

DIRECTOR GENERAL BORDER ROADS
GENERAL MAINTENANCE INSTRUCTION NO. 249
ON OPERATION AND MAINTENANCE OF
REFUELLER 6 KL MAKE UICE

INTRODUCTION:-

(a) Refueller 6KL capacity make UICE fabricated/built on Swaraj Mazda Super 12 TC-III chassis fitted with SLT 3 (BS-III) 4 Cylinder, inline, turbocharged intercooled, direct injection, water cooled diesel engine developing 102 BHP at 3000 rpm, along with cabin and slow speed PTO suitable for installed Centrifugal Pump.

(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 Refueller 6KL capacity make UICE.

(c) To prolong the life of Refueller 6KL capacity make UICE, to prevent frequent break downs and to reduce maintenance cost, the periodic maintenance must be carried out according to the '**Periodic 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 Refueller 6KL capacity make UICE manufactured by M/s UIC Engineering Solutions 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 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) | Technical Specification | - Appendix 'B' |
| c) | Recommended Lubricants with Filling Capacity and oil change frequency/periodicity | - Appendix 'C' |
| d) | Periodic Maintenance schedule | - Appendix 'D' |

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OPERATING PROCEDURE**Refueller Side****Check & Precautions before starting the refuelling operation:**

1. Check the adequate quantity of fuel in the carrier tank.
2. Check the level of oil in pump gear box. Top up if necessary.
3. Check the lubrication of universal joint on propeller shaft.
4. Check the oil level of the engine and coolant in the radiator.
5. Ensure that the bottom valve is open before starting the main refueller pump.
6. Before carrying out refuelling operation at Veh/Eqpt/Plant/Aircraft, recirculation ATF @ 400 lpm and record the differential pressure in log book. Same procedure should be adopted next day and change the filter elements in following conditions:-
 - (a) If differential pressure is 15 psi or more.
 - (b) If differential pressure is less than the differential pressure recorded on previous day.

Safety Precautions:

1. Earth the refueller with copper earth plate and cable provided on rear wall of cabin. Place earth plate underneath the tyre to achieve the earthing contact with the apron of the road surface/air field. If the road surface/air field is soft, use the cable and spike provided on right mudguard.
2. Bond the refueller to the Veh/Eqpt/Plant/Aircraft. Pull gently the bonding cable from the bonding drum provided on left mudguard and take it to the Veh/Eqpt/Plant/Aircraft. Fix the crocodile clip attached to the bonding cable to the Veh/Eqpt/Plant/Aircraft.
3. The refueling nozzle has been provided with bonding pin. Bond the nozzle with the Veh/Eqpt/Plant/Aircraft before starting the refueling operation.

Refueller Operations:**Refuelling Veh/Eqpt/Plant/Aircraft with own pump from Carrier tank:**

1. Place the refueller near the Veh/Eqpt/Plant/Aircraft in a convenient position.
2. Earth the refueller with earthing plate and cable. The earthing plate is provided in a jacket on the rear wall of cabin.
3. Bond the Veh/Eqpt/Plant/Aircraft and the refueller with the bonding wire and a crocodile clip provided on the bonding reel at the left mudguard.
4. Pull the hose gently from the hose reel and attach the pressure coupling to the Veh/Eqpt/Plant/Aircraft tank. Bond the nozzle to the Veh/Eqpt/Plant/Aircraft tank with a bonding pin provided with the nozzle.

5. Open the tank bottom valve by pulling the lever provided near the bottom valve.
6. Push the defuelling handle on panel board to set the four way valve into refuelling position.
7. Open the three inch butterfly valve of hose reel.
8. See that the tank drain valve is in off position.
9. Start the engine of the prime mover.
10. First declutch and put the vehicle in neutral gear. Pull the pneumatic push pull switch provided at the dash board to switch ON the pump PTO. Slowly release the clutch pedal. Now the pump is in operation.
11. Press the button on the bulk meter counter to RESET the current batch.
12. Put the pneumatic valve lever in ON position to register air in PCV.
13. Adjust the reference air pressure for the PCV by air regulator provided on the control panel. It is recommended not to use pressure above 5 Kg/Cm².
14. Adjust the speed of the pump by throttle provided on the control panel. The speed of the pump can be seen on the rpm meter. The speed should be limited to 1000 rpm.
15. The quantity of fuel delivered in liters can be seen by pressing the BATCH button on the meter counter. The flow rate of fuel can be observed by pressing the flow button.
16. When refueling is complete, first decrease the pump rpm and then put hand lever pneumatic valve lever in OFF position so as to release air from PCV. The flow will stop.
17. Declutch the vehicle and push the pneumatic push pull switch in cabin stop the pump PTO. Release clutch pedal and switch OFF the engine.
18. Remove the bonding connection and rewind the hoses gently on the drums by press button provided on the hose reel.
19. Close the butterfly valve of hose reel and tank bottom valve. The operation is complete.

Refuelling Veh/Eqpt/Plant/Aircraft with own pump from external source and barrel:

1. Place the refueller near the Veh/Eqpt/Plant/Aircraft in a convenient position.
2. Earth the refueller with earthing plate and cable. The earthing plate is provided in a jacket on the rear wall of cabin.
3. Bond the Veh/Eqpt/Plant/Aircraft and the refuller with the bonding wire and a crocodile clip provided on the bonding reel at the left mudguard.
4. Pull the hose gently from the hose reel and attach the pressure coupling to the Veh/Eqpt/Plant/Aircraft tank. Bond the nozzle to the Veh/Eqpt/Plant/Aircraft tank with a bonding pin provided with the nozzle.
5. Tank bottom valve has to be put in closed position and suction hose to be connected at self loading pipe. The pump will suck the fuel from any external source and refuel in the same way.

6. For sucking the fuel from the external tanker the suction hose is to be connected to the self loading point of external tanker.
7. For sucking the fuel from the barrel the suction hose has to be connected to suction bend and suction tube is to be put in barrel.
8. Push the defuelling handle on panel board to set the four way valve into refuelling position.
9. Open the three inch butterfly valve of hose reel.
10. See that the tank drain valve is in off position.
11. Start the engine of the prime mover.
12. First declutch and put the vehicle in neutral gear. Pull the pneumatic push pull switch provided at the dash board to switch ON the pump PTO. Slowly release the clutch pedal. Now the pump is in operation.
13. Press the button on the bulk meter counter to RESET the current batch.
14. Put the pneumatic valve lever in ON position to register air in PCV.
15. Adjust the reference air pressure for the PCV by air regulator provided on the control panel. It is recommended not to use pressure above 5 Kg/Cm².
16. Adjust the speed of the pump by throttle provided on the control panel. The speed of the pump can be seen on the rpm meter. The speed should be limited to 1000 rpm.
17. The quantity of fuel delivered in liters can be seen by pressing the BATCH button on the meter counter. The flow rate of fuel can be observed by pressing the flow button.
18. When refueling is complete, first decrease the pump rpm and then put hand lever pneumatic valve lever in OFF position so as to release air from PCV. The flow will stop.
19. Declutch the vehicle and push the pneumatic push pull switch in cabin stop the pump PTO. Release clutch pedal and switch OFF the engine.
20. Remove the bonding connection and rewind the hoses gently on the drums by press button provided on the hose reel.
21. Close the butterfly valve of hose reel and tank bottom valve. The operation is complete.

Defuelling Veh/Eqpt/Plant/Aircraft:

1. Place the refueller near the Veh/Eqpt/Plant/Aircraft in a convenient position so that the Veh/Eqpt/Plant/Aircraft for is clearly visible.
2. Earth the refueller with earthing plate and cable. The earthing plate is provided in a jacket on the rear wall of cabin.
3. Bond the Veh/Eqpt/Plant/Aircraft and the refuller with the bonding wire and a crocodile clip provided on the bonding reel at the left mudguard.

4. Pull the hose gently from the hose reel and attach the pressure coupling to the Veh/Eqpt/Plant/Aircraft tank. Bond the nozzle to the Veh/Eqpt/Plant/Aircraft tank with a bonding pin provided with the nozzle.
5. Open the tank bottom valve by pulling the lever provided near the bottom valve.
6. Pull the defueling handle on panel board to set the four way valve in to defueling position and close the butterfly valve provided at the suction line of the pump.
7. Open the 3" butterfly valve of hose reel.
8. See that the tank drain valve is in off position.
9. Start the engine of the prime mover.
10. First declutch and put the vehicle in neutral gear. Pull the pneumatic push pull switch provided at the dash board to switch ON the pump PTO. Slowly release the clutch pedal. Now the pump is in operation.
11. Press the button on the bulk meter counter to RESET the current batch.
12. Put the pneumatic valve lever in ON position to the register air in PCV.
13. Adjust the reference air pressure for the PCV by air regulator provided on the control panel. It is recommended not to use pressure above 5 Kg/Cm².
14. Adjust the speed of the pump by throttle provided on the control panel. The speed of the pump can be seen on the rpm meter. The speed should be limited to 1000 rpm.
15. The quantity of fuel delivered in liters can be seen by pressing the BATCH button on the meter counter. The flow rate of fuel can be observed by pressing the flow button.
16. When defueling is complete, first decrease the pump rpm and then put hand lever pneumatic valve lever in OFF position so as to release air from PCV. The flow will stop
17. Declutch the vehicle and push the pneumatic push pull switch in cabin stop the pump PTO. Release clutch pedal and switch OFF the engine.
18. Remove the bonding connection and rewind the hoses gently on the drums by press button provided on the hose reel.
19. Close the butterfly valve of hose reel and tank bottom valve. The operation is complete.

Loading the tank of refueller:

While refueller is refueling, the tank can be loaded by connecting the external pressure coupling at the recirculation point.

Recirculating the product:

The product can be re-circulated in the system by connecting the pressure coupling at recirculation point and follow the same process as of refueling.

Operation of Differential pressure Gauge:

1. When refuelling process starts, the differential pressure Gauge is indicating the inlet pressure of filter monitor. Open the Ball valve given at the back of control panel. This will open the outlet connection of filter casing and the piston of the Gauge will move upwards and stabilize to show the differential pressure.
2. To check the free motion of the piston, close the Ball valve and drain the Gauge by pressing a push button given at the bottom of the Gauge. Again open the ball valve and piston will stabilize to show the differential pressure.

Vehicle Side

Air filter Choke indicator

1. The condition of the filter can be monitored with a vacuum gauge. The vacuum reading goes up as the filter reaches near to its service interval. A high vacuum reading means the filter is dirty and needs to be serviced. Advice to check the air filter if it is clogged, is conveniently called as **Air filter choke indicator**.
2. Choke indicator works on the principle of vacuum. When engine is in operation, it demands air for combustion. If the filter is clogged, then engine tries hard to draw the required air which creates vacuum between air filters and engine line. The created vacuum is sensed by the choke indicator. Once the vacuum level reaches the predefined level, the red band gets locked & remains in the locked condition even if engine is shut down, unless the choke indicator is re-set.
3. An important attribute of Choke indicator is its ability to re-set. Simply press there-set button and it will continue providing indication if filter is again choking. The service indicator can be re-set up to 100 times. It is recommended to replace the service indicator every 30000 km or 24 months whichever is earlier.

Do's

Vehicle side

1.	Reinstall oil level gauge fully before checking engine oil level.
2.	Specific gravity of electrolyte in the battery be kept 1.260 at charged rate of 100% or 1.210 at charged rate of 75%.
3.	Drive belt be replaced, if becomes worn, cracked or frayed.
4.	Drive belt deflection between 9-10 mm for new belt and between 10-11 mm for used/old belt be kept/adjusted.
5.	Check accelerator cable deflection. If accelerator cable deflection is not within specified range, adjust by turning accelerator cable lock nuts. Standard accelerator cable deflection: 1.0 to 3.0 mm.
6.	Check Injection starting pressure and it should be 260-270 kg/cm ² .
7.	Change Engine oil and filters regularly during service intervals.
8.	Change/Clean Air filter element at every service.
9.	Check for oil pressure at engine idling speed. The pressure should not drop beyond specified minimum pressure.
10.	Give idle running for 2 minutes after starting the engine.
11.	Run the engine for 2 minutes in idle condition before switching the engine off.
12.	Regularly check air, oil and exhaust connections for leaks and abnormal dust/oil/carbon deposit.

13.	Always blow compressed air from inside to outwards for cleaning paper filter element (air cleaner).
14.	Never hold filter with dirty hands nor place it on dusty, oily or wet surface.
15.	Never run the veh with chocked filter element or without filter element.
16.	Always use approved lubricants as recommended.

Refueller side

1.	At a time only one fuel to be filled in both compartments since both compartments are interconnected.
2.	Ensure that the bottom valve is open before starting the main refueller pump.
3.	In case of emergency the HAND LEVER VALVE at panel should be released immediately. This will close the PCV and fuel supply will be shut off.
4.	Check all the fire extinguishers are active according to the manufacturer recommendations.
5.	Check all the bonding connection of pipe lines are intact.
6.	Check frequently the electrical continuity of complete refueller along with hoses with a multimeter.
7.	Check leaking hardwares.
8.	Check the hoses for any leakages or any kinks.

Don'ts

Vehicle side

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.
4.	Do not run the engine with damaged, oil feed & drain pipes.
5.	Do not run with damaged/faulty connections, from air cleaner to turbocharger and from turbocharger to inlet manifold.
6.	Do not run with damaged/faulty connections to the turbocharger turbine inlet and from turbine outlet.
7.	Do not use the control valve for lifting the turbocharger.
8.	If the engine dose not fire at once allow starter motor to rest, before operating the starter again.
9.	Do not operate the starter motor when the engine is running to avoid damage to starter pinion and fly wheel ring gear.
10.	Do not open/repair the Turbo charger, contact authorized service centre.
11.	Do not mix two different types of lubricants.
12.	Never open the pressure cap when the Radiator is hot.

Refueller side

1.	Do not forget to check the condition of fire extinguishers and to carry out the established maintenance progrmme
2.	Do not use delivery hose having leakage, crinkles and frayed ends.
3.	Do not forget to lubricate trunions of pump.
4.	Do not use clogged strainer in refueling nozzle.
5.	Avoid using of Refueller with defective gauges fitted on control panel.

TECHNICAL SPECIFICATION

Description	Refueller 6 KL Make UICE
<u>Prime mover</u>	Refueller has been built on Swaraj Mazda Super 12 Chassis. Engine Swaraj mazda model SLT3 BS III, inline, 4 Cylinder Turbocharged intercooled, direct Injection water cooled diesel engine
Maximum power	102 bhp @ 3000 rpm
Displacement	3455 cc
Bore and Stroke	100 x 110 mm
Compression ratio	17:1
Compression Pressure	30 kg/cm ² at 290 rpm
Cylinder liner	Dry & Loose
Valve clearance (Cold Engine)	Intake – 0.30 mm, Exhaust – 0.35 mm
Valve system	Overhead valve
Idling speed	620-700 rpm
Fuel injection pump	Distributor type
Injection order	1-3-4-2
Lubricating oil pump type	Forced feed type lubrication system, Trochoid type/Gear type
Standard oil pressure	3.8 to 4.4 kg/cm ²
Oil filter	Full flow, Paper filter
Oil bypass filter	CANNISTER - Bypass, depth filter SOBP – Stagged disc (SOBP – Spin on bypass)
Water pump type and drive	Centrifugal type and drive belt
Thermostat type	Wax type, opening temperature 82 °C
Radiator cap valve opening pressure	0.75 kg/cm ²
Battery	12V x 120 AH qty 01 No
Alternator	12V, 55 A
Clutch	Dry single plate with diaphragm spring, hydraulically controlled
Transmission	5 forward, 1 reverse, synchromesh
Front axle	Heavy duty Reverse Elliot "I" beam section
Rear axle	Heavy duty full floating banjo type
Steering	Re-circulating ball type, manual
Suspension	Front – Heavy duty semi elliptical type multi leaf spring with hydraulic double acting telescopic shock absorbers Rear - Heavy duty semi elliptical type multi leaf spring with helper
Service Brakes	Full air dual circuit S-cam roller follower type
Parking Brake	Graduated hand control valve system actuating rear brakes
Exhaust Brake	Provided
Tyre Size	8.25 x 20 – 14 PR (Front) 8.25 x 20 – 16 PR (Rear)
No. of Tyres	07 Nos (including 01 No Spare Tyre)
Track	Front – 2022 mm, Rear – 1693 mm
Maximum speed	80 Km/hr
<u>Dimensions</u>	
Wheel Base	3940 mm
Ground Clearance	300 mm
Overall length	7220 mm
Overall width	2400 mm

Overall height	2460 mm
Weight (GVW)	11990 kg
Cabin	Non sleeper Driver cabin enclosed type with toughened safety glasses
<u>Refueller Side</u>	
Pump	Centrifugal pump make UICE model 75MM x 75 MM self-priming type having in-built gear box with gear ratio 4:1, Capacity 500 LPM at 90 PSI pressure, The suction size is 4" and discharge size is 3"
Carrier tank	6000 ltrs capacity (net) with 5% vapor/air space
Fixed type main hole	Comprising of pressure and vacuum valve, Dip pipe, fill pipe & Emergency vent
4" Emergency bottom valve	4" dia – Stainless steel qty 01 No fitted at the bottom of the tank at the front. The valve is operated by a lever and cable assy provided near the tank. Remote emergency stop has been provided at the panel to shut off the valve in case of emergency
1 Micron Filter Casing	Model 500 LPM/MS with flow rate 500 LPM, 1 Micron filter elements model Coalescer PI-3477 qty 04 Nos & Separator PI-3608 qty 03 Nos
Pressure controller	3" pressure control valve, Diaphragm type. The reference air pressure 3.5 Kg/Cm ² is put on top of Diaphragm and Venturi pressure below the Diaphragm. In case Venturi pressure remains below 3.5 Kg/Cm ² the valve will remain open and if Venturi pressure goes above 3.5 Kg/Cm ² it will close the valve automatically
Fuel Defuel valve	3" four way valve qty 01 No provided to control the direction of flow of fluid for refueling & defueling purpose. The refueling line is of 3" size and defueling line of 2" size
Bulk Meter/Flow Meter	Fuel flow meter fitted with Electronic counter qty 01 No Make Fluidyne and model Series 6600
Venturies	3" dia qty 01 No provided with a needle valve to precisely measure the final discharge pressure, made of Aluminium alloy and is die casted
Hose Reel	Single Catharine complete with Electric Motor Winding Mechanism, 01 No hose reel is provided to accommodate 01 No 50 mm dia 20 mtr long refueling hose
Refuelling Hoses	50 mm dia, 20 mtr long Reel hose qty 01 No for refueling as per IS-5797
Suction Hoses	65 mm dia, 3.00/3.50 mtr long Suction Hose qty 01 No
Underwing Coupling	3 lug underwing nozzle qty 01 No provided at delivery hose
Trigger Nozzle	1.5" bore spout suitable for fitting defueling tube qty 01 No
Ground unit	International standard 3 lug Adopter qty 01 No. To prevent leakage upon disconnect, this unit incorporates a spring loaded check valve (Poppet Valve)
Air Eliminator	Top mounted on the top of the filter monitor qty 01 No provided to prevent air from going in to the system alongwith fuel
Differential Pressure Gauge	Direct reading differential pressure Gauge model GTB-534PB qty 01 No. The inlet side of Filter monitor is connected at the top of the Gauge and outlet side is connected at the lower side. It is designed to measure the difference between two pressures. The Gauge protection filter element is also fitted to prevent any dirt from the glass vial

3" Butterfly Valves	Fitted at the hose point, circulation point, Suction & self loading point qty 04 Nos. These are slim seal butterfly valves of AUDCO make and are provided with flow control lever which requires only quarter turn to completely open or close the valve. The valve can be used for tight shut off or for regulating flow also
Sensing lines & Accessories	The stainless steel seamless sensing lines are provided to connect the various critical points in the system to their respective pressure gauges at the control panel. The other fittings like unions, T-joints, nuts and ferrules are machined from the bar stocks. The pipe lines for flow of air from the air tank of the veh to various operating valves and cylinders is also provided
Air line Accessories	<p><u>Air line filter:</u> One Air line filter is provided just after the air tank of the veh to avoid any impurity entering in to the sensitive valves and cylinders. The filter size is ¼" diameter</p> <p><u>Air Regulator:</u> One Air line regulator is provided at the Control panel to regulate the bias pressure of air in the pressure control valve. The air regulator size is ¼" diameter</p> <p><u>Control valves:</u> 01 No Hand lever valve of ¼" dia size at the Control panel for operation of pressure control valve and 01 no Push pull valve of size ¼" dia at dash board for PTO operation</p> <p><u>Pneumatic Cylinder:</u> 01 No Pneumatic cylinder is provided to control operation of PTO</p> <p><u>RPM Meter:</u> 01 No digital RPM meter to measure the RPM of pump is provided at the Control panel</p>
Miscellaneous Eqpt	<p>Refueller is provided with the following equipments:</p> <p>01 No Barrel Suction pipe with 2" diameter Ball valve for suction of fuel from barrels</p> <p>01 No defueling tubes made of Aluminum pipe which can be fitted with trigger nozzle</p> <p>01 No bonding reel with a Crocodile clip and bonding cable</p> <p>01 No earthing reel with a earthing spike and cable</p> <p>01 No earthing Copper plate and cable</p> <p>02 nos 10 kg DCP type Fire Extinguisher & 01 No 1 kg DCP type Fire extinguisher</p> <p>01 No underwing Nozzle</p> <p>01 No trigger nozzles with connecting adaptors and swing joints</p>

**RECOMMENDED LUBRICANTS WITH FILLING CAPACITY AND
OIL CHANGE FREQUENCY/PERIODICITY**

S/ No	Unit	Filling capacity	Grade of lubricant	Oil change frequency/periodicity
a)	Total oil capacity	With CANNISTER filter – 13.9 ltrs With SOBP filter – 8.5 ltrs	40 °C or above -SAE 40 0 °C to 40 °C - SAE 30 -10 °C to -25 °C-SAE 20W-20 -25 °C to -30 °C-SAE 10W-30 -30 °C or below-SAE 5W-30	First change at 5000 km and thereafter every 30000 km
b)	Oil Pan capacity	6.0 ltr		
c)	Oil bypass filter capacity	CANNISTER – 6.0 ltrs SOBP – 0.5 ltr		
d)	Oil filter capacity	1.0 ltr		
e)	Transmission oil	3.3 ltrs	18 °C or below -SAE 80W/SG HP80 -18 °C or above –SAE 90W/SG HP 90	First change at 5000 km and thereafter every 15000 km
f)	Transfer case oil	2.5 ltrs		
g)	Rear Axle oil	2.6 ltrs		
h)	Steering oil	Mazda - 0.860 ltr Rane - 1.2 ltrs Sona – 0.930 ltr	SAE 90, Servo Gear Super 90, SAE 80/90 EP-90 (Sona)	Replace after every 30000 km or once in a year
j)	Coolant capacity	12.5 ltrs		Replace after every 12 months
k)	Fuel tank	180 ltrs	-	
	<u>4WD</u>			
l)	Front Axle oil	2.6 ltrs	SAE 80W90	First change at 5000 km and thereafter every 15000 km
m)	Rear Axle oil	2.6 ltrs	SAE 85W140	
n)	Steering oil	2.0 ltrs	SAE 90, Servo Gear Super 90, SAE 80/90	Replace after every 30000 km or once in a year
o)	Main oil filter	-	-	First change at 5000 km and thereafter every 15000 km
p)	Oil bypass filter	-	-	First change at 5000 km and thereafter every 30000 km
q)	Fuel filter (close to Engine CAV/Micro filters)	-	-	After every 30000 km
r)	Fuel filter (close to Fuel tank)	-	-	After every 15000 km
s)	Air cleaner & Pre-cleaner (Oil bath type)	-	-	Clean after every 5000 km & Replace oil. Replace oil after 2000 km in case of dusty/sandy areas
t)	Air cleaner & Pre-cleaner (Dry type)	-	-	Clean after every 5000 km & Replace element after every 30000 km. Clean element after 2000 km in case of dusty/sandy areas
u)	Brake fluid	-	-	Replace after every 30000 km or once in a year

Note:

Do not mix two different types of oils

PERIODIC MAINTENANCE SCHEDULE**Refueller Side****Daily test and Checks:**

1. Check entire fuel dispensing system for leaks and take immediate steps to stop them
2. Check the air system for any leaks.
3. Check readings on differential pressure gauges of filter water separator. Differential pressure gauge shows pressure drop across filter elements. If the drop reaches 15 psi, it is a signal to clean/replace elements of filter as described in description of filter water separator.
4. Check condition of strainer in refueling nozzle. Remove it, clean it and refit it.
5. Check quality of fuel by drawing samples from all drain pipes.
6. Check carefully that all refueller components are in sound operating conditions.
7. Check the hoses for any kinks or leakages.
8. Check oil level in engine and coolant level in radiator.
9. Check battery connections.
10. Always take safety precautions as detailed.

Weekly Checks

1. Lubricants Hole reel bearings.
2. Lubricate universal joints on propeller shaft.
3. Check soundness of earthing cable reel, earthing cable, crocodile clip, copper plate and spikes.

Monthly Checks

1. Top up level of oil in pump gear box.
2. Lubricate trunions of pump.
3. Check that carrier tank manhole gaskets are tightened properly to prevent water entering the tank and loss of fuel due to evaporations.
4. Check PV valves and emergency vents are in proper condition.
5. Disassemble Air Eliminator and replace gaskets and other parts if necessary and reassemble.
6. Check that delivery hose is in sound condition and without crinkles and frayed ends. Check with multimeter the continuity of static wire embedded in the hose.
7. Check the flame-arrestor and Engine exhaust, disassemble, clean it and reassemble.
8. Check the condition of fire extinguishers and carry out the established maintenance programme.
9. Check epicoating of tank and filter casing.
10. Check all the gauges on control panel.
11. Check closing and opening time of PCV.

Yearly Checks

1. All the gauges fitted on the control panel should be calibrated yearly.

PERIODIC MAINTENANCE SCHEDULE

Vehicle Side

S/ No	Service Item	5000 km	15000 km	22000 km	30000 km	37000 km	45000 km	52000 km	60000 km	67000 km	75000 km	82000 km	90000 km
A	ENGINE												
1	Adjust Engine valve clearance (in cold condition)	*	*	*	*	*	*	*	*	*	*	*	*
2	Check and tighten Intake & Exhaust manifold nuts	*	*	*	*	*	*	*	*	*	*	*	*
3	Check and tighten Turbocharger mounting bolts & nuts	*	*	*	*	*	*	*	*	*	*	*	*
4	Check engine oil level and top up if required		*	*		*	*	*		*	*	*	
5	Change engine oil#	*			*				*				*
6	Change main oil filter#	*	*		*		*		*		*		*
7	Change oil bypass filter (SOBP)#	*			*				*				*
8	Coolant mixture Engine & Radiator	Replace after every 12 months											
9	Check fuel lines for leakages	*	*	*	*	*	*	*	*	*	*	*	*
10	Replace Fuel filter (close to Engine CAV/Micro filters)				*				*				*
11	Replace Fuel filter (close to fuel tank)		*		*		*		*		*		*
12	Sedimentor	Drain after every 1000 km											
13	Drain fuel tank		*	*	*	*		*	*	*	*	*	*
14	Clean fuel tank						*						*
15	Check injection timing	Inspect after every 30,000 km											
16	Check injection Nozzle (spray & pressure)	*			*				*				*
17	Air Cleaner & Pre cleaner (oil bath type)@	Clean after every 5000 km and replace oil											
18	Air Cleaner & Pre cleaner (dry type)@	Clean after every 5000 km & Replace element after every 30000 km											
19	Check & tighten Air intake hose clamps	*	*	*	*	*	*	*	*	*	*	*	*
20	Check & tighten Turbocharger and Inter cooler hose clamps	*	*	*	*	*	*	*	*	*	*	*	*
21	Check and adjust Drive belt tension	*	*	*	*	*	*	*	*	*	*	*	*
B	CLUTCH AND TRANSMISSION												
1	Check and adjust Clutch operation, Pedal travel & free play	*	*	*	*	*	*	*	*	*	*	*	*
2	Check clutch fluid and gear oil leaks and tighten	*	*	*	*	*	*	*	*	*	*	*	*
3	Check & tighten engine and gear box mounting bolts	*	*	*	*	*	*	*	*	*	*	*	*
4	Tighten propeller shaft flange bolts & nuts	*	*	*	*	*	*	*	*	*	*	*	*
5	Check gear box oil level and top up if necessary			*		*		*		*		*	
6	Replace gear box oil	*	*		*		*		*		*		*

S/ No	Service Item	5000 km	15000 km	22000 km	30000 km	37000 km	45000 km	52000 km	60000 km	67000 km	75000 km	82000 km	90000 km
C	STEERING												
1	Check Steering gear box operation and its linkage for play	*	*	*	*	*	*	*	*	*	*	*	*
2	Check king pin oil level and top up if required	*	*	*	*	*	*	*	*	*	*	*	*
3	Check steering gear box oil level and top up if required (Manual Steering)	*	*	*	*	*	*	*	*	*	*	*	*
4	Power Steering oil	Replace after every 30000 km or once in a year											
5	Check & Grease CV joint and King pin bearing (4WD)				*				*				*s
D	BRAKES												
1	Check Brake pedal operation, pedal travel & free play and tighten	*	*	*	*	*	*	*	*	*	*	*	*
2	Check Power unit Vacuum Booster for operation	*	*	*	*	*	*	*	*	*	*	*	*
3	Check operation of parking brake and tighten	*	*	*	*	*	*	*	*	*	*	*	*
4	Carry out Brake adjustment	*	*	*	*	*	*	*	*	*	*	*	*
5	Brake fluid\$	Replace after every 30000 km or once in a year											
E	AIR BRAKES												
1	Check Compressor, Air dryer, Quadruple system protection valve, Dual Brake valve, Brake chamber, Spring Brake actuator, Low pressure & stop light switch	*	*	*	*	*	*	*	*	*	*	*	*
2	Replace Air dryer								*				
3	Drain air Brake reservoirs	*	*	*	*	*	*	*	*	*	*	*	*
4	Grease and adjust Slack adjuster	*	*	*	*	*	*	*	*	*	*	*	*
5	Check Graduated Hand control valve		*		*		*		*		*		*
6	Grease wheel brake assy	*	*	*	*	*	*	*	*	*	*	*	*
7	Check and adjust Automatic load sensing valve	*	*	*	*	*	*	*	*	*	*	*	*
F	AXLES												
1	Check Wheel bearing play	*	*	*	*	*	*	*	*	*	*	*	*
2	Check wheel nuts torque and tighten	*	*	*	*	*	*	*	*	*	*	*	*
3	Tyre Rotation	Rotate after every 3200 km											
4	Check Rear axle shaft bolts	*	*	*	*	*	*	*	*	*	*	*	*
5	Check Rear axle oil level and top up if necessary			*		*		*		*		*	
6	Replace Rear axle oil	*	*		*		*		*		*		*
7	Check Front axle oil level and top up if necessary (4WD)			*		*		*		*		*	
8	Replace Front axle oil (4WD)	*	*		*		*		*		*		*
G	SUSPENSION												
1	Check and tighten 'U' Bolts on front & rear suspension	*	*	*	*	*	*	*	*	*	*	*	*

S/ No	Service Item	5000 km	15000 km	22000 km	30000 km	37000 km	45000 km	52000 km	60000 km	67000 km	75000 km	82000 km	90000 km
2	Check and tighten Spring shackle bushes, Bolts & Nuts	*	*	*	*	*	*	*	*	*	*	*	*
H	GENERAL												
1	Check and tighten all chassis bolts & nuts and torsion bar bushes	*	*	*	*	*	*	*	*	*	*	*	*
2	Grease steering linkages, propeller shaft universal joints	*	*	*	*	*	*	*	*	*	*	*	*
3	Grease Front and Rear wheel bearing	Replace at every 60000 km											
4	Battery Electrolyte and Specific Gravity	Check once in a month											
5	Check operation of exhaust brake	*	*	*	*	*	*	*	*	*	*	*	*
6	Check operation of all lights and switches	*	*	*	*	*	*	*	*	*	*	*	*

Note:

If the veh is operating under the following conditions, it is suggested that the engine oil and oil filters should be changed more frequently.

- a) Driving in dusty conditions
- b) Extended period of idling or low speed operation like A/c veh, city operation etc.
- c) Driving for a prolonged period in cold temperatures or driving short distances only.

@ If the veh is operating in very dusty or sandy areas replace air cleaner oil/clean dry air filter element after every 2000 km.

\$ If veh is operating under extreme humid/rainy areas, change brake fluid after every six months.