ENGINE 21B

Index **Page**

GENERAL DESCRIPTION

Transit range vehicles may have both diesel engines and various petrol engine types fitted. Petrol engines are in-line as well as V4 and V6 versions.

This section covers the Ford diesel engine **only**. For easier identification this engine is designated with the code letter 'G' in line with other workshop manuals. The table below lists the engine types built in Germany and the United Kingdom respectively.

ENGINE SUMMARY

Cubic Capacity Litres	Compression Ratio	Type	HP (kw)	Engine Code		Source	
				Vehicle plate	Workshop Manual	Germany	U.K.
2,4	DIESEL	OHV/I-4	62 (46)	4A	G	X	X
1,5	LC	OHV/V4	60 (44)	EX	D	X	—
1,6	LC	OHV/I-4	65 (48)	L1	A	—	X
1,7	LC	OHV/V4	65 (48)	MX	D	X	—
2,0	LC	OHV/V4	70 (51)	NX	E	X	X
2,0	HC	OHV/V4	80 (59)	NY	E	—	X
3,0	LC	OHV/V6	100 (74)	HX	F	—	X

OHV = overhead valves

I-4 = in-line 4 cylinder engine

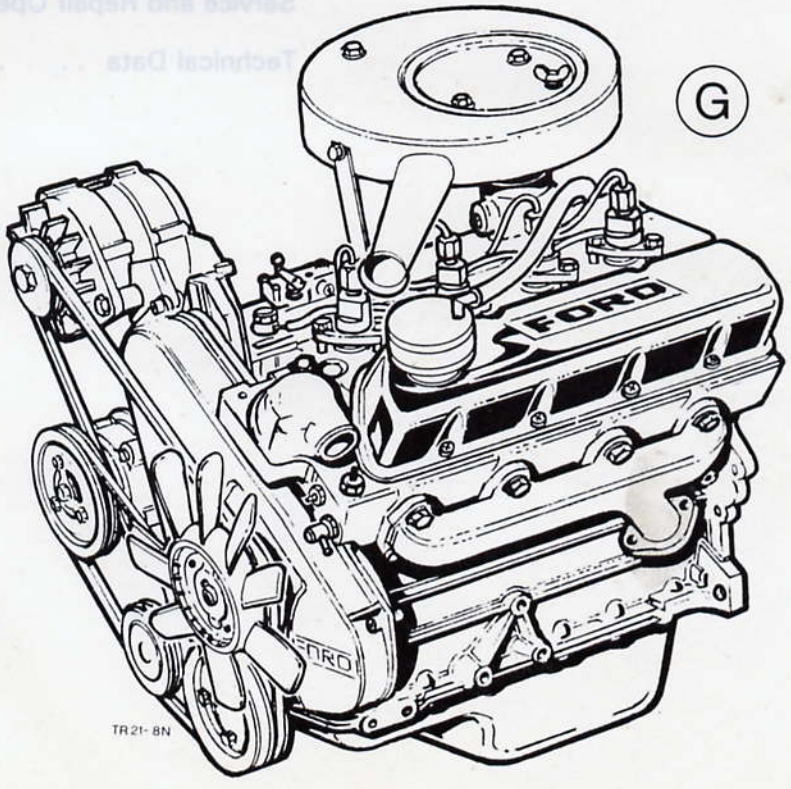

Fig. 1. 'G' Engine

GENERAL DESCRIPTION (cont'd)

The 'G' engine is a water-cooled 4 cylinder 4 stroke in-line indirect injection diesel engine (Fig. 1).

The combined fuel injection and fuel lift pump, fuel filter, brake pump and full-flow oil filter are all located on the right-hand side of the engine. The rotor oil pump is located at the front and is driven by a crankshaft gear. The fuel injection pump is driven via a toothed belt which also drives the camshaft. Similarly, alternator, brake pump and water pump are driven by the crankshaft via a V-belt.

In order to achieve low overall height (compact layout) the cylinders are mounted at an angle of 22,5 degrees to the left of vertical. To give maximum crankshaft drive stability the crankshaft is carried on five main bearings. Centre main bearing end float is determined by four half thrust washers.

The floating piston pins are located in the connecting rods (with bushes) and secured with two circlips. Pistons have two compression rings and one oil scraper ring. The camshaft which is carried on five bearings is located in the cylinder block on one side of the engine and driven by the crankshaft via a toothed belt which, as already mentioned, also drives the fuel injection pump. A drilling through the shaft carries oil to the replaceable bearings.

Overhead valve timing is effected via tappets, push rods and rocker arms. The rocker shaft has a drilling for rocker arm lubrication. Valves are arranged in the cylinder head in alternating sequence, commencing with an exhaust valve at the front of the engine. Inlet valves have one progressive coil spring and exhaust valves two. Valve adjusting screws are self-locking. Inlet and exhaust valves have different seat angles. Cylinder head valve guides are exchangeable.

The thermostart control incorporated in the inlet manifold ensures quick starting of the engine in low temperature conditions.

An automatic shut-off control fitted to the engine compartment splash shield enables the injection pump to be set to zero lift via a cable, thereby stopping the engine.

The fuel injection pump timing mark is located on the advance unit on top of the pump.

The engine has combustion chambers divided into a turbulence chamber located in the cylinder head and the main combustion chamber in the cylinder itself.

GENERAL DESCRIPTION (cont'd)

Lubrication Circuit, Fig. 2

The rotor oil pump located at the front of the engine block is driven by a gear on the crankshaft and draws oil via a strainer and suction pipe (lower drilling) from the oil sump.

The filtered oil is fed through the upper drilling via the pump relief valve into the full-flow oil filter and from there through the central axis of the oil filter cartridge to the main oil gallery. A by-pass valve located on the filter central axis opens in order to enable oil to pass directly into the main gallery in the event of oil filter cartridge blockage (by sludge, etc.).

The pump relief valve in the cylinder block, between the oil pump and the full-flow oil filter, is connected to the main oil gallery. Excessive oil pressure will force a small spring-loaded plunger downwards, with the downward movement of the plunger freeing the valve plunger drillings in the direction of the lower gallery thereby providing a direct connection between oil suction tube and pressure duct.

The five main bearings are connected to the main oil gallery. The big end journals are supplied with oil via diagonal lubrication passages from the nearest main crankshaft bearing.

The first four main bearing supports in the cylinder block have splash oil drillings which ensure splash lubrication of piston pins and better cooling of piston tops.

From the centre main bearing the oil passes via the centre camshaft bearing to the camshaft and from there through drillings to the remaining camshaft bearings.

Oil flows from the centre camshaft bearing through a cylinder block drilling to the cylinder head into the rocker arm shaft and to the rocker arms. Valve stems are lubricated by means of oil discharged through the rocker arm drilling.

Both the fuel injection pump and the lift pump are permanently lubricated with oil from the main oil gallery fed to the pumps via engine block and timing cover drillings. The return oil flow to the pump passes through the timing cover. The oil pressure switch which is screwed into the gallery on the right-hand side of the engine block is in direct communication with the main oil gallery.

GENERAL DESCRIPTION (cont'd)

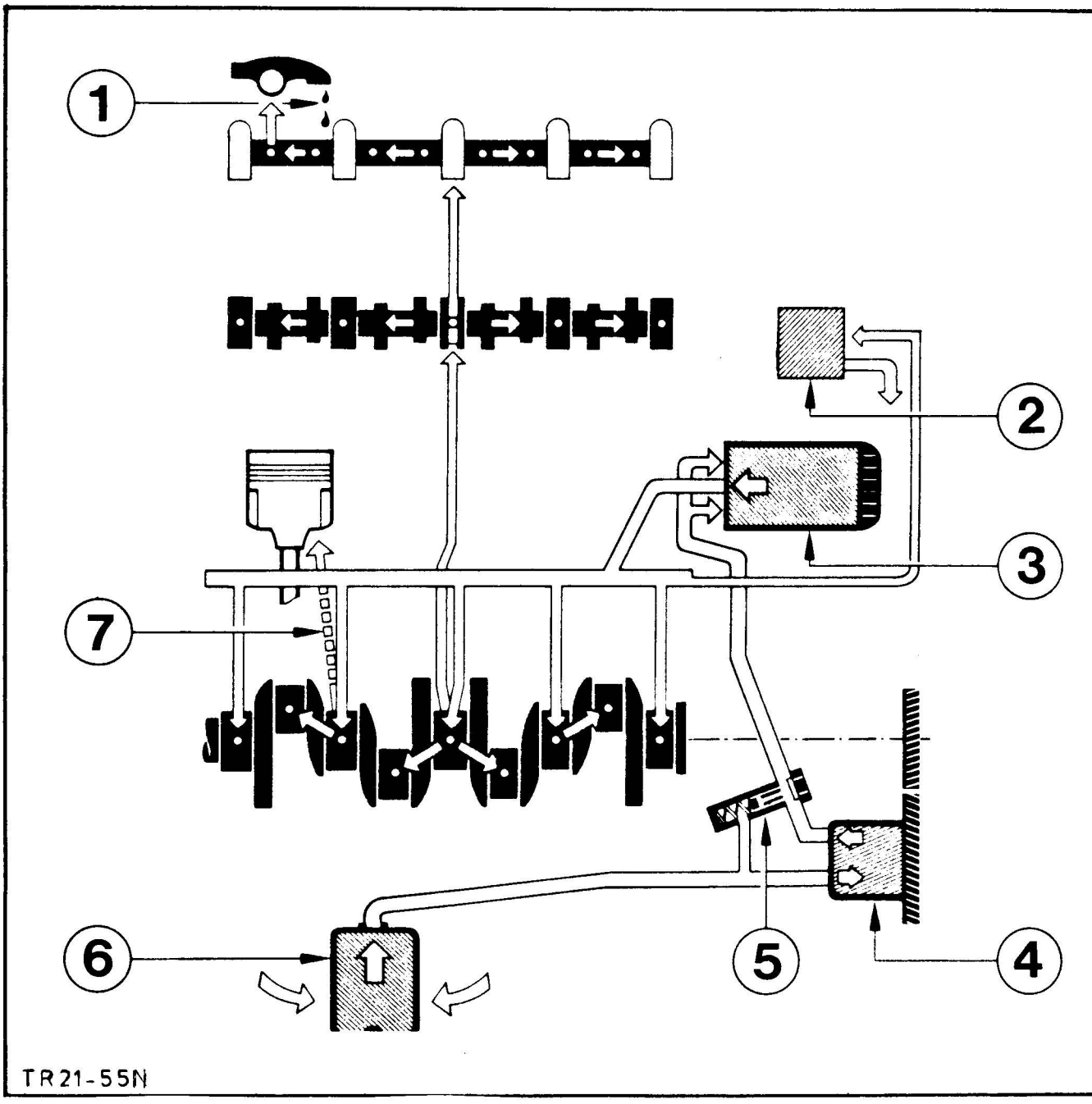

Fig. 2. Lubrication circuit

1. Valve stem drip feed lubrication system
2. Fuel injection pump
3. Exhauster pump
4. Full-flow oil filter
5. Rotor oil pump
6. Oil pump relief valve
7. Oil suction strainer
8. Piston splash lubrication system

GENERAL DESCRIPTION (cont'd)

Engine Ventilation System, Fig. 3

The mixture of air and crankcase fumes passes through the cylinder head into the rocker cover from where it is drawn through the oil separator and oil filler connecting hose into the inlet manifold and the filtered air, together with the air drawn through the air cleaner, is fed into the cylinder combustion chambers.

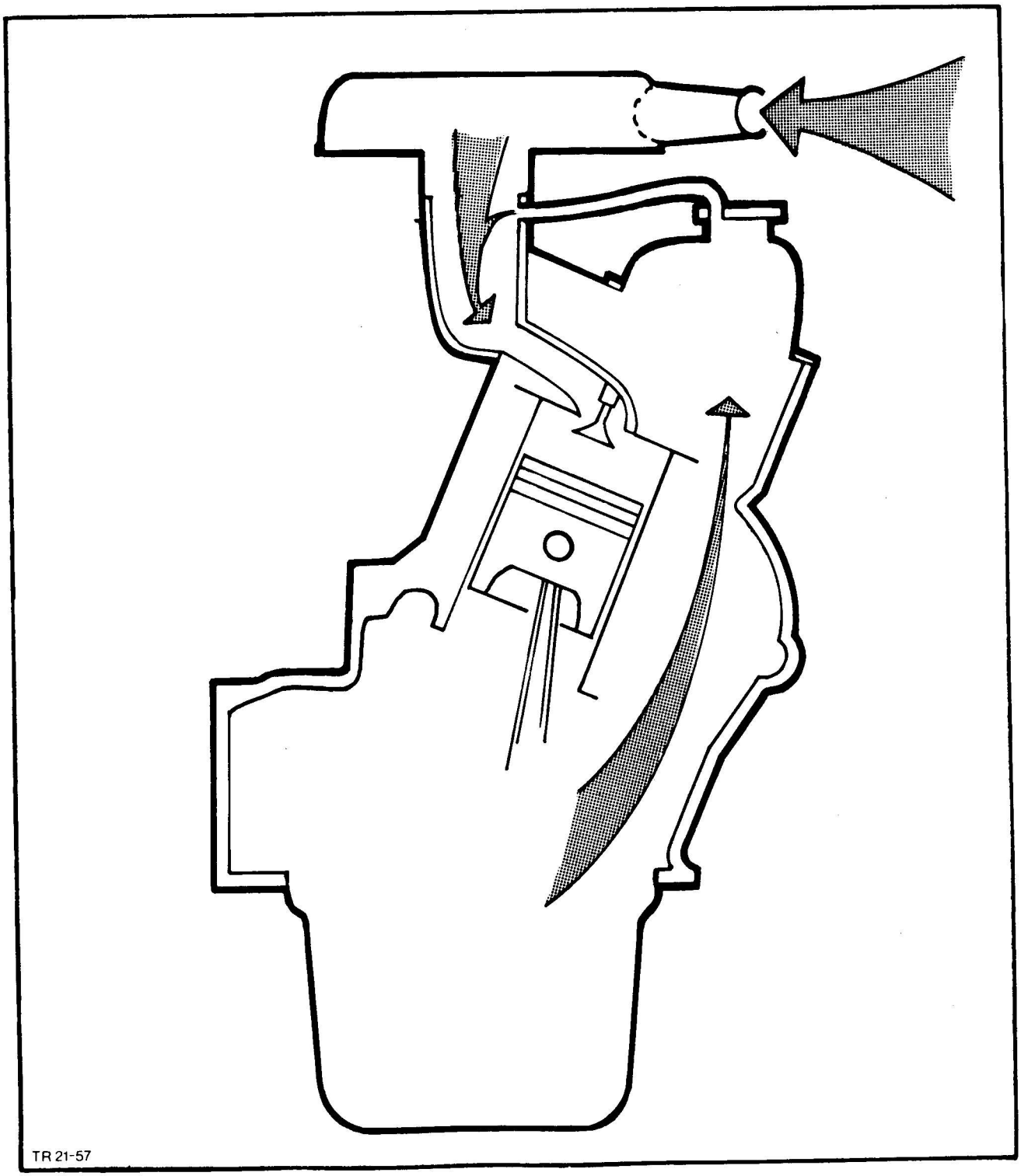

Fig. 3. Engine ventilation

GENERAL DESCRIPTION (cont'd)

Engine Identification and Engine Serial Numbers

Regulations in force in certain countries provide for engines to be marked with identification codes and serial numbers. Fig. 4 and 5 show where these data are marked on the engine. Minimum height of letters and numbers is 6 mm (0,25 in) and both codes and serial numbers (e.g. on replacement engines) should be marked in such a manner that they can be clearly recognised by the appropriate testing authorities, thereby preventing rejection of engines.

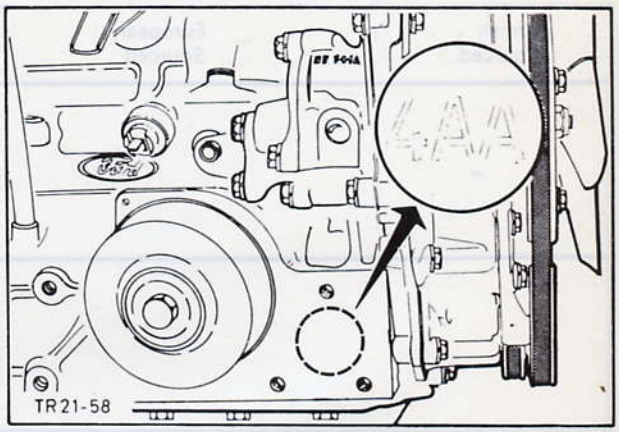

Fig. 4. Engine identification code

SERVICE ADJUSTMENT AND CHECKS

To check the engine oil level the vehicle should stand on level ground and the engine should be at normal operating temperature. Before carrying out the check, wait a short time to allow all oil to drain back into the sump.

Withdraw the dipstick, wipe it clean with a non-fluffy rag, replace and withdraw it again. The oil on the dipstick indicates the oil level in the sump, which should lie between the two marks, Fig. 6. The quantity of oil required to top up from the bottom mark to the top mark is approximately 1,7 litre (3,0 pints).

If necessary, top up through the filler neck, with engine oil to FORD specification.

Topping up is not necessary until the oil level drops to the bottom mark. Do not allow the oil level to drop any further. Never top up to above the top mark since the excess oil is wasted, i.e. the oil consumption is increased.

The engine oil should be changed and the full-flow oil filter renewed at 5000 km (3000 mile) intervals. If conditions of use are severe, e.g. short trips, frequent starts from cold, dusty roads, etc., the oil should be changed and the oil filter renewed at shorter intervals.

If the specified engine oil is not used the inevitable consequence will be excessive wear or damage to the engine. The oil film becomes discontinuous and engine components under high thermal stresses are subjected to increased wear. Residues collect in the sump and block oil passages. In addition, poor quality oil does not protect against corrosion so that rust forms on the cylinder walls. After a relatively short time the efficiency of the engine will decrease and there will be increased fuel and oil consumption. Always use a branded oil complying with FORD specifications.

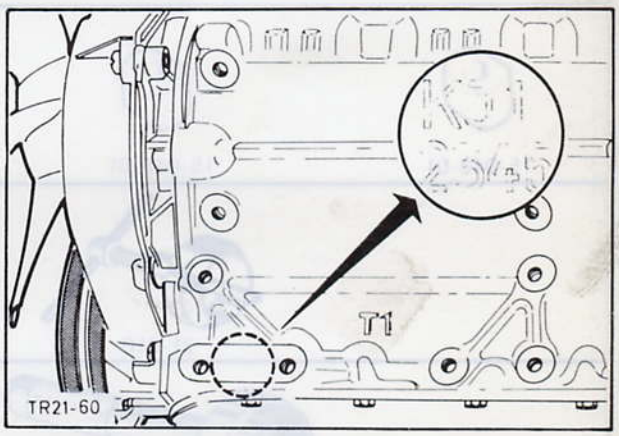

Fig. 5. Engine serial number

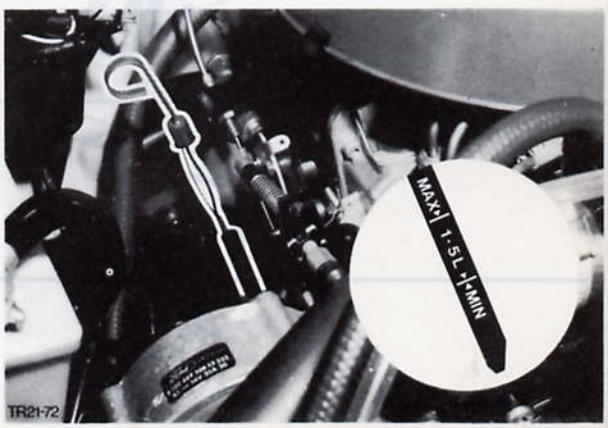

Fig. 6. Engine oil dipstick