

Group 15 Engine Assembly

GENERAL: This group contains information on the purchased engine that is not covered in the other groups. It covers all engine parts from the timing gear cover to the flywheel housing, and from the valve cover to the oil pan. The group also includes all engine-to-frame mounting parts.

SPECIFICS: As applicable

- ...Camshaft
- ...Connecting Rods
- ...Crankcase
- ...Crankshaft
- ...Cylinder Head
- ...Flywheel and Housing
- ...Oil Pan
- ...Oil Pump
- ...Pistons and Pins
- ...Timing Gear Cover
- ...Timing Gears
- ...Valve Covers
- ...Valves and Rockers

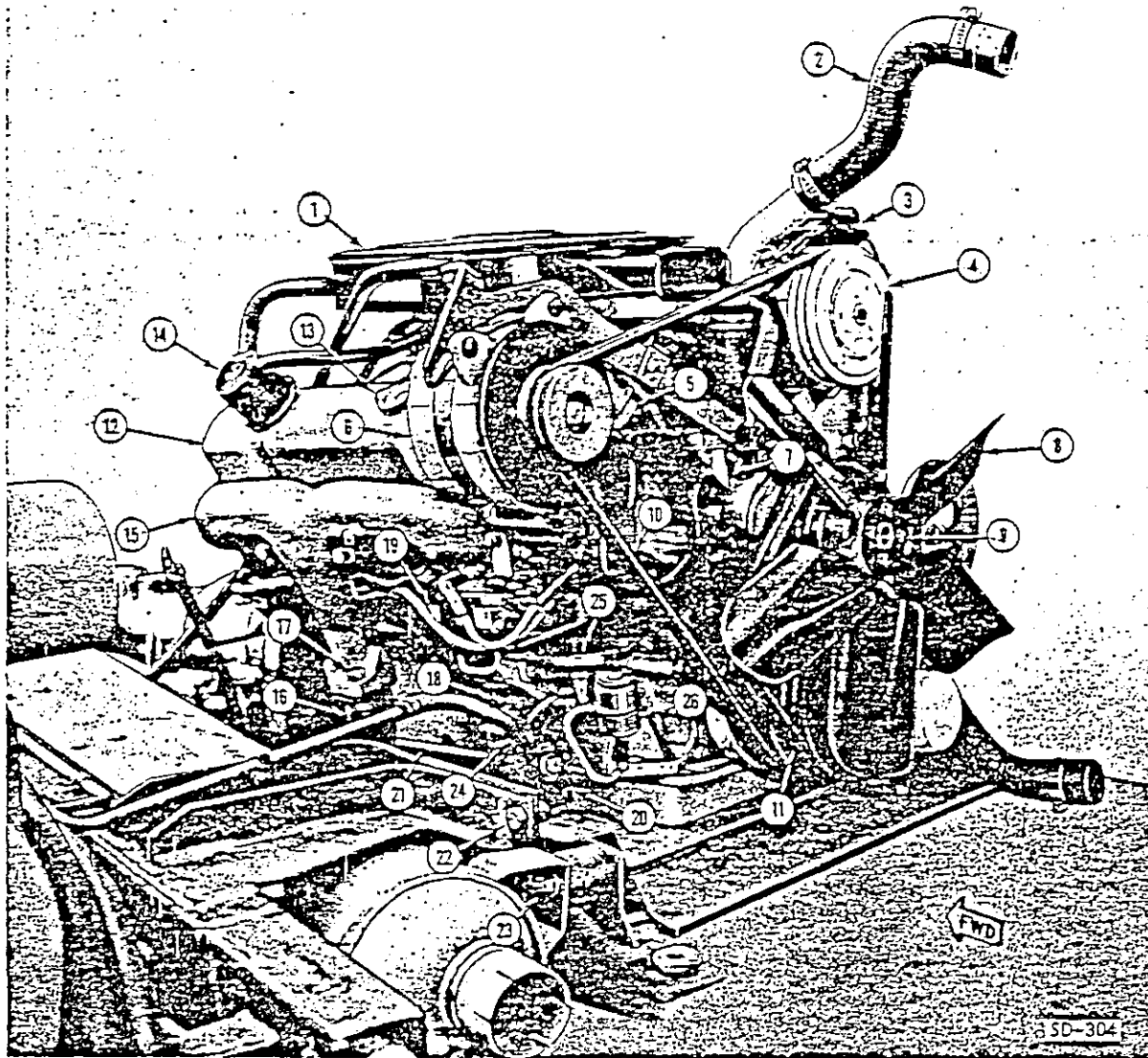


GROUP 15

ENGINE ASSEMBLY

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LEGEND

- | | |
|----------------------------------|---------------------------------------|
| 1-CARBURETOR AIR CLEANER | 14-PCV AIR CLEANER |
| 2-ENGINE OUTLET HOSE | 15-EXHAUST MANIFOLD (LH) |
| 3-A/C COMPRESSOR | 16-EXHAUST PIPE (LH) |
| 4-COMPRESSOR CLUTCH | 17-ATTACHING BOLT/NUT (2) |
| 5-DISTRIBUTOR | 18-INSULATOR (LH AFT) (W/CAPTIVE NUT) |
| 6-ALTERNATOR (85 AMP) | 19-BOSS (LH MOUNT) |
| 7-ADAPTER TUBE (2) | 20-CROSS BEAM MOUNT BRACKET |
| 8-FAN | 21-OIL PAN TO BLOCK ATTACHMENT POINT |
| 9-ATTACHING BOLTS (4) | 22-CROSS BEAM ATTACH BOLT |
| 10-ALT/COMP DRIVE BELT (2) | 23-MUFFLER MOUNT ATTACH BOLT |
| 11-FAN/WATER PUMP DRIVE BELT (2) | 24-FUEL INLET LINE |
| 12-ROCKER ARM COVER (LH) | 25-FUEL PUMP |
| 13-OIL FILLER CAP | 26-FUEL FILTER (IN-LINE) |

Figure 15-1. Engine Assembly (Sheet 1 of 2)

GROUP 15
ENGINE ASSEMBLY

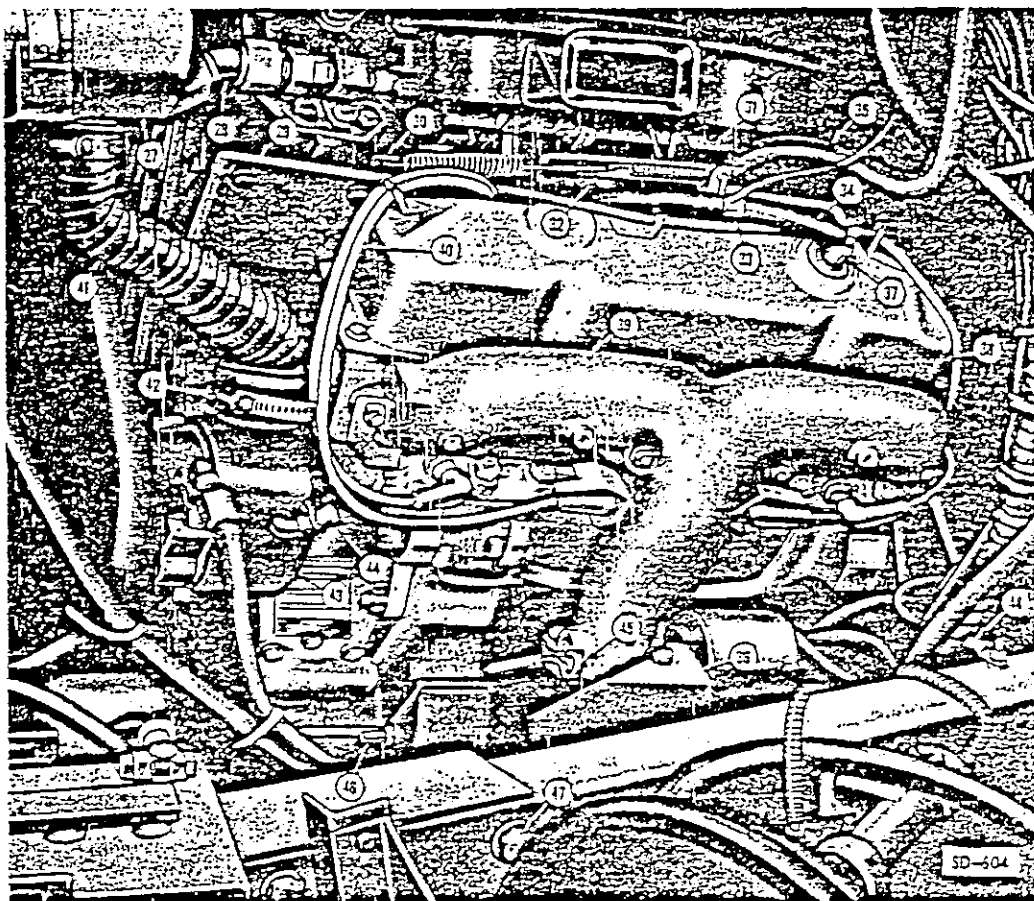
15-1. DESCRIPTION

a. General (fig. 15-1). The coach is equipped with a rear-mounted, overhead valve, V-8, high-block, 440 cubic inch engine (Chrysler model 440). Special features of the engine include an electronic ignition system, a four-barrel down-draft carburetor, positive crankcase ventilation (PCV) type clean-air-emission control system, an engine rpm (tachometer) indicating system, a reduction gear starter (with integral solenoid), a

33-1/2 quart ethylene glycol/water radiator and fan type cooling system, and key-lock type hinged service access doors.

NOTE

The engine is designed to operate on normal usage gasoline containing at least 0.5 grams of lead per gallon, or equivalent additive, and having a minimum octane rating of 91.



LEGEND (Continued)

- | | | |
|-----------------------------------|----------------------------|----------------------------------|
| 27-PWR STEERING FLUID RESERVOIR * | 34-CLEAN AIR EMISSION HOSE | 42-HOSE CLAMP * |
| 28-A/C FREON LINE | 35-VACUUM HOSE | 43-PWR STEERING PUMP |
| 29-A/C COMPRESSOR BRACKET | 36-HEAT SHIELD | 44-DRAIN CAP |
| 30-THROTTLE RTN SPRING BRACKET | 37-PCV VALVE | 45-OIL DIPSTICK |
| 31-CARBURETOR | 38-ROCKER ARM COVER | 46-MOUNT BOLT |
| 32-THROTTLE LINKAGE | 39-EXHAUST MANIFOLD | 47-CROSS BEAM ATTACH BOLT (4 RH) |
| 33-WASTE DESTRUCT "Y" FITTING | 40-IGNITION WIRES * | 48-GROUNDING JUMPER |
| | 41-ELEPHANT HOSE | |

* ON COACHES 00001 THROUGH 00365 ONLY

Figure 15-1. Engine Assembly (Sheet 2 of 2)

For service information on related systems such as the automotive electrical system, refer to Group 4; for the fuel system, refer to Group 11; for the exhaust system, refer to Group 12; for the cooling system, refer to Group 13; and for the transmission, refer to Group 16. When applicable, other groups are referenced in the text. For information on

part numbers and procurement of replacement parts, refer to Group 15 in the 2900R Parts Catalog.

b. Engine Leading Particulars. The leading particulars of the coach engine are listed in table 15-1.

Table 15-1. Engine Leading Particulars

ENGINE ITEM	PARTICULARS
Model	Chrysler 440
Cylinders	90° V-8
Stroke	3.750"
Piston displacement	440 cu in.
Compression ratio	8.12 to 1
Compression pressure, minimum (with engine warm spark plug removed, and throttle wide open).	120 - 150 psi
Compression variation (between cylinders on any on engine)....	40 psi maximum
Cylinder firing order	1-8-4-3-6-5-7-2
Oil pressure, 1200 rpm operation	45 to 65 psi
Oil filter	Full-flow, spin-on
Carburetor	4 barrel
Valve lifters	Hydraulic type
CYLINDER BLOCK	
Cylinder bore (standard)	4.320 - 4.322"
Cylinder bore out-of-round (max. allowable before reconditioning).	.005"
Cylinder bore taper (max. allowable before reconditioning)..	.010"
Reconditioning working limits (for taper and out-of-round) ..	.001"
Maximum allowable oversize (cylinder bore) .....	.040"
Tappet bore diameter .....	.9051" - .9059"
Distributor lower drive shaft bushing (press fit in block)....	.0005" - .0040"
Ream to .....	.4865" - .4880"
Shaft to bushing clearance .....	.0007" - .0027"
PISTONS	
Type material	Autothermic with steel struts
Land clearance (diametrical).....	.031" - .037"
Clearance at top of skirt .....	.0005" - .0010"
Weight	857.5 grams
Piston length (overall).....	3.96"
Ring groove depth	
No. 1 .....	.220"
No. 2 .....	.220"
No. 3 .....	.208"
Pistons for service	Std, and .005", .020", .040" oversize

Table 15-1. Engine Leading Particulars (Continued)

ENGINE ITEM	PARTICULARS
PISTON PINS	
Type	Press fit in rod
Diameter	1.0935" - 1.0937"
Length	3.555" - 3.575"
Clearance in piston (light thumb push @ 70°F) .....	.00045" - .00075"
Interference in rod .....	.0007" - .0012"
Pins for service	Standard only
PISTON RINGS	
Number of rings per piston	3
Compression	2
Oil	1
Oil ring type	Steel rail
Ring width	
Compression .....	.0775" - .0780"
Oil (steel rails) .....	.025"
Ring gap	
Compression .....	.013" - .023"
Oil (steel rails) .....	.015" - .055"
Ring side clearance	
Compression .....	.0015" - .0030"
Oil (steel rails) .....	.000" - .005"
Service rings	
Ring gap	
Compression .....	.013" - .023"
Oil (steel rails) .....	.015" - .062"
Ring side clearance	
Compression .....	.0015" - .004"
Oil (Steel rails) .....	.0000" - .005"
CONNECTING RODS	
Length (center to center)	6.766" - 6.770"
Weight (less bearing shells)	846 (\pm 4) grams
Side clearance (two rods) .....	.009" - .017"
Piston pin bore diameter	1.0923" - 1.0928"
CONNECTING ROD BEARINGS	
Tri-metal steel backed	
Diameter and length	
Diameter and length	2.376" - .927"
Clearance desired .....	.0005" - .0015"
Maximum allowable .....	.0025"
Bearings for service	Std, .001", .002", .003", .010", .012"

Table 15-1. Engine Leading Particulars (Continued)

ENGINE ITEM	PARTICULARS
CRANKSHAFT <i>SEE BULLETIN</i>	
Type	Fully counter-balanced
Bearings	Aluminum
No. 3 main	Aluminum
Thrust taken by	No. 3 main bearing
End play .....	.002" - .007"
Maximum allowable .....	.010"
Diametral clearance desired .....	.0005" - .002"
Diametral clearance allowed .....	.0025"
Finish at rear oil seal surface	Diagonal knurling
MAIN BEARING JOURNALS	
Diameter	2.7495" - 2.7505"
Maximum allowable out-of-round permissible .....	.001"
Bearings for service available in standard and the following undersizes.	.001", .002", .003" .010", .011", .012"
CONNECTING ROD JOURNALS	
Diameter	2.374" - 2.375"
Maximum allowable out-of-round and/or taper .....	.001"
CAMSHAFT	
Drive	Roller chain
Bearings	Steel backed babbitt
Number	5
Diametral clearance .....	.001" - .003"
Maximum allowable before reconditioning .....	.005"
Thrust taken by	Gear/cylinder block
CAMSHAFT JOURNALS	
Diameter	No. 1 1.998" - 1.999"
	No. 2 1.982" - 1.983"
	No. 3 1.967" - 1.968"
	No. 4 1.951" - 1.952"
	No. 5 1.748" - 1.749"
CAMSHAFT BEARINGS	
Diameter	No. 1 2.000" - 2.001"
	No. 2 1.984" - 1.985"
	No. 3 1.967" - 1.968"
	No. 4 1.951" - 1.952"
	No. 5 1.750" - 1.751"
VALVES, Intake	
Head diameter	2.08"
Length to center of valve face	4.79"

Table 15-1. Engine Leading Particulars (Continued)

ENGINE ITEM	PARTICULARS
Stem diameter .....	.3718" - .3725"
Stem to guide clearance .....	.0015" - .0032"
Maximum allowable .....	.017"
Face angle	45 degrees
Valve for service (oversize stems diameter)	Std, .005", .015", .030"
Lift (zero lash) .....	.434"
VALVES, Exhaust	
Head diameter	1.74"
Length to center of valve face	4.79"
Stem diameter	
Hot end .....	.3708" - .3715"
Cold end .....	.3718" - .3725"
Stem to guide clearance	
Hot end .....	.0025" - .0042"
Cold end .....	.0015" - .0032"
Maximum allowable .....	.017"
Face angle	45 degrees
Valve for service (oversize stem diameter)	Std, .005", .015", .030"
Lift (zero lash) .....	.430"
VALVE SPRINGS	
Number	16
Free length (exhaust)	2-23/64"
Free length (intake)	2-37/64"
Load when compressed (lbs. @ in.)	
Intake-valve closed	121-129 @ 1-55/64"
-valve open	192-208 @ 1-7/16"
Exhaust-valve closed	118-128 @ 1-47/64"
-valve open	200-210 @ 1-5/16"
Corrosion protection	Cadmium plated
ENGINE OIL SYSTEM (Full pressure type)	
Pump type	Rotary
Capacity	6 qts; when filter is replaced, add 1 qt
Pump drive	Camshaft gear
Minimum pump pressure @ idle	8 psi
Operating pressure at 2000 engine rpm	30-80 lbs
Pressure drop resulting from clogged filter	7-9 lbs

c. Electronic Ignition System. The coach engine incorporates an electronic ignition system which functions to deliver high amperage current impulses through resistor type, hi-temperature ignition cables to precision-fire the spark plugs. The spark plugs ignite the atomized fuel/air mixture in the cylinder at 7-1/2 degrees before the piston reaches top center (BTC) during each compression (power) stroke. During acceleration, this firing position is automatically varied by the vacuum operated advance mechanism in the distributor. The magnetic pickup and reluctor in the distributor work in conjunction with an electronic control unit to perform the functions which in a conventional system are performed by a set of mech-

anical breaker points and condenser. The magnetic pickup (permanent magnet and coil) in the distributor does not wear out, thus reducing maintenance, since there are no points or condenser to change or adjust. By electronically controlling ignition timing and dwell, improved consistency of optimum firing is attained throughout the engine's varying operational modes. More complete burning of the fuel/air mixture minimizes the amount of unburned exhaust gases to be handled by the positive crankcase ventilation clean air emission system and improves gasoline mileage. Table 15-2 briefly describes the components of the electronic ignition system. For detailed functional description, refer to Group 4.

Table 15-2. Electronic Ignition System Components

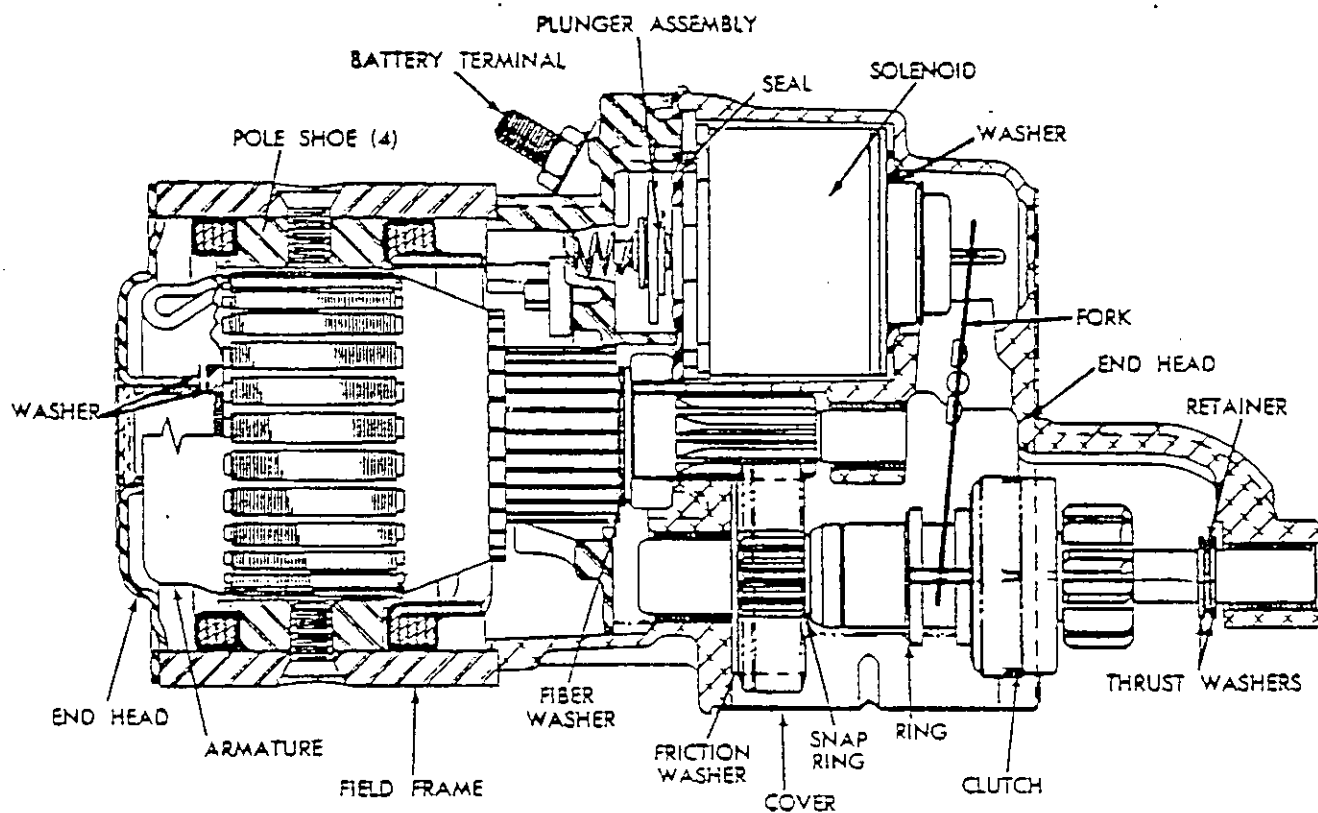
COMPONENT	LOCATION	FUNCTION
Starting ignition switch, key operated, 4 positions: "ACCY" "OFF" "IGN" "START"	Lower RH side of dash panel	The key-operated starting ignition switch has four positions: "ACCY", "OFF", "IGN", and "START". When key is turned to the "ACCY" position, the following circuits are energized: windshield wipers and washers, heater and defroster, instrument lights, and automotive air conditioning system. Turning to the "IGN" position activates the engine ignition system, instrument panel lights, brake lights, and turn signal lights. To start the engine, refer to 2900R Owner's Manual and accomplish "starting the engine" procedure
Ignition coil	Top aft LH side of engine intake manifold just aft of carburetor air cleaner	Houses primary and secondary coil windings
Distributor	Top of aft end of engine close to ignition coil	Contains magnetic pickup and coil, reluctor, rotor, and distributor cap; distributes timed impulses to the control unit
Control unit (electronic)	On upper RH corner of ignition panel on firewall in center of engine compartment	Upon signal from reluctor, control unit transistor interrupts primary coil current flow and electromagnetic field collapses across secondary windings, thereby inducing high amperage current flow through the distributor and ignition cables to fire the spark plug

Table 15-2. Electronic Ignition System Components (Continued)

COMPONENT	LOCATION	FUNCTION
Dual ballast resistor	On lower RH corner of ignition panel	During engine operation, compensating resistor maintains constant current available to primary coil during all variations of engine speed, protecting the coil from high current flow regardless of engine rpm. The resistor is automatically by-passed during cranking, allowing full battery voltage to the primary coil to provide maximum hot spark for starting. The other (auxiliary) resistor protects the control unit
Spark plugs (8)	One in each cylinder	To ignite the fuel/air mixture in the cylinder combustion chamber

d. Starter (fig. 15-2). The starter incorporates a 12 V dc motor and is mounted on the lower forward RH side of the engine. The starter has a 3.5 to 1 reduction gear set built into the starter

assembly, which is housed in an aluminum die casting. The starter utilizes a solenoid actuated shift device. The housing of the solenoid is integral with the starter drive-end housing.

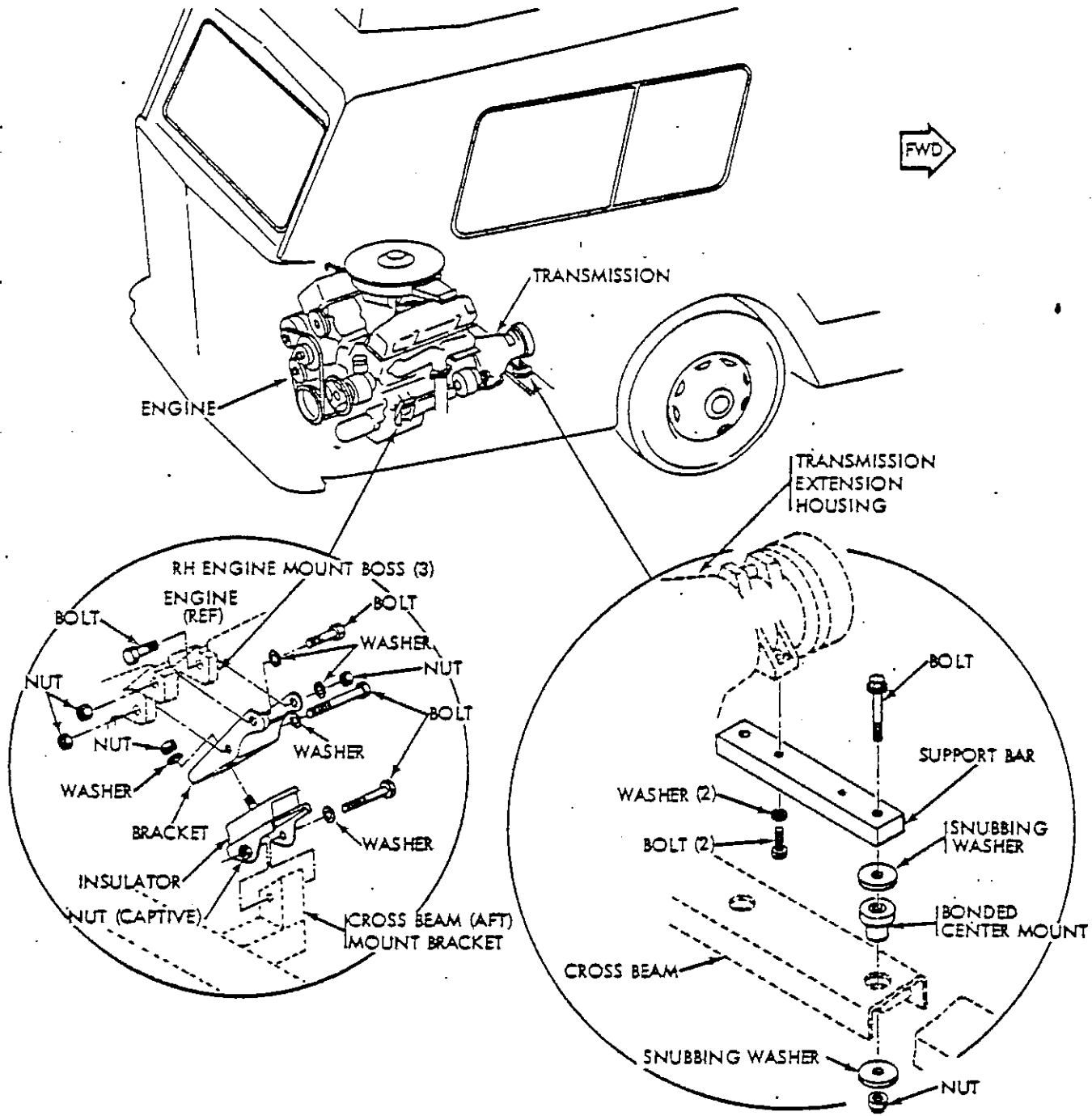


SD-306

Figure 15-2. Starter Cross Section

e. Engine Mounts (fig. 15-3). The engine is attached to two cross beams of the coach lower frame at four points. Each side of the engine block contains integral mount bosses, located on the lower aft end, which bolt to an adapter bracket and vibration insulator type mount arrangement. These insulators are installed between the aft cross beam mount bracket and the engine mount bosses. The forward end of the engine attaches

to the transmission, which contains an extension housing with a support bar bolted to its base. Attachment bolts are inserted through the two holes in the support and through two mount holes in a forward cross beam which incorporates elastomeric cushioned, bonded center mount assemblies. A ground jumper is installed to electrically bond the engine to the coach frame.



SD-307

Figure 15-3. Engine Mounts

f. Oil System. The engine oil system consists of an externally mounted rotor type oil pump and a full-flow, spin-on filter. Oil is forced under pressure by the oil pump through a series of oil passages. The primary function of the oil is to reduce friction. The oil must have sufficient film strength to withstand continuous pressure and changes in temperature without breaking down to permit direct contact between the moving parts. In performing its lubricating function, the engine oil also acts as a coolant by transferring a major portion of combustion heat from the pistons and valves to the cooling system. Additionally, the engine oil acts as a cleaning agent by carrying small particles of foreign matter, condensation, etc. to the oil filter, where the foreign material is removed from circulation. Engine oil also maintains a viscous seal against gasses, especially between the piston rings and the cylinder walls. The two top rings in each piston are compression rings, which the engine oil assists in sealing. The oil is wiped onto the cylinder walls through the oil ring in the lower groove of each piston. An oil pressure sending unit is mounted on the top forward end of the engine near the transmission housing. The unit is electrically connected to an oil pressure indicator gauge and a low-oil-pressure warning light on the dash panel.

g. Engine Controls. The engine is started and shut down by the starter/ignition key-operated switch located on the lower RH side of the dash panel. Refer to 2900R Owner's Manual for "Starting the Engine" procedure. The accelerator pedal (foot) is installed on the floor at the right of the steering column and is connected to the carburetor throttle by a cable, bellcrank, and push rod. Engine acceleration/deceleration is controlled by the foot operated pedal. As the pedal is depressed, the carburetor throttle valves open in proportion and provide more fuel-air mixture to the intake manifold, thus increasing engine speed. Springs on the linkage return the pedal to the original full-up position when foot pressure is decreased or removed, thus slowing engine to idle speed. The linkage between the transmission actuation lever and the carburetor throttle valve lever controls the transmission down-

shifting when the throttle is advanced for passing other vehicles and other similar rapid-acceleration situations. Refer to Group 11 for detailed information concerning the accelerator and linkages.

h. Engine Service Access Doors. The coach incorporates hinged key-lock type access doors to the engine compartment. These doors permit rapid access for necessary servicing and maintenance. Access doors with key-locking catches protect the engine from unauthorized tampering or theft of accessories. An individual key fits all doors. Access doors for servicing the engine are as follows:

(1) Engine Service. Located on the right side of coach at the rear, this single-lock compartment door provides access to the engine oil dipstick, power steering reservoir, and automotive battery.

(2) Engine/Transmission (and APU) Service. Located at rear of coach, this single-lock compartment door provides access to engine oil filling, transmission oil filling, the transmission oil dipstick, and the auxiliary power unit (APU).

NOTE

An access door on the aft left-hand side of the coach also provides access to the APU.

(3) Radiator Fill Service. Located at the center rear of coach, this compartment door provides access to the radiator filler cap. No key is required. The door must be pulled up to overcome spring tension normally holding the door closed.

15-2. TROUBLESHOOTING

Instructions for troubleshooting the engine are contained in table 15-3. Prior to troubleshooting, a preliminary visual inspection should be made as outlined in paragraph 15-4b to assist in locating the problem.

Table 15-3. Troubleshooting Engine

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
Engine fails to start	Battery weak or terminals corroded/loose	Recharge or replace if defective. Clean and tighten terminals
	Distributor cap wet	Dry by wiping or blow with compressed air
	Faulty starter action	Check starting relay and wiring; repair or replace

Table 15-3. Troubleshooting Engine (Continued)

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
	Automatic choke not actuated properly by operator	Instruct operator to depress accelerator pedal slightly before cranking with starter
	Carburetor air cleaner filter excessively dirty	Clean or replace; refer to Group 11
	Automatic choke valve inoperative because linkage is sticking	Clean linkage; refer to Group 11
	Fuel pump not delivering sufficient fuel due to clogged vent in fuel tank cap	Remove and inspect cap; clean as required, then reinstall. Ensure that rubber splash-apron grommet does not contact cap base so as to obstruct air venting
	Automatic choke vacuum hose leaking (loose or disconnected)	Connect or tighten as necessary
	Water in fuel	Siphon fuel from about 1/32 inch above bottom of tank into glass jar to partially fill jar; inspect fluid in jar for layer of water below fuel. If water is present, repeat procedure until tank fluid is free of water
Engine operation is sluggish	Carburetor air cleaner filter excessively dirty	Clean or replace; refer to Group 11
	Fuel pump output pressure low	Replace pump; refer to Group 11
	Fuel filter clogged	Replace; refer to Group 11
	Rocker-arm cover (crankcase) vent valve vacuum hose not attached to carburetor	Connect hose to carburetor
Rough or too slow engine idling	Idle jets incorrectly adjusted	Adjust; refer to Group 11
	Crankcase vent valve or hoses clogged	Clean or replace hoses; replace vent valve, refer to Group 11
Slow engine acceleration	Accelerator pump piston plunger cap worn or damaged	Install Chrysler kit part number 3780111 or replace carburetor
	Throttle linkage binding or defective	Repair or replace as necessary; refer to Group 11

Table 15-3. Troubleshooting Engine (Continued)

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
No fuel at carburetor on engine	Restricted line	Open fuel line and remove clogging matter or replace unserviceable line; refer to Group 11. Remove sharp bends and other restrictions
	Defective pump	Replace; refer to Group 11
Fuel mixture too rich; results in weak or rough engine operation	Fuel mixture out of adjustment	Adjust air-to-fuel mixture; refer to Group 11
Engine overheats	Coolant level too low	Replenish coolant
	Radiator pressure cap malfunctioning	Pressure-test cap; refer to Group 13
	Belts on water pump/fan slipping	Tighten each belt to 60 to 75 pounds tension; refer to Group 13
	Thermostat defective	Test; refer to Group 13
	Coolant pump impeller defective	Replace pump; refer to Group 13
Engine noisy (metallic sounds)	Water pump impeller bearing lacks lubricant	Lubricate pump; refer to Group 13
	Fuel pump rocker arm worn or damaged or spring broken	Replace pump; refer to Group 11
	Loose fuel pump mounting bolts	Tighten
Slow engine warm-up	Thermostat defective	Install serviceable thermostat; refer to Group 13
Engine misses or has low power	Defective spark plug(s)	Replace
	Spark plug lead(s) disconnected	Connect
	Distributor vacuum advance faulty	Repair or replace; refer to Group 4
	Faulty accelerator pump in carburetor	Adjust or install kit in pump or replace carburetor; refer to Group 11
Low oil pressure	Low oil level	Add oil as required
	Faulty oil pressure sending unit	Replace
	Thin or diluted oil	Change oil to correct viscosity; refer to paragraph 15-5c (4)
	Clogged oil filter	Install new oil filter

15-3. REMOVAL/INSTALLATION

a. General. Step-by-step instructions for replacement of the engine and components are provided in this section. Replacement parts should be procured from those listed in the 2900R Parts Catalog, Group 15.

b. Engine/Transmission Replacement. These procedures are for replacement of the engine with the transmission attached. Removal of the transmission as an individual unit with the engine installed is covered in Group 16, Transmission Assembly. These procedures require the use of a 2000 pound capacity transmission jack (model 62 Hein-Werner Corp., Waukesha, Wisconsin) or equivalent, with a special adapter that will support the engine around the perimeter on the oil pan where it bolts to the block base.

NOTE SEE BULLETIN

It is possible to lift the engine with a "cherry picker" type hoisting device. Lifting eyes, normally provided with a new replacement engine, may be used to attach the "cherry picker" to the engine. The procedures herein use the aforementioned jack and adapter method of lifting the engine. If other than the specified method of lifting is employed, appropriate deviations to the prescribed steps will be necessary.

Warning

When handling the engine/transmission during these procedures, make sure that the special adapter is securely bolted onto the jack and properly contacting the engine at the aft end and along the sides of the oil pan where it attaches to the block. The special adapter is designed to support the engine in a manner that will prevent it from tilting, rolling, or rotating out of position, possibly causing injury or damage.

(1) Preparation For Removal. Gain access and prepare the coach engine for removal as follows:

Caution

Install wheel chocks under front and rear surfaces of front tires to prevent inadvertent coach movement.

(a) Remove rear bumper by removing the two nuts and bolts attaching bumper to the energy absorber brackets and sliding bumper aft to clear brackets.

(b) Open engine compartment right-hand and rear access doors; tie open.

(c) Remove electrical power by disconnecting both domestic and automotive batteries.

(d) Detach the tubular link on the left-hand side and the bracket on the right-hand side connecting the aft grill to the left-hand and right-hand longitudinal frame members.

(e) Remove grill aft of the radiator by removing attaching nuts, bolts, washers, and shims; note shim locations, and retain all items for reuse during installation.

NOTE

To obtain better access for work underneath coach, raise rear end until rear tires are about 2 inches from floor, and install jack (truck) stands on both sides.

(f) Using a suitable container, drain radiator by removing pressure cap and opening drain cock; close drain cock when complete; retain cap; see figure 15-4.

Warning

Put container in a safe place or dispose of drained coolant solution immediately, as coolant is harmful if swallowed.

(g) Place suitable drain container under two transmission oil line fittings on transmission oil cooler at base of radiator, then disconnect lines and drain into container.

(h) Repeat previous step for oil line end fittings at transmission.

NOTE

Position transmission oil cooler lines flush against coach RH frame. Detach clamp on aft cross beam RH side, and remove lines so they will not obstruct cross beam during removal.

(i) Loosen clamp on both upper and lower radiator coolant hoses, and disconnect hoses.

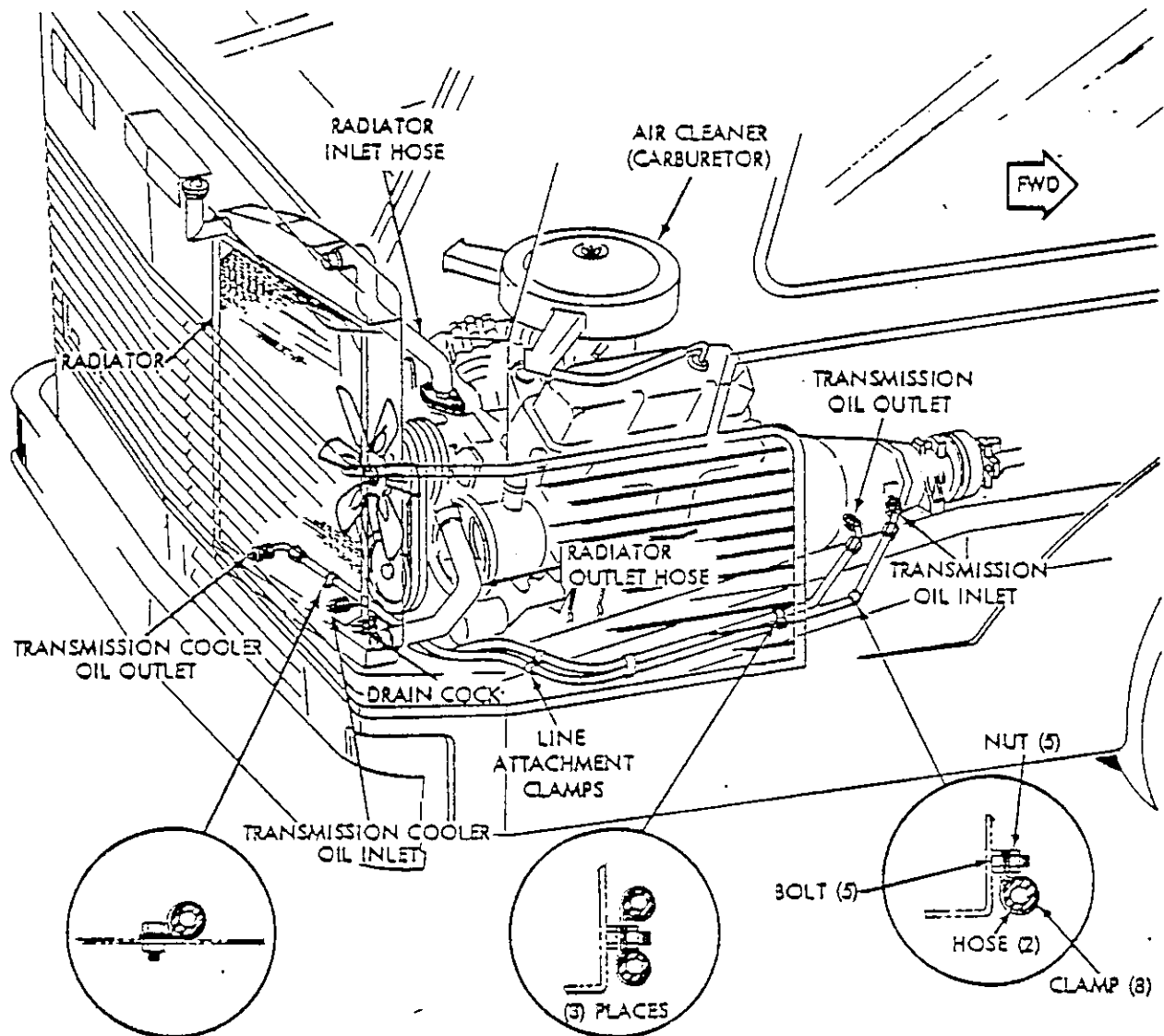


Figure 15-4. Transmission Oil-Cooler Lines

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(j) Drain power steering reservoir fluid into a suitable container by removing clamp and cap from small line protruding from right-hand side of pump housing; reinstall cap and clamp.

(k) Disconnect power steering pressure output hose, position disconnected hose to clear engine during removal, and tie back out of the way.

(l) Remove power steering reservoir in accordance with the procedures contained in Group 7.

(m) Remove radiator, air deflector, four air deflector attaching brackets, shroud, and the radiator guard in accordance with instructions contained in Group 13.

NOTE

On some installations, the green insulated A/C ground wire routes underneath the right-hand deflector-to-radiator attach bracket. In these cases, remove attaching bolts and bracket, and move the ground wire out of the way to clear engine during removal.

(n) Disconnect the following electrical wiring from the engine and tie back out of the way to clear engine during removal:

- Temperature sending unit electrical lead from terminal end adjacent to water pump.

- Two oil pressure sending unit leads (forward top end of engine).
- Alternator leads including grounding jumper.
- Distributor leads.
- A/C compressor clutch lead.
- Starter leads.
- Ground jumper lead (near starter at engine end only).
- Back-up light and neutral/park start switch harness plug on transmission.

Warning

To ensure safe operation during the following procedure, turn off appliance pilot lights and LPG service-and-relief valve. Make certain that gasoline is not exposed to any ignition source, such as a lighted cigarette or spark-producing machinery. Use a suitable container to catch fuel when fuel system components are drained.

- (o) Loosen clamp and disconnect fuel supply hose from fuel pump, and install a plug in hose end to prevent fuel from siphoning out of tank.
- (p) Remove hydrovac vacuum line for brake hydrovac boosters from engine connection.
- (q) Place marker tape on heater hoses to identify installed position, then disconnect hoses from tubes protruding from top of the engine.
- (r) Remove bolt attaching heat shield to right-hand exhaust manifold; remove shield.
- (s) Detach the injector hose from the right exhaust tail pipe by loosening hose clamp on red hose attached to the injector then removing hose from injector. Remove clamp securing hose to transmission base, then pull hose forward until clear of cross beam and position back out of the way.
- (t) Remove the left-hand and right-hand exhaust pipes from the engine in accordance with the procedures contained in Group 12.
- (u) Remove the carburetor air cleaner assembly, and disconnect throttle linkage in accordance with procedures contained in Group 11.

(v) Remove four bolts attaching fan to pulley, and remove fan; retain fan and attaching parts.

(w) Remove four bolts/nuts attaching A/C compressor mount bracket, detach compressor with freon lines attached, and position toward right-hand side of engine compartment to clear engine during removal.

Caution

Make sure that parking brake hand lever is fully forward ("off") and that lever adjustment knob is turned full counter-clockwise to release all cable tension prior to accomplishing the following step.

(x) Detach aft cable from parking brake in accordance with instructions in Group 10.

(y) Remove bolts attaching propeller shaft U-joining spiders to flanged yoke on parking brake and to the differential, and remove propeller shaft; retain shaft and bolts.

(z) Remove speedometer/waste destruct sending unit drive cable and housing from forward right-hand end of transmission extension housing.

(aa) Remove two nuts, bolts, shims, and lower snubbing washers attaching transmission support bar to cross beam; retain nuts, bolts, and snubbing washers; retain for reuse. Note number of shims at each location.

(ab) Remove "Y" fitting for the waste-destruct system (Thermaxan) vacuum line from hose above right hand rocker arm cover; retain "Y" fitting connected to small hose.

NOTE

Subsequent steps remove the engine supporting cross beam assembly. This requires supporting engine with the transmission jack and adapter (or equivalent) to permit lowering of aft cross beam when detached. The left-hand aft lower skin section, attached to the frame with slotted brackets, must be loosened and pulled aft about 3 inches while accomplishing the following step.

(ac) With jack and adapter under engine forward of the cross beam mounts and positioned so the adapter will support the engine along the points where the oil pan bolts to the block base, raise jack until the full weight of the engine is on the jack/adapter.

(ad) See figure 15-3. Remove both the left and right-hand bolts inserted through the engine mount brackets, insulators, and the cross beam mount brackets; retain bolts and washers.

(ae) Remove four nuts, washers, and bolts attaching each end of the aft engine supporting cross beam to the two frame mount plates.

(af) Using end lift (or equivalent) lifting device, insert lift pads under beam and raise to contact and support base of aft cross beam.

(ag) Remove nut and bolt attaching aft muffler mount to left-hand cross beam bracket.

Caution

When handling the cross beam during these procedures, make sure end lift pads are properly contacting the base of the beam and that engine supports are secure. The cross beam must be held in an upright position while lowering.

(ah) Hold aft cross beam upright and ensure that each engine mount insulator stud clears the cross beam mount holes, gradually lower cross beam until it is below the edge of the aft skin surrounding the engine compartment, then remove.

(ai) Roll aft cross beam aft until clear of coach, secure upright on end lift, and retain out of the way for later reinstallation.

(2) Removal of Engine/Transmission. With the engine prepared for removal and radiator removed as specified in previous steps, proceed as follows:

(a) Align the previously installed engine lift adapter and jack so it will roll straight aft, then raise forward transmission extension housing until high enough for lower edge of parking brake drum to clear the forward cross beam as it moves aft.

Warning

When handling the engine/transmission during these procedures, make sure that the adapter is securely bolted onto jack and properly contacting the engine around the aft end and along the sides of the oil pan where it attaches to the block. The adapter must be positioned in a manner that will prevent the engine from tilting or rolling; otherwise, it might tilt out of position causing injury or damage.

(b) Gradually roll engine/transmission assembly straight aft until clear of the engine compartment.

(c) Seat removed engine/transmission upright on support blocks and secure in place.

(3) Preparation of Replacement Engine for Installation. The following procedures assume that the replacement engine includes an installed 85 amp alternator, carburetor, fuel pump, fuel filter, power steering pump, transmission, transmission-to-carburetor linkage, oil filter, clean air emission air cleaner, hoses, ventilator valve, engine mount brackets, insulator, and attachment bolts.

NOTE

If any of the aforementioned components should require transfer from one engine to another, consult the applicable equipment group in this manual for removal and installation procedures.

Remove the following components from the removed engine and install on the replacement engine.

NOTE

Install the V-belt (set) for the alternator and A/C compressor, then take up slack and temporarily tie in place around the alternator pulley. The belts will be installed over the A/C compressor pulley following engine installation. The power steering (single) belt must be removed to allow clearance for installation of the alternator/compressor belts, then reinstalled and tension adjusted. To adjust power steering belt, loosen the bolt in the slotted hole in the mount bracket, and loosen pivot bolt. Use 1/2 inch socket in square hole at top of the bracket and press in toward the engine to obtain approximately 70 pounds tension. Tighten bolt in slotted hole of mount bracket, then tighten pivot bolt. To adjust the fan/water pump belt (set), loosen the idler pulley, the bolt in the slotted hole, and the pivot bolt. Then, using 1/2 inch socket drive inserted into the square hole in arm, press in on idler arm toward engine center to obtain 80 to 100 pounds tension on each belt on initial installation and 60 to 75 pounds thereafter. Torque the lock-bolt in the slotted hole to 45 foot-pounds, and tighten pivot bolt.

(a) Remove lifting eyes from top of replacement engine, and transfer A/C compressor mount bracket. Install throttle linkage spring bracket under inboard A/C bracket attachment bolt nearest to the carburetor.

NOTE

If lifting eye is to be used to lift engine in subsequent step (4) (a), withhold accomplishment of preceding step until lifting operations are completed.

(b) Transfer heater hose inlet and outlet connector tubes (pipes) and radiator inlet and outlet hoses.

(c) Transfer oil cooler inlet and outlet 45 degree fittings on transmission.

(d) Remove plug from replacement engine, and transfer vacuum line fitting on top of engine forward of carburetor.

(e) Remove plug from replacement engine, and transfer oil pressure sending unit located on top forward end of engine.

(f) Transfer throttle linkage support bracket on engine right-hand side adjacent to carburetor; refer to Group 11.

(g) Transfer flanged yoke on forward end of the parking brake to the replacement engine/transmission parking brake; torque attaching nuts to 36 to 38 foot-pounds.

(h) Make sure that engine mount bracket and insulator are installed as shown in figure 15-3. If not, remove lower bolt from engine bracket, and loosen two top bolts to allow bracket to pivot outward. Remove nut on stud protruding out of top of insulator, and remove insulator. Reinstall insulator with stud in lower hole in the bracket, and the short guide stud in the upper hold; install and tighten nut. Retain the lower bracket-to-boss attachment bolts, and do not retighten top bolts in the engine mount boss at this point.

NOTE

It is necessary, in subsequent step, to have the insulator and bracket free to pivot in order to insert the lower stud protruding down out of insulator in the cross beam mount bracket holes.

(4) Installation of Replacement Engine/Transmission. With the replacement engine/transmission prepared for installation as specified in previous procedures, install in coach as follows:

Caution

Ensure that wheel chocks are installed under front and rear surfaces of front tires to prevent inadvertent coach movement.

(a) Remove engine/transmission from shipping support blocks and position transmission jack and adapter under engine. Position the adapter so that it will support the engine around the points (fig. 15-1, item 21) where the oil pan bolts to the block base; raise until the top of engine, when seated on the jack/adapter, is at the approximate level of an installed engine.

Warning

When handling the engine/transmission during these procedures, make sure adapter is securely bolted onto jack and properly contacting the engine around the aft end and along the sides of the oil pan where it attaches to the block. The adapter must be positioned in a manner that will prevent the engine from tilting or rolling; otherwise, it might tilt out of position causing injury or damage.

(b) Remove both the left- and right-hand bolts and washers inserted through the engine mount brackets and insulators; retain bolts and washers.

NOTE

Ensure that insulators are installed as specified in previous step (3)(h).

(c) Align the engine, lift adapter, and jack to roll straight forward into mounting position in coach.

(d) Carefully roll engine/transmission forward until parking brake drum is even with the forward cross beam mount. Raise transmission extension housing until high enough for lower edge of the parking brake drum to clear the forward cross beam as it moves forward. Continue forward movement until the mount holes on the transmission extension housing support bar align with the holes in the elastomer mounts in the forward cross beam, then lower transmission support bar to seat on mounts. Use same number of shims as removed in paragraph 15-3b(1) step (aa).

(e) See figure 15-3. Loosely install bolts (head end on top), snubbing washers, and nuts through two transmission extension housing support bar holes and cross beam mount holes as shown; do not tighten nuts.

(f) Using engine support jack and adapter, raise engine until mount bracket insulator lower studs are approximately an inch above the point where they would normally engage the mount holes on the forward cross beam bracket (fig. 15-1, item 20).

(g) Roll cross beam secured upright on end lift, as retained from paragraph 15-3b(1), step (ai), into position at the aft end of coach at frame attach points. The left-hand aft lower

skin section, attached to the frame with slotted brackets, must be loosened and pulled aft about 3 inches while accomplishing the following step.

NOTE

In the following step, insert the two aft right-hand cross beam attaching bolts with the head end outboard and the forward two bolts with the head inboard (fig. 15-1, item 22). On the opposite end of the cross beam all four bolts are installed with the head end outboard (away from the engine).

(h) With engine jacked to position specified in paragraph 15-3b(4), step (f), slowly raise cross beam into position until the four holes in both left-hand and right-hand mount plates on cross beam align with frame mount plates, then install bolts, washers, and nuts.

(i) Install attaching nut and bolt in muffler mount (fig. 15-1, item 23) located at lower left-hand side of radiator; remove end lift.

NOTE

In the following step, the head of the right-hand bolt is installed on the forward side of the bracket and the head of the left-hand bolt in the opposite direction; torque bolts to 50 (\pm 15) foot-pounds.

(j) See figure 15-3. Lower engine to insert insulator studs and seat insulator base on cross beam mount brackets, then install both the left- and right-hand washers and bolts by inserting bolts through the engine mount brackets, insulators, and the cross beam mount brackets. Install lower bolt in insulator bracket and engine boss hole, and tighten upper two attaching bolt nuts.

(k) Lower the engine jack and adapter, and remove from work area.

(l) Using bolts retained during removal, install propeller shaft by attaching U-joint spiders on propeller shaft to flanged yoke on parking brake forward end and to the flanged yoke on the differential; torque bolts to 25 to 30 foot-pounds.

(m) Tighten nuts on the transmission cross beam mount bolts; torque to 122 to 133 foot-pounds.

NOTE

Make sure that parking brake hand lever is fully forward ("off") and that lever adjustment knob is turned full counter-clockwise to release all cable tension prior to accomplishing the following step.

(n) Install (connect) parking brake aft cable in accordance with instructions in Group 10.

(o) Connect speedometer/waste destruct sender unit drive cable and housing to the forward right-hand end of transmission extension housing.

(p) Connect back-up light and neutral/park start switch wiring harness plug to plug located on transmission right-hand side.

(q) See figure 15-4. Connect transmission oil cooler lines to transmission inlet and outlet 45 degree fittings.

(r) Attach aft transmission oil cooler line support clamp to stud on aft cross beam; tighten clamp attaching nut to 46 to 52 INCH-pounds.

NOTE

Prior to next step, untie belts (fig. 15-1, item 10) temporarily stowed around alternator pulley during preparation, and seat in grooves around compressor pulley, alternator pulley, and crankshaft pulley.

(s) Install A/C compressor (with freon lines attached) on mount bracket (fig. 15-1, item 29) on aft right-hand end of engine. Adjust the alternator/compressor belts by loosening the two lock bolts in the slot in the alternator mount bracket and the pivot bolt at alternator base. Use a prying device between engine and alternator housing just aft of the stator and forward of pulley. Pry outward away from engine until approximately 55 pounds tension is obtained on each belt. Tighten both lock bolt and pivot bolt.

NOTE

Application of a good brand of belt dressing on all V-belts is recommended.

(t) Connect pressure output hose to the power steering pump (fig. 15-1, item 43).

(u) Connect vacuum hose (fig. 15-1, item 35) to connector on upper forward engine intake manifold.

(v) Connect throttle linkage (fig. 15-1, item 32), and install carburetor air cleaner assembly in accordance with Group 11.

(w) See figure 15-5. Install "Y" fitting, attached to small hose in upper compartment for waste destruct system, in vacuum hose about three inches aft of ventilating valve in right-hand rocker arm cover. Cut hose and insert "Y" fitting into opening of each end of hose.

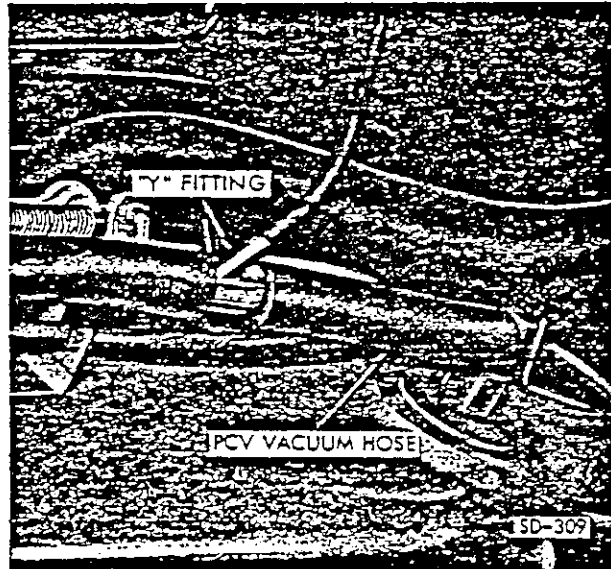


Figure 15-5 "Y" Fitting Waste-Destruct Vacuum Line

(x) Connect electrical leads to starter terminals.

(y) Connect grounding jumper (fig. 15-1, item 48) to engine (forward of starter).

(z) Connect two oil pressure sending unit leads (forward top end of engine).

(aa) Connect the following electrical wiring to the engine components listed:

-Temperature sending unit electrical lead to the terminal end protruding adjacent to the water pump.

-Alternator leads including grounding jumper.

-Distributor leads.

(ab) Install fan on aft end of drive pulley using four bolts (fig. 15-1, item 9) to attach fan to pulley; torque bolts to 15 to 18 foot pounds.

(ac) Install engine outlet hose (fig. 15-1, item 2) on engine outlet fitting and secure with clamp.

(ad) Install left-hand and right-hand exhaust pipes (fig. 15-1, item 16) on the engine exhaust manifolds in accordance with the procedures contained in Group 12.

(ae) Route red waste destruct hose aft between cross beam and support bar, then clamp to forward left-hand corner of transmission base; attach hose end to the injector unit tube on the right exhaust pipe with clamp.

(af) Install heat shield on right-hand engine exhaust manifold-to-pipe flange, using out-board forward bolt/nut.

(ag) Remove plug from fuel supply line hose and connect to fuel pump inlet line (fig. 15-1, items 24 and 26); secure with clamp.

(ah) Install heater supply and return line hoses (as indicated by tape markings put on during removal) on tubes (fig. 15-1, item 7) protruding from top aft end of engine left-hand side.

(ai) Make sure that radiator drain cock is closed.

(aj) Install radiator guard, radiator, air deflector, four air deflector attaching brackets, and shroud in accordance with instructions contained in Group 13.

(ak) See figure 15-4. Connect transmission oil cooler lines to inlet and outlet fittings located on oil cooler on base of radiator.

(al) Connect lower coolant hose to radiator outlet fittings, and secure with clamp.

(am) Using two bolts, install power steering fluid reservoir (fig. 15-1, item 27) with bracket and hoses attached onto the shroud on the right-hand side of radiator.

(an) Remove the cap on upper inlet tube on the power steering pump, then attach power steering reservoir-to-pump "elephant" hose (fig. 15-1, item 41) and secure with clamp. Discard removed cap.

(ao) Position tubular link on left-hand side and the bracket on the right-hand side for connecting to aft grill in subsequent step.

(ap) Install grill aft of the radiator by using four attaching nuts, bolts, washers, and shims. Install shims at locations noted during removal.

(aq) Install rear bumper on the energy absorber brackets by lifting into position and sliding bumper forward to seat in brackets, then insert bolts and install nuts.

(ar) Service coolant system with 50 percent ethylene glycol and 50 percent water in accordance with Group 13.

(as) Service automatic transmission with "Dexron" type automatic fluid.

(at) Service oil and power steering systems; refer to paragraphs 15-5c and Group 7, respectively.

(au) Connect automotive and domestic batteries.

15-4. INSPECTION/CLEANING

a. General. This section contains information necessary for inspecting and cleaning the engine.

b. Inspection. A preliminary inspection of the engine should be made before troubleshooting and before initial cleaning to facilitate the location of obvious defects such as vacuum and fluid leaks:

(1) Visually inspect engine and component parts for damage, misalignment and distortion, looseness of attaching parts, and evidence of chafing and abrasion of metal parts and/or flexible hoses.

(2) Inspect for excessive heat damage and vacuum leaks. Check for loose connections of vacuum lines and blown gaskets at exhaust pipe connections.

(3) Analyze damage areas, and try to determine the cause of damage or defect.

(4) Inspect power steering pump for evidence of leaks, loose connections, or damaged lines.

(5) Inspect power steering reservoir for leaks.

(6) Inspect fuel system for leaks, loose connections, or damaged fuel lines.

(7) Inspect fuel filter for evidence of contamination.

(8) Inspect electrical harnesses for damage, chafed areas, loose wires, and oil soakage.

(9) Check exhaust muffler for damage, corrosion, and defective mounts.

(10) Check V-belt drives for deterioration and proper tension.

(11) Check heat shield on right-hand side of engine for security of mounting.

c. Cleaning. Thorough cleaning of the engine exterior is an essential prelude to any close inspection, in order that the existence and extent of material defects can be determined. It is recommended that the engine be cleaned periodically to remove mud and dirt accumulations which could cause rust and impair normal cooling. Conventional drive-in, do-it-yourself, high pressure spray type washing will normally provide sufficient cleaning. Care must be taken to temp-

orarily cover the distributor and the carburetor air cleaner air inlets during spraying. Direct the spray from under the coach engine and transmission up into hard-to-see spots. Do not spray the firewall or areas other than the engine. Spraying with a soap solution should be followed by a water rinse to remove all traces of the solution. Following washing, apply belt dressing to the V-belt drives after they dry, and remove covers from carburetor air inlets and distributor.

15-5. GENERAL INFORMATION

a. General. This section contains general information related to data contained in the previous paragraphs.

b. Torque Requirements. Torque requirements for the engine are specified in table 15-4.

Table 15-4. Torque Requirements

Part secured	Attaching part(s)	Torque (foot-pounds)
Cylinder head	Bolt	70
Exhaust manifold	Nut	30
Exhaust pipe flange	Nut	39 to 43
Fan	Bolt	15 to 18
Fan belt-idler arm lock bolt	Bolt	45
Intake manifold	Bolt	40
Oil pan drain	Plug	20
Start mount	Bolt	50
Water pump housing to block	Bolt	30
Aft mount insulator attachment to frame	Bolt	45 to 65
Propeller shaft U-joint spiders to yoke	Bolt	25 to 30
Spark plug	Plug	10
Carburetor to manifold	Nut	17
Torque converter housing	Bolt	30
Exhaust manifold	Nut	30
Exhaust pipe flange	Nut	39 to 43

Table 15-4. Torque Requirements (Continued)

Part secured	Attaching part(s)	Torque (foot-pounds)
Exhaust pipe clamp	Bolt	20
Exhaust pipe support clamp	Bolt	20
Fan attaching	Bolt	15 to 18
Fuel pump attaching	Bolt	30
Alternator mounting	Bolt	30
Oil pan	Screw	17
Oil pump cover	Bolt	10
Oil pump attaching	Bolt	10
Starter mounting	Bolt	50
Water pump housing to cylinder block	Bolt	30

c. Oil System Servicing. Following installation of a new or overhauled engine, initially fill with oil of the quality and viscosity specified. After a break-in period of approximately 25 hours of operation, drain the oil system, replace oil filter, and refill with specified oil.

NOTE

Between oil changes, check the oil level daily. The oil level dipstick (fig. 15-1, item 45) is of the bayonet type, with two markings, "FULL" and "ADD OIL". After the engine has started, this level will drop somewhat, due to the filling of oil passages and the oil filter. A quart of oil should be added when the level is at or slightly below the "ADD OIL" mark. Do not run the engine with the oil level below the "ADD OIL" mark.

Following the initial break-in oil change requirement, the oil must be changed every 2 months or every 4000 miles, whichever occurs first, and the oil filter must be replaced every second oil change or every 8000 miles.

(1) Oil Quality and Viscosity Requirements.
The type of service for which an engine oil is intended is designated by the letters on the container. These are service classifications established by the API (American Petroleum Institute). This system does not replace the SAE (Society of Automotive Engineers) grade number of the oil, which indicates the viscosity or consistency of the oil recommended. References to API engine oil classification designating engine oil quality levels, as defined by both the old and new API engine oil classification system will be common during conversion to the new designations for some time to come. For example, reference to "MS" (old designation) and "SE", or "CC" (new designations), may both appear on many engine oil containers. Only oils of "SE", or "CC" quality levels in the new system (with or without additional reference to designations in the old system) or oils with the old classification "For Service MS", should be used in the coach engine. Use only oils bearing the aforementioned API classification designations with a viscosity rating suitable to temperature conditions as follows:

- Above +32 degrees F use SAE 40.
- Below +32 degrees F down to +10 degrees F, use SAE 10w-40.

• Below +10 degrees F to as low as -10 degrees F use: SAE 10w-30, SAE 10w-50, SAE 10w, SAE 5w-20, or SAE 5w-30.

• Below -10 degrees F use: SAE 5w-20 or 5w-30.

(2) Oil Filter. The coach engine oil system uses a spin-on type MOPAR oil filter element Part Number L-72 (Chrysler Part Number 18516-58). Before installing a new filter, inspect gasket contacting surfaces, and, if satisfactory, lubricate with clean engine oil. Install filter by hand tightening until gasket contacts mounting base, then tighten at least one-half turn more.

(3) Draining. Drain the engine oil, when required, as follows:

(a) Start and warm up engine until oil becomes hot and solids are in suspension.

(b) Shut down engine and position suitable container under the drain plug, located on the aft lower center area of the oil pan.

(c) Remove drain plug and allow oil to drain into container.

(d) When draining is complete, reinstall and tighten drain plug in base of oil pan; torque plug to 20 foot-pounds.

NOTE

Refer to paragraph 15-5c and determine if oil filter requires replacement; if so, accomplish in accordance with paragraph 15-5c(2).

(4) Filling. Fill the oil system, when required, as follows:

(a) With the oil system drained in accordance with preceding instructions, open aft center engine compartment access door.

(b) Remove oil filler cap (fig. 15-1, item 13) from top of the left-hand rocker arm cover.

(c) Using pouring spout, fill system with 7 quarts of oil specified in paragraph 15-5c(1).

NOTE

Open right-hand engine compartment access door and make sure that oil level on dipstick is at FULL mark. If filter is not being changed, only 6 quarts of oil are required to fill the system.

(d) Reinstall cap and operate engine until warm, and check for evidence of oil leakage; shut-off engine and close access doors.

d. Engine Storage. If coach is used seasonally and not driven extensively throughout the year, the engine requires protective measures to insure against damage and deterioration. In addition to the engine, other systems of the coach also must be prepared for storage as specified in Group 0. The engine is subject to the formation of rust on the operating parts which will, in the course of time, lead to excessive piston ring wear, sticking valves and rocker arms, and abnormal wear on valve guides and other moving parts.

(1) Storage for Less Than Thirty Days. In cases where the coach will be inoperative or in storage for less than thirty days or will be driven infrequently during this period, the following steps are recommended:

(a) Add one quart of special rust preventive oil to each five gallons of gasoline in the fuel tank.

(b) Run the engine on this mixture for five minutes at an engine speed of 1000 rpm.

No additional treatment will be necessary when the vehicle is returned to storage after having been driven for short distances.

(2) Storage for More Than Thirty Days and Less Than Ninety Days. The following steps are recommended if the coach is to be stored for more than thirty days (but not over ninety days) and the engine will not be operated during the storage period.

(a) Add one quart of special rust preventive oil to each five gallons of gasoline in the fuel tank.

(b) Run the engine on this mixture for at least five minutes at an engine speed of 1000 rpm.

(c) Remove fuel supply line at the fuel pump inlet, and plug; refer to Group 11. Operate engine until carburetor runs dry. The purpose of this step is to prevent the carburetor from becoming contaminated with the gums normally forming in gasoline after protracted exposure to oxygen in the air. Failure to observe this precaution usually causes flat spots and other carburetor malfunctions.

(d) Remove spark plugs, and pour two ounces of special rust preventive oil into each cylinder through spark plug opening. Crank engine through several revolutions with starter to distribute rust preventive oil on cylinder walls. Replace spark plugs and tighten to 10 foot-pounds.

(e) Remove rocker arm covers, and coat rocker arms, rocker arm shafts, valve springs, push rods, and valve stems with special rust preventive oil. Use a brush or a clean point spray gun with DRY air.

(f) Check cooling system for evidence of leaks.

NOTE

If cooling system has been serviced with prescribed coolant (50 percent ethylene glycol and 50 percent water) within the past 9 months, it will be protected for 90 days. The coolant protects for 12 consecutive months. Reservice, if required; refer to Group 13.

(3) Storage for Over Ninety Days. Storage of the coach for periods in excess of ninety days requires performance of the following procedures in order to prevent rust accumulation, corrosion of bearing and mating surfaces within the engine, and gum formation in the fuel system:

NOTE

An alternate method of protecting the engine against deterioration, in lieu of accomplishing the following procedures, would be to drive the coach at normal speeds for about an hour at least once every 30 days.

(a) Add one quart of special rust preventive oil to each five gallons of gasoline in the fuel tank, then operate engine on this mixture for 5 minutes. Shut down engine, and remove and plug fuel supply line at fuel pump inlet; refer to Group 11. Operate engine until carburetor runs dry.

(b) Refer to paragraph 15-5C(3); drain the lubricating oil from the engine, and add 2-1/2 quarts of rust preventive oil, which may be obtained from a reliable oil company.

(c) The coolant prescribed for the coach retains its corrosion inhibiting capability for about a 12 month period. Compare the time the coach will be stored with the date coolant system was last serviced. If the storage period exceeds the 12 month expiration date of the coolant's ability to protect, reservice coolant system; refer to Group 13 or re-inhibit coolant with a non-chromate inhibitor system NACCOOL 2000 (or equivalent).

NOTE

In warm climates, an alternate method of inhibiting rust in the coolant system during storage is to drain the system and add MOPAR RUST RESISTOR, then fill with clean water. However, when coach is returned to operational status, it must be serviced with coolant as specified in Group 13.

(d) Remove the spark plugs and pour two ounces of rust preventive oil into each spark plug opening. Turn the engine four or five revolutions with the starting motor to distribute the rust preventive oil on the cylinder walls, and install the plugs.

(e) Remove the cylinder head covers, and using a clean paint brush, coat the rocker arms, the rocker arm shafts, the valve springs, the push rods, and the valve stems with special rust preventive oil; replace covers.

(f) Remove the carburetor air cleaner, the PVC air cleaner, and the PCV ventilator valve. Seal the openings with masking or adhesive tape. Also, seal the exhaust outlet opening in the exhaust pipe (spout); replace cleaners and valve.

(g) Secure caps and plugs on A/C compressor.

(h) Lubricate water pump (NLG 1 Grade 2); refer to Group 13.

(i) Service power steering reservoir; refer to Group 7.

(j) Ensure that oil dipstick is fully inserted in tube.

(k) Seal off PCV air cleaner lines in rocker-arm cover.

(l) Seal off opposite side PCV valve lines.

(m) Plug vacuum outlet port on engine.

(n) Seal off all vacuum lines on carburetor.

(o) Service transmission with "DEXRON" type fluid, if required.

(p) Ensure that dipstick for transmission is fully inserted in tube.

(q) Seal differential breather.

(r) Remove the storage battery and store in a cool, dry place. Replenish the water in the battery cells to cover the plates 3/8 inch. See that the battery is fully charged and keep in fully charged state during the idle period.

(s) Make check list of all storage work done and retain for use when engine is to be put in service.

(t) Make periodic inspections to see that the engine is properly stored and that all seals are intact.

NOTE

To return engine to service, use check-list of items accomplished to put into storage, remove cover and plugs, and reservice all affected systems. The rust preventive oil should be drained prior to putting the engine back into operation. The engine crankcase should then be filled with oil, in accordance with paragraph 15-5c(4).



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Recreational Vehicle Division
133 Brockway Road, Box 664, Santa Clara, California 95052

URGENT

ROUTINE

MANDATORY

INFORMATIONAL

Service Bulletin

DATE 5 April 1974

NUMBER 2915 40001

<p>ATTENTION: SERVICE MANAGERS AND OWNERS</p>	<p>GROUP 15</p>
<p><u>DESCRIPTION</u></p> <p>The engine oil fill through the inboard valve cover on the 2900R Motor Home has been determined to be inconvenient for servicing the engine. To make adding oil to the engine an easier task the engine oil fill has been relocated on the outboard valve cover (same side as Freon compressor) starting with production coach 00532. This allows engine oil to be added and the oil level dipstick to be checked from the same side of the coach through the engine service door (Owner's Manual, Figure 4-2). An oil drip pan has been added just below the engine oil fill cap to prevent any spilled oil from dripping onto a hot exhaust manifold. This bulletin provides instructions for making the change, if desired.</p> <p><u>CONVERSION PROCEDURE</u></p> <p>To change existing coaches; disconnect vacuum hoses at ventilation valve and crankcase inlet air cleaner, remove both engine valve covers and simply switch each cover to the opposite side of the engine. At the same time, turn each cover 180 degrees (end to end) so that the crankcase ventilation valve and crankcase inlet air cleaner are both toward the rear of the coach. Proper switching will result in the crankcase ventilation valve at the inboard position and the crankcase inlet air cleaner at the outboard position with both toward the rear of the coach. The engine oil fill cap will then be at the outboard position toward the front of the coach. Add manifold oil drip pan (RVD 5106274) under the oil fill cap so that any spilled oil will be drained overboard away from the exhaust manifold.</p>	<p>SUBJECT</p> <p>ENGINE OIL CAP FILL</p>
<p><u>CAUTION</u></p> <p>Perform drilling of valve cover with cover removed from engine to prevent metal chips from entering engine.</p>	<p>MODEL (S) AFFECTED</p> <p>2900R</p> <p>SERIAL NUMBERS 00001 TO 00531</p>
	<p>(Factory Use Only) Information added to:</p> <p>OWNER MANUAL (S)</p> <p>SERVICE MANUAL (S)</p> <p>PARTS MANUAL (S)</p> <p>WARRANTY MANUAL (S)</p> <p>OTHER</p>



URGENT ROUTINE
 MANDATORY INFORMATIONAL

Service Bulletin

DATE 5 April 1974

NUMBER 2915 40001

ATTENTION: SERVICE MANAGERS AND OWNERS		GROUP 15
<p>Drill two holes 0.147 diameter in both the valve cover and oil drip pan. Attach pan (RVD 5106274) to valve cover with two self-tapping screws (RVD M14017). Make certain valve covers are clean, inspect cover gaskets for brittleness and use new gaskets if required.</p> <p>On coaches with serial numbers 00001 to 00516 reconnect vacuum hoses between carburetor and crankcase ventilation valve, between carburetor and crankcase ventilation air cleaner, and between large air cleaner and crankcase ventilation air cleaner.</p> <p>On coaches with serial numbers 00517 to 00531 reconnect vacuum hoses between carburetor and charcoal canister, and between ventilation valve and tee to charcoal canisters (see Figure 4-22.1 in Owner's Manual).</p> <p style="text-align: center;">NOTE</p> <p>Use an additional length of vacuum hose, approximately 3 feet, to reconnect air cleaner or ventilation valve after switching covers.</p>		SUBJECT ENGINE OIL FILL CAP
		MODEL (S) AFFECTED 2900R SERIAL NUMBERS 00001 TO 00531
<u>PARTS REQUIRED</u>		(Factory Use Only) Information added to:
<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
5106274	PAN, Oil drip	1
M14017	SCREW, Self-tapping	2 (#10 x 1/2)
M20015	HOSE, Vacuum	3 feet (3/8 ID)
FMC/RVD will supply the above parts upon request.		
<u>OWNERS</u>		OWNER MANUAL (S)
<p>If a FMC oil spill drip pan is desired, make a request for it through your dealer. Allow ample time for delivery since the parts will be supplied to dealers only upon request by you. The oil drip pan is not normally carried in dealers' inventory.</p>		SERVICE MANUAL (S)
<u>DEALERS</u>		PARTS MANUAL (S)
<p>Orders for the above parts should be placed with FMC/RVD Service Department via the standard parts ordering procedure now in effect. They will be supplied to you at no cost.</p> <p style="text-align: right;"><i>John L. Strevver</i> JOHN L. STREVER Service Manager</p>		WARRANTY MANUAL (S)
		OTHER

Technical Service Bulletin

U.S. Automotive
Service & Parts Sales
Division



Of Interest General Manager Sales Manager Service Manager Parts Manager Service Technicians

Effective January, 1975, all 440 engines will be assembled with CAST crankshafts. Cast crankshaft engines can be identified by a stamped letter "E" on the information pad on the upper left front of the cylinder block. In addition, engines with CAST crankshafts have external balance weights at the front damper and the torque converter and a clock face appears on the No. 1 counterweight of the cast crankshaft. (See identification sketches on page 3).

When ordering a replacement short engine, crankshaft, damper, torque converter or connecting rods, identification of the parts usage must be confirmed for a cast crankshaft or a forged crankshaft. INTERMIXING OF THESE COMPONENTS WILL RESULT IN SEVERE ENGINE VIBRATION.

The following part numbers cover both forged and cast crankshaft engine parts that are different:

<u>Part Name</u>	<u>Part Number</u>
Crankshaft (forged)	3751899
Crankshaft (cast)	4006426
Damper w/forged crank	3614371
Damper w/cast crank	3830432
Torque Converter w/forged crank	
440-1 engine	2543586
440-3 engine	3893499
Torque Converter w/cast crank	
440-1 engine	3515282
440-3 engine	3894562
Connecting Rod w/forged crank	2951906
Connecting Rod w/cast crank	4027096

(over)

Models

All 1975
Passenger Cars
and Trucks
Equipped With
440, 440-3,
and 440 HP
Engines

Subject

Crankshaft
Change

Index

ENGINE

Date:

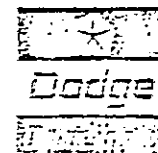
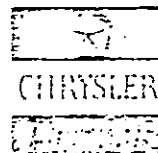
May 27, 1975

No.

09-05-75

P-1993-C

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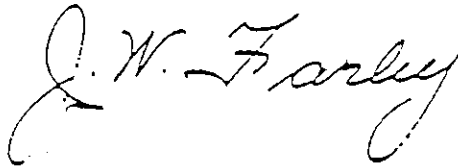
Part Name

Part Number

NOTE: The connecting rod, P/N 4027096, used with cast crank employs new bolts with a 5/8 inch head; rods with forged crank use bolts with a 9/16 inch head.

Connecting Rod Bolt w/forged crank	1737694
Connecting Rod Bolt w/cast crank	3830615

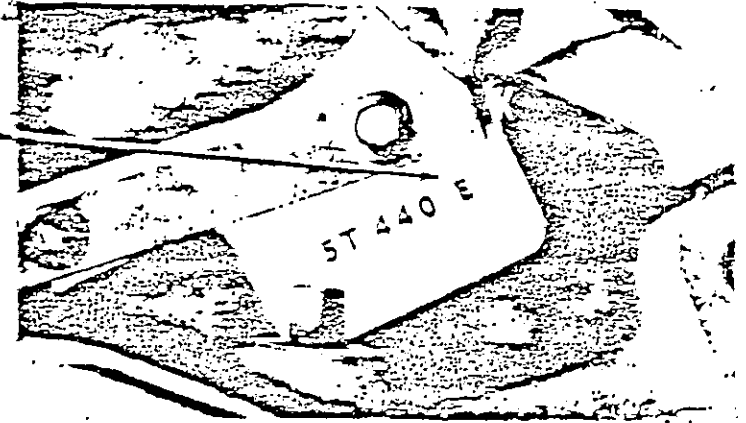
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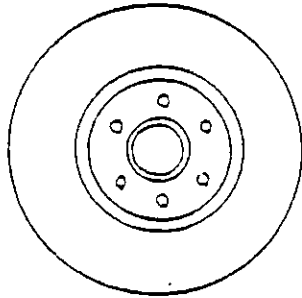
J. W. Farley
Manager - Technical Service
U.S. Automotive Service & Parts Sales

ATTACHMENT

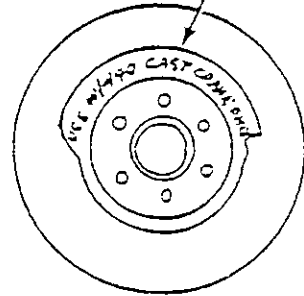
ENGINES BUILT WITH CAST CRANKS
HAVE A LETTER "E" ON THE
INFORMATION PAD (UPPER LEFT
FRONT OF CYLINDER BLOCK)



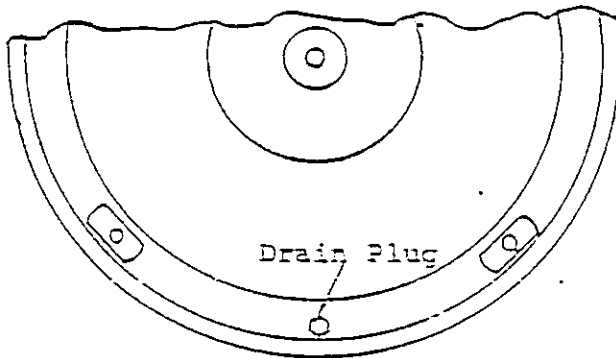
DAMPER HAS WORDING
"USE W/440 CAST CRANK ONLY"



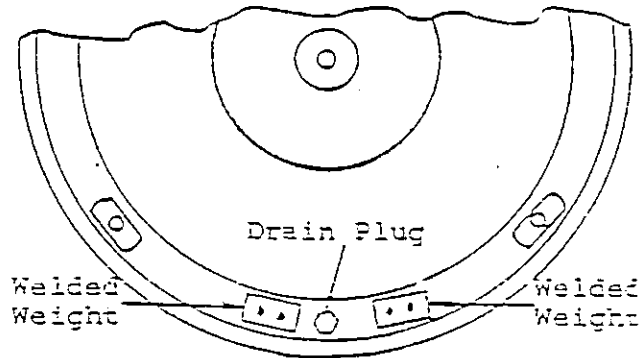
FORGED CRANKSHAFT DAMPER



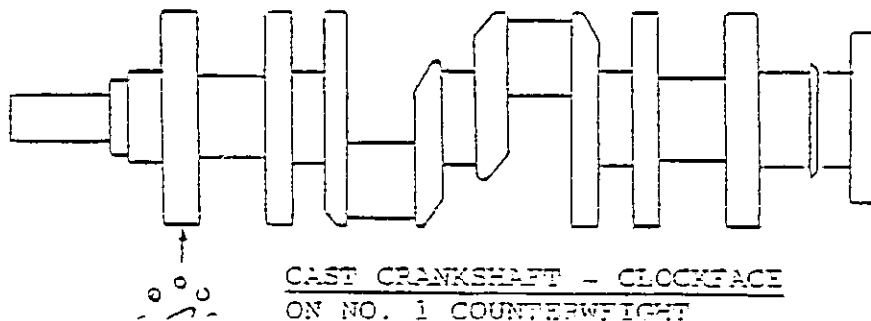
CAST CRANKSHAFT DAMPER



FORGED CRANKSHAFT TORQUE CONVERTER



CAST CRANKSHAFT TORQUE CONVERTER



CAST CRANKSHAFT - CLOCKFACE
ON NO. 1 COUNTERWEIGHT



URGENT

ROUTINE

MANDATORY

INFORMATIONAL

Service Bulletin

DATE March 12, 1976

NUMBER 2915-40002

<p>ATTENTION: SERVICE MANAGER</p>	<p>GROUP</p>
<p><u>DESCRIPTION</u></p>	<p>15</p>
<p>This bulletin provides instructions for identification of Chrysler 440 gasoline engines with a cast crankshaft and associated balance information.</p> <p><u>EFFECTIVITY</u></p> <p>Engines with cast crankshaft were first installed in transit coaches starting with coach #00957 and up. When replacing a Chrysler engine in a coach below serial #00957 a cast crankshaft engine will be supplied from service stores.</p> <p><u>IDENTIFICATION</u></p> <p>Effective with engine serial number E273014 and up, a cast crankshaft was used in all 440 engines. All of these engines have a vibration dampner with the words "use with cast crankshaft" stamped into the part. To further identify these engines the engine serial number and parts replacement information is stamped on the top of the block adjacent to the water pump housing. (See Figure 1.) A stamping of "J440T" indicates an engine with a forged crankshaft; a stamping of "5T440E" indicates an engine with a cast crankshaft. It may be necessary to rub off the engine paint to read the stamping.</p> <p><u>SERVICING INSTRUCTIONS</u></p> <p>When installing a replacement engine it is ESSENTIAL that the proper Vibration Dampner and Torque Converter Drive Plate Adapter (Figure 2) be used or severe vibration problems will result. If replacement engine has a "forged" crankshaft the following parts MUST be used:</p> <p>Vibration Dampner Chrysler #3614371 (MCD 5100011-R389)</p> <p>Converter Drive Plate Adapter Chrysler #3733114 (MCD 5106335-R002)</p> <p>If replacement engine has a "cast" crankshaft the following parts MUST be used:</p> <p>Vibration Dampner Chrysler #3830482 (MCD 5108543-R001)</p> <p>Converter Drive Plate Adapter Chrysler #3619449 (MCD 5108762)</p>	<p>SUBJECT</p> <p>CHRYSLER ENGINE WITH CAST CRANK-SHAFT</p> <p>SERVICE DATA</p>
	<p>MODEL (S) AFFECTED</p> <p>ALL TRANSIT COACHES WITH CHRYSLER 440 ENGINES</p> <p>00530 & UP</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">AS COLLECTED IN THIS BULLETIN</p>



URGENT

ROUTINE

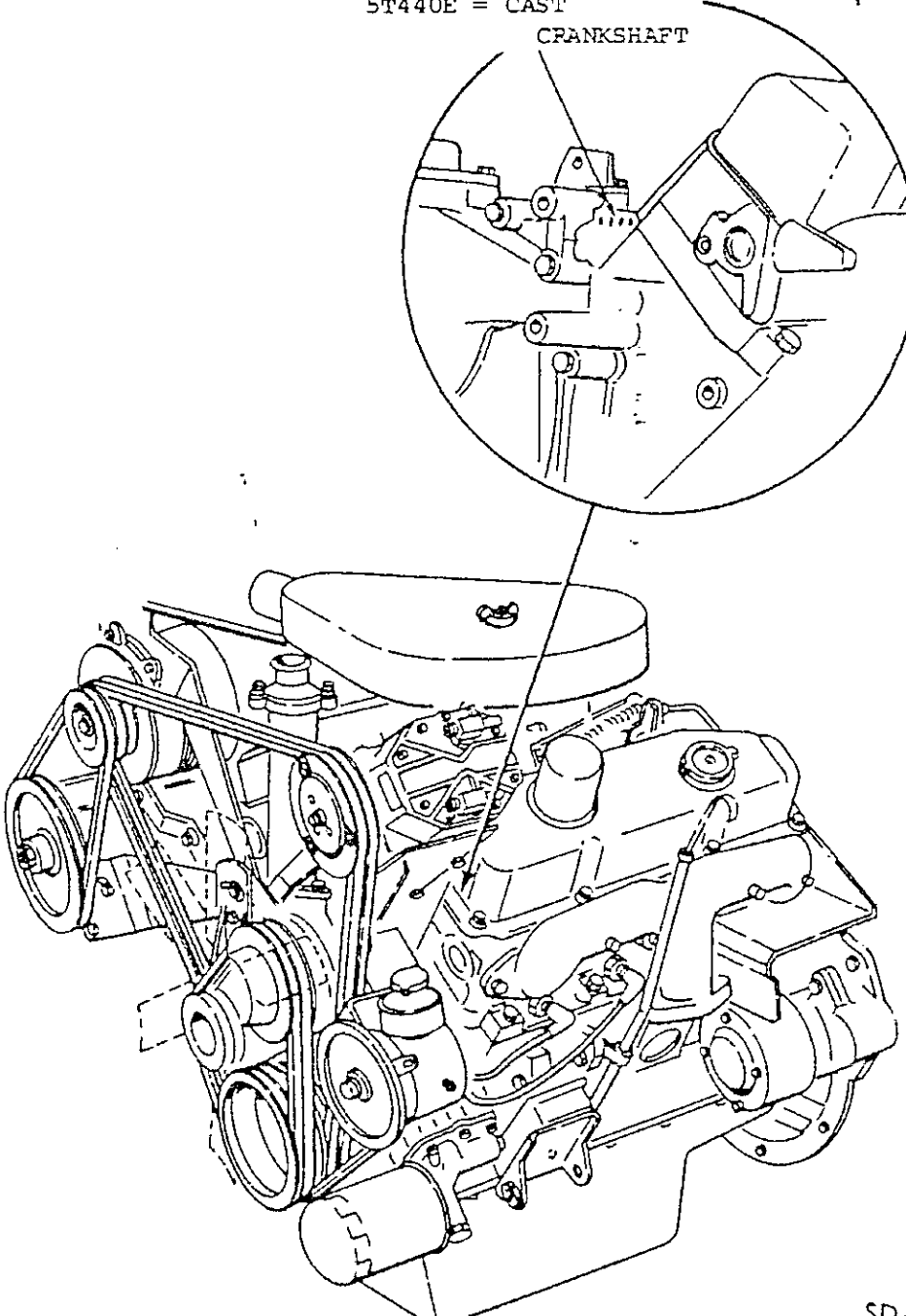
MANDATORY

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Service Bulletin

DATE MARCH 12, 1976

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ATTENTION: SERVICE MANAGER	GROUP 15
<p style="text-align: center;">STAMPING 'J440T = FORGED CRANKSHAFT 5T440E = CAST CRANKSHAFT</p>  <p style="text-align: right;">SD-924</p> <p style="text-align: center;">Figure 1. Engine Identification</p>	<p>SUBJECT CHRYSLER ENGINE W/CAST CRANKSHAFT SERVICE DATA</p> <p>MODEL (S) AFFECTED</p> <p>ALL TRANSIT COACHES WITH CHRYSLER 440 ENGINES 00530 AND UP</p>

Service Bulletin

DATE MARCH 12, 1976

NUMBER 2915-40002

<p>ATTENTION: SERVICE MANAGER</p>	<p>GROUP</p>
	<p>15</p> <p>SUBJECT CHRYSLER ENGINE W/CAST CRANKSHAFT SERVICE DATA</p>
<p>Figure 2. Transmission to Engine Adapter</p>	<p>MODEL (S) AFFECTED</p> <p>ALL TRANSIT COACHES WITH CHRYSLER 440 ENGINES 00530 AND UP</p>