



**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**MAINTENANCE SHEDULES
FOR
MULTIPURPOSE TRACK TAMPING MACHINE
(UNIMAT COMPACT -M)**



REPORT NO. TM-100

JUNE- 2006

**RESEARCH DESIGNS & STANDARDS ORGANISATION
LUCKNOW- 226 011.**

PREFACE

Maintenance of On-Track Machines is a challenging task. Maintenance of these machines is being done by zonal railways with the assistance of local trade available, zonal track machine workshops, CPOH / Allahabad and RDSO / Lucknow. With experience over the years, the railway engineers have developed adequate expertise in the maintenance of these machines. However, in absence of approved maintenance instructions, different maintenance practices have come into vogue. Therefore, it has become imperative to have a uniform maintenance standard throughout the Indian Railways. Provisional maintenance schedule manuals for Points and Crossings Changing Machine (T-28), Plasser Quick Relaying System (PQRS), Multipurpose Tamping Machine (MP), Track Relaying Train (TRT) and final maintenance schedule manuals of CSM (09-32), BCM (RM-80), FRM-80, Unimat, Duomatic machine (DUO), Unomatic machine (UNO), Ballast Regulating Machine (BRM 66-4), Tamping Express (09-3X), Dynamic Track Stabilizer (DGS 62N) and draft maintenance schedule of FRM-85-F have been issued by RDSO.

Provisional maintenance schedule manual of Multi purpose track tamping machine (Unimat Compact--M) was earlier issued vide letter no. TM/HM/15 dated 05-05-2003. Maintenance schedule manual of Multi purpose track tamping machine (MP) have been prepared after necessary amendment in provisional manual on the basis of experience and suggestions received from railways.

It is hoped that this manual will be quite useful for the staff maintaining the machines in field.

While every care have been taken to make the maintenance schedules quite exhaustive, there is always scope for further improvement. Suggestions from the railways in this regard will be welcome and may be sent to the undersigned.

(VIJAY SHARMA)
Executive Director/Track Machine
RDSO/Lucknow-226011.

JUNE -2006

EXPLANATORY NOTES

While preparing text of maintenance schedules for Multi purpose track tamping machine (Unimat Compact--M), the terms used and their meanings are explained below:

- CHECK - Ensure a specific condition does (or does not) exist.

- INSPECT - Look for damage and defects including breakage, distortion cracks, corrosion and wear, check for leaks, security and that all items are completed.

- CHANGE - Remove old parts by substituting a new or overhauled or reconditioned part. Fit new or overhauled / reconditioned part in place of missing part.

- OVERHAUL - Dismantle, examine, recondition or renew parts as necessary against given specifications, reassemble, inspect and test.

INDEX

S.NO.	DESCRIPTION	PAGE NO.
1.	Schedule I	1
2.	Schedule II	2
3.	Schedule III	3
4.	Schedule IV	4-5
5.	Schedule V	6
6.	Schedule VI	7-8
7.	Schedule VII	9-10
8.	Important instructions while operating the machine	11
9.	General Safety Notes	12
10.	Acknowledgement	13

SCHEDULE – I

(TO BE DONE DAILY) DURATION -- ONE HOUR

1. ENGINE

- i) Check level of lube oil.
- ii) Top up water in radiator.
- iii) Check the tension and condition of V-belts.
(Sag at center should be within 15 mm).
- iv) Check and prevent leakage from fuel pump, injectors, supply and return pipes.
- v) Check leakage of lube oil and prevent it if required.
- vi) Check the leakage from water hoses.
- vii) Check lube oil pressure.

	Rated	Actual
a) At idle RPM ---	1 to 2 kg/cm ²	
b) At rated RPM---	3 to 7 kg/cm ²	
c) On load at rated RPM ---	4 kg/cm ²	
- viii) Check air brake pressure (3.8 bar on lock position of brake valve)
- ix) Check fuel level and fill up the tank as per requirements.
- x) Check the battery charging gauge.
- xi) Record the maximum engine temperature of the day.
- xii) Clean the engine and premises.

2. GENERAL

- i) Check oil of level ZF gear box at 1200 RPM. Top up if required.
(For machine no. upto 2002)
- ii) Check oil level of axle gear boxes.
- iii) Check oil level of distribution gear box. (For machine no. upto 2002)
- iv) Check the tightness of cardan shaft bolts.
- v) Check the level of the air oiler and fill as per requirement.
- vi) Check air brake application.
- vii) Record the maximum hydraulic temperature of the day's work.
- viii) Drain the air reservoirs after day's work.
- ix) Check the complete machine for any unusual sound and rectify the problem before block working.
- x) Check the tank for lubrication of vibration shaft main bearing and top up.
- xi) Check and top up hydraulic oil in tank for tamping unit arm bearing.
- xii) Grease the pivot of tamping tool adjusting cylinder.
- xiii) Check and top up oil level of tank for lubrication of guide columns.
- xiv) Grease tamping unit sliding bushes.
- xv) Check the hydraulic hoses and prevent the leakage, if observed.
- xvi) Change the worn out tamping tools.
- xvii) Clean the tamping banks.
- xviii) Check all functions of the machine before block working.
- xix) Check the bolts of distributor of tamping unit

SCHEDULE – II

(TO BE DONE AFTER 50 HOURS OF ENGINE RUNNING) DURATION -- TWO HOURS

1. ENGINE

- i) Check outer air cleaner and clean it as necessary with pressurized air.
- ii) Replace the oil of air oiler with hyd. oil if found dirty otherwise top up.
- iii) Check water leakage from water hoses and water pump seal.
- iv) Drain water / sediments etc. from drain plug of HSD oil tank.
- v) Check electrolyte level and gravity of batteries.

2. GENERAL

- i) Check the oil level in pump drive gear box and top up if required.
- ii) Lubricate the bearing of rear feeler rollers by lube oil.
- iii) Lubricate the guide bushes of rear feeler rod by lube oil.
- iv) Lubricate the guide pulley of front tightening trolley by lube oil.
- v) Clean the chord displacement assembly and grease it.
- vi) Check the oil level of axle gear boxes and top up if required.
- vii) Check the oil level of drive intermediate shaft of powered bogie and top up if required. (For machine no. upto 2002)
- viii) Grease the axle gear box flange cover of powered bogie.
- ix) Lubricate the fixing hinges of tamping cylinders with grease.
- x) Clean and lubricate the guide plates of tamping cylinders with lube oil.
- xi) Lubricate the horizontal lifting hook guide of lifting and lining unit with grease.
- xii) Lubricate the bearing of lining rollers of lifting and lining unit with grease.
- xiii) Lubricate the vertical lifting hook guide of lifting and lining unit with grease.
- xiv) Lubricate the longitudinal guide of lifting and lining unit with grease.
- xv) Lubricate the feelers of front feeler with lube oil.
- xvi) Lubricate the guide bushing of front and middle feeler with lube oil.
- xvii) Lubricate the feeler rollers of middle feeler with lube oil.
- xviii) Clean and lubricate the guide rod of middle feeler with lube oil.

SCHEDULE -- III

(TO BE DONE AFTER 100 HOURS OF ENGINE RUNNING)

Duration – One Day

1. ENGINE

- i) Check whether the safety circuit of engine is functioning properly or not.
- ii) Check the battery connection and terminals and lubricate with grease .
- iii) Check the functioning of water separator.
- iv) Check the functioning of air unloader.

2. GENERAL

- i) Check the tension of leveling chord wire.
- ii) Check the condition of lining fork and replace if found damaged.
- iii) Check the condition of leveling and lining transducer chord wires and replace if found damaged.
- iv) Check the condition of brake shoes and replace if required.
- v) Adjust the gap between wheel and brake shoes.
- vi) Check the operation of limit switch for brake shoes.
- vii) Check the solenoid socket connections.
- viii) Clean the complete machine.

SCHEDULE – IV
(TO BE DONE AFTER 200 HOURS OF ENGINE RUNNING)
Duration – Two Days

1. ENGINE

- i) Replace the engine oil.
- ii) Replace the lube oil filter.
- iii) Replace the pre filter element.
- iv) Clean the screen filter element of fuel pump.
- v) Clean the radiator fins by blowing air from opposite side.
- vi) Check the radiator hoses and replace if found damaged.

Note: 1) Item no. (i), (ii) & (iii) will be done at 300 hrs of engine running and on dusty condition will be done at 200 hrs of engine running .

2. GENERAL

- i) Lubricate the of cardan shaft from engine to funk gear box with grease.
- ii) Lubricate the rocker bearing of preload cylinder of front tightening trolley with grease.
- iii) Lubricate the rocker bearing of lifting cylinder of front tightening trolley with grease.
- iv) Lubricate the rocker bearing of preload cylinder of rear tightening trolley with grease.
- v) Lubricate the cross bearing of cardan shaft between distributor and axle gear box with grease. (For machine No. upto 2002)
- vi) Replace the oil of axle gear boxes.
- vii) Replace the oil of drive intermediate shaft of powered bogie.
- viii) Lubricate the cross bearing of cardan shaft between axle 2 –axle 1 of powered bogie with grease.
- ix) Lubricate the brake linkage of powered bogie with grease.
- x) Lubricate the brake lever pivot with grease.
- xi) Lubricate the brake linkage of brake mechanism with lube oil.
- xii) Replace the hyd. oil of tank for vibration shaft main bearing.
- xiii) Lubricate the rocker bearing of pre load and lifting cylinder of middle feeler rod with oil.
- xiv) Replace the filter element for servo valve.
- xv) Replace the filter element for proportional valve.
- xvi) Check the filter indicator of return line filter and replace the filter on condition basis.

- xvii) Check the filter indicator of suction line filter and replace the filter on condition basis.
- xviii) Check the calibration of X-level.
- xix) Check the calibration of lining.
- xx) Check the calibration of tamping unit depth.
- xxi) Recondition the jaw of lifting unit hook.
- xxii) Clean the filter of servo valve for driving along with cleaning ports.
- xxiii) Change engine air cleaner element

Note: 1) Item no. (xviii), (xix), (xx), (xxi) & (xxiii) will be done at 500 hrs .of engine running.

SCHEDULE – V

(TO BE DONE AFTER 1000,3000 AND 5000 HOURS OF ENGINE RUNNING)
DURATION – SEVEN DAYS

1. ENGINE

- i) Overhaul the air compressor.
- ii) Clean the cooling coil.
- iii) Clean the crank case air breather.
- iv) Overhaul the self starter.
- v) Overhaul the alternator.
- vi) Check the bearing and shaft of radiator fan drive and change if required.
- vii) Check and adjust the engine timing.
- viii) Clean the HSD oil tank.
- viii) Check and adjust the tappet clearance.
- ix) Check and clean the air reservoir.
- x) Recharge the batteries.

2. GENERAL

- i) Replace the oil of pump drive gear box at engine.
- ii) Lubricate the king pin pivot of powered bogie with grease.
- iii) Replace the grease of hand brake gear.
- iv) Perform chemical testing of hyd, oil If found O.K then clean it with porta filter of 10 μ and reuse it.
- v) Check the bearing of all axles and grease them.
- vi) Check Maggie spring and replace if found damaged.
- vii) Check bearing of trolley wheels and grease them.
- viii) Inspect the chord wires of all transducers.
- ix) Clean the hydraulic tank.
- x) Check the condition and play of tamping units and replace/ overhaul ,if required.
- xi) Overhaul/ Replace the tamping units if required.
- xii) Overhaul/Replace the lifting units.

SCHEDULE VI
IOH
(TO BE DONE AFTER 2000 AND 4000 HOURS OF ENGINE RUNNING)
DURATION –45 DAYS

1. ENGINE

- i) Overhaul the engine, if required
- ii) Overhaul the injectors.
- iii) Overhaul the fuel injection pump.
- iv) Overhaul the air compressor.
- v) Overhaul the self starter.
- vi) Overhaul the alternator I & II.
- vii) Overhaul water pump.
- viii) Check the engine mounting pads.
- ix) Change water hoses.
- x) Check engine damper for dynamic balance.
- xi) Check the RPM of engine radiator fan. Take corrective measures if required.

2. HYDRAULIC

- i) Check the hydraulic pumps for rated delivery on the test bench and replace if it is less than the demand of circuit.
- ii) Check the hydraulic motors for rated torque and replace, if required.
- iii) Check the directional valves for leakage on the test bench, under rated pressure and replace, if required.
- iv) Replace the seals of all hydraulic cylinders along with gland bushes /piston and hone the cylinder barrel, if required.
- v) Replace all suction line, pressure line and return line filters.
- vi) Clean the hydraulic reservoir, paint with approved quality of paint and fill new oil.
- vii) Recharge the accumulators.
- viii) Overhaul all pressure controls and replace their kits, if required.
- ix) Clean the hydraulic oil cooler and repair, if required.
- x) Replace the hydraulic hoses on condition basis

2. PNEUMATIC

- i) Clean cooling coils.
- ii) Overhaul/ Replace air unloader.
- iii) Overhaul water separator and air oiler.
- iv) Change damaged and chocked pneumatic pipes if required.
- v) Overhaul all pneumatic valves and change the unserviceable valves.
- vi) Change the seals of all pneumatic cylinders on condition basis.
- vii) Change the seals of pneumatic brake cylinders.

4. MECHANICAL

- i) Overhaul the trollies and wheels of all the feeler rollers.
- ii) Strengthen the machine frame, where cracks have developed.
- iii) Check the wheels for tyre defects, reprofile or replace, if required.
- iv) Check all gear boxes and repair, if required.
- vi) Replace the brake shoes.
- vii) Paint the roof of machine.
- viii) Do patch painting where paint has pealed off or blistered and where welding work has been done.

5. ELECTRICAL

- i) Thoroughly clean all panel boxes.
- ii) Provide missing thimbles.
- iii) Replace defective switches and potentiometers.
- iv) Replace defective indicative instruments.
- v) Replace the batteries.
- vi) Overhaul the pendulums
- vii) Overhaul all transducers and replace the chord wires.
- viii) Replace the missing or defective light.
- ix) Calibrate the machine for zero setting in all respect.

6. GENERAL

- i) Check the function of all assemblies after IOH.
- ii) Calibrate the sensing equipments.
- iii) Test the machine for one week near the workshop, before it is put for work in regular section.

SCHEDULE – VII
POH
(TO BE DONE AFTER 6000 HOURS OF ENGINE RUNNING)
DURATION – 90 DAYS

1. ENGINE

- i) Overhaul /Replace the engine.
- ii) Overhaul the injectors.
- iii) Overhaul the fuel injection pump.
- iv) Overhaul the air compressor.
- v) Overhaul the self starter.
- vi) Overhaul the alternators.
- vii) Overhaul the radiator fan drive assembly.
- viii) Clean the engine radiator.
- ix) Replace the engine mounting pads.
- x) Replace the water hoses.
- xi) Overhaul the water pump.
- xii) Replace the engine air cleaner element.
- xiii) Replace all engine filters.
- xiv) Inspect the engine damper for dynamic balance.
- xv) Check the RPM of engine radiator fan.
- xvi) Clean the diesel tank.
- xvii) Check the engine safety circuit.

3. HYDRAULIC

- i) Replace all hydraulic pumps.
- ii) Replace all hydraulic motors.
- iii) Replace the hydraulic cylinders on condition basis.
- iv) Replace all hydraulic hoses.
- v) Replace all hydraulic filters.
- vi) Clean the hydraulic tank.
- vii) Replace the hydraulic oil in hydraulic tank.
- viii) Clean hydraulic oil cooler.
- ix) Check the hydraulic accumulator and recharge it.
- x) Replace the direct acting and pilot operated directional valve on condition basis.
- xi) Replace servo and proportional valve..
- xii) Replace all the pressure control valves on condition basis.
- xiii) Replace all the stop cock and flow control valves on condition basis.
- xiv) Flush the complete hydraulic system

3. PNEUMATIC

- i) Clean the cooling coil.
- ii) Replace air unloader.
- iii) Test air tanks for rated pressure.
- iv) Replace water separator and air oiler.
- v) Change all pneumatic hoses.
- vi) Change all pneumatic valves.
- vii) Change all pneumatic cylinders on condition basis.
- viii) Overhaul the brake cylinders.
- ix) Change all the brake shoes.

4. MECHANICAL

- i) Overhaul/Replace the tamping units.
- ii) Overhaul/ Replace the lifting units.
- iii) Overhaul the trollies, wheels & feeler rollers.
- iv) Strengthen machine frame where cracks have developed.
- v) Check the wheels for tyre defects, reprofile or change the assembly, if required.
- vi) Check the axle bearings and grease them. .
- vii) Axles may be replaced if the bearings are loose on the journal.
- viii) Complete machine to be painted as per approved paint scheme.
- ix) Overhaul the driving and idling bogies and replace the defective parts.

5. ELECTRICAL

- i) Replace the defective PCBs.
- ii) Replace the defective limit switches.
- iii) Calibrate all the indicative instruments.
- iv) Overhaul the pendulums.
- v) Overhaul all the transducers.
- vi) Conduct insulation test of main cables and replace the defective ones.
- vii) Overhaul the panel boxes.
- viii) Defective switches and indicative lights may be replaced.
- ix) Check the LED of all the solenoids.
- x) Check the calibration of digital potentiometers and replace the defective ones.
- xi) Calibrate the machine in all respect.
- xii) Test the machine for one week near the workshop, before it is put for work on regular section.

IMPORTANT INSTRUCTIONS WHILE OPERATING THE MACHINE

- i) The lower level of ZF gear box oil should be checked at 1200 engine RPM at 40°C.
- ii) The upper level of ZF gear box oil should be checked at 1200 engine RPM at 80°C.
- iii) Reverse gear shifting is recommended only in 1st and 2nd speed at reduced engine speed.
- iv) Engine speed must not be dropped below 1200 RPM during traveling due to lubrication of ZF gear box.
- v) Operating temperature of ZF gear box should be within 80 -110°C.
- vi) Oil capacity of pump drive gear box ----- 4.00 litre.
- vii) Capacity of axle gear box ----- 6.50 litre.
- viii) Replacement limit of brake shoes ----- 15 mm.
- ix) Minimum gap between wheel and brake shoe ----- 5 mm.
- x) Maximum stroke of brake cylinder at which limit switch will operate ---- 120mm.
- xi) Hydraulic cooler should be replaced at 20% blocking.
- xii) If the engine does not start after 10-15 seconds , release the starter switch to neutral and wait approximate for one minute.
- xiii) Before starting the engine a warning signal by operating the horn push button should be given.
- xiv) Do not use the machine for shunting purpose.
- xv) Driving speed of machine should be as per the condition of track.
- xvi) While cleaning the air cleaner, clean only outer element. Inner element should only be replaced.
- xvii) The air pressure for cleaning of outer element should not be exceed 60 PSI.
- xviii) Direct the compressed air from inside to outside.

GENERAL SAFETY NOTES.

1. The machine has to be operated according to existing Indian Railways Rules & Regulations.
2. The safety of yourself and other people is most important consideration in the operation and maintenance of the machine.
3. Remember, the machine is a working unit, carrying delicate instruments. Therefore, the machine should not be driven at excessive speed over bad track or crossing work.
4. Always keep your eyes open for other men working close to the machine.
5. Do not forget to look out for signals, switches and track obstructions.
6. Remember to make sure that all protection equipment and safety devices are in place on the machine and in working order especially when it is being driven from site to site.
7. Always keep the machine clean. Excessive oil or grease on the machine can cause you to slip and fall and is also a potential to fire hazard.
8. Always lock the machine before you leave. Make sure that the machine is protected in accordance with railway regulations.
9. Whenever you have the opportunity while waiting to get out on a job, do some of the smaller maintenance job, such as tightening loose nuts and bolts and cleaning the machine.
10. Do not permit unauthorized persons to operate the machine.
11. It is prohibited to use exposed light or fire on or near the machine.
12. When ever going out of the rear cab working on or near the tamping bank area, operate the emergency push button and ensure latching position.
13. Do not tow the machine if the final drive is engaged.
14. Inflammable or caustic chemical cleaners should not be used while cleaning the machine
15. Fire extinguishers should always be filled and checked periodically(according to the manufacturer's instruction)

ACKNOWLEDGEMENT

Following officers and staff have made their valuable contributions in finalization of the maintenance schedules for UNIMAT COMPACT-M.

RAILWAYS

- | | | |
|----|------------------|-------------------------|
| 1. | S/SRI A. K. JAIN | DY. CE (TMC) /CCG/ WR |
| 2. | S. K. GUPTA | PRINCIPAL/IRTMTC/NR/ALD |
| 3. | V.K. PASWAN | CHARGEMAN/MP-2007/ NER |
| 4. | M.S.BAGHAT | JE-II/NCR |
| 5. | N.P.SINGH | SSE/NR |

RDSO

- | | | |
|----|-------------------|-------------|
| 1. | S/SRI A.K. Pandey | DTM-V |
| 2. | H.C. Pandey | Dy.Dir./ TM |
| 3. | M.N.Siddiqui, | SE/TM |
| 4. | A.N. Srivastava, | SE//TM |
| 5. | Prem Kumar | SE//TM |