## 1966-73 FIAT 850 4 CYLINDER

**GENERAL SPECIFICATIONS**

| Year | Displ. cu. ins. | Displ. cc | Carburetor | HP at RPM | Torque (Ft. Lbs. at RPM) | Compr. Ratio | Bore in. | Bore mm | Stroke in. | Stroke mm |
|---|---|---|---|---|---|---|---|---|---|---|
| 1966-67 | 51.44 | 843 | 1x1-Bbl. | 40@5300 | 34@4800 | 8.0-1 | 2.559 | 65 | 2.500 | 63.5 |
| 1967 Super | 51.44 | 843 | 1x1-Bbl. | 42@5300 | 37@5000 | 8.8-1 | 2.559 | 65 | 2.500 | 63.5 |
| 1968-69 Coupe | 51.44 | 843 | 1x2-Bbl. | 52@6400 | 45.6@4000 | 9.3-1 | 2.559 | 65 | 2.500 | 63.5 |
| 1968-71 | 49.85 | 817 | 1x1-Bbl. | 36@3400 | 38@3400 | 8.9-1 | 2.519 | 64 | 2.500 | 63.5 |
| 1970-73 | 55.10 | 903 | 1x2-Bbl. | 52@4000 | 48@4000 | 9.5-1 | 2.559 | 65 | 2.677 | 68 |

### ENGINE IDENTIFICATION

Engine identification number is stamped in pad in front of cylinder block next to front engine cover.

| Application | Code |
|---|---|
| 843 cc Engine (Standard) | 100G.000 |
| 843 cc Engine (Super) | 100G.002 |
| 843 cc Engine (Coupe) | 100GC.000 |
| 817 cc Engine (Sedan) | 100G3.002 |
| 903 cc Engine (Coupe) | 100GBC.040 |
| 903 cc Engine (Spider) | 100GBS.040 |

### ENGINE REMOVAL

1) Raise rear of vehicle and position on safety stands. Disconnect positive battery cable. Remove lower engine compartment sides and hood.

2) Disconnect fuel inlet line at fuel pump and oil pressure sending unit. Drain oil pan and cooling system. Disconnect all electrical connections to engine and license plate light.

3) Disconnect accelerator and choke cables at carburetor. Disconnect both cooling hoses from engine. Remove lock ring securing air conveyor to radiator.

4) Remove generator, fan and water pump, and starter. Remove rear bumper. Attach a suitable engine holding fixture (A. 60534) to a hydraulic jack and position under engine.

5) Remove rear motor mount nut. From under vehicle, remove bolts securing engine to transaxle. Tilt engine if necessary to gain access to bolts and remove engine.

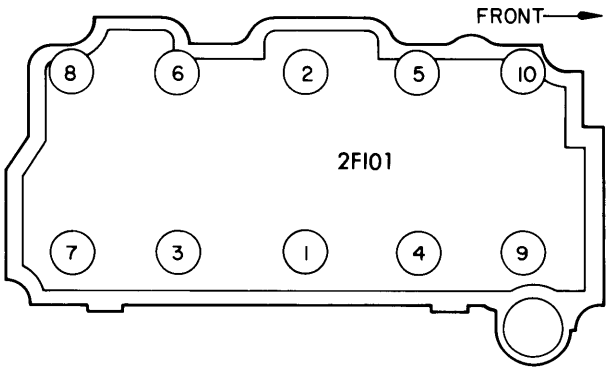
6) To install engine, reverse removal procedure. Take care when positioning engine against transaxle that transmission input shaft is aligned with clutch properly.

### CYLINDER HEAD REMOVAL

1) Disconnect positive battery cable. Remove air cleaner, carburetor, distributor, valve cover and rocker arm assembly. Disconnect cooling hoses from engine and exhaust pipe from manifold.

2) Disconnect spark plug wires and heat indicator connection. Withdraw all push rods. Remove all cylinder head bolts. With all bolts removed, thermostat housing can be removed with cylinder head.

3) To install cylinder head, reverse removal procedure. Tighten cylinder head to specification in sequence shown in illustration.




**CYLINDER HEAD TIGHTENING SEQUENCE**

**VALVES**

| Engine & 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) |
|---|---|---|---|---|---|---|---|
| 1966-73 All (Exc. 100GC.000) | | | | | | | |
| Intake | 1.063 (27) | 45½° | 45° | .051-.059 (1.3-1.5) | .2750-.2756 (6.985-7.000) | .0009-.0022 (.022-.055) | .339 (8.6) |
| Exhaust | .984 (25) | 45½° | 45° | .051-.059 (1.3-1.5) | .2750-.2756 (6.985-7.000) | .0009-.0022 (.022-.055) | .339 (8.6) |
| 1968-69 100GC.000 | | | | | | | |
| Intake | 1.142 (20) | 45½° | 45° | ..... | .2750-.2756 (6.985-7.00) | .0012-.0025 (.030-.063) | .346 (8.8) |
| Exhaust | 1.024 (26) | 45½° | 45° | ..... | .2750-.2756 (6.985-7.000) | .0012-.0025 (.030-.063) | .346 (8.8) |

## 1966-73 FIAT 850 4 CYLINDER (Cont.)

### VALVE ARRANGEMENT

E-I-I-E-E-I-I-E (front to rear).

### VALVE GUIDE SERVICING

1) Check clearance of valve guides. If clearance exceeds .006" valve guides must be replaced. Using a suitable driver (A. 60084) drive guide out of cylinder head.

2) Using same driver, install new guides. Guides might require reaming to obtain correct clearance with valve.

**VALVE SPRINGS**

| Engine | Free Length In. (mm) | PRESSURE Lbs. @ In. (kg @ mm) | |
|---|---|---|---|
| | | Valve Closed | Valve Open |
| 1966-73 All (exc. 100GC.000) | | | |
| Up to No. 392750 | 1.71 (43.4) | 46.3@1.14 (21@29) | 102.7@.843 (46.6@21.4) |
| From No. 392751 | 1.71 (43.4) | 51.6@1.34 (23.4@34) | 102.5@.972 (46.5@24.7) |
| 1968-69 100GC.000 Inner | | | |
| ①Up to No. 865939 | 1.47 (37.3) | 18@1.18 (8@30) | 40@.81 (18@20.7) |
| From No. 865940 | 1.56 (39.7) | 14@1.18 (6.4@30) | 28@.81 (12.5@20.7) |
| Outer | 1.71 (43.4) | 51.6@1.34 (23.4@35) | 102.5@.97 (46.5@24.7) |

① – Inner springs not used on engines No. 425696-739352.

### VALVE SPRING REMOVAL

1) With cylinder head removed, compress valve spring with a suitable spring compressor (A. 60084) and remove valve keepers.

2) Release spring compressor and remove upper spring retainer and spring. Withdraw valve from valve guide. To assemble, reverse removal procedure.

### ROCKER ARM ASSEMBLY

1) With rocker arm assembly removed, remove snap ring from end of shaft and slide off rocker arms, springs and support stands.

2) Thoroughly clean and inspect all components. Check contact surface of rocker arm for wear or scoring. Check shaft for wear or scoring.

3) Check clearance between rocker arm bore and shaft. If clearance exceeds .006", replace rocker arms or shaft. To assemble, oil all components and reverse disassembly procedure.

### VALVE TAPPET SERVICE

1) Camshaft must be removed to withdraw tappets. Check tappets for wear or scoring. If scoring is minor a fine abrasive stone can be used to smooth abrasions.

2) Check clearance between tappets and tappet bores in cylinder block. If clearance exceeds .0031", tappet bores must be reamed out and oversize tappets installed.

3) Tappets are available .002" and .004" oversize. Ream bores to .0004-.0018" clearance for oversize tappets.

### VALVE CLEARANCE ADJUSTMENT

Valve clearance is checked or adjusted with engine cold. Adjust clearance with piston at TDC of compression stroke of cylinder being adjusted.

**Valve Clearance Adjustment**

| Application | In. (mm) |
|---|---|
| All Engines (Exc. 100GC.000) | |
| All Valves | .006 (.15) |
| 100GC.000 Engines | |
| Intake | .006 (.15) |
| Exhaust | .008 (.20) |

**PISTONS, PINS, RINGS**

| Engine | PISTONS | PINS | | RINGS | | |
|---|---|---|---|---|---|---|
| | ①Clearance In. (mm) | Piston Fit In. (mm) | Rod Fit In. (mm) | Rings | End Gap In. (mm) | Side Clearance In. (mm) |
| 1966-73 All | .0008-.0016 (.02-.04) | .0003-.0006 (.008-.016) | ②.0006-.0015 (.016-.039) | No. 1 | .008-.014 (.20-.35) | .002-.003 (.045-.075) |
| | | | | No. 2 | .008-.014 (.20-.35) | .001-.002 (.025-.055) |
| | | | | Oil | ③ | .001-.003 (.025-.075) |

① – Measured 1.55" (39.5 mm) from top of piston.
② – Interference fit.
③ – Ring ends butt together.

## 1966-73 FIAT 850 4 CYLINDER (Cont.)

### OIL PAN REMOVAL

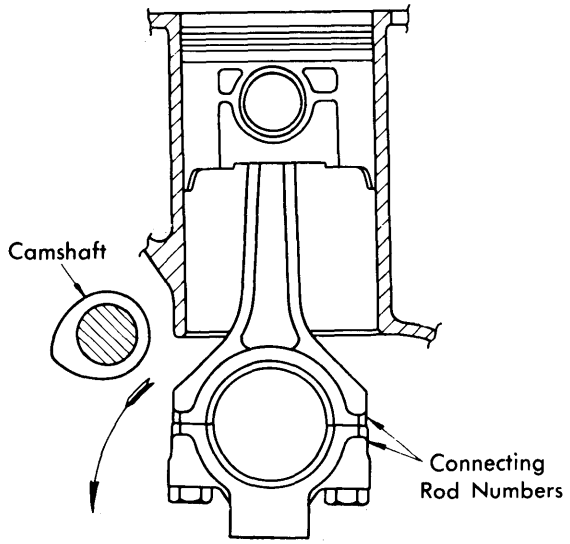
1) Drain engine oil and remove bolts securing oil pan to cylinder block. Remove oil pan. Thoroughly clean oil pan and cylinder block mating surfaces.

2) To install oil pan, reverse removal procedure. Apply sealer to oil pan mounting flange and install gaskets. Install a suitable gasket seating tool (A. 60163) on oil pan for approximately 45 minutes before installing oil pan.

### PISTON & ROD ASSEMBLY

1) Before installing piston and rod assembly, position ring gaps approximately 120° apart. Compress ring with a suitable ring compressor (A. 60273).

2) Install piston and rod assembly in bore, making sure numbers on rod and rod cap are facing away from camshaft. Rod numbered "1" must be installed in cylinder number 1 and so on.

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### PISTON & ROD INSTALLATION

### FITTING PISTONS

1) Pistons are manufactured in three class sizes. Cylinder bores are machined to size depending on class of piston. If piston is replaced for any reason, one of same class must be installed.

2) Class of piston is stamped in piston pin boss on bottom of piston. Class of cylinder bore is stamped in oil pan mating flange of cylinder block opposite camshaft side of engine.

3) Class is designated by a letter code. Check piston to cylinder clearance with a feeler gauge at right angles to piston pin.

4) If clearance of piston in bore exceeds .006", cylinders must be rebored and oversize pistons installed. Pistons are available .0079" (.2 mm), .0159" (.4 mm) and .0236" (.6 mm) oversizes.

### PISTON PIN REPLACEMENT

1) With piston removed, press out piston pin with a suitable driver and mandrel (A. 60285 and A. 95065). Separate piston from connecting rod.

2) Check clearance of pin in piston by oiling pin and inserting into pin boss of piston. Pin should push fit through piston with light thumb pressure but should not fall through.

3) Pins are manufactured in three class sizes and pin boss is machined to size depending on pin class. Class is designated by a number code stamped in face of pin and bottom of pin boss in piston.

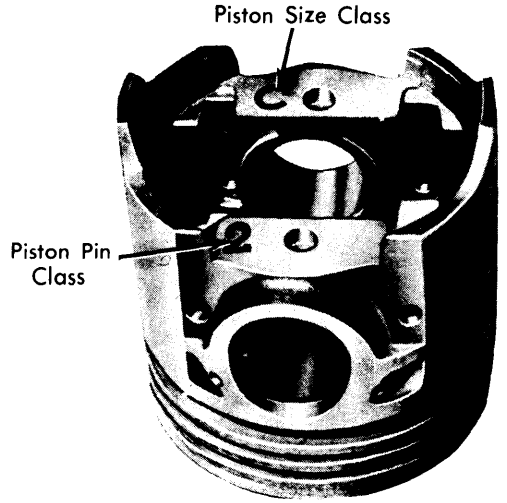
4) If piston pin is below standard size and is replaced, replace with one of same class. If clearance of pin in piston exceeds .002", piston and rod must be resized for an oversize piston pin. Pins are available .0079" oversize.

**Piston Pin Class Designation**

| Class Code | Piston Pin Size In. (mm) |
|---|---|
| Class 1 | .7862-.7864 (19.970-19.974) |
| Class 2 | .7864-.7865 (19.974-19.978) |
| Class 3 | .7865-.7867 (19.978-19.982) |

**Piston Pin Boss Class Designation**

| Class Code | Pin Boss Size In. (mm) |
|---|---|
| Class 1 | .7867-.7868 (19.982-19.986) |
| Class 2 | .7868-.7870 (19.986-19.990) |
| Class 3 | .7870-.7872 (19.990-19.994) |

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**PISTON PIN & PISTON SIZE CLASS CODE MARK LOCATIONS**

## 1966-73 FIAT 850 4 CYLINDER (Cont.)

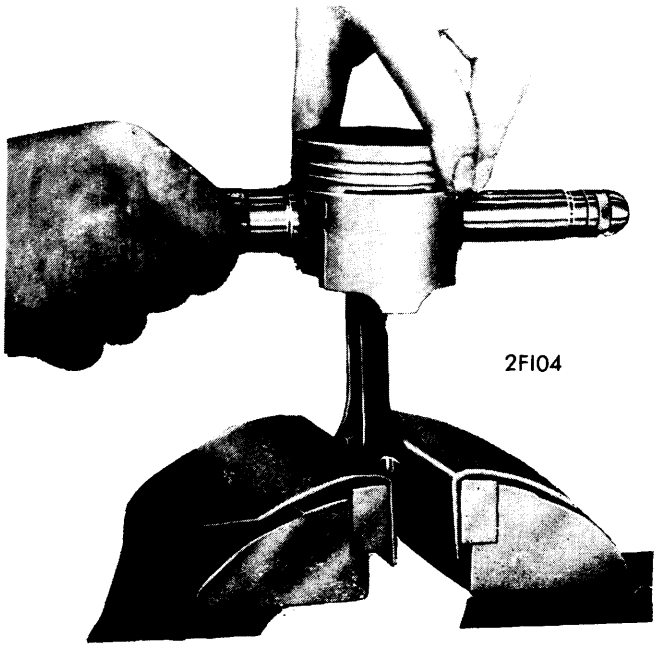
5) To assemble piston and rod assembly, connecting rod must be preheated to approximately 608°F. Place piston pin on a suitable installation tool (A. 60275).

6) Place preheated rod in a vise and position piston on rod so that side of piston with pin class number is facing away from numbered side of connecting rod and cap.

7) Place piston flat against rod and push pin into piston and rod until shoulder of tool contacts piston. Piston should move freely on pin.

8) To check pin fit in piston after installation, a suitable pin drag checking tool (A. 95065) is required. Position piston and rod in tool and turn dial indicator of tool to zero.

9) Using a torque wrench, apply 9.4 ft. lbs. to bolt of tool. If pin fit is right, dial indicator should return to zero when torque wrench is released.




PISTON PIN INSTALLATION

**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) |
| 1966-73 | 1.9994-2.0002 (50.785-50.805) | .0008-.0026 (.020-.066) | Center | .002-.010 (.06-.26) | 1.5742-1.5750 (39.985-40.005) | .0010-.0028 (.026-.071) | ..... |

### MAIN BEARING SERVICE

1) With crankshaft removed, thoroughly clean and blow out oil passages with compressed air. Inspect main and rod bearing journals for taper or out-of-round conditions.

2) If journal tapers or is out-of-round more than .002", journals must be reground and undersize bearings installed. Check bearing clearance with the Plastigage method.

3) If clearance exceeds .004", crankshaft must be reground and undersize bearings installed. Bearings for both main and rod journals are available .010", .020", .030" and .040" undersize.

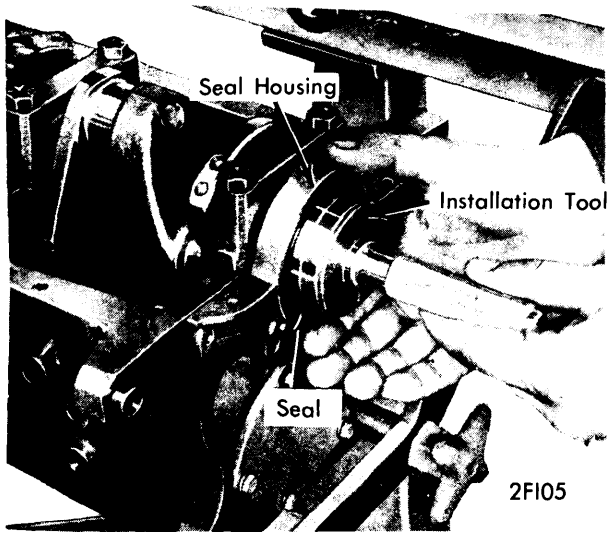
### CRANKSHAFT END PLAY

1) Check crankshaft end play by mounting a dial indicator at end of crankshaft and prying back and forth with a screwdriver. If end play exceeds .0138", thrust washers must be changed.

2) Remove center main bearing cap and install correct amount of .005" thick thrust washers to obtain correct crankshaft end play.

### REAR MAIN BEARING OIL SEAL SERVICE

Rear main bearing oil seal is mounted in a housing bolted to flywheel end of crankshaft. Seal should be replaced when ever housing is removed. When installing seal and housing, lubricate contact lip of seal and use a suitable alignment tool (A. 60281) to install.




REAR MAIN BEARING OIL SEAL INSTALLATION

## 1966-73 FIAT 850 4 CYLINDER (Cont.)

### ENGINE FRONT COVER & OIL SEAL

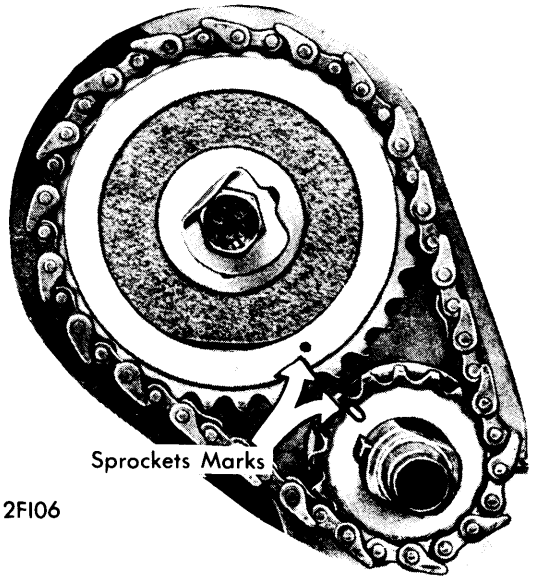
Seal is mounted in front cover and should be replaced whenever cover is removed. When installing seal in cover, make sure it is squarely seated in cover. Lubricate contact lip of seal, use new gasket with sealer and install cover on cylinder block.

**CAMSHAFT**

| Engine | Journal Diam. In. (mm) | Clearance In. (mm) | Lobe Lift In. (mm) |
|---|---|---|---|
| 1966-73 | | | .339 |
| No. 1 | 1.4951-1.4961 (37.975-38.000) | .0010-.0030 (.025-.075) | (8.6) |
| No. 2 | 1.7060-1.7070 (43.333-43.358) | .0010-.0028 (.026-.071) | |
| No. 3 | 1.2195-1.2205 (30.975-31.000) | .0010-.0028 (.026-.071) | |

### TIMING CHAIN REPLACEMENT

Remove sprocket from camshaft by removing sprocket retaining bolt. To install sprocket and timing chain reverse removal procedure, making sure marks on camshaft sprocket and crankshaft sprocket are aligned (see illustration).




**TIMING CHAIN & SPROCKET INSTALLATION**

### CAMSHAFT REMOVAL

1) Remove front engine cover and bolt securing camshaft sprocket to camshaft. Remove camshaft sprocket with chain. Remove bolt securing front camshaft bearing and remove camshaft with bearing.

2) To install camshaft, reverse removal procedure. Install timing chain in correct position. *See Timing Chain Removal.*

### CAMSHAFT BEARING REPLACEMENT

1) Front camshaft bearing is removed with camshaft. Center and rear camshaft bearings must be driven from cylinder block.

2) Front bearing is manufactured in three class sizes of outside diameter. Bearing bore in cylinder block is machined to size depending on class of bearing.

3) Class is designated by a letter stamped in cylinder block next to bearing retainer screw, while class letter of bearing is stamped in outer face.

4) If front bearing is replaced for any reason, one of same class must be installed. Drive out center and rear bearings with a suitable driver (A. 60292).

5) Use same driver to install bearings, making sure oil holes align with holes in block. Bearings must be reamed to correct clearance for camshaft journals.

**VALVE TIMING**

| Engine | INTAKE Open (BTDC) | INTAKE Close (ABDC) | EXHAUST Open (BBDC) | EXHAUST Close (ATDC) |
|---|---|---|---|---|
| 1966-73 All (exc. 100GC.000) | 16° | 56° | 56° | 16° |
| 1968-69 100GC.000 | 25° | 51° | 64° | 12° |

*NOTE — Crankshaft rotates in counterclockwise direction.*

### VALVE TIMING

1) To insure that marks on timing chain sprockets are in correct position, valve timing must be checked. Install a suitable graduated scale (A.95694) to crankcase.

2) Adjust valve clearance of both valves on number one cylinder to .015". Turn flywheel until number one intake valve just starts to open. At this position, pointer on flywheel should read 16° BTDC on graduated scale.

3) Continue turning flywheel until mark on flywheel aligns with TDC on graduated scale. At this point, marks on sprockets should align. Reset valve clearances.

## ENGINE OILING

**Crankcase Capacity** – 3.5 qts. with filter.

**Oil Filter** – A centrifugal oil filter, driven by crankshaft pulley through a "V" belt.

**Normal Oil Pressure** – 43-57 psi. at normal idle.

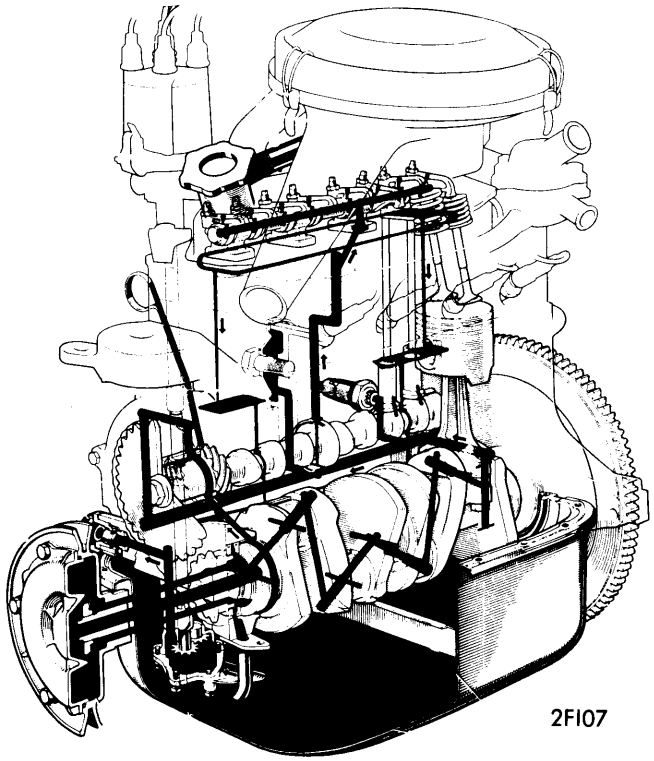
**Pressure Regulator Valve** – Install in lower left side of crankcase. Remove plug and withdraw spring and valve. Add or remove shims in plug as required to obtain correct oil pressure.

### ENGINE OILING SYSTEM

Full pressure, metered oiling system, utilizing a gear type oil pump driven by camshaft.

## 1966-73 FIAT 850 4 CYLINDER (Cont.)

### ENGINE OILING (Cont.)




ENGINE OILING SYSTEM

**OIL PUMP**

1) With oil pan removed, remove bolts securing oil tube to main cap, bolts securing oil pump to cylinder block and remove oil pump.

2) Remove bolts securing cover to pump body. Remove drive gear and driven gear. Thoroughly clean and inspect all components.

3) Measure clearance between gear teeth and pump housing. If clearance exceeds .006", replace gears or housing.

4) Measure clearance between drive gear shaft and seat. If clearance exceeds .006", replace drive gear or pump housing.

5) Check clearance between pump drive shaft and bushing in housing. If clearance exceeds .006", replace drive shaft or bushing in cylinder block. Bushing requires a .0010-.0028" press fit in cylinder block.

6) Measure drive gear and driven gear backlash. If backlash exceeds .006", replace both gears. To assemble oil pump, reverse disassembly procedure.

**Oil Pump Specifications**

| Application | In. (mm) |
|---|---|
| Gears-to-Housing Clearance | .0004-.0040 (.01-.10) |
| Gear Backlash | .0031 (.08) |
| Drive Shaft-to-Cylinder Block Bushing Clearance | .0010-.0024 (.025-.062) |
| Drive Gear Shaft-to-Seat in Housing Clearance | .0005-.0020 (.013-.050) |

## ENGINE COOLING

**Thermostat** – Starts opening at 185-192°F.

**Cooling System Capacity** – 8 qts.

**WATER PUMP**

1) Remove right side engine apron and drain cooling system. Remove drive belt from water pump pulley. Disconnect hoses at cylinder head and radiator.

2) Remove lock ring securing air conveyor to radiator. Remove bolts securing water pump to cylinder block and remove water pump and air conveyor. To install water pump reverse removal procedure.

**TIGHTENING SPECIFICATIONS**

| Application | Ft. Lbs. (mkg) |
|---|---|
| Cylinder Head Bolts | 29 (4.0) |
| Connecting Rod Bolts | 25 (3.5) |
| Main Bearing Bolts | 45 (6.2) |
| Flywheel Bolts | 25-29 (3.5-4.0) |
| Rocker Arm Assembly Nuts | |
| All (exc. 100GC.000) | 12 (2.0) |
| 100GC.000 | 36 (5.0) |
| Camshaft Sprocket Bolt | 36 (5.0) |
| Crankshaft Pulley Nut | 72 (10) |
| Engine Mount-to-Transaxle | 18 (2.5) |
| Engine Mount-to-Body | 22-25 (3.0-3.5) |
| Engine Front Cover | 6 (0.8) |