

# DEUTZ

7585 Ponce de Leon Circle  
Atlanta, Georgia 30340

Model	No. Cyls.	Bore	Stroke	Displ.
F1L 208 D	1	80 mm (3.150 in.)	82 mm (3.228 in.)	413 cc (25.2 cu. in.)
F1L 210 D	1	95 mm (3.740 in.)	95 mm (3.740 in.)	673 cc (41.0 cu. in.)

These engines are air-cooled, four-stroke, direct injection diesels. Crankshaft rotation is counterclockwise when facing flywheel.

## MAINTENANCE

### LUBRICATION

Crankcase oil must meet or exceed API service classification CC or CD. The oil viscosity grade is determined by the ambient temperature expected between oil changes. For operation in temperatures below  $-5^{\circ}$  ( $23^{\circ}$ F), SAE 10W oil is recommended. For temperatures ranging between  $-10^{\circ}$ C ( $14^{\circ}$ F) to  $10^{\circ}$ C ( $50^{\circ}$ F), SAE 20W-20 should be used. When temperatures are between  $5^{\circ}$ C ( $40^{\circ}$ F) to  $30^{\circ}$ C ( $85^{\circ}$ F), SAE 30 oil is recommended. For temperature above  $25^{\circ}$ C ( $77^{\circ}$ F), SAE 40 oil should be used. Multiviscosity oil, such as 20W-40, is approved for all temperature operation, however, the oil must meet MIL-L46152 specification.

Manufacturer recommends governing oil change intervals on oil grade used (CC or CD), operating conditions (normal or severe) and sulfur content of fuel (above or below 0.5%). On all new or overhauled engines, first oil change should be after the first 20-30 hours of operation for severe duty applications or after the first 40-60 hours of operation for normal duty applications. Then, the second oil change is performed at the normal interval for all engines as follows: For normal duty operation and using fuel with less than 0.5% sulfur content, oil change interval is every 200 hours for "CC" classification oil or every 300 hours for "CD" oil. If fuel sulfur content exceeds 0.5% interval is reduced to every 100 hours for "CC" oil or every 200 hours for "CD" oil. For engines used in severe duty applications and using fuel with less than 0.5% sulfur content, oil change interval is every 100 hours of operation when using "CC" oil or every 200 hours if using "CD" oil. If fuel sulfur content exceeds 0.5%, use of "CC" oil is not recommended for severe duty applications. Oil change interval using "CD" oil is reduced to 100 hours of

operation. In all applications regardless of hours of operation, oil should be changed at least once every 12 months.

Engine oil should be drained while engine is warm. Crankcase capacity is approximately 2.1 liters (2.2 quarts) for F1L 208 D and 2.4 liters (2.5 quarts) for F1L 210 D. Engine filter should be renewed at the same time oil is changed.

### AIR CLEANER

The oil bath type air cleaner should be service after every 10 to 60 hours of operation depending on dust conditions. Engine should be stopped at least one hour before removing filter bowl to allow oil to drain from filter element into bowl. Clean bowl and refill with clean oil to the oil level mark. If filter element is heavily contaminated, it should be removed and cleaned in diesel fuel. Allow diesel fuel to drain out of filter before reinstalling.

### FUEL SYSTEM

#### FUEL FILTER AND BLEEDING.

On engines equipped with a fuel tank mounted on the engine, a renewable filter element is mounted internally in

bottom of tank. It is recommended that filter element be renewed after every 200 hours of operation. Fuel should be drained from tank before removing filter.

On engines using a remote mounted fuel tank, an externally mounted fuel filter is used. Manufacturer recommends renewing filter after every 1200 hours of operation or sooner if loss of power is evident.

Whenever fuel filter is serviced or fuel lines are disconnected, air must be bled from fuel system in the following manner. If equipped with external type filter, loosen bleed screw (1—Fig. D1-1) on filter mounting bracket. When air-free fuel flows from bleeder, retighten screw. On all engines, loosen bleed screw (2—Fig. D1-2) on injection pump. When air-free fuel flows from bleeder, retighten screw. If engine fails to start at this point, loosen high pressure fuel line at injector. With pump controls in "run" position, crank engine until fuel is discharged at loosened connection. Retighten fuel line fitting and start engine.

#### ENGINE SPEED ADJUSTMENT.

The engine must be at normal operating



Fig. D1-1—View of air bleed screw (1) on filter housing (if so equipped).

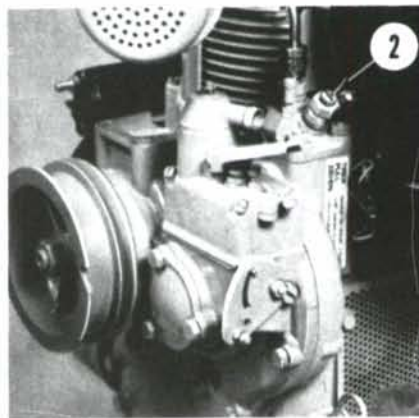


Fig. D1-2—View of injection pump air bleed screw (2).

COMPRESSION PRESSURE

Compression pressure may be checked to establish relative condition of engine before proceeding with engine disassembly. Engine should be run briefly to ensure there is a normal fill of oil on rings and cylinder before checking pressure. Remove injector and install Deutz special adapter 100 080 with pressure gage. Cranking speed must be at least 150 rpm. Compression pressure should be 1900-2100 kPa (275-305 psi).

VALVE ADJUSTMENT

Valve clearance should be adjusted with engine cold. Recommended clearance is 0.15 mm (0.006 inch) for intake and 0.20 mm (0.008 inch) for exhaust.

To adjust clearance, remove rocker cover and rotate crankshaft until piston is at TDC on compression stroke. Loosen rocker arm adjusting screw locknut. Turn adjusting screw as required until appropriate size feeler gage can be inserted between valve and rocker arm with a slight drag. Tighten locknut and recheck clearance.

On hand-start engines, a decompression device is fitted to cylinder head to partially open the intake valve during engine starting. With intake valve closed and decompression device in disengaged position, measure clearance between stop pin of rocker arm and decompressor cam with a feeler gage. Clearance should be 0.7 mm (0.027 inch). If necessary, adjust stop pin to obtain desired clearance. To check decompressor operation, measure distance from rocker arm to top of rocker arm housing with decompressor engaged and disengaged. The difference between the two readings is distance valve is being opened which should be 0.4-0.6 mm (0.016-0.023 inch).

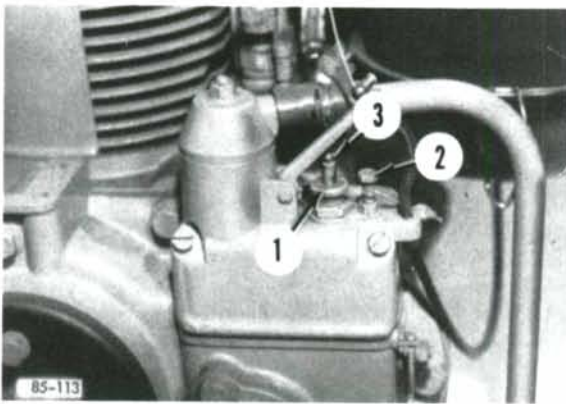


Fig. D1-3—Idle speed is adjusted using screw (1) and maximum speed is adjusted using screw (2). Be sure governor rod (3) moves freely.

temperature and an accurate tachometer used when adjusting engine speed setting. The engine speed settings depend on the engine application. Recommended engine speed should be stamped on the engine nameplate.

Low idle speed is normally 800-1000 rpm. Idle speed is adjusted using adjusting screw (1—Fig. D1-3). Note that some engines are not equipped with a low idle adjusting screw.

Maximum speed is adjusted using adjusting screw (2). Maximum rated speed must not exceed 3600 rpm on F1L 208 D engine or 3000 rpm on F1L 210 D engine. Be sure to install a new seal wire on maximum speed screw to secure adjustment.

**INJECTION PUMP TIMING.** To check injection pump static timing, first turn crankshaft in normal direction until piston is on compression stroke. Disconnect fuel inlet pipe and injector high pressure pipe from injection pump. Connect a nozzle tester pump to fuel inlet of injection pump and attach a drip tube to high pressure outlet of pump. Move speed control lever to full-speed position. Do not actuate excess fuel starting button. Actuate tester pump and note that fuel should flow from drip tube. Slowly rotate crankshaft until fuel flow from injection pump outlet just stops. AT this point beginning of injection occurs, and timing marks on crankshaft pulley and front cover should be aligned as shown in Fig. D1-4.

Injection timing is adjusted by changing thickness of pump mounting shims. Reducing shim thickness will advance timing and increasing shim thickness will retard timing.

Connecting rod:	
F1L 208 D.....	35 N·m (26 ft.-lbs.)
F1L 210 D.....	45 N·m (33 ft.-lbs.)
Cylinder head:	
F1L 208 D.....	40 N·m (30 ft.-lbs.)
F1L 210 D.....	55 N·m (40 ft.-lbs.)
Crankshaft pulley.....	40 N·m (30 ft.-lbs.)
Flywheel:	
F1L 208 D.....	160 N·m (118 ft.-lbs.)
F1L 210 D.....	180 N·m (133 ft.-lbs.)
Front cover.....	23 N·m (17 ft.-lbs.)
Injection pump.....	23 N·m (17 ft.-lbs.)
Injector.....	35 N·m (26 ft.-lbs.)
Main bearing flange.....	35 N·m (26 ft.-lbs.)
Oil sump.....	23 N·m (17 ft.-lbs.)
Rocker arm bracket.....	30 N·m (22 ft.-lbs.)
Rocker cover.....	23 N·m (17 ft.-lbs.)

REPAIRS

TIGHTENING TORQUES

Refer to the following table for special tightening torques. Metric fasteners are used throughout the engine.

Fig. D1-4—At beginning of injection, timing marks should be aligned as shown.

