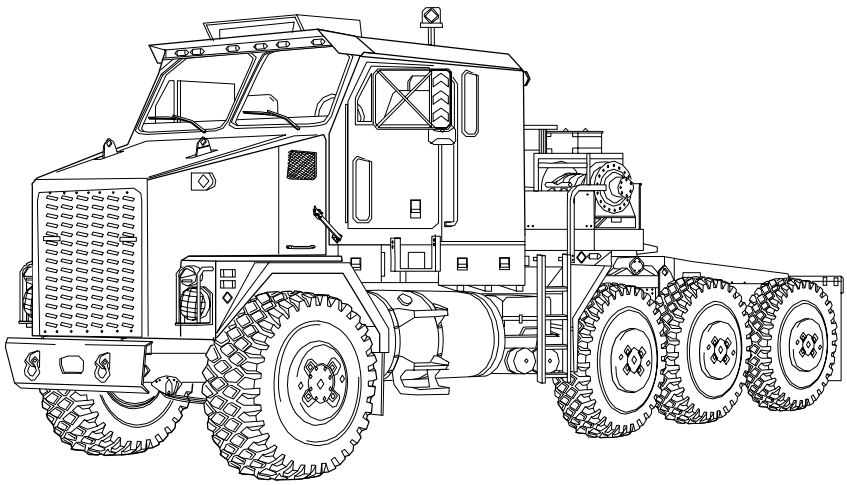
*TM 9-2320-360-34-2

VOLUME NO. 2
GENERAL SUPPORT

TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE



TRUCK, TRACTOR, M1070, 8 X 8, HEAVY EQUIPMENT TRANSPORTER (HET)

NSN 2320-01-318-9902
EIC: B5C

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

*Supersedes TM 9-2320-360-34-2 dated 31 March 1994

HEADQUARTERS, DEPARTMENT OF THE ARMY

May 2007

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WARNING

Personnel hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 dB (A) or greater. Wear approved hearing protection devices when working in high noise level areas. Personnel exposed to high noise levels shall participate in a hearing conservation program in accordance with DA PAM 40-501. Hearing loss occurs gradually but becomes permanent over time.

WARNING

CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU

Carbon monoxide is a colorless, odorless, DEADLY POISONOUS gas and when breathed deprives body of oxygen and causes SUFFOCATION. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Permanent BRAIN DAMAGE or DEATH may result from severe exposure.

The following precautions MUST be followed to ensure personnel are safe whenever personnel heater or main or auxiliary engine is operated for any purpose.

DO NOT operate personnel heater or engine of vehicle in enclosed area without adequate ventilation.

DO NOT idle engine for long periods without ventilator blower operation. If tactical situation permits, open hatches.

DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.

NEVER sleep in a vehicle when the heater is operating or the engine is idling.

BE ALERT at all times during vehicle operation for exhaust odors or exposure symptoms. If either are present, IMMEDIATELY EVACUATE AND VENTILATE the area. Affected personnel treatment shall be: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, give artificial respiration as described in FM 4-25.11 and get medical attention.

BE AWARE; neither the gas particulate filter unit nor field mask for nuclear, biological, and chemical protection will protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.

WARNING

Wear eye protection and use care when replacing snap rings and retaining rings. Snap/retaining rings are under spring tension and can act as projectiles when released and may cause severe eye injury.

Protective goggles must be worn when drilling. Failure to comply may result in injury to personnel.

Always wear eye protection and protective clothing when handling glass. Failure to comply may result in injury.

WARNING

Adhesive-sealants and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If sealing compound gets on skin or clothing, wash immediately with soap and water.

General purpose cement can burn easily and is harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If cement gets on skin or clothing, wash immediately with soap and water.

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WARNING

- **Adhesive causes immediate bonding on contact with eyes, skin, or clothing and also gives off harmful vapors. Wear protective goggles and use in well-ventilated area. If adhesive gets in eyes, try to keep eyes open; flush eyes with water for 15 minutes and get immediate medical attention.**
- **On direct contact, uncured silicone sealant irritates eyes. In case of contact, flush eyes with water and seek medical attention. In case of skin contact, wipe off and flush with water.**

WARNING

Solvent cleaning compound MIL-PRF-680 Type II and III may be irritating to the eyes and skin. Use protective gloves and goggles. Use in well-ventilated areas. Use respirator as needed. Accidental ingestion can cause irritation of digestive tract and respiratory tract, may cause lung and central nervous system damage. Can be fatal if swallowed. Inhalation of high/ massive concentrations can cause coma or be fatal. First aid for ingestion: do not induce vomiting. Seek immediate medical attention. First aid for skin contact: remove contaminated clothing. Wash skin thoroughly with soap and water. If symptoms persist, seek medical attention. First aid for eye contact: flush with water for 15 minutes or until irritation subsides. If symptoms persist, seek medical attention. First aid for inhalation: move to fresh air. If not breathing, provide artificial respiration. If symptoms persist, seek medical attention. Keep away from open flames and other sources of ignition. Failure to follow this warning may result in injury or death to personnel.

•The flashpoint for type II solvent cleaning compound is 141-198°F (61-92C) and type III is 200-241°F (93-116C).
•Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment.
•Fire extinguishers should be placed nearby when using solvent cleaning compound. Failure to follow this warning may result in injury or death.
•Cloths or rags saturated with solvent cleaning compound must be disposed of IAW authorized facilities' procedures. Failure to follow this warning may result in injury.
•Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury.

- **Compressed air for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).**
- **Steam cleaning creates hazardous noise levels and severe burn potential. Eye, skin, and ear protection is required. Failure to comply may result in injury to personnel.**
- **Face shield must be used by personnel operating spray gun. Failure to comply may result in injury to personnel.**

WARNING

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, transmission fluid, lubricants, batteries, battery acid or CARC paint, consult your Unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact the Army environmental hotline at 1-800-872-3845. Improper disposal of this material may result in damage to environment or injury to personnel.

WARNING

- **Floor jack must be positioned on flat surface. Placing jack on uneven or soft surface could result in truck falling, causing serious injury or death to personnel.**
- **Jackstands must be positioned on flat surface, not more than 10 in. (25.4 cm) from wheels. Placing jackstands on uneven or soft surface could result in truck falling, causing serious injury or death to personnel.**
- **Do not work on any item supported only by jacks or hoist. Always use blocks or proper stands to support the item prior to any work. Equipment may fall and cause injury or death to personnel.**
- **To avoid personal injury, use hoist or get assistance when lifting components that weigh more than 50 lb (23 kg). Ensure all chains, hooks, slings, and lifting devices are in good condition and are of correct capacity.**

WARNING

Observe the following precautions when working on or around engine/transmission components.

- **Use guide straps or rope to guide engine/transmission assembly while lifting. Failure to comply may result in injury to personnel.**
- **Grade 8 screws must be used to support engine. Failure to comply may result in engine falling causing injury or death to personnel.**
- **Keep out from under heavy parts. Falling parts may result in serious injury to personnel.**

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WARNING

Observe the following precautions when working on or around engine/transmission components (cont).

- **When working on a running engine, use caution around rotating parts. Tools, clothing, and hands may get caught causing serious injury or death to personnel.**
- **Ensure engine is cool before performing maintenance. Failure to comply may result in severe burns.**
- **Engine has may sharp edges. Use caution when using hand tools. Failure to comply may result in injury to personnel.**

WARNING

Observe the following precautions when working on fuel system components.

- **Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET OF VEHICLE.**

WARNING

Observe the following precautions when working on or around exhaust system components.

- **Ensure exhaust manifold and exhaust tube are cool before performing maintenance. Failure to comply may result in serious injury to personnel.**

WARNING

Observe the following precautions when working on or around electrical system components.

- **Remove rings, bracelets, watches, necklaces, and any other jewelry before working around HET Tractor. Jewelry can catch on equipment and cause injury or short across electrical circuit and cause severe burns or electrical shock. Batteries can explode from a spark. Battery acid is harmful to skin and eyes. Always wear eye protection when working with batteries.**
- **Batteries produce explosive gases. Keep sparks and open flame away from batteries. Failure to comply may result in serious injury to personnel.**
- **Use extreme care when measuring voltage while engine is running. Rotating fan blade and hot engine parts may cause injury.**

WARNING

Observe the following precautions when working on or around brake system components.

- **Do not use brake drum that exceeds maximum wear specifications. Failure to comply may result in brake failure and serious injury or death.**
- **Brake shoes/drum may be coated with dust. Breathing dust may be harmful to personnel. Do not use compressed air to clean brake shoes/drum. Wear filter mask approved for use against dust.**
- **Left and right camshafts are different and not interchangeable. Using wrong camshaft may result in inoperative brakes and injury to personnel.**

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WARNING

Observe the following precautions when working on or around axle components.

- **Axles are heavy. Keep hands and feet out from under axle. Failure to comply may result in injury or death to personnel.**
- **Differential assemblies are heavy. Stay clear of differential assembly when it is supported by lifting device. If differential falls, serious injury or death may result.**
- **Axle/suspension is heavy. Keep hands and feet out from under axle. Failure to comply may result in injury or death to personnel.**
- **Support axle with transmission lift. Secure axle to transmission lift with strap or chain. Failure to comply may result in serious injury to personnel.**
- **Keep hands clear of spring and axle housing when lowering axle. Failure to comply may result in serious injury to personnel.**
- **Keep fingers out of pin hole in spring brackets and spring eyes when removing spring pins. Failure to comply may result in injury to personnel.**

WARNING

Observe the following precautions when working on or around cab and frame components.

- **Cab weighs 2600 lb (1179 kg). Stay clear of cab when it is supported by lifting device. If cab falls, serious injury of death may result. Use 10 ft (3 m) guidelines to help guide cab during removal.**
- **Do not work on HET Tractor when supported only by jack or hoist. It may fall and cause severe injury or death.**
- **Ensure personnel are clear of lifting area. All personnel are within visual sight of each other and not within 15 ft (4.6 mm) of cab when lifting is in process. Failure to comply may result in serious injury or death to personnel.**
- **Do not allow personnel to work between jackstands and cab or within designated danger zones while lifting device is supporting cab. Failure to comply may result in serious injury or death to personnel.**
- **Hood is not designed to be a work platform. Using hood as a work platform may result in injury or equipment damage.**

WARNING

Observe the following precautions when working on or around fifth wheel.

- **Rear of fifth wheel plate must be resting on angle stop before performing maintenance. Failure to comply may result in injury.**

WARNING

Observe the following precautions when working on or around suspension system components.

- **Keep hands clear of pin and spring when removing pin. Failure to comply may result in serious injury to personnel.**
- **Air suspension system may still be pressurized even though AIR PRESS gage reads 0 psi. Remove air line slowly to allow air to escape. Failure to comply may result in air line blowing off causing serious injury to personnel.**
- **Air suspension will drop when air line is removed. Stay clear of suspension. Failure to comply may result in serious injury to personnel.**

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WARNING

Observe the following precautions when working on or around winch system components.

Driver's side and passenger's side winches are not interchangeable. Winch cable slot on drum is on gear end for driver's side winch and on motor end for passenger's side winch. Failure to install correct winch may result in injury to personnel and improper winch operation.

Plug and valve cartridge locations determine if counterbalance valve is for driver or passenger side. Plug and valve cartridge must be in correct locations for driver and passenger side winch. Failure to comply may cause injury to personnel and result in reverse winch operation.

Always wear heavy gloves when handling winch cable. Never let cable run through hands. Frayed cable can cut hands severely.

Use care when removing cable from drum. End of cable can spring up causing injury to personnel.

Output shaft is installed differently in winch drum depending on whether winch is for passenger or driver's side. For driver's side winch, splined end of output shaft must be on cutout end of winch drum. For passenger's winch, splined end of output shaft must be on end opposite cutout end of winch drum. Failure to comply may result in improper winding of cable and injury to personnel.

WARNING

Polyurethane Coating (CARC)

Eye and hearing protection must be worn at all times when using power tools for grinding, cutting, sawing and drilling. Failure to do so may result in injury to personnel. Chemical Agent Resistant Coating (CARC) paint contains isocyanate which is highly irritating to skin and respiratory system. High concentrations of isocyanate can produce symptoms of itching and reddening of skin, a burning sensation in the throat and nose, and watering of the eyes. In extreme concentrations, isocyanate can cause cough, shortness of breath, pain during respiration, increased sputum production, and chest tightness. First aid for ingestion: do not induce vomiting. Seek immediate medical attention. First aid for skin contact: remove contaminated clothing. Wash skin thoroughly with soap and water. If symptoms persist, seek medical attention. First aid for eye contact: flush with water for 15 minutes or until irritation subsides. If symptoms persist, seek medical attention. First aid for inhalation: move to fresh air. If not breathing, provide artificial respiration. If symptoms persist, seek medical attention.

The following precautions must be taken whenever using CARC paint:

- **Protective equipment (gloves, goggles, ventilation mask) must be worn when using CARC paint.**
- **NEVER cut CARC-coated materials without high-efficiency, air-purifying respirators in use.**
- **DO NOT grind or sand painted equipment without high-efficiency, air-purifying respirators in use.**
- **BE AWARE of CARC paint exposure symptoms; symptoms can occur a few days after initial exposure. Seek medical help immediately if symptoms are detected.**
- **Use only in well-ventilated areas. Check with local environmental office for methods and locations approved for painting in accordance with local and state environmental regulations.**
- **ALWAYS use air line respirators when using CARC paint unless air sampling shows exposure to be below standards. Use chemical cartridge respirator if air sampling is below standards.**

WARNING

After Nuclear, Biological, or Chemical (NBC) exposure of vehicle, all air filters shall be handled with extreme caution. Unprotected personnel may experience injury or death if residual toxic agents or radioactive material are present. If vehicle is exposed to chemical or biological agents, servicing personnel shall wear protective mask, hood, protective overgarments, and chemical protective gloves and boots in accordance with FM 3-11.4. All contaminated air filters shall be placed in double-lined plastic bags and moved swiftly to a segregation area away from the worksite. The same procedure applies for radioactive dust contamination. The Company NBC team should measure radiation prior to filter removal to determine extent of safety procedures required per the NBC Annex to the unit Standard Operating Procedures (SOP). The segregation area in which the contaminated air filters are temporarily stored shall be marked with appropriate NBC placards. Final disposal of contaminated air filters shall be in accordance with local SOP. Decontamination operation shall be in accordance with FM 3-11.5 and local SOP.

See FM 4-25.11 for additional first aid data.

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Technical Manual
TM 9-2320-360-34-2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 May 2007

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

TRUCK, TRACTOR, M1070, 8 X 8, HEAVY EQUIPMENT TRANSPORTER (HET) (NSN 2320-01-318-9902)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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CHAPTER 19
ENGINE MAINTENANCE

Contents

Section I. INTRODUCTION

19-1. INTRODUCTION

This chapter contains maintenance instructions for removal, installation, and repair of the engine at the General Support maintenance level. Some subassemblies and parts must be removed before the engine and components can be accessed. They are referenced to other paragraphs of this manual or TM 9-2320-360-20.

Section II. SERVICE UPON RECEIPT

19-2. GENERAL MAINTENANCE INSTRUCTIONS

a. Follow these maintenance instructions when removing and installing engine:

(1) When unpacking items, remove packing material (for example: barrier paper, tape, plastic bags, and protective caps).

(2) Cap or tape over engine inlets and exhaust ducts to prevent foreign objects from getting inside the engine. Keep dust, dirt, and other objects out of internal parts of the engine.

CAUTION

Do not use tape to close off fuel or oil openings. Adhesive surface of tape will mix with fuel or oil and will get in the engine lines.

(3) Cap or tape over open tubes, hoses, fittings, and engine openings as soon as parts are taken off.

(4) Use suitable container to catch oil and coolant when removing hoses, fittings, and plugs.

(5) Handle and store removed engine components carefully.

(6) Inspect parts as removed for breaks, dents, cracks, surface defects, or other obvious damage. Turn in bad parts. Set aside good parts for later use.

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19-2. GENERAL MAINTENANCE INSTRUCTIONS (CONT)

(7) When possible, replace gaskets, packings, and seals removed during repair work. Replace lockwire, lockwashers, and cotter pins at time of reassembly.

(8) Replace broken, worn, or burned electrical wiring.

(9) Replace broken, frayed, crimped, or soft flexible hoses. Replace stripped or damaged fittings. Replace entire connected flexible hoses if fittings are damaged.

(10) Tag and mark shims, connectors, wires, valves, fittings, and mating ends of lines before disconnecting or removing. Identify similar parts to ensure correct assembly.

(11) Use hoists, jacks, and other aids when lifting engine.

b. Follow these inspection instructions when removing and installing engine:

(1) Inspect mounting surfaces and surfaces in contact with gaskets, seals, or machined surfaces. Look for burrs or scratches which might damage parts or seals upon installation. Remove any defects found.

(2) Remove drain plugs from engine system components and inspect sediment sticking to plug. Grit or fine metal particles may indicate actual or potential component failure. A few fine particles are normal. This inspection will help to show defective parts before internal inspection of the components.

(3) Inspect hose surfaces for broken or frayed fabric. Check for breaks caused by sharp kinks or contact with other parts of the vehicle. Inspect fitting threads for damage. Replace any defective parts. After assembly and during initial vehicle operation period, check for leaks. Inspect wiring harnesses for chafed or burned insulation. Inspect terminal connectors for loose connections and broken parts. Visually inspect castings and weldments for cracks.

Section III. MAINTENANCE PROCEDURES

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19-3. ENGINE TO ENGINE STAND INSTALLATION/REMOVAL

This task covers:
a. Installation
b. Removal
c. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Sending units and attachments removed (TM 9-2320-360-20).
Starter removed (TM 9-2320-360-20).
150 amp circuit breakers removed (TM 9-2320-360-20).
24-volt (front) alternator/bracket removed (TM 9-2320-360-20).
Exhaust manifolds removed (para 3-23).
Air box drains removed (para 3-9).
Air box covers removed (para 3-8).

Tools and Special Tools
Tool Kit, Genl Mech (Item 202, Appendix E)
Plate, Adapter (Item 7, Appendix E)

Tools and Special Tools (Cont)
Sling Assemblies (2) (Item 160, Appendix E)
Stand, Engine (Item 181, Appendix E)
Wrench, Torque, 0-175 Lb-Ft (Item 236, Appendix E)

Materials/Parts
Compound, Sealing, Pipe Thread (Item 28, Appendix B)
Tags, Identification (Item 56, Appendix B)
Ties, Cable, Plastic (Item 60, Appendix B)
Lockwasher (Item 120, Appendix F)
Screws (13) (Item 275, Appendix F)

Personnel Required
Two

a. Installation

(1) Remove electrical connector (1) from electrical connector (2).

(2) Remove screw (3), lockwasher (4), and ether start temperature sensor (5) from engine assembly (6). Discard lockwasher.

NOTE
Location of plastic cable ties should be marked before removal.

(3) Remove plastic cable tie (7) from engine wire harness (8) and hose no. 2630 (9).

(4) Remove hose no. 2761 (10) from adapter (11).

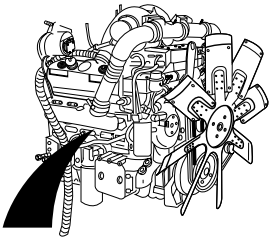
(5) Remove adapter (11) from engine assembly (6).

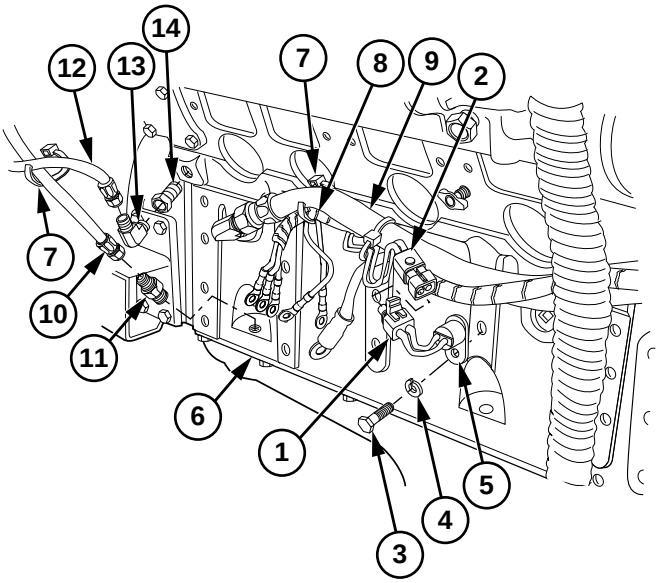
(6) Remove plastic cable tie (7) from hose no. 2761 (10) and hose no. 2682 (12).

(7) Remove hose no. 2682 (12) from elbow (13).

(8) Remove elbow (13) from adapter (14).

(9) Remove adapter (14) from engine assembly (6).





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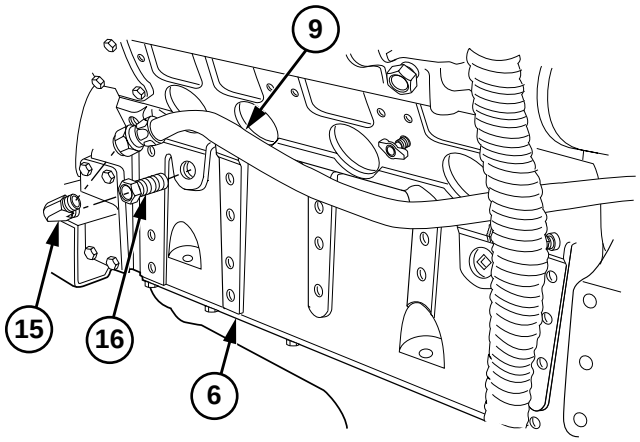
19-3. ENGINE TO ENGINE STAND INSTALLATION/REMOVAL (CONT)

(10) Remove hose no. 2630 (9) from elbow (15).

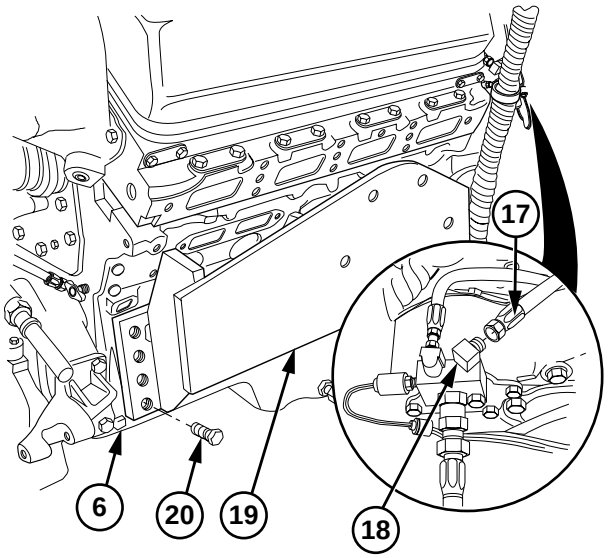
(11) Remove elbow (15) from adapter (16).

(12) Remove adapter (16) from engine assembly (6).



(13) Remove fuel line (17) from elbow (18).

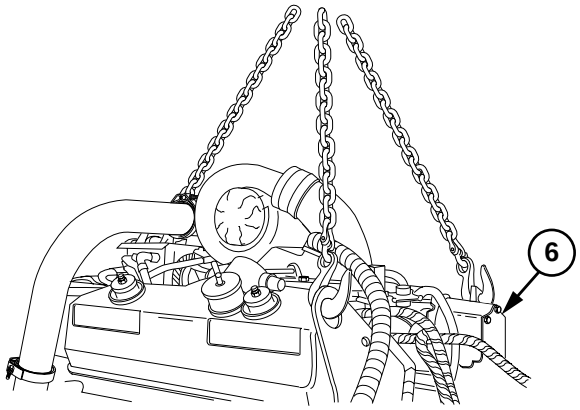
(14) Install adapter plate (19) on engine assembly (6) with 13 screws (20) with aid of assistant.



WARNING

Engine assembly weighs 2605 lb (1182 kg). Stay clear of engine assembly when it is supported by lifting device. If engine falls, serious injury or death may result.

(15) Install suitable lifting device on engine assembly (6).



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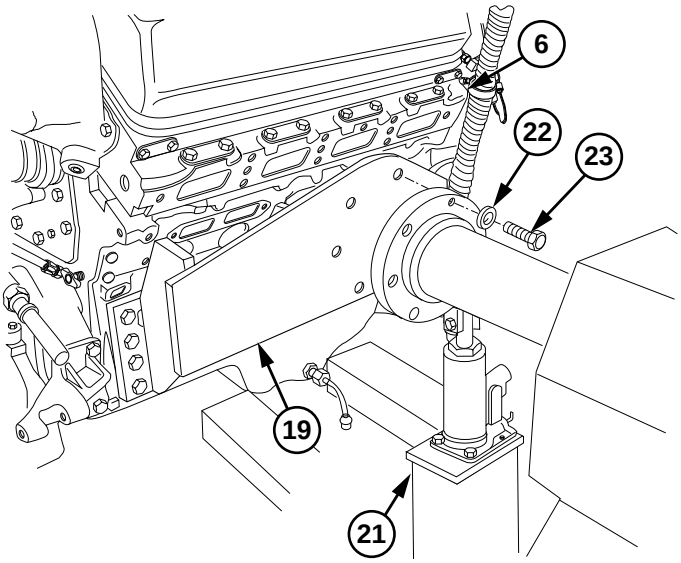
WARNING

Stand clear of engine when supported by lifting device. Engine may fall and cause serious injury to personnel.

(16) Mount engine assembly (6) and adapter plate (19) on engine stand (21) with six washers (22) and screws (23). Torque to 147 lb-ft (200 N·m).

(17) Remove lifting device from engine assembly (6).



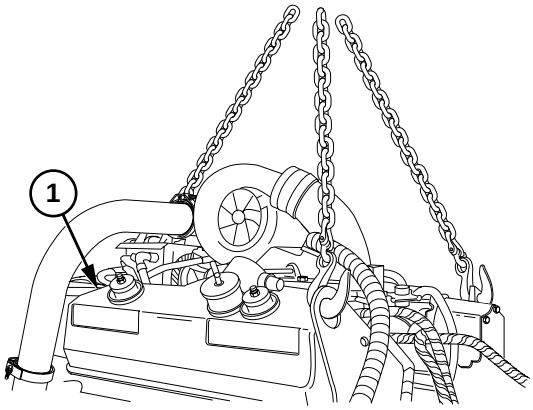
b. Removal

(1) Install lifting device on engine assembly (1).

WARNING

Stand clear of engine when supported by lifting device. Engine may fall and cause serious injury to personnel.

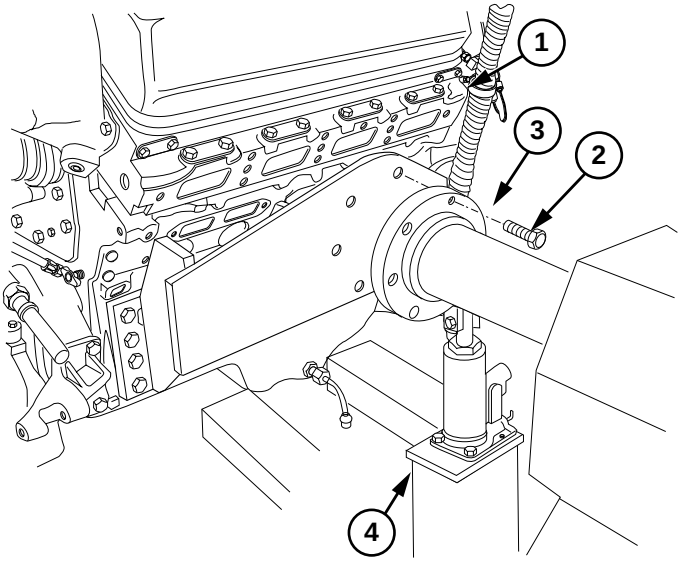
(2) Support engine assembly (1) with lifting device.



(3) Remove six screws (2), washers (3), and engine assembly (1) from engine stand (4).

(4) Place engine assembly (1) on suitable supports.

(5) Remove lifting device from engine assembly (1).



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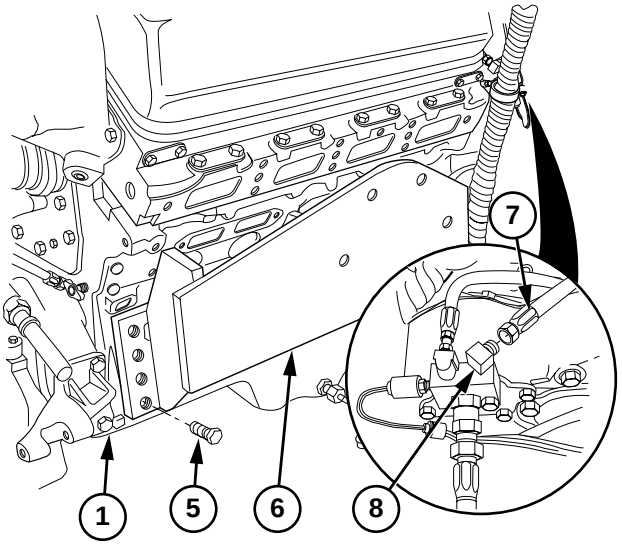
19-3. ENGINE TO ENGINE STAND INSTALLATION/REMOVAL (CONT)

(6) Remove 13 screws (5) and adapter plate (6) from engine assembly (1).

(7) Install fuel line (7) on elbow (8).



WARNING

Pipe thread sealing compound can burn easily, can give off harmful vapors, and is harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If pipe thread sealing compound gets on skin or clothing, wash immediately with soap and water.

(8) Coat threads of two adapters (9 and 10) and elbows (11 and 12) with pipe thread sealing compound.

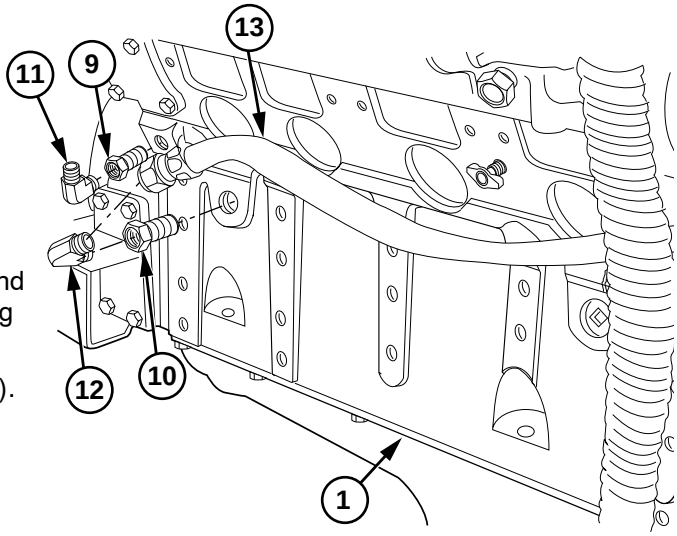
(9) Install adapter (10) on engine assembly (1).

(10) Install elbow (12) on adapter (10).

(11) Install hose no. 2630 (13) on elbow (12).

(12) Install adapter (9) on engine assembly (1).

(13) Install elbow (11) on adapter (9).



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(14) Install hose no. 2682 (14) on elbow (11).

NOTE

Plastic cable ties should be positioned in locations marked during removal.

(15) Install plastic cable tie (15) on hose no. 2682 (14) and hose no. 2761 (16).

WARNING

Pipe thread sealing compound can burn easily, can give off harmful vapors, and is harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If pipe thread sealing compound gets on skin or clothing, wash immediately with soap and water.

(16) Coat threads of adapter (17) with pipe thread sealing compound.

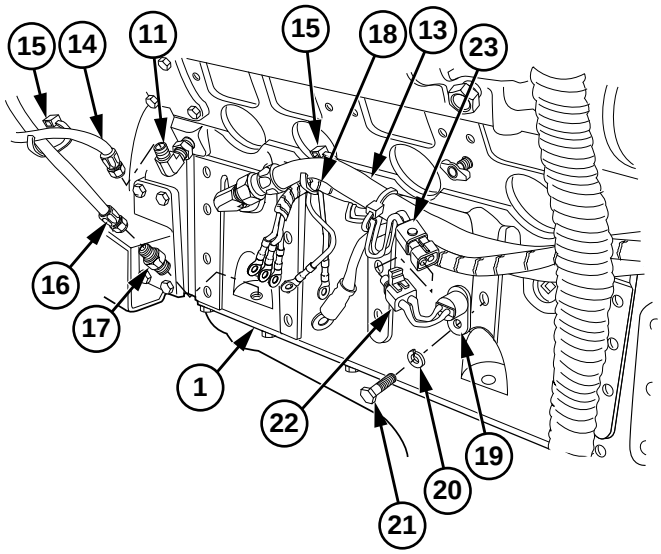
(17) Install adapter (17) on engine assembly (1).

(18) Install hose no. 2761 (16) on adapter (17).

(19) Install plastic cable tie (15) on hose no. 2630 (13) and engine wire harness (18).

(20) Install ether start temperature sensor (19) on engine assembly (1) with new lockwasher (20) and screw (21).

(21) Install electrical connector (22) on electrical connector (23).



c. Follow-On Maintenance

(1) Install air box covers (para 3-8).

(2) Install air box drains (para 3-9).

(3) Install exhaust manifolds (para 3-23).

(4) Install 24-volt (front) alternator/bracket (TM 9-2320-360-20).

(5) Install 150 amp circuit breakers (TM 9-2320-360-20).

(6) Install starter (TM 9-2320-360-20).

(7) Install sending units and attachments (TM 9-2320-360-20).

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19-4. ENGINE BLOCK REPAIR

This task covers:
a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Testing
e. Follow-On Maintenance

INITIAL SETUP

Equipment Conditions
Sending units and attachments removed (TM 9-2320-360-20).
Starter removed (TM 9-2320-360-20).
150 amp circuit breakers removed (TM 9-2320-360-20).
24-volt (front) alternator/bracket removed (TM 9-2320-360-20).
Exhaust manifolds removed (para 3-23).
Air box drains removed (para 3-9).
Air box covers removed (para 3-8).
Engine mounted on engine stand (para 19-3).
Fan removed (TM 9-2320-360-20).
Fan belts removed (TM 9-2320-360-20).
Fan clutch removed (TM 9-2320-360-20).
Electronic control module (ECM) removed (TM 9-2320-360-20).
Thermostats removed (TM 9-2320-360-20).
DDEC oil pressure sensor removed (TM 9-2320-360-20).
DDEC oil temperature sensor removed (TM 9-2320-360-20).
Rocker covers removed (TM 9-2320-360-20).
Fuel injector wire harnesses removed (para 4-3).
12-volt (rear) alternator/bracket removed (TM 9-2320-360-20).
Oil cooler and housing removed (para 3-19).
Left thermostat housing removed (para 5-3).
Right thermostat housing removed (para 5-4).
Secondary fuel filter housing removed (para 4-13).
Water pump removed (para 5-5).
Vibration damper and front cover removed (para 3-15).
Water pump drive gear removed (para 3-24).
Crankshaft pulley removed (para 3-12).
Crankshaft vibration damper removed (para 3-14).
Turbocharger removed (para 4-11).
Air inlet adapter removed (para 4-5).
Fuel supply pump removed (para 4-4).
Blower accessory drive hub removed (para 4-9).
Tachometer drive gear removed (para 3-25).

Equipment Conditions (Cont)
Blower removed (para 4-6).
Aftercooler removed (para 5-7).
Engine brake retarder wire harnesses removed (para 6-16).
Engine brake retarders removed (para 3-26).
Rocker arms removed (para 3-18).
Injectors removed (para 4-2).
SRS/TRS sensor removed (para 3-7).
Cylinder heads removed (para 3-10).
Oil pan removed (para 3-20).
Oil pressure regulator valve removed (para 3-22).
Oil pressure relief valve removed (para 3-21).
Crankshaft cover, front oil seal, and oil pump removed (para 19-14).
Engine block breather tube removed (para 3-6).
Flexplate assembly removed (para 3-17).
Flywheel housing removed (para 19-9).
Blower drive support removed (para 4-8).
Camshafts and end bearings removed (para 19-12).
Idler gear removed (para 19-13).
Rear end plate removed (para 19-6).
Front end plate removed (para 19-5).
Pistons, connecting rods, and liners removed (para 19-10).
Main bearings and crankshaft removed (para 19-8).

Tools and Special Tools
Tool Kit, Genl Mech (Item 202, Appendix E)
Compressor Unit, Air (Item 24, Appendix E)
Gage, Depth, Micrometer (Item 48, Appendix E)
Gage, Dial, Cylinder Bore (Item 49, Appendix E)
Goggles, Industrial (Item 57, Appendix E)
Remover/Installer, Core Plug Plug (Item 133, Appendix E)
Remover/Installer, Water Inlet Adapter, Aftercooler (Item 134, Appendix E)
Sling Assemblies (2) (Item 160, Appendix E)
Socket, Pipe Plug (Item 165, Appendix E)
Testing Kit, Cylinder Block Pressure (Item 192, Appendix E)

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19-4. ENGINE BLOCK REPAIR (CONT)

INITIAL SETUP (CONT)

Tools and Special Tools (Cont)
- Wrench Set, Socket, 3/4 In. Drive (Item 231, Appendix E)
- Wrench, Torque, ,0-600 Lb-Ft (Item 233, Appendix E)
- Wrench, Torque, 0-300 Lb-In. (Item 235, Appendix E)
- Wrench, Torque, 0-175 Lb-Ft (Item 236, Appendix E)
- Wrench, Torque, 0-75 Lb-In. (Item 237, Appendix E)

Materials/Parts
- Antifreeze, Permanent (Item 12, Appendix B)
- Compound, International, No. 2 (Item 21, Appendix B)

Materials/Parts (Cont)
- Compound, Sealing and Lubricating (Item 27, Appendix B)
- Compound, Sealing, Pipe Thread (Item 28, Appendix B)
- Oil, Lubricating (Item 45, Appendix B)
- Gaskets (8) (Item 27, Appendix F)
- Gasket (Item 34, Appendix F)
- Gasket (Item 38, Appendix F)
- Gasket (Item 48, Appendix F)
- Lockwashers (2) (Item 127, Appendix F)
- Seal Rings (34) (Item 258, Appendix F)
- Seal Rings (16) (Item 271, Appendix F)
- Shims, Head (4) (Item 322, Appendix F)

a. Disassembly

WARNING

Engine has may sharp edges. Use caution when using hand tools. Failure to comply may result in injury to personnel.

(1) Install lifting device on engine block (1).

WARNING

Engine weighs 2605 lb (1182 kg). Stand clear of engine when supported by lifting device. Engine may fall and cause serious injury or death to personnel.

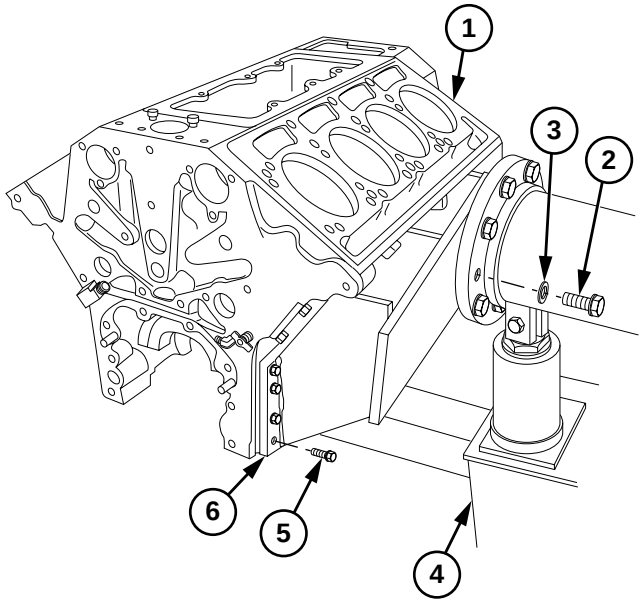
(2) Support engine block (1) with lifting device.

(3) Remove six screws (2), washers (3), and engine block (1) from engine stand (4).

(4) Place engine block (1) on floor.

(5) Remove lifting device from engine block (1).

(6) Remove 13 screws (5) and adapter plate (6) from engine block (1).



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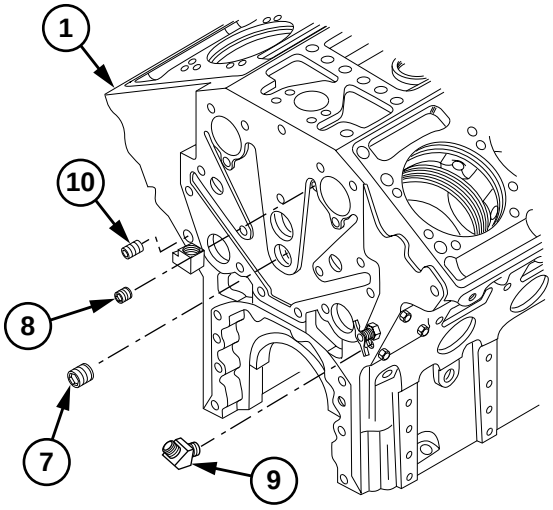
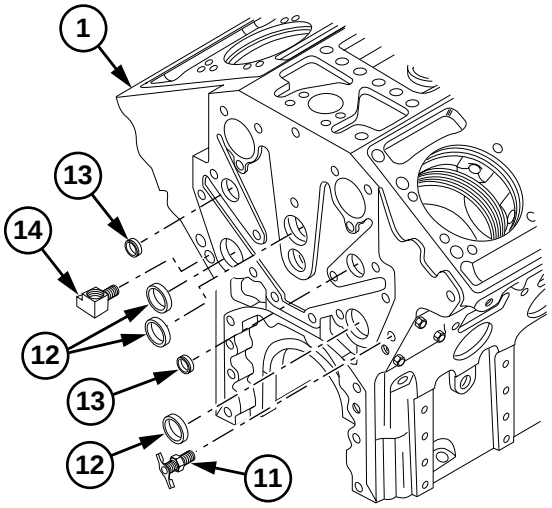
19-4. ENGINE BLOCK REPAIR (CONT)

(7) Remove oil galley plugs (7 and 8), elbow (9), and plug (10) from front of engine block (1).



(8) Remove drain cock (11) three plugs (12), and two plugs (13) from front of engine block (1).

(9) Remove fitting (14) from front of engine block (1).



(10) Remove oil galley plug (15) from rear of engine block (1).

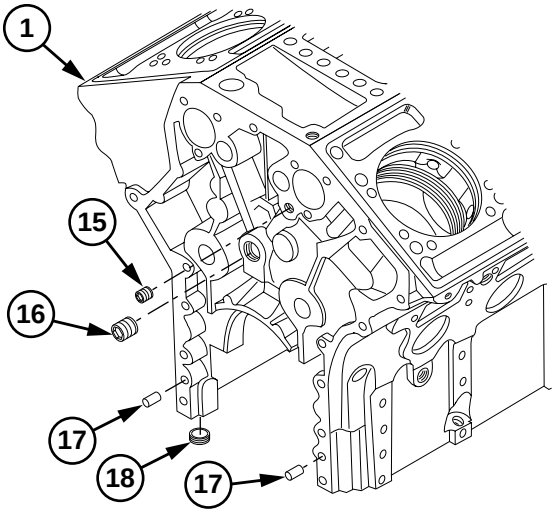
(11) Remove oil galley plug (16) from rear of engine block (1).

NOTE

Do step (12) only if dowels are damaged. Do not remove dowels just to clean engine block.

(12) Remove two dowels (17) from rear of engine block (1).

(13) Remove two cup plugs (18) from bottom of engine block (1).



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(14) Remove plug (19) from right side of engine block (1).

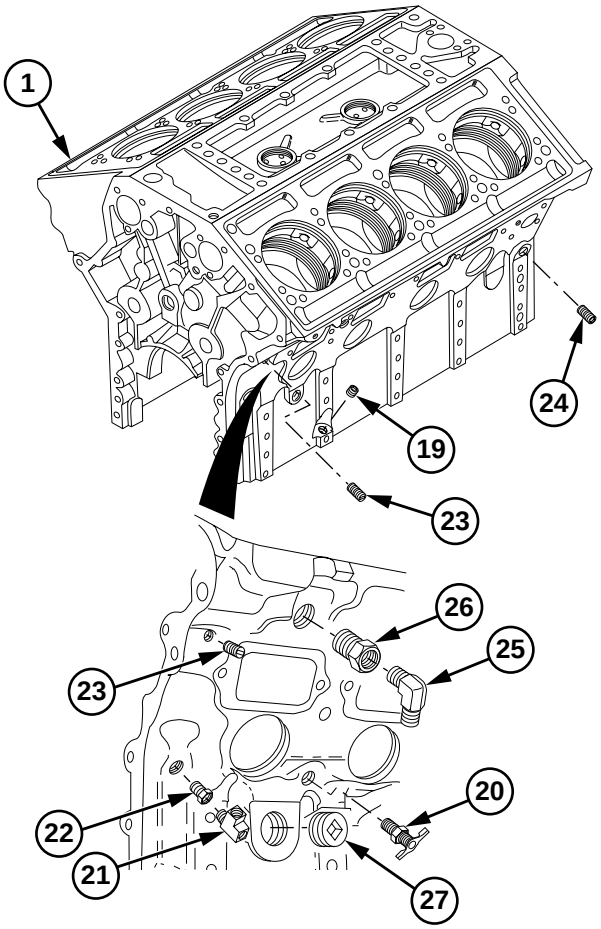
(15) Remove drain cock (20) from right side of engine block (1).

(16) Remove elbow (21) and fitting (22) from right side of engine block (1).

(17) Remove oil galley plugs (23 and 24) from side of engine block (1).

(18) Remove elbow (25) and reducer bushing (26) from right side of engine block (1).

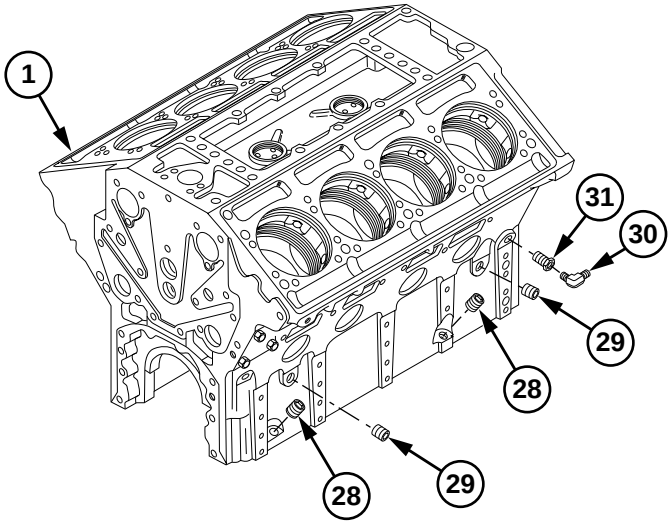
(19) Remove plug (27) from right side of engine block (1).



(20) Remove two plugs (28) from left side of engine block (1).

(21) Remove two plugs (29) from left side of engine block (1).

(22) Remove elbow (30) and reducer bushing (31) from left side of engine block (1).



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