DIRECTOR GENERAL BORDER ROADS

GENERAL MAINTENANCE INSTRUCTION NO. 248

ON OPERATION AND MAINTENANCE OF

MEDIUM RECOVERY VEHICLE 4X4 STALLION ASHOK LEYLAND

INTRODUCTION:-

(a) Medium Recovery Veh Model Stallion 4x4 Make Ashok Leyland Chassis having Wheel base 4200 mm fitted with Ashok Leyland HA57L135/5 model BSIII norms diesel engine developing 135 kW at 2400 rpm, 6 speed synchromesh gear box including one over drive speed and power steering with Wrecker Equipment.

(b) This GMI gives the technical specification and know how on the operation, maintenance and repair procedure of aggregates of model vehicles, to ensure maximum performance and safe/satisfactory operation. Assuming that the technicians in the workshop are fully conversant with the repair and maintenance practices of commercial vehicles in general, the repair procedures out lined in this GMI emphasizes the special features of this product. Compliance with procedures given in this GMI will enable to desire the maximum service from the Ashok Leyland diesel vehicles.

(c) To prolong the life of Medium Recovery Veh Model Stallion 4x4, to prevent frequent break downs and to reduce maintenance cost, the periodic maintenance must be carried out according to the **'P*eriodic Maintenance Schedule'*** described in this GMI. Periodic Maintenance is essential for preventing troubles and accidents to ensure satisfaction and safety. Daily care and inspection is also essential for prolonging the operating life of the vehicle and for safe driving. It also reduces the wear and tear on the vehicle, prolongs its life, give more mileage, failure of the guide lines given below can result in personal injury or serious damage to the vehicle. All information and instruction in the GMI is based on the latest owner's manual and service booklet.

AIM:-

The instructions are issued as guidelines for schedule of preventive maintenance, lubrication of Medium Recovery Veh Model Stallion 4x4 manufactured by M/s Ashok Leyland Ltd for regular attention to keep the vehicle in good mechanical condition which must be strictly followed.

ACTION BY:-

(a) User unit: To carryout periodic inspection and monitor regular/periodical Maintenance as laid down in this instruction and to record the tasks done in log book.

(b) Field Workshop:

(i) To carryout and monitor maintenance schedule and oil changes as per periodical maintenance laid down in the maintenance instruction and to check the record of maintenance including lubrication.

(ii) To advise the user unit in respect of any lapse noticed.

(c) Mobile Maintenance Team: To ensure that proper maintenance is carried out and submit report accordingly to Task Force Commander and OC Wksp for their necessary action.

DETAILS:-

This instruction includes the following aspects:-

a)	Operating Procedure – DO's and Don'ts	- Appendix 'A'
b)	Periodic Maintenance schedule	- Appendix 'B'
c)	Technical Specification	- Appendix 'C'
d)	Recommended Lubricants/Filling Capacities/Tyre Pressure chart	- Appendix 'D'

(M B Negi)
EE (E&M) SG
Joint Director (Tech)
For Dir Gen Border Roads

Appendix 'A'

OPERATING PROCEDURE

Electronic Diesel control system (EDC)

1. Electronic Diesel Control system (EDC) is provided to meet the demands of lowering of harmful exhaust gas emissions keeping in view the importance on fuel injection and engine management system with regard to the following:-

a) High fuel injection line pressure
b) Water/coolant temperature dependant fuel quantity delivery – for starting.
c) Control of close idling speed
d) Determined fuel quantity and timing in engine start phase to suit geographical/climatic conditions.
e) Integral timing function adjusting start of delivery as a function of engine speed to meet the emission norms.
f) Regulated fuel quantity in reference to load and engine speed.
g) Metered fuel quantity to control and maintain free acceleration smoke.

2. In Electronic Diesel Control system (EDC), the driver has no direct control over the injected fuel quantity through the accelerator pedal. EDC system is also capable of data exchange with other electronic systems such as Automatic transmission through CAN (Control Area Network).

3. EDC system is sub divided into the following:

(a) Sensors – Detects the eng operating conditions and the driver's demand. They convert physical variables in to electrical signals.

(b) Electronic Control unit (ECU) – Processes the information received from the sensors. It controls the actuators through electrical output signals. It also provides interfaces with other systems like diagnostic tool, ABS etc.

(c) Actuators – Convert the electrical signal from the ECU in to physical variable.

4. Benefits of Turbo charging:

a) Lower fuel consumption
b) Lower emission
c) Better Torque characteristics
d) Lower weight and a smaller engine package
e) Lower engine noise
f) Altitude compensating

Dual Brake system

5. The Dual Brake system is a split system of Air brakes to actuate front and rear foundation brakes separately/independently, thereby ensuring partial braking for the veh, in case of failure in air system in any of these circuits (front or rear). Advantages of Dual brake system are as under:-

(a) Ensures better safety
(b) Doubles the reliability of the brake system
(c) Response time is reduced (viz) reduced stopping distance and reduced stopping time.
(d) Increased reservoir capacity:
    (i) More number of safe brake applications
    (ii) Better condensation of water and oil
    (iii) Ensures supply of clean dry air to brake valve and Brake chamber
    (iv) Hence, increased life of brake system components

(e) Pneumatic system is split in to independent sub systems.
- (i) Front axle brake system
- (ii) Rear axle brake system
- (iii) Spring actuated mechanical hand brake system
- (iv) Auxiliary system

(f) Provides a third braking system available to the driver even in the unlikely event of failure of both the primary and secondary brakes.

(g) There is no panic situation for the driver. Safe braking is always available under his foot pedal.

(h) Provides for spring actuated mechanical hand brakes. This can hold the veh in a gradient of 27^0. This also provides for safer surer hand brake in the place of conventional mechanical hand brake.

(j) Auxiliary equipments like Air horns are isolated from the main brake system, which ensures better safety. Failure in auxiliary system can not affect main system.

(k) Low pressure warning switches are provided in each circuit, which indicates to the driver the failure in any of the sub-system.

6. Advantages of Diaphragm Clutch:

a) Reduced clutch pedal effort
b) Optimum clamping load maintained regardless of wear on clutch disc.
c) Uniform clamping load over facing.
d) Diaphragm spring unaffected by centrifugal forces as in the case of coil springs.
e) Compact and fewer parts
f) Better dynamic balance due to rotational symmetry.
g) High fatigue life of diaphragm spring.

Do's

1.	Check for engine oil pressure at engine idling condition minimum oil pressure should be 1.0 kg/Cm^2
2.	Idle the engine for 2 minutes after starting the engine.
3.	Idle the engine for 2 minutes before switching off the engine.
4.	Periodic cleaning of crank case breather is necessary to allow free flow of oil from turbo charger outlet.
5.	Before applying the exhaust brake, change to appropriate gears suitable to the vehicle speed and road condition.
6.	While exhaust brake is in use remove the leg from the accelerator pedal for reducing the fuel supply and engine speed.
7.	Service brake can be used in conjunction with the exhaust brake. Check for air and exhaust leaks and arrest suitably for ensuring efficient operation.
8.	Exhaust brake to be used only during downhill operation.
9.	Always use approved lubricants as recommended
10.	Ensure Clutch pedal free play between 4 to 7 mm.
11.	Fleet guard fuel filtering system consists of a strainer (fitted before feed pump) and a fuel filter cum water separator (fitted at pressure side before FIP).

12.	Drain cock provided in water separator should be hand tightened fully. Never use any spanner for rotating the drain cock.
13.	Check fan belt tension at regular intervals and adjust as needed. Check for any abnormal wear and damage in pulleys/belt including pulley alignment.
14.	Replace the fan belt if it is frayed or pieces of material missing or longitudinal cracks intersect with transverse cracks.
15.	Remove dust deposit weekly by squeezing the dust evacuator valve provided in dry type air cleaner and dust evacuator valve also be replaced immediately if it is torn, cracked, remains open or missing.
16.	Always use recommended radiator pressure cap to avoid leakage.
17.	Always refill the radiator with recommended coolant.
18.	After long storage before starting the engine, fill-up the oil feed hole of the turbocharger with clean engine oil to ensure lubrication during start-up.
19.	Sump heater and Flange heater should be operated only during sub-zero temperature operation. The extent of duration that these should be kept on will depend on the actual sub zero ambient temperature experienced.
20.	Turbocharger needs CLEAN ENGINE OIL and CLEAN AIR (from the Air Filter) for its proper functioning and durability.

Don'ts

1.	Do not run the engine with low oil pressure and low oil level.
2.	Do not put the engine under full load immediately after starting
3.	Do not switch off the engine under full load/through gears.
4.	Do not run the engine with blocked, punctured, aged, deformed hose/ pipe connections from the air cleaner to the turbo charger and turbo charger to the inlet manifold.
5.	Do not open / repair the turbo charger, contact authorized service centre.
6.	Do not accelerate the engine immediately after start. Idle the engine for at least two minutes after start and before the engine is stopped.
7.	Do not depress the clutch after applying the exhaust brake as this will make the exhaust brake ineffective.
8.	Do not press the accelerator pedal after applying the exhaust brake.
9.	Do not allow exceeding the recommended speeds for respective gears after applying the exhaust brake.
10.	Never raise engine speed with exhaust brake applied during actual driving.
11.	Do not continuously operate the starter motor for more than 10 seconds at a time. Wait for 30-60 seconds before trying again.
12.	Do not over tension the Belt and do not apply oil/grease or paint on pulley grooves.
13.	Do not start the engine when the air cleaner indicator shows 'RED BAND'. Clean air cleaner and start.
14.	Never operate the engine, if the restriction indicator is either broken or missing.
15.	Do not open the oil separator cap as there is no serviceable path inside is available.
16.	Never open the pressure cap when the radiator is hot.
17.	Do not park/leave the veh with ignition switch in 'ON' position.

Appendix 'B'

PERIODIC MAINTENANCE SCHEDULE

S/ No	Operation	Daily	Weekly	Every 1000 Kms	Every 5000 Kms	Every 10000 Kms	Every 20000 Kms	Every 30000 Kms	Remarks
A	**ENGINE**								
1	Check and tighten Cylinder head bolt					*			
2	Check and adjust valve clearance					*			
3	Check Compression pressure						*		
4	Check engine mounting front and rear/other peripheral bolts and tighten if necessary				*				
5	Check engine oil level and top up if required	*							
6	Change engine oil and oil filter element					*			Every 5000 Kms for HAA/Desert area
7	Clean oil cooler								During every O/H
8	Check fan belt tension and adjust if necessary		*						
9	Check coolant level and top up if required	*							
10	Check fan mounting bolt tightness and tighten if necessary			*					
11	Check water pump bearing for abnormal sound					*			
12	Drain Cooling system, clean and fill recommended coolant							*	
13	Replace rubber hose for coolant pump								As required
14	Check injection timing and fuel feed pump operation					*			
15	Replace fuel inline strainer and fuel cum water separator					*			
16	Adjust fuel injector nozzle pressure					*			
17	Clean fuel feed pump strainer					*			
18	Injection pump assy for O/H							*	
19	Clean fuel tank strainer						*		
20	Replace fuel hose							*	Every 2 years
21	Check intake and exhaust manifold mounting nut tightness and tighten if necessary					*			
22	Check and rectify exhaust gas leakage at silencer and exhaust pipe			*					
23	Check exhaust pipe mounting and tighten if necessary			*					
24	Clean Air cleaner primary element								If Restriction Indicator shows Red band
25	Replace Air cleaner primary element								After 2 consecutive cleaning
26	Replace Air cleaner safety element								At the time of 3rd replacement of primary element
	EDC (Electronic Diesel Control)								
27	Check tightness of mating connectors & engine speed sensor and clean				*				

S/ No	Operation	Daily	Weekly	Every 1000 Kms	Every 5000 Kms	Every 10000 Kms	Every 20000 Kms	Every 30000 Kms	Remarks
28	Check function of EDC & sensors with diagnostic tool							*	
B	**CLUTCH**								
1	Lubricate clutch operating pedal shaft, clutch withdrawal lever and clutch withdrawal bearing		*						
2	Check clutch pedal free play to 5 mm		*						
3	Check oil level in reservoir and top up				*				
4	Change oil in clutch reservoir								Every 40000 km
5	Check clutch disc wear					*			
C	**GEAR BOX AND AUX GEAR BOX**								
1	Check oil level & top up if necessary		*						
2	Change oil when hot. Refill to correct level						*		Every 1 year
3	Check and replace reaction rod ball joints							*	
4	Check and tighten all mounting bolts of gear box and auxiliary gear box		*						
5	Clean and re fit breather of gear box and auxiliary gear box				*				
D	**PROPELLER SHAFT**								
1	Lubricate UJ Cross, Propeller shaft splines and tightness of propeller shaft bolts		*						
E	**REAR AXLE**								
1	Check oil level and top up if necessary		*						
2	Check the tightness of axle shaft nuts and drive head		*						
3	Repack the hub with recommended grease and adjust hub end play					*			
4	Change oil when hot. Refill to correct level						*		Every 1 year
5	Check and adjust end play of hub if necessary				*				
6	Check and adjust preload						*		
7	Clean the breather				*				
F	**FRONT AXLE**								
1	Check oil level and top up if necessary		*						
2	Check the tightness of drive head		*						
3	Repack the hub with recommended grease and adjust hub end play					*			
4	Change oil when hot. refill to correct level						*		Every 1 year
5	Check and adjust wheel alignment if necessary and check max cut				*				
6	Check and adjust preload						*		
7	Lubricate track rod ball joints		*						
8	Drag link socket to be preloaded						*		
9	Socket assy to be replaced								Replace socket at 40000 km
G	**OTHER ITEMS**								
1	Lubricate brake wedges on front axle and ‘S’ camshaft on rear axle				*				

S/ No	Operation	Daily	Weekly	Every 1000 Kms	Every 5000 Kms	Every 10000 Kms	Every 20000 Kms	Every 30000 Kms	Remarks
2	Check brake liner for wear and replace if necessary					*			
H	**STEERING GEAR**								
1	Check oil level in reservoir and top up if required				*				
2	Lubricate drag link ball joints				*				
3	Check steering mounting bolts/nuts				*				
4	Change Hyd oil and filter cartridge							*	Every 1 year
J	**SUSPENSION**								
1	Lubricate front and rear spring shackle pins			*					
K	**CHASSIS**								
1	Check the chassis cross members and side members for loose bolts or rivets and tighten				*				
L	**CABIN**								
1	Replace cabin mounting bush							*	Every 2 year
M	**MISC**								
1	Check tyre pressure and inflate		*						
2	Check battery electrolyte level and top up if required		*						
3	Check tightness of all clips/clamps of hoses and tighten if required				*				

PERIODIC MAINTENANCE SCHEDULE

S/ No	Operation	Daily	Weekly	Monthly	Once in 3 Months	Once in 6 Months	Once in a year
N	**BRAKE SYSTEM**						
1	Check mounting bolts/nuts for tightness and tighten if required				*		
2	Check for air leakage in all the lines, joints and assys	*					
	Single Cylinder compressor						
3	Check inlet hose for deterioration and renew, if required			*			
4	Check Compressor performance and go for overhaul, if required (Build up time at 1600 rpm: 6 minutes (Max) for 65 ltrs, 10 minutes (Max) for 100 ltrs. If exceeds the limit, then unit requires O/H)				*		
5	Clean Cylinder head and decarbonise Inlet/Delivery pipe lines. O/H using cylinder head repair kit						*
	Air Dryer						
6	Check for moisture/water collection in the reservoir. If water collection is noticed, replace the Desiccant cartridge			*			
7	Check for performance. Pressure differential should not exceed 1.3 bar				*		
	Quadruple system protection valve						
8	Check the gaiter condition and replace, if necessary				*		
9	Drain sensing tank and watch for pressure drop in the gauges to detect Non return valve leak					*	
	Reservoir						
10	Drain the reservoirs and check for moisture/water collection in the reservoir. If water collection is noticed, replace the Desiccant cartridge in Air Dryer			*			

S/ No	Operation	Daily	Weekly	Monthly	Once in 3 Months	Once in 6 Months	Once in a year
	Dual Brake Valve						
11	Check for free movement of the plunger			*			
12	Check gaiter for damage/deterioration, replace Gaiter if necessary				*		
	R6 Relay valve & Trailer control valve						
13	Apply and release the brakes and check for free exhaust. Check for performance				*		
	Load sensing valve						
14	Check and adjust the setting angle						*
	Wedge brake actuator						
15	Check for uniform application and release of brakes			*			
	Spring brake actuator						
16	Lubricate Fork and pin. Check for free movement of push rod by applying and releasing brakes			*			
17	Check the condition of breather tube and ensure clips are secured properly at both ends				*		
	Quick Release valve (Diaphragm)						
18	Check for uniform exhaust by applying and releasing brakes			*			
	Slack Adjuster						
19	Lubricate using recommended grease		*				
20	Apply the Brakes and check for the angle between the arm and push rod is 90^0. Adjust the brakes if required and ensure the angle is 90^0			*			
	Graduated hand control valve						
21	Check lever for proper locking in brakes 'ON/OFF' positions				*		
22	Check Gaiter and Knob for damage and replace if reqd					*	
	Shut off Cock						
23	Check for proper operation of the valve				*		
24	Check for blockage of vent hole (if applicable)					*	
	Palm coupling						
25	Replace the rubber sealing ring						*
	Exhaust Brake assy						
26	Lubricate the linkages and check slackness			*			
27	Check performance and free movement of Butterfly valve				*		
	Brake Chamber						
28	Lubricate Fork and pin. Check for free movement of push rod by applying and releasing the brakes			*			
	Low Pressure Indicator switch						
29	Check for proper working of Beeper	*					
	Stop light switch						
30	Check for proper working of stop lights	*					
	Hose assy						
31	Check for crack/deterioration/rubbing marks				*		

Note:

a) Overhaul the all above units of Brake system using recommended repair kits and replacement of Desiccant cartridge in the Air Dryer once in two years.

b) Ensure that the angle between the push rod and the slack adjuster is 90^0 or $+ 5^0$ and $- 0^0$, if the angle is less than 90^0 then the push rod travel is more and needs immediate adjustment of brakes.

c) While overhauling Exhaust Brake assy, the foot control valve/Air exhaust brake valve/magnetic valve also must be overhauled to ensure trouble free operation of exhaust brake system.

d) Do not lubricate the pivot pin joints in the housing of butterfly valve shaft and the bushes.

Appendix 'C'

TECHNICAL SPECIFICATION

Description	Stallion 4x4 MRV BS III
Engine	
Model	HA57L135/5
Type	Diesel 4 stroke, 6 cylinder water cooled, direct injection, in line overhead valve, Turbocharged with inter cooler
Maximum output	135 KW @ 2400 rpm
Maximum torque	66 kgm (660 Nm) @ 1600-1800 rpm
Bore x Stroke	104 x 113 mm
Displacement	5.76 ltrs
Compression ratio	17.5 $\pm$0.5 : 1
Firing Order	1-4-2-6-3-5
Direction of Rotation	Counter clockwise viewed from fly wheel
Compression Pressure	Maximum - 29 – 32 kg/cm^2 @ 280 rpm Minimum - 24 kg/cm^2 @ 280 rpm
Idling revolution	600 $\pm$ 50 rpm
Engine weight (with oil)	530 kg
Cold starting aids	Flange heater and sump heater
Turbocharger	With wastegate, Make TEL
Fuel Injection pump	BOSCH Model VP37 Rotary Type (Distributor), Electronic Control unit – EDC 15VM + 2.V9
Injector Nozzle opening pressure	270 – 278 bar
Injection timing	0.6 mm $\pm$ 0.02 mm plunger lift at TDC with No 1 cylinder at compression stroke
Injection Nozzle type	Multi hole Nozzle (first Injector NBF)
Tappet/Valve clearance (when cold)	
Intake	0.30 mm (0.012")
Exhaust	0.45 mm (0.018")
Valve Timing	
Intake opens	31^0 before TDC
Intake closes	43^0 after BDC
Exhaust opens	71^0 before BDC
Exhaust closes	29^0 after TDC
Lubrication System	
Eng oil pump type and Drive	Full forced pressure feed by gear pump and drive by timing gear
Eng oil Cooler	Multi plates type (No. of Plates-8), Water cooled
Maximum Eng oil pressure	4.5/4.8 kg/Cm^2 at full load 1.2/1.6 kg/Cm^2 at Eng idling
Minimum Eng oil pressure	1.0 kg/Cm^2 at Eng idling
Cooling System	
Coolant pump type and Drive	Forced circulation by volute pump, 55 mm dia ball and roller bearing and drive by Poly V-belt, Impeller diameter – 100 mm
Thermostat	Twin thermostat, wax type, bottom by pass system, opens at $82^0 \pm 2^0$C
Maximum cooling temperature permissible	95^0C
Clutch	
Make	Amalgamations Valceo /Luk India
Type	Single plate dry type Diaphragm clutch- Hydraulically operated
Outside diameter	383 mm
Inside diameter	220 mm

Clutch face thickness with load	10 mm
No. of Rivets	36
Clutch Booster	Make - Wabco TVS/Brakes India. Stroke 85 mm, Type 3" version
Gear Box Main	Make - Ashok Leyland Ltd
Model, Type	ZF S6-36 MK II, Synchromesh type
No. of gears	6 forward and 1 reverse
Gear Ratios (Forward)	
1st	6.93 : 1
2nd	4.43 : 1
3rd	2.63 : 1
4th	1.51 : 1
5th	1 : 1
Over drive	0.84 : 1
Reverse	6.22 : 1
PTO output speed ratio	1.05 : 1
PTO operation	Electro pneumatic switch operated from driver's cabin
Gear Box Auxiliary	Make – Ashok Leyland Ltd
Ratios	High – 1:1, Low – 2.15:1
Operation	Electro pneumatic switch operated from driver's cabin
Propeller Shaft	
Gear Box to Auxiliary Gear Box	1600 Series
Auxiliary Gear Box to Front axle	1600 Series
Auxiliary Gear Box to Rear axle	1600 Series
Axles- Front & Rear	
Make, Model	Meritor HVS India/Ashok Leyland Ltd, Pressed banjo type-RS 145
Type- Front	Fully floating pressed type drive axle with steerable ends , Cap- 7500 Kg, Over slung
Type- Rear	Fully floating with differential lock, Cap- 10200 Kg, Over slung
Differential ratio	6.83:1
Suspension	
Front Spring	Semi elliptical multi leaf – progressive
Rear Spring	Semi elliptical multi leaf with helper
No. of Leaves	Front – 15, Rear - 16 (main), 4 (helper), 2 (packing)
Span/length of spring eyes	Front – 1650 mm, Rear – 1524 mm
Leaf width	Front – 76.2 mm, Rear - 76.2 mm
Shock absorber Front & Rear	Make – Gabriel/Hydraulics, Type - Double acting telescopic
Wheels	
Rim size	B 10 x20
Tyre size	14.00 x 20, 18 PR, Qty -05 Nos
Brakes	
Service brake	Make – Brakes India Ltd for Front & Meritor HVS India/ Brakes India Ltd for Rear, Type - Air Brake Dual line
Parking brake	Pneumatic type
Exhaust Brake	Make – Wabco TVS, Type - Butterfly type actuated by air pressure
Steering	ZF Power steering/Rane TRW steering
Type	Integral Power Steering
System pressure	130 bar
Drive	Engine driven

Steering wheel diameter	500 mm	
Electrical system		
Battery	12 V x 130 AH- Qty 02 Nos	
Alternator (Max. output)	24V, 55 Amps, Make – BOSCH/LUCAS	
Starter Motor	24V, Pre-engaged, Make – BOSCH/LUCAS	
Head lamp	70/75W – 02 Nos	
Fog lamp	70W – 02 Nos	
Revolving lamp	70W – 01 No	
Pilot lamp	LED, 02 Nos	
Performance data		
First Gear speed (Max)	11 Km/hour	
Sixth Gear speed (Max)	93 Km/hour	
Reverse Gear speed	12 Km/hour	
Maximum gradeability (solo)	25^0	
Turning circle diameter	16.7 mtr	
Braking efficiency	4x4 – 43%, 4x2 – 40%	
Maximum draw bar pull	7.5 Ton – 4x4 low, 4.4 Ton - 4x4 high	
Gross power to weight ratio (solo)	12.6 kw/T	
Cross country towing	10 Tons (Max)	
Parking Brake performance (solo)	25^0	
Over turning angle	20^0	
Mud Tracking	430 mm	
Water wading	760 mm	
Unladen weights (with wrecker Eqpt)		
Front Axle	6310 kg	
Rear Axle	4415 kg	
Total	10725 kg	
Laden weight	**4.5 Ton Normal operation (Lift & Move)**	**7 Ton Limited operation***
Front Axle	5125 kg	4020 kg
Rear Axle	10100 kg	13705 kg
Total (Gross vehicle weight)	15225 kg	17725 kg
Pay Load	4500 kg	7000 kg
* With limited speed of 15 kmph on plain roads		
Major dimensions		
Wheel base	4200 mm	
Front overhang (with bumper)	1770 mm	
Front overhang (on chassis, without bumper)	1485 mm	
Rear overhang (on vehicle)	1420 mm	
Rear overhang (on chassis)	885 mm	
Front wheel Track	2030 mm	
Rear wheel Track	2060 mm	
Angle of approach	28^0	
Angle of departure	33^0	
Ground clearance	Front /Rear - 360 mm	
Overall length (Max)	7390 mm	
Overall height (Max)	3400 mm	
Overall Width (Max)	2500 mm	
Superstructure Details		
Crew cabin	Provided behind driver’s cabin with seating bench to seat 4 people	

Wrecker Equipment	Twin boom with manual slewing and having facility for manual lowering and lifting. Manually swiveling for angular pulls
Boom specification	Twin boom suitably strengthened for recovery operation. The boom length and height will be such that it will enable lifting of major assy and suspend 'B' vehicles up to 7.5 Tons. On suspended tow veh causalities up to 12 Tons class. Radius of boom 4156 mm. Hook lifting capacity at a clear reach of 450 mm will be not less than 7.5 tons for each boom and with boom locked 12 tons on rear jacks. Lift and move at minimum reach of 450 mm from rear most position of the veh, for suspended tow, with booms locked will be 4.5 ton on cross country and 7 tons for level road at 15 kmph.
Maximum rear of boom	Sides – 3500mm, Rear – 450mm
Clear lift of boom @ max reach	2500 mm
Maximum lift capacity @ max reach	2.5 Ton
Clear lift of boom @ min reach	5000 mm
Boom projection in stowed condition	450 mm from rear most position of the veh
Boom height in stowed condition	3400 mm
Angle of slew	150^0 for each boom
Wrecker Platform overall dimension (including crew cabin)	
Max length	5470 mm
Max width	2500 mm
Height above veh frame	2025 mm
Weight of wrecker eqpt without platform	3575 kg (Approx)
Weight of counter weight as front bumper	450 kg
Boom cabin size	Steel 14 dia, 6 x 36 IWRC 1960, IS 2262 ; 100 mtrs long per boom
Cable breaking capacity	More than 1.75 time load lift capacity (13900 Kg)
Safety device for over loading	Slipping clutch (adjustable) set to 7.5 ton
Outrigger jacks	Manually retractable outrigger jacks with locking arrangement
Controls	Controls for service drums will be provided on both LH and RH at the rear of the veh for ease of operation. The veh accelerator controls will also be duplicated on LH and RH at the rear of the veh
Line Pull Switch	
Quantity	Qty 02 Nos
Type	Line pull type, mechanically operated and capable of exerting straight pull from rear and side of the veh
Capacity	7.5 tons (each winch)
Winching speed	3.3 meter per minute @ 4 Ton load (max)
Winch cable size	14 mm dia
Cable breaking capacity	Not less than 1.75 times winch pull capacity
Device for cleaning and lubrication	Cleaning and manual lubrication of rope
Swiveling search light	
Type	Detachable and swiveling type search lights (2 Nos) are provided, on top of Wrecker frame to cater for illumination up to 100 mtr. One more portable search light with 100 mtr cable is provided, interchangeable with Swiveling search light.
Transmission Assy	
Type	A suitable winch reversing transmission assy is provided for clock wise & anti clock wise simultaneously

Appendix 'D'

RECOMMENDED LUBRICANTS

S/No	Unit	Ambient Temp	IOC Grade
a)	Engine	- 15 ^{0}C & above	Servo Pride XL 15W 40
		- 30 ^{0}C & above	Servo Pride XL 10W 40
b)	Gear Box Synchromesh	- 15 ^{0}C & above	SAE 80W 140
		- 30 ^{0}C to + 30 ^{0}C	SAE 75W 90
		< 0 ^{0}C	Servo Gear HP 80W
		> 0 ^{0}C	Servo Gear HP 90 (T)
c)	Power Steering	--	Servo Trans Fluid 'A'
d)	Hydraulic Jack	--	Servo System 68
e)	Axles/Auxiliary Gear Box/Winch gear Box	< 4 ^{0}C	Servo Gear Super 80W 90
		> 4 ^{0}C	Servo Gear Super 85W 140
f)	Clutch Master Cylinder	--	Servo brake fluid super HD
g)	General Chassis Lubrication	--	Servo Grease MP (Servo Gem RR3 for Wheel Bearings)

Note: Do not mix two different types of oils

FILLING CAPACITIES

S/No	Unit	Capacity
a)	Engine	10.5 ltrs
b)	Cooling System	18.5 ltrs
c)	Gear box Main ZF S6 36	6.5 ltrs
d)	Auxiliary Gear Box	4.5 ltrs
e)	Front Axle	16 ltrs
f)	Rear Axle	16 ltrs
g)	Power Steering	4 ltrs
h)	Clutch Hydraulic System/Clutch reservoir	0.30 ltr/1.0 ltr
j)	Fuel tank – 02 Nos	160 ltrs each

TYRE PRESSURE CHART

Tyre size	Ply Rating	Position	Qty	Tyre Pressure	
				Laden 4.5 Ton	Laden 7.0 Ton
14.00 x 20	18	Front Axle	2	45 psi	20 psi
14.00 x 20	18	Rear Axle	2	113 psi	125 psi
14.00 x 20	18	Spare	1		