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Foreword

Navistar, Inc. is committed to continuous research and development to improve products and introduce technological advances. Procedures, specifications, and parts defined in published technical service literature may be altered.

This *Engine Service Manual* provides a general sequence of procedures for out-of-chassis engine overhaul (removal, inspection, and installation). For in-chassis service of parts and assemblies, the sequence may vary.

NOTE: Photo illustrations identify specific parts or assemblies that support text and procedures; other areas in a photo illustration may not be exact.

See vehicle manuals and Technical Service Information (TSI) bulletins for additional information.

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Technical Service Literature

1171809R5	<i>DT 466, DT 570 and HT 570 Engine Operation and Maintenance Manual</i>
EGES-265-2	<i>DT 466, DT 570 and HT 570 Engine Service Manual</i>
EGES-270	<i>DT 466, DT 570 and HT 570 Engine Diagnostic Manual</i>
EGED-285	<i>DT 466, DT 570 and HT 570 Electronic Control Systems Diagnostic Form (Pad of 50)</i>
EGED-290	<i>DT 466, DT 570 and HT 570 Diagnostics Form (Pad of 50)</i>

Service Diagnosis

Service diagnosis is an investigative procedure that must be followed to find and correct an engine application problem or an engine problem.

If the problem is engine application, see specific vehicle manuals for further diagnostic information.

If the problem is the engine, see specific *Engine Diagnostic Manual* for further diagnostic information.

Prerequisites for Effective Diagnosis

- Availability of gauges, diagnostic test equipment, and diagnostic software
- Availability of current information for engine application and engine systems

- Knowledge of the principles of operation for engine application and engine systems
- Knowledge to understand and do procedures in diagnostic and service publications

Technical Service Literature required for Effective Diagnosis

- *Engine Service Manual*
- *Engine Diagnostic Manual*
- Diagnostics Forms
- Electronic Control Systems Diagnostics Forms
- Service Bulletins

Safety Information

This manual provides general and specific maintenance procedures essential for reliable engine operation and your safety. Since many variations in procedures, tools, and service parts are involved, advice for all possible safety conditions and hazards cannot be stated.

Read safety instructions before doing any service and test procedures for the engine or vehicle. See related application manuals for more information.

Disregard for Safety Instructions, Warnings, Cautions, and Notes in this manual can lead to injury, death or damage to the engine or vehicle.

Safety Terminology

Three terms are used to stress your safety and safe operation of the engine: Warning, Caution, and Note

Warning: A warning describes actions necessary to prevent or eliminate conditions, hazards, and unsafe practices that can cause personal injury or death.

Caution: A caution describes actions necessary to prevent or eliminate conditions that can cause damage to the engine or vehicle.

Note: A note describes actions necessary for correct, efficient engine operation.

Safety Instructions

Work Area

- Keep work area clean, dry, and organized.
- Keep tools and parts off the floor.
- Make sure the work area is ventilated and well lit.
- Make sure a First Aid Kit is available.

Safety Equipment

- Use correct lifting devices.
- Use safety blocks and stands.

Protective Measures

- Wear protective safety glasses and shoes.
- Wear correct hearing protection.
- Wear cotton work clothing.
- Wear sleeved heat protective gloves.
- Do not wear rings, watches or other jewelry.

- Restrain long hair.

Vehicle

- Make sure the vehicle is in neutral, the parking brake is set, and the wheels are blocked before servicing engine.
- Clear the area before starting the engine.

Engine

- The engine should be operated or serviced only by qualified individuals.
- Provide necessary ventilation when operating engine in a closed area.
- Keep combustible material away from engine exhaust system and exhaust manifolds.
- Install all shields, guards, and access covers before operating engine.
- Do not run engine with unprotected air inlets or exhaust openings. If unavoidable for service reasons, put protective screens over all openings before servicing engine.
- Shut engine off and relieve all pressure in the system before removing panels, housing covers, and caps.
- If an engine is not safe to operate, tag the engine and ignition key.

Fire Prevention

- Make sure charged fire extinguishers are in the work area.

NOTE: Check the classification of each fire extinguisher to ensure that the following fire types can be extinguished.

1. Type A — Wood, paper, textiles, and rubbish
2. Type B — Flammable liquids
3. Type C — Electrical equipment

Batteries

- Always disconnect the main negative battery cable first.
- Always connect the main negative battery cable last.
- Avoid leaning over batteries.
- Protect your eyes.

- Do not expose batteries to open flames or sparks.
- Do not smoke in workplace.

Compressed Air

- Use an OSHA approved blow gun rated at 207 kPa (30 psi).
- Limit shop air pressure to 207 kPa (30 psi).
- Wear safety glasses or goggles.
- Wear hearing protection.
- Use shielding to protect others in the work area.
- Do not direct compressed air at body or clothing.

Tools

- Make sure all tools are in good condition.
- Make sure all standard electrical tools are grounded.

- Check for frayed power cords before using power tools.

Fluids Under Pressure

- Use extreme caution when working on systems under pressure.
- Follow approved procedures only.

Fuel

- Do not over fill the fuel tank. Over fill creates a fire hazard.
- Do not smoke in the work area.
- Do not refuel the tank when the engine is running.

Removal of Tools, Parts, and Equipment

- Reinstall all safety guards, shields, and covers after servicing the engine.
- Make sure all tools, parts, and service equipment are removed from the engine and vehicle after all work is done.

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Engine Identification

Engine Serial Number

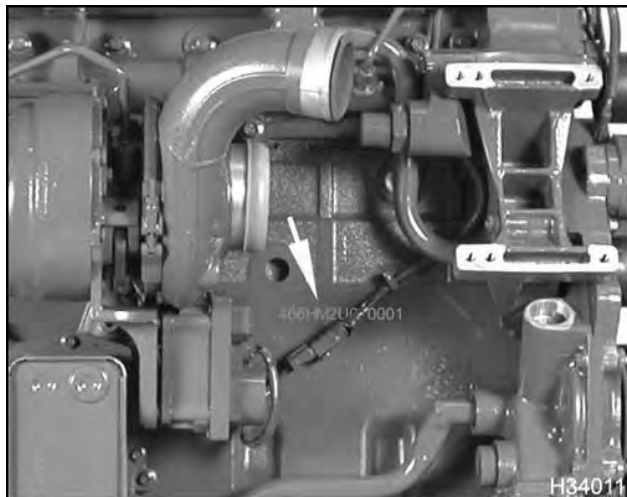


Figure 1 Engine serial number (right side front)



Figure 2 Engine serial number (right side rear)

Engine Serial Number Examples

DT 466 engine: 466HM2UXXXXXXX

DT 570 engine: 570HM2UXXXXXXX

Engine Serial Number Codes

466 – Engine displacement

570 – Engine displacement

H – Diesel, turbocharged, Charge Air Cooler (CAC), and electronically controlled

M2 – Motor truck

U – United States




7 digit suffix – Engine serial number sequence beginning with 2,000,000

Engine Serial Number Locations

- The engine serial number is stamped on a crankcase pad on the right side of the crankcase (front for earlier model years and rear for later model years).
- The engine serial number is also on the engine emission label.

Engine Emission Label

A common emission label is issued for the International® DT 466 and DT 570 diesel engines.

 INTERNATIONAL®			
IMPORTANT ENGINE INFORMATION IMPORTANT MOTRUR INFORMATIONS ENGINE MANUFACTURED BY: MOTEUR FABRIQUE PAR: INTERNATIONAL TRUCK AND ENGINE CORPORATION			
MODEL YEAR MODELE	2004	MODEL MODELE	D260
ADV. BHP @ RPM PUISS. NOM. A TR/MIN	260 @ 2300	Engine Family Famille De moteur	DT 466 HT
LB-FT TORQ @ RPM COUPLE LB-PI A TR/MIN	800 @ 1400	DISPLACEMENT CYLINDREE	466 IN ³ 7.6L
Emission family		4NVXH0466ANA	
Label number		1800000C1	
Emission control system		DI, ECM, TAA, EGR, OC	
			
FEL INFORMATION IF APPLICABLE			
Valve lash COLD .483 mm (.019 in) INT and EX			
Curb idle, fuel rates, and injection timing are non-adjustable			
EPA notes			
EURO notes			
Reserved EXAMPLE			
ENGINE S/N 466HM2U1234567			
			

H34005

The Environmental Protection Agency (EPA) emission label is on top of the valve cover. The engine label includes the following:

- Model year
- Engine family, model, and displacement
- Advertised brake horsepower and torque rating
- Emission family and control systems
- U.S. Family Emission Limits (FEL), if applicable
- Valve lash specifications
- Engine serial number
- EPA, EURO, and reserved fields for specific applications

Engine Accessories

The following engine accessories may have manufacturer's labels or identification plates:

- Air compressor (for brake or suspension system)
- Air conditioning compressor
- Alternator
- Cooling fan clutch
- EVRT® electronically controlled turbocharger – International's version of a Variable Geometry Turbocharger (VGT)
- Power steering pump
- Starter motor

Labels or identification plates include information and specifications helpful to vehicle operators and technicians.

Figure 3 Engine emission label (Example)

Engine Description
Table 1 International® DT 466 and DT 570 Features and Specifications

Engine	4 stroke, in-line six cylinder diesel
Configuration	Four valves per cylinder
Displacement	7.6 L (466 in ³)
Displacement	9.3 L (570 in ³)
Bore (sleeve diameter)	116.6 mm (4.59 in)
Stroke	
DT 466	119 mm (4.68 in)
DT 570	146 mm (5.75 in)
Compression ratio	
DT 466	16.5 : 1
DT 570	17.5 : 1
Aspiration	VGT turbocharged and Charge Air Cooled (CAC)
Rated power @ rpm	
DT 466*	210 bhp @ 2600 rpm
DT 570**	285 bhp @ 2200 rpm
Peak torque @ rpm	
DT 466*	520 lbf•ft @ 1400 rpm
DT 570**	800 lbf•ft @ 1200 rpm
Engine rotation (facing flywheel)	Counterclockwise
Combustion system	Direct injection turbocharged
Fuel system	International® electro-hydraulic generation 2 injection
Total engine weight (dry without accessories)	
DT 466	671 kg (1,480 lbs)
DT 570	708 kg (1,560 lbs)
Cooling system capacity (engine only)	12.8 L (13.5 qts US)
Lube system capacity (including filter)	28 L (30 qts US)
Lube system capacity (overhaul only, with filter)	34 L (36 qts US)
Firing order	1-5-3-6-2-4

* Base rating shown. See Appendix A in the *Engine Diagnostics Manual*.

**Base rating shown. See Appendix B in the *Engine Diagnostics Manual*.

Engine Features

Table 2

Standard Features	Optional Features
Four valves per cylinder	Air compressor
Dual timing sensors	Power steering pump
Replaceable piston and sleeve configuration	Front cover PTO access
Gerotor lube oil pump	Engine Fuel Pressure (EFP) sensor
International® common rail high-pressure injection system	Diamond Logic® engine brake
Variable Geometry Turbocharger (VGT)	Diamond Logic® exhaust brake
Exhaust Gas Recirculation (EGR)	Fuel heater
Water supply housing (Freon® compressor bracket)	Oil pan heater
Alternator bracket	Coolant heater assembly
Control modules	
Water In Fuel (WIF) separation	
Water In Fuel (WIF) sensor	
Inlet Air Heater (IAH) – single or dual element	

Standard Features

DT 466, DT 570, and HT 570 are in-line six cylinder engines (medium range). Engine displacements are 7.6 liters (466 cubic inches) for the DT 466 and 9.3 liters (570 cubic inches) for the DT 570, and HT 570. The firing order of the cylinders is 1–5–3–6–2–4.

The cylinder head has four valves per cylinder for improved air flow. Each fuel injector is centrally located between the four valves and directs fuel over the piston bowl for improved performance and reduced emissions. The overhead valve train includes mechanical roller lifters, push rods, rocker arms, and dual valves that open using a valve bridge.

A one piece crankcase withstands high-pressure loads during diesel operation.

The lower end of the DT 570 and HT 570 engines (for ratings above 300 hp) includes a crankcase ladder designed to absorb additional loads generated by increased horsepower. Seven main bearings support the crankshaft for DT 466, DT 570, and HT 570 engines. Fore and aft thrust are controlled at the rear bearing. Four insert bushings support the camshaft for each engine. The rear oil seal carrier is part of the flywheel housing. The open crankcase breather

assembly uses a road draft tube to vent crankcase pressure and an oil separator that returns oil to the crankcase.

The crankshaft (CKP) and camshaft (CMP) sensors are used by the ECM and IDM to calculate rpm, fuel timing, fuel quantity, and duration of fuel injection.

Two different kinds of pistons are used in the in-line engines:

- The DT 466 engine has one piece aluminum alloy pistons.
- The DT 570 and HT 570 engines have two piece articulated pistons with a steel crown.

All pistons are mated to fractured cap joint connecting rods. Replaceable wet cylinder sleeves are used with the pistons.

A gerotor lube oil pump, mounted to the front cover, is driven directly by the crankshaft. All engines use an oil cooler and spin-on oil filter.

A low-pressure fuel supply pump draws fuel from the fuel tank through a fuel filter assembly that includes a strainer, filter element, primer pump, drain valves,

and Water In Fuel (WIF) sensor. After filtering, fuel is pumped to the cylinder head fuel rail.

The International® common rail high-pressure injection system includes a cast iron oil manifold, fuel injectors, and a high-pressure oil pump.

The key feature of the VGT is actuated vanes in the turbine housing. The vanes modify flow characteristics of exhaust gases through the turbine housing. The benefit is the ability to control boost pressure for various engine speeds and load conditions. An additional benefit is lower emissions.

An EGR control valve regulates cooled exhaust gases entering the inlet air stream. Cool exhaust gas increases engine tolerance for EGR, while reducing smoke formed by gas dilution in the mixture. Three EGR coolers are available depending on applications.

A water supply housing (Freon® compressor bracket) is a coolant supply housing that includes an auxiliary water connection.

Three control modules monitor and control the electronic engine systems:

- Diamond Logic® engine controller – Electronic Control Module (ECM)
- Injector Drive Module (IDM)
- Exhaust Gas Recirculation (EGR) drive module

Water In Fuel (WIF) separation occurs when the filter element repels water molecules and water collects at the bottom of the element cavity in the fuel filter housing.

A Water In Fuel (WIF) sensor in the element cavity of the fuel filter housing detects water. When enough water accumulates in the element cavity, the WIF sensor sends a signal to the Electronic Control Module (ECM). A fuel drain valve handle on the housing can be opened to drain water from the fuel filter housing.

An Inlet Air Heater (IAH) – a single or dual element – warms the intake air entering the cylinder head.

Optional Features

An air compressor is available for applications requiring air brakes or air suspension.

A hydraulic power steering pump can be used with or without an air compressor.

The front cover includes a mounting flange for Power Take Off (PTO) accessories. The air compressor drive gear train, used with a spline adapter, provides power for front mounted PTO accessories.

An optional Engine Fuel Pressure (EFP) sensor detects low pressure caused by high fuel filter restriction and sends a signal to the ECM; the ECM illuminates the amber FUEL FILTER lamp on the instrument panel.

The Diamond Logic® engine brake is new for medium range diesel engines. This compression braking system uses a high-pressure rail assembly and the VGT for additional braking. The operator controls the engine brake for different operating conditions.

The Diamond Logic® exhaust brake system uses only the VGT to restrict exhaust flow for additional braking. The operator controls the exhaust brake for different operating conditions.

Options for vehicles and applications used in cold climates include the following:

- **Oil pan heater**

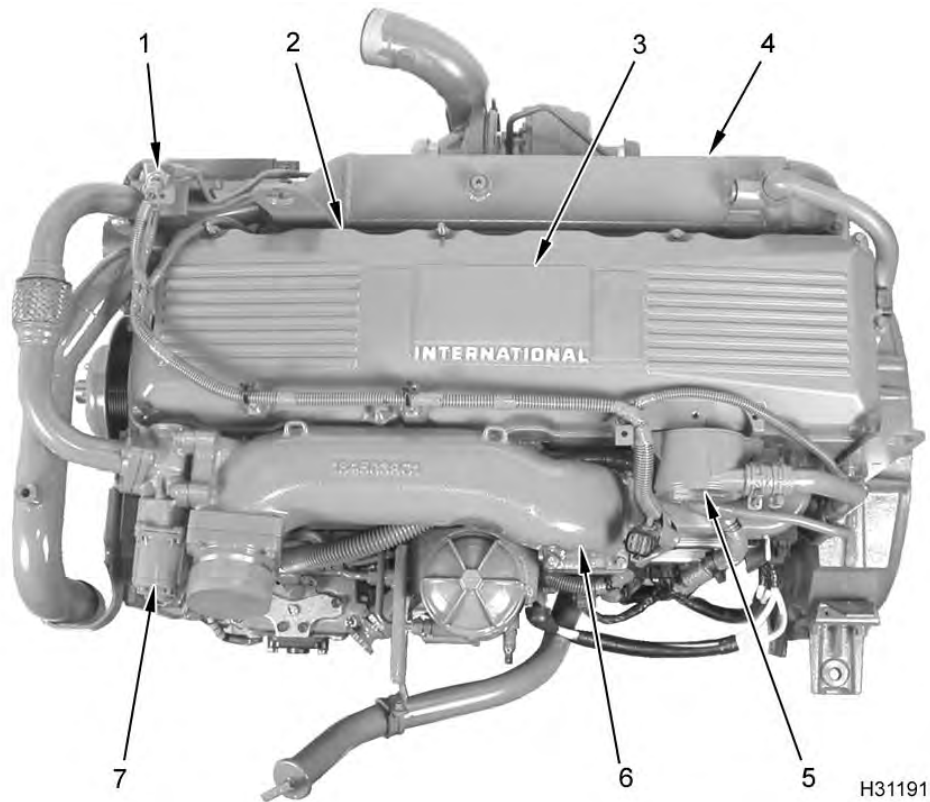
The oil pan heater warms engine oil in the pan and ensures oil flow to the injectors.

- **Coolant heater**

The coolant heater raises the temperature of coolant surrounding the cylinders for improved performance and fuel economy during start-up.

- **Fuel heater**

The fuel heater (a 300 watt element) in the base of the fuel filter assembly heats the fuel for improved performance.

Engine Component Locations**Figure 4 Component location – top**

- | | | |
|---------------------------------------|--------------------------------------|-----------------------------|
| 1. Exhaust Back Pressure (EBP) sensor | 3. Exhaust emission label (location) | 6. Inlet and EGR mixer duct |
| 2. Valve cover | 4. EGR cooler assembly | 7. EGR control valve |
| | 5. Breather assembly | |