ENGINE & DRIVING GEAR

Your REVCON vehicle is certified by the United States Environmental Protection Agency as conforming to the requirements of the regulations for the control of air pollution from new motor vehicles. This certification is contingent on certain adjustments being set to factory standards. In most cases, these adjustment points either have been permanently sealed and/or made inaccessible to prevent indiscriminate or routine adjustment in the field. For this reason, the factory procedure for temporarily removing plugs, caps, etc., for purposes of servicing the product must be strictly followed and, wherever practicable, returned to the original intent of the design.

ENGINE GENERAL INFORMATION

THE FOLLOWING INFORMATION ON ENGINE SERVICE SHOULD BE NOTED CAREFULLY, AS IT IS IMPORTANT IN PREVENTING DAMAGE, AND IN CONTRIBUTING TO RELIABLE ENGINE PERFORMANCE.

When raising or supporting the engine for any reason, do not use a jack under the oil pan. Due to the small clearance between the oil pan and the oil pump screen, jacking against the oil pan may cause it to be bent against the pump screen resulting in a damaged oil pick-up unit.

It should be kept in mind, while working on the engine, that the 12-volt electrical system is capable of violent and damaging short circuits. When performing any work where electrical terminals could possibly be grounded, the ground cable of the battery should be disconnected at the battery.

Any time the carburetor or air cleaner is removed, the intake opening should be covered. This will protect against accidental entrance of foreign material which could follow the intake passage into the cylinder and cause extensive damage when the engine is started.

IN THE MECHANICAL PROCEDURES DESCRIBED IN THIS SECTION, GENERALLY NO REFERENCES WILL BE MADE TO THE REMOVAL OF OPTIONAL EQUIPMENT SUCH AS POWER STEERING PUMP, AIR CONDITIONING COMPRESSOR, ETC.

SHOULD IT BECOME NECESSARY TO REMOVE ANY SUCH ITEM TO PERFORM OTHER SERVICE, REFER TO THE APPROPRIATE SECTION OF THIS SERVICE MANUAL FOR SPECIFIC INFORMATION.

ENGINE DIAGNOSIS INTRODUCTION

Engine Performance Diagnosis procedures are guides that will lead to the most probable causes of engine performance complaints. They consider all of the components of the fuel, ignition, and mechanical systems that could cause a particular complaint, and then outline repairs in a logical sequence.

The procedures are based on Symptoms that are listed in the Table of Contents.

Each Symptom is defined, and it is vital that the correct one be selected based on the complaints reported or found.

Review the Symptoms and their definition to be sure that only the correct terms are used.

The words used may not be what you are used to in all cases, but because these terms have been used interchangeably for so long, it was necessary to decide on the most common usage and then define them. If the definition is not understood, and the exact Symptom is not used, the Diagnostic procedure will not work.

It is important to keep two facts in mind:

1. The procedures are written to diagnose problems on vehicles that have "run well at one time" and that time and wear have created the condition.

2. All possible causes cannot be covered, particularly with regard to emission controls. If doing the work prescribed does not correct the complaint, then either the wrong Symptom was used or a more detailed analysis will have to be made.

All of the Symptoms can be caused by worn out or defective parts. If time and/or mileage indicate that parts should be replaced, it is recommended that it be done.

ENGINE DIAGNOSIS

SYMPTOM	DEFINITION
A. Dieseling	Engine continues to run after the switch is turned off. It runs unevenly and makes knocking noises.
B. Detonation	A mild to severe ping, usually worse under acceleration. The engine makes sharp metallic knocks that change with throttle opening. Sounds like pop corn popping.
C & D. -- Stalls, Cold or Hot	The engine quits running. It may be at idle or while driving.
C & D. -- Rough Idle, Cold or Hot	The engine runs unevenly at idle. If bad enough, it may make the vehicle shake.
E. Miss	Steady pulsation or jerking that follows engine speed, usually more pronounced as engine load increases. Not normally felt above 1500 rpm or 30 mph. The exhaust has a steady spitting sound at idle or low speed.
F. Hesitates	Momentary lack of response as the accelerator is depressed. Can occur at all vehicle speeds. Usually most severe when first trying to make the car move, as from a stop sign. May cause the engine to stall if severe enough.
G. Surges	Engine power variation under steady throttle or cruise. Feels like the vehicle speeds up and slows down with no change in the accelerator pedal.

SYMPTOM	DEFINITION
H. Sluggish	Engine delivers limited power under load or at high speed. Won't accelerate as fast as normal; loses too much speed going up hills, or has less top speed than normal.
I. Spongy	Less than the anticipated response to increased throttle opening. Little or no increase in speed when the accelerator pedal is pushed down a little to increase cruising speed. Continuing to push the pedal down will finally give an increase in speed.
J. Poor Gas Mileage	Self describing.
K. Cuts Out	The engine exhibits a significant or total temporary loss of power at sharp, irregular intervals. This may occur repeatedly or intermittently and is usually worse under heavy acceleration.
L. Hard Start /Cold	Self describing.
M. Hard Start /Hot	Self describing.

ENGINE PERFORMANCE DIAGNOSIS

SYMPTOM	CORRECTION PROCEDURE
A. Dieseling	1. Make visual checks of the following for sticking: a. Carburetor, choke, and throttle linkage. b. Fast idle cam (See cleaning, inspection of carburetor.) 2. Check and reset ignition timing and idle speed settings. Refer to emission control information label. 3. Remove carbon with top engine cleaner. Follow instructions on can. If condition still exists, suggest that owner try different gasoline.
B. Detonation	1. Check for obvious overheating problems. a. Low coolant. b. Loose fan belt. c. Restricted air flow, etc. 2. Check ignition timing per emission control information label. 3. Remove carbon with top engine cleaner. Follow instructions on can. If condition still exists, suggest that owner try different gasoline.
C. Stalls or Rough Idle – Cold	1. With engine running, remove air cleaner cover and filter. Damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold wet rag over sensor to close it if engine is too warm. If damper door does not close, apply vacuum directly to vacuum motor. If door closes, replace sensor. If door stays open, replace vacuum motor. 2. Visually check the following. a. Hot air tube to air cleaner connection and condition of hot air stove. b. Vacuum hoses for splits, kinks, and proper connections. See Hose Routing Schematic on Vehicle Emission Control Information Label. c. Air leaks at carburetor mounting and intake manifold. d. Ignition wires for cracking, hardness, and proper connections. Repair or replace as necessary. 3. Check the following for sticking: a. Carburetor, choke, and throttle linkage. b. Fast idle cam. c. Carburetor flooding. 4. With engine running, visually check vacuum break linkage for movement while removing and reinstalling vacuum hose. If the linkage does not move and vacuum is at hose, replace vacuum break assembly. 5. With engine off, check all choke adjustments. 6. Check engine timing and idle speed. See Emission Control Information Label. 7. Check E.F.E. valve. Disconnect E.F.E. hose from tube and connect an extra vacuum hose from any manifold vacuum source to E.F.E. tube. Observe actuator linkage for movement. If no movement, repair as necessary.
D. Stalls or Rough Idle – Hot	1. With engine running, remove air cleaner cover and filter. Damper door in air cleaner snorkel should be open. If closed and engine is hot, check temperature operation of sensor unit. 2. Visually check the following: a. Vacuum hoses for splits, kinks, and proper connections. See hose routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wire for cracking, hardness, and proper connections. Repair or replace as necessary. d. Check idle solenoid. Replace as necessary. 3. Check engine timing and idle speed. See Emission Control Information. 4. Check P.C.V. valve for proper operation by placing finger over inlet hole in valve end several times. Valve should snap back. If not, replace valve. 5. Remove carbon with top engine cleaner. Follow instructions on can. If idle is still rough, run a cylinder compression check.

SYMPTOM	CORRECTION PROCEDURE
E. Miss	1. Visually check the following: a. Vacuum hoses for splits, kinks, and proper connections. See Hose Routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness and proper connections. Repair or replace as necessary. 2. Disconnect air cleaner. 3. Remove one spark plug wire at a time with insulated pliers. If there is an rpm drop on all cylinders, go to rough idle (hot) diagnosis charts. 4. If there is no rpm drop on one or more cylinders, remove spark plug(s) and check for: a. Cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 5. Check spark plug wires by connecting ohmmeter to end of each wire in question. If meter reads over 50,000 ohms, replace wire(s). 6. Visually check distributor cap and rotor for moisture, dust, cracks, burns, etc. Clean and/or repair as necessary. 7. Perform compression check on questionable cylinder(s). If compression is low, repair as necessary. 8. Remove rocker covers. Check for bent push rods, worn rocker arms, broken valve springs, worn cam shaft lobes. Repair as necessary.
F. Hesitates	1. Visually check the following: a. Vacuum hoses for splits, kinks, and proper connections. See Hose Routing Schematic on the Vehicle Emission Information Label. b. Air leaks at carburetor mounting intake manifold. c. Check ignition wires for cracking, hardness, and proper connections. Repair as necessary. 2. Note: Cold Engine Only. Check the following for sticking or faulty operation: a. Carburetor, choke, and throttle linkage. b. Fast idle cam. See cleaning, inspection, and adjustment of carburetor. 3. Check carburetor accelerator pump operation. With air cleaner removed and engine off, hold choke valve open and look for gas squirt in carburetor bore while moving throttle. 4. If weak or no pump squirt, remove carburetor air horn and repair pump system as necessary. Check float level adjustment before replacing air horn and pump rod adjustment after assembly.

SYMPTOM	CORRECTION PROCEDURE
	5. Disconnect and plug vacuum advance hose; connect tachometer and timing light. Check ignition timing and idle speed against specs on emission label. 6. With engine running, remove air cleaner cover and filter. Damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold wet rag over sensor to close if engine is too warm. If damper door does not close, apply vacuum directly to vacuum motor. If door closes, replace sensor. If door stays open, replace vacuum motor.
G. Surges	1. With engine running, remove air cleaner cover and filter. Damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold wet rag over sensor to close if engine is too warm. 2. Visually check the following: a. Vacuum hoses for splits, kinks, and proper connections. See Hose Routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness, and proper connections. Repair or replace as necessary. 3. Check ignition timing per Emission Control Label. To check mechanical advance, observe timing marks. It should advance as throttle is opened and return to mark as throttle is closed. 4. With engine off, remove vacuum hose from distributor vacuum advance. Connect vacuum pump and apply 15" vacuum. Vacuum should hold steady for 15 seconds. If vacuum drops, replace vacuum advance unit. 5. Check carburetor fuel inlet filter. Replace if dirty or plugged. 6. Test fuel pump by connecting hose from carburetor fuel feed line to a suitable container. Start engine and let idle for 15 seconds. a. Mechanical pump should supply 1/2 pint or more. If not, go to step 7. If OK, go to step 9. 7. To check mechanical fuel pump, connect a vacuum gauge. Crank or run engine until maximum vacuum is reached. If less than 12 inches, replace pump. If vacuum reading is 12 inches or more, go to step 8.

SYMPTOM	CORRECTION PROCEDURE
	8. Check fuel lines and hoses for splits, leaks, or kinks by disconnecting each section of line and connect vacuum gauge. Crank or run engine until vacuum gauge peaks. Vacuum should be at least 12 inches. If less, repair or replace defective line or hose. 9. If fuel lines and pump check OK, remove tank unit, replace strainer and clean fuel tank, if necessary. 10. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary.
H. Sluggish or Spongy	1. Remove air cleaner and check air filter for dirt or being plugged. Replace as necessary. 2. With engine running, damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold rag over sensor to close if engine is too warm. If damper door does not close, apply vacuum directly to vacuum motor. If door closes, replace sensor. If door stays open, replace vacuum motor. 3. Check ignition timing per Vehicle Emission Control Information Label. Check mechanical advance as throttle is opened and closed. 4. Remove air cleaner and check for full throttle valve opening in carburetor by depressing accelerator pedal to floor; also check for full choke valve opening and free the operating air valve (if equipped). Repair as necessary. See carburetor cleaning and inspection. 5. With engine off, remove vacuum hose from distributor vacuum advance. Connect vacuum pump and apply 15" vacuum. Vacuum should hold steady for 15 seconds. If vacuum drops, replace vacuum advance unit. 6. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 7. Remove carburetor air horn and check the following: a. Power piston for freeness b. Dirt in carburetor c. Float adjustment d. Metering rods e. Power valve(s) Refer to carburetor cleaning and inspection.

SYMPTOM	CORRECTION PROCEDURE
I. Poor Gasoline Mileage	1. With engine running, remove air cleaner cover and filter. Check filter for dirt or being plugged. Replace as necessary. Damper door in air cleaner snorkel should be closed when engine is cold. It may be necessary to place cold wet rag over sensor to close it if engine is too warm. If damper door does not close, apply vacuum directly to vacuum motor. If door closes, replace sensor. If door stays open, replace vacuum motor. 2. Visually check the following: a. Vacuum hoses for splits, kinks and proper connections. See hose routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness, and proper connections. Repair or replace as necessary. 3. Check ignition timing per Emission Control Information Label. To check mechanical advance, observe timing mark. It should advance as throttle is opened and return to mark as throttle is closed. 4. Check carburetor choke linkage and settings. Clean and repair as necessary. See carburetor choke adjustments, cleaning and inspection. 5. With engine off, remove vacuum hose from distributor vacuum advance. Connect vacuum pump and apply 15" vacuum. Vacuum should hold steady for 15 seconds. If vacuum drops, replace vacuum advance unit. 6. Remove spark plugs, check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 7. If in previous checks, adjustments have not been made that could improve mileage, remove carburetor air horn and check the following: a. Power piston for freeness b. Dirt in jets and metering passages c. Metering rods d. Power valve(s) e. Float adjustment See carburetor cleaning, inspection, and adjustments. 8. Suggest owner fill tank and recheck mileage.

SYMPTOM	CORRECTION PROCEDURE
J. Cuts Out	1. Check ignition wires, boots, cap and coil for: a. Damage b. Deterioration c. Loose connections d. Carbon tracking Clean, tighten and/or replace defective parts as necessary. 2. Check ignition system. Check distributor for: a. Worn shaft b. Bare or shorted wires Repair or replace defective parts as necessary. 3. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 4. Check carburetor fuel inlet filter. Replace if dirty or plugged. 5. Test fuel pump by connecting hose from carburetor fuel feed line to a suitable container. Start engine and let idle for 15 seconds. Fuel pump should supply 1/2 pint or more. If not, go to step 7. 6. To check mechanical fuel pump, disconnect inlet hose at pump and then connect a vacuum gauge. Crank or run engine until maximum vacuum is reached. If less than 12 inches, replace pump. If vacuum reading is 12 inches or more, go to step 8. 7. Check fuel lines and hoses for splits, leaks, or kinks by disconnecting each section of line and connecting a vacuum gauge. Crank or run engine until vacuum gage peaks. Vacuum should be at least 12 inches. If less, repair or replace defective line or hose as necessary. 8. If fuel pump and fuel lines check OK, remove tank unit, replace strainer and clean fuel tank, if necessary. If carburetor is suspected, remove the air horn and check the following: a. Power piston(s) or main fuel piston for freeness. b. Dirt in jets and metering passages. c. Metering rods. d. Power valve(s) or main fuel valve(s). e. Float adjustment. See Carburetor Cleaning Inspection and Adjustment.
K. Hard Start - Cold (Engine Cranks OK)	1. Visually check the following: a. Vacuum hoses for splits, kinks and proper connections. See hose routing charts. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness, proper connections, and carbon tracking. Repair or replace as necessary. d. Check choke and vacuum break operation and adjustment. 2. Check ignition timing per emission control information label. If timing is too early - speed up engine to see if timing mark moves. If not, check for stuck mechanical advance. Repair as necessary and recheck timing. 3. Check the following: a. Choke, throttle linkage and fast idle cam for sticking. b. Carburetor flooding. Clean and repair as necessary. If repairs are necessary, see carburetor, cleaning and inspection. 4. Check ignition system. Check distributor for: a. Worn shaft b. Bare and shorted wires c. Repair or replace as necessary. 5. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 6. Test the fuel pump by connecting hose from carburetor fuel feed line to a suitable container. Start engine and let idle for 15 seconds. Pump should supply 1/2 pint or more. If more than 1/2 pint, check filter in carburetor. Replace if necessary. If less than 1/2 pint, for mechanical pump, go to step 7. 7. Disconnect inlet hose at pump and connect a vacuum gauge. Crank or run engine until maximum vacuum is reached. If less than 12 inches, replace pump. If more than 12 inches, go to step 8. 8. Check fuel lines and hoses for splits, leaks, or kinks by disconnecting each section of line and connect vacuum gauge. Crank or run engine until vacuum gauge peaks. Vacuum should be at least 12 inches. If less, repair or replace defective line or hose. 9. If fuel lines and pump check OK, remove tank unit, replace strainer and clean fuel tank, if necessary.

SYMPTOM	CORRECTION PROCEDURE
L. Hard Start - Hot (Engine cranks OK)	1. Visually check the following: a. Vacuum hoses for splits, kinks and proper connections. See hose routing Schematic, Vehicle Emission Control Information Label. b. Air leaks at carburetor mounting and intake manifold. c. Ignition wires for cracking, hardness, proper connections, and carbon tracking. Repair or replace as necessary. 2. Check ignition timing per Emission Control Information Label. If timing is too early - speed up engine to see if timing mark moves. If not, check for stuck mechanical advance. Repair as necessary and recheck timing. 3. Check the following: a. Choke, throttle linkage and fast idle cam for sticking. b. Carburetor flooding. Clean and repair as necessary. If repairs are necessary, see carburetor cleaning and inspection. 4. Check ignition system. Check distributor for: a. Worn shaft b. Bare and shorted wires c. Faulty pick up coil, module, ignition coil, and shorted condenser. Repair or replace as necessary. 5. Remove spark plugs. Check for cracks, wear, improper gap, burned electrodes, heavy deposits. Repair or replace as necessary. 6. Also check steps 6, 7, 8, 9 - Hard Start - Cold.

ENGINE MECHANICAL DIAGNOSIS

The following diagnostic information covers common problems and possible causes. When the proper diagnosis is made, the problem should be corrected by adjustment, repair or part replacement as required. Refer to the appropriate section of the manual for these procedures.

CONDITION

Excessive Oil Loss

POSSIBLE CAUSE	CORRECTION
1. External oil leaks.	1. Tighten bolts and/or replace gaskets and seals as necessary.
2. Improper reading of dipstick.	2. Check oil with car on a level surface and allow adequate drain down time.
3. Improper oil viscosity.	3. Use recommended S.A.E. viscosity for prevailing temperatures.
4. Continuous high speed driving and/or severe usage such as trailer hauling.	4. Continuous high speed operation and/or severe usage will normally cause decreased oil mileage.
5 P.C.V. system malfunctioning.	5. Service as necessary.
6. Valve guides and/or valve stem seals worn, or seals omitted.	6. Ream guides and install oversize service valves and/or new valve stem seals.
7. Piston rings not seated, broken or worn.	7. a. Allow adequate time for rings to seat. b. Replace broken or worn rings as necessary.
8. Piston improperly installed or misfitted.	8. Replace piston or repair as necessary.
Low Oil Pressure	
1. Slow idle speed	1. Set idle speed to specification.
2. Incorrect or malfunctioning oil pressure switch.	2. Replace with proper switch.
3. Incorrect or malfunctioning oil pressure gauge.	3. Replace with proper gauge.
4. Improper oil viscosity or diluted oil.	4. a. Install oil of proper viscosity for expected temperature. b. Install new oil if diluted with moisture or unburned fuel mixtures.
5. Oil pump worn or dirty.	5. Clean pump and replace worn parts as necessary.
6. Plugged oil filter.	6. Replace filter and oil.
7. Oil pickup screen loose or plugged.	7. Clean or replace screen as necessary.
8. Hole in oil pickup tube.	8. Replace tube.
9. Excessive bearing clearance.	9. Replace as necessary.
10. Cracked, porous or plugged oil galleys.	10. Repair or replace block.

POSSIBLE CAUSE	CORRECTION
11. Galley plugs missing or misinstalled.	11. Install plugs or repair as necessary.

Valve Train Noise

1. Low oil pressure.	1. Repair as necessary. (See diagnosis for low oil pressure.)
2. Loose rocker arm attachments.	2. Inspect and repair as necessary.
3. Worn rocker arm and/or pushrod.	3. Replace as necessary.
4. Broken valve spring.	4. Replace spring.
5. Sticking valves.	5. Free valves.
6. Lifters worn, dirty or defective.	6. Clean, inspect, test and replace as necessary.
7. Camshaft worn or poor machining.	7. Replace camshaft.
8. Worn valve guides.	8. Repair as necessary.

ENGINE KNOCK DIAGNOSIS

CONDITION

a. Engine knocks cold and continues for two to three minutes. Knock increases with torque. [1]

POSSIBLE CAUSE	CORRECTION
1. EFE equipped engines may have valve knock.	1. Replace EFE valve.
2. Flywheel contacting splash shield.	2. Reposition splash shield.
3. Loose or broken balancer or drive pulleys.	3. Tighten or replace as necessary.
4. Excessive piston to bore clearance.	4. Replace piston.

b. Engine has heavy knock hot with torque applied.

1. Broken balancer or pulley hub.	1. Replace parts as necessary.
2. Loose torque converter bolts.	2. Tighten bolts.
3. Accessory belts too tight or nicked.	3. Replace and/or tension to specs as necessary.
4. Exhaust system grounded.	4. Reposition as necessary.
5. Flywheel cracked.	5. Replace flywheel.
6. Excessive main bearing clearance.	6. Replace as necessary.
7. Excessive rod bearing clearance.	7. Replace as necessary.

c. Engine has light knock hot in light load conditions.

1. Detonation or spark knock.	1. Check engine time and fuel quality.
2. Loose torque converter bolts.	2. Tighten bolts.
3. Exhaust leak at manifold.	3. Tighten bolts and/or replace gasket.
4. Excessive rod bearing clearance.	4. Replace bearings as necessary.

d. Engine knocks on initial start up but only lasts a few seconds.

1. Fuel pump.	1. Replace pump.
2. Improper oil viscosity.	2. Install proper oil viscosity for expected temperatures.
3. Hydraulic lifter bleed down.[2]	3. Clean, test and replace as necessary.
4. Excessive crankshaft end clearance.	4. Replace crankshaft thrust bearing.

e. Engine knocks at idle hot.

1. Loose or worn drive belts.	1. Tension and/or replace as necessary.
2. Compressor or generator bearing.	2. Replace as necessary.
3. Fuel pump.	3. Replace pump.
4. Valve train.	4. Replace parts as necessary.
5. Improper oil viscosity.	5. Install proper viscosity oil for expected temperature.
6. Excessive piston pin clearance.	6. Ream and install oversize pins.

POSSIBLE CAUSE	CORRECTION
7. Connecting rod alignment.	7. Check and replace rods as necessary.
8. Insufficient piston to bore clearance.	8. Hone and fit new piston.

[1] Cold engine piston knock usually disappears when the cylinder is grounded out. Cold engine piston knock which disappears in 1.5 minutes should be considered acceptable.

[2] When the engine is stopped, some valves will be open. Spring pressure against lifters will tend to bleed lifter down. Attempts to repair should be made only if the problem is consistent and appears each time engine is started.

ENGINE AND DRIVING GEAR (Continued)

GENERAL DESCRIPTION

CYLINDER BLOCK

The cylinder block is made of cast iron and has 8 cylinders arranged in a "V" shape with 4 cylinders in each bank. Five bearings support the crankshaft which is retained by bearing caps that are machined with the block for proper alignment and clearances. Cylinders are completely encircled by coolant jackets.

CYLINDER HEAD

The cast iron cylinder heads have individual intake and exhaust ports for each cylinder. Valve guides are integral, and rocker arms are retained on individual threaded studs.

CRANKSHAFT AND BEARINGS

The crankshaft is cast nodular iron, and is supported by five main bearings. Number five bearing is the end thrust bearing.

All main bearings are lubricated from oil holes that connect to the main oil gallery. This runs along the left side of the cylinder case, just above the oil pan rail. Two additional galleries supply oil to the valve lifters.

A torsional damper on the forward end of the crankshaft dampens any engine torsional vibrations.

CAMSHAFT AND DRIVE

The cast iron camshaft is supported by five bearings and is chain driven. A steel crankshaft gear drives the timing chain which in turn drives the camshaft through an aluminum and nylon sprocket.

Cam lobes are ground, hardened and tapered with the high side toward the rear. This, coupled with a spherical face on the lifter, causes the valve lifters to rotate.

Camshaft bearings are lubricated through oil holes which intersect the main oil gallery. The main oil gallery is rifle drilled down the left side of the cylinder case.

PISTONS AND CONNECTING RODS

The pistons are made of cast aluminum alloy using two compression rings and one oil control ring. Pins are Chromium steel and have floating fit in the pistons. They are retained in the connecting rods by a press fit.

Connecting rods are made of forged steel. Full pressure lubrication is directed to the connecting rods by drilled oil passages from the adjacent main bearing journal. Oil holes at the connecting rod journals are located so that oil is supplied to give maximum lubrication just prior to full bearing load.

VALVE TRAIN

A very simple ball pivot-type train is used. Motion is transmitted from the camshaft through the hydraulic lifter and push rod to the rocker arm. The rocker arm pivots on its ball and transmits the camshaft motion to the valve. The rocker-arm ball is retained by a nut.

HYDRAULIC VALVE LIFTERS

Hydraulic Valve Lifters are used to keep all parts of the valve train in constant contact.

The hydraulic lifter assembly consists of: the lifter body, which rides in the cylinder block boss, a plunger, a push rod seat, a metering valve, a plunger spring, a check ball and spring, a check ball retainer and a push rod seat retainer.

When the lifter is riding on the low point of the cam, the plunger spring keeps the plunger and push rod seat in contact with the push rod.

When the lifter body begins to ride up the cam lobe, the check ball cuts off the transfer of oil from the reservoir below the plunger. The plunger and lifter body then rise as a unit, pushing up the push rod and opening the valve.

As the lifter body rides down the other side of the cam, the plunger follows with it until the valve closes. The lifter body continues to follow the cam to its low point, but the plunger spring keeps the plunger in contact with the push rod. The ball check valve will then move off its seat and the lifter reservoir will remain full.

INTAKE MANIFOLD

The intake manifold is of cast iron double level design for efficient fuel distribution. The carburetor pad is centrally located with a passage running underneath the pad (E.F.E.) through which exhaust gases are forced to promote faster fuel vaporization when the engine is cold.

EXHAUST MANIFOLDS

Two cast iron exhaust manifolds are used to direct exhaust gases from the combustion chambers to the exhaust system. The right hand side manifold receives a heat shield that is used to route heated air to the air cleaner for better fuel vaporization.

COMBUSTION CHAMBERS

Combustion Chambers are cast to insure uniform shape for all

ENGINE AND DRIVING GEAR (Continued)

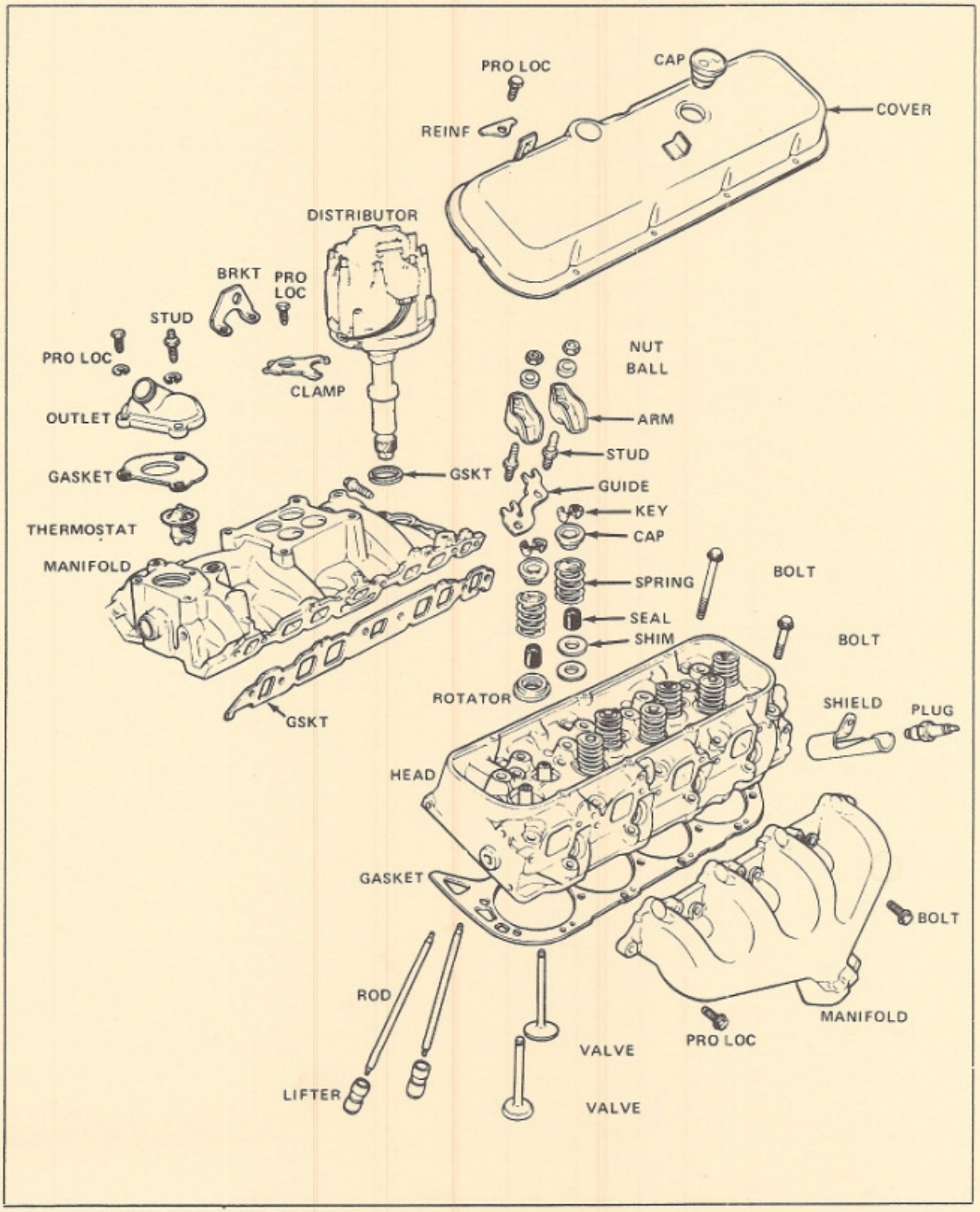


Figure 22 – Engine Upper End (Exploded View)

ENGINE AND DRIVING GEAR (Continued)

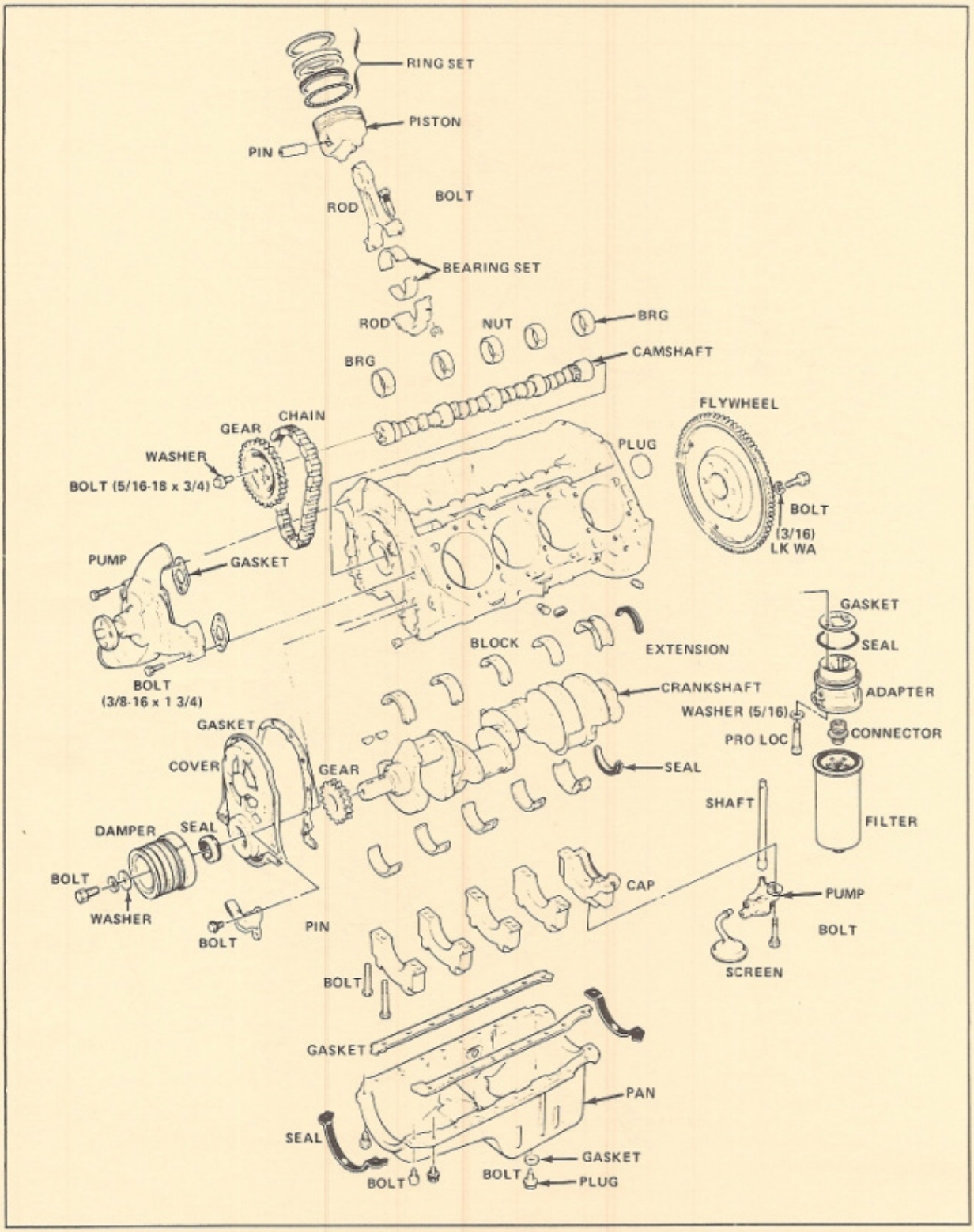


Figure 23 – Engine Lower End (Exploded View)

ENGINE AND DRIVING GEAR (Continued)

cylinders. Spark plugs are located between the intake and exhaust valves.

The contoured wedge shape of the combustion chamber minimizes the possibility of detonation, facilitates breathing, and provides swirling turbulence for smooth, complete combustion.

ENGINE LUBRICATION

Full pressure lubrication through a full flow oil filter, is furnished by a gear-type oil pump. The distributor, driven by a helical gear on the camshaft, drives the oil pump. The main oil gallery feeds oil, through drilled passages, to the camshaft and crankshaft to lubricate the bearings. The valve lifter oil gallery feeds the valve lifters which, through hollow push rods, feed the individually mounted rocker arms.

ON VEHICLE SERVICE

ENGINE MOUNTS

Engine mounts are the non-adjustable type and seldom require service. Broken or deteriorated mounts should be replaced immediately, because of the added strain placed on other mounts and drive line components.

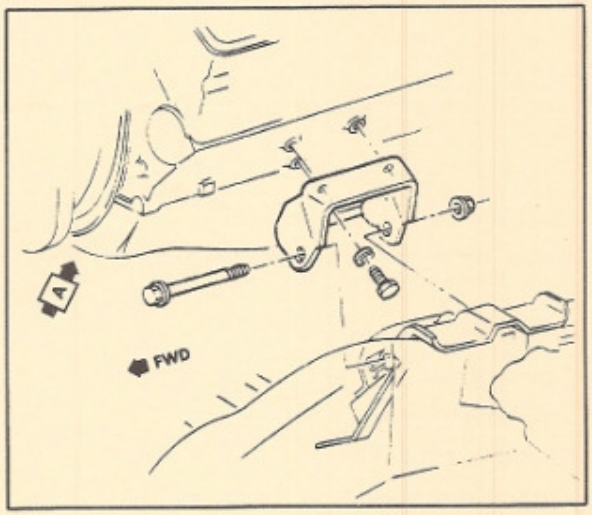


Figure 24 – Engine Mounting Bracket (Upper Section)

Checking Engine Mounts

Front Mount

Raise the engine to remove weight from the mounts and to place a slight tension in the rubber. Observe both mounts while raising engine. If an engine mount exhibits:

a. Hard rubber surface covered with heat check cracks
b. Rubber separated from a metal plate of the mount
c. Rubber split through center

Replace the mount. If there is relative movement between a metal plate of the mount and its attaching points, lower the engine on the mounts and tighten the screws or nuts attaching the mount to the engine, frame, or bracket.

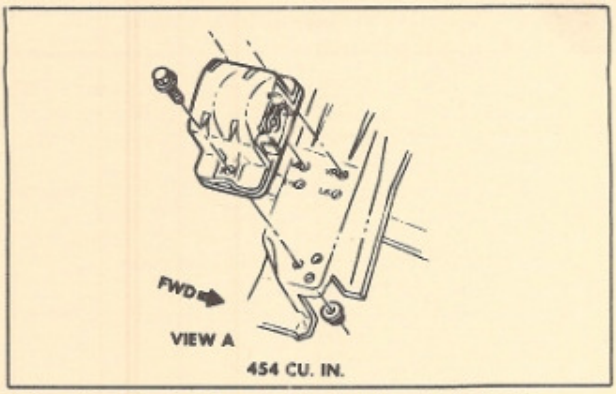


Figure 25 – Engine Mounting Bracket (Lower Section)

Rear Mount

Raise the vehicle on a hoist. Push up and pull down on the transmission tailshaft while observing the transmission mount. If the rubber bushings allow the transfer case support plate to contact the crossmember, replace both bushings. For more information see the section on the transfer care.

Front Mount Replacement

1. Remove mount retaining bolt from below frame mounting bracket.
2. Raise front of engine and remove mount-to-engine bolts and remove mount. Raise engine only enough for sufficient clearance. Check for interference between rear of engine and cowl panel which could cause distributor damage.
3. Replace mount to engine and lower engine into place.
4. Install retaining bolt and torque all bolts to specifications.

MINOR ENGINE ADJUSTMENTS

ROCKER ARM COVER

Removal

1. Remove air cleaner.
2. Disconnect crankcase ventilation hoses at rocker arm covers.
3. Disconnect electrical wiring harness from rocker arm clips.
4. Remove carburetor heat stove pipe from right exhaust manifold.
5. If the vehicle is equipped with air conditioning, remove the A/C compressor upper brace.
6. Remove rocker arm cover to head attaching bolts and remove rocker arm cover.

   NOTICE: If cover adheres to cylinder head, shear off by bumping end of rocker arm cover with a rubber mallet. If cover will not come loose, **CAREFULLY** pry until loose. DO NOT DISTORT SEALING FLANGE.

Installation

1. Clean sealing surface on cylinder head and rocker arm cover with degreaser. Using a 3/16" (5mm) bead of RTV, or equivalent, place rocker arm cover on the head, install

ENGINE AND DRIVING GEAR (Continued)

retaining bolts and torque to specification. Loose RTV sealant, or pieces causing installation interference, must be removed from both cylinder head and cover seal surfaces prior to applying new sealant.

When going around the attaching bolt holes, always flow the RTV on the inboard side of the holes.

2. On A/C equipped vehicles, install the A/C compressor upper brace. Adjust pulley belt to specification.
3. Install carburetor heat stove pipe.
4. Connect electrical wiring harness at clips on rocker arm cover.
5. Connect crankcase ventilation hoses.
6. Install air cleaner start engine and check for leaks.

VALVE MECHANISM

Adjustment

1. Adjust valves when lifter is on base circle of camshaft lobe as follows:
   a. Crank engine until mark on torsional damper lines up with center or "O" mark on the timing tab fastened to the crankcase front cover and the engine is in the No. 1 firing position. This may be determined by placing fingers on the No. 1 valve as the mark on the damper comes near the "O" mark on the crankcase front cover. If the valves are not moving, the engine is in the No. 1 firing position. If the valves move as the mark comes up to the timing tab, the engine is in No. 6 firing position and should be turned over one more time to reach the No. 1 position.
   b. With the engine in the No. 1 firing position as determined above, the following valves may be adjusted.
   -- Exhaust -- 1, 3, 4, 8
   -- Intake -- 1, 2, 5, 7

   c. Back out adjusting nut until lash is felt at the push rod then turn in adjusting nut until all lash is removed. This can be determined by rotating push rod while turning adjusting nut (see figure 26). When play has been removed, turn adjusting nut in one full additional turn (to center lift plunger).

   d. Crank the engine one revolution until the pointer "o" mark and torsional damper mark are again in alignment. This is No. 6 firing position. With the engine in this position, the following valves may be adjusted.
   -- Exhaust -- 2, 5, 6, 7
   -- Intake -- 3, 4, 6, 8
4. Install rocker arm covers as previously outlined.
5. Start engine and adjust carburetor idle speed.

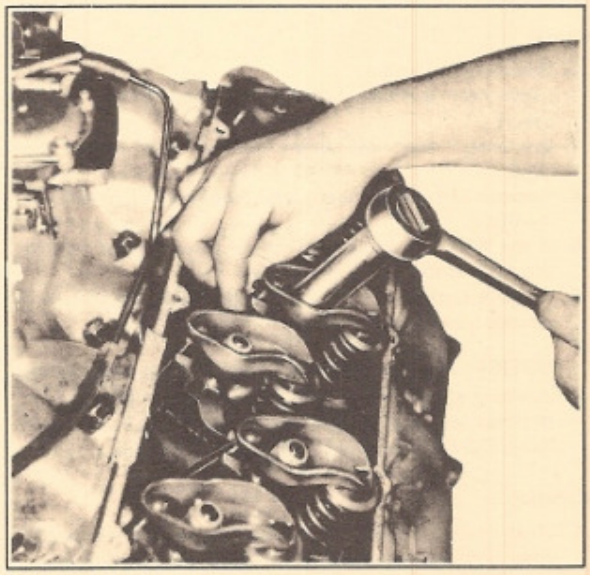


Figure 26 — Valve Adjustment

OIL PAN

Removal

1. Disconnect battery negative cable.
2. Loosen fan shroud.
3. Remove air cleaner.
4. Remove distributor cap.
5. Raise vehicle and drain oil pan.
6. Remove torque converter cover.
7. Remove mount "through" bolts and raise engine.
8. Remove oil pan bolts and drop pan.

Installation

If installing new oil pan, transfer dipstick tube from old unit.

1. With clean sealing surfaces on pan and block, place oil pan on block and install oil pan bolts. Torque to 135 lb. in. (15N-m).
2. Lower engine on mounts and install mount through bolts. Torque to 75 lb. ft. (100 N-m).
3. Install torque converter cover.
4. Lower vehicle.
5. Install distributor cap and tighten fan shroud.
6. Fill crankcase with oil.
7. Install air cleaner and connect battery negative cable.

OIL PUMP

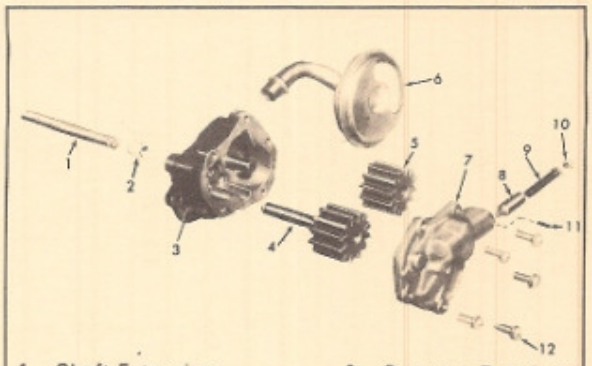
Removal

1. Remove oil pan as previously outlined.
2. Remove pump to rear main bearing cap bolt and remove pump and extension shaft.

Disassembly *(See figure 27)*

1. Remove the pump cover attaching screws and the pump cover.
2. Mark gear teeth so they may be reassembled with the same teeth indexing. Remove the idler gear and the drive gear and shaft from the pump body.
3. Remove the pressure regulator valve retaining pin, pressure regulator valve and related parts.

ENGINE AND DRIVING GEAR (Continued)



1. Shaft Extension
2. Shaft Coupling
3. Pump Body
4. Drive Gear and Shaft
5. Idler Gear
6. Pickup Screen and Pipe
7. Pump Cover
8. Pressure Regulator Valve
9. Pressure Regulator Spring
10. Washer
11. Retaining Pin
12. Screws

Figure 27 – Oil Pump

4. If the pickup screen and pipe assembly need replacing, the entire pump must be replaced. The screen and pipe assembly is welded to the pump body.

Cleaning and Inspection

1. Wash all parts in cleaning solvent and dry with compressed air.
2. Inspect the pump body and cover for cracks or excessive wear.
3. Inspect pump gears for damage or excessive wear.

   The pump gears and body are not serviced separately. If the pump gears or body are damaged or worn, replacement of the entire oil pump assembly is necessary.
4. Check the drive gear shaft for looseness in the pump body.
5. Inspect inside of pump cover for wear that would permit oil to leak past the ends of the gears.
6. Inspect the pickup screen and pipe assembly for damage to screen, pipe or relief grommet.
7. Check the pressure regulator valve for fit.

Assembly *(See figure 27)*

1. Install the pressure regulator valve and related parts.
2. Install the drive gear and shaft in the pump body.
3. Install the idler gear in the pump body with the smooth side of gear towards pump cover opening.
4. Install gasket and the pump cover and torque attaching screws to specifications.
5. Turn drive shaft by hand to check for smooth operation.

Installation

1. Assemble pump and extension shaft to rear main bearing cap, aligning slot on top end of extension shaft with drive tang on lower end of distributor drive shaft.
2. Install pump to rear bearing cap bolt and torque to specifications.
3. Install oil pan previously outlined.

ENGINE COOLING

ENGINE COOLING GENERAL DESCRIPTION

Your Revcon has a pressure type engine cooling system with thermostatic control of coolant circulation. The cooling system is sealed by a pressure type radiator filler cap which causes the system to operate at higher than atmospheric pressure. The higher pressure raises the boiling point of the coolant which increases the cooling efficiency of the radiator. The 15 pound (103 kPa) pressure cap used raises the boiling point of coolant to approximately 258° F (125° C) at sea level.

The radiator cap should be washed with clean water and pressure checked every 12 months.

All models have a closed cooling system using a round pressure cap and a coolant reservoir. Coolant can be added without removing the radiator cap.

A pressure-vacuum valve radiator cap is used which allows the coolant to expand through the pressure valve in the center of the cap without building unnecessary pressure. The expanding coolant flows into the coolant reservoir. The vent valve closes due to expansion and coolant flow. The nominal 15 pound (103 kPa) pressure will not be reached until the system is working at maximum capacity.

Any air or vapor in the cooling system will be forced to the coolant reservoir under the liquid level and leave through the vent tube at the top of the reservoir. As the system cools, the extra coolant in the reservoir will be drawn back to the radiator through the vent valve. In this manner, the radiator will keep itself full at all times.

COOLANT LEVEL

The need for additional coolant can be detected by observing the level of coolant in the "see through" reservoir while the engine is at normal operating temperature. The radiator cap need not normally be removed.

The coolant level should be at the "Full Cold" mark when the system is cool or at ambient temperature. After the vehicle has been driven sufficiently to obtain normal operating temperatures, the level should be above the "Full Cold" mark.

Periodically, the radiator cap should be removed to observe coolant level in the radiator.

> **CAUTION: The radiator coolant level should only be checked when the engine is cool. If the radiator cap is removed from a hot cooling system, serious personal injury may result.**

The recovery bottle should be at its appropriate mark when checked.

Regardless of whether freezing temperatures are expected or not, cooling system protection should be maintained at least to -34° F (-37° C), to provide adequate corrosion protection and loss of coolant from boiling. With glycol content less than requirement for -34° F (-37° C) protection, coolant boiling point is less than the temperature indicating light setting.

Figure 28 – Engine General Data Specifications

GENERAL DATA:

TYPE		90° V-8 GASOLINE
DISPLACEMENT	LITRE (*)	7.4 (W)
RPO		LE8
BORE		4.250
STROKE		4.000
COMPRESSION RATIO		8.5:1
FIRING ORDER		1-8-4-3-6-5-7-2

CYLINDER BORE:

DIAMETER			4.2495-4.2525
OUT OF ROUND	PRODUCTION		.001 MAX.
	SERVICE		.002 MAX.
TAPER	PRODUCTION	THRUST SIDE	.0005 MAX.
		RELIEF SIDE	.001 MAX.
	SERVICE		.001 MAX.

PISTON:

CLEARANCE	PRODUCTION	.0030-.0040
	SERVICE	.0050 MAX.

PISTON RING:

COMPRESSION	GROOVE CLEARANCE	PRODUCTION	TOP	.0017-.0032
			2ND	.0017-.0032
		SERVICE		HI LIMIT PRODUCTION +.001
	GAP	PRODUCTION	TOP	.010-.020
			2ND	.010-.020
		SERVICE		HI LIMIT PRODUCTION +.010
OIL	GROOVE CLEARANCE	PRODUCTION		.005-.0065
		SERVICE		HI LIMIT PRODUCTION +.001
	GAP	PRODUCTION		.015-.055
		SERVICE		HI LIMIT PRODUCTION +.010

* VIN Designation

PISTON PIN

		LE8
DIAMETER		.9895-.9898
CLEARANCE	PRODUCTION	.00025-.00035
	SERVICE	.001 MAX.
FIT IN ROD		.0013-.0021 INTERFERENCE

CRANKSHAFT

MAIN JOURNAL	DIAMETER		#1-2-3-4 2.7481-2.7490
			#5 2.7476-2.7486
	TAPER	PRODUCTION	.0002 MAX.
		SERVICE	.001 MAX.
	OUT OF ROUND	PRODUCTION	.0002 MAX.
		SERVICE	.001 MAX.
MAIN BEARING CLEARANCE	PRODUCTION		#1-2-3-4 .0013-.0025
			#5 .0024-.0040
	SERVICE		#1-4 .001-.0025 #5 .0025-.0035
CRANKSHAFT END PLAY			.006-.010
CRANKPIN	DIAMETER		2.2000-2.1990
	TAPER	PRODUCTION	.0005
		SERVICE	.001 MAX.
	OUT OF ROUND	PRODUCTION	.0005
		SERVICE	.001 MAX.
ROD BEARING CLEARANCE	PRODUCTION		.0009-.0025
	SERVICE		.0030 MAX.
ROD SIDE CLEARANCE			.013-.023

CAMSHAFT

LOBE LIFT ± .002	INTAKE	.2343
	EXHAUST	.2530
JOURNAL DIAMETER		1.9482-1.9492

ENGINE AND DRIVING GEAR (Continued)

VALVE SYSTEM

LIFTER			HYDRAULIC
ROCKER ARM RATIO			1.50:1
VALVE LASH	INTAKE		ONE TURN DOWN FROM ZERO LASH
	EXHAUST		
FACE ANGLE (INT. & EXH.)			45°
SEAT ANGLE (INT. & EXH.)			46°
SEAT RUNOUT			.002 MAX.
SEAT WIDTH	INTAKE		1/32 - 1/16
	EXHAUST		1/16 - 3/32
STEM CLEARANCE	PRODUCTION	INT.	.0010 - .0027
		EXH.	.0010 - .0027
	SERVICE		HI LIMIT + .001 INTAKE + .002 EXHAUST
VALVE SPRING (OUTER)	FREE LENGTH		2.03
	PRESSURE LBS. @ IN.	CLOSED	76-84 @ 1.70 INT. @ 1.61 EXH
		OPEN	194-206 @ 1.25 INT. @ 1.16 EXH
	INSTALLED HEIGHT ± 1/32"		1-23/32 INT. 1-19/32 EXH.
DAMPER	FREE LENGTH		1.86
	APPROX. # OF COILS		4

Figure 29 — Valve System Specifications

TORQUE SPECIFICATIONS

CRANKCASE FRONT COVER	80 LB. IN.
FLYWHEEL HOUSING COVER	80 LB. IN.
OIL FILTER BYPASS VALVE	80 LB. IN.
OIL PAN (TO CRANKCASE) (1/4-20)	80 LB. IN.
OIL PUMP COVER	80 LB. IN.
ROCKER ARM COVER	45 LB. IN.
CAMSHAFT SPROCKET	20 LB. FT.
OIL PAN TO CRANKCASE (5/16-18)	165 LB. IN.
CLUTCH PRESSURE PLATE	30 LB. FT.
DISTRIBUTOR CLAMP	25 LB. FT.
FLYWHEEL HOUSING	30 LB. FT.
MANIFOLD (EXHAUST)	20 LB. FT.[1]
MANIFOLD (INLET)	30 LB. FT.
WATER OUTLET	30 LB. FT.
WATER PUMP	30 LB. FT.
CONNECTING ROD CAP	45 LB. FT.
CYLINDER HEAD	65 LB. FT.
MAIN BEARING CAP	80 LB. FT.[2]
OIL PUMP	65 LB. FT.
FLYWHEEL	60 LB. FT.
TORSIONAL DAMPER	60 LB. FT.
TEMPERATURE SENDING UNIT	20 LB. FT.
OIL FILTER	25 LB. FT.
OIL PAN DRAIN PLUG	20 LB. FT.
SPARK PLUG	17-27 LB. FT.

[1] Inside bolts on 5.7 (L) 30 LB. FT.
[2] Intermediate outer bolts are 70 LB. FT.

Figure 30 — Torque Specifications

When adding solution due to loss of coolant for any reason or in areas where temperatures lower than -34° F (-37° C) may occur, a sufficient amount of an ethylene glycol base anti-freeze that meets GM Specification 1899-M should be used.

NOTICE: Alcohol or methanol base anti-freeze, or plain water, are not recommended for your engine at anytime. They will not provide proper protection against corrosion.

Flushing Cooling System

Various methods and equipment may be used to perform this service. If special equipment such as a back flusher is used, equipment manufacturer's instructions should be followed. However, it is advisable to remove the thermostat before flushing the system.

THERMOSTAT

The thermostat consists of a restriction valve actuated by a thermostatic element. This is mounted in the forward part of the intake manifold, under the coolant outlet.

Your thermostat is designed to open and close at predetermined temperatures and if not operating properly should be removed and tested.

DIAGNOSIS

If the cooling system requires frequent addition of coolant in order to maintain the proper level, check all units and connections in the cooling system for evidence of leakage. Inspection should be made with cooling system cold. Small leaks which may show dampness or dripping can easily escape detection when the engine is hot, due to the rapid evaporation of coolant. Tell-tale stains of grayish white or rusty color or dye stains from anti-freeze, at joints in cooling system are almost always sure signs of small leaks even though there appears to be no damage.

Air may be drawn into the cooling system through leakage at the water pump seal or through leaks in the coolant recovery system. Gas may be forced into the cooling system through leakage at the cylinder head gasket(s) even though the leakage is not sufficient to allow coolant to enter the combustion chamber.

ENGINE COOLING SYSTEM CHECKS

Exhaust Leaks

To check for exhaust leaks into the cooling system, drain the system until the coolant level stands just above the top of the cylinder head(s), then disconnect the radiator upper hose and remove the thermostat and fan belt(s). Start the engine and quickly accelerate several times. At the same time note any appreciable coolant rise or the appearance of bubbles which are indicative of exhaust gases leaking into the cooling system.

NOTICE: A defective head gasket may allow exhaust gases to leak into the cooling system. This is particularly damaging to the cooling system as the gases combine with the water to form acids which are harmful to the radiator and engine.

Water Pump

Water pump operation may be checked by running the engine

ENGINE AND DRIVING GEAR (Continued)

while squeezing the radiator upper hose (engine warm). A pressure surge should be felt. Check for a plugged venthole in pump.

Radiator

Test for restriction in the radiator, by warming the engine up and then turning the engine off and feeling the radiator. The radiator should be hot along the left side and warm along the right side, with an even temperature rise from right to left. Cold spots in the radiator indicate clogged sections.

Thermostat

An operational check of the thermostat can be made by hanging the thermostat on a hook in a 33% glycol solution 25° F (4° C) above the temperature stamped on the thermostat valve. Then submerge the valve completely and agitate the solution thoroughly. Under this condition the valve should open. Now remove the thermostat and place it in a 33% glycol solution 10° F (-12°C) below temperature indicated on the valve. With valve completely submerged and coolant agitated thoroughly, the valve should close completely.

Overheat and/or Noise

Engine overheat and/or cooling system noise may be caused by restrictions in the cooling system. Components which may be prone to this condition are cylinder head, water pump, block, thermostat housing and inlet manifold. Symptoms of this condition are as follows:

1. Engine may make snapping/cracking noises.
2. Heater core may gurgle or surge.
3. Radiator hoses may collapse and expand.
4. Heater hoses may vibrate and thump.
5. Overheat light may or may not come on.

Symptoms are the result of coolant boiling at some localized area and may not be noticed after extending idling and/or while being driven. Determine which side of the engine is involved and whether it is more at the front or rear of engine.

Diagnosis/Inspection

1. Isolate area of engine the localized boiling is originating from. This can be done by probing engine with a sounding bar (large screwdriver).
2. With radiator cap removed, observe water being circulated in radiator. Feel the front area of radiator for cold spots which indicate blockage. Blocked radiators generally occur on units that have accrued miles and not on new vehicles.

   CAUTION: The radiator cap should be removed from a cool engine only. If the radiator cap is removed from a hot cooling system, serious personal injury may result.

3. Inspect thermostat to see if it opens completely.
4. Inspect thermostat housing to make sure it is completely free of obstructions.
5. Remove water pump from vehicle and remove the back cover on the pump. All internal passages can be inspected using a flashlight.
6. Inspect crossover at the front of the inlet manifold. This entire passage can be seen with only the thermostat removed.
7. Remove heads, but lay them aside for now and check the block first because the heads are the most complex pieces as far as coolant passages are concerned.
8. With water pump and heads removed, ALL coolant passages CAN be inspected by using a penlight flashlight. All water jacket areas can be seen directly and a block should never be replaced as being suspect unless the restricted area can be DIRECTLY SEEN.
9. If none of the above inspections reveal the problem area, the heads must be considered prime suspect. Heads with blocked coolant passages generally have more than one area that is blocked. Inspect the heads for signs of overheat discoloration (a dark blue or black area). If none are found look in the coolant passages for blockage and probe all passages that are accessible. The head is very intricate and all passages cannot be reached. Use a probe that is fairly substantial as a tag wire may go through or around a partially blocked area. If nothing is found by visual inspection and probing, inspect the passages for a rough ragged appearance. The roughest internal passages are probably the ones that are blocked. Replace a blocked or suspect head and inspect the replacement head before installing it.

FAN CLUTCH

1. **Noise** – Fan noise is sometimes evident under the following conditions:
   a. When clutch is engaged for maximum cooling.
   b. During first few minutes after start-up until the clutch can re-distribute the silicone fluid back to its normal disengaged operating condition after overnight settling.

   Fan noise or an excessive roar will generally occur continuously, however, under all high engine speed conditions (2500 rpm and up) if the clutch assembly is locked up due to an internal failure. If the fan cannot be rotated by hand or there is a rough grating feel as the fan is turned, the clutch should be replaced.
2. **Looseness** – Under various temperature conditions, there is a visible lateral movement that can be observed at the tip of the fan blade. This is a normal condition due to the type of bearing used. Approximately 1/4" (6.5mm) maximum lateral movement measured at the fan tip is allowable. This is not cause for replacement.
3. **Silicone Fluid Leak** – The operation of the unit is generally not affected by small fluid leaks which may occur in the area around the bearing assembly. If the degree of leakage appears excessive, however, proceed to item 4.
4. **Engine Overheating** – If the fan and clutch assembly free-wheels with no drag (revolves over five times when spun by hand), the clutch should be replaced.

ENGINE COOLING SYSTEM COMPLAINT

To avoid needless time and cost in diagnosing cooling system complaints, the driver should consider driving conditions that would place abnormal loads on the cooling system.

1. **DOES OVERHEATING OCCUR WHILE PULLING A TRAILER?**

   If answer is affirmative, how heavy is trailer? If trailer weight is greater than 2000 lbs., your REVCON is overloaded. Further diagnostic checks should not be required.

ENGINE AND DRIVING GEAR (Continued)

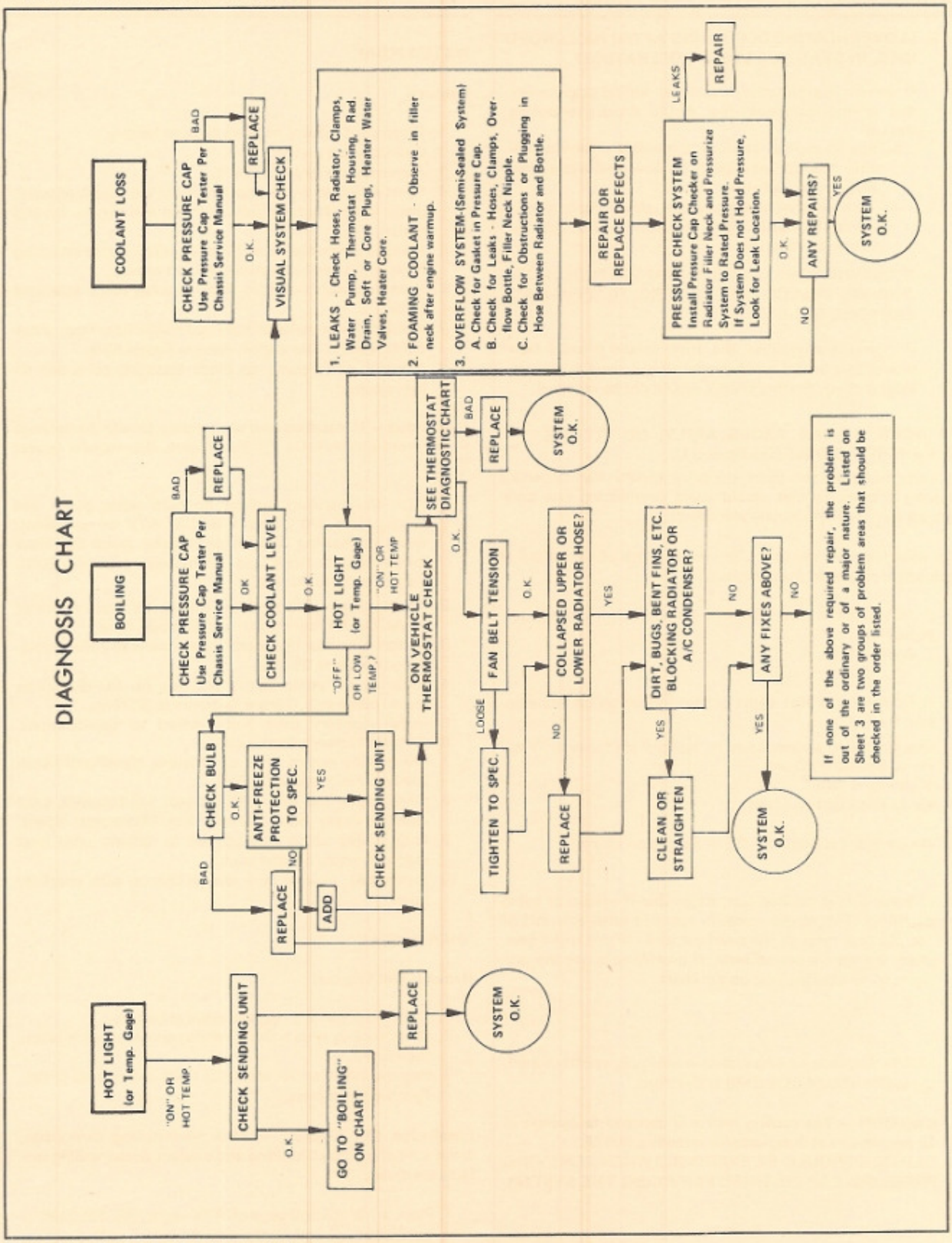


Figure 31 — Engine Cooling Diagnosis Chart