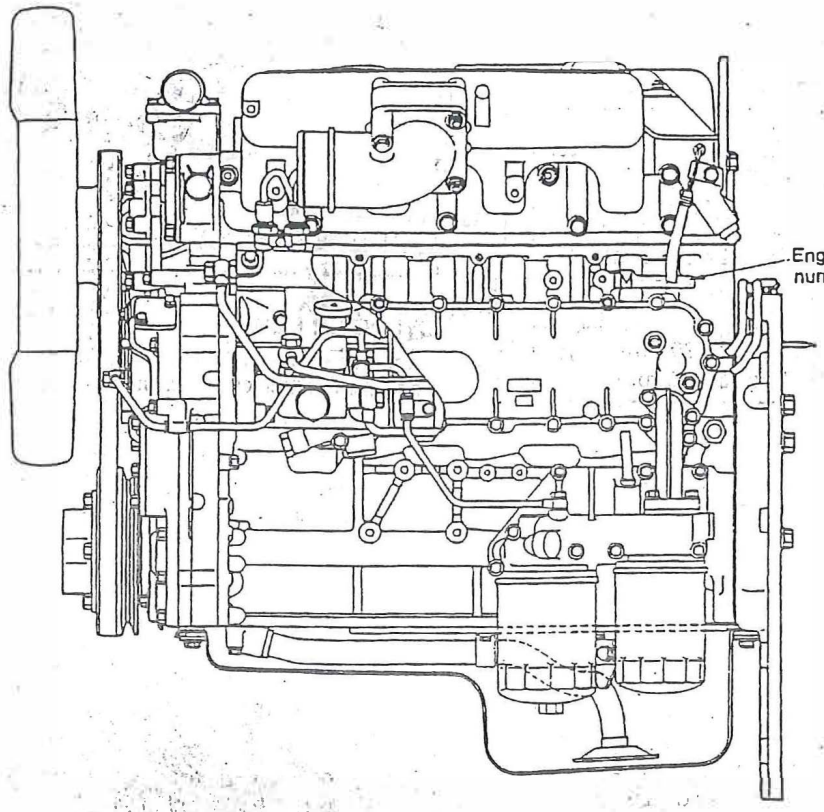
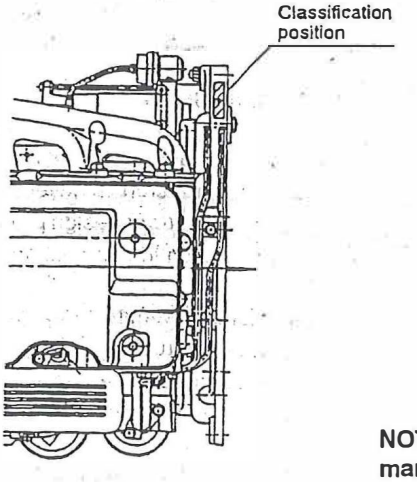
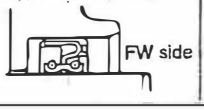
ENGINE IDENTIFICATION ILLUSTRATION



Location and identification of A/T (automatic transmission) and M/T (manual transmission) reference points



Specifications	Engine rear seal	End plate classification markings
A/T	Single lip seal 	A
M/T	Double lip seal 	M

NOTE: All trucks manufactured for the North American market are only available with automatic transmissions.

ENGINE INTRODUCTION

The TM engine is a water cooled, overhead valve four-cylinder diesel engine with timing gears. The main specifications and outline of each part are described below.

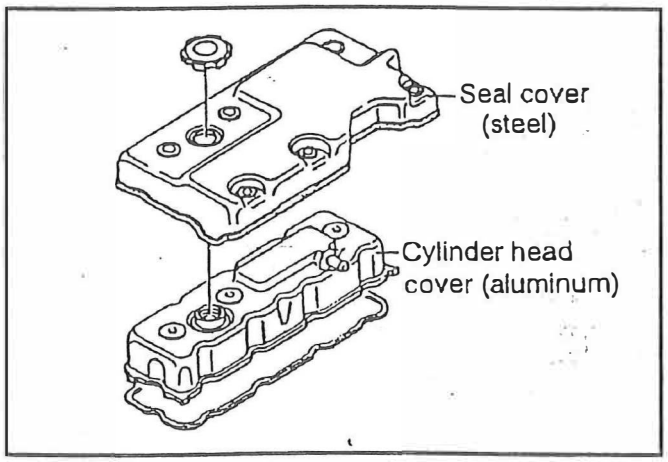
Engine Model	TM
Combustion Chamber	Direct Injection Type
Cylinder Liner	Dry Type
Bore X Stroke	109.0mm × 122.0mm (4.29 in × 4.80 in)
Total Displacement	4,553 cc / (277.8 cu in)
Compression Ratio	18:1
Compression Pressure	30kg/cm² @ 270 rpm (426.7 psi @ 270 rpm)

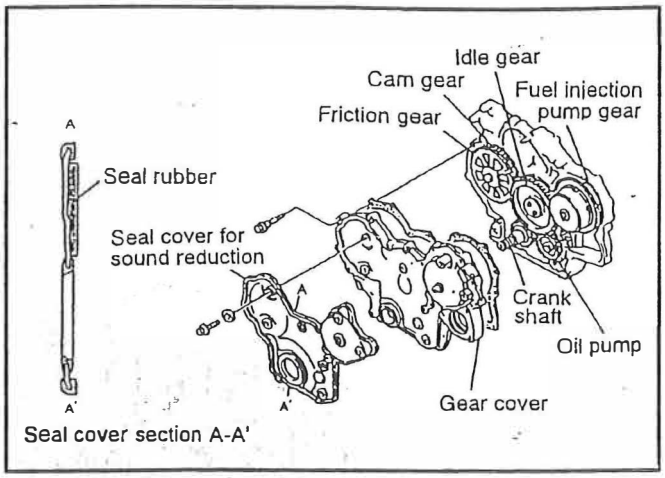
CYLINDER HEAD COVER

The cylinder head cover is a double structure design. A large seal cover has been added on top of the cylinder head cover and the injection nozzles. This second cover reduces noise levels and improves the engine appearance.

TIMING GEAR AND TIMING GEAR CASE

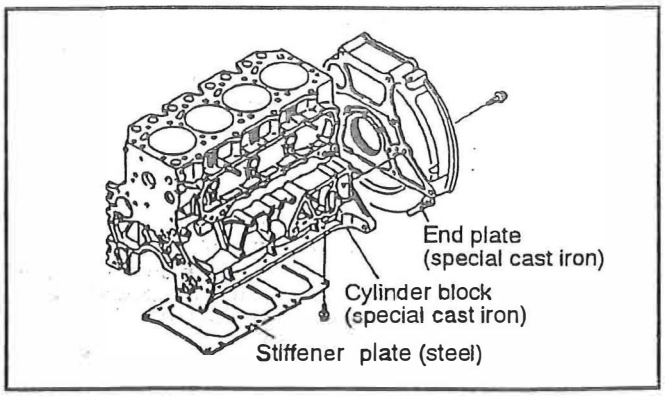
The timing gear case is made of special cast iron. The timing gear cover is made of aluminum. The TM engine timing gears are helical and manufactured of chrome steel. To reduce gear backlash and noise, a friction gear is used in conjunction with the cam gear. Noise levels are further reduced by the installation of the seal cover on top of the gear cover.





CYLINDER BLOCK

The cylinder block incorporates a deep skirt form and a stiffener plate for improved rigidity. The design offers reduced vibration and excellent resistance to the high combustion pressures generated in a large displacement diesel engine. The end plate and the cylinder block are manufactured of special cast iron to reduce vibration and twist.



PISTONS AND CRANKSHAFT

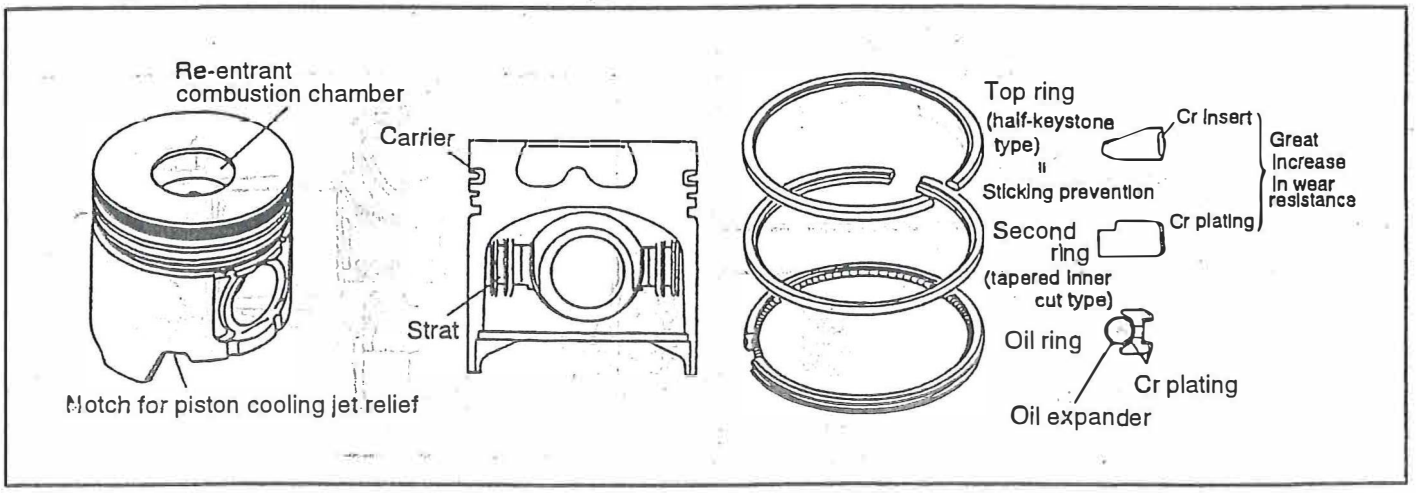
The pistons are made of an aluminum alloy. The depression in the center of the piston is called the re-entrant combustion chamber. The re-entrant design produces high efficiency while realizing a reduction in combustion noise.

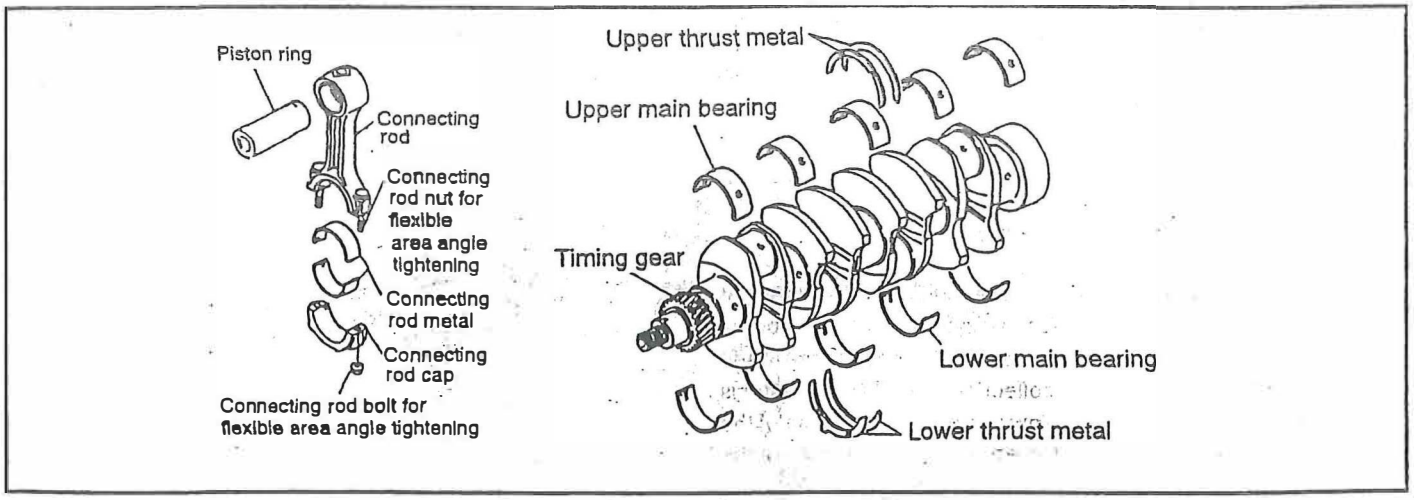
A special (nickel austenite cast iron) carrier is provided on the top ring groove, improving the wearability of the piston ring and ring groove. A ring groove cooling cavity (cooling channel) is provided in the ring groove to improve durability.

Each piston has two compression rings and one oil ring. A half-keystone ring is used for the top ring to prevent sticking. A tapered inner cut design is used for the second ring. The outer and inner circumference of the top ring and the second ring are

treated with hard chrome plating. The oil ring is also chrome plated and incorporates a piano wire coil spring expander on the inner circumference to ensure that ample surface pressure is maintained.

The crankshaft is made of carbon steel, and has eight balance counterweights to reduce engine vibration and sound. The crank pins and journals have been processed with filet hardening to improve durability. The crank gear for the timing gear train is shrink fitted onto the front of the crankshaft to improve the reliability of the crank gear and crank pulley.





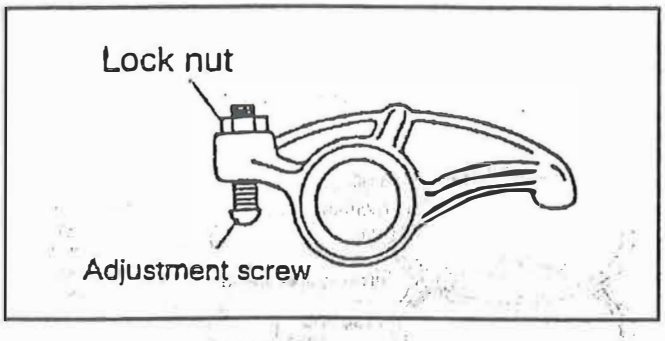
CYLINDER HEAD

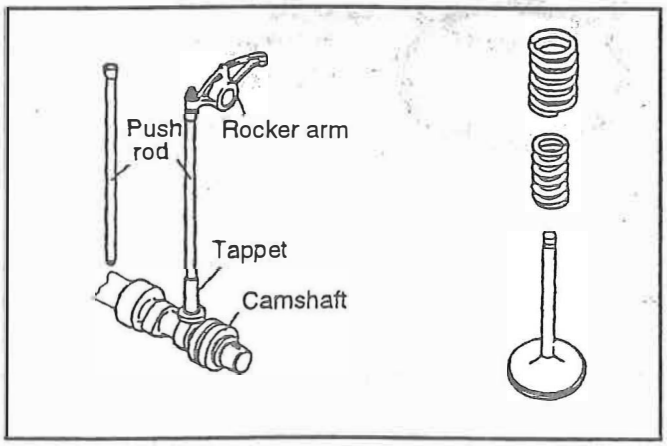
The cylinder head is made of special cast iron to withstand the strong combustion pressure of the direct injection method. Cast iron construction also improves heat fatigue resistance and durability while allowing reduced engine height do to the reduction in the thickness of the head itself.

VALVE SYSTEM

The TM diesel engine incorporates the OHV (overhead valve) design. The rocker shaft is 21mm / (.8268 in) in diameter and made of special steel for durability. The surface pressure of the push rod has been reduced by using a spherical shape for the tip of the rocker arm's adjustment screw. The upper and lower ends of the push rod are carbonized, (hardened) to increase the wear resistance. The valve weight has been reduced by incorporating hollow centers.

The valve springs are an unequal pitch double spring to minimize valve float at high rpm. The springs are common for both the intake and exhaust sides.

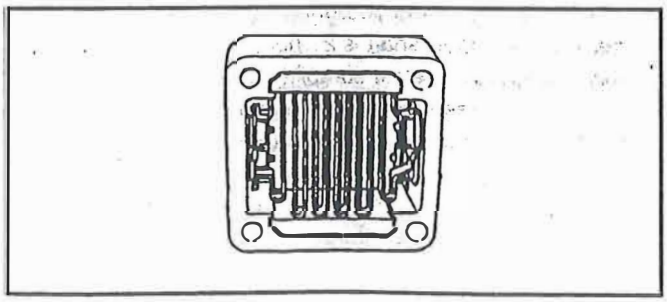




INTAKE AND EXHAUST SYSTEMS

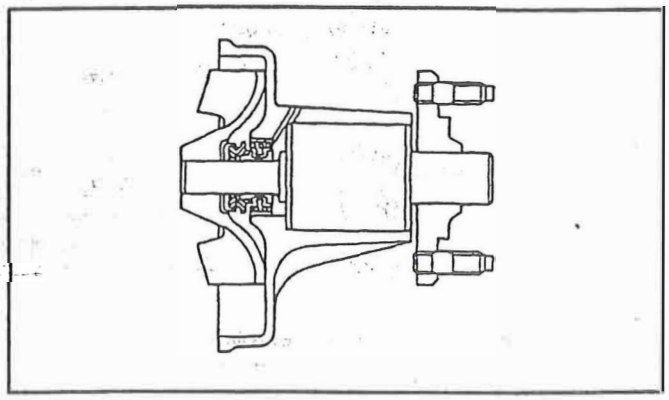
The intake manifold has been designed with an offset intake to provide uniform swirl between cylinders and to improve efficiency. To aid in cold starting, an air heater has been installed in the intake manifold collection area. The air heater is used in place of conventional glow plugs. The operation of the air heater is automatically controlled by the temperature of the coolant at engine start up.

The exhaust system is of a conventional design.



COOLING SYSTEM

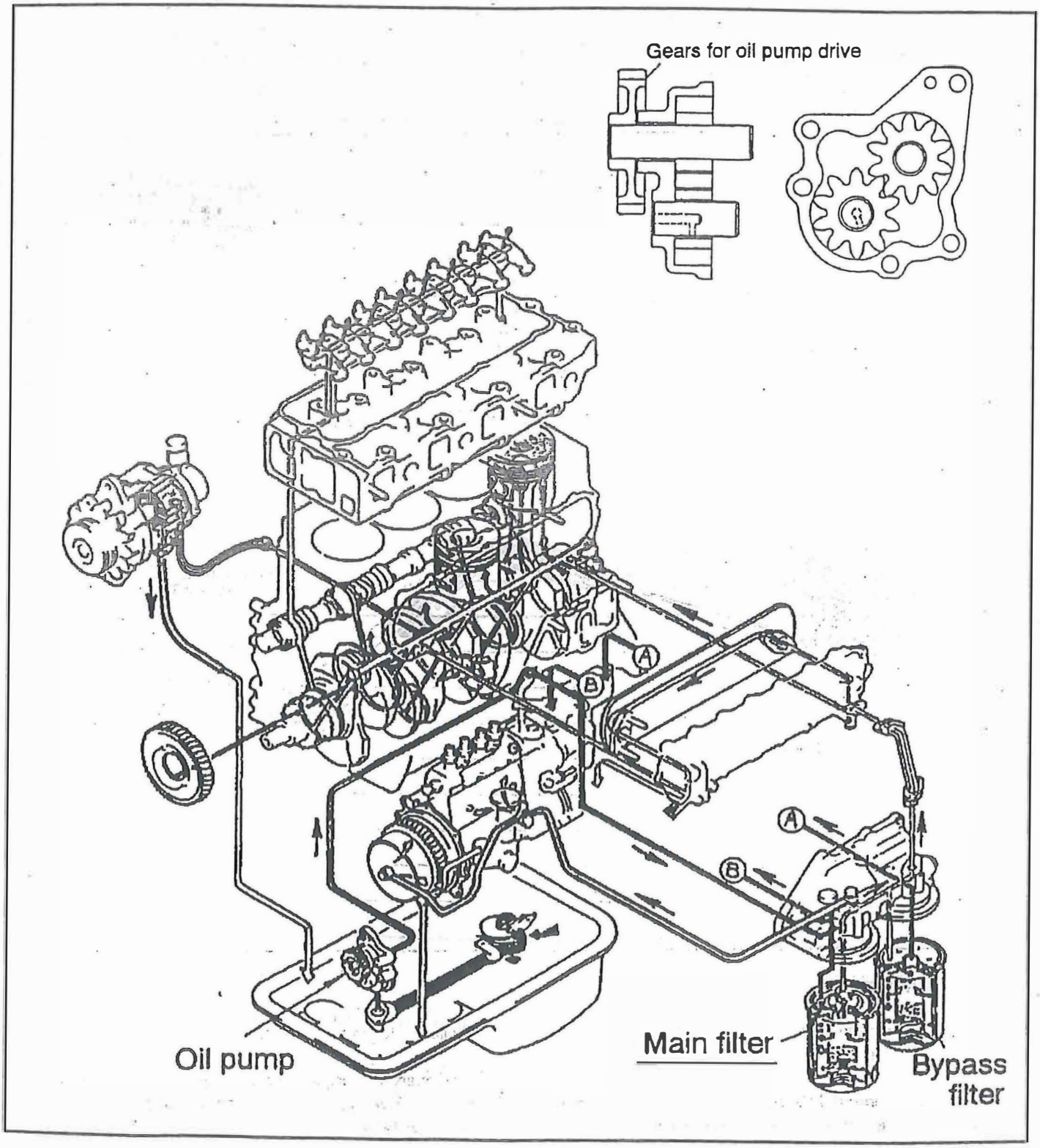
A water cooled centrifugal circulation type water pump is used to circulate the engine coolant. A seven blade cooling fan moves air through the radiator. The water pump and fan are belt driven by the crankshaft pulley. A wax-type thermostat made of stainless steel is used to regulate engine temperature.



LUBRICATION SYSTEM

The engine is lubricated by a gear type pressure feed oil pump. The oil pump is driven by the idler gear. Oil filtration is provided by a main oil filter and a bypass filter.

LUBRICATION SYSTEM DIAGRAM



FUEL SYSTEM

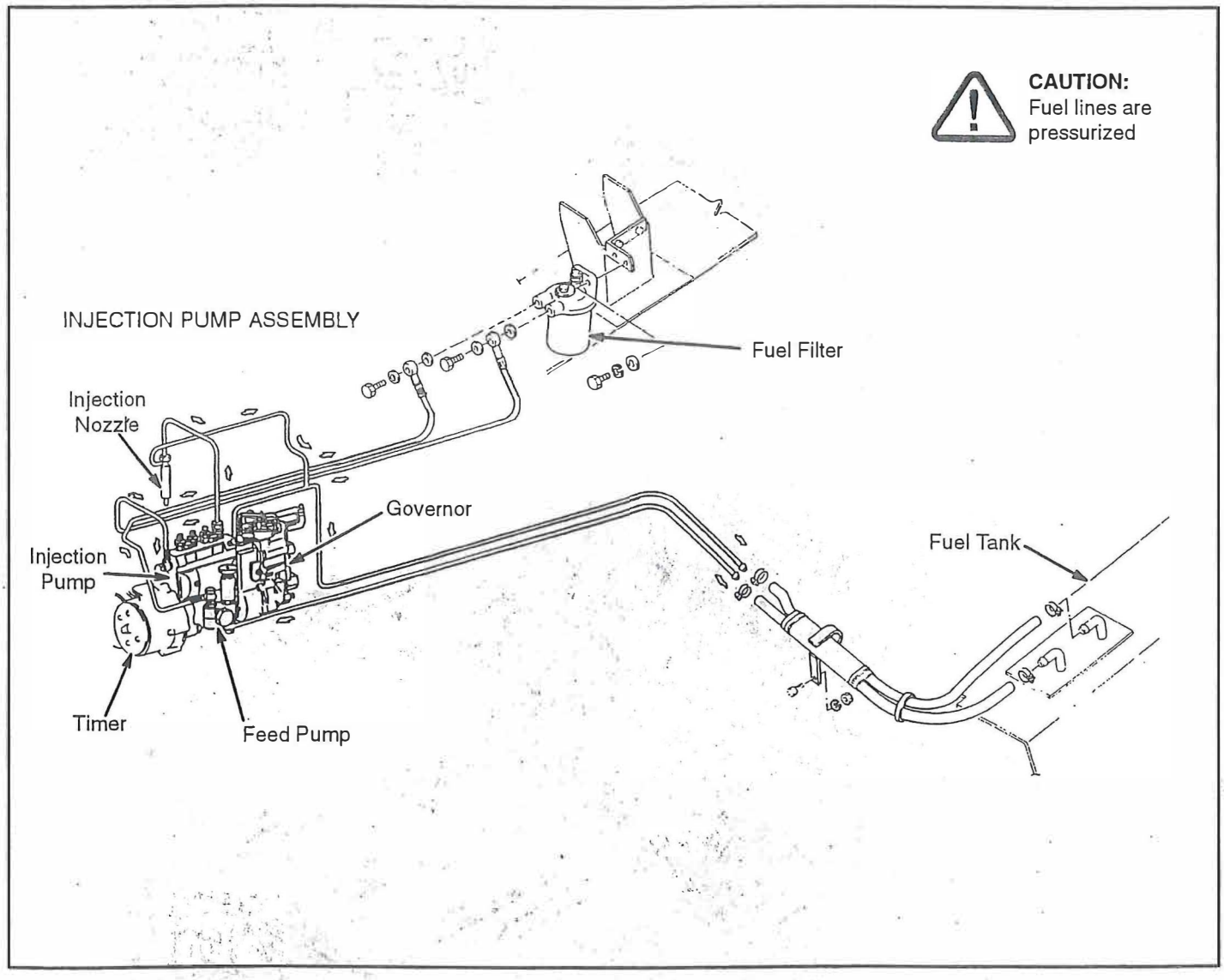
The fuel injection pump is a high pressure in-line type (Bosch A type). Fuel is filtered through a full flow spin on paper filter.

A manual priming pump on the injection pump and a bleed screw on top of the fuel filter mounting base are provided to aid in bleeding air from the fuel system.

The fuel feed pump is an integral part of the injection pump unit. The feed pump tappet is moved by a special cam lobe on the pump camshaft. The tappet is connected to a piston by a rod. The reciprocating action of the piston creates fuel pressure.

A mechanical all-speed governor with a small lever reaction (low accelerator pedal effort) and built in torque cam is used. Starting pressure is adjusted automatically.

FUEL SYSTEM DIAGRAM



ELECTRICAL SYSTEM

Electrical system voltage: 12 volt
Battery: 160F51 maintenance free 108 amp hour / 5 hour

The starter is an improved version of the conventional high output 2.2 kw starter. It is an electromagnetic push-in with auxiliary rotation reduction type starter.

The battery is charged by a high output 50 amp alternator. An integral IC voltage regulator controls alternator output and system voltage.

Yale
Industrial Trucks

NOTES

Yale Industrial Trucks

SECTION 2

2 ENGINE INSPECTION AND ADJUSTMENT