabin 28-volt utility outlet
Engine	
• Rolls-Royce 250-C20B engine, 420 shp (313 kW) • Automatic engine re-ignition	• Engine anti-ice • Engine wash kit • Facet oil filter

MD 520N Standard Equipment

Monitoring Instrumentation	
• Dual tachometer, NR and N2 • Engine oil pressure indicator • Engine oil temperature indicator • Engine torque meter • N1 tachometer • Fuel quantity indicator • Digital chronometer • Airspeed indicator • Barometric altimeter • DC ammeter • Outside air temperature indicator • Magnetic compass • Turbine outlet temperature indicator • Battery over-temperature warning light	• Engine chip detector warning light • Engine out warning light • Fuel filter obstruction warning light • Fuel low warning light • Generator out warning light • Low rotor rpm warning light • Main transmission chip detector warning light • Main transmission oil pressure warning light • Main transmission oil temperature warning light • Tail rotor transmission chip detector warning light
Miscellaneous	
• Engine, airframe, and battery log books • Rotorcraft flight manual • System/subsystem maintenance manuals and illustrated parts catalogs • Engine exhaust cover	• Engine inlet cover • Pitot tube cover • Fan inlet cover • Main rotor blade tie-downs • Ground handling wheels

5.3 MD 520N Optional Equipment

Optional equipment for the MD 520N is available for additional cost, and is literally non-exhaustive.

MD 520N Optional Equipment

Airframe	
• Heated pitot tube • Paravion door openers • Comfort windows • Dual side mount (forward looking infrared sensor & searchlight) • Searchlight • Moveable landing/searchlight • Landing light pulse system • Video turret side mount	• Skid mirror • Two-/three-color standard exterior paint • Sealed lead-acid battery • Cargo hook with hard mount • Cargo hook provisions • On-board cargo hook weighing system • Emergency water floats • High-visibility main rotor blades

MD 520N Optional Equipment

• Airframe fuel filter • Generator cooling kit • Engine bay door quick release hinges • Exterior crew handles • Air conditioning R-134 w/ forward evaporator	• Night vision goggle compatible lighting • Wire strike protection kit • Fuel Filter • Twenty-one gallon auxiliary fuel tank • Thirty-three gallon auxiliary fuel tank • Tyler platform
Interior - Cockpit	
• Leather covered interior panels • Leather covered seats • Black mesh seats • 28-volt receptacle • Pilot/copilot gooseneck lights • Right-hand command pilot • Flat panel monitor mounts	• Pilot Mason grip • Right-hand command pilot • Instrument panel face plate modification • Slant panel • Night vision goggle compatible lighting • Flat black painted interior
Interior - Cabin	
• Leather covered interior panels • Leather covered seats	• Black mesh seats
Monitoring Instrumentation	
• Diamond J turbine outlet temperature indicator • Avionics cooling fan • Blind encoder • Encoding altimeter 3-inch • Instantaneous vertical speed indicator • TRA 3000 radar altimeter w/indicator • Attitude gyro indicator, 3-inch • Directional gyro - panel mounted • Compass system (KCS55A) • Radio magnetic indicator (K1229-00) • Turn and bank indicator, 2-inch • Turn and bank indicator, 3-inch • Copilot intercom switch • Garmin G500 system • Emergency locator transmitter	• Various NAV / COM / GPS equipment • Various transponders • Various displays, radios, transceivers, and data links • Various audio panels, intercoms, CD player, AM / FM radios • Cyclic remote frequency switch • Hand held radio provisions to include AA-34 universal • Communication headsets • External PA / siren system • Forward looking infrared sensor • Aero Computers mapping system

5.4 Fuselage

The MD 520N fuselage is a teardrop-shaped, aerodynamically efficient structure that incorporates a NOTAR® circulation control tail boom and an empennage consisting of horizontal and vertical stabilizers. The MD 520N fuselage is a semi-monocoque construction, manufactured primarily of aluminum alloy. It consists of a rigid, three-dimensional truss type structure, with an integral roll-bar design, for increased occupant safety. The airframe structure is designed to be energy absorbing and fails progressively in the event of impact. Occupant seat crush boxes are incorporated into the design and provide 20g shock resistance. The composite tail boom incorporates the NOTAR® circulation control and is the mount for the empennage and rotating direct-jet thruster at the end of the tail boom.

The airframe includes doors for the pilot, copilot, and both sides of the passenger area that can be quickly removed for flight.

The fuselage structure is divided into the following three main sections (shown in the figure below):

- ***Forward section*** - comprised of a pilot compartment and, directly aft separated by a bulkhead, a passenger / cargo compartment. The pilot compartment is equipped with seats for the pilot and either a copilot, or with copilot controls removed, one or two passengers. The passenger / cargo compartment, located in the aft section of the aircraft, contains provisions for installation of a bench or individual folding-type seats for two to three passengers. The lower fuselage structure beneath the pilot floor contains compartment space for the aircraft battery and provision for small cargo storage or installation of avionics equipment.
- ***Aft section*** - includes the structure for the tail boom attachment, NOTAR® system fan, and engine compartment. The tail boom is also a monocoque structure manufactured of aluminum alloy, and is the supporting attachment structure for the direct-jet thruster, horizontal stabilizer, and vertical stabilizers
- ***Lower section*** - divided by the center beam and provides the housing for the two fuel cells. Provisions for the attachment of a cargo hook are located on the bottom of the fuselage in line with the center beam.

5.5 Exterior

The MD 520N exterior can be painted a single-color of the customer choice from available colors. An additional two, three, or more colors can be painted on the exterior for an additional cost. The exterior provides mounting locations for external antennas of customer-purchased avionics / communication equipment, external lighting, main rotor static mast, landing gear, and tail boom.

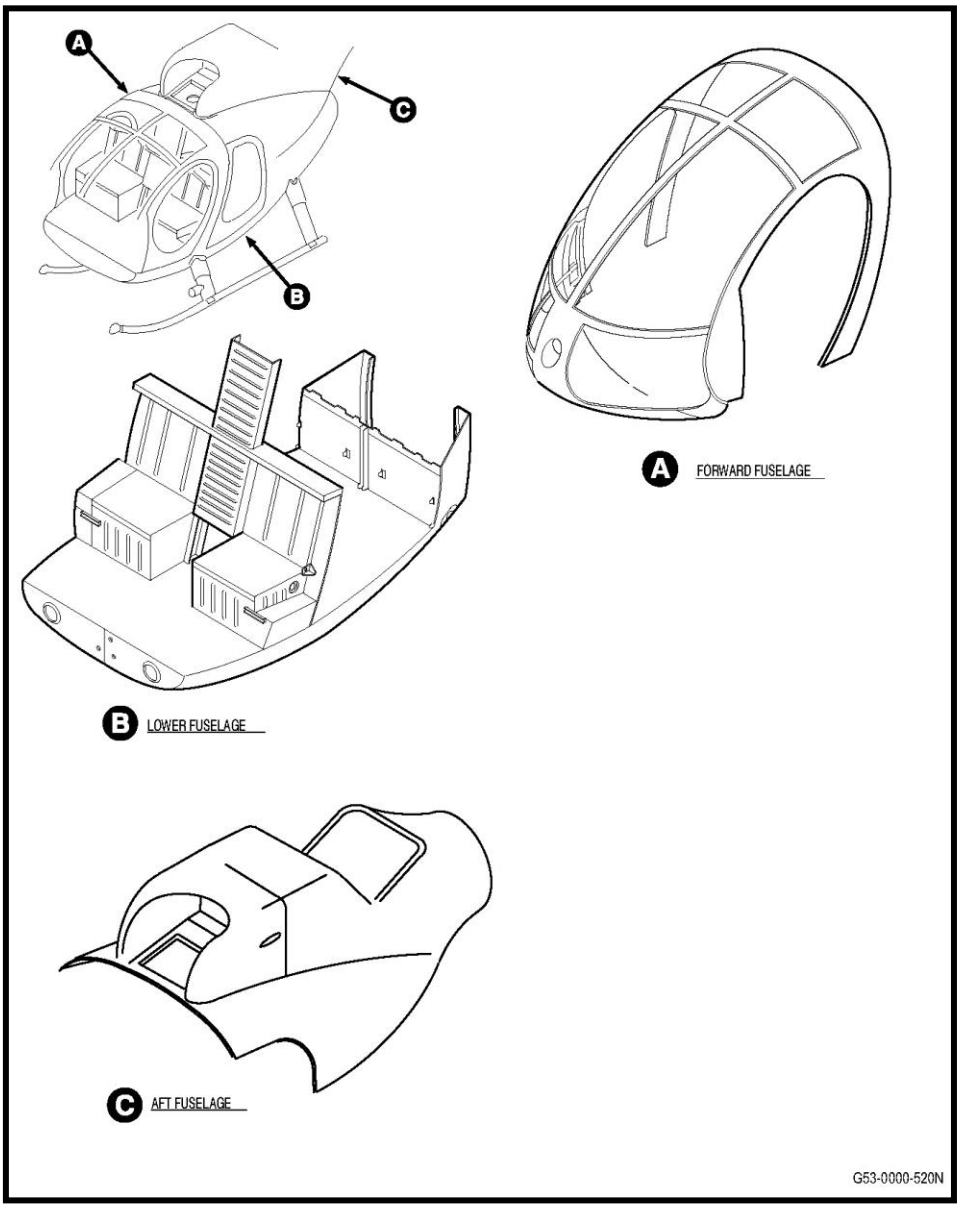
5.6 External Lighting

The MD 520N external lighting (shown in the figure on page 36) consists of a:

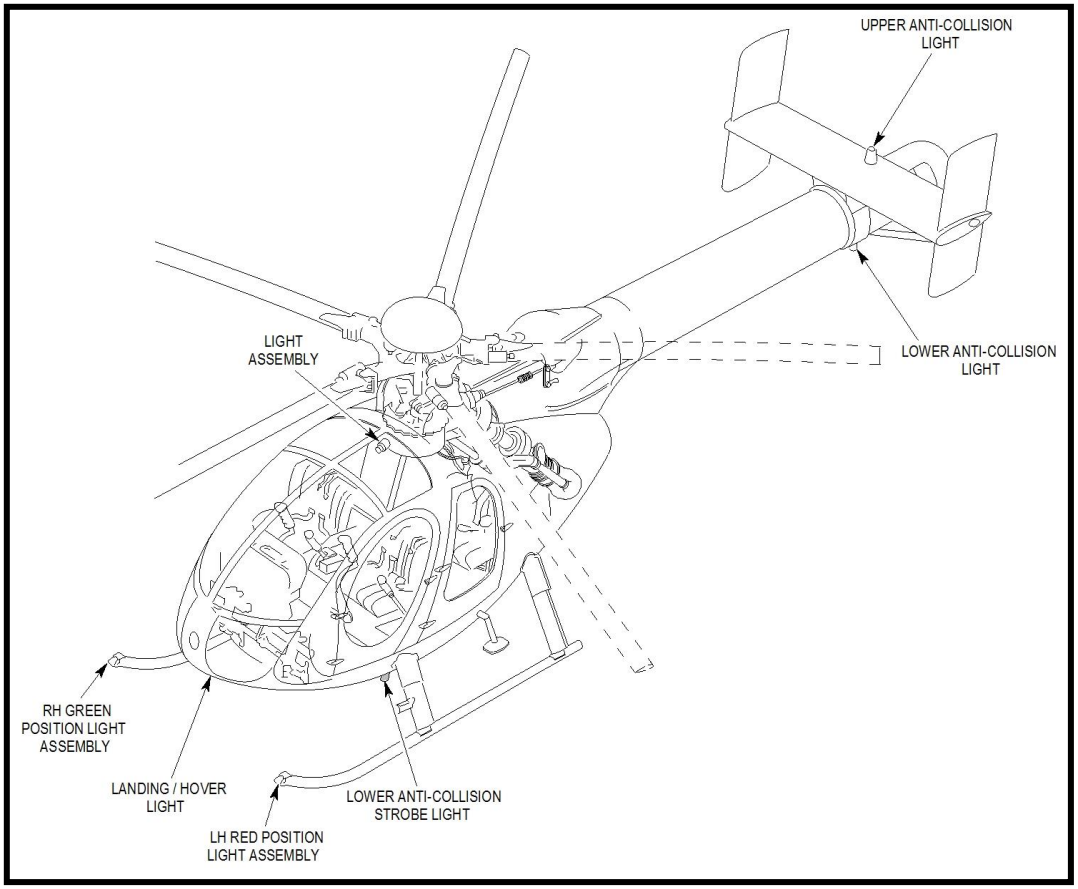
- Rear position light assembly
- Rear anti-collision strobe light assembly

- Lower anti-collision strobe light assembly
- Left-hand red position light assembly
- Right-hand green position light assembly
- Landing hover light.

Standard cockpit lighting includes cockpit light for the pilot. A passenger compartment convenience light is optional.



MD 520N Main Fuselage Assembly Sections



MD 520N Internal and External Lighting Locations

5.7 Interior

The MD 520N interior consists of the cockpit area, cabin compartment area, and engine compartment. The MD 520N is provided with the utility interior.

5.7.1 Cockpit

The cockpit has accommodations for the pilot and / or copilot. The minimum crew is one pilot in the command position. The instrument panel is located in the forward portion of the cockpit, and provides space for a full complement of avionics equipment. The instrument panel layout allows for easy scanning of flight instruments.

The cockpit is ergonomically designed to facilitate single pilot operation in the left-hand or right-hand command configuration. All controls are within easy pilot reach. In addition, the anti-torque tail rotor control pedals are adjustable for up to 4 inches fore and aft to accommodate 25th-percentile to 95th-percentile male / female pilots. Seats are constructed of padded upholstered material and are attached to the forward bulkhead. Directly aft of the crew station, a bulkhead behind the forward compartment separates the cockpit and passenger / cargo compartment.

5.7.2 Cabin Compartment

The passenger / cargo compartment provides space for passengers, cargo, or multi-mission equipment. The rear portion of the passenger / cargo compartment provides increased headroom and visibility. Standard seats are constructed of padded upholstered material and are attached to the rear bulkhead. Optional aluminum tube frame and black mesh seats are also available.

5.7.3 Engine Compartment

The engine compartment is located aft and below the passenger compartment. The engine compartment provides an enclosed mounting platform for the turboshaft engine and can be easily accessed behind two clam-shell type doors contoured to the shape of the fuselage. The engine compartment can be easily accessed without ground support equipment or support equipment.

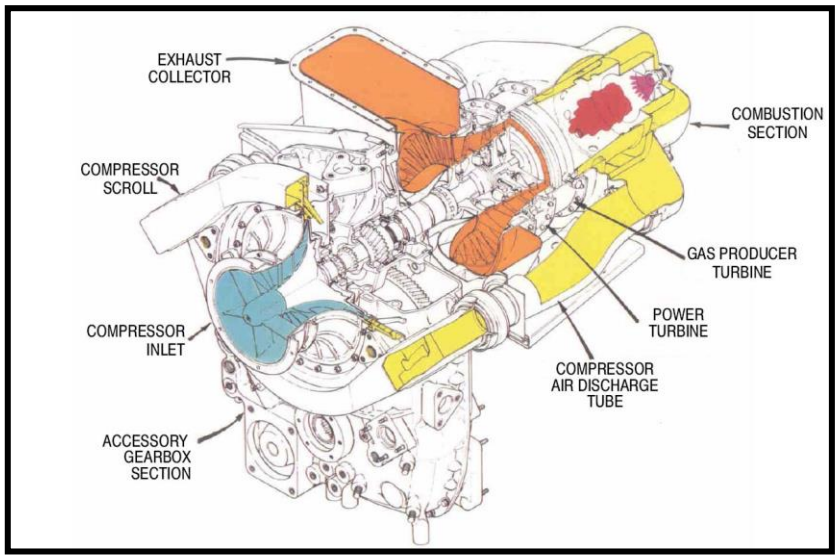
5.8 Systems

5.8.1 Fuel System

The MD 520N fuel system consists of two interconnected bladder cells with a total capacity of 64 gallons (242.30 liters) located in bays below the passenger / cargo compartment floor of the lower section. Each bladder cell is internally supported by the airframe and contains electrically-powered fuel quantity transmitters that monitor fuel level and provide fuel quantity to the pilot. Low fuel level is displayed to the pilot through a yellow caution light on the instrument panel. Fuel flow from the bladder cells can be manually shutoff by the pilot using a mechanically actuated fuel shutoff valve control located on the instrument panel.

5.8.2 Propulsion System

The engine used in the MD 520N is the Rolls-Royce Model 250-C20R/2 gas turbine engine. The Model 250-C20R/2 produces 450 shp, derated to 375 shp for takeoff, and 350 shp at maximum continuous operation. The engine consists of a combined four-stage axial and single-stage centrifugal compressor, a can-type combustion chamber, a four-stage turbine assembly, exhaust pipe, and accessory gearbox (AGB).



Typical Rolls-Royce Model 250 Turboshaft Engine Cross Section

The Model 250-C20R/2 engine has an automatic re-ignition system that provides automatic activation (and pilot indication) of the ignition exciter activation in the event of an engine flameout and resulting engine power loss.

5.8.2.1 Engine Control

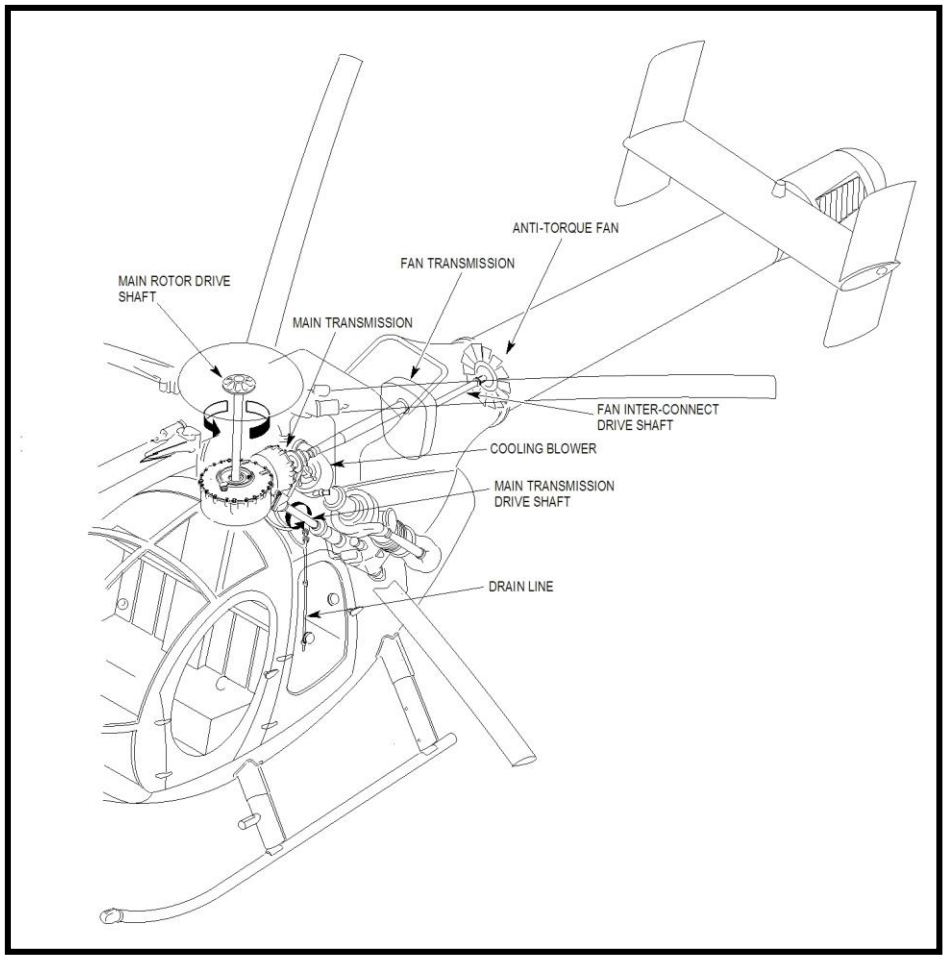
Engine control is accomplished by fuel control actuation using the throttle twist grip located at the end of the collective stick. The throttle twist grip has three positions: cutoff, idle, and full open. Moving the throttle twist grip from cutoff to idle provides automatic fuel metering for engine starting, acceleration, and idle stabilization. Moving the throttle twist grip to full open during operation increases the gas producer speed and allows the power turbine governor speed control. The collective stick throttle twist grip movement friction is adjustable, and can also be locked when the operational gas producer turbine speed is attained.

5.8.3 Drive System

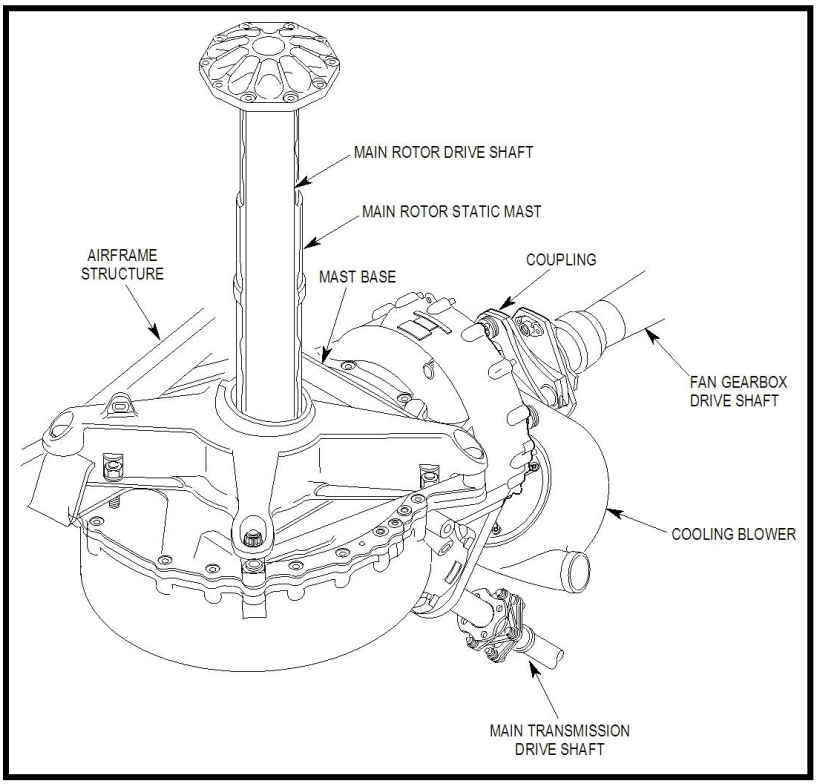
The MD 520N drive system (shown in the figures below) consists of an:

- Overrunning clutch – The overrunning clutch transmits power from the engine to the main rotor transmission drive shaft
- Main rotor transmission drive shaft – Connects to the main rotor transmission input shaft
- Oil cooler / blower – Belt driven off the main drive shaft, it draws cooling air from the air inlet fairing to supply ambient air to the engine and transmission oil coolers and to the engine compartment
- Main rotor transmission – Mounted to the basic airframe structure above the passenger / cargo compartment, the main rotor transmission is lubricated by a self-contained air-cooled lubrication system

- Main rotor static mast – Non-rotating and is rigidly mounted to the mast support structure. It provides support for the main rotor, main rotor transmission, and main rotor transmission drive shaft
- Main rotor drive shaft – Transmits torque to the main rotor. Lifting loads are prevented from being imposed on the main transmission, eliminating thrust loading of transmission parts
- Oil cooler – The oil cooler is a two section cooler with an upper and lower art. The upper part is used to cool the transmission lubricating oil and the lower part is used to cool the engine lubricating oil
- NOTAR® fan drive shaft – Connects the main rotor transmission to the NOTAR® fan. The enclosed variable pitch composite blade fan produces a low-pressure, high-volume airflow to pressurize the composite tail boom.



MD 520 In-Situ Drive System



MD 520N Main Transmission Drive System

5.8.4 Rotor System

The static mast-hub support system, unique to MDHI products, uses a static mast, rigidly attached to the fuselage. All dynamic loads are transmitted through the mast, rather than through the transmission. A separate, inner drive shaft transmits engine torque to the main rotor hub. This feature offers improved flight control integrity and helps retain rotor system components in the event of a main rotor blade strike. Additionally, this approach allows for the design of a main transmission that is lighter in weight, and can be removed without disturbing the hub or control system.

The MD 520N utilizes a five-blade, fully articulated main rotor assembly. Rotor blades, pitch housings, and links are secured to the hub by laminated steel strap sets. These sets are used in lieu of typical thrust bearing stacks to contain blade centrifugal loading and allow feathering. The strap sets provide additional functionality:

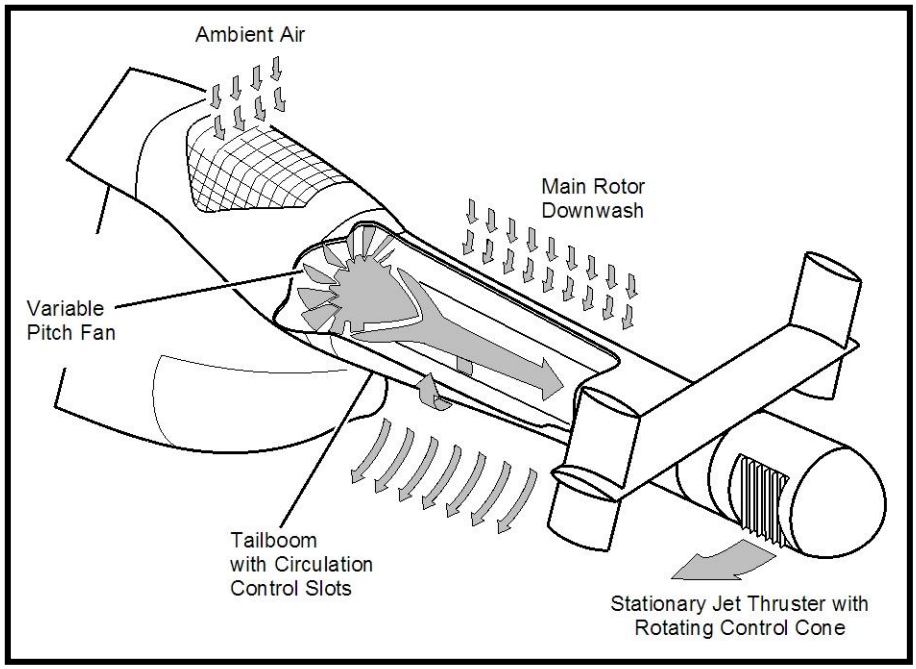
- The strap set configuration (which is secured firmly to the hub) allows the centrifugal load exerted by one blade to be countered by the force exerted by the opposite two blades, resulting in very light centrifugal loads exerted on the hub.
- The V-legs of the strap set rotate as driving members to turn the main rotor blades.
- The strap sets are configured to allow feathering and flapping of the blades.

Main rotor blades are retained to the main rotor hub using captive cam-handle-type blade retention bolts.

5.8.5 NOTAR® Anti-Torque System

The NOTAR® anti-torque system (shown 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. Air is expelled through two slots which run the length of the tail boom on the right side, causing 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.

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. Total NOTAR® fleet time for all MD helicopters exceeds 750,000 hours.



MD 520N NOTAR® Anti-Torque System

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 competitor helicopters.

5.8.6 Flight Control System

Cyclic, collective, and adjustable pedal controls are provided in the pilot / copilot positions. The cyclic and collective control sticks incorporate friction devices as a method for the pilot to vary movement friction and the amount of effort required to move the control sticks. The cyclic stick lateral and longitudinal movement friction is adjustable. The collective stick vertical movement friction and the throttle twist grip movement friction are adjustable. The collective stick throttle twist grip can also be locked when the operational gas producer turbine speed is attained. The dual flight controls can be easily removed to provide room for passengers or cargo.

5.8.7 Yaw Stability Augmentation System

The MD 520N incorporates a yaw stability augmentation system (Yaw-SAS). The Yaw-SAS is installed to the right vertical stabilizer of the empennage, and significantly reduces pilot workload throughout the flight envelope, especially in gusty / turbulent weather conditions.

Yaw rate data drives the right-side vertical stabilizer, which corrects out-of-trim flight. Pilot inputs during maneuvers and level flight is significantly reduced. The left-side vertical stabilizer is not connected to the Yaw-SAS.

5.8.8 Electrical System

The MD 520N electrical system is a direct current (dc) system with electrical power supplied by a 24-volt nickel-cadmium battery and a 28-volt, 85-amp engine-driven generator. The electrical system incorporates a generic electrical wire harness that is shielded to minimize electro-magnetic interference (EMI). Forward and aft line relay contacts protect main power bus and feeder wires. Over-voltage diodes protect circuits from excessive ground power voltages. An external power receptacle is available for ground power.

5.8.9 Environmental Control System

Cabin environmental control is accomplished by an integral heating and defogging system and an external-air circulation system. The heating and defogging system requires no additional equipment and uses oil cooler blower supplied unheated air and turboshaft engine compressor supplied heated air.

Cabin ventilation with ambient external air is available using instrument panel mounted mechanical controls to operate a moveable vane. In addition, adjustable window-mounted ventilators are installed in each door window to provide in-flight, outside forced air into the cabin or provide vent-air exhaust.

An air conditioning system is an available option.

5.8.10 Monitoring Instrumentation

Typical MD 520N monitoring instrumentation provided as standard equipment includes:

- Dual engine tachometer (NR and N2)
- Engine oil pressure
- Engine oil temperature
- Engine torque meter
- Engine N1 tachometer
- Engine turbine outlet temperature
- Fuel quantity
- Airspeed
- Barometric altimeter
- Magnetic compass
- Outside air temperature
- Direct current ammeter
- Fuel quantity
- Digital chronometer
- Annunciator panel caution / warning lights
  - Engine chip detector light
  - Engine-out warning
  - Fuel filter warning
  - Fuel low warning
  - Generator-out warning
  - Battery over-temperature warning
  - Low rotor revolutions per minute (rpm) warning
  - Main rotor transmission chip detector warning
  - Main rotor transmission oil pressure warning
  - Main rotor transmission oil temperature warning.

5.8.11 Caution / Warning Annunciators

Caution and warning annunciators (indicators) are located at the top of the instrument panel above the flight instruments. A caution indication will be displayed by a yellow indicator illumination. A warning indication will be displayed by a red indicator illumination. Additionally, an audible warning tone will be presented for an engine-out and low-rotor-speed indication with the corresponding warning indicator illumination.

5.8.12 Avionics / Communications

The MD 520N is provided with a standard avionics suite. Optional purchaser configured avionics, communications, instrumentation, etc., may be added at additional expense. To accommodate additional avionics / communication equipment, an optional slant console panel installation is available.

5.8.12.1 Next-Generation Electronic Flight Instrument System

The MD 500-series helicopters will incorporate a modernized instrumentation / avionics cockpit consisting of a Garmin G500 suite that includes a multi-function and primary flight displays (MFD, PFD) and an engine indicating and crew alerting system (EICAS). The EICAS will replace the caution and warning annunciators. The next-generation electronic flight instrumentation system will work with additional equipment such as a GTN650 GPS / NAV / COM and automatic dependent surveillance-broadcast (ADS-B) to provide next-generation air transportation system compatibility.

6. PERFORMANCE SPECIFICATIONS

Performance specifications for the MD 520N helicopter with the standard Rolls-Royce Model 250-C20R/2 turboshaft engine are provided below.

6.1 MD 520N – Rolls-Royce Model 250-C20R/2 Turboshaft Engine

The MD 520N has a nominal empty weight of 1,585 pounds (719 kg) (standard configuration) and 1,486 pounds (674 kg) (industrial configuration). The maximum takeoff gross weight is 3,350 pounds (1591 kg) (normal category) and 3,850 pounds (1746 kg) (external load operations). Ratings are for the MD 520N with a Rolls-Royce Model 250-C20R/2 turboshaft engine rated at 450 shp (336 kW), derated to takeoff power – 375 shp (280 kW), and maximum continuous power – 350 shp (261 kW).

MD 520N Performance Specifications

Parameter	Condition	Imperial 3000 lb	Metric 1360 kg	Imperial 3350 lb	Metric 1519 kg
Maximum Cruise Speed, kt (mph) [km/hr]	Sea Level	128 (147)	[237]	123 (142)	[229]
	5000 ft (1524 m)	132 (152)	[245]	133 (143)	[230]
Maximum Permitted Speed, kt (mph) [km/hr]	V_{NE} at Sea Level	152 (175)	[282]	152 (175)	[282]
Maximum Range, nm (mi) [km]	Sea Level	204 (235)	[378]	197 (227)	[365]
	5000 ft (1524 m)	222 (256)	[412]	210 (242	[389]
Maximum Endurance, hr	Sea Level	2.4	2.4	2.2	2.2
Maximum Rate-of-Climb (TOP), fpm (m/sec)	Sea Level Standard Day	1,913	(9.7)	1,546	(7.9)
	ISA +20C Day	1,687	(8.6)	1,280	(6.5)
Maximum Operating Altitude, ft (m)	Density Altitude	20,000	(6,097)	20,000	(6,097)
Service Ceiling, ft (m)	ISA	16,300	(4,970)	13,200	(4,024)
Maximum Hook Capacity, lb (kg)		2,000	(907)	2,000	(907)
Hover-in-Ground Effect (HIGE), ft (m)	Standard Day	12,800	(3,901)	9,300	(2,835)
	ISA +20C Day	9,000	(2,743)	5,100	(1,554)
Hover-Out-of-Ground Effect (HOGE), ft (m)	Standard Day	9,400	(2,865)	5,600	(1,707)
	ISA +20C Day	5,600	(1,707)	1,400	(427)
Maximum Takeoff Gross Weight, lb (kg)	Normal Category	--	--	3,350	(1,591)
	External Load Operation	--	--	3,850	(1,746)
Empty Weight (Configurations), lb (kg)	Standard	--	--	1,585	(719)
	Industrial	--	--	1,486	(674)
Useful Load, lb (kg) Standard Configuration	Normal Category	--	--	1,764	(800)
	External Load Operations	--	--	2,264	(1,027)

MD 520N Performance Specifications

Parameter	Condition	Imperial 3000 lb	Metric 1360 kg	Imperial 3350 lb	Metric 1519 kg
Useful Load, lb (kg) Industrial Configuration	Normal Category	--	--	1,864	(845)
	External Load Operations	--	--	2,364	(1,072)
Fuel Capacity, lb (kg)	64 gal (242 l)	--	--	4.0	(183)

6.2 Environmental Impact

The MD 520N noise signature is far below the FAA and International Civil Aviation Organization (ICAO) noise requirements. The table below provides the decibel values at three MD 520N flight profiles. The corresponding graphic (shown at the top of the following page) provides a noise level comparison (effective perceived noise level [EPNL]), in decibels (dB), for three helicopter models and the ICAO limit.

MD 520N Operational Noise Levels for Three Flight Profiles

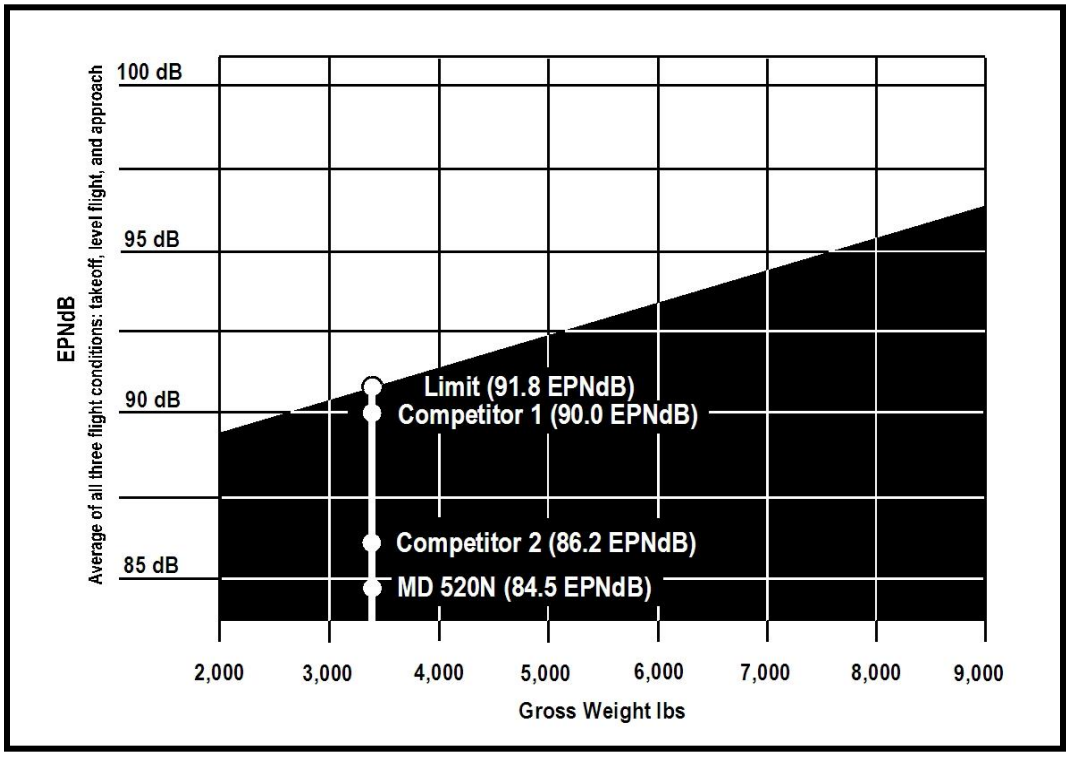
Flight Profile	Measured Value, EPNdB	ICAO Requirement	Compliance Margin
Takeoff	85.4	91.8	6.4
Level Flyover	80.0	90.8	10.8
Approach / Landing	87.7	92.8	5.1

The full-page figure (page 31) provides a comparison of 500-foot overflight effective, perceived noise levels (EPNLs) of competitor single-engine aircraft using European Aviation Safety Agency (EASA) data. This figure shows the MD 500E with four-blade tail rotor, MD 520N, and MD 600N helicopters provide the lowest EPNLs of light single-engine helicopters.

6.3 Safety

The MD 520N has inherent safety features. The fuselage incorporates a rigid, three-dimensional truss type structure, with an integral roll-bar design for increased occupant safety. The airframe structure is designed to be energy absorbing and fails progressively in the event of impact. The fuel cells are separated well away from the outer skin, enclosed by two deep keel beams. Shoulder and seat belts are attached to the aircraft structure rather than to the seat. The pilot and cabin doors function both as primary and emergency exits.

Occupant seat crush boxes are incorporated into the design and provide 20g shock resistance. The seat crush boxes were originally designed to meet Civil Aviation Regulation, Part 6 (CAR6) requirements and have been validated under Title 14 Code of Federal Regulation (CFR), Chapter



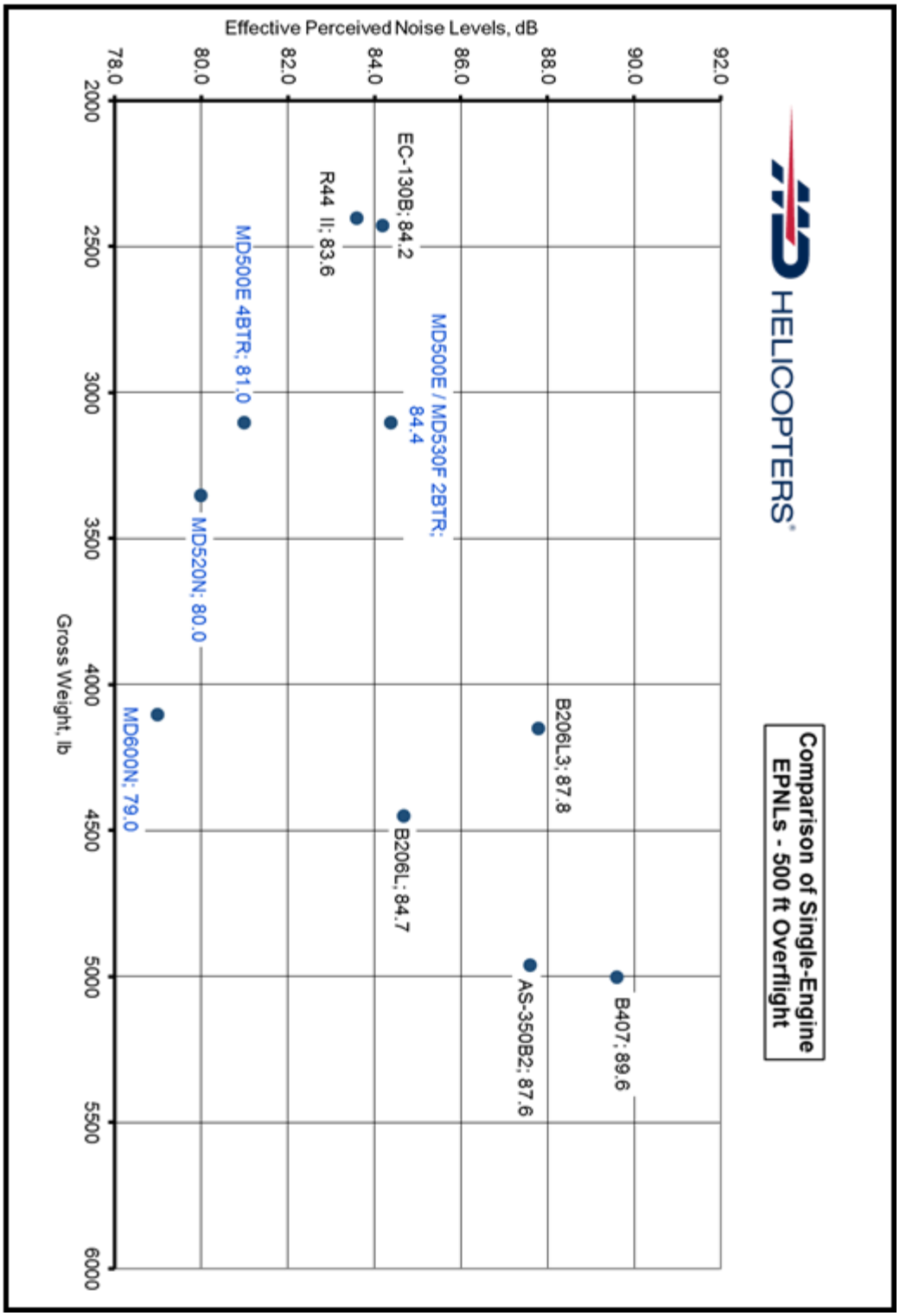
MD 520N Average Noise Certification Level Comparison

1, Part 27, Subpart C, Section 27.562 for the MD 600N air vehicle. Seat crush boxes for the MD 600N are the same as used in the MD 500-series.

Incorporation of the NOTAR® system eliminates the typical spinning tail rotor and reduces the opportunity for tail rotor strikes, increases ground-personnel safety, and provides for improved landing zone safety.

Additional safety features include:

- Static mast, hub, and transmission are mounted on titanium struts preventing direct contact between transmission and upper deck, reducing vibration, and increasing passenger safety
- Fuel cells, located under the cabin floor, are protected during an impact event due to the closely spaced fuselage frames and by the center beam
- Unobstructed pilot visibility for situational awareness
- Crash resistant fuel system
- Integral crewmember seats with energy absorbing structure
- Main rotor height of 8.8 feet, providing ground crew and passenger added safety



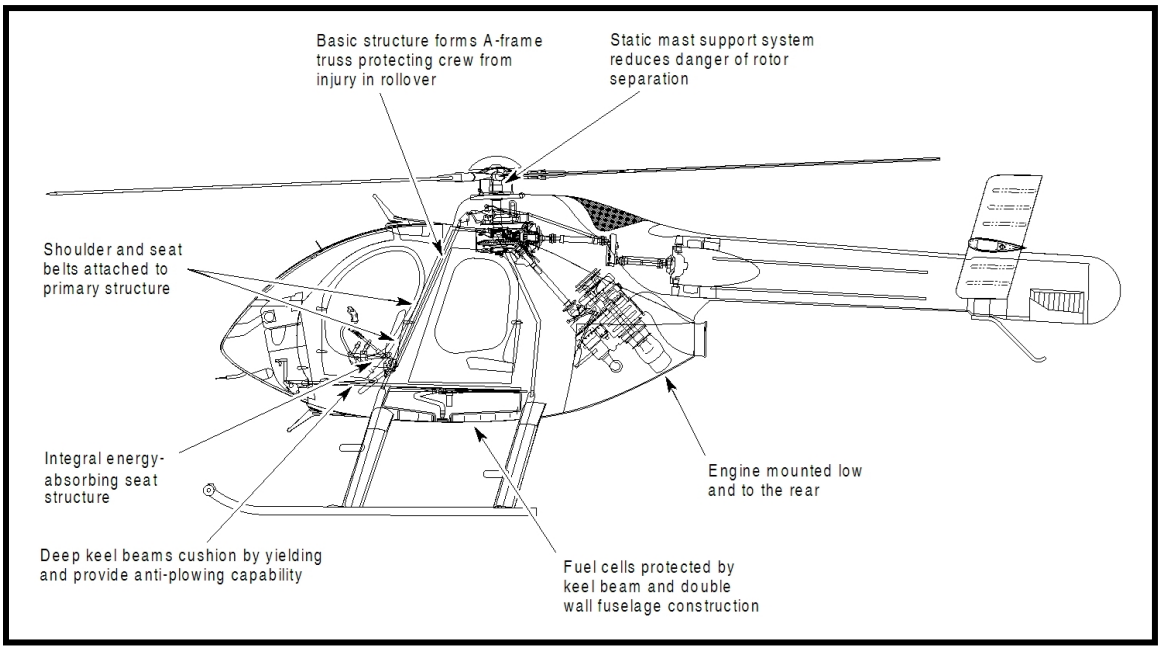
The MD 520N Helicopter has Low 500-Foot Overflight Effective Perceived Noise Levels of Comparable Light Single-Engine Helicopters

- 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
  - Significant foreign object damage tolerance
  - Flyable with fan drive loss.

6.4 Crashworthiness

The MD 520N is a derivative of the OH-6A observation helicopter used extensively by the United States Army during the Vietnam conflict, in which nearly 1500 OH-6A aircraft were operated. The OH-6A earned a reputation for being the most survivable helicopter in the world due to the inherent design features shown in the figure below.

Tests on the landing gear and fuselage sections verified the crashworthiness capability of the MD 500-series. The testing indicates that the MD 500-series helicopters will provide occupant protection for approximately 95-percent of all civil accidents, and that the landing gear and airframe fuselage is capable of absorbing vertical descents up to 26.3 feet per second with only moderate crewmember injury.



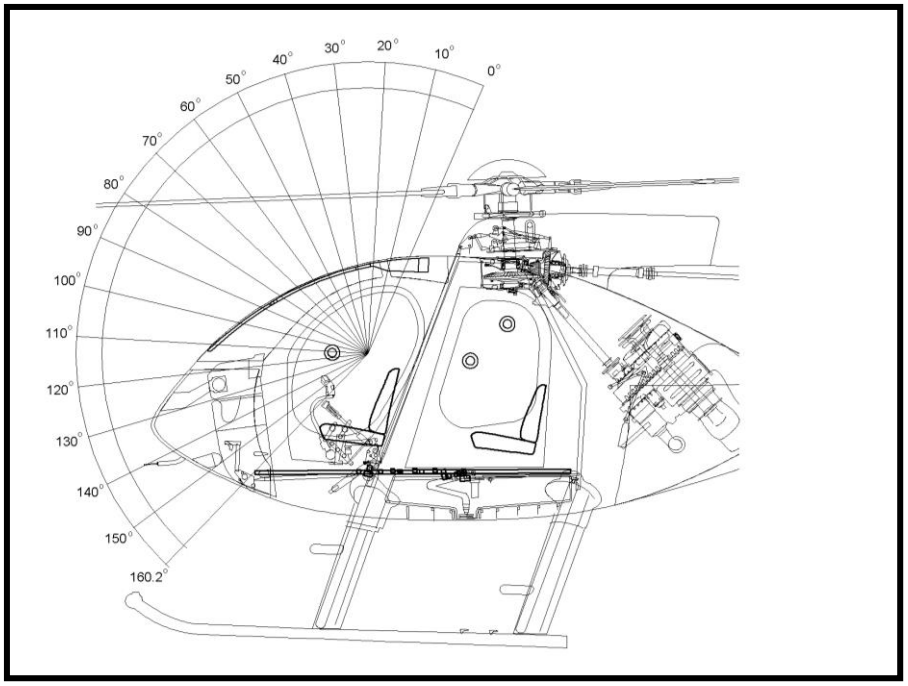
MD 520N Crashworthy Design Features

6.5 Human Systems Interface

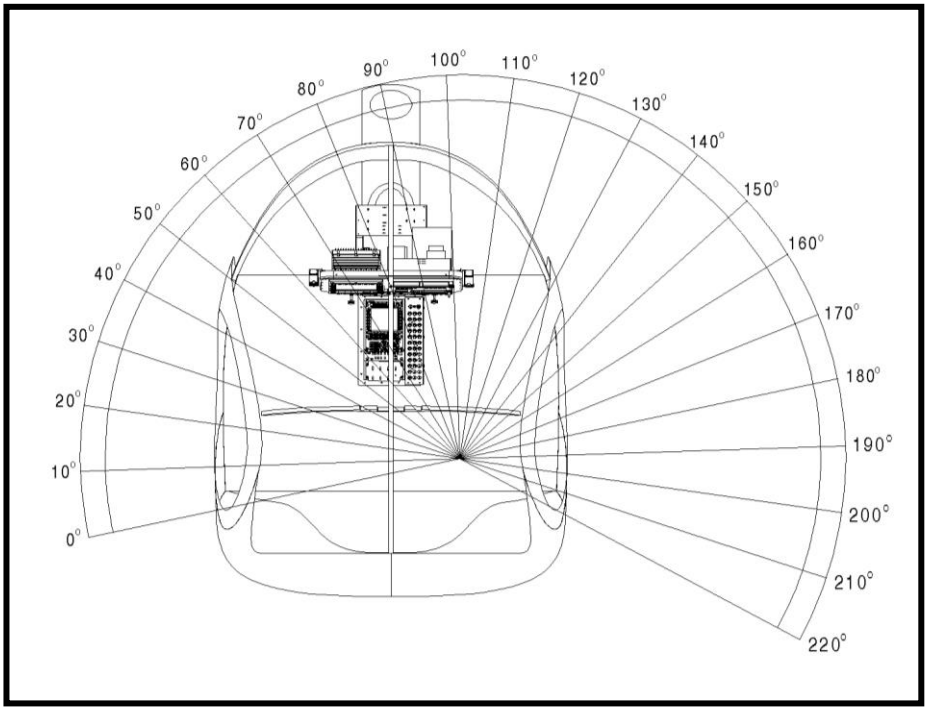
The MD 520N incorporates anthropometric design features that are compatible with 25th to 95th percentile male or female crewmembers. Sizing parameters for the 25th and 95th percentile male and female are provided in the table below. Canopy design meets human engineering design requirements for windows, canopies, and windshields, as shown in the figures that follow.

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)



The MD 520N Provides a 160-Degree Vertical Unobstructed View for the Pilot and Copilot



The MD 520N Provides a 220-Degree Horizontal Unobstructed View for the Pilot and Copilot (View is Top-Down)

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7. MAINTENANCE AND SERVICING

The MD 500-series helicopters were 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 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, as well as easy to understand technical publications. The MD 500-series helicopter spare parts are readily available, and most parts have a corresponding United States Department of Defense National Stock Number (NSN).

7.1 Maintenance

The MD 520N design provides for the maximum maintenance support at the lowest maintenance level. The MD 520N 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) 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 520N helicopter airframe uses an on-condition maintenance concept, which allows scheduled inspections / checks. To be compliant with commercial regulatory requirements, an MD 520N continued airworthiness inspection program was developed by MDHI. This program provides for schedule inspections, and also includes life-limited component replacement. The maintenance and inspection intervals are provided in the Handbook of Maintenance Instruction. Airframe-related inspection intervals occur every:

- 100 hours
- 300 hours
- 600 hours
- 1200 hours
- Yearly
- Special time-phase inspections.

The engine also has life-limited components, a fixed TBO, and inspection intervals. The MD 520N life-limited parts, overhaul intervals, and inspection intervals are listed in the table below.

MD 520N Life-Limited Parts, Overhaul, and Inspection Intervals

Component	Life Limit, hr	Overhaul Interval, hr	Inspection Interval, hr
MAIN ROTOR			
Blade Assembly	3,430		100
Blade Attachment Folding Pin	7,600		
Hub Subassembly	8,900	2,770	300
Upper/Lower Thrust Bearing Cup			2 yr/2770 hr❶
Upper/Lower Thrust Bearing Cone			2 yr/2770 hr❶
Lower Thrust Bearing Cup			2 yr/2770 hr❶
Lower Thrust Bearing Cone			2 yr/2770 hr❶
Hub Pitch Housing Assembly	9,100		
Hub Retention Strap Assembly	2,770		100
Lead-Lag Hub Bolt	6,120		300
Lead-Lag Hub Link Assembly	11,080		
Lead-Lag Damper			600❷
Swashplate			2 yr/2770 hr❶
Drive Shaft	3,260		300
Mast Assembly	10,450		
DRIVE SHAFTS, COUPLINGS, AND CLUTCHES			
Main Rotor Transmission Drive Shaft Coupling	3,200		
Main Rotor Transmission		5,000	
Overrunning Clutch Assembly		1,800❸	100/300❸
Fan Transmission			100
Fan Drive Shaft	2,620		
Oil Cooler Blower Bearing		1,200	
Oil Cooler Blower Belt		1,200	
NOTOR® SYSTEM			
Fan Blade Assembly	7,500		100
Fan Hub	7,500		100
Tension-Torsion Strap	2,500		
Fan Support Bearing	2,400		2 yr/2700 hr❶
Pitch Plate Assembly	7,500		
Pitch Plate Bearing	2,400		2 yr/2770 hr❶
Rotating Cone Assembly	10,204		100
TAIL BOOM			
Tail Boom Assembly	10,000		300
Empennage Fittings			100
Horizontal Stabilizer Torque Tube	5,000		

MD 520N Life-Limited Parts, Overhaul, and Inspection Intervals

Component	Life Limit, hr	Overhaul Interval, hr	Inspection Interval, hr
Horizontal Stabilizer Assembly			100
Vertical Stabilizer Assembly			100
CONTROLS			
Longitudinal Idler Bellcrank Assembly	2,870		
Longitudinal Idler Pitch Mixer	6,050		
Longitudinal Control Rod	7,740		
Cyclic Stick Trim Switch	1,000		
YSAS			300
AIRFRAME			
Landing Gear Strut			100
ENGINE❹			
Compressor Module		3.500	
Compressor Impeller	3,550/9,150❺		
Turbine Module		3,500	1,750❻
First-Stage Turbine Wheel	1,775/3,000❺		
Second-Stage Turbine Wheel	1,775/3,000❺		
Third-Stage Turbine Wheel	4,550/6,000❺		
Fourth-Stage Turbine Wheel	4,550/6,000❺		
Fuel Control		2,500	
Governor		2,000	
Fuel Pump		2,250	
Fuel Nozzle		2,500	
Compressor Bleed Valve		1,500	
Starter/Generator		1,200	

NOTES:

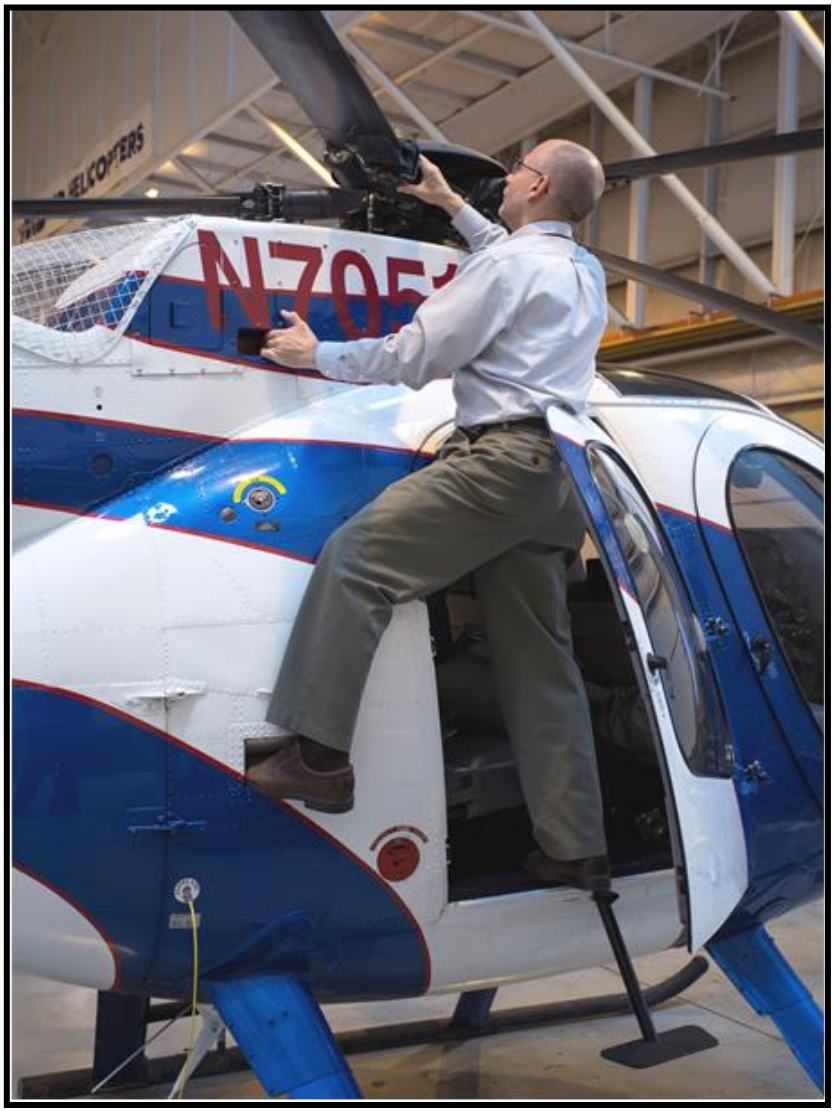
Detailed maintenance / inspection information is provided in the Handbook of Maintenance Instruction, Rotorcraft Flight Manual, and Supplier Technical Publications (i.e., Rolls-Royce).

❶ Bearing grease re-pack task.
❷ Every 600 hours up to 4,200 hours then every 300 hours after.
❸ With cargo hook operation.
❹ Engine inspection intervals at 100, 150, 300, 600, 1000, and 1500 hours are detailed in the corresponding Rolls-Royce Maintenance Manual.
❺ Value represents hours/cycles.
❻ Hot section inspection.

7.2 Servicing

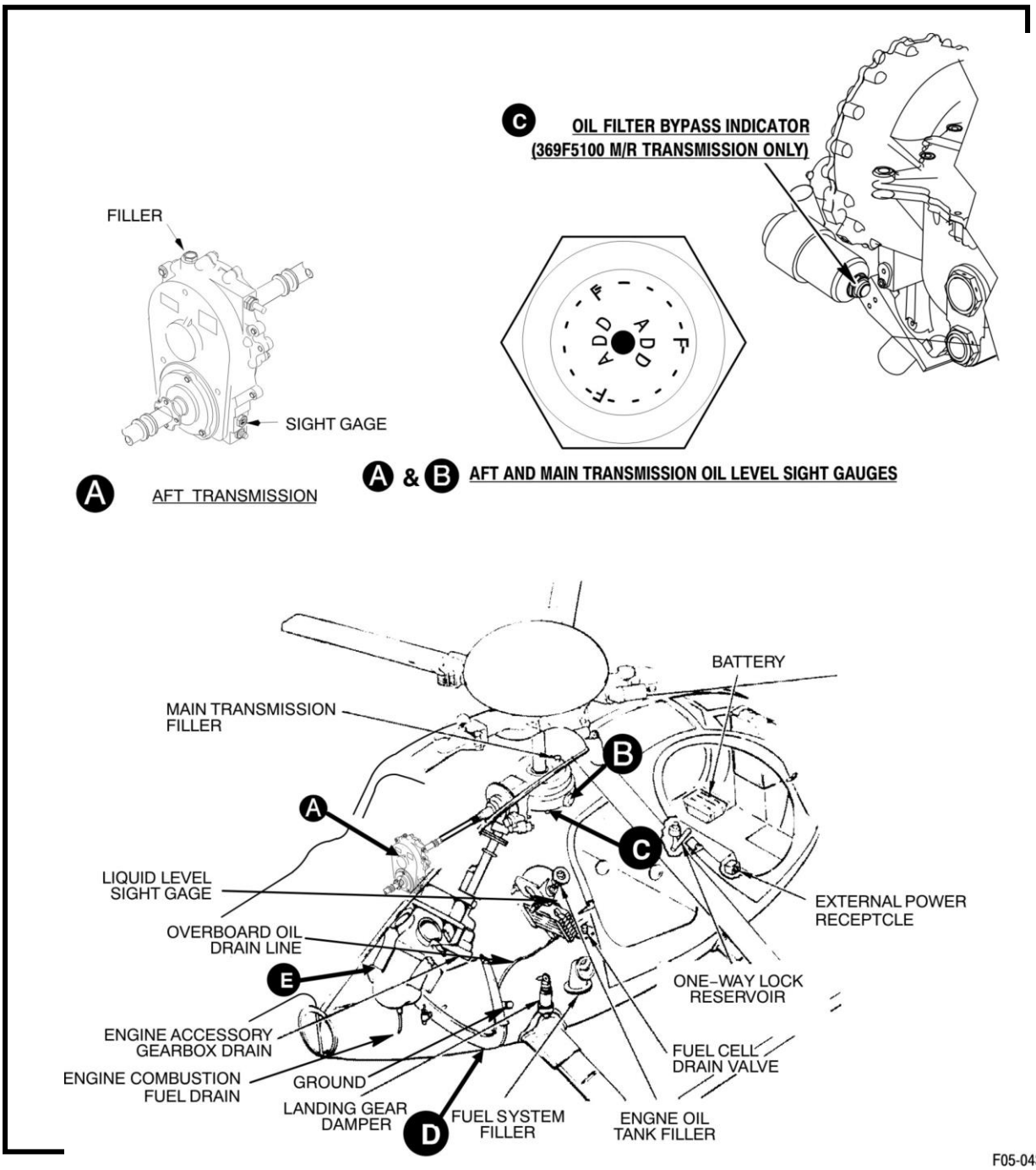
The MD 520N was designed for ease of maintenance, incorporating built-in features that eliminate support equipment and aid servicing. These features include:

- Spring loaded doors that provide engine and main rotor head access (refer to figure on the following page)
- Quick access panels
- Integrated engine water wash system.



The MD 520N has Built-in Steps to Provide Access to the Main Rotor Head without External Ground Support Equipment

The MD 520N helicopter has been designed for servicing and operation using common, commercially-available compounds. Servicing locations are shown in the figure below. Servicing is performed in accordance with the corresponding equipment maintenance manuals. Servicing intervals are detailed in the MD 520N Handbook of Maintenance Instructions. Capacities and compounds used to service the MD 520N are listed in the table following the figure.



MD 520N Servicing Location Points

MD 520N Fluid Capacities and Specifications

Component	Compound	Capacity	Specifications	Notes
Engine	Lubricant	3.0 quarts (2.84 liters)	MIL-PRF-7808G / MIL-PRF-23699C	❶ ❷
Overrunning Clutch	Lubricant	3.64 ounces (107 cc)	Mobil AGL	
Main Rotor Transmission	Lubricant	14.0 pints (6.62 liters)	Mobil AGL	
Aft Transmission	Lubricant	0.5 pint (0.23 liter)	Mobil AGL	
One-Way Lock	Lubricant	0.67 ounces (20 cc)	MIL-PRF-5606 / MIL-PRF-6083	
Battery	Distilled Water	As Required	MS36300	
Fuel Cell	Fuel	64.0 gallons (242 liters) 416 pounds	ASTM-D-1655, Jet A ASTM-D-1655, Jet A-1 ASTM-D-1655, Jet B ASTM-D-1655, JP-1 ASTM-D-1655, RP-3 ASTM-D-6615, Jet B MIL-DTL-5624, JP-4 MIL-DTL-5624, JP-5 MIL-DTL-83133, JP-8	❸ ❹

NOTES:

❶ Refer to Rolls-Royce Operation and Maintenance Manual for approved oils.

❷ Oil specification type mandated by ambient temperature. Refer to Rolls-Royce Operation and Maintenance Manual.

❸ Refer to Rolls-Royce Operation and Maintenance Manual for complete fuel specifications.

❹ At 40F and below, fuel must contain anti-icing additives per MIL-I-27686. Refer to Rolls Royce Operation and Maintenance Manual.

7.2.1 Hourly Cost

The MD 520N helicopter was designed for ease of supportability and low-cost operation. Current, estimated direct operating cost per operating hour data for the MD 520N, shown in the following table, is based on “current-year” 2014 U.S. dollars.

Estimated MD 520N Direct Operating Cost Per Operating Hour is Based on Current-Year (2021) U.S. Dollars

Activity	Cost, U.S. Dollars ($)	Total
Rolls-Royce Model 250-C20R/2 Engine		
Fuel and Lubricants❶		
Fuel at $4.26 per gallon at approximately 32 gallons per hour	$136.32	
Lubricants at 3-percent of fuel	$4.09	
		$140.41
Airframe Maintenance and Spares❷		
Maintenance Labor Costs:		
Scheduled (0.4 man-hour per flight hour at $106.00 per hour)	$42.40	
Unscheduled (0.26 man-hour per flight hour at $106.00 per hour)	$27.56	
		$69.96
Spares Cost:		
Scheduled (Inspection) Parts: Used during Periodic Inspection (e.g., filters, seals, o-rings, etc.)	$5.78	
On-Condition / Unscheduled Part	$21.12	
Reserves: Component Overhaul (Time Between Overhaul)	$63.64	
Reserves: Life-Limited Parts	$57.71	
		$148.25
Engine❸		
Scheduled Maintenance Labor and Parts	$3.00	
Reserves for Engine Overhaul, Spares, Accessories	$90.80	
		$93.80
TOTAL DIRECT OPERATING COST❹		**$452.42**

❶Fuel cost and labor rate are 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, 117 kias
Altitude: 1,000 feet (304 m) on a standard day.

❷Overhaul costs are based on participation in factory exchange program.
❸Engine fleet maintenance costs are provided by Rolls-Royce.
❹Indirect costs such as insurance, hanger, salary, etc. are not included.

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

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8. PRODUCT SUPPORT

MD Helicopters, Inc. is dedicated to 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 transition-flight and maintenance-crew training courses for MDHI-manufactured helicopters. 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

Transition flight, maintenance test, and recurrent pilot training are available from MDHI. Flight transition pilot training for one pilot is included as part of each MDHI helicopter purchase.

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 520N pilots. Recurrent pilot training provides a pilot review of MD 520N 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, flight manual review, preflight inspection, followed by an open-book examination.

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 (i.e., instructional material, 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
- 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 520N 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:

- Returns the non-conforming or defective part or component for credit or refund; or
- Requests 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 limited commercial warranty (CSP-A-2) and SOR forms can be accessed through the MDHI website.

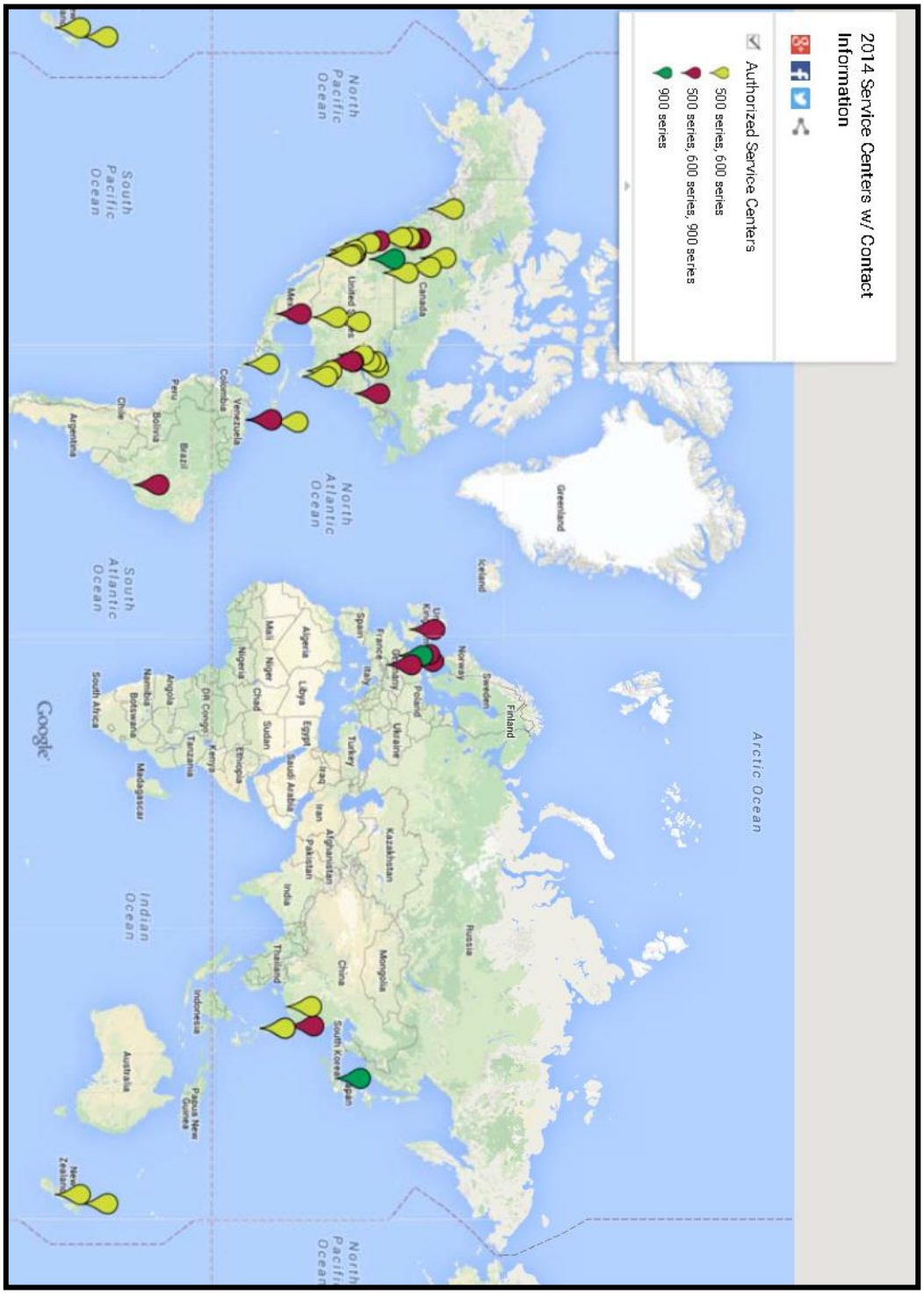
8.3 Service Centers

MD Helicopters, Inc. has approved service centers located worldwide. The figure below shows MDHI worldwide approved service centers locations. Detailed service center information is available on the MD Helicopters 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