PHOOLTAS

PHOOLTAS TRANSRAIL LIMITED

RAIL BOUND MOBILE VEHICLE (8 - WHEELER)

MODEL : RBMV.02.B

G A U G E : 1676 mm

WORK SHOP MANUAL

REFERENCE NO. WSM/302B/3K23, REV.:-00

phooltas
phooltas
info@phooltas.org
www.phooltas.org

B.O: Plot No.- 1A, Sector-7,IIE, SIDCUL, Haridwar, Uttarakhand-249403 (INDIA)
H.O.: Layak Enclave (East), Sahay Nagar, Phulwari Sharif, Patna Bihar-801506 (INDIA)

INTRODUCTION

PHOOLTAS make Rail Bound Mobile Vehicle with MMU equipment (Model-RBMV.02.B) is a 8 Wheeler, twin power pack, self-propelled car. RBMV is idle vehicle for rail track civil maintenance work to run on B.G schedule of DFCC network. RBMV has been provided with hydraulic knuckle boom crane (Total 2 Nos) i e, one no. each end on RBMV. RBMV and its mounted cranes are suitable to load – unload rail maintenance material at required site from loading platform and attached BFRS which are usually used for shipping at track site construction and maintenance work. RBMV is equipped with multiple maintenance units (MMU) and various other necessary tools & spares which are used in emergency and routine maintenance-inspection of track. Therefore proper maintenance of RBMV is necessary to ensure the reliability and availability in emergency and for regular maintenance work of track. This Operation and Maintenance manual of 8 Wheeler RBMV has been prepared with the objective of making operating personnel aware to correct operation and maintenance techniques adopted in field.

This vehicle has been provided with two knuckle boom crane with load lifting capacity (1 ton at 15M reach), suitable storage rack, cubical, cupboards, pigeon box for MMU tools and spares track maintenance work. Vehicle has been equipped with A.C cabins for Crew and drivers which is an ideal vehicle for RBMV work.

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3. MAINTENANCE SCHEDULE

Objective: For upkeep of 8 wheelers all time availability in working conditions.

Back Ground: Rail Bound Maintenance Vehicle 8 Wheeler (RBMV.02.B) is twin power pack, self-propelled 4 axle vehicle to run on B.G schedule of DFCC network. This special maintenance instruction has been prepared to maintenance 8 wheelers so that its availability can be ensured all the time.

Following maintenance instructions to be followed for various components:

MAINTENANCE OF ENGINE

EVERY 3500 to 4000 HOURS OR 1 YEARS WHICHEVER IS EARLIER.

C-Check

S. No.	Maintenance Steps
1.	Repeat all maintenance steps of check A & B
2.	Check exhaust and inlet manifold and nuts.
3.	Tighten all mounting bolts and nuts.
4.	Clean Turbocharger diffuser and impeller.
5.	Check turbocharger bearing sound and vibration for normal working.
6.	Check engine mounting pad for any crack or ageing, Replace is required.
7.	Replace filter Assembly of lub. oil fuel oil and coolant.
8.	Clean fuel tank and suction strainer.
9.	Replace engine lubrication oil, engine coolant.

4. BRAKE AND PNEUMATIC LINE

Six Month check (Include all Monthly check schedule along with Six month schedule.)

- Check brake block thickness, replace and adjust brake clearance as required.
- Check pressure switch and all pneumatic safety switches for proper functioning adjust if required.
- Check gauges and indicator for proper functioning.

Yearly check (Include all Six month check schedule along with Yearly schedule.)

- Check rubber packing any leakage on panel brake, replace packing if required.
- Check all components on brake panel for proper functioning and no leakages from them.
- Check any damages of flexible hose / pipe for any external crack or damages, replace them.

Three Year / check (Include Yearly check schedule along with Three Year schedule.)

- Overhaul the safety switch.
- Clean the chokes, exhaust plugs, mesh filters in the distributor valves on panel brake control valve and check proper functioning of all sub-assemblies.
- Overhaul the drivers brake valve (SA9,A9). Replace all the rubber items and clean filters.
- Check for proper functioning of relay valves and replace the damaged / worn out components / valve Assembly
- Replace rubber / sealing washer of air brake hose end (B.P line) coupling.
- Check all the hose assemblies of brake system for damage or over ageing, replace if required.

3-1/2 to 4 Year I.O.H.

- Replace all the rubber items and choke in the brake system equipment's like safety valves, Auto Drain Valves Drivers Brake valve, Relay valve Tread brake Block units, Isolating cocks, Dust collectors, Angle cocks, filters etc.
- Check the Distributor Valve sub-assemblies and entire assembly for proper functioning, replace rubber items, chokes and springs only if required.
- Entire distributor valve does not need overhauling for 6 years.
- Replace all hose assemblies if not done so far.

Six Year P.O.H.

- Repair and maintenance of brake system including overhauling of Distributor valve.
- Brake Testing.

5. HYDRAULIC POWER PACK

(For radiator fan, creep traction, crane and elevating platform and A.C drive)

Six Month check (Include all Monthly check schedule along with Six month schedule.)

- Remove drain plug and drain hydraulic reservoir.
- Remove suction strainer and clean before refitting in reservoir.
- Though clean of hydraulic bottom dirt of reservoir inside before putting new oil.
- Replace new filter elements for proper hydraulic equipment working.
- Check leakage from fitting and tighten, if still leakage observe then replace fitting.

Yearly check (Include all Six month check schedule along with Yearly schedule.)

- Check pump and motor drive coupling for proper condition, replace if worn out or abnormal.
- Check control solenoid valve for proper function if sticky then remove and clean by air blowing, if still malfunctioning replace then.
- Check and reset pressure for normal operating range as per manual.
- Check for damage hose pipes, joints leakage, replace as required.

Three Year P.O.H. / check (Include Yearly check schedule along with Three Year schedule.)

- Externally clean all hydraulic components before removing from equipment.
- Check cylinder seal and cylinder condition, if required replace cylinder unit.
- Replace crack / damages and ageing pressure hoses if required.
- Replace suction strainer and filter element.
- Check electro hydraulic valve for any malfunctioning, replace them if earlier it has been not replace.
- Check pump and motors for proper working capacity pressure, shaft seal and drive shaft condition, if abnormal or wear out send them for reconditioning.

6. TRANSMISSION

Six Month check (Include all Three Monthly check schedule along with Six month schedule.)

- Check main transmission oil pressure for proper range.
- Check electro pneumatic valve and pneumatic air cylinder of transmission control for any leakage and proper functioning, rectify it.

Yearly check (Include all Six month check schedule along with Yearly schedule.)

- Clean transmission body, suction strainer, filter housing and oil sump thoroughly.
- Replace new transmission oil and filter element.
- Check main oil pressure and transmission oil temperature for proper range.
- Check any leakage from joint, pipe line and filter sealing, if any rectify it.

7. SUSPENSION / BOGIE

Six Month check (Include all Three Monthly check schedule along with Six month schedule.)

- Examine condition of side bearer wear piece and wear plate.
- Check and ensure proper axle guide Assembly clearances with gauge.

Yearly check (Include all Six month check schedule along with Yearly schedule.)

- Bogie frame should be checked thoroughly after cleaning for any possible cracks.
- Check for wheel flange gear in the rear cover box of roller bearing axle box.
- Check alignment of guide for proper range.

Three Year check (Include Yearly check schedule along with Three Year schedule.)

- Clean thoroughly bogie and suspension Assembly Remove bogie and it attached brake hose components for replacing worn out bushes, packing and damages components.
- Check and replace worn out bushes and pins of bogie hanger.
- Check and replace guide bushes and wear plates.
- Check spring free height and pairing for Assembly if required replace spring in the suspension unit.
- Check and adjust bogie bolster clearances in primary and secondary stage by adding required packing after every wheel profiling.

Packing below the spring in Bogie Assembly after re-profiling the wheel.

- After wheel wear (in diameter) a packing, has to be provided below the lower spring seat to raise the body. After providing packing stopper assembly and axle safety strap assembly is adjusted accordingly.
- Once the diameter of the wheel reduced as (fully worn), it is discarded and is replaced by new ones. Earlier added / packing below the spring sheet should be removed to maintain buffer height.

8. AXLE DRIVE GEAR BOX (ADGB) ASSEMBLY

Six Month check (Include all Three Monthly check schedule along with Six month schedule.)

- Through clean surface of ADGB and Aux. gear box.
- Replace ADGB oil and suction strainer with new.
- Check for any leakages from oil seal, packing or pipe line of ADGB, rectify it.

Yearly check (Include all Six month check schedule along with Yearly schedule.)

- Check and ensure drive flange and coupling fastener condition for proper functioning.

3-1/2 to 4 Year P.O.H. or 2,50,000 km. run. to 3,00000 km. run.

- This work should be carried out at authorized work shop. Remove final drive from 8 wheeler car, clean thoroughly ADGB and Auxiliary gear box surface and dismantle the Assembly and sub Assembly and inspect gear and bearing condition. The defective component, oil seal and packing should be replaced.

9. TORQUE ARM ASSEMBLY

Six Month check (Include all Three Monthly check schedule along with Six month schedule.)

- Spring disk to be checked physically. if found damage replace it.
- Pre- compression of spring disk to be maintained for the specified value by tightening the castle nut at one end of torque arm.
- Spherical joints and bushes are checked for wear.
- Check for proper tighten of lock nut and split pin.

Yearly check (Include Six month check schedule along with Yearly schedule.)

- Check rubber disc pad for any crack or ageing replace with new.

10. AXLE BOX ASSEMBLY

Yearly check (Include Three month check schedule along with Yearly schedule.)

- Replace new 'O' ring / packing.

11. WHEEL ASSEMBLY

Permissible variation in tread diameter during wheel machining :

- Wheels of the same axle 0.5 mm, Wheels of the same bogie 3.0 mm.

12. ULTRASONIC TESTING OF AXLE

a. To ensure safety and reliability of rolling stock, the axles should be examined periodically for detection of any fatigue cracks by ultrasonic test using ultrasonic flaw detector. Testing of axles should be carried out by trained and certified personnel only. Under no circumstances testing should be carried out by any other personnel not meeting the requirement.

b. **Frequency of ultrasonic test** First test to be carried out after use of 30 days and there after every year.

c. **Scanning technique**

- Far end scanning : This technique shall be used for testing the full length of the axle from both the ends.
- - Near end –low angle scanning : This technique is used for examination of fatigue cracks, if any, in the raised wheel seat inner fillet area, which remains unscanned during far end scanning.
- Trace delay technique : This technique should be used to examine the axle in part of 500 mm each. This technique may be employed for confirmation of the findings during far end scanning.
- High angle scanning : This technique may be employed for confirmation of the findings during near end low angle scanning.

d. **Preparation before test**

- Prior to ultrasonic testing, it should be insured that the axle end faces are smooth for achieving proper acoustic coupling. If required, the end faces of the axle should be properly smoothened by filing/emery finishing for achieving proper acoustic coupling.

- In low angle and high angle scanning, the onset of the signal in relation to the initial pulse is a function of the thickness of the Perspex wedge at the probe index marking and the velocity of the ultrasonic wave in the Perspex.

e. **Acceptance criteria**

- Axles found to produce signals as per the standard signals by far end and near end low angle scanning techniques should be declared satisfactory.
- Axle found to produce flaw signal other than those standard signals during scanning by far end and near end low angle scanning techniques shall be withdrawn from service.
- Further confirmation of the defect may be carried out by trace delay technique or high angle scanning technique as the case may be.

Note :- During service, few standard signals may disappear due to change in the geometrical configuration of axle. This aspect may be kept in view.

Recording of test observation

Personnel conducting the ultrasonic test shall maintain a register indicating the complete details of axle identification, technique used, observation made, code of procedure followed and his remarks. He should also record the observation on visual examination of the axle.

13. ELECTRICAL CHECK AND MAINTENANCE

Quarterly check (Include all Monthly check schedule along with Quarterly schedule.)

- Intensive air cleaning, rush preventing lubrication of electrical junction box terminal and proper tighten.
- Check function of all safety switches and sensor for proper working.

Six Month check (Include all Quarterly check schedule along with Six month schedule.)

- Clean and inspect contractor fingers, relay point for proper working.
- Check condition of electrical cable, replace worn frayed broken or corroded braided shunt.
- Check terminal connector and connection are properly tighten.
- Replace relay or contractor if worn out or pitted and malfunctioning.
- Check battery and terminal for clean and lubricate.

Yearly check (Include all six month check schedule along with Yearly schedule.)

- Check engine safety switches for proper working, if malfunctioning replace them.
- Check control panel switches for proper working, if malfunctioning replace them.
- Check battery voltage for proper working, check specific gravity top up if required.
- Apply petroleum jelly on battery terminal connection.

14. RECOMMENDED OIL AND LUBRICANTS

ENGINE (A.L N6)

Water coolant	-	240 Liter's. (twin radiator + coolant tank)
EURO COOL LL MAX 50		
Approx. quantity	-	30 liter's. x 2 = 60 Liter's
Oil multi grade 20 W/40	-	Indian oil/Bharat Petroleum/Hindustan
Petroleum / Equivalent.		

TRANSMISSION (AVTEC)

Approx. quantity	-	80 liter's. x 2 = 160 Liter's.
Transmission oil	-	Type C4 - SAE 30

AXLE DRIVE GEAR BOX

Hydrodynamic drive

Approx. quantity	-	2 x 45 liter's / box = 90 liter's
Gear oil	-	EP – 90

AXLE BOX

Grease	-	8 x 1.5 kg / Bearing (AP-3 Castrol)
Bogie dash port and side bearer housing	-	EP – 90 oil 0.5 x 8 = 4 Liter's.

HYD. OIL

Hyd. Oil	-	SAE 68, Qty.- As per equipment capacity.

15. MAINTENANCE OF BATTERY

Maintenance of battery can be divided into two schedules

Monthly Schedule

In addition to the weekly schedule following are also to be attended.

- Check specific gravity and voltage of all cells.
- Remove inter cell connections, take out the cells, clean thoroughly the cells, inter cell and end cell connections and fit back in the TW. Apply petroleum jelly.
- Check vent plugs. Provide ceramic vent plug if not provided. Tighten if necessary and replace if missing.
- Check the cells by cell tester. Replace defective cells.

Hydrometer Reading And Battery Condition

Hydrometer reading Correct at 27° C	Battery Condition
1.250 ± 0.005	Fully Charged
1.170 ± 0.005	75 % Charged
1.120 ± 0.005	50 % charged
1.100 or below	must be recharged

16. MAINTENANCE OF BRAKE VALVES

A-9 Automatic Brake Valve

The A-9 automatic brake valve is a compact self- lapping, pressure maintaining brake valve which is capable of graduating the application or release of OHE car air brakes. It has five positions, namely release, minimum reduction, full service, over reduction and emergency.

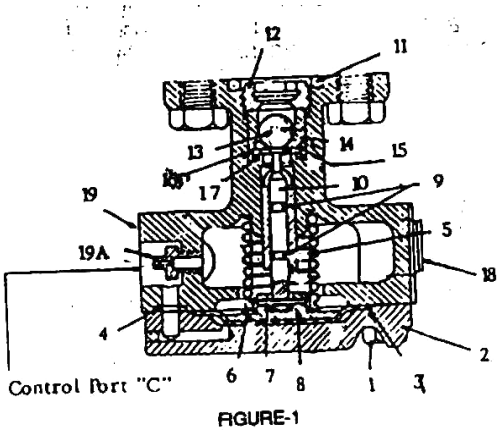


FIGURE-1

Maintenance Schedule

Monthly Schedule

- Check for leak tightness at inlet ,outlet and exhaust port on the pipe bracket.
- Check the operating handle movement ; it should be free of undue resistance.
- The pressure setting must be checked and reset, if necessary.
- Check the five position movement of the handle and the pressure in each position.
- Check the emergency position repeatedly for complete and instant operation.

Half yearly schedule

- The A-9 automatic brake valve should be dismantled from the OHE car cabin and overhauled as per procedure.

Yearly schedule

- Replace all rubber components, in addition to overhauling.

SA-9 Independent Brake Valve

- The SA-9 independent brake valve is a compact, self-lapping pressure maintaining straight air brake valve which performs the function of graduating the application or release of the OHE CAR air brakes.

Maintenance Schedule

Monthly Schedule

- Check the operating handle movement; it should be smooth and without any undue resistance.
- The pressure setting must be checked and reset, if necessary.
- Check the two position movement of the handle.
- Check for air pressure leakage in the valve.
- Half yearly schedule

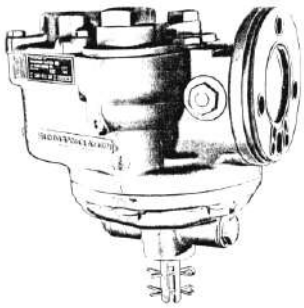
The SA-9 independent brake valve should be dismantled from the OHE CAR and overhauled as per procedure.

Yearly Schedule

- Replace all rubber components, if found damaged in addition to overhauling.

C3W Distributor Valve

The C3W distributor valve is a diaphragm operated, self-lapping valve that functions to supply and exhaust compressed air in proportion to the control air pressure in the signal port.



Maintenance Schedule

Monthly Schedule

- Test the sensitivity of the relay valve functioning for the changes in control, by checking the delivery pressure for different control pressures.
- Ensure that there is no leakage in the valve.

Half Yearly Schedule

- The C3W distributor valve should be dismantled from the OHE CAR and overhauled as per procedure

Yearly Schedule

- Replace all rubber components, if found damaged in addition to overhauling.

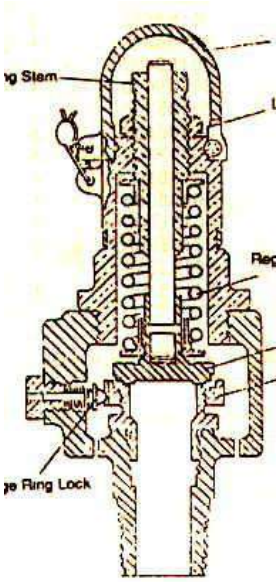
D-1 Auto Drain Valve

The D-1 automatic drain valve automatically discharges condensate and moisture from a reservoir with each opening cycle of the compressor control device.

Maintenance Schedule

Monthly Schedule

- No separate maintenance schedule is required to check the performance of the valve. However, the valve can be actuated manually by pressing the manual over-ride feature provided on the magnet valve for compressor governing pressure switch.



Half Yearly Schedule

- The D-1 auto drain valve should be dismantled from the OHE CAR and overhauled

Yearly Schedule

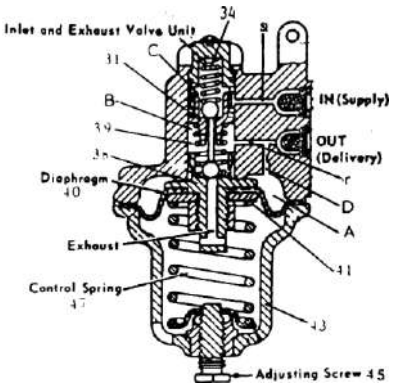
- Replace all rubber components, in addition to overhauling.

J-1 Safety Valve

The J-1 safety valve, when properly installed in the main reservoir piping, functions to prevent the excessive buildup of main reservoir pressure by venting the excess pressure to atmosphere as soon as the pressure reaches the predetermined setting.

Monthly Schedule

- Check the leakage in the safety valve.
- Check the set-up pressure and if necessary re- adjust the pressure setting.



Half Yearly Schedule

- The J-1 safety valve should be dismantled from the RBMV CAR and overhauled as per procedure.

Yearly Schedule

- Replace all rubber components, in addition to overhauling.

N-1 Reducing Valve

- The N-1 reducing valve is a small capacity, self-lapping diaphragm operated type regulating valve and functions to reduce an air supply pressure, to that of a lower delivery pressure.

Monthly Schedule

- There is no specific maintenance procedure called to ensure the proper functioning of this valve, other ensuring whether the maximum brake cylinder pressure limited to whatever level set on the N-1 reducing valve.

Half Yearly Schedule

- The N-1 reducing valve should be dismantled from OHE CAR and overhauled as per procedure

Yearly Schedule

- Replace all rubber components in addition overhauling.

Double Check Valve

It is a simple device with three port and very few components in the assembly. When two independent signal pressures are required to actuate the same control port of another device one a time, double check valve is used.

Maintenance schedule

Monthly schedule

- With the system fully charged, move the handle of SA-9 independent brake valve to minimum service position and allow the brake cylinder pressure to stabilize. Then make a full service application with the graduated hand control valve and observe that the brake cylinder pressure increase to whatever is allowed by the later. Release brakes at the graduated hand control valve fully. The brake cylinder pressure will drop down and again stabilize at the value corresponding to the pressure due to the minimum service position of the independent brake valve. Move the independent brake valve handle to release position and observe that the brake cylinder pressure reduces to zero completely.

Half yearly schedule

- The double check valve should be dismantled from the OHE car and overhauled as per procedure

Yearly schedule

- Replace all rubber components, in addition to overhauling.