

GM POWERTRAIN
INDUSTRIAL ENGINES by **KEM**

INDUSTRIAL GAS ENGINE
OPERATORS MANUAL

MODEL - GMG-430
Katolight Spec.

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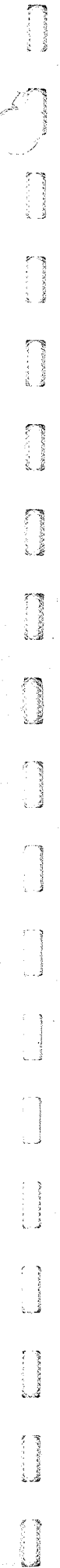


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FORWARD

The necessary safety precautions and regulations have been observed in the design, choice of materials and manufacture of your Industrial Power Unit package. It has been run-in, tested and adjusted at the factory.

However, maximum engine performance and longevity is not possible without regard to maintenance. Therefore, this manual is presented, and should be used as a guide in setting forth a maintenance program and schedule.

In the interest of safety be sure to refit any guards and protective devices that may have been removed during work on the engine.

To prevent pollution to the environment, please retain and properly dispose of old fuel and oil.



The first part of the document is a letter from the Secretary of the State to the Governor, dated January 10, 1901. It contains information regarding the appointment of a new member to the State Board of Education.



The second part of the document is a report from the State Board of Education, dated January 15, 1901. It discusses the progress of the board's work during the previous year and outlines its plans for the future.

The third part of the document is a report from the State Board of Education, dated January 20, 1901. It discusses the progress of the board's work during the previous year and outlines its plans for the future.

The fourth part of the document is a report from the State Board of Education, dated January 25, 1901. It discusses the progress of the board's work during the previous year and outlines its plans for the future.

1.1 ENGINE MODEL AND SERIAL NUMBER

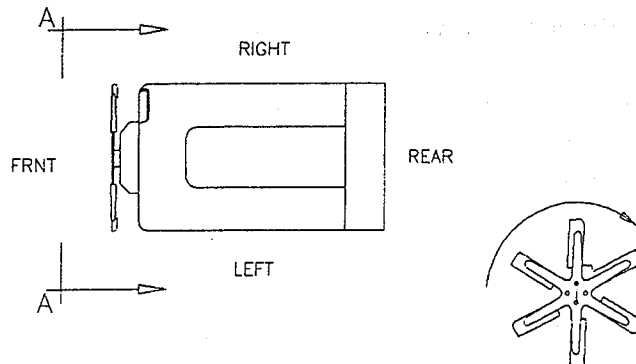
General Description:

  EQ. INC.	
TUALATIN OREGON	
MODEL	
S/N	
HDC	

Identification placard is located on the right side of the engine, under the starter.

General Description:

The terms "front and rear", "right and left" as well as fan rotation are shown below.



Description and use of hot date code (to give instruction on finding GM parts in the parts list from GM).

Hot Date Code is stamped on serial plate.

Example: V0109AH

the underlined section will be your code. Number 9 indicates the model year of your engine. Letters indicate GM engine code. Using the numbers and letters in the hot date code, go to the back of the section (top end or bottom end) and you will find a list of notes, i.e. 1, note 2 . . . Within these notes you will find the number and letters that match your hot date code. Once you find your corresponding code, to the left of it you will find a note#. You will need this note# to find the correct part for your engine.

Example: Note #22

Gasket, head	(1,2,5,9,12,17)	12448061
Gasket, head	(1,5,12,20,22,28)	12346681

The gasket with the corresponding note # would be correct, and to the right of it would be the correct replacement part.

1.2 FUEL, COOLANT AND LUBRICANT

Periodical replenishment and replacement of oil and coolant are the key to the best maintenance, trouble-free performance, and increase of service life of the engine.

GENERAL LUBRICATION INSTRUCTIONS

1. Lubricate every necessary part as specified in "Periodic Check and Service Chart".
2. Always apply the oil of optimum viscosity to ambient temperature. In cold weather, use of too high viscosity oil can be often a cause of difficult engine starting.
3. Prior to the lubrication, be sure to clean oiler, grease gun, oil fillers, grease nipples, etc. If grease nipples or other oil filler parts are broken or bent, replace them at once with new ones.
4. If excessive leaks are noticed from oil seals or packings, etc., replace the seals or packings at once to stop leaks.

Always use clean fuel and pay attention to the following when handling the fuel.

- After the end of the day's work, fill the fuel tank with fuel to its capacity. This is to expel air from the tank as otherwise the moisture in the air might condense into water drops which contaminate the fuel. Also, this gives enough time for dust and water to be separated and settled before operation on the next day.
- Store the fuel in a storage tank for at least 24 hours to allow rust and water to precipitate before use.
- When filling the fuel tank from a drum, take care not to allow deposits on the bottom of the drum to be carried over into the tank.
- Open the drain plug at the bottom of the storage and fuel tanks occasionally to drain off deposits and water.

COOLANT

Use soft water with a low impurity content as the coolant. Use of water containing salt, or water in the vicinity of a mine or spa could accelerate deposit of scale in the water jacket and corrosion of the external surface of the cylinder liner.

Use anti-corrosive in hot weather to prevent corrosion and use anti-freeze in cold weather to prevent freezing of the coolant.

NOTE: If the coolant in the cooling system contains anti-freeze or anti-corrosive, add a solution of the same concentration as the solution initially put into the system.

Cautions on use and handling of anti-freeze

- Use a permanent type anti-freeze.
- When anti-freeze is to be applied or when the coolant with anti-freeze is to be replaced by coolant without anti-freeze to comply with the rise in the atmospheric temperature, wash and clean the cooling system.

The anti-freeze/water mixing ratio depends on the lowest temperature expected.

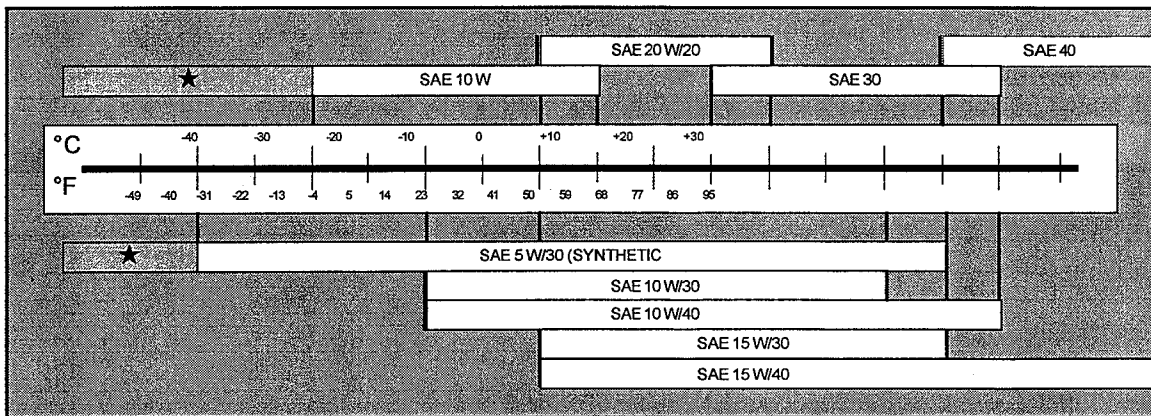
LUBRICANT

Engines which are often operated in more severe conditions require the use of higher quality engine oil. Use the oil and grease conforming to the specifications shown below.

Oil and Grease		Specifications	
	Under normal operating conditions	API CC or higher	40°C or above SAE 40
Engine Oil	Under severe operating conditions or for engine w/turbocharger.	API CD or higher	40 to -5°C SAE 30 10 to -30°C SAE 10W-30
Gear Oil		API GL-3	SAE 80 SAE 90
Brake fluid		SAE J1703	
Multipurpose type grease		NGLI No. 2	
Clutch shifter grease		MIL-G-3545B	

Oil Viscosity

The viscosity of the oil being greatly influenced by the ambient temperature, the choice of the SAE-grade should be governed by the ambient temperature at engine site (see diagram). If temperatures temporarily fall below the limit of the SAE-grade selected, this will merely affect the starting performance, but cause no engine damage.



★ Only with engine oil preheating.

Since a too viscous oil causes starting difficulties, the choice of the viscosity grade during winter operation should be governed by the ambient temperature prevailing at the time of starting the engine. Oil changes as a function of ambient temperatures can be avoided by using multigrade oils, which are again subject to the oil change intervals recommended.

Checking Oil Level

The oil level may be checked by two methods:

1. Dipstick

Pull out dipstick, wipe clean and reinsert as far as it will go, then withdraw. The oil level should be between the marks indicated on the dipstick. If the level is only up to or even below the lower mark, top with oil immediately, preferably up to the upper marking on dipstick.

2. Sight gauge (when applicable)

The oil level in the sight gauge will be approximately 1 1/2 inches down from the top of the glass when the engine oil level is maximum. Verify by checking the dipstick.

GMPT INDUSTRIAL ENGINE INFORMATION

Engine oil requirements:

Type

API-“SH”

Weight - SAE 30 for above 40° F

SAE 15W40 for above 0° F

SAE 10W30 for all temperatures

Oil Changes:

Change oil and filter ever 125 hours or 3 months, whichever comes first.

(NOTE: OEM air cleaners, PCV systems, or engine operating temperatures may vary the oil change interval.)

Oil Temperatures:

Upper limit is 266° F

Ideal running temperature is 221° F

Lower limit is 176° F

Lubrication System: (Maximum allowable degree angles of engine)

8.5 degrees with the front of the engine down

18 degrees with the rear of the engine down

20 degrees side to side

1.3 INSTRUMENTATION

Oil Pressure (20 to 50 PSI)

The oil pressure will vary according to temperature and the viscosity of the oil. If the oil is relatively light, on a warm day the gauge will register on the low end of the scale or approximately 20 PSI. Conversely, if the oil is heavy, on a cold day, gauge readings of 50 PSI would be expected.

Coolant Temperature (160-195°F)

The coolant temperature is regulated by a thermostat.

Volt Meter (12 - 15 volts)

Primarily the voltmeter is provided to indicate the condition of the battery. If the gauge registers in the red above 15 volts, shut the engine down and investigate. The engine will not automatically shut down in the unlikely event of over-voltage.

Should the voltage drop below approximately 12 volts, there will not be enough power to run the electrical system and the engine will quit running.

If the gauge registers in the red below 12 volts, check the condition of the battery.

2.0 INSPECTION AND MAINTENANCE

To prolong the life of the engine and maintain top operating conditions at all times, it is important that the engine is checked and serviced at regular intervals.

Periodic Inspection and Maintenance

1. The simple inspection and maintenance procedures are summarized below. An emergency engine should also be inspected and maintained according to the maintenance standard table described in the chart below.
2. Determine the inspection and maintenance intervals by checking the service meter readings. When the engine is operated under poor or severe conditions, perform inspection and maintenance earlier.

See following pages for maintenance schedules.

2.1 MAINTENANCE SCHEDULE

CHECK AND SERVICE ITEM		SERVICE INTERVALS						REMARKS	
		EVERY 10 HRS.	EVERY 60 HRS.	EVERY 125 HRS.	EVERY 250 HRS.	EVERY 500 HRS.	EVERY 1000 HRS.		
ENGINE GENERAL	Starting condition & noise		O						
	Low speed & acceleration (rated condition)		O					Check for hunting	
	Exhaust condition		O						
	Cylinder head, manifold & mounting bracket installation		O*				O	*Applicable to new engines only	
	Compression pressure						O		
	Valve clearance		O*					*New engines only	
	Air cleaner element (cyclone type) Condition				O				
	Air cleaner element (flat type) Condition				O		●		
	Check turbocharger bearing for rotating conditions. Check oil feed pipe joints							O	
LUBRICATION	Oil leaks		O						
	Damaged hose						O		
	Engine oil pan	Check oil for contamination & quantity	O						
		Replace Oil			●	●	●		*On new engine, be sure to replace engine oil.
Oil filter element	Replace Oil			●	●	●			
FUEL SYS	Leaks-check hose for damage & deterioration		O						
	Fuel filter Clogging				O				
COOLING SYSTEM	Water leaks-Check hose for damage/deterioration	O							
	Replace coolant & clean system					O		Clean system before & after use of antifreeze.	
	Loose or damaged V-belt	O							
	Damaged fan, mounting condition of fan					O			
	Radiator	Water quality	O						
		Cap function				O			
	Clogged and/or damaged core					O			
	Lubrication of water pump and idler pulley			O					
ELECTRICAL	Battery	Electrolyte quantity		O				Every 2 weeks-every week in summer.	
		Specific gravity of electrolyte			O				
		Connected condition of terminals				O			
		Loose electrical wiring connections and loose or damaged insulators			O				
MISC.	Check emergency stop equipment for operation			O					
	Lubrication of clutch shifter and fork shaft						O	Use clutch shifter grease.	
	Lubrication of bearings case (for direct drive type)						O	Use clutch shifter grease.	
	Check meters, gauges and pilot lamps				O				

SYMBOLS=O-Check, adjust or lubricate. / ●-Replace oil, grease or element.

2.2 INTAKE AND EXHAUST SYSTEM

Checking Engine Exhaust Emissions

After the engine has fully warmed up, check the color of exhaust gas.

Colorless or faint blue	Good
Black	Bad, showing incomplete combustion
White	Bad, showing combustion of oil forced up.

Please note: Exhaust gas which is really colorless or faint blue will look white due to winter weather.

2.3 AIR CLEANER

A dirty air cleaner element, if left as it is will decrease engine output. It will also cause increased fuel consumption, increase in harmful contents of exhaust emissions as well as black smoke.

Cyclone Type Air Cleaner

1. **Remove the dust cup and withdraw the element.** On a double element type cleaner, be sure not to remove the inner element when the outer element is cleaned. The inner element should be removed only when the outer element is replaced. Make sure that both elements are replaced at the same time.
2. **Prior to installation, clean the inside of the case and dust cup,** and slowly insert the element. If the air cleaner is placed in a horizontal position, install the dust cup so that the assembling direction indicating mark of the cup with face upward.

NOTE: Make sure that the element and dust cup are securely installed. If left loose, dust will be drawn in and the air cleaner will fail to function properly.

2.4 ENGINE OIL

Replace engine oil - after the first 60 hours and every 250 hours thereafter.

On a new engine, be sure to replace the oil after the first 60 hours of operation.

1. After shutdown, remove the oil while it is still hot. At the same time, the oil filter should be replaced.
2. Install the drain plug and pour in fresh engine oil from the oil filter port up to the FULL mark on the level gauge.
3. After running the engine at idle for several minutes recheck the oil level.

NOTE: A badly contaminated or deteriorated oil should be replaced regardless of the replacement intervals. **Replace the oil filter element each time that the oil is replaced.**

2.5 OIL FILTER

Replace element - Every 125 hours

NOTE: The element cannot be washed and reused.

1. Remove the element by turning counterclockwise. If the element is hard to loosen, use a special tool (filter wrench) for easier removal.
2. Prior to installation of a new element, apply a thin coat of engine oil to the packing of the element and tighten the element fully with a special tool (filter wrench).
3. If the element only has been replaced without replacing the engine oil, replenish to proper level and check the oil level.
4. After installation, thoroughly wipe away spilt oil, start the engine, and check for oil leaks from the packing.

2.6 FUEL FILTER

The fuel filter separates and removes foreign substances and precipitated water contained in fuel. Over a long period of service, however, the filter will be clogged with foreign substances. So the filter should be replaced at regular intervals.

Replace element - Every 500 hours.

1. Remove the element, while using care not to spill fuel.
2. **The element cannot be washed and reused.**
3. After installation, bleed the fuel system and check for fuel leaks.

NOTE: Wipe away spilt fuel as it could start a fire.

2.7 COOLANT

Replace coolant and clean system - Every 500 hours.

Scale and rust are formed in the radiator and engine water jacket in the course of time. It is important to clean the radiator and water jacket to remove deposits of scale and rust as they cause reduction of the cooling efficiency. Also make sure that the system is cleaned if the coolant contains anti-rust or anti-freeze.

When cleaning the system, heat the coolant to 80°C or higher and keep the engine idling. If the water temperature is lower, the thermostat is closed to shut off flow of the coolant to the radiator, making it impossible to clean the system thoroughly.

1. Open the radiator cap and open the drain cocks of the engine crankcase and radiator to remove the coolant.
2. Close the drain cocks and pour coolant into radiator. Run the engine until the coolant is heated to about 80°C.
3. If there is considerable scale or rust, pour in a cleaning solution and run the engine until the solution is heated to about 80°C.

Coolant Cont.

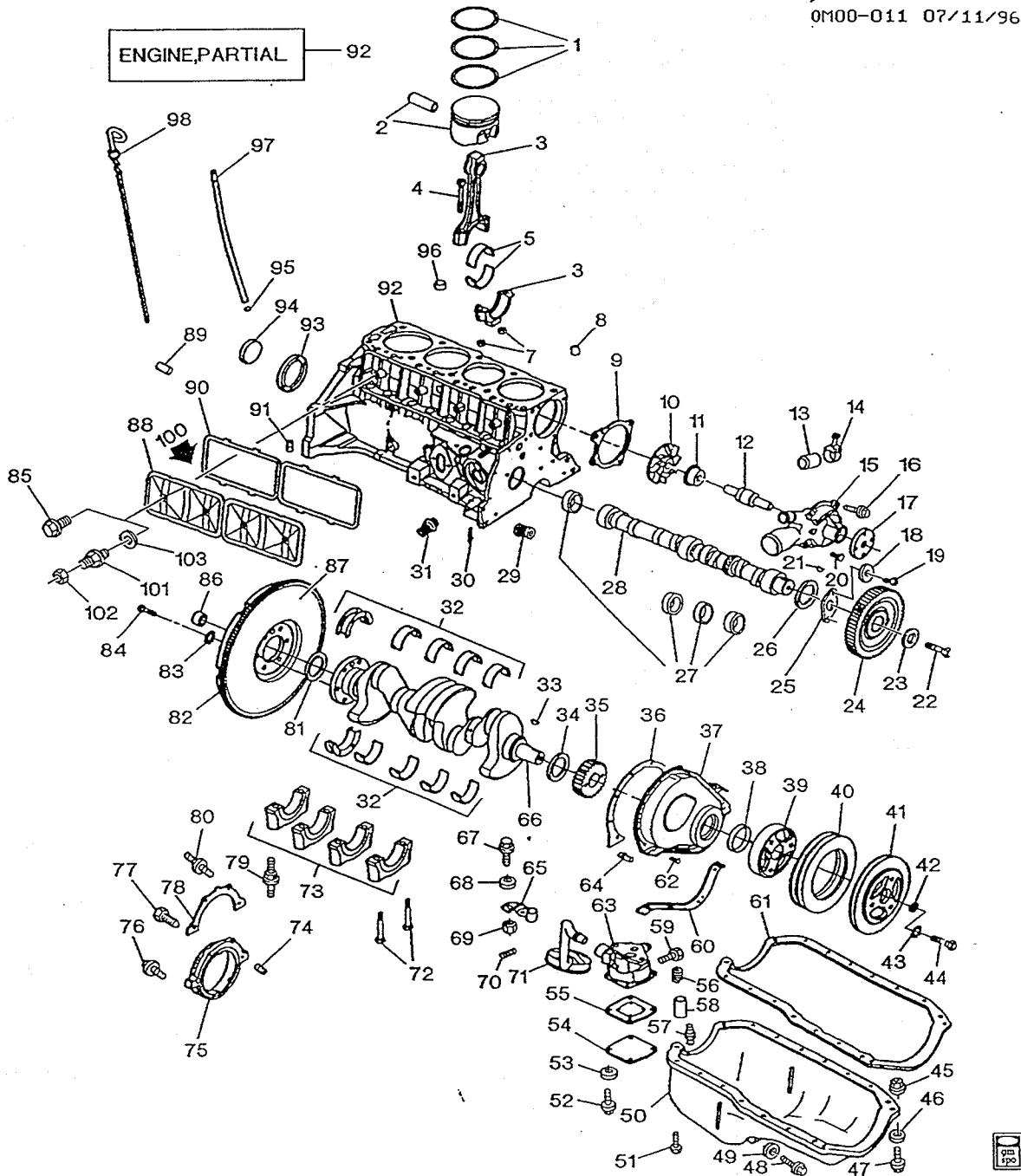
4. Continue to idle the engine for about 30 minutes.
5. After stopping the engine, open the drain cocks of the engine crankcase and radiator to drain off the coolant completely.
6. Close the drain cocks and pour in coolant to rinse the system thoroughly. Rinse until dirty water no longer runs out.
7. Use soft water and fill until it flows out from the overflow pipe.
NOTE: Use soft water. Use of well water or river water may cause scaling or rusting. Add anti-corrosive to water in hot season to prevent corrosion and add anti-freeze in cold season to prevent freezing of the coolant.
8. After filling the coolant, run the engine for awhile. After stopping the engine, check the coolant level and replenish, if necessary. This rechecking of the coolant level is necessary because the coolant level will fall after initial operation as a result of expelling air from the system.

3.0 ACCESSORY PARTS GMG-430

<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>
10108694	OIL CAP	1
735-4432	1" CHROME BREATHER W/ GROMMET	1
KM2161	181 ALTERNATOR BRKT KIT	1
KM2161-1	3.0L BELT TENSIONER BRKT	1
KM2161-2	ALTERNATOR BRKT	1
K032049	ALTERNATOR	1
KM2169	CAUTION-12VOLT SYSTEM DECAL	1
3995646	S/BLOCK WATER PUMP PULLEY	1
15390	V BELT FOR 181 CHEV	1
SP05-075-018	SPACER, 5/16" x 3/4" x 3/16"	1
443830	ALTERNATOR GROUND WIRE	1
9000820	DELCO STARTER 181	1
12338064	STARTER BOLTS (L/MOUNT LONG)	1
14037733	STARTER SHORT BOLT, 181	1
10486024	HEI TIMING JUMPER	1
PF25	OIL FILTER	1
KM2172-30	EXHAUST PIPE ASSY. 3.0L	1
999301SHN	RADIATOR LSG 3.0L W/CAPS	1
602966271	COTTER PIN 3/16 x 2 1/2"	1
KM1022	#5 SAE BELLHOUSING	1
KM1021	8" CLUTCH J ADAPTER	1
KM2171	#5 SAE COVER PLATE	1
161269211	3/8NC x 1 3/4" SKT. HD. SCREW	6
16126919	3/8NC x 1 1/2" SOCCS BOLT	1
KM2066	ENGINE LIFTING EYES	1
605-1115	THERMOSTAT WATER OUTLET	1
KM1028	RADIATOR SUPPORT 3.0	1
KM1023	3.0L CARB SPACER	1
14091870	VALVE COVER GROMMET	4
8317	PUSHER FAN 17" IND. 3.0	1
7568	UPPER RADIATOR HOSE, 181	1
7217	LOWER RADIATOR HOSE, 181	1
#28	S.S. HOSE CLAMP	2
300251-6	5/16 VINYLE HOSE BLACK	2ft
183	192 DEG THERMOSTAT	1
KM2171	#5 SAE COVER PLATE	1
732-1032	1 7/8" MUFFLER CLAMP	1
PP7003	EXHAUST SUPPORT BRACKET	1

4.0 GM ENGINE PARTS

OM00-011 07/11/96



OM00-011D

1991-1999 I ENGINE ASM-3.0L L4 PART 1			
1.	0.643	RING KIT, PSTN (STD) (FOR PISTONS W/DEEP OIL GROOVE)	91-93 I (LW6) 4 14089025
	0.643	RING KIT, PSTN (.030 O.S.)	91-93 I (LW6) 4 14089026
	0.643	RING KIT, PSTN (.020 OVS - *14, 25)	95 I (LW6) 4 12361570

0.643	RING KIT, PSTN (.020 OVSI - *2, 14, 25)	96-99	I (LW6)	4	12361570	
0.643	RING KIT, PSTN (.020 OVSI - *23, 25)	94	I (LW6)	4	12361570	
0.643	RING KIT, PSTN (*19, 20, 21, 22, 23, 24, 27) (STD) (FOR PISTONS W/DEEP OIL GROOVE)	94-96	I (LW6)	4	14089025	
0.643	RING KIT, PSTN (*19, 20, 21, 22, 23, 24, 27) (.030 O.S.)	94-96	I (LW6)	4	14089026	
0.643	RING KIT, PSTN (*19, 20, 21, 27) (.030 O.S.)	97	I (LW6)	4	14089026	
0.643	RING KIT, PSTN (*19, 27, 30, 31, 32) (.030 O.S.)	98-99	I (LW6)	4	14089026	
0.643	RING KIT, PSTN (*2, 14, 19, 20, 21, 27) (STD) (FOR PISTONS W/DEEP OIL GROOVE)	97	I (LW6)	4	14089025	
0.643	RING KIT, PSTN (*2, 14, 19, 27, 30, 31, 32) (STD) (FOR PISTONS W/DEEP OIL GROOVE)	98-99	I (LW6)	4	14089025	
0.643	RING KIT, PSTN (*2, 14, 25) (STD) (FOR PISTONS W/DEEP OIL GROOVE)	94-96	I (LW6)	4	14089025	
2.	0.629	PISTON, (W/PIN) (.020 OVSI - *14, 25)	95	I (LW6)	4	3937768
0.629	PISTON, (W/PIN) (.020 OVSI - *2, 14)	97-99	I (LW6)	4	3937768	
0.629	PISTON, (W/PIN) (.020 OVSI - *2, 14, 25)	96	I (LW6)	4	3937768	
0.629	PISTON, (W/PIN) (.020 OVSI - *23, 25)	94	I (LW6)	4	3937768	
0.629	PISTON, (W/PIN) (.020" O.S. - *1, 2, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22)	91-94	I (LW6)	4	93419821	
0.629	PISTON, (W/PIN) (.020" O.S. - *19, 20, 21, 22, 27)	95-96	I (LW6)	4	93419821	
0.629	PISTON, (W/PIN) (.020" O.S. - *19, 20, 21)	97	I (LW6)	4	93419821	
0.629	PISTON, (W/PIN) (.020" O.S. - *19, 30, 31, 32)	98	I (LW6)	4	93419821	
0.629	PISTON, (W/PIN) (.020" O.S. - *19, 31, 32)	99	I (LW6)	4	93419821	
0.629	PISTON, (W/PIN) (HI-LIMIT - *1, 2, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22)	91-94	I (LW6)	4	93419820	
0.629	PISTON, (W/PIN) (HI-LIMIT - *19, 20, 21, 22, 27)	95-96	I (LW6)	4	93419820	
0.629	PISTON, (W/PIN) (HI-LIMIT - *19, 20, 21)	97	I (LW6)	4	93419820	
0.629	PISTON, (W/PIN) (HI-LIMIT - *19, 30, 31, 32)	98	I (LW6)	4	93419820	
0.629	PISTON, (W/PIN) (HI-LIMIT - *19, 31, 32)	99	I (LW6)	4	93419820	
0.629	PISTON, (W/PIN) (STD - *1, 2, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22)	91-94	I (LW6)	4	93419819	
0.629	PISTON, (W/PIN) (STD - *19, 20, 21)	97	I (LW6)	4	93419819	
0.629	PISTON, (W/PIN) (STD - *19, 20, 21, 22, 27)	95-96	I (LW6)	4	93419819	

	0.629	PISTON, (W/PIN) (STD - *19, 26, 27, 30, 31, 32)	98	I (LW6)	4	93419819
	0.629	PISTON, (W/PIN) (STD - *19, 26, 27, 31, 32)	99	I (LW6)	4	93419819
	0.629	PISTON, (W/PIN) (STD - *2, 14)	97-99	I (LW6)	4	3963663
	0.629	PISTON, (W/PIN) (STD - *2, 14, 25)	96	I (LW6)	4	3963663
	0.629	PISTON, (W/PIN) (STD - *3, 5, 6, 8, 14, 16, 23, 25)	91-95	I (LW6)	4	3963663
	0.629	PISTON, (W/PIN) (STD HI LIMIT - *2, 14, 25)	95-96	I (LW6)	4	3963667
	0.629	PISTON, (W/PIN) (STD HI LIMIT - *2, 14)	97-99	I (LW6)	4	3963667
	0.629	PISTON, (W/PIN) (STD HI LIMIT - *23, 25)	94	I (LW6)	4	3963667
3.	0.603	ROD, CONN (*14) (INCL 4, 6, 7)	91-92	I (LW6)	4	93423947
	0.603	ROD, CONN (*14) (INCL 4, 6, 7)	95	I (LW6)	4	93423947
	0.603	ROD, CONN (*19, 20, 21, 22, 24, 25, 27) (INCL 4, 6, 7)	94-95	I (LW6)	4	93423947
	0.603	ROD, CONN (*2, 14, 19, 20, 21, 22, 25, 26, 27) (INCL 4, 6, 7)	96	I (LW6)	4	93423947
	0.603	ROD, CONN (*2, 14, 19, 20, 21, 26, 27) (INCL 4, 6, 7)	97	I (LW6)	4	93423947
	0.603	ROD, CONN (*2, 14, 19, 26, 27, 30, 31, 32) (INCL 4, 6, 7)	98-99	I (LW6)	4	93423947
	0.603	ROD, CONN (*4, 6, 7) (INCL 4, 6, 7)	91-93	I (LW6)	4	93423947
4.	0.623	BOLT, CONN ROD (PART OF 3)	91-93	I (LW6)	8	14050532
	0.623	BOLT, CONN ROD (*19, 20, 21, 22, 23, 24, 25, 27) (PART OF 3)	94-95	I (LW6)	8	461372
	0.623	BOLT, CONN ROD (*2, 14, 19, 20, 21, 22, 26, 27, 30, 31) (PART OF 3)	96-97	I (LW6)	8	461372
	0.623	BOLT, CONN ROD (*2, 14, 19, 26, 27, 31, 32) (PART OF 3)	98-99	I (LW6)	8	461372
5.	0.616	BEARING KIT, CONN ROD (.001 U.S.) (.001 U.S.) (FEDERAL-MOGUL)	91-93	I (LW6)	4	12523925
	0.616	BEARING KIT, CONN ROD (.001 U.S.) (*19, 20, 21, 22, 23, 24, 25, 26, 27) (.001 U.S.) (FEDERAL-MOGUL)	94	I (LW6)	4	12523925
	0.616	BEARING KIT, CONN ROD (.001 U.S.) (*2, 14, 19, 20, 21, 22, 25, 26, 27) (.001 U.S.) (FEDERAL-MOGUL)	95-96	I (LW6)	4	12523925
	0.616	BEARING KIT, CONN ROD (.001 U.S.) (*2, 14, 19, 20, 21, 26, 27) (.001 U.S.) (FEDERAL-MOGUL)	97	I (LW6)	4	12523925
	0.616	BEARING KIT, CONN ROD (.001 U.S.) (*2, 14, 19, 26, 27, 31, 32) (.001 U.S.) (FEDERAL-MOGUL)	98-99	I (LW6)	4	12523925
	0.616	BEARING KIT, CONN ROD (STD)	91-93	I (LW6)	4	12523924
	0.616	BEARING KIT, CONN ROD (STD) (*19, 20, 21, 22, 23, 24, 25, 26, 27) (STD)	94	I (LW6)	4	12523924

	0.616	BEARING KIT, CONN ROD (STD) (*2, 14, 19, 20, 21, 22, 25, 26, 27) (STD)	95-96	I (LW6)	4	12523924
	0.616	BEARING KIT, CONN ROD (STD) (*2, 14, 19, 20, 21, 26, 27) (STD)	97	I (LW6)	4	12523924
	0.616	BEARING KIT, CONN ROD (STD) (*2, 14, 19, 26, 27, 30, 31, 32) (STD)	98-99	I (LW6)	4	12523924
7.	0.626	NUT, CONN ROD (PART OF 3) (3/8-24) (HEX)	91-95	I (LW6)	8	3866766
	0.626	NUT, CONN ROD (*2, 14, 19, 20, 21, 22, 25, 26, 27) (PART OF 3) (3/8-24) (HEX)	96-97	I (LW6)	8	3866766
	0.626	NUT, CONN ROD (*2, 14, 19, 26, 27, 30, 31, 32) (PART OF 3) (3/8-24) (HEX)	98-99	I (LW6)	8	3866766
8.	1.639	BEARING, O/PMP DRV SHF (2.375)	91-99	I (LW6)	1	326312
9.	1.079	GASKET, W/PMP (1.069)	91-99	I (LW6)	1	10101256
10.	N.S.	IMPELLER, W/PMP (PART OF 15)				
11.	N.S.	SEAL, W/PMP BRG (PART OF 15)				
12.	N.S.	BEARING, W/PMP (PART OF 15)				
13.	8.846	CAP, HTR WAT OTLT (*2, 14, 25, 26, 27) (1.073) (AC-DELCO #15544596)	95-99	I (LW6)	1	15544596
	8.846	CAP, HTR WAT OTLT (*23, 24, 25, 26, 27) (1.073) (AC-DELCO #15544596)	94	I (LW6)	1	15544596
	8.846	CAP, HTR WAT OTLT (*3, 5, 8, 14, 16) (1.073) (AC-DELCO #15544596)	91-93	I (LW6)	1	15544596
14.	8.948	CLAMP, WORM TYPE (11/16" TO 1 5/16") (HTR WAT OTLT CAP) (*3, 5, 8, 14, 16)	91-93	I (LW6)	AR	1470030
	8.948	CLAMP, WORM TYPE (11/16" TO 1 5/16") (HTR WAT OTLT CAP) (*23, 24, 25)	94	I (LW6)	AR	1470030
	8.948	CLAMP, WORM TYPE (11/16" TO 1 5/16") (HTR WAT OTLT CAP) (*14, 25, 26, 27)	95	I (LW6)	AR	1470030
	8.948	CLAMP, WORM TYPE (11/16" TO 1 5/16") (HTR WAT OTLT CAP) (*2, 14, 25, 26, 27)	96-98	I (LW6)	AR	1470030
	8.948	CLAMP, WORM TYPE (11/16" TO 1 5/16") (HTR WAT OTLT CAP) (*2, 3, 14, 19, 26, 27, 31, 32)	99	I (LW6)	AR	1470030
15.	1.069	PUMP, WAT (*2)	96-99	I (LW6)	1	12528816
	1.069	PUMP KIT, WAT (*1, 2, 4, 7, 9, 10, 11, 12, 13, 15)	91-93	I (LW6)	1	12523503
	1.069	PUMP KIT, WAT (*14, 25, 26, 27)	95-96	I (LW6)	1	12523504
	1.069	PUMP KIT, WAT (*14, 26, 27)	97-99	I (LW6)	1	12523504
	1.069	PUMP KIT, WAT (*19, 20, 21, 22)	94-97	I (LW6)	1	12523503
	1.069	PUMP KIT, WAT (*19, 30, 31, 32)	98-99	I (LW6)	1	12523503
	1.069	PUMP KIT, WAT (*23, 24, 25, 26, 27)	94	I (LW6)	1	12523504

	1.069	PUMP KIT, WAT (COOLANT) (INCL 10, 11, 12) (*3, 5, 6, 8, 14, 16)	91-93 I (LW6)	1	12523504
16.	1.079	BOLT, W/PMP (5/16-18 X 7/8) (CAD/ZC) (8.900)	91-99 I (LW6)	1	443899
17.	N.S.	HUB, FAN & W/PMP PUL (PART OF 15)	91-99 I (LW6)		
18.	8.932	WASHER, EXT TOOTH LK ZN 1/4 (CM/SHF THR BRG) (AC-DELCO #121753)	91-99 I (LW6)		121753
19.	0.533	BOLT, CM/SHF THR BRG (HEX HD DIM 3/8 280M PC 1/4-20X1/2) (8.900) (AC-DELCO #9442008)	91-98 I (LW6)	1	9442008
	0.533	BOLT, CM/SHF THR BRG (1/4-20 X 1/2, 1/8 THD) (300M, PC) (8.900)	95-99 I (LW6)	3	9442895
20.	1.079	BOLT, W/PMP (HEX, 5/16-18X1.50) (8.900) (AC-DELCO #9440366)	91-99 I (LW6)	2	9440366
21.	0.738	KEY, CM/SHF GR (PART OF 28) (19.05MM X 4.75MM) (8.960) ...	91-99 I (LW6)	2	106751
22.	0.738	BOLT, CM/SHF SPKT (HFH M10X1.5X36, FULL THD, 10.9 PD *) (8.900)	91-93 I (LW6)	AR	24504922
	0.738	BOLT, CM/SHF SPKT (*4, 12, 24, 25) (HEX HD DIM 3/8 280M PC -1/4-20X1/2) (8.900) (AC-DELCO #9442008)	94-98 I (LW6)	2	9442008
23.	0.738	WASHER, CM/SHF SPKT (0.659)	91-93 I (LW6)	1	10101744
24.	0.736	GEAR, CM/SHF	91-99 I (LW6)	1	2771369
25.	0.533	PLATE KIT, CM/SHF THR (INCL 26)	91-99 I (LW6)	1	12508079
26.	0.738	RING, CM/SHF SPKT SPCR	91-99 I (LW6)	1	549631
27.	0.539	BEARING, CM/SHF	91-99 I (LW6)	3	14002525
28.	0.519	CAMSHAFT, ENG (*1, 2, 4, 7, 9, 10, 11, 12, 13, 15) (INCL 21, 26)	91-93 I (LW6)	1	3937764
	0.519	CAMSHAFT, ENG (*19, 20, 21, 22, 30, 31) (INCL 21, 26)	94-99 I (LW6)	1	3937764
	0.519	CAMSHAFT, ENG (*2, 14, 25, 26, 27) (INCL 21, 26)	95-99 I (LW6)	1	2770015
	0.519	CAMSHAFT, ENG (*23, 24, 25, 26, 27) (INCL 21, 26)	94 I (LW6)	1	2770015
	0.519	CAMSHAFT, ENG (*3, 6, 14, 16) (INCL 21, 26)	91-93 I (LW6)	1	2770015
	0.519	CAMSHAFT, ENG (*5, 8) (INCL 21, 26)	91-93 I (LW6)	1	2770015
29.	1.837	VALVE, OIL FLTR BYPASS (*1, 2, 3, 4, 5, 6, 7, 8, 9, 10) (AC-DELCO #25013759)	91-93 I (LW6)	1	25013759
	1.837	VALVE, OIL FLTR BYPASS (*14, 25, 26, 27) (*1, 2, 3, 4, 5, 6, 7, 8, 9, 10) (AC-DELCO #25013759)	95 I (LW6)	1	25013759
	1.837	VALVE, OIL FLTR BYPASS (*19, 20, 21, 22, 23, 24, 25, 26, 27) (*1, 2, 3, 4, 5, 6, 7, 8, 9, 10) (AC-DELCO #25013759)	94 I (LW6)	1	25013759

	1.837	VALVE, OIL FLTR BYPASS (*2, 14, 25, 26, 27) (*1, 2, 3, 4, 5, 6, 7, 8, 9, 10) (AC-DELCO #25013759)	96 I (LW6)	1	25013759
	1.837	VALVE, OIL FLTR BYPASS (*2, 14, 26, 27) (*1, 2, 3, 4, 5, 6, 7, 8, 9, 10) (AC-DELCO #25013759)	97-99 I (LW6)	1	25013759
30.	0.293	PIN, CYL HD LOC (5/16X9/16 STL) (8.939) (AC-DELCO #585927)	91-99 I (LW6)	8	585927
31.	1.855	FITTING, OIL FLTR (*11, 12, 13, 14, 15, 16, 17, 18, 19, 20)	91-99 I (LW6)	1	3853870
32.	0.096	BEARING KIT, CR/SHF (#1, 2, 3, 4) (.001"U.S.) (0.616)	91-99 I (LW6)	4	12329955
	0.096	BEARING KIT, CR/SHF (#1, 2, 3, 4) (.010"U.S.) (0.616)	91-99 I (LW6)	4	12329957
	0.096	BEARING KIT, CR/SHF (#1, 2, 3, 4) (.020"U.S.) (0.616)	91-99 I (LW6)	4	12329958
	0.096	BEARING KIT, CR/SHF (#1, 2, 3, 4) (.030"U.S.) (0.616)	91-99 I (LW6)	4	12329959
	0.096	BEARING KIT, CR/SHF (#1, 2, 3, 4) (STD)	91-99 I (LW6)	4	12329954
	0.096	BEARING KIT, CR/SHF (#5) (.001"U.S.)	91-99 I (LW6)	1	10048778
	0.096	BEARING KIT, CR/SHF (#5) (STD)	91-99 I (LW6)	1	12329774
	0.096	BEARING KIT, CR/SHF (#5) (0.025" U.S.)	91-94 I (LW6)	1	10147961
	0.096	BEARING KIT, CR/SHF (#5) (0.025" U.S.) (*19, 20, 21, 22) ..	95-96 I (LW6)	1	10147961
	0.096	BEARING KIT, CR/SHF (#5) (0.025" U.S.) (*2, 14, 19, 20, 21, 26, 27)	97 I (LW6)	1	10147961
	0.096	BEARING KIT, CR/SHF (#5) (0.025" U.S.) (*2, 14, 19, 26, 27, 31, 32)	98-99 I (LW6)	1	10147961
33.	8.960	KEY, WOODRUFF #9 .187X.750 PL (CR/SHF GR) (*1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15)	91-93 I (LW6)	AR	106751
	8.960	KEY, WOODRUFF #9 .187X.750 PL (CR/SHF GR) (*19, 20, 21, 22, 23, 24)	94 I (LW6)	AR	106751
	8.960	KEY, WOODRUFF #9 .187X.750 PL (CR/SHF GR) (*19, 20, 21, 22, 25, 26, 27)	95-99 I (LW6)	1	106751
34.	0.213	SEAL, CR/SHF FRT OIL (TIMING GR CVR)	91-99 I (LW6)	1	10243247
35.	0.728	GEAR, CR/SHF	94-99 I (LW6)	1	2768986
	0.728	GEAR, CR/SHF (*1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16)	91-93 I (LW6)	1	2768986
36.	0.207	GASKET, ENG FRT CVR (*21, 22, 23, 24, 25, 26, 27)	91-99 I (LW6)	1	14096156
37.	0.206	COVER, ENG FRT (INCL 34, 42, 60)	91-99 I (LW6)	1	3992251
38.	N.S.	ABSORBER, CR/SHF BALR (PART OF 41)	91-99 I (LW6)	1	
39.	N.S.	HUB, CR/SHF BALR (PART OF 41)	91-99 I (LW6)	1	
40.	N.S.	PULLEY, CR/SHF (PART OF 41)	91-99 I (LW6)	1	

41.	0.659	BALANCER, CR/SHF (*1, 2, 3, 4, 6, 7, 9, 10, 11, 12, 13, 15) (INCL 38, 39, 40))	91-93 I (LW6)	1	3826280
	0.659	BALANCER, CR/SHF (*19, 20, 21, 22, 24, 26, 27) (INCL 38, 39, 40))	94 I (LW6)	1	3826280
	0.659	BALANCER, CR/SHF (*19, 20, 21, 22, 25, 26, 27) (INCL 38, 39, 40))	95 I (LW6)	1	3826280
	0.659	BALANCER, CR/SHF (*19, 20, 21, 26, 27) (INCL 38, 39, 40))	96-97 I (LW6)	1	3826280
	0.659	BALANCER, CR/SHF (*19, 26, 27, 30, 31, 32) (INCL 38, 39, 40))	98-99 I (LW6)	1	3826280
	0.659	BALANCER, CR/SHF (*2, 25) (INCL 38, 39, 40))	96-99 I (LW6)	1	3896590
	0.659	BALANCER, CR/SHF (*23, 25) (INCL 38, 39, 40))	94-95 I (LW6)	1	3896590
	0.659	BALANCER, CR/SHF (*5, 8, 14, 16) (INCL 38, 39, 40))	91-93 I (LW6)	1	3896590
42.	N.S.	ABSORBER, CR/SHF BALR (ABSORBER-TORSIONAL DAMPER VIBRATION)	91-99 I (LW6)	1	
43.	8.932	WASHER, EXTERNAL TOOTH LK 7/16 (CR/SHF BAL)	91-99 I (LW6)	6	136857
44.	0.662	BOLT, CR/SHF BALR (1/2-20X1.38)	91-93 I (LW6)	1	10126796
45.	1.428	NUT, OIL PAN (5/16-18 X 1/4, 286M) (POR) (8.915)	91-99 I (LW6)	AR	12338130
46.	8.931	WASHER, (OIL PAN) (AC-DELCO #9439510)	91-99 I (LW6)	2	9439510
	0.738	WASHER, OIL PAN (.263X.48X.072) (SPR LOCK) (8.931) (AC-DELCO #9439510)	91-99 I (LW6)	AR	9439510
47.	1.428	BOLT, OIL PAN (1/4-20 X 1/2, 1/8 THD) (300M, PC) (8.900)	91-99 I (LW6)	AR	9442895
48.	1.453	PLUG, OIL PAN DRN (PART OF 50) (1/2-20, 81LG)	91-99 I (LW6)	1	3921988
49.	1.456	GASKET, OIL PAN DRN PLUG (PART OF 50)	91-99 I (LW6)	1	14090908
50.	1.426	PAN, OIL (*1, 3, 4, 7, 11 - 14, 16 SECOND DSGN - 17) (INCL 48, 49)) (2ND DES 1992 OEM WITH BDCST CODE 2RA W/FRT SUMP OIL PAN.)	91-93 I (LW6)	1	93419740
	1.426	PAN, OIL (*19, 20, 23, 24, 25, 26, 27) (INCL 48, 49))	94 I (LW6)	1	93419740
	1.426	PAN, OIL (*2, 14, 19, 20, 25, 26, 27, 30, 31) (INCL 48, 49))	95-97 I (LW6)	1	93419740
	1.426	PAN, OIL (*2, 14, 19, 26, 27, 30, 31, 32) (INCL 48, 49))	98-99 I (LW6)	1	93419740
	1.426	PAN, OIL (*2, 5, 6, 8, 13 - 14, 16 FIRST DSGN - 17) (INCL 48, 49)) (1ST DES 1992 OEM ENG WITH BDCST CODE 2RW W/RR SUMP OIL PAN.)	91-93 I (LW6)	1	93419742
	1.426	PAN, OIL (*21, 22) (INCL 48, 49))	94-97 I (LW6)	1	93419741
	1.426	PAN, OIL (*9, 10, 12, 15) (INCL 48, 49))	91-93 I (LW6)	1	93419741

51.	1.428	BOLT, OIL PAN (HEX 5/16-18X5/8, 0.481 THD, 280M, ZP) (8.900)	91-99 (LW6)	2	180075
	1.428	BOLT, OIL PAN (HFH 1/4-20X.62 280M POR) (8.900)	97-99 (LW6)	2	9440033
	1.428	BOLT, OIL PAN (1/4-20 X 1/2, 1/8 THD) (300M, PC) (8.900)	97-99 (LW6)	12	9442895
52.	8.906	SCREW, RD HD SLOTTED MA 1/4-20X3/4" CAD/ZC (O/PMP CVR)	91-96 (LW6)	4	133043
53.	8.931	WASHER, (O/PMP CVR) (AC-DELCO #9439510)	91-96 (LW6)		9439510
	1.723	WASHER, O/PMP CVR (.263X.48X.072) (SPR LOCK) (8.931) (AC-DELCO #9439510)	91-96 (LW6)	4	9439510
54.	1.723	COVER, O/PMP	91-96 (LW6)	1	3792507
55.	1.724	GASKET, O/PMP CVR	91-96 (LW6)	1	3789970
56.	1.609	SPRING, OIL PRESS RLF VLV	91-96 (LW6)	1	3814903
57.	1.609	PLUG, OIL PRESS RLF VLV BORE (1.531)	91-96 (LW6)	1	3930824
58.	1.609	VALVE, OIL PRESS RLF	91-96 (LW6)	1	3829433
59.	1.652	BOLT, O/PMP (5/16-18 X 3/4, 300M) (HEX HD, STEEL) (8.900)	91-99 (LW6)	3	9424877
60.	N.S.	REINFORCEMENT, ENG FRT CVR LWR FLG (PART OF 37)			
61.	1.429	GASKET, OIL PAN	91-99 (LW6)	1	14096637
62.	0.206	BOLT, ENG FRT CVR (8.900)	91-96 (LW6)	6	9439930
	0.206	BOLT, ENG FRT CVR (1/4-20 X 1/2, 1/8 THD) (300M, PC) (8.900)	95-99 (LW6)	12	9442895
	0.206	BOLT, ENG FRT CVR (*1, 6, 14, 15) (8.900)	93 (LW6)	6	9439930
63.	1.652	PUMP, OIL (*19, 20, 21, 22, 23, 24, 25, 26, 27) (EXC SCREEN & TUBE)	94 (LW6)	1	14091485
	1.652	PUMP, OIL (*2, 14, 19, 20, 21, 22, 25, 26, 27, 30, 31) (EXC SCREEN & TUBE)	95-97 (LW6)	1	14091485
	1.652	PUMP, OIL (*2, 14, 19, 26, 27, 30, 31, 32) (EXC SCREEN & TUBE)	98-99 (LW6)	1	14091485
	1.652	PUMP, OIL (*2, 5, 6, 8, 13, 14) (EXC SCREEN & TUBE)	91-93 (LW6)	1	14091485
64.	0.748	NOZZLE, CM/SHF GR LUB	91-99 (LW6)	1	3875950
65.	1.656	BRACKET, O/PMP SCRN (PART OF 71) (*9, 10, 12, 15, 21, 22)	91-94 (LW6)	1	3905965
	N.S.	BRACKET, O/PMP SCRN (PART OF 71) (*1, 3, 4, 7, 11, 16)	(LW6)	1	
	N.S.	BRACKET, O/PMP SCRN (PART OF 71) (*2, 5, 6, 8, 13, 14)	(LW6)	1	
	1.656	BRACKET, O/PMP SCRN (PART OF 71) (*21, 22)	95 (LW6)	1	3905965
	1.656	BRACKET, O/PMP SCRN (PART OF 71) (*19, 20, 25, 26, 27)	95 (LW6)	1	3970417
	1.656	BRACKET, O/PMP SCRN (PART OF 71) (*19, 20, 23, 24, 25)	94 (LW6)	1	3970417
	1.656	BRACKET, O/PMP SCRN (PART OF 71) (*2, 14, 19, 20, 25, 26, 27)	96-99 (LW6)	1	3970417
66.	0.646	CRANKSHAFT	91-95 (LW6)	1	93427534
	0.646	CRANKSHAFT, (*2, 14, 19, 20, 21, 25, 26, 27)	96 (LW6)	1	93427534

	0.646	CRANKSHAFT, (*2, 14, 19, 20, 21, 27)	97 I (LW6)	1	93427534
	0.646	CRANKSHAFT, (*2, 14, 19, 26, 27, 30, 31, 32)	98-99 I (LW6)	1	93427534
67.	8.900	BOLT, HEX 1/4-20X3/4, 300M PC (O/PMP SCR N BRKT)	91-99 I (LW6)	AR	9425113
68.	8.929	WASHER, 1/4X1/2X1/16 HARD ZP (O/PMP SCR N BRKT)	91-96 I (LW6)	1	2436161
	1.656	WASHER, O/PMP SUC PIPE BRKT (1/4X1/2X1/16) (ZP, HARD) (8.929)	91-99 I (LW6)	AR	2436161
69.	1.652	NUT, O/PMP (*2, 14, 21, 22, 25) (HEX 3/8-16) (8.917)	96 I (LW6)	1	9442946
	1.652	NUT, O/PMP (*2, 5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 21, 22, 23, 25) (HEX 3/8-16) (8.917)	91-95 I (LW6)	1	9442946
	1.652	NUT, O/PMP (*21) (HEX 3/8-16) (8.917)	97-99 I (LW6)	1	9442946
70.	1.609	PIN, OIL PRESS RLF VLV	91-99 I (LW6)	1	838839
71.	N.S.	SCREEN, O/PMP (W/BRKT) (PART OF 63)	94-96 I (LW6)		
	1.656	SCREEN, O/PMP (W/BRKT) (*2, 5, 6, 8, 13, 14, 16) (INCL 65, 69) (PART OF 63)	91-93 I (LW6)	1	3915988
	1.656	SCREEN, O/PMP (W/SUC PIPE) (*14, 19, 20, 21, 22, 25, 26, 27) (INCL 65, 69) (PART OF 63)	95 I (LW6) (3.0L)	1	93410647
	1.656	SCREEN, O/PMP (W/SUC PIPE) (*2, 14, 19, 20, 21, 26, 27) (INCL 65, 69) (PART OF 63)	96-97 I (LW6) (3.0L)	1	93410647
	1.656	SCREEN, O/PMP (W/SUC PIPE) (*21) (INCL 65, 69) (PART OF 63)	97 I (LW6)	1	93415669
	1.656	SCREEN, O/PMP (W/SUC PIPE) (*9, 10, 12, 15, 21, 22) (INCL 65, 69) (PART OF 63)	91-96 I (LW6)	1	93415669
	1.656	SCREEN, O/PMP (*1, 3, 7, 11, 16, 19, 20, 23, 24, 25, 26, 27) (W/TUBE) (INCL 65, 69) (PART OF 63) (W/SCREEN)	91-94 I (LW6)	1	2778192
	1.656	SCREEN, O/PMP (*2, 14, 19, 20, 25, 26, 27) (W/TUBE) (INCL 65, 69) (PART OF 63)	95-96 I (LW6)	1	2778192
	1.656	SCREEN, O/PMP (*2, 14, 19, 20, 26, 27) (W/TUBE) (INCL 65, 69) (PART OF 63)	97 I (LW6)	1	2778192
	1.656	SCREEN, O/PMP (*2, 14, 19, 26, 27, 30, 31, 32) (W/TUBE) (INCL 65, 69) (PART OF 63)	98-99 I (LW6)	1	2778192
72.	0.056	BOLT, CR/SHF BRG CAP (7/16-14 X 2.98)	91-99 I (LW6)	10	3872781
73.	DISCON	CAP, CR/SHF BRG (0.095)	91-99 I (LW6)	4	3970194
74.	0.137	PIN, CR/SHF RR OIL SEAL HSG LOC (SPRING TYPE S 7/16X9/16 STL ZP) (8.940)	91-99 I (LW6)	1	9441003
75.	0.137	HOUSING, CR/SHF RR OIL SEAL (INCL 80, 81) (0.659)	91-99 I (LW6)	1	14088556
76.	0.137	BOLT, CR/SHF RR OIL SEAL HSG (HFH, 1/4-20X1.38, .52 OD, .75 THD, 280M, PO)	91-99 I (LW6)	AR	14096659

77.	0.137	BOLT, CR/SHF RR OIL SEAL HSG	91-99 I (LW6)	AR 14096658
78.	0.137	GASKET, CR/SHF RR OIL SEAL HSG	91-97 I (LW6)	1 12555714
	0.137	GASKET, CR/SHF RR OIL SEAL HSG (*2, 14, 19, 26, 30, 31, 32)	98-99 I (LW6)	1 12555714
79.	0.056	STUD, CR/SHF BRG CAP (*2, 3, 5, 6, 8, 9, 10, 12, 13, 14, 15, 18, 21, 22, 24, 26, 27)	91-96 I (LW6)	1 3852870
	0.056	STUD, CR/SHF BRG CAP (*21)	97 I (LW6)	1 3852870
80.	0.137	STUD, CR/SHF RR OIL SEAL RET (PART OF 75) (5/16X18X1 43/64) (1.428)	91-99 I (LW6)	2 14080362
81.	0.137	SEAL, CR/SHF RR OIL (NORMAL ROTATION) (PART OF 75)	91-99 I (LW6)	1 10088158
82.	0.673	GEAR, FLYWHL RING (*1, 2, 3, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22, 24, 25, 26, 27) (PART OF 87)) (153 TEETH)	91-95 I (LW6)	1 3991407
	0.673	GEAR, FLYWHL RING (*19, 20, 21, 22, 24, 26, 27) (PART OF 87)) (153 TEETH)	96 I (LW6)	1 3991407
	0.673	GEAR, FLYWHL RING (*19, 20, 21, 26, 27, 30) (PART OF 87)) (153 TEETH)	97 I (LW6)	1 3991407
	0.673	GEAR, FLYWHL RING (*19, 26, 27, 30) (PART OF 87)) (153 TEETH)	98-99 I (LW6)	1 3991407
	0.673	GEAR, FLYWHL RING (*31, 32) (PART OF 87))	98 I (LW6)	1 460583
83.	0.669	WASHER, FLYWHL (*1, 2, 3, 4, 7, 9, 10, 11, 12, 13, 15, 17, 20, 21, 22, 24, 25.) (7/16) (EXT TOOTH LK) (8.932)	91-94 I (LW6)	1 136857
	0.669	WASHER, FLYWHL (*19, 20, 21, 22, 26, 27) (7/16) (EXT TOOTH LK) (8.932)	95-99 I (LW6)	1 136857
84.	0.669	BOLT, FLYWHL (*1, 2, 3, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22, 24, 26, 27)	91-95 I (LW6)	6 839756
	0.669	BOLT, FLYWHL (*19, 20, 21, 22, 26, 27)	96-98 I (LW6)	6 839756
	0.669	BOLT, FLYWHL (*19, 20, 21, 26, 27) (7/16-20X.97)	95-97 I (LW6)	6 12337973
	0.669	BOLT, FLYWHL (*19, 26, 27, 30, 31, 32) (7/16-20X.97)	98-99 I (LW6)	6 12337973
85.	0.446	BOLT, VLV PUSH ROD CVR	91-99 I (LW6)	4 3814350
86.	0.649	BEARING, CLU PILOT (*1, 4, 7, 11, 19, 20) (NEEDLE) (19/32 ID 1 3/32 O.D.X 3/4)	91-99 I (LW6)	1 14061685
87.	0.666	FLYWHEEL, ENG (*1, 2, 3, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22, 24, 26, 27) (INCL 82))	91-95 I (LW6)	1 93422872
	0.666	FLYWHEEL, ENG (*19, 20, 21, 22, 26, 27) (INCL 82))	96-97 I (LW6)	1 93422872
	0.666	FLYWHEEL, ENG (*19, 26, 27, 30) (INCL 82))	98-99 I (LW6)	1 93422872
	0.666	FLYWHEEL, ENG (*31, 32) (INCL 82))	98-99 I (LW6)	1 93419731

88.	N.S.	COVER, VLV PUSH ROD (ORIGINAL CVR) (USE 14096155 GASKET)	91-95 I (LW6)	
	0.439	COVER, VLV PUSH ROD (439.5MM X 108.5MM, 4 RD CORNERS) (USE W/10021542 GASKET)	91-99 I (LW6)	1 10024137
89.	0.685	PIN, TRANS LOC (5/8 DIA, 1 3/16 LG) (8.939)	91-99 I (LW6)	2 12338119
90.	0.443	GASKET, VLV PUSH ROD CVR (SEE ITEM #88) (SERVICE ORIGINAL CVR ONLY)	91-95 I (LW6)	AR 14096155
	0.443	SEALER, VLV PUSH ROD CVR (RTV SILICONE) (3.35 OZ TUBE) (WHEN REQUIRED) (8.800)	94-99 I (LW6)	AR 12345739
91.	1.531	PLUG, ENG BLK OIL GAL (AUTO DRAIN, INT SQ, 3/8-18X.42 PEOR STL) (8.971)	91-99 I (LW6)	1 14090911
92.	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*1, 4, 7, 11, 19, 20, 21, 22, 29) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS, RR SEAL GASKET)	91-95 I (LW6)	1 10159451
	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*14, 25) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS)	95 I (LW6)	1 93429813
	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*19, 20, 21, 22) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS, RR SEAL GASKET)	96-97 I (LW6)	1 10159451
	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*19, 30, 31, 32) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS, RR SEAL GASKET)	98-99 I (LW6)	1 10159451
	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*2, 14, 25) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS)	96-99 I (LW6)	1 93429813
	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*2, 6, 9, 10, 12, 13, 15) (*18) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS, RR SEAL GASKET)	91-93 I (LW6)	1 10159451
	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*26) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS, RR SEAL GASKET)	94 I (LW6)	1 12523704
	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*26, 27) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS, RR SEAL GASKET)	95-99 I (LW6)	1 12523704

	0.033	ENGINE, 3.0 L (181 CID) SERV PARTIAL (*3, 5, 8, 14, 16, 23, 25, 27) (INCL'S BLK, PSTN & ROD, CR/SHF, CR/SHF BRGS, CONN ROD BRGS)	91-94	I (LW6)	1	93429813
93.	0.553	PLUG, CM/SHF RR BRG HOLE ..	91-99	I (LW6)	1	3704158
94.	0.034	PLUG, ENG BLK CORE HOLE ..	91-93	I (LW6)	AR	3826505
	0.034	PLUG, ENG BLK CORE HOLE (*19, 20, 21, 22, 24, 25)	94	I (LW6)	AR	3826505
	0.034	PLUG, ENG BLK CORE HOLE (50.8MM) (CUP TYPE) (*23)	94	I (LW6)	AR	3789860
	0.034	PLUG, ENG BLK CORE HOLE (*19, 20, 21, 22, 26, 27)	95-99	I (LW6)	AR	3826505
	0.034	PLUG, ENG BLK CORE HOLE (50.8MM) (CUP TYPE) (*2, 14, 25)	95-98	I (LW6)	AR	3789860
95.	N.S.	PLUG, OIL LVL IND TUBE HOLE				
96.	1.531	PLUG, ENG BLK OIL GAL (37/64 DIA) (8.970) (FRT END OF ENG BLK AT OIL GALLERY)	91-99	I (LW6)	1	3835577
97.	1.516	TUBE, OIL LVL IND (*14) (WITH BRACKET)	96-99	I (LW6)	1	93429975
	1.516	TUBE, OIL LVL IND (*14, 24, 26, 27)	94	I (LW6)	1	2768595
	1.516	TUBE, OIL LVL IND (*2, 14, 24, 25, 26, 27)	95	I (LW6)	1	2768595
	1.516	TUBE, OIL LVL IND (*2, 27) (EXC BRACKET)	96-97	I (LW6)	1	2768595
	1.516	TUBE, OIL LVL IND (*2, 27) (WITH BRACKET)	98-99	I (LW6)	1	93429975
	1.516	TUBE, OIL LVL IND (*25, 26) (EXC BRACKET)	96-99	I (LW6)	1	2768595
	1.516	TUBE, OIL LVL IND (*3 - 14, 16 SECOND DESIGN - 17 (OEM ENGINE BDCST CODE 2RW W/FRT SUMP OIL PAN.)	91-93	I (LW6)	1	2768595
	1.516	TUBE, OIL LVL IND (*5, 8 - 14, 16 FIRST DESIGN - 17 OEM ENGINE BDCST CODE 2RA W/REAR SUMP OIL PAN.)	91-93	I (LW6)	1	93420020
98.	1.516	INDICATOR, OIL LVL (*2, 14, 25, 26, 27)	95-99	I (LW6)	1	14025224
	1.516	INDICATOR, OIL LVL (*3, 5, 8, 14, 16, 23, 24, 25)	91-94	I (LW6)	1	14025224
100.	0.443	SEALER, VLV PUSH ROD CVR (BLACK) (5 OZ. CARTRIDGE) (LOCTITE RTV 5900) (8.800)	95-99	I (LW6)	AR	12346286
101.	0.446	STUD, VLV PUSH ROD CVR (*14) (INCL NEOPRENE RUBBER WASHER .53 OD .06 THICK SAE 10R4)	96-99	I (LW6)	1	352169
102.	0.439	NUT, VLV PUSH ROD CVR (*14) (8.915)	96-99	I (LW6)	AR	451399
103.	0.446	WASHER, VLV PUSH ROD CVR (*14) (25/64 X 47/64 X 1/16) (8.929)	96-99	I (LW6)	3	2436163

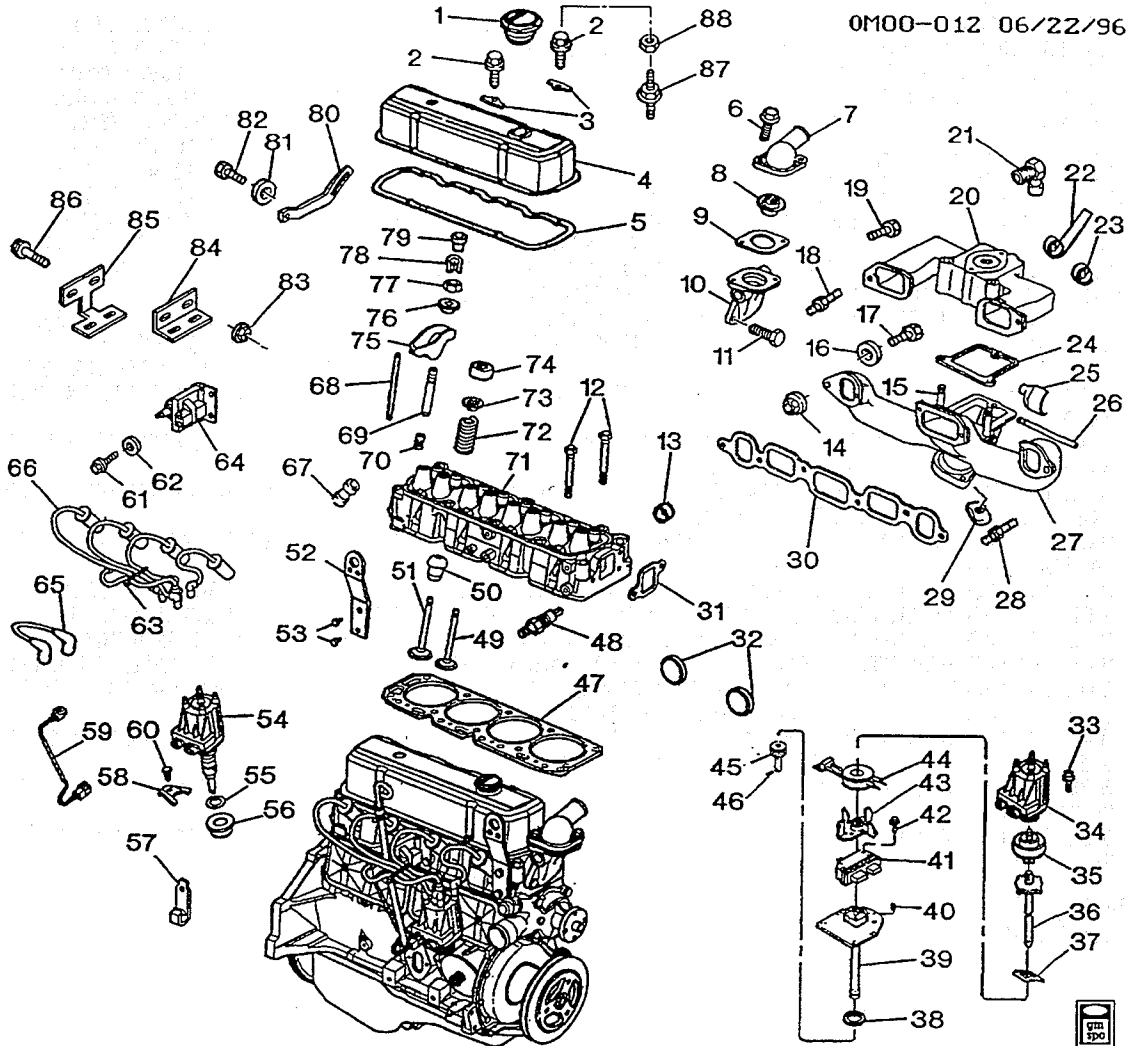
NOTE 1: 3.0L 181 CID MARINE ENG. 1991 14097242 (1RT); 1992 14097382 (2RT); 1993 10213737 (3RT).

NOTE 2: 3.0L 181 CID MARINE ENG. 1991 14097244 (1RS), 1992 14097384 (2RS), 1993 10213741 (3RS), 1996 93427130 (6RS), 1997 93428833 (7RS), 1998 93430376 (8RS), 1999 93433192 (9RS).

- NOTE 3: 3.0L 181 CID MARINE ENG. 1991 14097398 (1RH), 1992 14097399 (2RH), 1993 10213742 (3RH), 1999 93433798 (9RH).
- NOTE 4: 3.0L 181 CID MARINE ENG. 1991 14097438 (1RJ); 1992 14097440 (2RJ); 1993 10213743 (3RJ).
- NOTE 5: 3.0L 181 CID MARINE ENG. 1991 14097251 (1RZ); 1992 14097393 (2RZ); 1993 10213758 (3RZ).
- NOTE 6: 3.0L 181 CID MARINE ENG. 1991 14097249 (1RD); 1992 14097391 (2RD); 1993 10213828 (3RD).
- NOTE 7: 3.0L 181 CID MARINE ENG. 1991 14097246 (1RX); 1992 14097387 (2RX); 1993 10213829 (3RX).
- NOTE 8: 3.0L 181 CID MARINE ENG. 1991 14097250 (1RY); 1992 14097392 (2RY); 1993 10213830 (3RY).
- NOTE 9: 3.0L 181 CID MARINE ENG. 1991 14097376 (1RB); 1992 14097385 (2RB); 1993 10214171 (3RB).
- NOTE 10: 3.0L 181 CID MARINE ENG. 1991 14097377 (1RC); 1992 14097390 (2RC); 1993 10214172 (3RC).
- NOTE 11: 3.0L 181 CID MARINE ENG. 1991 14097439 (1RK); 1992 14097441 (2RK); 1993 10214176 (3RK).
- NOTE 12: 3.0L 181 CID MARINE ENG. 1991 14097247 (1RR); 1992 14097388 (2RR); 1993 10214178 (3RR).
- NOTE 13: 3.0L 181 CID MARINE ENG. 1991 14097248 (1RU); 1992 14097389 (2RU); 1993 10214179 (3RU).
- NOTE 14: 3.0L 181 CID MARINE ENG. 1991 14097330 (1RA), 1992 14097394 (2RA), 1995 93427533 (5RA), 1996 93427535 (6RA), 1997 93428834 (7RA), 1998 93430377 (8RA), 1999 93433187 (9RA).
- NOTE 15: 3.0L 181 CID MARINE ENG. 1991 14097243 (1RP), 1992 14097383 (2RP), 1993 10214177 (3RP).
- NOTE 16: 3.0L 181 CID MARINE ENG. 1992 10224590 (2RW); 1993 10224591 (3RW).
- NOTE 17: FIRST DESIGN IS WITH REAR SUMP OIL PAN; SECOND DESIGN IS WITH FRONT SUMP OIL PANL.
- NOTE 18: MAY NEED TO REMOVE RIGHT HAND #4 MAIN BEARING CAP BOLT AND REPLACE WITH #3852870 STUD (ITEM #79).
- NOTE 19: 3.0L 181 CID MARINE ENG. 1994 10232482 (4RX), 1995 12552044 (5RX), 1996 93427129 (6RX), 1997 93428832 (7RX), 1998 93430375 (8RX), 1999 93433194 (9RX).
- NOTE 20: 3.0L 181 CID MARINE ENG. 1994 10232483 (4RK), 1995 12552042 (5RK), 1996 93427127 (6RK), 1997 93428830 (7RK), 1998 93430373 (8RK).
- NOTE 21: 3.0L 181 CID MARINE ENG. 1994 10232486 (4RR), 1995 12552043 (5RR), 1996 93427128 (6RR), 1997 93428831 (7RR).
- NOTE 22: 3.0L 181 CID MARINE ENG. 1994 10232487 (4RC), 1995 12552041 (5RC), 1996 93427126 (6RC).
- NOTE 23: 3.0L 181 CID INDUSTRIAL ENG. 1994 10232511 (4RW) (CANC REPL BY ---> (12551321 (4RN)).
- NOTE 24: 3.0L 181 CID INDUSTRIAL ENG. 1994 10243387 (4RL) (CANC REPL BY ---> (12551320 (4RM)).
- NOTE 25: 3.0L 181 CID INDUSTRIAL ENG. 1994 12551321 (4RN), 1995 12552039 (5RN), 1996 93427124 (6RN).
- NOTE 26: 3.0L 181 CID CRUSADER ENG. 1994 12551276 (4RF), 1995 12552040 (5RF), 1996 93427125 (6RF), 1997 93428829 (7RF), 1998 93430372 (8RF), 1999 93433188 (9RF).
- NOTE 27: 3.0L 181 CID INDUSTRIAL ENG. 1994 12551320 (4RM), 1995 12552038 (5RM), 1996 93427123 (6RM), 1997 93428828 (7RM), 1998 93430371 (8RM), 1999 93433189 (9RM).
- NOTE 31: 3.0L 181 CID MARINE ENG. 1998 93432747 (8RP), 1999 93433190 (9RP).
- NOTE 32: 3.0L 181 CID MARINE ENG. 1998 93432786 (8RQ), 1999 93433191 (9RQ).

RPO DEFINITIONS

LW6 - ENGINE, GAS, 4 CYL



OM00-012D

1991-1999 I ENGINE ASM-3.0L L4 PART 2

1.	1.758	CAP, OIL FIL (*1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 19, 21, 22, 23, 24, 25, 26, 27) (PUSH ON TYPE) (RUBBER) (AC-DELCO #FC140)	91-96 I (LW6)	1	10110859
	1.758	CAP, OIL FIL (*19, 21, 26, 27) (PUSH ON TYPE) (RUBBER) (AC-DELCO #FC140)	97 I (LW6)	1	10110859
	1.758	CAP, OIL FIL (*19, 21, 26, 27, 30, 31, 32) (PUSH ON TYPE) (RUBBER) (AC-DELCO #FC140)	98-99 I (LW6)	1	10110859
2.	0.413	BOLT, VLV RKR ARM CVR (SPL HFH 1/4-20X.87 DOG PT FULL THD PS .52-OD) (1.428)	91-93 I (LW6)	AR	25520079
	0.413	BOLT, VLV RKR ARM CVR (1/4-20 X 1/2, 1/8 THD) (300M, PC) (8.900)	94-99 I (LW6)	AR	9442895
3.	0.413	REINFORCEMENT, VLV RKR ARM CVR (*1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 19, 21, 22, 23, 24, 25, 26, 27)	91-96 I (LW6)	AR	3877670

	0.413	REINFORCEMENT, VLV RKR ARM CVR (*2, 14, 19, 21, 26, 27, 30, 31, 32)	97-99 I (LW6)	AR	3877670
4.	0.386	COVER, VLV RKR ARM (*1, 2, 3, 5, 7, 8, 9, 10, 12, 13, 14, 15, 16, 19, 21, 22, 23, 24, 25, 26, 27) (INCL 57)	91-95 I (LW6)	1	2770089
	0.386	COVER, VLV RKR ARM (*2, 14, 19, 21, 22, 25, 26, 27, 30, 31, 32) (INCL 57)	96-98 I (LW6)	1	2770089
	0.386	COVER, VLV RKR ARM (*4, 11, 20) (INCL 57)	91-98 I (LW6)	1	2769092
	0.386	COVER, VLV RKR ARM (*6) (INCL 57)	91-93 I (LW6)	1	2770090
5.	0.423	GASKET, VLV RKR ARM CVR (*1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 19, 21, 22, 23, 24, 25, 26, 27)	91-95 I (LW6)	AR	14096154
	0.423	GASKET, VLV RKR ARM CVR (*2, 14, 19, 21, 22, 25, 26, 27, 30, 31, 32)	96-99 I (LW6)	AR	14096154
6.	1.251	BOLT, ENG COOL THERM HSG (*26, 27) (HEX) (3/8-16X1.00 300M) (8.900) (AC-DELCO #9424320)	96-99 I (LW6)	3	9424320
	1.251	BOLT, ENG COOL THERM HSG (*3, 5, 6) (HFH 3/8-16X .88 280 POR 0.75 OD 0.72 THD) (8.900)	91-93 I (LW6)	2	9440169
	1.251	BOLT, ENG COOL THERM HSG (*3, 5, 6, 24, 26, 27) (HEX) (3/8-16X1.00 300M) (8.900) (AC-DELCO #9424320)	91-95 I (LW6)	3	9424320
7.	1.153	OUTLET, WAT (*3, 5, 6, 24, 26, 27)	91-99 I (LW6)	1	3841191
8.	1.246	THERMOSTAT, ENG COOL (*3, 5, 6, 24, 26, 27) (AC-DELCO #131-84)	91-99 I (LW6)	1	10220957
9.	1.154	GASKET, WAT OTLT (*26, 27) (AC-DELCO #10105135)	97-99 I (LW6)	1	10105135
	1.154	GASKET, WAT OTLT (*3, 5, 6, 24, 26, 27) (AC-DELCO #10105135)	91-96 I (LW6)	1	10105135
10.	1.251	HOUSING, ENG COOL THERM (*3, 5, 6, 24, 26, 27)	91-99 I (LW6)	1	3789160
11.	1.251	BOLT, ENG COOL THERM HSG (*26, 27) (HEX) (3/8-16X1.00 300M) (8.900) (AC-DELCO #9424320)	96-99 I (LW6)	3	9424320
	1.251	BOLT, ENG COOL THERM HSG (*3, 5, 6) (HFH 3/8-16X .88 280 POR 0.75 OD 0.72 THD) (8.900)	91-93 I (LW6)	2	9440169
	1.251	BOLT, ENG COOL THERM HSG (*3, 5, 6, 24, 26, 27) (HEX) (3/8-16X1.00 300M) (8.900) (AC-DELCO #9424320)	91-95 I (LW6)	3	9424320
12.	0.293	BOLT, CYL HD (HEX, 1/2-13X3.6, 1041 STZ, PLAIN, MACH, W/SEALER) (USE/W 12346004 SEALANT)	94-99 I (LW6)	AR	10166832

	0.293	BOLT, CYL HD (*17) (HEX, 1/2-13X3.6, 1041 STZ, PLAIN, MACH, W/SEALER)	91-93 I (LW6)	AR	10166832
13.	0.293	PLUG, CYL HD CORE HOLE (0.034)	91-99 I (LW6)	2	3826506
14.	3.604	NUT, EXH MANIF (*2, 25, 26, 27) (3/8-24, 301M ZC *) (HEX) (8.915)	96-99 I (LW6)	8	225854
	3.604	NUT, EXH MANIF (*8, 9, 11, 16, 23, 24, 25, 26, 27) (3/8-24, 301M ZC *) (HEX) (8.915)	91-95 I (LW6)	8	225854
15.	3.275	STUD, INT MANIF (*2, 25, 26, 27) (STRAIGHT, NO THDS "A"SIDE, 3/8-16X0.3, 0.9 TOTAL LEN, 1018, PLAIN)	96-99 I (LW6)	2	3835487
	3.275	STUD, INT MANIF (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27) (STRAIGHT, NO THDS "A"SIDE, 3/8-16X0.3, 0.9 TOTAL LEN, 1018, PLAIN)	91-95 I (LW6)	2	3835487
16.	3.275	WASHER, EXH MANIF (*2, 25, 26, 27) (#10X18.30) (LK) (8.931) (*M10 HOLE SIZE X 18.30 OD X .117 THK)	96 I (LW6)	AR	11500046
	3.275	WASHER, EXH MANIF (*2, 26, 27) (#10X18.30) (LK) (8.931) (*M10 HOLE SIZE X 18.30 OD X .117 THK)	97-99 I (LW6)	AR	11500046
	3.275	WASHER, EXH MANIF (*24, 25, 26, 27) (#10X18.30) (LK) (8.931) (*M10 HOLE SIZE X 18.30 OD X .117 THK)	93-95 I (LW6)	AR	11500046
	3.275	WASHER, EXH MANIF (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27) (29/64 X 49/64 X 7/64) (HEL SPR LK) (8.931)	91-96 I (LW6)	6	9439513
17.	3.275	BOLT, EXH MANIF (*2, 25, 26, 27) (HEX) (3/8-16X1.00 300M) (8.900) (AC-DELCO #9424320)	96-99 I (LW6)	3	9424320
	3.275	BOLT, EXH MANIF (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27) (HEX) (3/8-16X1.00 300M) (8.900) (AC-DELCO #9424320)	91-95 I (LW6)	3	9424320
18.	3.275	STUD, EXH MANIF (*2, 25, 26, 27)	96-99 I (LW6)	1	3794230
	3.275	STUD, EXH MANIF (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27)	91-95 I (LW6)	1	3794230
19.	3.275	BOLT, INT MANIF (*26, 27) (3/8-16 X 1 1/4, 300M) (HEX) (USE T/W 12346193 SEALER) (8.900)	97-99 I (LW6)	AR	9440954
	3.275	BOLT, INT MANIF (*3, 5, 8, 14, 16, 24, 26, 27) (3/8-16 X 1 1/4, 300M) (HEX) (USE T/W 12346193 SEALER) (8.900)	91-96 I (LW6)	AR	9440954
20.	3.265	MANIFOLD, INT (*2, 25, 26, 27)	96-99 I (LW6)	1	5743050
	3.265	MANIFOLD, INT (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27)	91-95 I (LW6)	1	5743050

21.	3.278	FITTING, INT MANIF VAC (*26, 27)	96-99	I (LW6)	1	3989020
	3.278	FITTING, INT MANIF VAC (*3, 24, 26, 27)	91-95	I (LW6)	1	3989020
22.	3.641	SPRING, EFE VLV A/RTL (*2) ..	97-99	I (LW6)	1	602799
	3.641	SPRING, EFE VLV A/RTL (*2, 25)	96	I (LW6)	1	602799
	3.641	SPRING, EFE VLV A/RTL (*5, 8, 14, 16, 23, 25)	91-95	I (LW6)	1	602799
23.	3.640	THERMOSTAT, EFE VLV (*2) ...	97-99	I (LW6)	1	838573
	3.640	THERMOSTAT, EFE VLV (*2, 25)	96	I (LW6)	1	838573
	3.640	THERMOSTAT, EFE VLV (*5, 8, 14, 16, 23, 25)	91-95	I (LW6)	1	838573
24.	3.270	GASKET, EXH MANIF (*2, 25, 26, 27)	96-99	I (LW6)	1	10141249
	3.270	GASKET, EXH MANIF (*3, 5, 8, 14, 23, 24, 25, 26, 27)	91-95	I (LW6)	1	10141249
25.	3.140	BUSHING, EFE VLV SHF (*2) (3.647)	97-99	I (LW6)	2	3848282
	3.140	BUSHING, EFE VLV SHF (*2, 25) (3.647)	96	I (LW6)	2	3848282
	3.140	BUSHING, EFE VLV SHF (*23, 25) (3.647)	94	I (LW6)	2	3848282
	3.140	BUSHING, EFE VLV SHF (*25) (3.647)	95	I (LW6)	2	3848282
	3.140	BUSHING, EFE VLV SHF (*5, 8, 14) (3.647)	91-93	I (LW6)	2	3848282
26.	N.S.	SHAFT, EFE VLV (PART OF 27) (*5, 8, 14, 23, 25)				
27.	3.601	MANIFOLD, EXH (*2) (INCL 26)	97-99	I (LW6)	1	458432
	3.601	MANIFOLD, EXH (*2, 25) (INCL 26)	96	I (LW6)	1	458432
	3.601	MANIFOLD, EXH (*26, 27) (INCL 26)	96-99	I (LW6)	1	2767499
	3.601	MANIFOLD, EXH (*3, 24, 26, 27) (INCL 26)	91-95	I (LW6)	1	2767499
	3.601	MANIFOLD, EXH (*5, 8, 14, 16, 23) (INCL 26)	91-95	I (LW6)	1	458432
28.	3.613	STUD, EXH PIPE (*2, 25, 26, 27)	96-99	I (LW6)	2	14088827
	3.613	STUD, EXH PIPE (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27)	91-95	I (LW6)	2	14088827
29.	3.273	CLAMP, INT & EXH MANIF (*2, 26, 27)	97-99	I (LW6)	4	3792519
	3.273	CLAMP, INT & EXH MANIF (*26, 27)	96	I (LW6)	4	3792519
	3.273	CLAMP, INT & EXH MANIF (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27)	91-95	I (LW6)	4	3792519
30.	3.270	GASKET, INT MANIF (*2, 25, 26, 27)	96-99	I (LW6)	1	12517943
	3.270	GASKET, INT MANIF (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27)	91-95	I (LW6)	1	12517943
31.	1.252	GASKET, ENG COOL THERM HSG (*26, 27)	96-99	I (LW6)	1	10140501
	1.252	GASKET, ENG COOL THERM HSG (*3, 5, 6, 24, 26, 27)	91-95	I (LW6)	1	10140501
32.	0.034	PLUG, ENG BLK CORE HOLE (*1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21, 22, 24, 26, 27) (41.5MM DIA) (BRASS) .	91-95	I (LW6)	AR	3826504

	8.970	PLUG, WATER JACKET SIDE (ENG BLK CORE HOLE) (*16, 23, 25) (0.034)	91-95 I (LW6)	AR	838538
	0.034	PLUG, ENG BLK CORE HOLE (*19, 20, 21, 22, 26, 27) (41.5MM DIA) (BRASS)	96-99 I (LW6)	AR	3826504
	8.970	PLUG, WATER JACKET SIDE (ENG BLK CORE HOLE) (*2, 14, 25) (0.034)	96-98 I (LW6)	AR	838538
33.	2.368	BOLT, DISTR CAP (PART OF 54) (AC-DELCO #10469669)	91-99 I (LW6)	2	10469669
34.	2.367	CAP, DISTR (PART OF 54)	91-95 I (LW6)	1	10469698
	2.367	CAP, DISTR (PART OF 54) (AC-DELCO #D315A)	91-99 I (LW6)	1	10476237
35.	2.382	ROTOR, DISTR (PART OF 54) (AC-DELCO #D450)	91-99 I (LW6)	1	10467546
36.	2.372	SHAFT, DISTR (PART OF 54) (AC-DELCO #10468359)	91-98 I (LW6)	1	10468359
37.	2.372	RETAINER, DISTR IGN PICK UP COIL (PART OF 54) (AC-DELCO #10474792)	91-99 I (LW6)	1	10474792
38.	2.363	SEAL, DISTR HSG OIL (O RING) (PART OF 54) (1.639) (AC-DELCO #10477565)	91-99 I (LW6)	1	10477565
39.	2.362	HOUSING, DISTR (PART OF 54) (AC-DELCO #10468362)	91-98 I (LW6)	1	10468362
40.	2.372	PIN, DISTR IGN PICK UP POLE PIECE LOC (PART OF 54) (1/8 X 1/2 ZN) (CHAMFERED ENDS, ZINC PLT) (3.459)	91-99 I (LW6)	1	454666
41.	2.383	MODULE, DISTR IGN CONT (PART OF 54) (AC-DELCO #D1965A)	91-99 I (LW6)	1	10482830
42.	2.383	BOLT, DISTR ICM (PART OF 54) (AC-DELCO #10469668)	91-99 I (LW6)	2	10469668
43.	2.372	POLE PIECE, DISTR PICK UP (PART OF 54) (AC-DELCO #10469667)	91-99 I (LW6)	1	10469667
44.	2.372	COIL, DISTR PICK UP (PART OF 54) (AC-DELCO #D1944A)	91-99 I (LW6)	1	10470794
45.	2.374	GEAR, DISTR SHF (PART OF 54) (AC-DELCO #10468365)	91-98 I (LW6)	1	10468365
46.	2.379	PIN, DISTR GR (PART OF 54) (8.939) (AC-DELCO #9422127)	91-99 I (LW6)	1	9422127
47.	0.289	GASKET, CYL HD (PART OF GASKET KIT, CYL HD)	91-99 I (LW6)	1	14096660
	0.289	GASKET KIT, CYL HD (INCLS #5, 30, 31) (INCL GASKET, CYL HD)	91-99 I (LW6)	1	12457584
48.	2.270	SPARK PLUG, (AC-DELCO #R46TS)	91-99 I (LW6)	4	5613326
	2.270	SPARK PLUG, (AC MR 43T - *1, 2, 4, 9, 15) (AC-DELCO #MR43T)	91-93 I (LW6)	4	5613438
	2.270	SPARK PLUG, (AC MR43LTS - *7, 10, 11, 12, 13, 19, 20, 21, 22) (AC-DELCO #MR43LTS)	91-95 I (LW6)	4	5614210

	2.270	SPARK PLUG, (AC MR43LTS) - (*19, 20, 21) (AC-DELCO #MR43LTS)	96-97 I (LW6)	4	5614210
	2.270	SPARK PLUG, (AC MR43LTS) - (*19, 30, 31, 32) (AC-DELCO #MR43LTS)	98-99 I (LW6)	4	5614210
	2.270	SPARK PLUG, (AC MR43LTS) - (*30, 31) (AC-DELCO #MR43LTS)	98 I (LW6)	4	5614210
	2.270	SPARK PLUG, (AC R45T - *6) (AC-DELCO #R45T)	91-93 I (LW6)	4	5613875
49.	DISCON	VALVE, EXH (.0035 O.S.) (*19, 20, 21, 22, 30)	96 I (LW6)	4	3940912
	DISCON	VALVE, EXH (.0035 O.S.) (*7, 10, 11, 12, 13, 19, 20, 21, 22)	91-95 I (LW6)	4	3940912
	DISCON	VALVE, EXH (.0035"O.S.) (*3, 5, 6, 8, 14, 16)	91-93 I (LW6)	4	6263774
	DISCON	VALVE, EXH (.0035"O.S.) (1ST DES ID BY ENG STAMPING CODES 4RL, 4RW. NO COMPARABLE- 2ND DES.) (*23)	94 I (LW6)	4	6263774
	0.297	VALVE, EXH (.0035"O.S.) (2ND DES ID BY ENG STAMPING CODES 4RM, 4RN.) (*23)	94 I (LW6)	4	14082312
	DISCON	VALVE, EXH (.0155 O.S.) (*19, 20, 21, 22)	96 I (LW6)	4	3940913
	DISCON	VALVE, EXH (.0155 O.S.) (*3, 5, 6, 8, 14, 16)	91-93 I (LW6)	4	6263775
	DISCON	VALVE, EXH (.0155 O.S.) (*7, 10, 11, 12, 13, 19, 20, 21, 22)	91-95 I (LW6)	4	3940913
	DISCON	VALVE, EXH (.0155 O.S.) (1ST DES ID BY ENG STAMPING CODES 4RL, 4RW.) (*23)	94 I (LW6)	4	6263775
	0.297	VALVE, EXH (.0155" O.S.) (2ND DES ID BY ENG STAMPING CODES 4RM, 4RN.) (*23)	94 I (LW6)	4	14082313
	DISCON	VALVE, EXH (.0305 O.S.) (*19, 20, 21, 22)	96 I (LW6)	4	3940914
	DISCON	VALVE, EXH (.0305 O.S.) (*3, 5, 6, 8, 14, 16)	91-93 I (LW6)	4	6263776
	DISCON	VALVE, EXH (.0305 O.S.) (*7, 10, 11, 12, 13, 19, 20, 21, 22)	91-95 I (LW6)	4	3940914
	DISCON	VALVE, EXH (.0305 O.S.) (1ST DES ID BY ENG STAMPING CODES 4RL, 4RW.) (*23)	94 I (LW6)	4	6263776
	0.297	VALVE, EXH (*1, 2, 4, 9, 15) (.0305 O.S.)	91-93 I (LW6)	4	14033160
	0.297	VALVE, EXH (*1, 2, 4, 9, 15) (STD)	91-93 I (LW6)	4	14095451
	0.297	VALVE, EXH (*1, 2, 4, 9, 15) (.0035 O.S.)	91-93 I (LW6)	4	14095459
	0.297	VALVE, EXH (*1, 2, 4, 9, 15) (.0155 O.S.)	91-93 I (LW6)	4	14095460
	0.297	VALVE, EXH (*19, 20, 21) (STD)	96-97 I (LW6)	4	3937750
	0.297	VALVE, EXH (*19, 30, 31, 32) (STD)	98-99 I (LW6)	4	3937750
	0.297	VALVE, EXH (*7, 10, 11, 12, 13, 19, 20, 21, 22) (STD)	91-95 I (LW6)	4	3937750

	0.297	VALVE, EXH (STD) (*2, 14, 25, 26, 27)	96-99 I (LW6)	4	14082305
	0.297	VALVE, EXH (STD) (*3, 5, 6, 8, 14, 16)	91-93 I (LW6)	4	6263778
	0.297	VALVE, EXH (STD) (1ST DES ID BY ENG STAMPING CODES 4RL, 4RW.) (*23, 24)	94 I (LW6)	4	6263778
	0.297	VALVE, EXH (STD) (2ND DES ID BY ENG STAMPING CODES 4RM, 4RN.) (*14, 25, 26, 27)	94-95 I (LW6)	4	14082305
50.	N.S.	INSERT, VLV PUSH ROD SPHER (PART OF 68)	91-99 I (LW6)	AR	
51.	0.296	VALVE, INT (.0035 OS) (*1, 2, 3, 4, 5, 6, 8, 9, 14, 15, 16, 23)	91-95 I (LW6)	4	3997749
	0.296	VALVE, INT (.0035" O.S.) (*19, 20, 21, 22) (.0035 O.S.)	96 I (LW6)	4	14075642
	0.296	VALVE, INT (.0035" O.S.) (*7, 10, 11, 12, 13, 19, 20, 21, 22) (.0035 O.S.)	91-95 I (LW6)	4	14075642
	0.296	VALVE, INT (.0155 O.S.) (*1, 2, 3, 4, 5, 6, 8, 9, 14, 15, 16, 23)	91-95 I (LW6)	4	3997750
	0.296	VALVE, INT (.0155 O.S.) (*19, 20, 21, 22) (.0155 O.S.)	96 I (LW6)	4	14075643
	0.296	VALVE, INT (.0155 O.S.) (*7, 10, 11, 12, 13, 19, 20, 21, 22) (.0155 O.S.)	91-95 I (LW6)	4	14075643
	0.296	VALVE, INT (.0305 O.S.) (*1, 2, 3, 4, 5, 6, 8, 9, 14, 15, 16, 23)	91-95 I (LW6)	AR	3997751
	0.296	VALVE, INT (.0305 O.S.) (*19, 20, 21, 22) (.0305 O.S.)	96 I (LW6)	4	14075644
	0.296	VALVE, INT (.0305 O.S.) (*7, 10, 11, 12, 13, 19, 20, 21, 22) (.0305 O.S.)	91-95 I (LW6)	4	14075644
	0.296	VALVE, INT (STD) (*1, 2, 3, 4, 5, 6, 8, 9, 14, 15, 16, 23, 24, 25, 26, 27)	91-95 I (LW6)	4	3989088
	0.296	VALVE, INT (STD) (*19, 20, 21, 30, 31) (STD)	97-99 I (LW6)	4	14075641
	0.296	VALVE, INT (STD) (*2, 14, 25, 26, 27)	96-99 I (LW6)	4	3989088
	0.296	VALVE, INT (STD) (*7, 10, 11, 12, 13, 19, 20, 21, 22) (STD)	91-96 I (LW6)	4	14075641
52.	0.004	BRACKET, ENG LIFT FRT	96-99 I (LW6)	1	6273484
	0.004	BRACKET, ENG LIFT FRT (*1, 2, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22)	91-95 I (LW6)	1	6273484
53.	0.004	BOLT, ENG LIFT FRT BRKT (8.900)	95-99 I (LW6)	8	9442963
	0.004	BOLT, ENG LIFT FRT BRKT (*1, 2, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22, 25, 26, 27) (3/8-16X3/4) (8.900)	91-95 I (LW6)	2	9442052
54.	2.361	DISTRIBUTOR, (INCL 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46) (AC-DELCO #1103782)	91-99 I (LW6)	1	1103782
55.	2.363	GASKET, DISTR (AC-DELCO #10132896)	91-99 I (LW6)	1	10132896
56.	2.379	WASHER, DISTR DRVN GR THR	91-99 I (LW6)	1	3792285

57.	DISCON	CLIP, ENG WRG HARN (PART OF 4) (*1, 2, 3, 5, 7, 8, 9, 10, 12, 13, 14, 15, 16, 19, 21, 22, 23, 24, 25, 26, 27)	91-99	I (LW6)	2	9798433
	8.950	CLIP, CLOSED TUBE-.437, ATTACH HOLE .343A:.62, STL W/NEOPRENE COATING (ENG WRG HARN) (PART OF 4) (*6) ..	91-93	I (LW6)	AR	652035
58.	2.363	CLAMP, DISTR	91-99	I (LW6)	1	355780
59.	2.240	WIRE, IGN COIL (AC-DELCO #12097982)	91-99	I (LW6)	1	12097982
60.	2.363	BOLT, DISTR CLA (HEX) (3/8-16X1.00 300M) (8.900) (AC-DELCO #9424320)	91-99	I (LW6)	3	9424320
61.	2.183	BOLT, IGN COIL (HFH 3/8-16X.62 280M POR) (8.900) .	99	I (LW6)	2	9440034
	2.183	BOLT, IGN COIL (*1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 14, 16, 19, 22, 23, 24, 25, 26, 27) (3/8-16 5/8) (8.900)	91-95	I (LW6)	1	9428638
	2.183	BOLT, IGN COIL (*2, 14, 19, 27, 30, 31) (HFH 3/8-16X.62 280M POR) (8.900)	97	I (LW6)	2	9440034
	2.183	BOLT, IGN COIL (*26) (3/8-16 5/8) (8.900)	96-97	I (LW6)	1	9428638
62.	2.170	WASHER, IGN COIL (25/64 X 53/64 X 5/64) (8.929)	91-99	I (LW6)	2	120394
63.	2.251	RETAINER, SPLG WIRE (*2, 14, 25, 26, 27)	96-99	I (LW6)	AR	1625931
	2.251	RETAINER, SPLG WIRE (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27)	91-95	I (LW6)	AR	1625931
64.	2.170	COIL, IGN (AC-DELCO #D535)	98-99	I (LW6)	1	1115315
	2.170	COIL, IGN (*1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 14, 16, 19, 22, 23, 24, 25, 26, 27) (AC-DELCO #D535) ..	91-96	I (LW6)	1	1115315
	2.170	COIL, IGN (*2, 14, 19, 26, 27, 30, 31) (AC-DELCO #D535)	97	I (LW6)	1	1115315
65.	2.240	WIRE, IGN COIL	91-96	I (LW6)	1	93430079
	2.240	WIRE, IGN COIL (*2, 14, 26, 27)	97-99	I (LW6)	1	93430079
66.	2.239	HARNESS, SPLG WIRE (*19, 20, 21) (AC-DELCO #10486136) ..	96-97	I (LW6)	1	10486136
	2.239	HARNESS, SPLG WIRE (*19, 20, 21, 22) (AC-DELCO #10486136)	95	I (LW6)	1	10486136
	2.239	HARNESS, SPLG WIRE (*19, 20, 30) (AC-DELCO #10486136) ..	98	I (LW6)	1	10486136
	2.239	HARNESS, SPLG WIRE (*2, 14, 25, 26, 27)	96-99	I (LW6)	1	93430078
	2.239	HARNESS, SPLG WIRE (*3, 5, 8, 14, 16, 23, 24, 25, 26, 27)	91-95	I (LW6)	1	93430078
67.	0.459	LIFTER, VLV (AC-DELCO #HL66)	91-93	I (LW6)	8	5232720
	0.459	LIFTER, VLV (*19, 20, 21, 22, 23, 24, 25, 26, 27) (AC-DELCO #HL66)	94	I (LW6)	8	5232720
	0.459	LIFTER, VLV (*2, 14, 19, 20, 21, 22, 25, 26, 27, 30, 31, 32) (AC-DELCO #HL66)	95-99	I (LW6)	8	5232720
68.	0.426	ROD, VLV PUSH (INCL 50)	91-98	I (LW6)	8	93414888

69.	0.429	STUD, VLV RKR ARM BALL (.003" O.S.)	91-99	I (LW6)	8	3814692
	0.429	STUD, VLV RKR ARM BALL (.013" O.S.)	91-99	I (LW6)	8	3815892
70.	0.308	SEAL, VLV STEM OIL (O-RING TYPE)	91-99	I (LW6)	8	10214034
71.	0.269	HEAD, CYL (*1, 2, 3, 4, 5, 6, 8, 9, 14, 15, 16)	91-93	I (LW6)	1	10159444
	0.269	HEAD, CYL (*14, 25, 26, 27)	95	I (LW6)	1	12523506
	0.269	HEAD, CYL (*19, 20, 21)	97	I (LW6)	1	10140599
	0.269	HEAD, CYL (*19, 20, 21, 22)	96	I (LW6)	1	10140599
	0.269	HEAD, CYL (*19, 30, 31, 32)	98-99	I (LW6)	1	10140599
	0.269	HEAD, CYL (*2, 14, 25, 26, 27)	96-99	I (LW6)	1	12523506
	0.269	HEAD, CYL (*23, 24) (1ST DES ID BY ENG STAMPING CODES 4RL, 4RW)	94	I (LW6)	1	10159444
	0.269	HEAD, CYL (*25, 26, 27) (2ND DES ID BY ENG STAMPING CODES 4RM, 4RN.) (VALVE STEM HAVE LARGER DIA FOR 2ND DES)	94	I (LW6)	1	12523506
	0.269	HEAD, CYL (*7, 10, 11, 12, 13, 19, 20, 21, 22)	91-95	I (LW6)	1	10140599
72.	0.303	SPRING, VLV (*1, 2, 4, 7, 9, 10, 11, 12, 13, 15, 19, 20, 21, 22) (STEM DIA.8MM) (THE 8-DIGIT HEAD CAST NBR IS NOT FOLLOWED BY "S".)	91-95	I (LW6)	8	14076469
	0.303	SPRING, VLV (*19, 20, 21, 22, 30) (STEM DIA.8MM) (THE 8-DIGIT HEAD CAST NBR IS NOT FOLLOWED BY "S".)	96-97	I (LW6)	8	14076469
	0.303	SPRING, VLV (*19, 30, 31, 32) (STEM DIA.8MM) (THE 8-DIGIT HEAD CAST NBR IS NOT FOLLOWED BY "S".)	98-99	I (LW6)	8	14076469
	0.303	SPRING, VLV (*2, 14, 25, 26, 27)	96-99	I (LW6)	8	3735381
	0.303	SPRING, VLV (*3, 5, 6, 8, 14, 16, 23, 24, 25, 26, 27)	91-95	I (LW6)	8	3735381
73.	0.309	CAP, VLV SPR (*1, 2, 3, 4, 5, 6, 7, 8, 9)	91-99	I (LW6)	8	10038209
	0.309	CAP, VLV SPR (*10, 11, 12, 13, 14, 15, 16, 17)	91-99	I (LW6)	8	10038209
	0.309	CAP, VLV SPR (*19, 20, 21, 22, 23, 24, 25, 26)	91-99	I (LW6)	8	10038209
	0.309	CAP, VLV SPR (*22, 23, 24, 25, 26)	91-99	I (LW6)	8	10038209
	0.309	CAP, VLV SPR (*27, 29, 30, 31, 32)	91-99	I (LW6)	8	10038209
74.	0.308	SHIELD, VLV STEM OIL	91-99	I (LW6)	12	10007818
75.	0.333	ARM KIT, VLV RKR (W/BALL)	91-99	I (LW6)	8	5723551
76.	0.429	BALL, VLV RKR ARM	91-99	I (LW6)	8	3992294
77.	0.429	NUT, VLV RKR ARM (3/8-24)	91-99	I (LW6)	8	465934
78.	0.310	KEY, VLV STEM	91-99	I (LW6)	16	24503856
79.	0.309	ROTATOR, VLV (*2, 14, 25, 26, 27) (EXH)	95-99	I (LW6)	4	14042575
	0.309	ROTATOR, VLV (*3, 5, 6, 8, 14, 16, 23, 24, 25, 26, 27) (EXH)	91-94	I (LW6)	4	14042575

80.	2.277	BRACE, GEN (*3, 5, 24, 26, 27) (2.317)	91-96 I (LW6)	1	6270047
81.	8.931	WASHER, HEL SPR LK (29/64X49/64X7/64 (GEN BR) (*3, 5, 23, 24, 25, 26, 27)	91-96 I (LW6)	1	9439513
82.	2.277	BOLT, GEN BR (*2, 14, 19, 27) (8.900)	97-99 I (LW6)	1	9442963
	2.277	BOLT, GEN BR (*3, 5, 24, 26, 27) (8.900)	91-96 I (LW6)	1	9442963
83.	8.915	NUT, HEX W/CON WA, M4X.7X4.5, 5, NO (IGN COIL BRKT) (*1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 14, 16, 19, 22, 23, 24, 25, 26, 27)	91-95 I (LW6)	AR	10180301
84.	2.183	BRACKET, IGN COIL (TOP) (*1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 14, 16, 19, 22, 23, 24, 25, 26, 27) (2.170) (AC-DELCO #10468368)	91-99 I (LW6)	1	10468368
85.	2.183	BRACKET, IGN COIL (BOTTOM) (*1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 14, 16, 19, 22, 23, 24, 25, 26, 27) (2.170) (AC-DELCO #10468367)	91-99 I (LW6)	1	10468367
86.	8.900	BOLT (IGN COIL BRKT) (*1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 14, 16, 19, 22, 23, 24, 25, 26, 27)	91-96 I (LW6)	AR	11507041
87.	0.446	STUD, VLV PUSH ROD CVR (*14) (INCL NEOPRENE RUBBER WASHER .53 OD .06 THICK SAE 10R4)	96-99 I (LW6)	1	352169
88.	0.439	NUT, VLV PUSH ROD CVR (*14) (8.915)	96-99 I (LW6)	1	451399

NOTE 1: 3.0L 181 CID MARINE ENG. 1991 14097242 (1RT), 1992 14097382 (2RT), 1993 10213737 (3RT).

NOTE 2: 3.0L 181 CID MARINE ENG. 1991 14097244 (1RS), 1992 14097384 (2RS), 1993 10213741 (3RS), 1996 93427130 (6RS), 1997 93428833 (7RS), 1998 93430376 (8RS), 1999 93433192 (9RS).

NOTE 3: 3.0L 181 CID MARINE ENG. 1991 14097398 (1RH), 1992 14097399 (2RH), 1993 10213742 (3RH), 1999 93433194 (9RH).

NOTE 4: 3.0L 181 CID MARINE ENG. 1991 14097438 (1RJ), 1992 14097440 (2RJ), 1993 10213743 (3RJ).

NOTE 5: 3.0L 181 CID MARINE ENG. 1991 14097251 (1RZ), 1992 14097393 (2RZ), 1993 10213758 (3RZ).

NOTE 6: 3.0L 181 CID MARINE ENG. 1991 14097249 (1RD), 1992 14097391 (2RD), 1993 10213828 (3RD).

NOTE 7: 3.0L 181 CID MARINE ENG. 1991 14097246 (1RX), 1992 14097387 (2RX), 1993 10213829 (3RX).

NOTE 8: 3.0L 181 CID MARINE ENG. 1991 14097250 (1RY), 1992 14097392 (2RY), 1993 10213830 (3RY).

NOTE 9: 3.0L 181 CID MARINE ENG. 1991 14097376 (1RB), 1992 14097385 (2RB), 1993 10214171 (3RB).

NOTE 10: 3.0L 181 CID MARINE ENG. 1992 14097377 (1RC), 1992 14097390 (2RC), 1993 10214172 (3RC).

NOTE 11: 3.0L 181 CID MARINE ENG. 1992 14097439 (1RK), 1992 14097441 (2RK), 1993 10214176 (3RK).

NOTE 12: 3.0L 181 CID MARINE ENG. 1992 14097247 (1RR), 1992 14097388 (2RR), 1993 10214178 (3RR).

NOTE 13: 3.0L 181 CID MARINE ENG. 1991 14097248 (1RU), 1992 14097389 (2RU), 1993 10214179 (3RU).

NOTE 14: 3.0L 181 CID MARINE ENG. 1991 14097330 (1RA), 1992 14097394 (2RA), 1995 93427532 (5RA), 1996 93427535 (6RA), 1997 93428834 (7RA), 1998 93430377 (8RA), 1999 93433187 (9RA).

NOTE 15: 3.0L 181 CID MARINE ENG. 1991 14097243 (1RP), 1992 14097383 (2RP), 1993 10214177 (3RP).

NOTE 16: 3.0L 181 CID MARINE ENG. 1992 10224590 (2RW), 1993 10224591 (3RW).

NOTE 17: APPLY 12346004 THREAD SEALER TO BOLT IF PRE-APPLIED SEALER IS NOT PRESENT.

NOTE 19: 3.0L 181 CID MARINE ENG. 1994 10232482 (4RX), 1995 12552044 (5RX), 1996 93427129 (6RX), 1997 93428832 (7RX), 1998 93430375 (8RX), 1999 93433194 (9RX).

NOTE 20: 3.0L 181 CID MARINE ENG. 1994 10232483 (4RK), 1995 12552042 (5RK), 1996 93427127 (6RK), 1997 93428830 (7RK), 1998 93430373 (8RK).

NOTE 21: 3.0L 181 CID MARINE ENG. 1994 10232486 (4RR), 1995 12552043 (5RR), 1996 93427128 (6RR), 1997 93428831 (7RR).

NOTE 22: 3.0L 181 CID MARINE ENG. 1994 10232487 (4RC), 1995 12552041 (5RC), 1996 93427126 (6RC).

NOTE 23: 3.0L 181 CID INDUSTRIAL ENG. 1994 10232511 (4RW) (CANC REPL BY--> 12551321 (4RN)).

NOTE 24: 3.0L 181 CID INDUSTRIAL ENG. 1994 10243387 (4RL) (CANC REPL BY--> 12551320 (4RM)).

NOTE 25: 3.0L 181 CID INDUSTRIAL ENG. 1994 12551321 (4RN), 1995 12552039 (5RN), 1996 93427124 (6RN).

NOTE 26: 3.0L 181 CID CRUSADER ENG. 1994 12551276 (4RF), 1995 12552040 (5RF), 1996 93427125 (6RF), 1997 93428829 (7RF), 1998 93430372 (8RF), 1999 93433188 (9RF).

NOTE 27: 3.0L 181 CID INDUSTRIAL ENG. 1994 12551320 (4RM),1995 12552038 (5RM),1996 93427123 (6RM),1997
93428828 (7RM),1998 93430371 (8RM),1999 93433189 (9RM).
NOTE 30: 3.0L 181 CID MARINE ENG. ,1998 93430374 (8RV).
NOTE 31: 3.0L 181 CID MARINE ENG. ,1998 93432747 (8RP),1999
93433190 (9RP).
NOTE 32: 3.0L 181 CID MARINE ENG. ,1998 93432786 (8RQ),1999
93433191 (9RQ).

RPO DEFINITIONS

LW6 - ENGINE,GAS,4 CYL

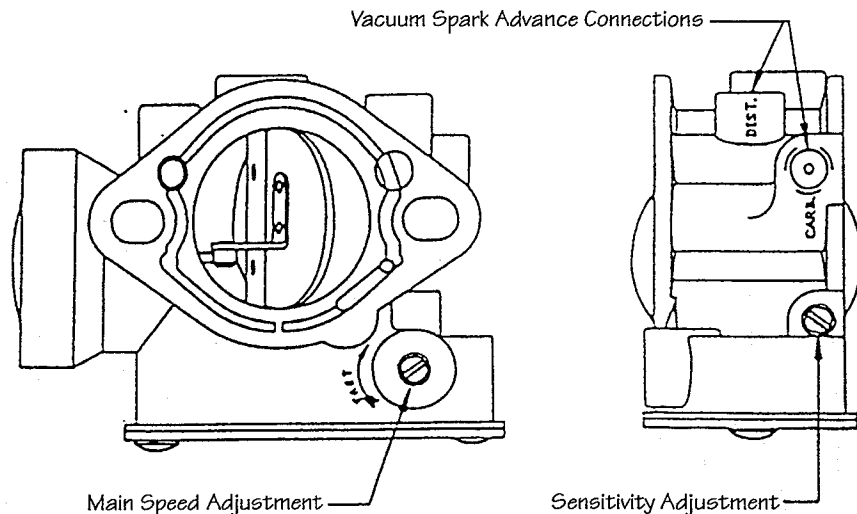
5.1 VELOCITY GOVERNOR

The SENSITIVITY ADJUSTMENT is factory set and sealed to cover a range of engine speeds. Only in rare instances should the sensitivity adjustment be changed. To readjust the sensitivity setting proceed as follows:

1. Remove the plug covering the sensitivity adjusting screw by carefully drilling a 1/8 diameter hole thru the center of the plug and prying the plug out.
2. If engine is too sensitive, turn the SENSITIVITY SCREW 1/4 turn clockwise, and readjust the MAIN ADJUSTMENT to obtain the desired speed. End each adjustment with a clockwise turn of the screw. Repeat as needed.
3. If the engine speed drops excessively when loaded, turn the SENSITIVITY SCREW 1/2 turn counter-clockwise, then turn this screw 1/4 turn clockwise. Readjust the MAIN ADJUSTMENT to obtain the desired speed. End each adjustment with a clockwise turn of the screw. Repeat this procedure as needed.
4. When all adjustments are completed, seal the adjusting screws using HOOFF SEAL KIT 200-940. If the seal kit is not available, seal each screw by forcing SILICONE SEALER into the cavity around the screw. Sealer must enter the screw slot to lock the screw from turning.

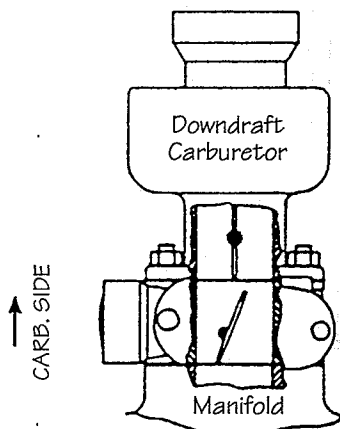
NOTE: If spark advance ports in governor are not used, plug these holes in the governor with 1/8" pipe plugs.

Also, if carburetor has vacuum controlled power jets, plug the connecting channel in the carburetor flange so that the power jet hole vents to the vacuum channel on the governor flange through a slotted gasket.

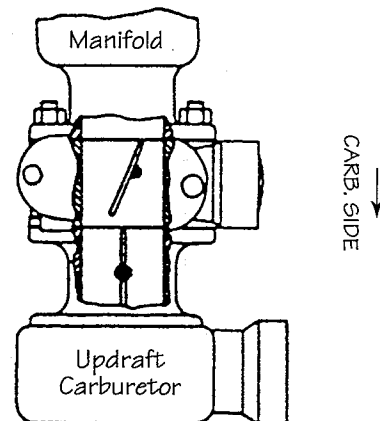


INSTRUCTION SHEET

- REMOVE:** Air cleaner and carburetor, after disconnecting throttle linkage, choke cable, spark advance tubing, and fuel line. Also remove and discard the old gasket and studs.
- INSTALL:** Long studs, gasket, governor, gasket, aluminum spacer (if needed for carburetor linkage clearance), gasket, and carburetor. Also install drilled brass nut on one carburetor stud.
- CONNECT:** Fuel line, choke cable, throttle linkage, and vacuum spark-advance tubing.
- CHECK:** Carburetor for smooth throttle action to wide open position, and choke control linkage.
- START:** The engine. check for fuel and vacuum leaks. Allow the engine to warm up to normal operating temperature.
- ADJUST:** Governor for required engine speed with carburetor wide open. Turn governor adjusting screw clockwise for higher speeds, and counter-clockwise for lower speeds. Always end any speed adjustment with a clockwise turn of the screw to remove lost motion within the governor linkage.
- SEAL:** Governor to engine by passing seal wire (Kit 200-481) through hole in brass nut, around carburetor body, and through two holes in Hoof Seal Body. Twist wire ends together and snip off excess wire. Snap Seal Cover over Seal Body.
- INSTALL:** Air cleaner. Road test the vehicle, and make final speed adjustments as needed. Recheck to fuel or vacuum leaks.
- SEAL:** Governor adjustment by placing Brass Locking Disc (Kit 200-940) on top of adjusting screw so that tang on disc is located in slot of screw. Then place Expansion Plug over Brass Disc and tap the plug with a 1/4" diameter punch and hammer to set the plug in place.



NOTE:
Arrow cast on side of governor must always point toward carburetor.



5.2 ELECTRONIC GOVERNOR

225 SERIES ELECTRONIC ACTUATOR

INTRODUCTION

The 225 Series actuator is a rotary output, linear torque proportional electric servo designed for mechanical actuation of fuel system control levers. The actuator is energized by appropriate speed control unit signals, and is capable of 25 degrees rotation.

INSTALLATION

the actuator must be rigidly mounted as close as possible to the engine throttle lever. When selecting the mounting location, consideration must be given to possible linkage obstructions.

The linkage should be direct, short, and as light as possible. Low friction rod end bearings should be used throughout the linkage system.

The linkage should be adjusted so that the fuel control minimum fuel and maximum fuel stops are used rather than the internal actuator stops.

A. Drill the actuator mounting holes in a pre-fabricated mounting bracket. Mounting hole configuration is illustrated in Diagram 4. The position of the actuator on the mounting bracket should insure minimal misalignment between each end of the governor system linkage. The linkage ball bearing rod ends can tolerate a maximum misalignment of 10 degrees.

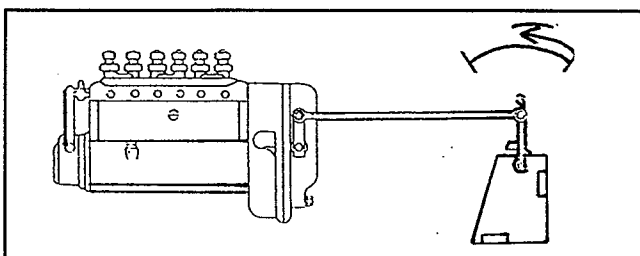
B. Affix the actuator bracket to the selected location on engine.

C. Attach the actuator securely to the mounting bracket.

D. Adjust and secure the linkage rod and rod end bearings. For proportional actuators to operate with linear control systems, it is important to obtain a linear relationship between actuator stroke and fuel delivery.

Diesel Fuel Systems

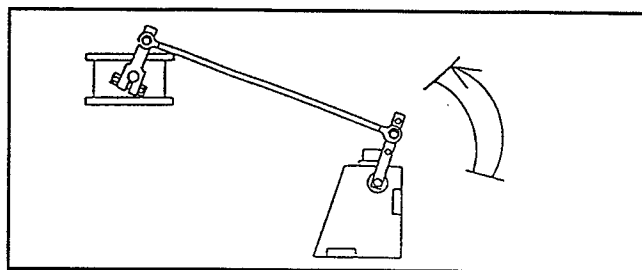
For diesel fuel systems, the linkage configuration is typically linear. The actuator lever should be nearly parallel to the fuel control lever and perpendicular to the linkage rod at the mid fuel position. See Diagram 1.



Fuel Control Lever At Mid Fuel Position
DIAGRAM 1

Carbureted Fuel Systems

For carbureted fuel systems, the linkage is typically non-linear. The ideal linkage relationship is for the carburetor butterfly valve lever to be parallel with the actuator lever and the linkage rod to be perpendicular to the actuator lever at maximum fuel position. See Diagram 2.



Carburetor Fuel Valve At Mid Fuel Position
DIAGRAM 2

The actuators with 2 pin connectors are prewired for 12 or 24V. Use the included harness to connect the actuator to the speed control unit.

E. Fabricate a cable harness to connect the speed control unit to the actuator. The recommended wire size of the cable harness is at least #16 gauge (1.5 mm) for 12 volt systems and #18 (1.0 mm) for 24 volt systems. The wiring must be capable of handling typical current levels of 8 amps for 112 volt systems and 4 amps for 24 volt systems without experiencing a significant voltage drop. Larger gauge wire will be necessary for cable lengths greater than 10 ft. (3 meters).

If an actuator with a military connector is used, the electrical connector EC 1000 must be prewired in a configuration to match the system voltage supply. See Diagram #.

32 Volt Operation

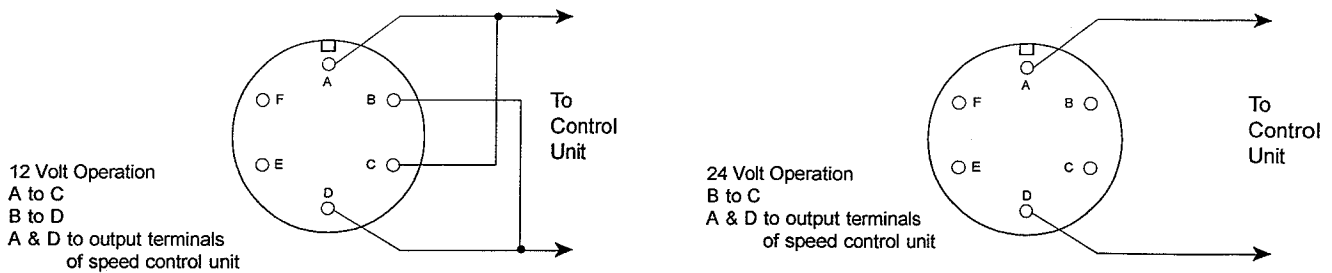
Wire the actuator electrical connector as illustrated for 24 Volt operation. A 1.5 ohm, 25 Watt resistor must be added in series with pin A of actuator and the output terminal of the speed control unit.

F. Connect A and D of the military connector or the 2 pin connector harness to the speed control unit. Refer to applicable speed control unit literature.

Before Starting The Engine

G. Push the actuator lever to the maximum full fuel position. Upon release, the linkage should return smoothly to minimum fuel position. Recheck the linkage to insure both the linkage and the levers are securely fastened and that no binding is present.

DIAGRAM 3
Military Connector Wiring



LINKAGE ADJUSTMENT

The linkage can be optimized by adjusting for an actuator current difference from no engine load to full engine load of approximately 2 amps for 12 volt systems or 1 amp for 24 volt systems.

The no load current is altered by varying the length of the linkage, and the range is adjusted by changing the hole used by the rod end bearing on the actuator lever.

Smaller angles of actuator travel may improve transient performance, but will reduce the force available at the fuel control lever. Adjusting the actuator to operate through at least one half (12 degrees) of its stroke will provide near optimum response.

TROUBLESHOOTING

If the governor system fails to operate, make the following tests at the actuator mounted connector while moving the actuator through its stroke.

Measure the Resistance
ACB 225/ADB 225

A to B	2.5 ohms
C to D	2.5 ohms
A to C	Infinity
A to Housing	Infinity
C to Housing	Infinity

ADC 225

Red to White (12V)	1.25 ohms
Red to White (24V)	5.0 ohms
Red to Housing	Infinity
White to Housing	Infinity

Energize the actuator to full fuel (follow steps in control unit publication) and manually move the actuator through its range. No binding or sticking should occur.

If the actuator passes these tests, the problem is elsewhere in the system. Refer to the control unit troubleshooting publication.

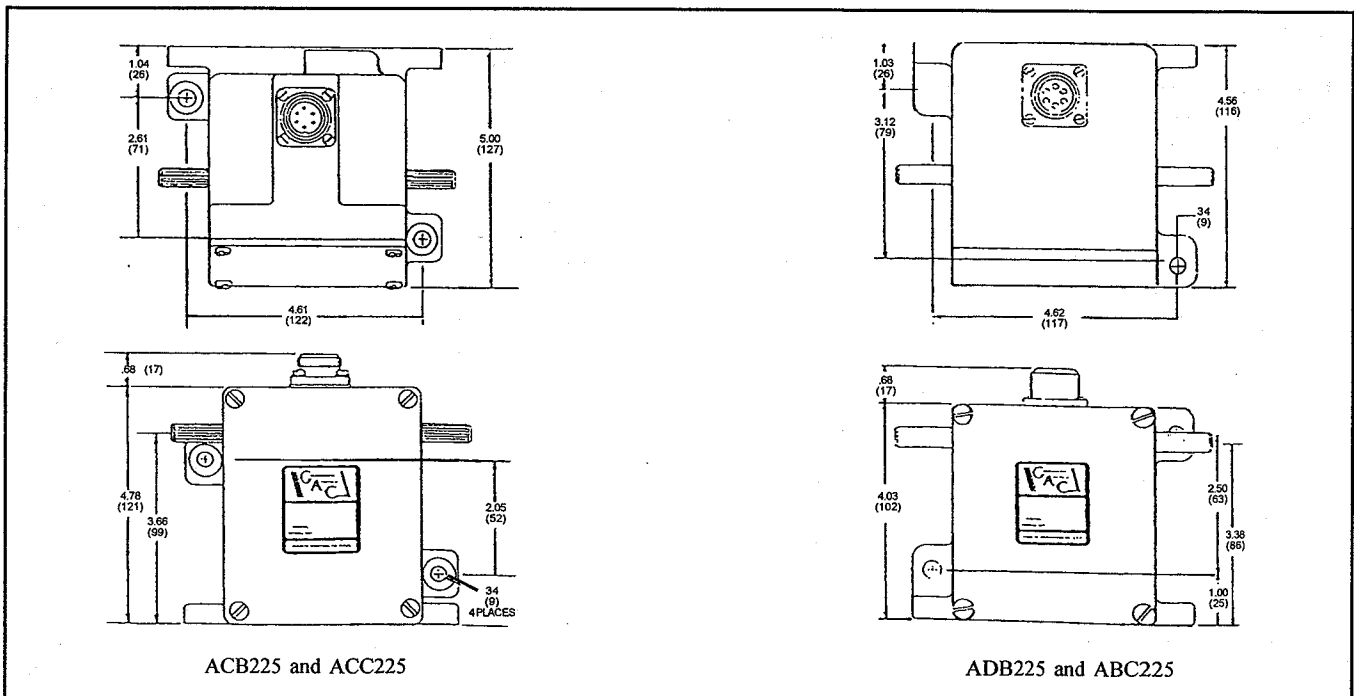
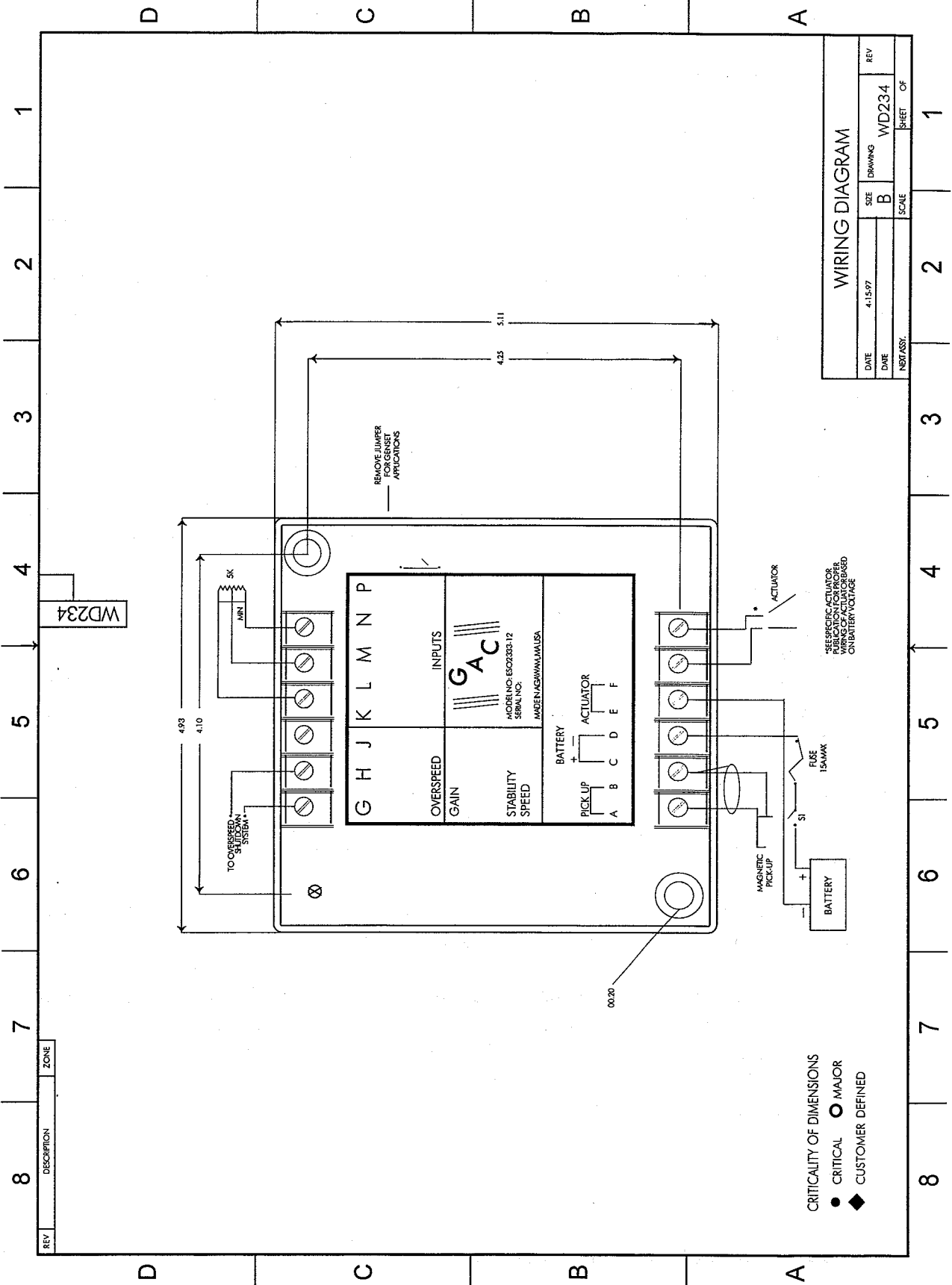


DIAGRAM 4
Actuator Outline Dimensions



REV	DESCRIPTION	ZONE

WIRING DIAGRAM			
DATE	SIZE	DRAWING	REV
4-15-97	B	WD234	
INSTR/ASST.	SCALE	SHEET	OF
		1	1

5.3 ELECTRONIC GOVERNOR

ADJUSTMENT - Before starting engine

Check to insure the GAIN, and STABILITY controls, and if applied the external SPEED TRIM control, are set to mid-position.

ENGINE START

The controller is factory set at approximately engine idle speed. (1000 Hz. Speed Sensor Signal)

Crank the engine with D.C. battery power applied to the governor system. The actuator will energize fully to the maximum fuel position until the engine has started. The governor should be controlling the engine at low idle speed.

If the engine is unstable after starting, turn the GAIN and STABILITY adjustments counterclockwise until the engine is stable.

GOVERNOR SPEED SETTING

The governed speed setpoint is increased by a clockwise rotation of the SPEED adjustment control. Fine, precise speed adjustments can be obtained with an optional Speed Trim control.

GOVERNOR PERFORMANCE

Once the engine is at the operating speed and at no load, the following governor performance adjustments can be made.

- A. Rotate the GAIN adjustment clockwise until instability develops. Gradually move the adjustment counterclockwise until stability returns. Then move the adjustment 1/8 turn counterclockwise to insure stable performance.
- B. Rotate the STABILITY adjustment clockwise until instability develops. Gradually move the adjustment counterclockwise until stability returns. Then move the adjustment 1/8 turn counterclockwise to insure stable performance.
- C. Gain and stability adjustments may require minor changes after engine load is applied. Normally, adjustments at no load achieve satisfactory performance.
- D. The dead time compensation can be changed with posts E1, E2, and E3 to optimize the control system. If a rapid instability, greater than 2Hz., is present at the actuator lever, cut the jumper between post E1 and E2. If the fast instability is still present, remove the jumper between posts E4 and E5. If slow instability, low gain setting, or poor response exists, add a 22 mfd. Capacitor between posts E2 (-) and E3 (-).

If the throttle is erratic, but performance is good, removing the E4 to E5 jumper will tend to steady the throttle.

To be performed by qualified personnel only.

6.0 TROUBLESHOOTING

IGNITION

1. Gas fuel requires the finest heavy duty spark plugs, with gaps not over .030". More voltage is required to bridge the plug gap than that required using gasoline as a fuel.
2. Spark timing requires rigid adherence to factory recommendations, as natural gas burns relatively slowly. Late timing will result in power loss, excessive heating of the exhaust valves and high exhaust stack temperatures. With no vaporization of liquid fuel in the cylinder to help cool valves during intake and compression cycles, excessive exhaust temperatures may burn or reduce the life of exhaust valves.
3. Propane requires retarded spark setting from that specified for natural gas under load, as the burning rate is faster than that of natural gas. An automatic or manual spark timing adjustment is necessary for dual fuel applications of natural and L.P. gas, particularly with a high compression ratio or a turbo-charged engine.
4. Gasoline engines require a spark plug gap of .045".
5. Dual fuel engines require a spark plug gap of .025.

HIGH ENERGY IGNITION (HEI) DISTRIBUTOR TIMING

These instructions relate to High Energy Ignition (HEI) distributor systems with electronic spark timing.

Distributor Ignition Systems with EST accomplishes the spark timing function electronically. This results in longer spark plug life, eliminates mechanical contacts and scheduled maintenance, provides better cold weather starting and is environmentally protected.

EST achieves new standards of distributor ignition performance by providing 40% more output voltage and 85% higher energy level. With higher energy available, combustion is more reliable and complete.

Available for GM based L4, V6, and V8 engines.

TIMING PROCEDURE

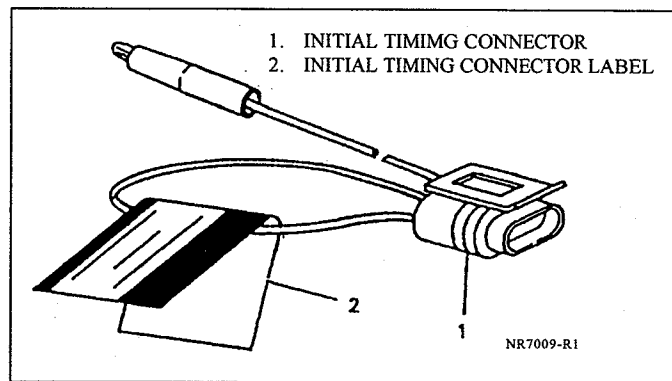
1. Do not use a timing light that requires piercing of the secondary insulation. Use only a timing light with inductive pick-up or jumper type connectors. Piercing the secondary insulation will cause spark plug misfiring and may damage the internal conductor resulting in failure of the secondary wire later.
2. Install timing light at #1 spark plug lead, per manufacturer's instructions.
3. Do not connect alligator clip lead of the initial timing connector to a B+ source until after engine is started. If the initial timing connector is connected to B+ source while engine is started, the ignition control module (ICM) in the distributor may be damaged. If the engine must be restarted while the initial timing connector is installed, detach alligator clip lead from B+ source to avoid damaging the ICM.

Troubleshooting Cont.

4. Start the engine and allow it to warm to operating temperature. (Follow engine manufacturer's instructions.) Connect alligator clip on long lead of the initial timing connector to convenient B+ voltage source, such as battery terminal on starter solenoid. This removes all advance from electronic spark timing. Engine will probably slow down when connection is made. Engine speed should be around 650 RPM. Loosen the distributor clamp screw just enough to rotate distributor, and set base timing to specification shown for engine.

ENGINE TIMING SPECIFICATIONS:		
INDUSTRIAL		DO NOT EXCEED:
454	INITIAL 6°	TOTAL 30°
350	INITIAL 6°	TOTAL 28°
262	INITIAL 2°	TOTAL 26°
181	INITIAL 0°	TOTAL 20°
Set idle speed to 700 RPM \pm 50 RPM		
NOTE: Reduce initial timing if total exceeds limits.		

5. When timing is set to specification, secure distributor in position with clamp screw.
6. Tighten clamp screw to torque specified.
7. Recheck timing to assure that distributor did not move during tightening.



Installing Initial Timing Connector Label

8. Disconnect the initial timing connector from B+ source. Label the initial timing connector as shown by folding adhesive label (in package) over one of the wires, matching the edges to cover the adhesive. Keep with engine for future use.

Troubleshooting Cont.

CARBURETION

1. Gas carburetion, because of its simplicity, is unlikely to give any problems when properly installed with an adequate supply of gas. Since the carburetor has the least complicated function to perform, and has the least moving parts, it would be well to exhaust every other avenue of possible mechanical or electrical failure before tampering with gas pressure or carburetor adjustments, particularly if the system has been functioning normally in the past.
2. If carburetion is definitely at fault, the first corrective step is to measure gas inlet pressures at idle and full load with a water manometer. Do not attempt to measure gas pressure with a mercury manometer. If this pressure is determined to be correct for the B.T.U. content of the fuel and the light load mixtures it is desired to maintain, proceed to the next step described under paragraph 3.
 - a. Pressures recommended for various conditions of load and fuel heat content are covered in paragraph 8.
3. If conditions still indicate carburetor malfunction, remove the air valve cover (or covers) and lift out the spring and air-gas valve complete with diaphragm.
 - a. Inspect diaphragm for possible holes, or charring from excessive heat or backfiring. The diaphragm should be reasonably flexible. Diaphragm life under normal conditions should be as much as five years without difficulty. Heat from proximity to exhaust manifolds, or from turbo-charged air which is not properly cooled due to insufficient or hot water passing through the inter-cooler, can shorten diaphragm life considerably. Impco has a silicone rubber on fibre-glass diaphragm for extreme heat conditions, on special order.
 - b. If diaphragms prove sound, check the inside diameter of the air valve cup and the fins on the outside of the gas jet which guide the air valve. Under ultra high frequency vibrations sometimes encountered in deep well pumping, it is possible to find grooves worn in the cup by the fins, which may lead to poor metering as the valve tries to pass up and down over the step. Impco has a specially constructed metering bowl for this infrequent emergency.
 - c. Also inspect the inside diameter of the gas jet, and the O.D. of the small tapered gas valve for possible wear from the same cause.
 - d. If everything to this point appears o.k., wash all the parts thoroughly in kerosene or the equivalent. If the fuel is digester (sewage) gas, wash parts in water and detergent. This residue will not dissolve in petroleum products.
 - e. Reassemble cleaned or replaced parts in the bowl, centering the spring on the air valve, and replace and fasten the cover. From the air-fuel outlet of the mixer to the throttle body, reach in with fingers or non-sharp rod, and lift valve several times to assure free travel with the spring closing the valve. Check the gas valve for leaks in closed position by sucking on the gas inlet. It should be sealed.

Carburetion Cont.

A water manometer may be easily constructed if no manufactured model is available. Using transparent plastic tubing from a hardware store, a "U" can be formed on a board with a ruler taped next to the "U" approximately half way between the top and bottom. Fill the "U" tube half way with water and measure the number of inches between the two levels of water when pressure is applied to one end of the tube.

Failing this, a piece of automotive vacuum hose may be marked off into inches at one end. This end may be weighted by forcing a small steel nut or one or two washers over the scaled end. Drop the weighted end in a container of water. With the other end fastened to the pressure source, adjust the pressure to the point where bubbles start to flow at the depth in inches at which the desired pressure is reached. Quite an exact check can be made by raising or lowering the hose slightly to see the exact depth at which bubbles start to flow.

With the engine running at idle, gas pressure should be 5 to 7" depending on light load air-fuel mixtures you wish to maintain. Using 1050 B.T.U. natural gas, 7" pressure will produce a straight power mixture, while 5" pressure will give economy mixtures at light load.

At full load of 2" to 7" of mercury intake manifold vacuum, the gas pressure ideally should not drop more than 2" of water column, although this is of no matter as long as the power adjustment on the carburetor is effective in controlling full load mixtures.

If the power adjustment is not effective, it indicates:

- A. The engine is lightly loaded and gas metering valve is not withdrawn from the gas jet.
 1. Mixture may be richened by increasing gas pressure.
 - B. Heat content of the fuel is less than 1000 B.T.U. per cubic foot.
 1. Increase gas pressure. It may be raised to 12" to 16" of water column if necessary.
 - C. If mixture is still too lean:
 1. Try DG (digester gas) air-gas valve assembly in the carburetor with normal gas pressure of 5" to 7".
 - D. If mixture is still too lean:
 1. The B.T.U. content must be as low as 600 to 700 B.T.U. per cubic foot.
 2. Substitute a complete DG (digester gas) mixer in place of the standard model. This DG model is effective down to 600 B.T.U. per cubic foot.
4. To understand the flexible control of the mixture under various conditions of load, refer to figure #3 showing a cut away of an Impco #200 carburetor. This shows the air gas valve assembly to be the only moving part in the mixers. The air flow measuring valve rises precisely in relation to the volume of air consumed by the engine, which is in turn controlled by engine speed and throttle position.

Carburetion Cont.

The cut away shows the air-gas valve assembly lifted about one third of the available travel. Notice that the greatest restriction to gas flow is the shaped gas metering valve, the bulk of which is not yet withdrawn from the gas jet. In this position, the power adjustment valve has little or no control over mixtures, since even in its fully closed position, its restriction to gas flow is less than that of the metering valve.

Mixtures may be leaned or richened with the valve in this or less open positions, by increasing or decreasing gas pressure to the carburetor.

5. Full power mixtures are controlled by the power mixture adjustment. This adjustment must be made with the engine under full or working load. With the gas metering valve withdrawn from the jet, the major restriction to gas flow becomes the power mixture adjustment, which is most effective at full load, and decreasingly effective down to approximately one half load where it no longer has much effect.
6. This dual control of mixtures at different load settings, makes it possible to maintain a straight best power mixture from idle to full power with increased gas pressure up to certain limits, or a lean light load mixture may be obtained with lower gas pressure and readjustment of the power mixture adjustment to proper full load mixtures.
7. Illustration #4 is a graph showing air fuel mixtures obtained at light and full load with various inlet pressures to the carburetor. Graphs for different engine configurations will vary as to the percentage of load where the curve moves from the mixture controlled by gas pressure, to the mixture controlled by the power mixture adjustment.

This is so because of the relationship of carburetor size to engine displacement and speed. A large engine with a comparatively small carburetor, will withdraw the gas metering valve from the jet more quickly, and at a lesser percentage of load than a large carburetor on a small engine. Different Impco carburetors vary slightly as to ideal gas inlet pressure for best economy. 5" of water column gas pressure is a compromise which suits most conditions with 1050 B.T.U. fuel.

8. For fuel with less heat (B.T.U.'s) per cubic foot, an increase in gas inlet pressure to 10" to 12" of water column will compensate for fuel down to 900 - 950 B.T.U. heat value.

Fuel with even less heating value in the 800 B.T.U. range requires a special gas valve #DG-AV1-12. Digester gas with 650 B.T.U. heat value requires a special mixing bowl with restricted air passages. These would be the DG-200 mixer, DG-200D mixer and DG-200T mixer (DG for digester gas).

9. No compensation in mixtures is necessary because of altitude changes. Air and gas expand essentially the same amount at high altitude, whereas a liquid fuel has a constant density so that mixtures richen at high altitude.

Carburetion Cont.

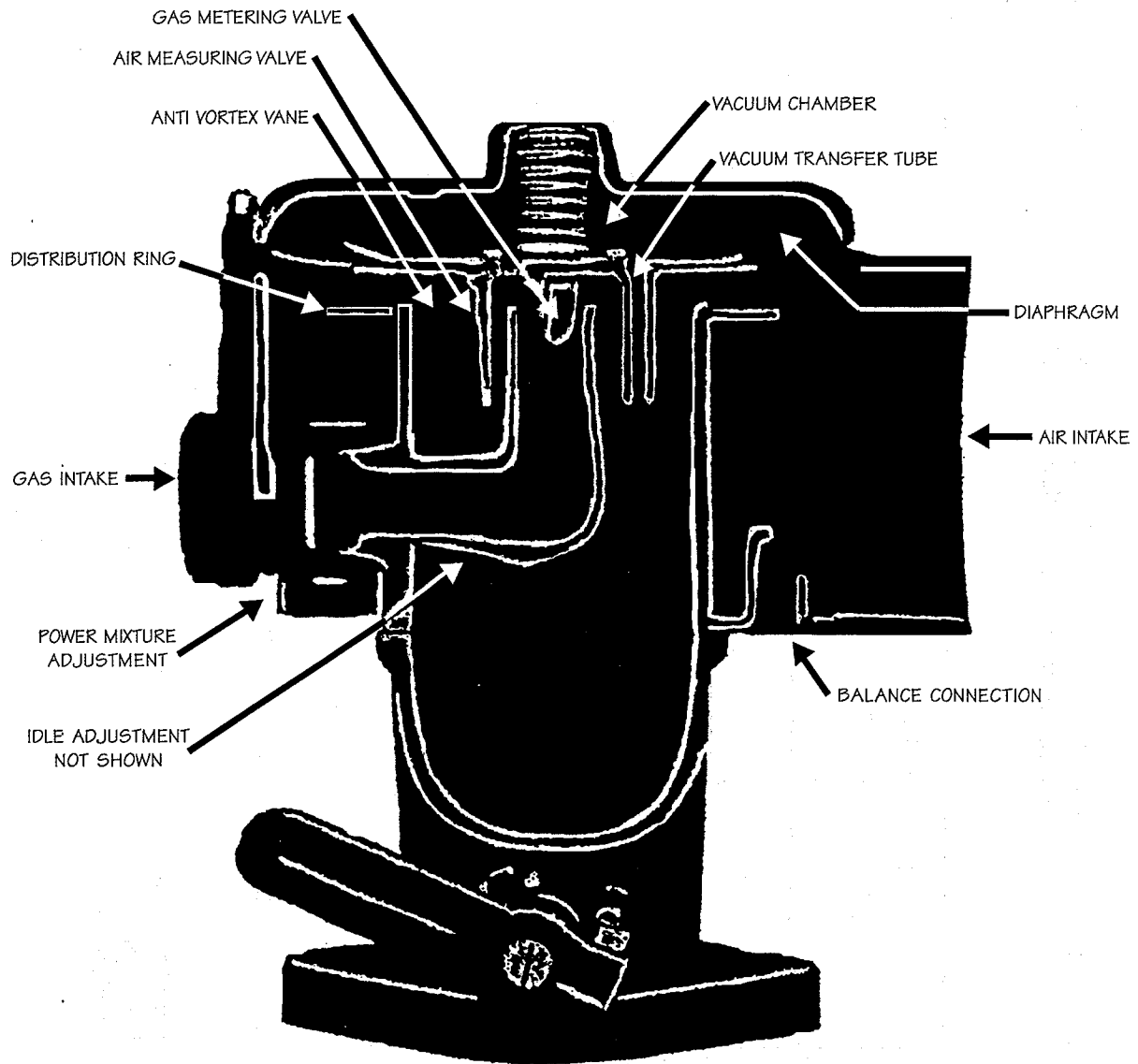
Power declines 3% for each 1000 feet of altitude even with correct air fuel mixtures, so that loss with a liquid fuel is even greater, and consumption of liquid fuel per horsepower hour increases at higher altitude unless the carburetor or diesel injection system is adjusted to compensate for altitude.

10. A turbo-charged engine likewise causes no problem with air fuel mixture ratios. By using a balance pressure connection from the air inlet at the carburetor to the atmospheric vent of the gas regulator, both air and gas densities increase equally. Volume of air-gas flow is the same as in a naturally aspirated engine, however the weight of air and fuel flowing is increased by pressurizing each. In order to check the fuel to air pressure differential which should still be approximately 5" of water column at idle for 1050 B.T.U. gas, it is necessary to connect the water manometer to the air pressure entering the carburetor, and to the gas pressure entering the carburetor. This will measure the difference in pressures only, not the total pressure of either. This difference should be the same as that of a naturally aspirated system.

One minor difference in mixtures occurs due to compression heating of the air by the turbo-compressor. This air temperature is almost always controlled by the use of an inter-cooler, however the temperature still rises a bit above ambient temperature. This causes a slight richening of the air-fuel ratio, since the gas remains at relatively constant temperature, as the air temperature is raised. A slight adjustment of the power mixture towards lean will compensate for the air temperature rise.

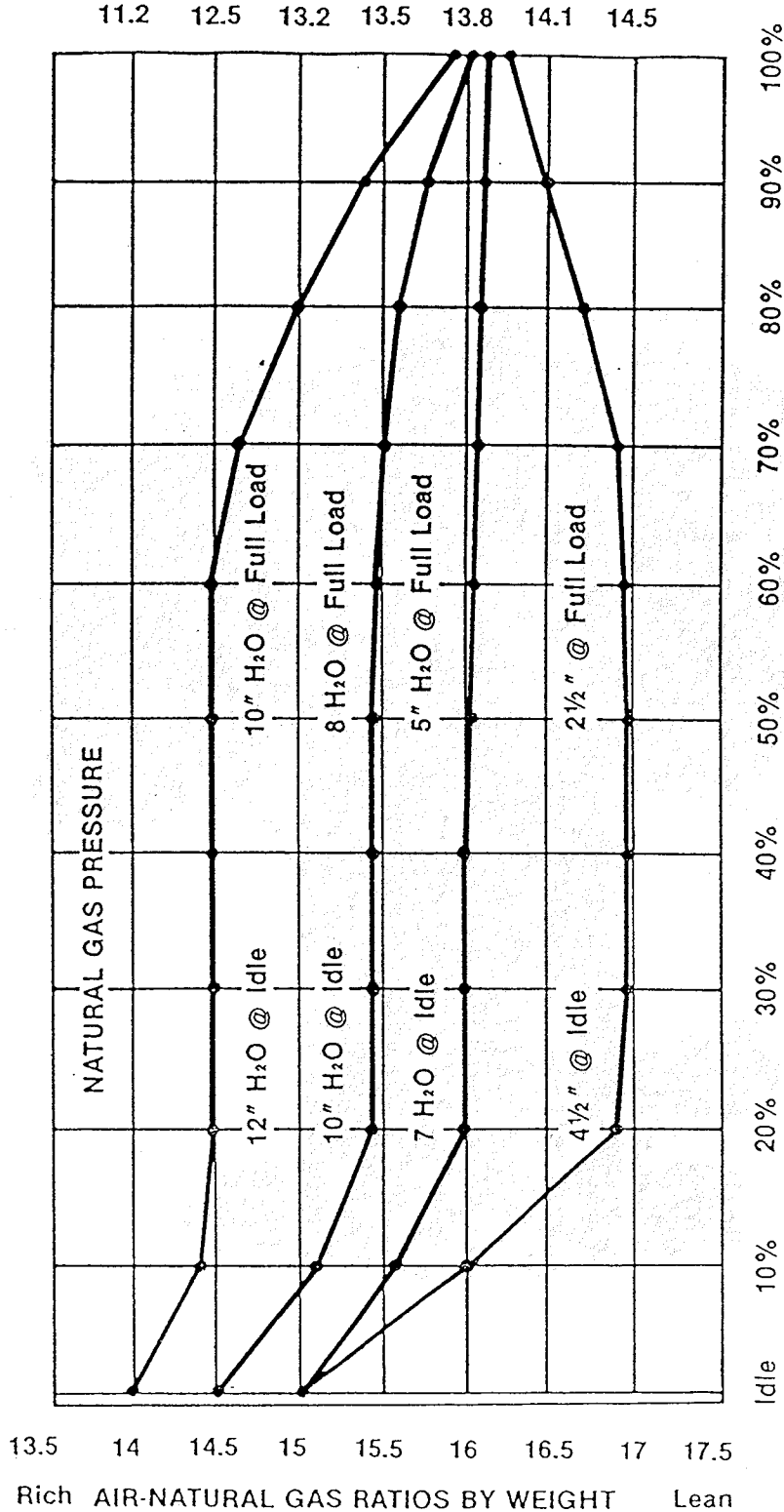
11. Hot intake air to a naturally aspirated engine cuts power production materially, as well as increasing the possibility of detonation and pre-ignition which can injure or destroy an engine in short order. Aside from power loss from detonation, there is a loss of 1% of power for each 10 of air temperature rise. Roughly 7# of air is required to produce one horsepower for one hour. Since heating air lightens it (as in a hot air balloon) a greater volume of hot air is required to weigh 7#. An engine at full load will only breathe a fixed volume of air, so that the number of available pounds of air are reduced by using hot air to the carburetor.
12. Heated air to the carburetor is especially critical in a turbo-charged installation using propane fuel full or part time. Water temperature is required to be 60' through the inter-cooler for a 10 to 1 compression ratio with turbo-charger, in order to avoid detonation. This cold water is seldom available.

DIAPHRAGM OPERATED AIR VALVE GAS CARBURETOR



EQUIVALENT READINGS ON GASOLINE SCALE OF EXHAUST GAS ANALYZER

GRAPH: Mixture Comparison At Light Loads — Full Load Mixtures Readjusted For Each Pressure
1050 B.T.U. Natural Gas (High Heat Value)



LOAD — PERCENTAGE OF AVAILABLE HORSEPOWER

ENGINE: Ford 352 cubic inches w/Impco #425-12 Carburetor.

NOTE: Exhaust gas analyzers do not read accurately below 14.5 to 1 on the gasoline scale. They will not register leaner mixtures, and may reverse with very lean air-fuel ratios.

Fig. #4

TROUBLE SHOOTING CHART

PROBLEM:

POSSIBLE CAUSE:

ENGINE FAILURE OR FAILURE TO START
 TEMPERATURE WARNING
 ENGINE PERFORMANCE
 ENGINE OIL PRESSURE LOW
 ENGINE OIL CONSUMPTION HIGH
 ENGINE NOT RUNNING SMOOTHLY
 ENGINE SMOKING
 ENGINE BACKFIRING

IGNITION FUSE OR FUSES	◆							
BATTERY LOW	◆							
FOULED PLUGS OR WIRES	◆		◆			◆		
FUEL FILTER CLOGGED	◆		◆			◆		
FUEL PRESSURE LOW	◆		◆			◆		◆
FUEL TANK EMPTY	◆							◆
AIR IN FUEL SYSTEM	◆		◆			◆		◆
DEFECTIVE FUEL INJECTOR	◆					◆	◆	
AIR CLEANER CLOGGED		◆	◆					◆
OIL LEVEL TOO HIGH		◆		◆				
OIL LEVEL TOO LOW				◆				
WRONG SAE GRADE OF OIL		◆		◆				
OIL PUMP SUCTION LEAK				◆				
OIL LINE OR FILTER LEAK				◆				
CRANKSHAFT BEARING WORN				◆				
COMPRESSION LOW	◆		◆		◆			◆
CYLINDERS OR RINGS WORN	◆				◆			◆
VALVE GUIDES WORN					◆			◆
DRIVE COUPLING FAILURE		◆						
FAN DRIVE OR IDLER FAILURE		◆						
RADIATOR CLOGGED		◆						
FAN BELT LOOSE OR BROKEN		◆						



[The text in this section is extremely faint and illegible. It appears to be a list or a series of entries, possibly organized in a table with multiple columns. The content is too light to transcribe accurately.]

