TOYOTA

F ENGINE

REPAIR MANUAL

TOYOTA MOTOR SALES CO., LTD.

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EXPORT-TECHNICAL DEPARTMENT

F O R E W O R D

This F engine Repair Manual has been published to furnish information for major repair on the improved engine (from Engine No. F243298) and its related components equipped on the Toyota Land Cruiser, and the Toyota gasoline truck.

In general, it pertains to the F engine equipped on the Toyota Land Cruiser, and also it described on the different components equipped on the F engine utilized for the Toyota gasoline truck.

As this manual is published for the guidance, and reference for the servicemen to acquire a thorough knowledge of the F engine construction, and operation, and also on the various components installed on the F engine.

We recommend that this manual should be available at all times to aid the servicemen in performing the various operations of the maintenance.

All information, and specification contained in this manual are the most up-to-date at the time of this publication, and we reserve the right to change without any notice or incurring obligation.

SECTION INDEX

GENERAL INFORMATION

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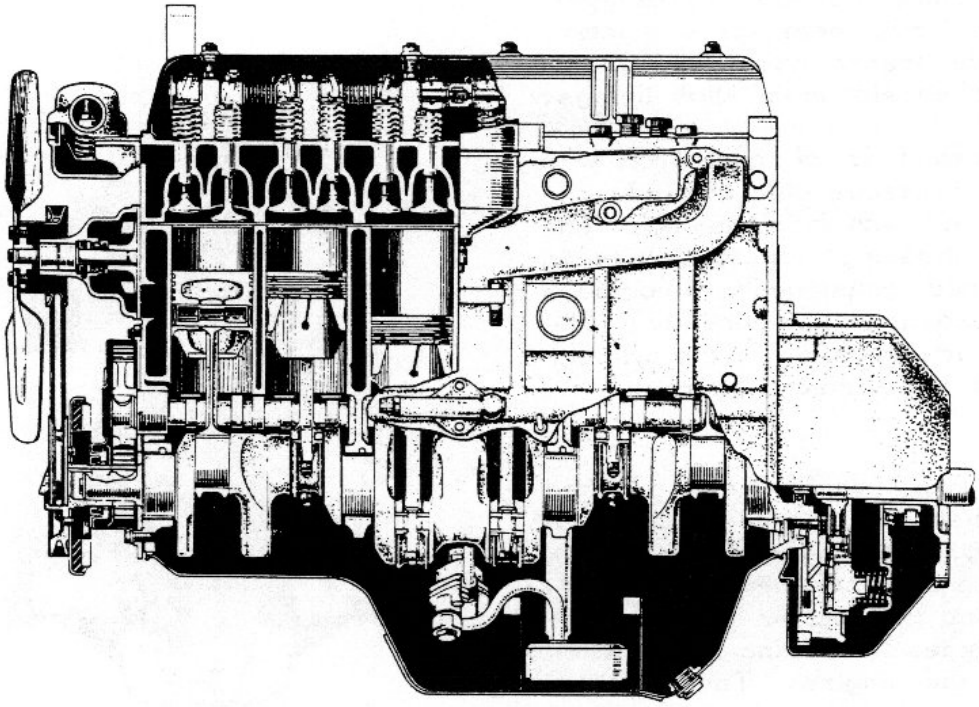

Fig.1-1 Cross Section Side View G1565

The engine is a four-cycle, six cylinder over-head valve type, with force feed lubrication, and water cooled. This engine has a displacement of 3.878 liters (236.7 cu. in), with 90 mm (3.54") bore, and 101.6 mm (4.00") stroke. The compression ratio is 7.8 to 1.

The cylinder head being made of integral casting with wedge shaped type combustion chambers provides efficient heat distribution.
Also together with the independent inlet and outlet ports provide smooth performances during slow, intermediate, and high speed operations.

The cylinder block and crankcase assembly is the major section of the engine, and is cast integrally, forming a rigidly reinforced unit, and is integrally cast with coolant passages in the block for cooling the entire length of the cylinder.

The engine is equipped with a fully counterbalanced crankshaft which contributes smooth engine performances. The crankshaft is supported by four bearings, which are of steel backed aluminum alloy linings and replaceable insert type. The crankshaft end play is controlled by the third crankshaft journal and the bearings. The crankshaft bearing caps are large in size to assure rigid support of the bearings and the crankshaft.

The pistons are of special light alloy with eccentric finished slightly larger at the right angle to the piston pin. Two compression rings and two oil rings are used on each piston.

The connecting rods are "I" beam section forged steel. The upper end is fitted with a clamp bolt to secure the connecting rod onto the piston pin. Connecting rod bearings are interchangeable insert type, and are of steel backed aluminum alloy linings.

The camshaft is of cast iron with cam lobe surfaces chill treated, and is supported with four bearings. The camshaft bearings of steel backed babbitt lined construction provide a uniform expansion and durability. The bearings are installed in the cylinder block and for perfect alignment.

A heavy cast iron flywheel is bolted onto the flange at the rear end of the crankshaft, and ring gear is shrunk fit onto the outer diameter of the flywheel, and the starter clutch pinion gear engages this ring gear when cranking the engine. The flywheel and the crankshaft are accurately balanced to prevent engine vibration, and the flywheel surface is accurately machined for clutch operation.

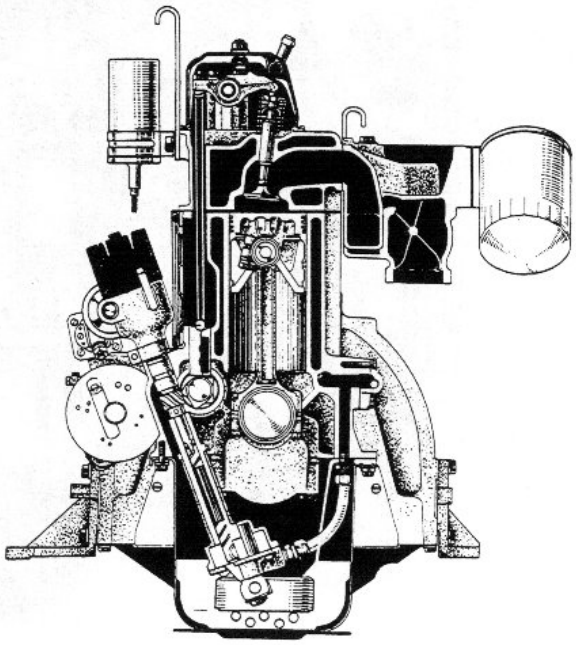

Fig.1-2 Cross Section Front View G1566

The distributor is mounted on the right side of the cylinder block, and is gear driven by the camshaft. The distributor is provided with the centrifugal advancer and the vacuum advancer mechanism to insure efficient performances under various operations.

The carburetor is of 2-barrel type, which ensures appropriate supply of air-fuel mixture as per demands of the engine under various operating conditions, the 2-barrel type is used both in Land Cruiser and trucks commencing from the Engine No. F-294920.
The fuel pump is a diaphragm type, and is operated by the camshaft cam.

The lubrication system is an all forced-feed, partial flow filtering type. The oil pump is a gear type and is driven by the camshaft through the distributor shaft.

The cooling system is a pressure forced circulation type, and the water pump is a six blade impeller centrifugal type, which is driven by the crankshaft pulley through the "V" belt. The radiator is fin and tube type, and the pressure is sustained by the radiator cap. Circulation of the coolant is controlled by the wax pellet element type thermostat.

The charging system is composed of the alternator, and the regulator. The alternator is driven by the crankshaft pulley through the "V" belt. This alternator provides an efficient output at lower engine speeds, and a very high output at cruising speed.

The starter is incorporated with the magnetic switch and the starter clutch. The magnetic switch and the starter clutch enable to accomplish a smooth meshing, and the starter clutch prevents the over-running of the armature.

GENERAL SPECIFICATION

Model		F
Type		Gasoline, four-cycle, in-line OHV, water cool.
Number of cylinder		Six
Bore and stroke		90 × 101.6 mm (3.54 × 4.00")
Displacement		3.878 cc (236.7 cu. in.)
Compression ration		7.8 to 1
Compression pressure		10.5 kg/cm² (149.3 psi) at 200 rpm
Max. explosive pressure		44 kg/cm² (629 psi) at 2,200 rpm
Max. mean effective pressure		9.7 kg/cm² (139 psi) at 2,200 rpm
Max. horsepower		SAE-Gross 155 HP at 4, 000 rpm SAE-Net 138 HP at 4,000 rpm
Max. torque		SAE-Gross 31.7 m-kg (230 ft-lb at 2 ,200 rpm) SAE-Net 29.4 m-kg (213 ft-lb at 2 ,200 rpm)
Min. fuel consumption at full load		214 g/hp-hr (7. 54 Oz/hp-hr) at 2,200 rpm
Piston type		Flat, T-slot
Piston material		Aluminum alloy
Number of compression ring		Two
Number of oil ring		Two
Intake valve	opens	B.T.D.C. 17°
	closes	A.B.D.C. 53°
Exhaust valve	opens	B.B.D.C. 55°
	closes	A.T.D.C. 15°
Valve clearance	intake	0.20 mm (0.008")
	exhaust	0.35 mm (0.014")
Ignition timing		B.T.D.C. 7° at 500 rpm
Improved combution system		B.T.D.C. 7° at 650 rpm
Firing order		1-5-3-6-2-4
Air cleaner		Replaceable felt element type
(Optional)		Oil bath type
Fuel pump type		Diaphragm
Carburetor		Down-draft, two-barrel
Lubricating method		All forced-feed, partial flow filtering
Oil pump type		Gears
Oil filter type		Cartridge type paper filter element
Oil capacity :	crankcase	7 liters (7.4 US qts., 6.2 imp. qts)
	oil cleaner	1 liters (1.1 US qts., 0.9 imp. qts)
Cooling system		Water cooled, pressure forced circulation
Radiator type		Fin and tube pressurized
Water pump type		Six blade impeller centrifugal

Thermostat type		Wax pellet element
Coolant capacity	(FJ)	15.2 liters (16 US qts., 13.4 imp. qts)
	(FA)	19.1 liters (20.2 US qts., 16.8 imp. qts)
Alternator :	voltage	12 volts
	output	480 watts
Starter :	voltage	12 volts
	output	1.3 kilowatts
Battery :	voltage	12 volts
	capacity	50 AH (20 hr. rating)

FOR 2FQ15-B

Type	6-cylinders, in line, O.H.V.
Bore and stroke	90×101.6 mm (3.54×4.00 in.)
Displacement	3,878 cc (236.7 cu.in.)
Compression ratio	7.2 to 1
Max. horsepower	(JIS) 110 HP at 3200 rpm
Max. torque	(JIS) 27.5 m-kg (200 ft-lb.) at 2000 rpm
Battery	12 Volts 45 amp. hr. (20 hr. rate.) ×2
Alternator	24 volts 720 watts
Starter	24 volts 1.8 HP
Fuel tank capacity	90 liters (23.8 US gal., 19.8 imp. gal.)
Cooling system capacity	20 liters (21.1 US qts., 17.6 imp. qts.)
Engine oil capacity	5.0 liters (5.3 US qts., 4.4 imp. qts.)

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