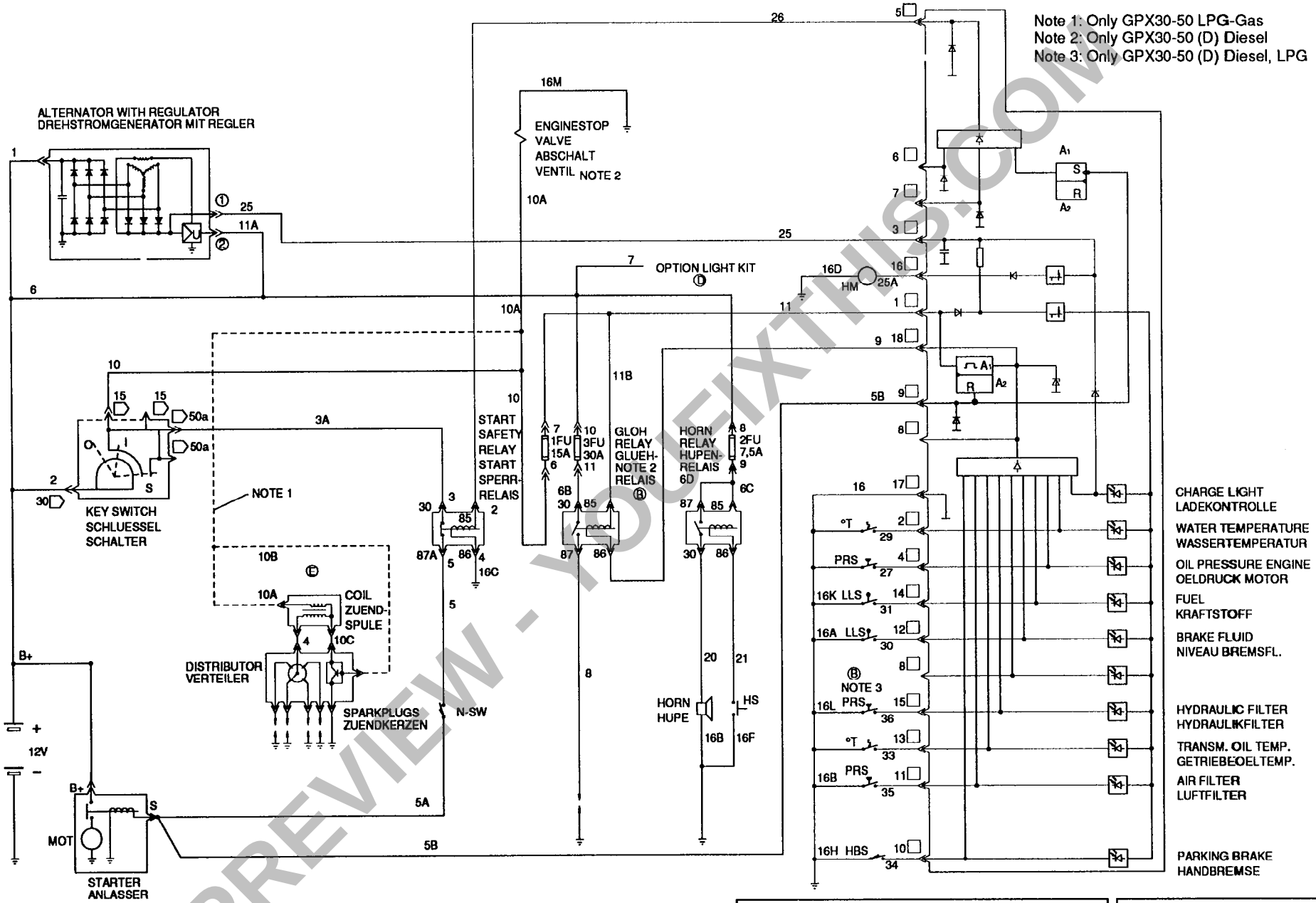


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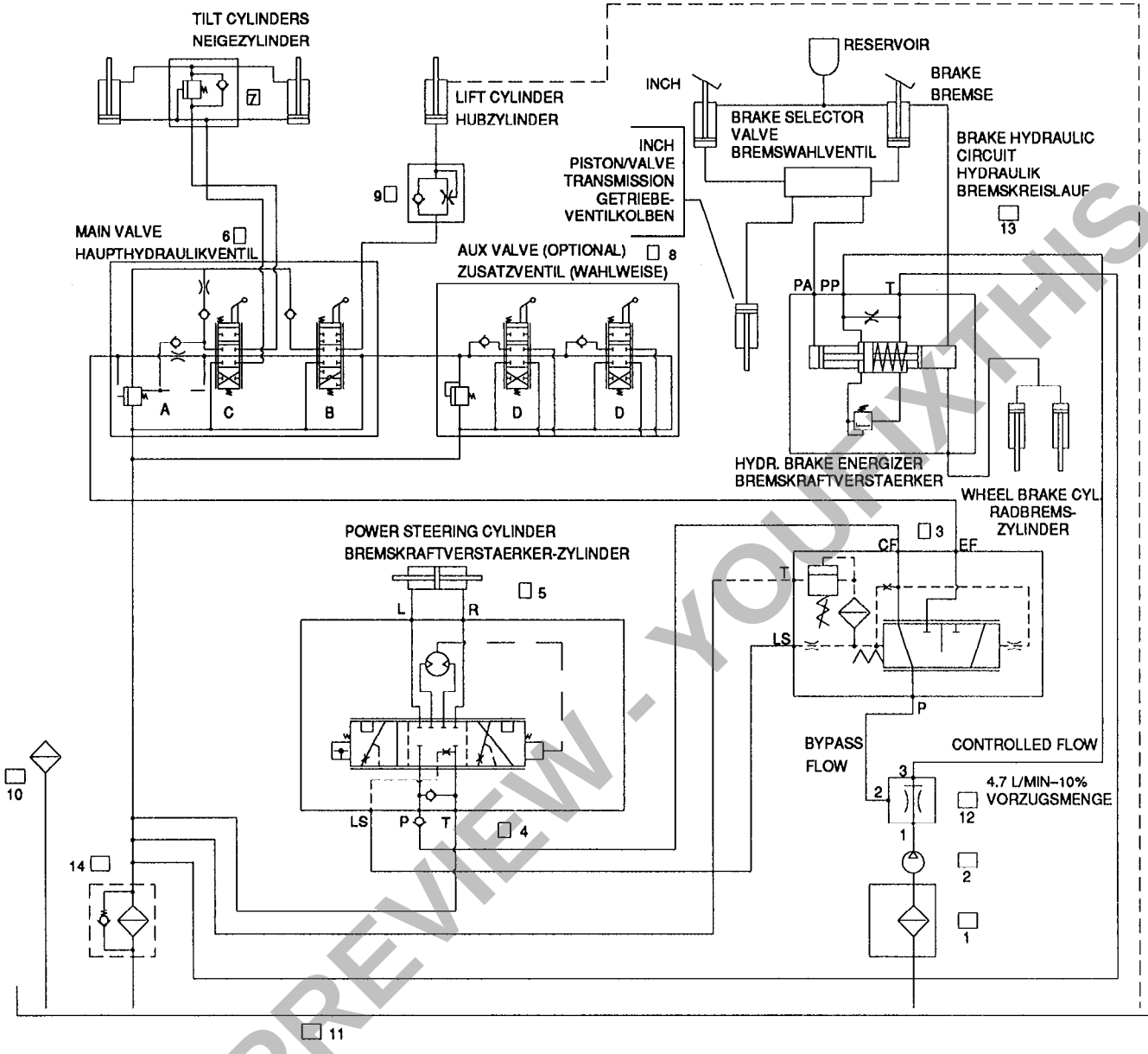
EFFECTIVITY LEVEL/CHANGE # / DATE	
E	COIL CHANGED • GEF920209 • 30SEP92 • FK/KHL
D	OPTION LIGHT KIT • GEF920209 • 30SEP92 • FK/KHL
C	GEF920117 WAS GEF920113 • GEF920160 • 24JUL92 • FK/KHL
B	NOTES ADDED • GEF920117 • 26JUN92 • FK/KHL
A	RELEASED • GEF920084 • 22MAY92 • FK/KHL

WIRING DIAGRAM (STROMLAUFPLAN)

GPX30/50 D/LPG/GAS

22MAY92 | 4320812

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MAIN HYDRAULIC SYSTEM
HAUPTHYDRAULIKSYSTEM

1. SUCTION SCREEN
   SAUGSIEB
2. HYDRAULIC PUMP
   HYDRAULIKPUMPE
3. PRIORITY DEMAND VALVE WITH PRESSURE RELIEF VALVE FOR STEERING
   VORZUGSMENGENTEILER MIT DRUCKBEGRENZUGSVENTIL FUER LENKUNG
4. POWER STEERING VALVE
   BREMSKRAFTVERSTAERKER-VENTIL
5. POWER STEERING CYLINDER
   BREMSKRAFTVERSTAEKER-ZYLINDER
6. *MAIN HYDRAULIC VALVE WITH:*
   - A. PRESSURE RELIEF VALVE
   - B. LIFT LOWERING SPOOL WITH LOAD CHECK
   - C: TILT SPOOL WITH COUNTERBALANCE VALVE
   - D: AUXILIARY SPOOLS

   HAJPTHYDRAULIKVENTIL MIT:
   - A: DRUCKBEGRENZUNGSVENTIL
   - B: HEBEN/SENKEN- SCHIEBER MIT LASTBREMSE
   - C: NEIGE-SCHIEBER MIT AUSGLEICHSVENTIL
   - D: ZUSATHYDRAULIK-SCHIEBER
7. COUNTERBALANCE VALVE
   AUSGLEICHSVENTIL
8. AUX VALVE
   ZUSATZVENTIL
9. LOWERING FLOW VALVE
   SENKBREMSVENTIL
10. BREATHER FILTER
    ENTLUEFTUNGSFILTER
11. HYDRAULIC TANK
    HYDRAULIK TANK
12. PRIORITY DEMAND VALVE FOR BRAKING
    VORZUGSMENGENTEILER FUER BREMSSYSTEM
13. BRAKE CIRCUIT
    BREMSKEIS
14. RETURN LINE FILTER
    RUECKLAUFFILTER

EFFECTIVITY LEVEL/CHANGE # / DATE	
B	REVISED•REDRAWN•GEF930023•09.02.93
A	RELEASED•GEF920308•18DEC92•WA./...

DIAGRAM - CIRCUIT
HYDRAULIC
(HYDRAULIK-DIAGRAMM)
GPX/GCX 30-50
18DEC92 **IN-23319**

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Fastener Tightening Specifications

ITEM	N•m	lb. ft.	lb. in.
Balance Shaft Drive Gear Retaining Bolt	16	12	—
Balance Gear Driven Gear Bolt (torque plus a 35° turn)	20	15	—
Balance Shaft Retainer Bolt	14	—	124
Camshaft Sprocket Bolts	28	21	—
Camshaft Thrust Plate Screws	14	—	124
Connecting Rod Bolt Nuts (torque plus a 70° turn)	27	20	—
Coolant outlet Bolts	28	21	—
Coolant Pump Bolts	40	30	—
Crankshaft Rear Oil Seal Retainer Screws and Nuts	15	11	—
Cylinder Head Bolts (in sequence)	90	65	—
EGR Valve Bolt	22	16	—
Engine Block Drain Plug	20	15	—
Exhaust Manifold Bolts			
Center Two Bolts	36	26	—
All Other Bolts	28	20	—
Flywheel Bolts	100	74	—
Flywheel Housing Bolts	44	32	—
Front Cover Bolts	14	—	124
Hydraulic Lifter Guide Assembly	16	12	—
Intake Manifold Bolts (in sequence)	47	35	—
Main Bearing Cap Bolts	110	81	—
Oil Filter Adapter Bolts	22	16	—
Oil Gallery Plug, Left Rear	40	30	—
Oil Gallery Plug, Right Rear	40	30	—
Oil Gallery Plug, Left Side Rear	30	22	—
Oil Pan Bolts	11	—	97
Oil Pan Drain Plug	25	18	—
Oil Pan Nuts	23	17	—
Oil Pan Studs to Oil Seal Retainer or Engine Block	23	17	—
Oil Pressure Fitting	11	—	97
Oil Pump Bolt	88	65	—
Oil Pump Cover Bolts	9	—	80
Rocker Arm Cover Bolts	10	—	90
Rocker Arm Nuts	27	20	—
Rocker Arm Stud	47	35	—
Torsional Damper Bolt	95	70	—

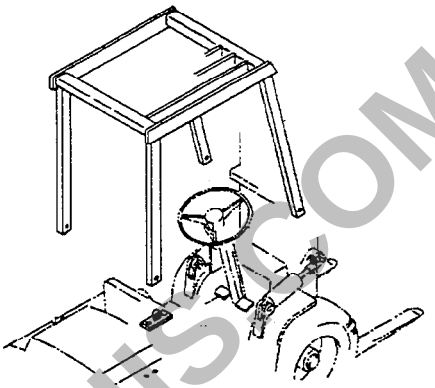
43SPEC3

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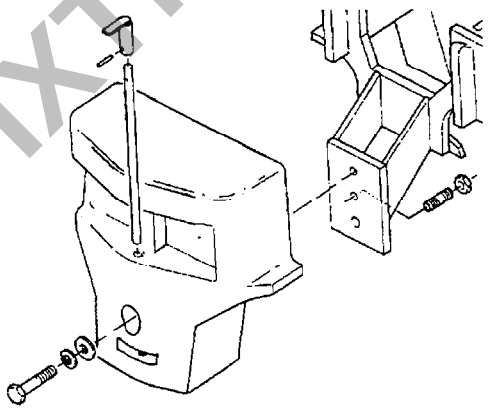
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Engine Removal

The following procedures describe the steps necessary to remove the engine. A hoist capable of lifting the overhead guard, counterweight, and engine is required.

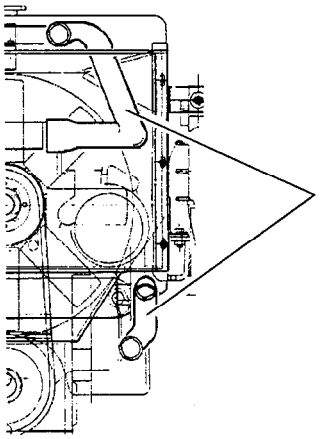


1. Remove the overhead guard.
2. Remove the driver's seat and any electrical wires mounted to the seat support.
3. Remove the clamshell hood.



4. Remove counterweight. See the procedures for removing the counterweight in Group 38.
5. Disconnect battery leads at battery and remove the battery. Disconnect horn wires.
6. Remove floor plates. Remove top and side body sheet metal.

7. Drain radiator and remove radiator hoses to engine and to filler neck bracket.



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Section 1. Troubleshooting

CONDITION	POSSIBLE CAUSE	SUGGESTED CORRECTION
Temperature light comes on frequently.	1. Transmission cooler or lines blocked. 2. Transmission cooler defective.	1. Check cooler and lines for blockage. Flush cooler and lines. If problem not corrected, replace cooler or defective lines. 2. Replace transmission cooler. Flush system.
Transmission fluid loss (no signs).	1. Transmission oil cooler portion of radiator leaking into cooling system.	1. Check engine coolant for transmission fluid contamination. Repair or replace cooler.
Rough idle (engine misfiring).	1. Coolant temperature below normal due to incorrect or defective thermostat.	1. Replace thermostat.
Excessive blue/white exhaust smoke.	1. Coolant temperature below normal due to incorrect or defective thermostat.	1. Replace thermostat.
Engine overheating.	1. Low coolant level. 2. Radiator pressure cap defective. 3. Inadequate air flow to radiator. 4. Radiator fins plugged. 5. Radiator clogged. 6. Scale or deposits in cooling system. 7. Radiator defective. 8. Thermostat incorrect or defective. 9. Collapsed radiator hose(s). 10. Water pump defective.	1. Check coolant. Fill as required. Check for leaks. 2. Replace radiator pressure cap. 3. Check operation of fan. If defective, replace fan. 4. Blow debris from radiator fins. 5. Drain and flush radiator. 6. Drain and flush cooling system. 7. Repair or replace radiator. 8. Replace thermostat. 9. Replace hose(s). 10. Replace water pump.
Engine lubricating oil loss.	1. Oil cooler core leaking.	1. Check for oil in coolant. If found, check and replace oil cooler core.

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4.3L ENGINE SPECIFICATIONS

GENERAL DATA:				
Type				V6
Displacement				4.3L (262 C.I.D.)
Bore				101.600 mm (4.00 in.)
Stroke				88.392 mm (3.48 in.)
Compression Ratio				9.10 to 1
Firing Order				1 - 6 - 5 - 4 - 3 - 2
Oil Pressure (Minimum HOT)				41 kPa (6 psi) / 1000 RPM - 124 kPa (18 psi) / 2000 RPM
CYLINDER BORE:				
Diameter				101.618 - 101.643 mm (4.0007 - 4.0017 in.)
Out of Round	Production			0.025 mm (0.001 in.) Maximum
	Service			0.051 mm (0.002 in.) Maximum
Taper	Production	Thrust Side		0.0125 mm (0.0005 in.) Maximum
		Relief Side		0.025 mm (0.001 in.) Maximum
	Service			0.025 mm (0.001 in.) Maximum
PISTON:				
Clearance	Production			0.018 - 0.061 mm (0.0007 - 0.0024 in.)
	Service Limit			0.061 mm (0.0024 in.) Maximum
PISTON RING:				
Compression	Groove Clearance	Production	Top	0.030 - 0.081 mm (0.0012 - 0.0032 in.)
			Second	0.030 - 0.081 mm (0.0012 - 0.0032 in.)
		Service Limit		0.107 mm (0.0042 in.) Maximum
	Gap	Production	Top	0.254 - 0.508 mm (0.010 - 0.020 in.)
			Second	0.254 - 0.635 mm (0.010 - 0.025 in.)
		Service Limit		0.889 mm (0.035 in.) Maximum
Oil	Groove Clearance	Production		0.051 - 0.178 mm (0.002 - 0.007 in.)
		Service Limit		0.202 mm (0.008 in.) Maximum
	Gap	Production		0.381 - 1.397 mm (0.015 - 0.055 in.)
		Service Limit		1.651 mm (0.065 in.)
PISTON PIN:				
Diameter				23.546 - 23.553 mm (0.9270 - 0.9273 in.)
Clearance in Piston	Production			0.005 - 0.018 mm (0.0002 - 0.0007 in.)
	Service Limit			0.025 mm (0.001 in.) Maximum
Fit in Rod				0.020 - 0.041 mm (0.0008 - 0.0016 in.) Interference
EXHAUST MANIFOLD:				
Surface Flatness				0.254 mm (0.010 in.) Maximum
INLET MANIFOLD:				
Surface Flatness				0.254 mm (0.010 in.) Maximum
CYLINDER HEAD:				
Surface Flatness				0.102 mm (0.004 in.) Overall
BALANCE SHAFT:				
Front Bearing Journal Diameter				54.986 - 55.001 mm (2.1648 - 2.1654 in.)
Rear Bearing Journal Diameter				38.085 - 38.100 mm (1.4994 - 1.500 in.)
Rear Bearing Journal Clearance				0.025 - 0.091 mm (0.001 - 0.0036 in.)

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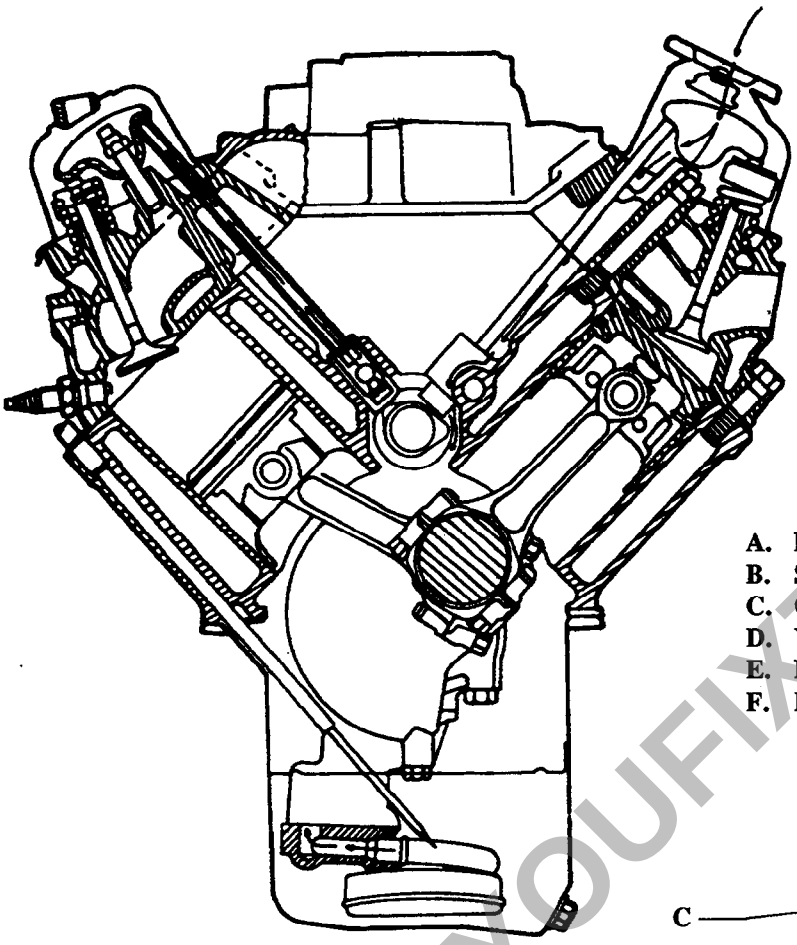
Group	Section	Description
		INTRODUCTION
		Safety
		Planned Maintenance
00		**ENGINES**
00	1	Engine Removal
00	2	Diesel Workshop Manual
00	3	Gas/LPG Workshop Manual
01		**COOLING SYSTEM**
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01	2	Cooling System Testing and Maintenance
01	3	Fan Belt Replacement
01	4	Radiator Removal
02		**FUEL SYSTEM**
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02	2	The IMPCO Fuel System
02	3	Carburetor Overhaul
02	4	Velocity Governor Overhaul
02	5	Removal of IMPCO Vaporizing System
06		**TRANSMISSION**
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06	2	Draining and Refill
06	3	Transmission Removal
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14		**ELECTRICAL SYSTEM**
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20		**DRIVE AXLE**
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20	2	Axle End Removal
20	3	Axle Ends Overhaul
20	4	Differential Overhaul
22		**WHEELS AND TIRES**
22	1	Lifting, Jacking, and Blocking
22	2	Wheels and Tires Mounting

(continued on next page)

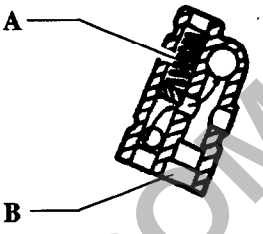
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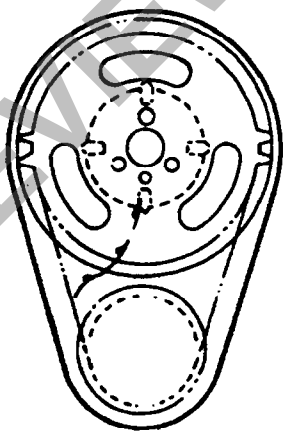
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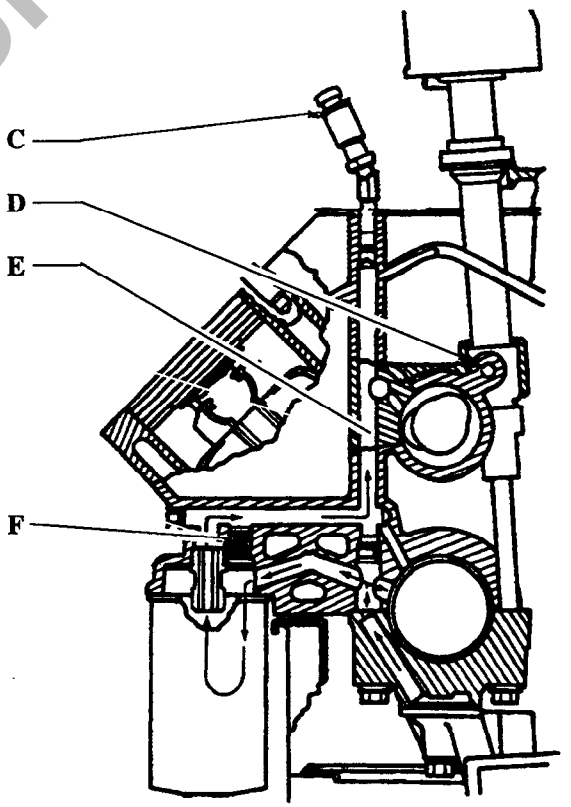
Front View



A. Regulator Valve (Shown in Open Position)
B. Suction
C. Oil Pressure Switch
D. Valve Lifter Gallery
E. Main Oil Gallery
F. Bypass Valve



Front View
Showing Path of Oil to Timing Chain



Rear View
Showing Main Gallery, Oil Filter and Crankshaft Oil Feed

Figure 6 - Engine Lubrication Diagram

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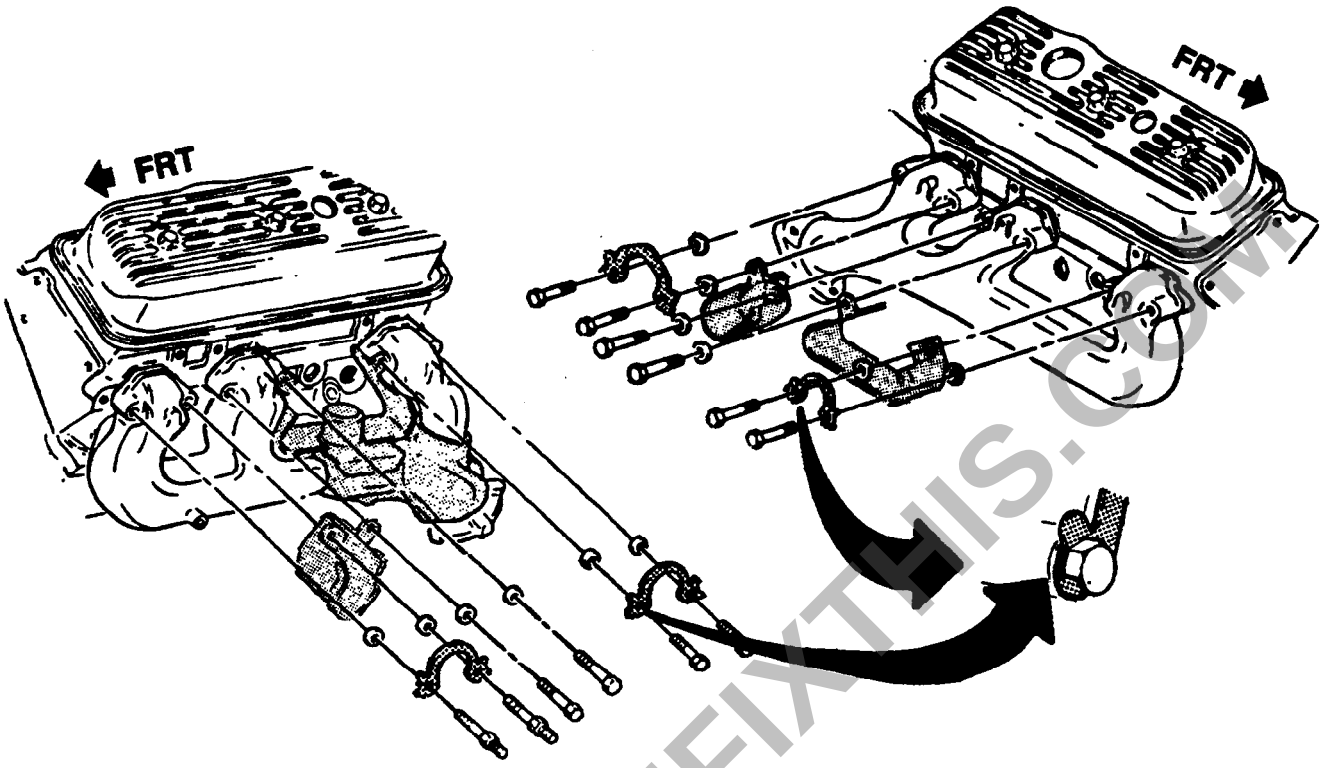


Figure 83 - Exhaust Manifolds and Components

EXHAUST MANIFOLD INSTALLATION

Install or Connect

1. Exhaust manifold.
2. Heat shield (60).

NOTICE: Refer to "Notice" on page 1.

3. Exhaust manifold bolts (63), washers (61), and tab washers (62).

Tighten

a. Bolts on center exhaust tube to 36 N•m (26 lbs. ft.).
b. Bolts on front and rear exhaust tubes to 28 N•m (20 lbs. ft.).
c. Bend the tab washers over the heads of all bolts.

EGR VALVE INSTALLATION

Install or Connect

1. New gasket.
2. EGR valve.

NOTICE: Refer to "Notice" on page 1.

3. Bolts.

Tighten

- Bolts to 22 N•m (16 lbs. ft.).

FLYWHEEL INSTALLATION

Install or Connect

1. Flywheel.

NOTICE: Refer to "Notice" on page 1.

2. Flywheel bolts.

Tighten

- Bolts to 100 N•m (74 lbs. ft.).

COOLANT PUMP INSTALLATION

Install or Connect

1. Gaskets.
2. Coolant pump.

NOTICE: Refer to "Notice" on page 1.

3. Coolant pump bolts.

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Reassembly

Assembly of Fuel Bowl Body

1. Install packing in open side of retainer and place completed assembly on 863805 bushing driver with packing facing small end of driver. Insert small end of driver into choke shaft hole; start retainer into counterbore of body and lightly drive retainer into body until flush with machined surface.
2. Install shaft hole plug using light hammer.
3. Refer to match marks made at time of disassembly and install choke bracket, bracket attaching screws and lockwashers.
4. Install choke shaft and lever assembly and rotate shaft so that cut out section faces out.
5. Start choke plate into place (poppet valve stem and spring facing into air intake). Press choke lever against shaft boss to compress ratchet pin spring; center choke plate in closed position and start choke plate screws into place. When plate is properly centered, tighten screws securely.
6. Install choke lever spring (not shown) to return choke to wide open position.
7. Install main jet (not shown) and fiber washer in threaded hole at bottom of fuel bowl.
8. Install well vent jet in fuel bowl and tighten, using a small screwdriver.
9. Install discharge jet and fiber washer in large threaded passage below fuel bowl, using 910748 jet wrench.
10. Install drain plug in threaded passage at bottom of fuel bowl, using 7/16" end wrench.
11. Install main passage plug with fiber washer using a 1/2" wrench. If main jet adjustment is used, back out adjusting screw two or three turns before installing main jet adjustment and fiber washer.

Assembly of Throttle Body

1. Insert throttle shaft packing in open end of retainer and place completed assembly on bushing driver 863805 with packing facing small end of driver.
2. Insert small end of driver into throttle shaft hole; start retainer into counterbore of throttle body and lightly drive retainer into body until flush with machined surface or slightly below surface to avoid interference with throttle lever.
3. Insert throttle lever and stop assembly in throttle body. Rotate throttle shaft to wide open position and insert throttle plate into shaft. Then rotate to closed position and hold plate closed with fingers.
4. Start throttle plate screws and leave screws loose. Center throttle plate in throttle bore and tighten throttle plate screws.
5. Install throttle shaft hole plug in side opposite throttle lever, using a light hammer to drive plug in flush with face of boss.
6. Install idle adjusting needle and friction spring in threaded passage at side of throttle body. Turn idle needle in lightly against seat, then back out needle 1 and 1/4 turns as a preliminary setting.
7. Install idle jet in counterbored passage of machined surface.
8. Install fuel valve seat and fiber washer using 863800 wrench.
9. Place new throttle body to bowl gasket on machined surface of throttle body. Then install fuel valve needle in seat and position float assembly in hinge bracket.

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8. Check the side clearance of the clutch hub ring seal. A MAXIMUM wear of [.2032 mm] or .008 and above will require replacement of the ring.

   1. Clutch drum
   2. Piston Inner Seal
   3. Ring Wear Surface
   4. Clutch Hub

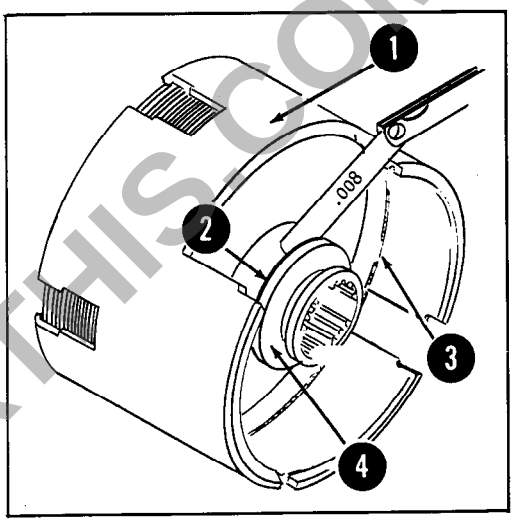


Fig. 22586

9. Check the side clearance of the clutch piston outer seal. A MAXIMUM wear of [.2032 mm] or .008 and above will require replacement of the ring.

   1. Piston Outer Seal
   2. Ring Wear Surface
   3. Clutch Piston

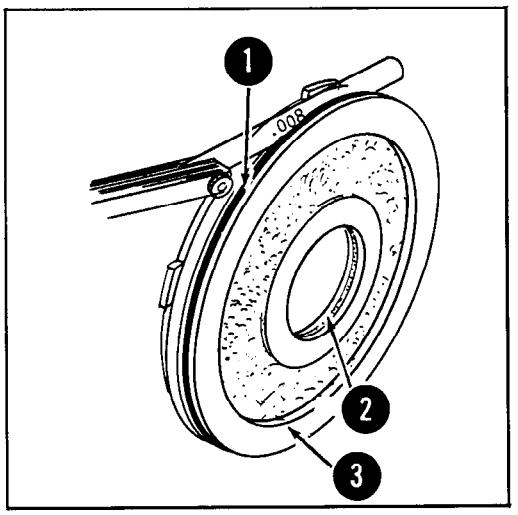


Fig. 22587

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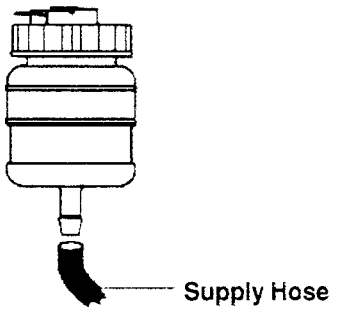
Section 3.

Axle Ends Overhaul

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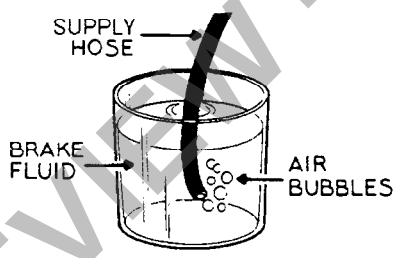
13. Remove the **supply hose** from the brake fluid reservoir that supplies the power booster, and allow the reservoir to drain into a pan.



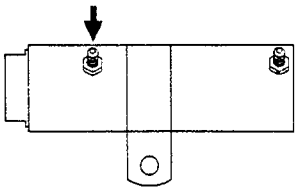
NOTICE

Some models have a single reservoir (located in the steering pylon) that supplies the braking/inching master cylinders *and* the power booster. Other models have a second reservoir (located under the hood) that supplies the power booster.

14. Place the end of the **supply hose** into an inspection jar elevated above the Selector Valve.



15. Connect the pressure bleeder hose to the bleeder screw on the **Selector Valve** at the end that connects to the BRAKING master cylinder outlet line.

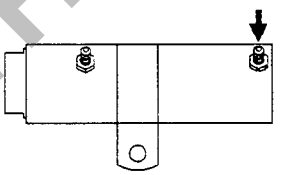


16. Open the pressure bleeder valve, then open the bleeder screw to allow fluid and entrapped air to escape into the inspection jar. When the fluid is flowing free of air bubbles, tighten the bleeder screw.

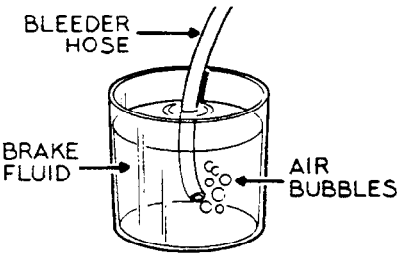
17. Check firmess of braking pedal. Repeat procedure if braking pedal is not firm.

Now, bleed the inching system...

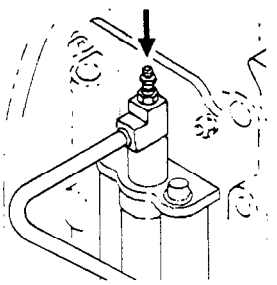
1. Connect a plastic tube to the bleeder screw on the **Selector Valve** at the end that connects to the INCHING master cylinder outlet line.



2. Immerse the other end of the tube in the elevated inpection jar.

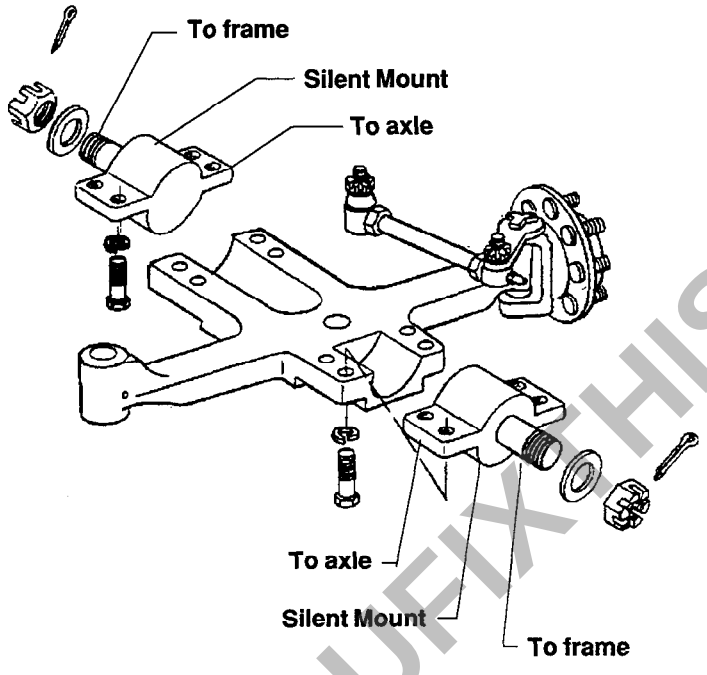


3. Connect the pressure bleeder hose to the bleeder screw on the **inching port** on the **transmission control cover.**



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Steer Axle Replacement

Truck must be blocked as described in step 2 on previous page.

1. Remount the silent mounts, if they have been removed from the frame, reinstalling the washers, mounting nuts, and cotter keys.
2. Raise steer axle assembly up to the silent mounts with another lift truck or an approved hoist.
3. Replace the fasteners that hold the silent mounts to the steer axle. Torque them to 113-128 N•m (83-95 lbf-ft.)
4. Put drag link on ball stud and tighten rear retaining nut on socket assembly to a torque of of 27 N•m (20 lbf-ft).
5. Reassemble socket. (See step 3 on page 2.)
6. Replace counterweight as described in, Group 38, Section 1 "Counterweight Removal."

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Section 4.

Hydraulic Schematic

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Cylinder Repair

This material describes basic cylinder repair for primary and secondary lift cylinders. The repairs are intended to solve drift problems where the upright falls more than 7/8" in a minute. If drift exceeds 7/8" limit, the problem could also be in the Control Valve. Check the Control Valve spool linkage first to eliminate this as the problem before proceding with cylinder repair.

See Section 2, "Operational Checks", for Drift Test procedures.

To repair the upright's primary and/or secondary cylinders:

1. Remove the cylinders from the upright as described in Section 4, Upright Check and Adjustment.
2. Position cylinder on a work bench with adequate support for safe and convenient disassembly. Two sets of 4X4 "V"-notched blocks are helpful. One set for the cylinder barrel and one set for the piston rod to prevent nicks and scratches from harming the piston or rod.
3. Clean the entire cylinder to prevent dirt and other contamination from entering the cylinder during reassembly. Parts may be cleaned with solvent or mineral spirits and must be dried completely. If petroleum solvent is not available, use a hydraulic fluid compatible with that used in the vehicle's system.
4. Remove cylinder gland cap with the proper-sized spanner wrench or equivalent tool. Pull the piston rod out of the cylinder barrel and place it on a set of "V"-notched blocks. Remove all packings and seals from the piston and the cylinder cap.

NOTE: Use extreme care that your tools do not make nicks and burrs on the interior surface area of the cap or the exterior surface area of the piston.

5. The U-cup seals are the most difficult to remove, particularly from the cylinder cap. An electric soldering gun tip (weller 250 or equal) will melt through the U-cup seals in one or two minutes. The soldering tip may need to be bent approximately 90 degrees to effectively penetrate the U-cup seal inside the cylinder cap.
6. After disassembly and cleaning inspect cylinder barrel and bore for cracks, pining, scoring, or other irregularities that may require replacement of the barrel. Likewise inspect the piston and rod for nicks, scratches, scoring, or other defects that may demand new parts.
7. Minute imperfections inside the cylinder barrel or on the piston or rod may be improved for acceptable use by careful honing.

NOTE: Removal of material that produces a notch, groove, or out-of-roundness may cause excessive leakage upon beginning operation or at best a shortened life.

8. Use new parts as necessary. Always use the Packing Kit listed in the parts manual. New kits includes all the seals, wiper rings, wear rings and "O" rings necessary for the particular cylinder.

NOTE: Care should be utilized in the installation of these parts to assure that damage to any part does not happen or go unnoticed. Dip all packings, seals and rings in clean, compatible hydraulic oil prior to reassembly.

9. Installation of some parts require special attention/ tooling. "O" rings should be carefully installed to eliminate cuts or twisting. U-cup seals should be installed with specialty tools designed for the application.

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