

## 18i, FUEGO & FUEGO TURBO 4-CYLINDER

### ENGINE CODING

#### ENGINE IDENTIFICATION

Engine identification plate is located on left side of engine block above starter. First 3 characters show engine type.

#### ENGINE IDENTIFICATION

Application	Code
Fuego Turbo (1565 cc) .....	A7L
Fuego and 18i (1647 cc) .....	843

### ENGINE & CYLINDER HEAD

#### ENGINE

##### Removal

1) Remove battery. On 18i, remove engine undercover. On all models, drain cooling system at engine and radiator. Drain engine oil. Remove radiator grille (on 18i remove parking light bulbs first), grille upper crossmember, radiator and cooling fan.

2) If equipped with air conditioning, remove cooling fans, disconnect condenser from radiator and place on bumper. Remove starter and exhaust heat shields, catalytic converter and air intake hose. Remove clutch cable and bracket. On 18i, remove alternator.

3) On all models, if equipped with power steering, remove pump and place it with lines attached on frame rail. If equipped with air conditioning, disconnect compressor and place on frame rail with lines. Disconnect all electrical leads, control cables, vacuum lines and coolant hoses that might interfere with engine removal.

4) Disconnect fuel lines and clamp to prevent tank drainage. Remove sending units from cylinder head. Remove upper engine-to-transaxle bolts. On Fuego and Fuego Turbo, remove electronic ignition module and sensor from clutch or converter housing.

5) On all models, remove flywheel shield, lower engine-to-transaxle bolts, and side engine bolts. If equipped with automatic transmission, remove converter shield and converter fixing bolts on drive plate. Clamp plate with converter locking tool (Mot. 582).

6) Attach lifting sling (Mot. 597) and raise engine until transaxle touches steering crossmember. Secure transaxle. Pull engine forward to disengage from transaxle. Remove engine from vehicle. If equipped with automatic transmission, attach retaining plate (B. Vi. 465) to prevent converter movement.

##### Installation

1) To install, reverse removal procedure noting the following: On manual transmission models, lightly grease the clutch shaft splines and the surface of the clutch thrust plate with Molykote BR 2 grease.

2) Adjust clutch cable clearance. On automatic transmission models, lubricate the converter centering housing in crankshaft with Molykote BR 2 grease (or equivalent).

3) Line up paint mark on converter facing part of driving plate blade sharp edges. Replace driving plate ter bolts. On Fuego Turbo, first tighten bolts and springs on the catalytic converter flange, then loosen 1 1/2 turns.

#### CYLINDER HEAD

##### Removal

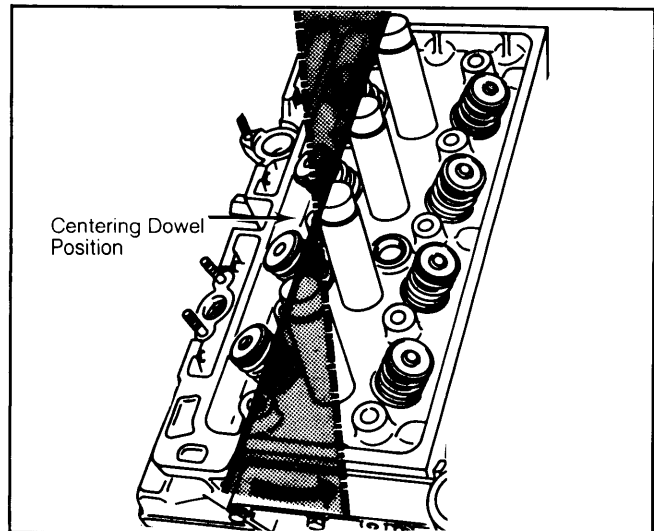
1) Disconnect battery. Remove radiator grille and upper crossmember. Drain cooling system at cylinder block and radiator. Disconnect wiring, cables, and the heater hoses at water pump. Remove catalytic converter. Remove water pump belt and air intake hose.

2) Remove distributor, valve cover, and diagnostic socket. Disconnect fuel lines and clamp to prevent tank drainage. On Fuego Turbo, disconnect the connecting hose between turbo and air cooler. Disconnect the oil feed line from the turbo. Disconnect the EGR hose.

3) On all models, unscrew rocker arm adjusting screws and remove push rods, arranging in proper sequence. Loosen cylinder head bolts and remove inner 6. Remove rubber washers and cups in spark plug recesses. Clamp rocker arm assembly with a rubber band or string around the 4 end bolts.

4) Remove rocker arm assemblies. Unstick cylinder head from block by rotating cylinder head around centering dowel on distributor side. Tap each end of cylinder head with a plastic mallet on each side. See Fig. 1. DO NOT merely lift off cylinder head.

Fig. 1: Rotating Cylinder Head Around Centering Dowel



Do NOT merely lift off cylinder head.

5) Raise cylinder head slightly and remove lifters, arranging them in sequence. Remove cylinder head and lifter chamber seal. Place liner clamp (Mot. 521-01) in position on cylinder block.

##### Installation

1) Remove old gasket pieces with Magnus "Magstrip" or Decaplock "88" liquid. Remove any oil from cylinder head bolt holes with a syringe. Check cylinder liner protrusion as outlined under Pistons, Pins & Rings.

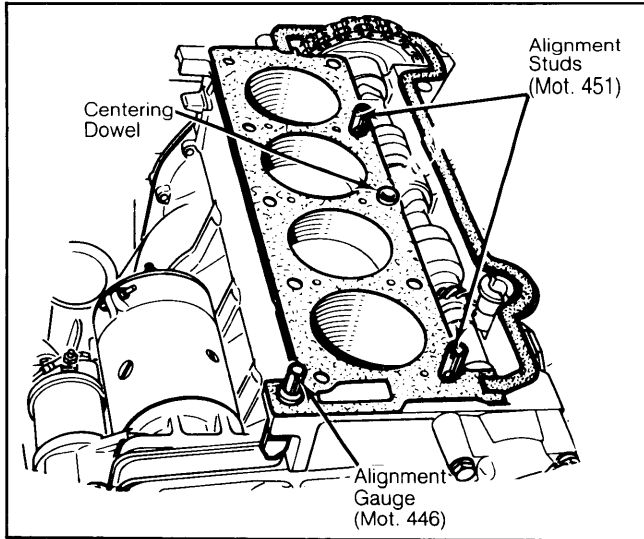
2) Remove liner clamp. Ensure centering dowel and distributor drive gear are properly positioned in cylinder block. See Camshaft & Timing Chain in this article. Position cylinder head gasket. See Fig. 2.

3) Screw alignment studs (Mot. 451) into indicated positions until ball makes contact with cylinder head gasket. Install lifter chamber gasket, ensuring ends do not overlap with cylinder head gasket. Place alignment gauge (Mot. 446) in cylinder block hole. See Fig. 2.

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**Fig. 2: Alignment Gauge, Studs and Centering Dowel Positioning**



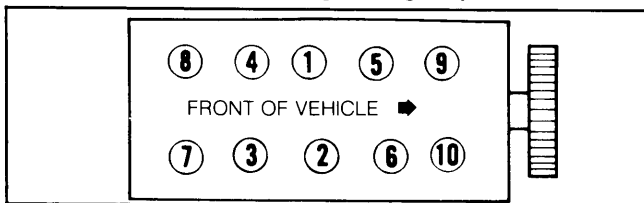
Screw in alignment studs until ball contacts gasket.

4) Place the lifters in cylinder head in correct order. Tap lifters lightly to seat in their housings. Install rocker arm assemblies to cylinder head. Ensure that the 2 rocker arm supports with holes fit properly over their centering dowels.

5) Place cylinder head on block. Be careful not to move lifter chamber gasket. Remove studs using "T" handle of tool set Mot. 451.

6) Lightly lubricate cylinder head bolts with engine oil. Remove any oil from bolt holes with a syringe. Insert bolts. Tighten bolts in correct sequence in 2 steps, first to 30 ft. lbs. (41 N.m), and then to 57-61 ft. lbs. (78-83 N.m). See Fig. 3. Remove cylinder head alignment gauge (Mot. 446).

**Fig. 3: Cylinder Head Bolt Tightening Sequence**



7) Insert push rods. Install remaining components in reverse order of removal and adjust valve clearance. Run engine till thermostat opens and allow to cool 2 1/2 hours. Loosen bolt No. 1 a half turn and retighten to 57-61 ft. lbs. (78-83 N.m). Repeat for remaining bolts in correct sequence.

### CAMSHAFT

#### CAMSHAFT & TIMING CHAIN

##### Removal

1) Remove the cylinder head, distributor, and camshaft end bearing cover plate. Remove oil pan and crankshaft pulley. Remove the timing cover, and the timing chain tensioner with thrust plate and filter. Remove the 2 chain guides.

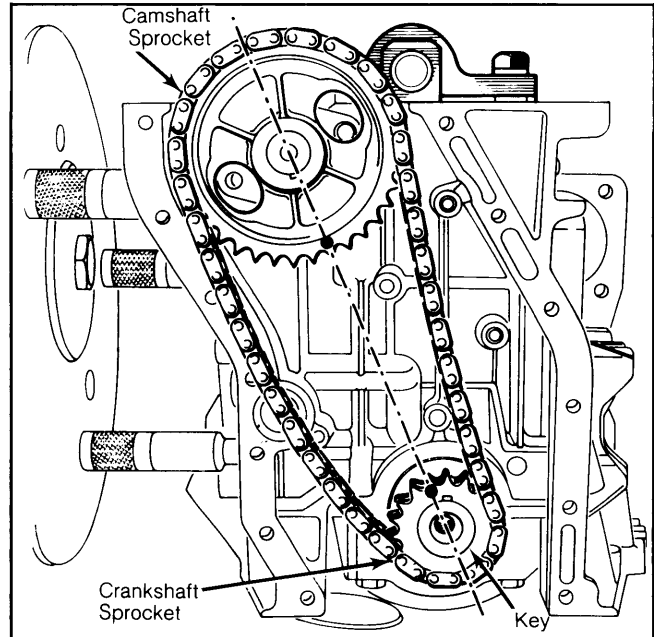
2) Remove crankshaft pulley key, and remove crankshaft sprocket and chain together using puller (Mot.

49). Screw bolt (Mot. 525) into crankshaft and then remove camshaft.

##### Installation

1) Lubricate the camshaft bearings and slide the camshaft in, but not all the way. Place the chain over the camshaft sprocket. Line up the mark on the sprocket with center of the crankshaft and camshaft. See Fig. 4.

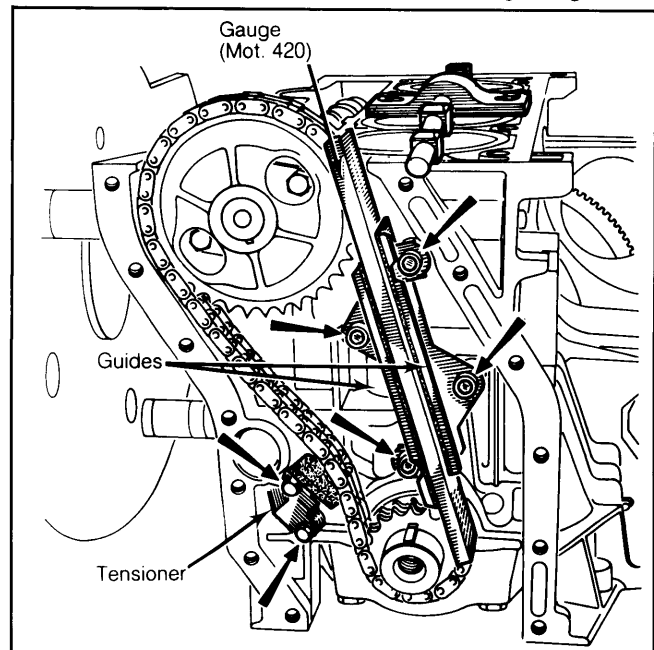
**Fig. 4: Alignment of Camshaft and Crankshaft Sprockets**



Line up mark on sprocket with cam and crankshaft centers.

2) Place the key on the crankshaft. Rotate the crankshaft to bring the key to the top. Place the crankshaft sprocket on the chain. The timing mark must line up with the camshaft sprocket mark as well as the center of the camshaft and crankshaft. See Fig. 4.

**Fig. 5: Adjusting Timing Chain Tension Using Gauge**



Broad arrows indicate tensioner and guide bolts.

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3) Place the sprocket on the crankshaft. Use tool Mot. 525 to install sprocket, while gradually pushing camshaft into position. Insert and tighten 2 camshaft clamp bolts. Install chain tensioner with oil filter and thrust plate. Tighten bolts.

4) Install chain guides. If chain gauge (Mot. 420) is available, place on the chain. Push the 2 guides against the gauge, tighten bolts and remove the gauge. See Fig. 5. If gauge is not available, stretch the chain and position the guides so there is .012-.020" (.30-.50 mm) between chain and the guides. Tighten the bolts.

5) Install crankshaft pulley key. Install timing cover centering dowels and install timing cover to block. Install new oil seal as follows: Place oil seal over assembly sleeve of installation tool (Mot. 525).

6) Place assembly against timing cover and screw bolt into crankshaft until seal contacts timing cover. Install remaining components in reverse order of removal.

### DISTRIBUTOR DRIVE GEAR

1) Rotate engine to bring No. 1 cylinder to TDC. Install distributor drive gear with smaller offset toward camshaft. Drive gear slot should be in line with lube hole in cylinder block.

2) Angle formed by drive gear slot and a line perpendicular to camshaft should be 53°. Fill camshaft oil galley with oil and install rear camshaft bearing cover plate and gasket.

## VALVES

### VALVE ARRANGEMENT

Right side — All intake.  
Left side — All exhaust.

### VALVE GUIDE SERVICING

1) With cylinder head removed, lay cylinder head on wedge shaped block so guide is vertical. Valve guide angles are 23° for intake valves, 26° for exhaust valves. Push the guide out in a press, using mandrel from Mot. 356 tool set.

2) Examine the valve guide and determine whether it is original or a replacement. Replace with the next oversize. First oversize has 1 groove mark, 2nd oversize has 2 groove marks. Turn the cylinder head over on the block and ream the guide bore for valve guide.

3) Ream to .519" (13.20 mm) for 1st oversize, .526" (13.35 mm) for 2nd oversize. Fit the valve guide on the end of the mandrel with chamfer facing outward. Lubricate the guide and press in until positioned correctly.

4) Distance between valve seat and end of valve guide should be 1.575" (40.00 mm) for intake valves, 1.220" (31.00 mm) for exhaust valves. Ream the valve guide bore to accept valve stem using Mot. 357. Recut valve seat.

### VALVE SPRINGS

#### Removal

1) Disconnect battery. Remove valve cover. Remove distributor (if necessary). Position piston corresponding to spring to be removed at TDC. Unscrew appropriate rocker arm screw and remove push rod.

2) Compress valve spring with spring compressor (Mot. 382 or Faucom U 43-L). Hold valve stem with pliers and remove split keepers, cap and springs.

#### Installation

To install, reverse removal procedure. Make sure valve spring is installed with closest coil spring spacing toward cylinder head.

### ROCKER SHAFT

#### Disassembly

Remove the retaining roll pin from the rocker shafts. Note relative positions of parts and remove and clean them.

**NOTE:** Cup plugs at ends of shafts must not be removed.

#### Reassembly

Install the 2 shafts into supports at clutch end of head. Install intake shaft retaining pin. Install the remaining parts and install the exhaust shaft retaining pin.

**NOTE:** Supports 1 and 4 are identical, with lubrication holes and locating dowel. Supports 2, 3 and 5 are identical, with no lubrication hole. The 2 shafts are also identical.

### VALVE CLEARANCE ADJUSTMENT

Set valves cold. To adjust, rotate crankshaft until valve listed in column 1 of table is fully open, then adjust valves specified in second column of table. Set intake valves to .008" (.20 mm), and exhaust valves to .010" (.25 mm). Note that valves and cylinders are numbered from rear to front.

### VALVE ADJUSTMENT SEQUENCE

Valve Open	Adjust
No. 1 Exhaust	No. 3 Intake & No. 4 Exhaust
No. 3 Exhaust	No. 4 Intake & No. 2 Exhaust
No. 4 Exhaust	No. 2 Intake & No. 1 Exhaust
No. 2 Exhaust	No. 1 Intake & No. 3 Exhaust

## PISTONS, PINS & RINGS

### CYLINDER LINERS & PISTON ASSEMBLY

#### Removal

Remove cylinder head, oil pan, and oil pump. Mark the connecting rods and caps on camshaft side. Remove caps and bearings. Remove liner clamp and remove piston and rod assembly from block with liner.

#### Installation

1) Check cylinder liner protrusion WITHOUT sealing "O" ring installed on liner base. Install dial indicator (Mot. 251-01) and measuring block (Mot. 252-01) and measure protrusion. It should be .004-.007" (.10-.17 mm). See Fig. 6. If protrusion is incorrect, check with a new set of liners to determine if the problem is the block or the liners.

2) Position the liners with "O" rings installed so that difference in protrusion is not greater than .002" (.04 mm) on any 2 adjacent cylinders. Liners should also be stepped down from front to rear or vice-versa. Oil the piston and connecting rod assembly and insert to liner using ring compressor (Mot. 851).

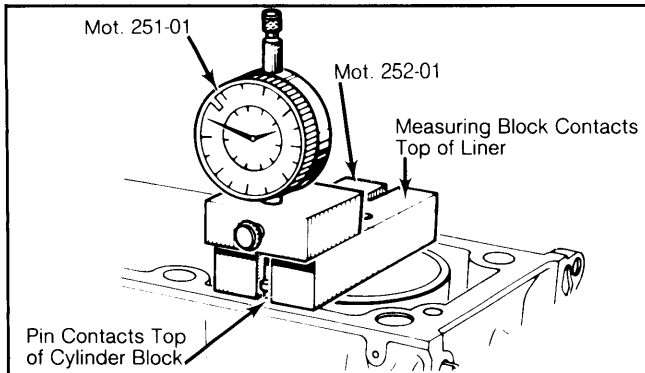
3) Tops of the pistons are marked with an arrow pointing toward flywheel and have a spot facing the

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same way. Flat surface of big end of connecting rod must be parallel to flat surface at top of liner. Connecting rod markings face camshaft.

**Fig. 6: Checking Cylinder Liner Protrusion**



Check protrusion without "O" ring installed.

4) Install liner clamp (Mot. 521-01). Place connecting rods with bearings on lubricated rod bearing journals and install matching rod caps and bearings. Install remaining components in reverse order of removal.

### PISTON PIN

#### Removal (Fuego Turbo)

On turbo models, piston pins are free fitting in both piston and connecting rods, and are held in by retainers. To remove piston pin, remove retainers, and push out piston pin.

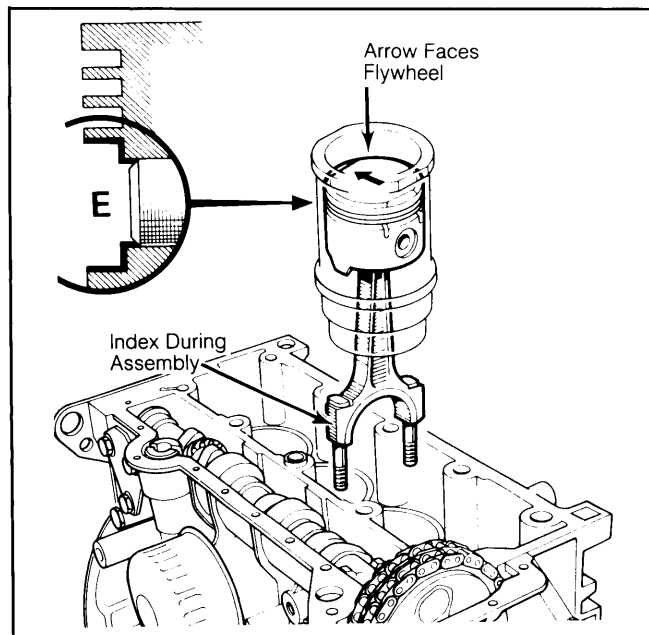
#### Installation

To install pin, insert pin through connecting rod and piston and install pin retainers. Make sure assembly turns freely.

#### Removal (All Other Models)

Remove piston from liner and rings from piston. Using press (Mot. 574-07), press out piston pin.

**Fig. 7: Piston Mounting and Identification Marks**



Make sure piston pin is recessed in piston.

### Installation

1) Heat connecting rod to 482°F (250°C). Insert centering guide (of tool kit Mot. 574) into piston. Place the connecting rod in the piston.

2) Lightly oil the piston pin with Molykote M55 (or equivalent) and press in piston pin until the guide butts up against support block. Check to ensure that pin is recessed from piston diameter. See Fig. 7.

### PISTON RINGS

Fit rings to pistons with "O" mark or "TOP" facing up. Oil pistons before inserting to liners. Rings are pre-gapped. Ensure that flat surface of connecting rod is parallel to flat surface on liner.

## CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

### MAIN & CONNECTING ROD BEARING SERVICE

1) Remove cylinder head and oil pan. Invert engine and mark bearing caps. Remove connecting rod bearing caps and all main bearing caps except No. 1. Remove all bearing shells.

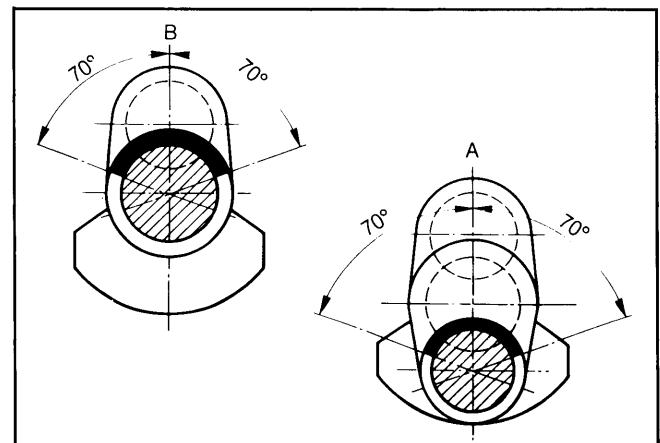
2) Remove No. 1 main bearing cap by tapping underneath with a hammer at each end. Remove oil seals, crankshaft, main bearings and thrust washers.

3) Use a micrometer and measure crankshaft journals. If any main bearing journal is worn beyond 2.148" (54.55 mm) or any connecting rod journal is worn beyond 1.880" (47.75 mm), crankshaft must be reground and fitted with new bearings.

**NOTE:** Journals are roll hardened. Make sure roll hardening remains intact over a 140° section facing rotational centerline of crankshaft. See Fig. 8.

4) Install upper main bearings (they have lubrication holes). Lubricate bearings and crankshaft journals. Fit crankshaft to block. Insert thrust washers with White metal face toward the crankshaft. Fit main bearings No. 2, 3, 4, and 5 to caps (they have no lubrication holes).

**Fig. 8: Crankshaft MUST Maintain Roll Hardened Surfaces as Shown**



Roll hardening must cover a 140° section.

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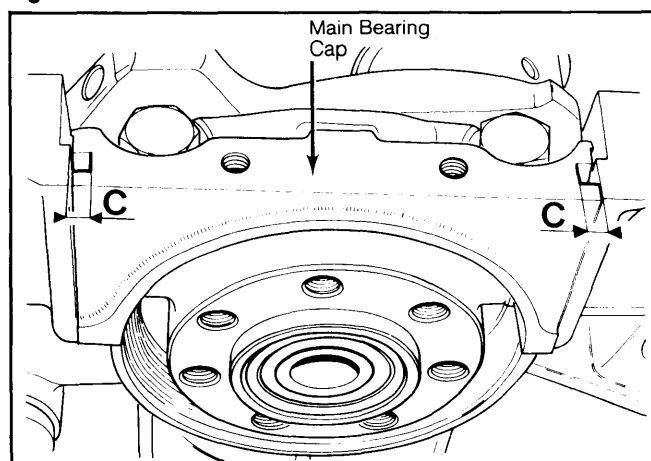
5) Lubricate bearings and install caps without tightening bolts. Fit rear main bearing and cap as outlined in Rear Main Bearing Cap & Oil Seal procedure. Use a dial indicator and check crankshaft end play.

6) If end play exceeds .009" (.23 mm) replace thrust washers to obtain correct specification. Fit upper connecting rod bearings and slide onto crank shaft. Fit lower half of bearing and tighten all caps. Ensure crankshaft is free to turn.

### REAR MAIN BEARING CAP & OIL SEAL

1) Insert bearing to cap. Temporarily install cap and tighten bolts. Measure dimension "C" between cylinder block and main bearing seal housing. See Fig. 9. If less than .20" (5.0 mm) select seals .201" (5.10 mm) thick. If greater than .20" (5.0 mm), select seals .213" (5.40 mm) thick (White marking).

Fig. 9: Measurement for Seal Selection



Measure between cylinder block and seal housing.

2) Remove cap. Place 2 side seals on cap with seal groove facing outward. Seal protrusion on cylinder block side should be .031" (.20 mm). Lubricate seals and bearing and install cap over 2 centering studs, placing foil shims between block and seals to protect seals.

3) When cap is almost in place, use a ruler to ensure seals still protrude slightly. Remove shims and studs and tighten bolts. After checking end play, install oil seal with Mot. 259-01. Be careful of oil seal lip.

## ENGINE OILING

### CRANKCASE CAPACITY

Capacity is 4.5 quarts (4.3L) with filter change.

### OIL FILTER

Oil filter is the disposable canister type.

### NORMAL OIL PRESSURE

Oil pressure should be 29 psi (2.1 kg/cm<sup>2</sup>) at idle, 58 psi (4.0 kg/cm<sup>2</sup>) at 4000 RPM.

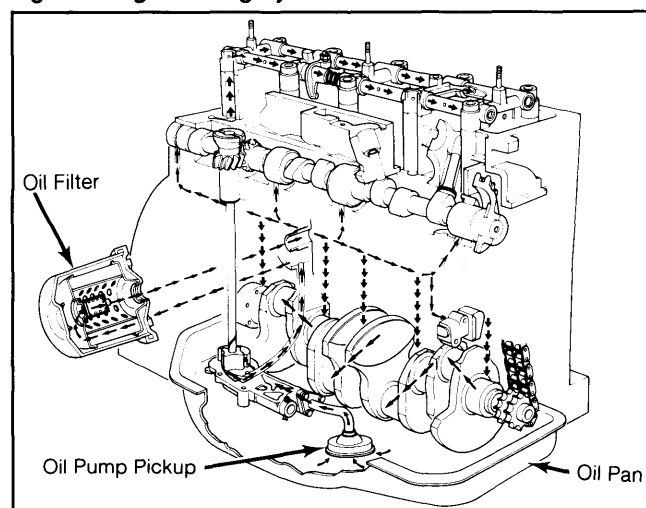
### ENGINE OILING SYSTEM

Engine oil is picked up in the pan and pumped by the oil pump through the oil filter to passages in the lifter chamber. From there it travels upward through

passages to lubricate camshaft bearings and downward through passages to lubricate crankshaft and connecting rod bearings.

It travels upward through a passage at the rear of lifter chamber to the rocker shafts to lubricate the valve train and drains back to the lifter chamber. At the front of the lifer chamber it travels through a passage to timing chain tensioner. Oil then drains back to the oil pan.

Fig. 10: Engine Oiling System



### OIL PUMP

#### Removal

Drain oil pan and remove flywheel protective cover (if necessary). Remove the oil pan, oil pump and 2 pump rotors.

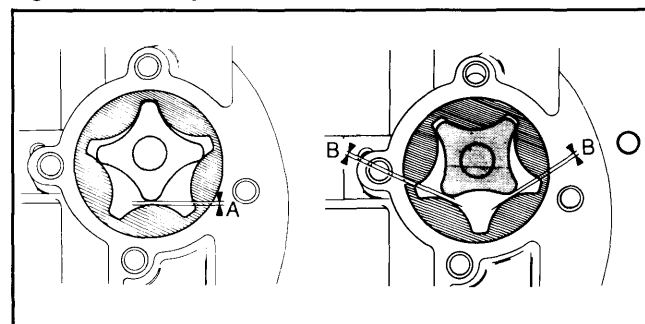
#### Disassembly

Unscrew suction pipe bolts. Remove cotter pin from pressure relief valve and remove spring cup, spring and piston.

#### Inspection

Check clearance of 2 rotors in positions shown in Fig. 11. Dimension "A" should be .002-.011" (.04-.09 mm). Dimension "B" should be .001-.006" (.02-.14 mm). If clearance exceeds specifications, replace rotors.

Fig. 11: Oil Pump Rotor Clearances



#### Reassembly

Place piston, spring, and spring cup in pump body. Install cotter pin, suction pipe and gasket. Tighten bolts and bend lock plate over.

#### Installation

Install assembly with rotors to block. Install oil pan and new gasket.

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### ENGINE COOLING

#### COOLING SYSTEM CAPACITY

Capacity is about 7.5 quarts (7.3L). Fill at reservoir tank.

#### WATER PUMP

##### Removal

Disconnect battery. Drain cooling system and remove upper grille crossmember, grille, radiator and cooling fan. Remove water pump drive belt and pump fixing bolts. Free pump by tapping with a mallet.

#### Installation

To install, reverse removal procedure. Note that seal is dry mounted.

#### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Connecting Rod Cap Nuts .....	33 (45)
Crankshaft Pulley Bolt .....	67 (91)
Cylinder Head Bolts .....	1 57-61 (78-83)
Flywheel Bolt .....	37 (50)
Main Bearing Caps .....	48 (65)
1 — See text.	

## ENGINE SPECIFICATIONS

### GENERAL SPECIFICATIONS

Year	DISPLACEMENT		Fuel System	HP@RPM	Torque Ft. Lbs.@RPM	Compr. Ratio	BORE		STROKE	
	Cu. In.	Liters					In.	mm	In.	mm
1982 Non Turbo	100.5	1647	Fuel Inj.	86.3@5500	86.3@2500	8.6:1	3.10	79.0	3.30	84.0
Turbo	95.7	1565	Fuel Inj.	107@5500	120@2500	8.0:1	3.30	77.0	3.30	84.0

### VALVES

Engine Size & Valve	Head Diam. In. (mm)	Face Angle	Seat Angle	Seat Width In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift In. (mm)
1565 cc & 1647 cc Intake	1.524 38.7	90°	90°	.059-.071 (1.5-1.8)	.313-.314 (7.95-7.98)	.001-.003 (.025-.076)	....
Exhaust	1.358 (34.5)	90°	90°	.039-.053 (1.00-1.35)	.313-.314 (7.95-7.98)	.001-.003 (.025-.076)	....

### PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit In. (mm)	Ring No.	End Gap In. (mm)	Side Clearance In. (mm)
1565 cc & 1647 cc	.0016-.0024	Free Fit	Press Fit <sup>1</sup>	All	<sup>2</sup>	....

<sup>1</sup> — Turbo motor free fit. <sup>2</sup> — Supplied pre-set.

### CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam. In. (mm)	Clearance In. (mm)	Thrust Bearing	Crankshaft End Play In. (mm)	Journal Diam. In. (mm)	Clearance In. (mm)	Side Play In. (mm)
1565 cc & 1647 cc	2.157 <sup>1</sup> (54.80)	....	No. 3	.002-.009 (.05-.23)	1.890 <sup>2</sup> (48.00)	....	.012-.022 (.31-.57)

<sup>1</sup> — Limit 2.148" (54.55 mm). <sup>2</sup> — Limit 1.880" (47.75 mm).

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## 18i, FUEGO & FUEGO TURBO 4-CYLINDER (Cont.)

### ENGINE SPECIFICATIONS (Cont.)

#### VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (Kg @ mm)	
		Valve Closed	Valve Open
1565 cc & 1647 cc Outer	2.138 (54.3)	....	117@1.201 (53@30.5)
Inner <sup>1</sup>	1.843 (46.8)	36@.95 (16.3@24.5)	....

<sup>1</sup> — Turbo motor has outer spring only.

#### VALVE TIMING

Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
1565 cc 1647 cc	10° 21°	50° 59°	50° 59°	21° 21°

#### CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1565 cc & 1647 cc	....	<sup>1</sup>	....

<sup>1</sup> — End play .002-.005" (.05-.12 mm).