



ANDHRA PRADESH STATE ROAD TRANSPORT CORPORATION

Mechanical Engineering Department, Office of the VC & MD,
Bus Bhavan, Mushirabad, Hyderabad - 500 624

Lr.No.OP4/462(3)/2011-MED,

CIRCULAR No:13/2012-MED, Dt.12.04.2012

Sub: MAINTENANCE - Proper maintenance of Ashok Leyland Hino Engines at depots to improve life and reduce cost of overhaul - Certain instructions issued - Reg.

It is a matter of serious concern that the frequency of Engine changes has increased abnormally at the Depots in the recent months owing to several reasons.

It is a healthy practice that the engine replacement be taken place as per a precise pre-planned program based on the wear & tear of components like Cylinder liners, Piston rings and bearings on completion of stipulated mileage so that the engine overhaul of highest quality at lesser expenditure can be achieved without any retrieval.

But in majority of the cases, the engines replacement is taking place abruptly because of serious failures like seizure of Pistons/rings, seizure of Crankshaft bearings, breakage of Connecting rods/bolts, Crankshaft, Cam shafts, Cylinder block and cracks in Cylinder bores etc thus resulting in irreparable damage to the expensive components.

The Corporation is forced to procure new engine blocks, Crankshafts, Cylinder Heads and Connecting rods to meet the demand of engines by spending huge amounts. The quantum of such procurement has increased drastically in the recent past because of maintenance abuses. Unless we aim at achieving an average ultimate life of 13 to 14 lakh kms for an engine block and crankshaft, it is difficult to curtail the expenditure on procurement of new Cylinder blocks and crankshafts.

Apart from direct financial losses, there are several other repercussions like cancellation of kms, loss of earnings, under-utilization of fleet, disruption in scheduled maintenance, inconvenience to commuters etc because of such unforeseen and unplanned engine replacements at depots.

Indulging in frequent engine changes not only affects the manpower utilization at depots as the manpower has to be diverted to attend the relief of vehicle breakdowns and attend unplanned replacement of engines but also result in backlog of Preventive maintenance schedules.

A thorough study of stripped engines at various workshops has revealed that majority of the abrupt engine failures could have been averted had the depots taken proper care in engine maintenance.

- The stripping analysis of Engines at Workshops reveals that on an average
- 40% of engines are subjected to overheating due to improper cooling system,
 - 27% of engines are subjected to poor lubrication and
 - 20% to improper Air intake system.



Engine block & Cooler plates with Heavy scale formation
(Coolant additive not used in recommended ratio)

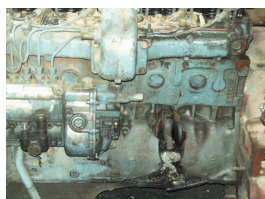


Severe scoring on Cylinder Liner & Pistons
(Subjected to severe overheating due to defective Cooling system)



Badly worn Bearings
Starvation of engine oil

Crank pin seizure



Broken Engine Block



Bent Connecting Rod



Broken Crankshaft



Valve Failure (Improper Tappet Setting)

There is every scope for improving the life of engines by taking proper care on maintenance of engines.

There are ample guidelines through MED circulars on better maintenance of vital systems like Air intake, Cooling, Lubrication, Fuel and Engine suspension which greatly influence the performance and life of engines. But it is felt that some laxity is prevailing at depots in implementing these guidelines. The following are the common lapses observed in Engine maintenance at Depots.

- Badly diluted coolant mixture
- Missing/Loose Radiator caps & usage of non-genuine Pressure caps (pressure setting not matching with the OE recommendation)
- Loose mounting of Radiator Assembly
- Blocked Intercooler/ Radiator fins
- Missing Radiator shrouds
- Low coolant level. Coolant leakage from Radiator, rubber hoses, Cooler plate etc.
- Overfilling of coolant (without allowing space for air in De-aeration tank)
- Blocked de-aeration holes
- Non functioning of Coolant temperature gauges
- Defective/ missing thermostats
- Non-functioning of Viscous fan, broken fan blades, loose fan belts
- Defective water pump
- Defective fuel injectors, incorrect FIP timing, choked exhaust system Choked Air filters
- Low engine oil level
- Non functioning of Oil pressure gauges/ low pressure indicators
- Improper grade of engine oil and delayed engine oil/filter changes
- Leakage of engine oil from seals, gaskets and pipes etc
- Loose engine mounting bolts & damaged mounting pads.
- Worn out Turbocharger seals
- Crankcase dilution
- Defective air intake system. Dust entry into Air intake system due to loose/missing hose clamps, damaged rubber hoses/metallic pipes.
- Missing/loose Air compressor suction hose.
- Incorrect valve clearance

Since each of the above systems play critical role in achieving optimum engine life, it is felt essential to pay special focus on these systems at all depots as a drive.

The following **8 point program** is evolved in this regard for strict implementation at all Depots of Ashok Leyland area with a view to improve the life of engines and reduce the expenditure.

1. Constitute **exclusive teams consisting of a Mechanical Supervisor, one Mechanic and one Shramik** and take **accurate census** on the condition of various items of the engines (furnished in the annexure) on **100% vehicles of the Depot**. More than one team may be engaged if the fleet strength of the depot is more.
2. **Consolidate the data** obtained through physical census.
3. **Rectify the minor deficiencies within 3 days** after conducting census by engaging the above team during the course of Sch-I/II maintenance.

4. Prepare the list of various items required for total rectification of deficiencies. Place ***special indents on Zonal Stores for supply*** and collect the materials within one week.
5. Prepare a ***time bound program for rectification of defects which necessitate detention of vehicles*** for attention duly keeping the required spare parts readily available.
6. ***Complete the task on 100% vehicles within 2 weeks*** and submit detailed ***compliance report to the respective Dy.CMEs.***

The Coolant Temperature gauge and Engine Oil Pressure gauge/ Low oil pressure indicators shall always be kept in proper working condition in all vehicles under any circumstance after this Drive.

7. ***Sensitize the Drivers on identifying the engine defects by way of Coolant Temperature gauge and Engine Oil Pressure gauge/ Low oil pressure indicators*** with the help of Safety Instructors covering 100% drivers of the Depot.

The Drivers must be suitably educated to stop the engines if the engine oil pressure falls below ***1.0 bar at idling speed*** and ***3.0 bar at rated speed.***

Similarly, the engine ***shall not be operated if the coolant temperature exceeds 100°C (falls in Red band)***

The Drivers shall be instructed to indicate the defects in the vehicle logsheets which they have observed through dashboard.

The observations made by the Drivers and as reported through logsheet remarks shall not be neglected by the Maintenance staff. The reasons for high coolant temperature and low engine oil pressure shall be thoroughly investigated and the vehicle shall not be booked for service until the defects are totally rectified.

8. Implement the following standing instructions on Engine maintenance with true spirit
 - Identify the vehicles for Top-overhaul in a systematic manner by 1st day of every month based on engine blow-by condition. The guidelines issued vide circular No.40/92-MED., Dt. 04 08 1992 and circular No. 3/2000-MED, Dated 29.2.2000 shall be followed in this regard.
 - Never resort to replace the damaged liners, Pistons and con-rod bearings at depot level. Send the engines to Workshops for complete overhaul in such cases.
 - Carry out diagnostic analysis of engines failed at low mileage and take appropriate action to avoid recurrence of such failures.
 - Implement the instructions on maintenance of engine Cooling system issued vide circular No. 18/2007-MED, Dt.06/09/2007 religiously
 - Keep adequate stocks of different types of Engine oils for various types of engines and never deviate the instructions in filling the recommended grades. Strictly adhere to recommended schedule of changing engine oil and filters and do not allow delayed oil changes under any circumstance.

Engine Model	Recommended Oil grade	Capacity	Change Kms
Hino 6D	SAE 40	10.5	15,000
Hino E-0	SAE 40	10.5	16,000
Hino E-I	SAE 15w40 CF4	10.5	16,000
Hino E-II/ E-III Mofussil	SAE 15w40 CH4+	10.5	36,000
Hino E-II/ E-III City	SAE 15w40 CH4+	10.5	24,000
Hino E-III CRS (Indra)	SAE 15w40 CH4+	19.0	40,000
Hino 4 Cyl BS-III (mini)	SAE 15w40 CH4+	8.5	16,000
Hino CNG	SAE 20w50 CD/CF4	10.5	10,000

- Pay adequate attention to timely replacement of damaged engine mounting beds and periodically inspect the tightness of engine mounting bolts. Defective engine suspension like loose engine mounting bolts and damaged mounting pads will result in heavy engine vibrations which in turn may lead to leakage of engine oil from gaskets due to loosening of fasteners.
- Always ensure proper connections to the Air filter Service Indicator. Choked Air filters if ignored may not only affect the engine performance but also lead to internal seepage of engine oil through Turbocharger seals.

All the Depot Managers & Maintenance In charges of Depots holding Ashok Leyland Fleet shall bestow special attention to implement the above instructions on Engine maintenance.

The Dy. CMEs are advised to monitor the situation at the depots under their Jurisdiction and submit a compliance report to respective EDs (Zones) and ED(E&IT) in this regard.

The COS' of Leyland area are advised to ensure adequate supply of the spares required for effective engine maintenance at all Depots.

The WMs of Leyland area are advised to ensure proper quality of Engine overhaul and avoid premature failures.

VICE CHAIRMAN & MANAGING DIRECTOR

To

All Depot Managers of Ashok Leyland Area for necessary action.

Copy to: Dir (V&S), ED (E,IT&HRD), ED (O&MIS), ED (A&P), FA, CAO, ED (Medi.) for infn.

Copy to: all EDs (Zones) for necessary action.

Copy to: All RMs for necessary action.

Copy to: CME (O), CCOS, CA, CFM, CME(C&B), CE (IT), CPM, CM (HRD) for information

Copy to: DyCME (O), DyCME (P), DyCME(C&B), DyCME (IED), DyCAO (SP&A), CSTO, COS(C) I & II for information.

Copy to: All DyCMEs, COSs & DyCAOs of Tata area for necessary action.

Copy to: WMs of Leyland Area Workshops for necessary action.

Copy to: All AOs for information & n/action.

Copy to: All Principals of ZSTCs, BTC, HPT & TA/HPT for information.

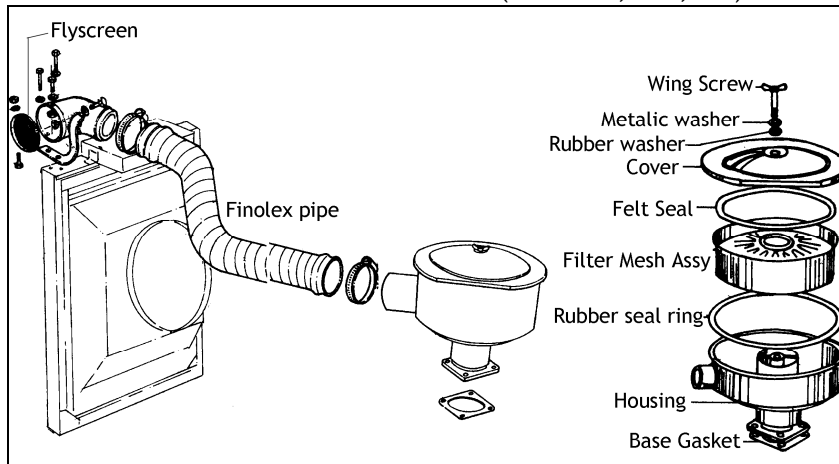
Copy to: All Maintenance In-charges of Leyland area depots for necessary action.

Copy to: RAO, AG Audit, Bus Bhavan, Hyderabad for information.

Copy to: Manuals section for record.

AIR INTAKE SYSTEM

AIR CLEANER OIL BATH TYPE (HINO 6D, E-0, E-I)



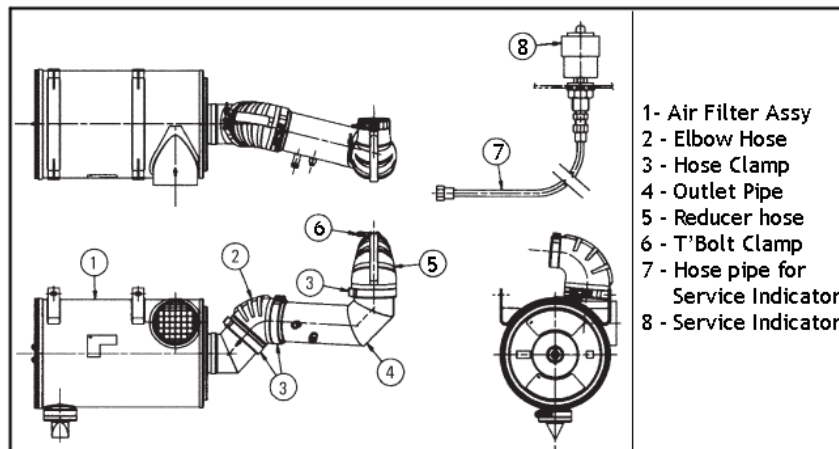
VEHICLE No:

ENGINE TYPE:

Dt. of Check:

	Items to be checked	Condition	Remarks
Air Filter (Oil Bath)			
1	Air cleaner Inner Rubber Seal (Small)		
2	Air cleaner Outer Rubber Seal (Big)		
3	Felt Seal		
4	Air Cleaner base Gasket		
3	Air cleaner oil level		
4	Air cleaner bottom fixing nuts		
5	Filter mesh		
8	Wing bolt with metal & rubber washer		
6	Finolex pipe with mesh & Clamps		
12	Air Comp. Suction hose & clamping		

AIR CLEANER DRY TYPE - HINO E-II/E-III



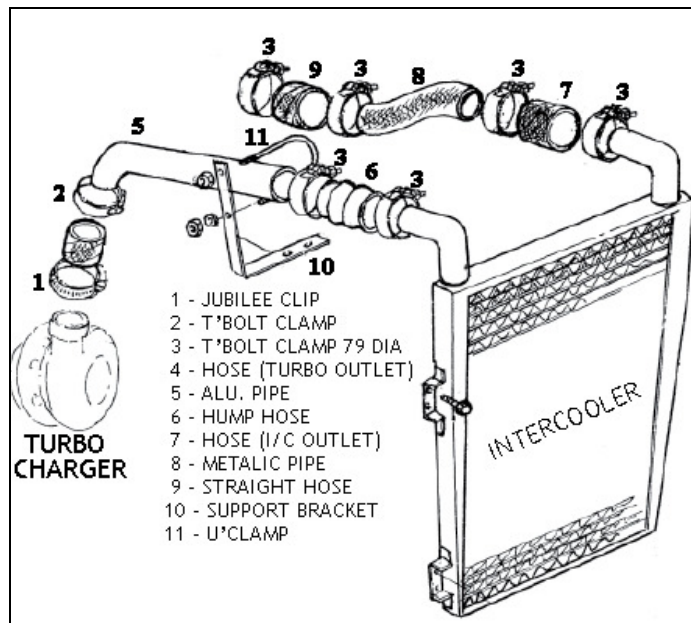
VEHICLE No:

ENGINE TYPE:

Dt.of Check:

	Items to be checked	Condition	Remarks
Air Filter (Dry type)			
1	Rubber sealing ring for End Cover		
2	Rubberized metallic washer for wing nut		
3	Service Indicator Pipe connections		
4	Service Indicator		
5	Rubber Hoses (Bend & Straight)		
6	Hose Clamps (Jubilee Clips)		
7	Air Comp. Suction hose & clamps		

INTERCOOLER & PIPE CONNECTIONS (E-II/E-III)



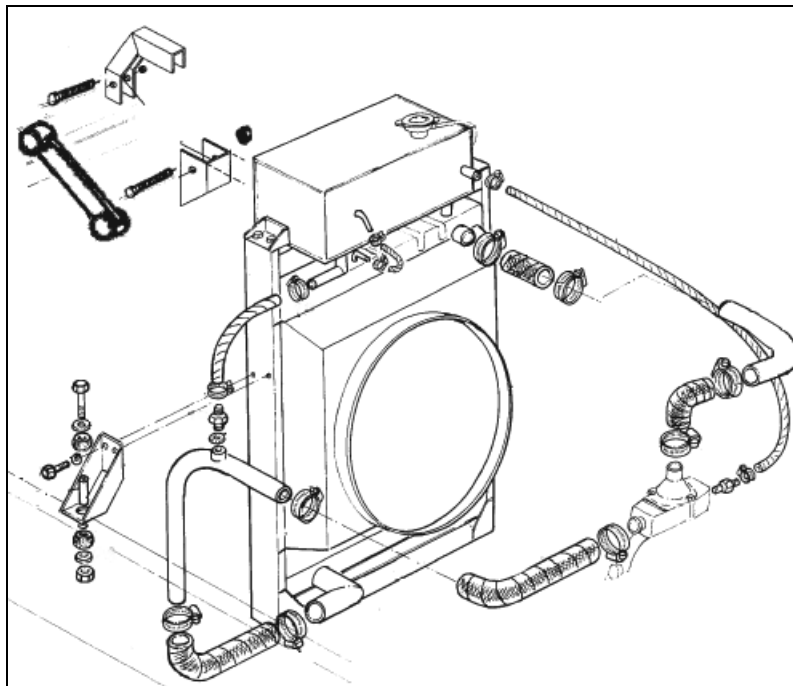
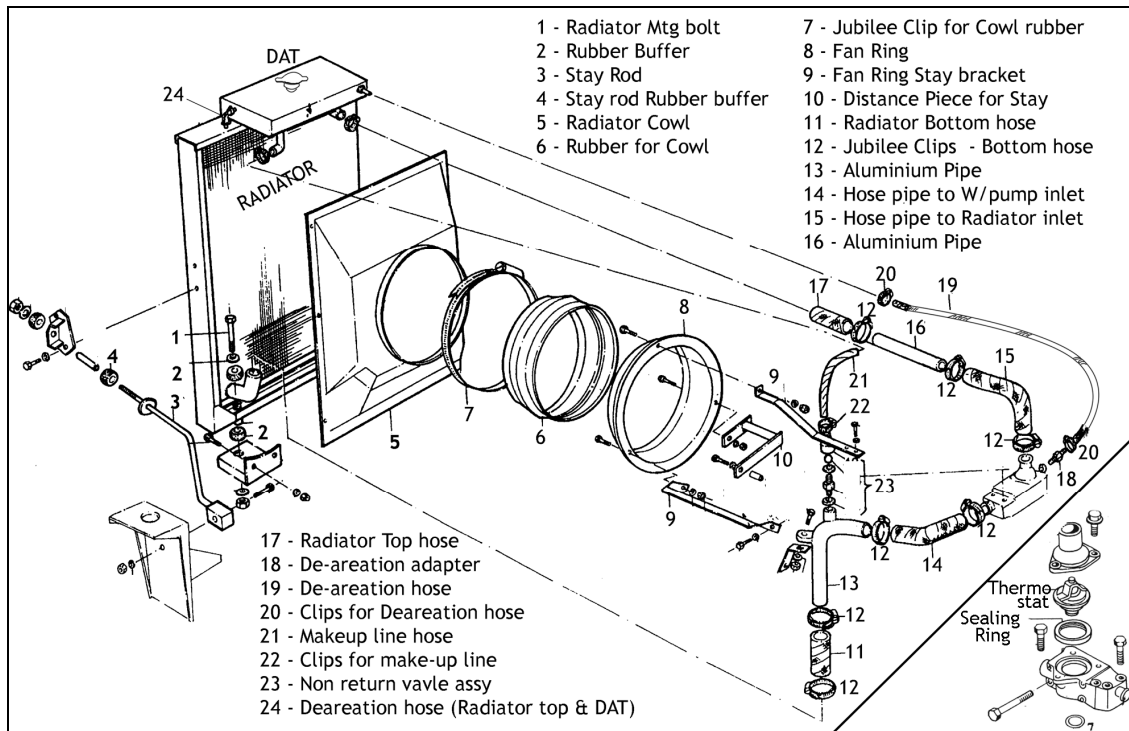
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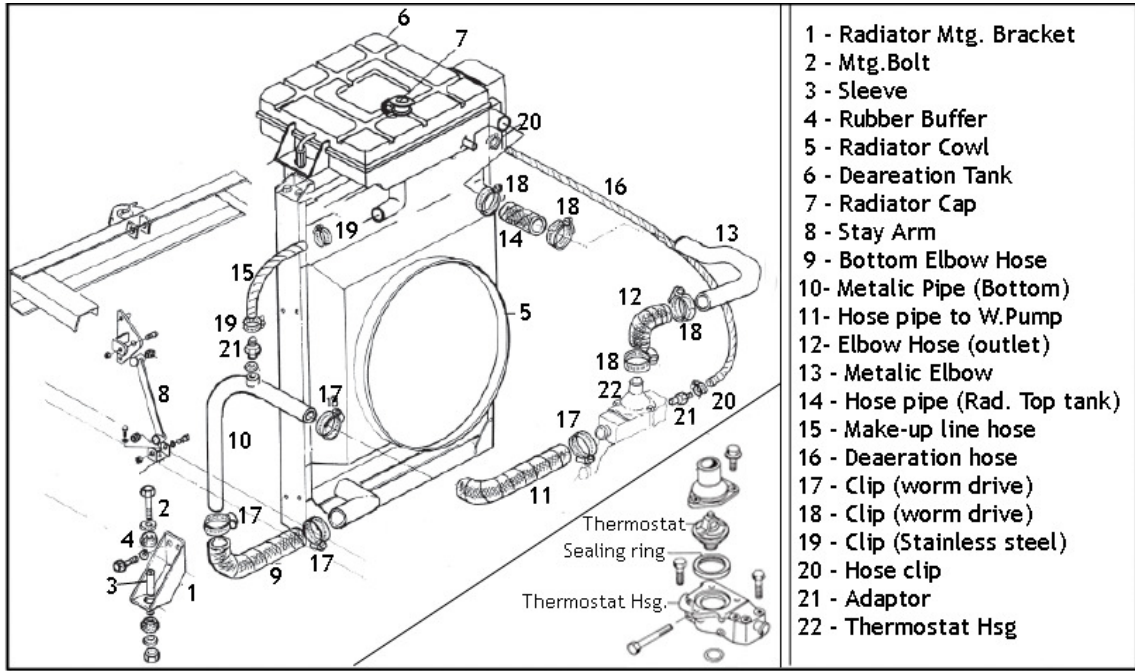
Dt.of Check:

	Items to be checked	Condition	Remarks
Intercooler			
1	Intercooler mounting bolts		
2	Intercooler Hoses (4 nos)		
3	Hose clamps (8 nos)		
4	Intercooler pipe support Bracket & U'clamp		
5	Intercooler fins condition		
6	Cleanliness between Intercooler & Radiator		
7	Front Grill (free flow of air)		

ENGINE COOLING SYSTEM

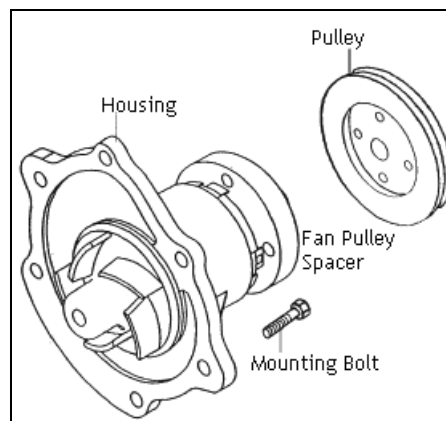
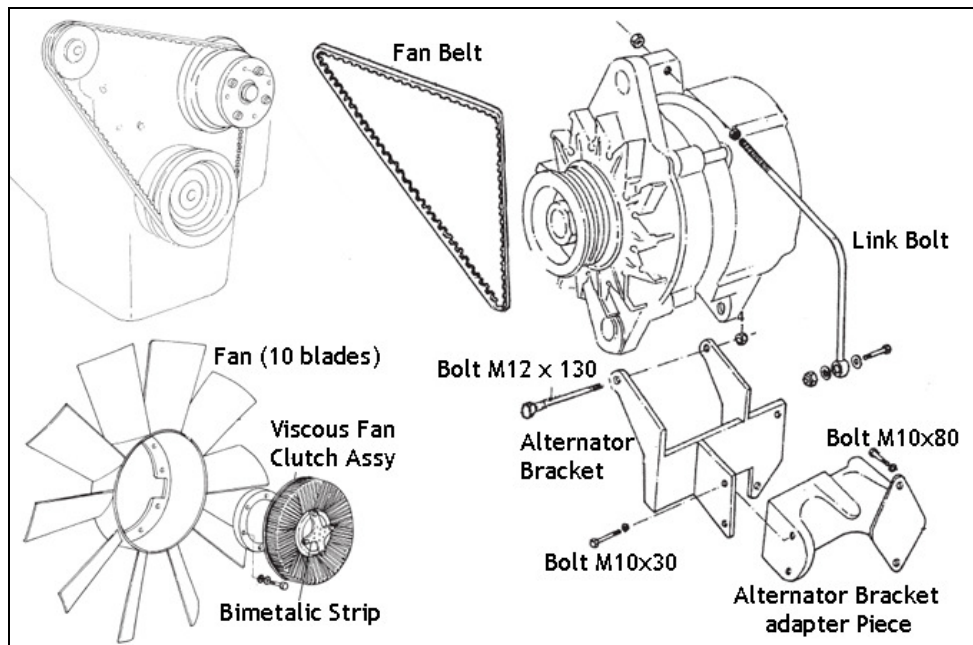


Radiator for BS-III



VEHICLE No:	ENGINE TYPE:	Dt. of Check:	
Items to be checked	Condition	Remarks	
Radiator			
1	Radiator Mounting bolts		
2	Radiator Stay bolts		
3	Radiator mounting rubber buffers		
4	Radiator fins		
5	Radiator core		
6	Radiator Shroud/Cowl		
7	Coolant concentration (1:4 copper, 1:1 Alumin)		
8	Coolant level		
9	Coolant Visibility in translucent tank		
10	Radiator Pressure Cap with chain		
11	De-areation holes in auxiliary tank & upper tank		
12	De-areation adapters, hoses & clamps		
13	Radiator Bottom hoses & clamps		
14	Radiator Top hoses & Clamps		
15	Make-up line hoses & clamps		
16	Thermostat (start opening at 83 ^o C; full opening at 94 ^o C)		
17	Thermostat Hsg sealing Ring		
18	Non-Return Valve		
19	Temp. difference between Top & Bottom tanks (not < 15 ^o C)		
20	Coolant Temperature Transducer		
21	Working condition of Temp. gauge		
22	Water cooled Air Compressor Water lines & clamps		

Cooling System - Cooling Fan, Drive Belt, Alternator mounting & Water Pump



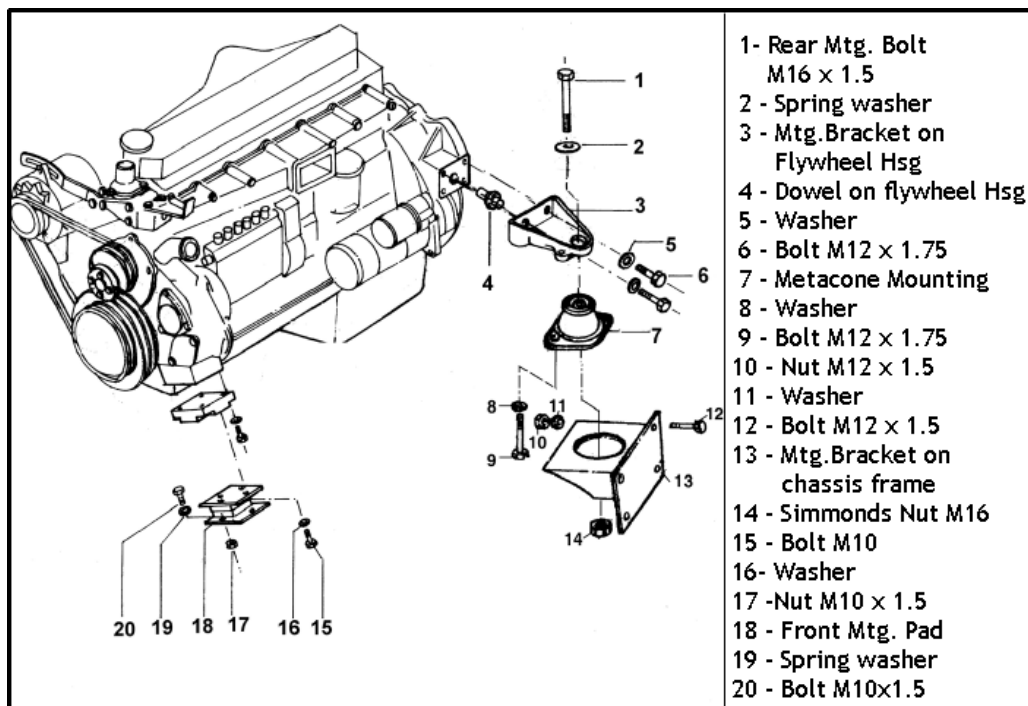
VEHICLE No:

ENGINE TYPE:

Dt.of Check:

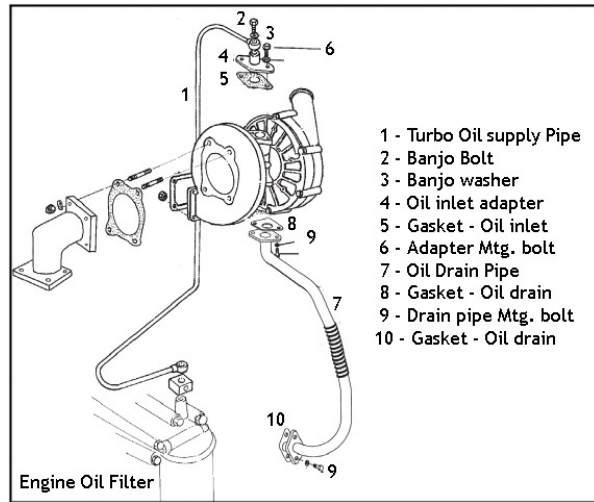
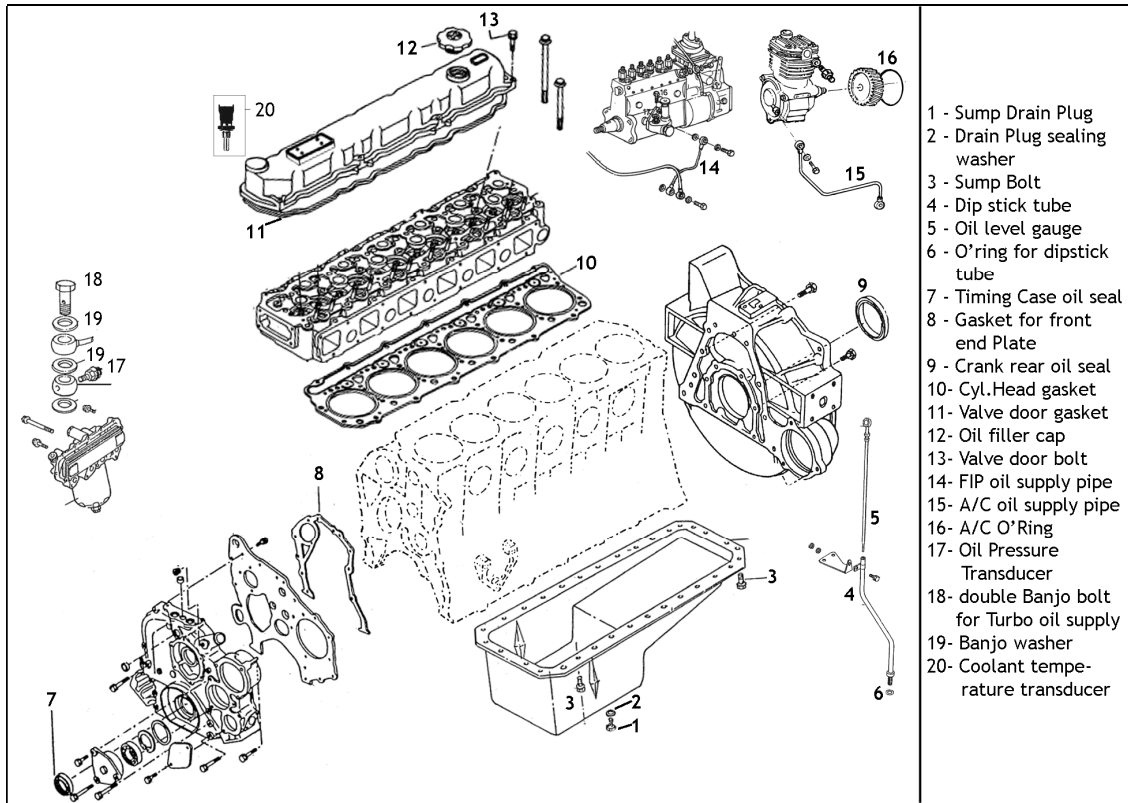
	Items to be checked	Condition	Remarks
Water Pump & Cooling Fan			
1	Water pump mounting		
2	Viscous fan working condition		
3	Fan blades		
4	Cleanliness of Bi-metalic coil/ Strip		
5	Fan Belt Tension		
6	Alternator foundation		
7	Alternator adjustment Link bolt		

ENGINE SUSPENSION & OTHERS



VEHICLE No:	ENGINE TYPE:	Dt. of Check:	
Items to be checked	Condition	Remarks	
Engine Suspension & Fuel			
1	Engine front mounting beds & bolts		
2	Engine rear mounting beds & bolts		
3	FIP timing		
4	Tappet clearance		
5	Injector pressure		
6	Connection to KSB (Rotary FIP)		

GASKETS & SEALING RINGS IN LUBRICATION SYSTEM



VEHICLE No:

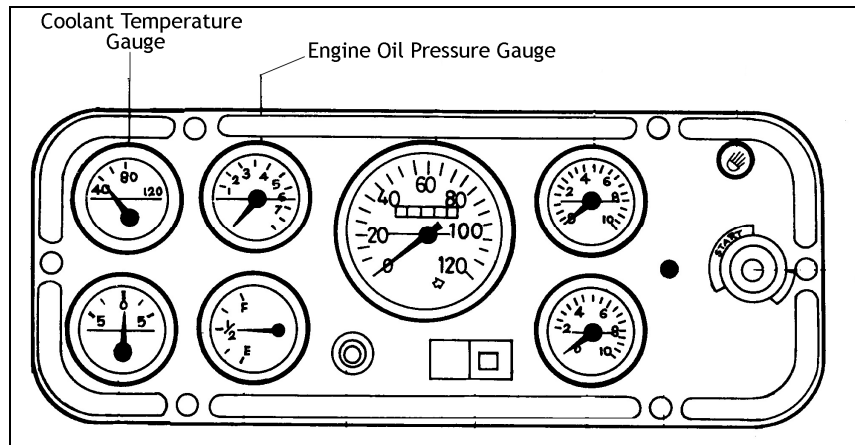
ENGINE TYPE:

Dt.of Check:

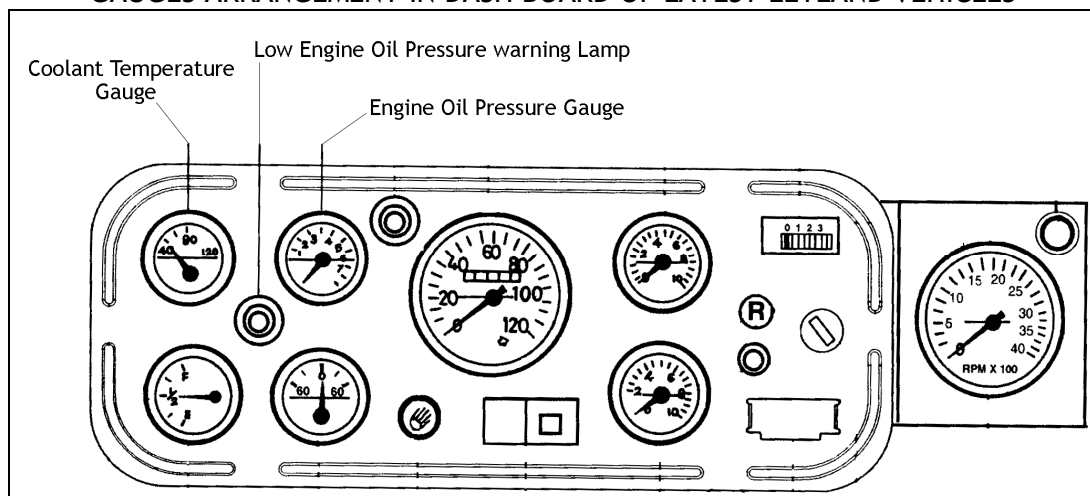
	Items to be checked	Condition	Remarks
Engine Lubrication			
1	Correctness of Dipstick		
2	Engine oil Grade		
3	Engine oil level		
4	Engine oil Pressure transducer		
5	Engine oil pressure gauge connection		
6	Engine oil pressure gauge working condition		
7	Crankcase dilution		
8	Engine breather condition		

9	Sump Sealant		
10	Sump drain plug		
11	Timing Case Gasket		
12	Timing case oil seal		
13	Crank shaft rear oil seal		
14	Valve cover gasket		
15	Tappet cover (Side cover) gasket		
16	FIP mounting gasket		
17	Lube oil supply connection to FIP		
18	Lube oil supply connection to Air Compressor		
19	Lube oil supply connection to Turbocharger		
20	Turbocharger oil return line		
21	Turbocharger internal oil seepage		
22	Engine Oil filter head		
23	Air Compressor oil throw		
24	Engine oil Cooler gasket		

GAUGES ARRANGEMENT IN DASH BOARD OF OLD MODEL LEYLAND VEHICLES



GAUGES ARRANGEMENT IN DASH BOARD OF LATEST LEYLAND VEHICLES



Parts Required for Oil Pressure Gauge & Water Temperature Gauge

	Description	Part No.	Qty
1	Water Temperature Gauge	F2041200	1
2	Oil Pressure Gauge	F2041300	1
3	Warning Lamp (Low Oil Pr)	F8008600	1
4	Low oil Pressure Switch	F2241500	1
5	Adaptor (Oil Pressure)	F0130915	2
6	Lock Nut	F3550715	2
7	S/A Oil pipe Gauge to L'Bracket assy	B9227103	1
8	S/A Oil level gauge	B9227104	1
9	Adaptor on Oil filter head	B7015402	1
10	Washer for Adapter	F2702050	1
11	Water Temperature Gauge BS-II/III	F2041900	1
12	Oil pressure gauge BS-II/III	F2008800	1
13	Temperature sensor unit	F7800700	1
14	Pressure sender	X7809300	1