



भारत सरकार
रेल मंत्रालय

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

संतत् टैम्पिंग मशीन (09-32 सी0एस0एम) के लिए अनुरक्षण अनुसूची

**MAINTENANCE SCHEDULE
FOR CONTINUOUS TAMPING MACHINE**

(09-32 CSM)

रिपोर्ट संख्या टी.एम.-69
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PREFACE

Maintenance of On-Track Machine is a challenging task. Presently, about 345 On Track Machines are working over different zonal railways. 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 Crossing Tamping Machine (UNIMAT), Ballast Cleaning Machine (RM-80), Dynamic Track Stabilizer (DGS-62N), Shoulder Ballast Cleaning Machine (FRM-80), Ballast Regulating Machine (BRM), Points and Crossings Changing Machine, Plasser Quick Relaying System(PQRS), Multipurpose Tamping Machine (MP), Duomatic machine (DUO), Unomatic machine (UNO) and Track relaying train (TRT) have been issued by RDSO. Provisional maintenance schedule manual for Continuous tamping machine was earlier issued vide letter no. TM/HM/15 dated 14-11-95. Maintenance schedule manual of Continuous Tamping Machine (09-CSM) 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 has 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.

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EXPLANATORY NOTES

While preparing text of schedules for maintenance of CSM, 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 - Fit new or overhauled or reconditioned part in place of old parts and missing parts.
- OVERHAUL - Dismantle, examine, recondition or renew parts as necessary against given specifications, reassemble, inspect and test.

INDEX

S.N.	DESCRIPTION	PAGE NO.
1.	Schedule I	1-2
2.	Schedule II	3-4
3.	Schedule III	5
4.	Schedule IV	6-7
5.	Schedule V (IOH)	8
6.	Schedule VI (IOH)	9 -10
7.	Schedule VII (POH)	11-13
8.	Annexure -I	14
9.	Annexure –II	15-16
10.	Annexure –III	17
11.	Acknowledgement	18

SCHEDULE -I
(TO BE DONE DAILY)

1. ENGINE

- i) Check water level of radiator and top up, if required.
- ii) Check level of engine oil & top up, if required.
- iii) Check the belt tension and correct, if required.
- iv) Check fuel level & top up, if required.
- v) Check the leakage from engine hoses, water pump seal etc. and do the needful.
- vi) Check the leakage from fuel pump, injectors, fuel supply and return pipes and do needful.
- vii) Check oil level and leakage from compressor.
- viii) Check engine oil pressure on load after two hours working.
- ix) Record the maximum engine temperature of the days work.
- x) Clean the engine & premises.
- xi) Drain water from air receiver after day's work.
- xii) Check charging ammeter of batteries (it should be +ve).
- xiii) Check air filter indicator.

2. TAMPING UNITS

- i) Check & fill the reservoir for lubrication of tamping arm bearing (55 mm pin) up to the mark.
- ii) Check & fill the reservoir for lubrication of vibration shaft bearings up to the mark.
- iii) Check & top up the wick lubricator for lubrication of guide columns.
- iv) Greasing of connecting rod bearing (35mm pin) and vibration shaft bearing is to be done after every 2-3 hours of working.
- v) Clean the tamping banks.
- vi) Check tightness and infringement of tamping tools with one another.

3. GENERAL

- i) Check for any unusual sound from tamping units, gear boxes, engine & hydraulic pumps.
- ii) Check all spares & tools for emergency as per Annexure - I.

- iii) Check and top up hydraulic oil tank.
- iv) Record the maximum temperature of hydraulic fluid during the day's work.
- v) Check the bolts of carbon shafts and tighten if required.
- vi) Check the oil leakage from all gear boxes and do the needful.
- vii) Check locking device of lifting and lining unit..
- viii) Grease all lining roller pins.
- ix) Grease all guide rollers of satellite.
- x) Check locking device of satellite.
- xi) Check tightness of bolts of satellite axle support cylinder.
- xii) Check torque support of satellite.
- xiii) Apply lube oil on bush bearing.
- xiv) Check air brake pressure at locking position.
- xv) Check pneumatic system for any air leakage.
- xvi) Check the leakage from hydraulic hoses and do needful.
- xvii) Top up the air oiler.
- xviii) Drain the water separator.
- xix) Check all the functions of machine before block working.

SCHEDULE - II
(TO BE DONE AFTER 50 ENGINE HOURS)
DURATION – 2 HOURS

1. ENGINE

- i) Check the condition of V belt and do the needful.
- ii) Check battery terminal and connection for tightness.
- iii) Apply petroleum jelly on battery terminal.
- iv) Check injector pipes for any rubbing and do needful.
- v) Clean the water separator.
- vi) Check foundation and bracket bolts of compressor.

2. TAMPING UNIT

- i) Check tightness of shoe plate bolts of guide column.
- ii) Check squeezing cylinder cover plate bolts for tightness.
- iii) Check tamping unit cylinder holding bracket bolts for tightness.
- iv) Check the nuts of 55 mm and 35 mm pin for tightness.
- v) Check tamping unit locking device.

3. TRACK LIFTING & LINING UNIT

- i) Inspect clamp roller locking bracket bolts for tightness.
- ii) Examine the clamp roller for wear and free movement and do the needful.
- iii) Grease lining cylinder pivots.
- iv) Grease lifting unit guide columns.
- v) Grease rail clamp pivot pins.
- vi) Grease roller clamp housing.
- vii) Grease locking device pivots.
- viii) Lubricate the track lifting cylinder pivots with lube oil.
- ix) Lubricate the clamp carrier pivots with oil.

4. DRIVING AND IDLE BOGIE

- i) Grease king pin pivot of driving & idle bogies.
- ii) Grease axle gear box flange cover of driving bogie.
- iii) Grease torque arm pivots of driving bogie and satellite.
- iv) Grease link rods.
- v) Adjust the clearance of all brake shoes.
- vi) Check brake linkage and oil the pivots.

5. ELECTRICAL

- i) Clean alternator and check connections.
- ii) Check all limit switches.
- iii) Check gap between chord wire and carrier of lining transducer.
- iv) Clean the depth transducers for free movement of chord wire carrier.
- v) Check electrolyte level of batteries.
- vi) Check function of horns.

6. GENERAL

- i) Check oil level of all gear boxes and fill up-to the mark, if required.
- ii) Grease flange covers of gear boxes.
- iii) Check foundation bolts of brake cylinders.
- iv) Check levelling cord tensioning arrangement.
- v) Lubricate all ball & socket and pivot joints with oil.
- vi) Clean the complete machine.

SCHEDULE - III
(TO BE DONE AFTER 100 ENGINE HOURS)
(DURATION –ONE DAY)

1. ENGINE

- i) Check high water temperature safety device.
- ii) Check low lube oil pressure safety device.
- iii) Check the throttle control linkages.
- iv) Examine the mounting bolts of engine.
- v) Grease radiator fan drive.

2. GENERAL

- i) Grease all carbon shafts.
- ii) Check universal joints for play and replace, if required.
- iii) Grease all brake linkages.
- iv) Check all lights and do needful.
- v) Check the condition of brake shoes and change, if required.
- vi) Check feeler rollers of middle trolley for play.
- vii) Check clearance of lifting roller disc below the rail head in lowered condition.
- viii) Check guide rod of transducers for bends and tightness of bolts.
- ix) Check nuts & bolts of measuring devices for tightness.
- x) Check foundation bolts of brake cylinder.
- xi) Grease bogie turning pin.
- xii) Check the condition of brake shoes, replace if required.
- xiii) Check function of satellite axle support cylinder.
- xiv) Clean the water separator.

SCHEDULE - IV

**(TO BE DONE AFTER 200,400,600 AND 800 ENGINE HOURS)
(DURATION TWO DAYS)**

1. ENGINE

- i) Change engine oil.
- ii) Change lub oil filter.
- iii) Change pre filter element.
- iv) Change secondary filter element.
- v) Clean the centrifuge.
- vi) Check tappet clearance and adjust if required.
- vii) Clean cooling coil.
- viii) Clean crank case air breather.
- ix) Check and change radiator hoses, if required.
- x) Clean outer air cleaner element.
- xi) Check specific gravity of battery electrolyte.
- xii) Check coupling disc of injection pump.
- xiii) Clean the compressor breather.
- xiv) Check foundation bolts of compressor.
- xv) Change compressor filter.

Note : a) Item (i) to (v) have to be done after 125 engine hours
b) Item (xv) have to be done after 500 engine hours.

2. GENERAL

- i) Check air unloader for proper functioning.
- ii) Change return line filter element.
- iii) Change gear oil of hydraulic drive reduction gear box.
- iv) Change oil of satellite axle gear box.
- v) Change oil of intermediate drive shaft.
- vi) Change oil of axle gear boxes and funk gear box.

- vii) Inspect all carbon shafts for any crack.
- viii) Grease torque arm pivot.
- ix) Change oil of ZF gear box.
- x) Change proportional valve filter element.
- xi) Change servo valve filter element.
- xii) Check calibration of cross level.
- xiii) Check calibration of lining.
- xiv) Check calibration of tamping unit depth.
- xv) Grease hand brake gear.
- xvi) Change filter of axial piston pump.
- xvii) Change suction filters.
- xviii) Check all pressure controls for rated settings.
- xix) Change oil of distribution gear box.
- xx) Grease pendulum bridge pivots.
- xxi) Check height transducer carrier rod, for wear or damage.
- xxii) Check allen bolts of clapper bracket distance piece for tightness.
- xxiii) Check shock absorbers and do needful.
- xxiv) Check transducer fittings for measuring and lining trollies.

Note : Item (ix), (xvi) and(xvii) have to be done after 500 engine hours of engine running.

SCHEDULE - V

**(TO BE DONE AFTER 1000,3000 AND 5000 ENGINE HOURS)
(DURATION—7 DAYS)**

1. ENGINE

- i) Clean diesel tank with lint free cloth.
- ii) Replace all the water hoses
- iii) Check the RPM of engine radiator fan and do the needful.
- iv) Change the oil of air compressor.
- v) Overhaul air compressor, if required.
- vi) Overhaul self starter.
- vii) Overhaul alternator I & II.
- viii) Check engine timing.
- ix) Change batteries, if required
- x) Overhaul the injectors.
- xi) Overhaul the fuel injection pump.

2. GENERAL

- i) Clean hydraulic oil through 10 micron porta filter.
- ii) Send sample of hydraulic oil for physical & chemical test.
- iii) Check bearings of all axles and grease them.
- iv) Check meggy springs and replace, if required.
- v) Check bearings of trolley wheel and grease them.
- vi) Clean the air reservoir.
- vii) Check wires of all transducers and do needful.
- viii) Overhaul/replace tamping unit, if required.
- ix) Overhaul the air unloader.
- x) Clean the hydraulic reservoir and fill laboratory tested/new oil as required.
- xi) Change the brake shoes.
- xii) Calibrate the sensing equipments.
- xiii) Overhaul/ replace the lifting unit, if required.

SCHEDULE - VI (IOH)

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

1. ENGINE

- i) Top overhaul the engine.
- ii) Check bearing and shaft of radiator fan drive and do needful.
- iii) Clean the engine radiator.
- iv) Change the engine mounting pads.
- v) Overhaul water pump.

2. HYDRAULIC

- i) Check the hydraulic pumps for proper function and do the needful.
- ii) Check the hydraulic motors for proper function and do the needful.
- iii) Check the D.C. valves for leakage and do needful.
- iv) Replace the seals of all hydraulic cylinders along with gland bushes /piston.

3. HOSES

- i) Replace the hydraulic hoses which are damaged by external abrasion.
- ii) Provide the missing clamps.

4. PNEUMATIC

- i) Overhaul water separator and air oiler.
- ii) Change pneumatic pipes leading to brake cylinders.
- iii) Overhaul all pneumatic valves and change the unserviceable ones.
- iv) Change the seals of all pneumatic cylinders.
- v) Change the seals of brake cylinders.

5. MECHANICAL

- i) Strengthen the machine frame, where cracks have developed.
- ii) Check the wheels for tyre defects, reprofile or replace, if required.
- iii) Check the shock absorbers.
- iv) Do patch painting where paint has peeled off or blistered and where welding work has been done.
- v) Replace the missing and defective hand tools.

6. GENERAL

- i) Thoroughly clean all panel boxes.
- ii) Provide missing thimbles.
- iii) Replace defective switches and potentiometers.
- iv) Check the function of all assemblies after IOH.
- v) 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 ENGINE HOURS)

1. ENGINE

- i) Top overhaul or replace the engine on condition basis.
- 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 the radiator fan drive assembly.
- viii) Clean the engine radiator.
- ix) Change engine mounting pads.
- x) Change water hoses.
- xi) Overhaul water pump.
- xii) Change engine air cleaner elements.
- xiii) Change all engine filters along with lube oil.
- xiv) Check engine damper for any damage.
- xv) Check the RPM of engine radiator fan, if less than the rated RPM, take corrective measures.
- xvi) Clean diesel tank.

2. HYDRAULIC

- i) Change all hydraulic pumps and motors.
- ii) Overhaul/Replace all hydraulic cylinders.
- iii) Replace all hydraulic hoses.
- iv) Clean the hydraulic tank, inside to be painted with approved quality of paint.
- v) Fill new oil after replacing return line and suction filters.
- vi) Replace all pressure filters, proportional valve and servo valve filters.
- vii) Clean hydraulic oil cooler.
- viii) Check the hydraulic accumulators and recharge, if required.

- ix) Change all the direct acting and pilot operated D.C. valves.
- x) Proportional valves and servo valves may be got calibrated.
- xi) Change all the pressure control valves.
- xii) Replace all the stop cocks and flow control valves.
- xiii) Flush the complete system.
- xiv) Overhaul all pressure controls and replace their kits, if required.

3. PNEUMATIC

- i) Clean/Replace 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.
- viii) Change brake cylinders seal.

4. MECHANICAL

- i) Overhaul/Replace 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 replace.
- vi) Check the axle bearings and grease them.
- vii) Overhaul all the gear boxes except ZF gear box.
- viii) Overhaul the X-bearing of all propellor shaft or replace if required.
- ix) Replace the shaft coupling and holding nuts & bolts.
- x) Overhaul the driving and idle bogies and replace the defective parts.
- xi) Check the satellite rollers or replace them, if required.
- xii) Complete machine may be painted with approved paint.

- xiii) Check the bogie coil springs and replace, if broken.
- xiv) Change all the brake shoes.

5. ELECTRICAL

- i) Repair or replace the defective PCBs.
- ii) Replace the limit switches.
- iii) Replace defective indicative instruments.
- iv) Overhaul the pendulums.
- v) Overhaul all the transducers.
- vi) Get 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 for lifting and alignment.
- xii) Replace the missing or defective lights.

Annexure - I**List of Safety Equipments**

S.No.	Description	Quantity
1.	Detonators	1 box
2.	H.S. flag red	2 nos.
3.	H.S. flag green	1 nos.
4.	H.S. Tri colour lamps	2 nos.
5.	Chain & Pad lock	1 set
6.	25 t jack with traverser	1 no.
7.	Crow bars	4 nos.
8.	Beaters	4 nos.
9.	Wooden blocks off sizes	8 nos.
10.	Rail thermometer (dial type)	1 no.
11.	Banner flag	2 nos.
12.	Portable Control Phone	1 no
13.	First Aid Box	1 no
14.	Skid	4 nos.
15.	Walkie-Talkie set	1 no.

Annexure – II

LIST OF SPARES & TOOLS TO BE KEPT IN MACHINE'S STORE

S. No.	Description	Qty.
A	GENERAL	
1.	Seal set for small squeezing cylinder	2 sets
2.	Big squeezing cylinder seal sets	2 sets
3.	Tamping Unit Up & Dn Hydraulic cylinder seal sets	2 sets
4.	Piston locking screw for small squeezing cylinder	2 nos.
5.	Piston locking screw for big squeezing cylinder	2 nos.
6.	35 mm pin	2 nos.
7.	Clapper cylinder pin	1 set
8.	Clapper bracket	2 nos.
9.	Tamping tools	1 set
10.	Tamping tool bolts	8 nos.
11.	Tamping tool cap	8 nos.
12.	Locating screw	8 nos.
13.	Clamp roller	2 nos.
14.	Tamping depth transducer cord	7 M
15.	Versine transducer cord	7 M
16.	Cord wire 2 mm	40 M
17.	Carrier tamping depth transducer	2 nos
18.	Versine transducer carrier	2 nos.
19.	Seal set for all hydraulic cylinder	1 set each
20.	Proportional filter	1 nos.
21.	Servo valve filter	2 nos.
22.	ZF in line filter	1 no.
23.	Variable out put pump filter	2 nos.
24.	Primary fuel filter	1 no.
25.	Secondary fuel filter	1 no.
26.	Return line hydraulic filter	2 nos.
27.	Lub oil filter	2 nos.
28.	Air cleaner filter element (outer & inner)	1 set
29.	Fuel pressure hoses (injector pipes)	1 set
30.	Radiator hoses	1 set
31.	Set of copper washer	1 set
32.	Cardon shaft engine to funk gear box	1 no.

S. No.	Description	Qty.
33.	Gland bush for small squeezing cylinder	2 nos.
34.	Piston for small squeezing cylinder	2 nos.
35.	Piston rings for small squeezing cylinder	1 set
36.	Grub screw	10 nos.
37.	Gland Bush for big squeezing cylinder	2 nos.
38.	Piston for big squeezing cylinder	2 nos.
B.	Hydraulic hoses	
39.	2781-4 (with spare fittings)	5 m
40.	2781-6 (with spare fittings)	5 m
41.	2781-8 (with spare fittings)	5 m
42.	2781-10 (with crimped fittings)	5 m
43.	2781-12 (with crimped fittings)	5 m
44.	2781-16 (with crimped fittings)	5 m
45.	2781-20 (with crimped fittings)	5 m
46.	503-24 (with spare fittings)	5 m
47.	Pn hose 12.5MM	15 m
48.	Pn hose 6.3MM	10 m
C.	Electrical	
49.	Relay ELT-663	2 nos.
50.	Relay 7002/S4	2 nos.
51.	Fuses 4A	4 nos.
52.	PCB EK 813	1 no
53.	Head light and working light bulb	2 nos.
54.	Thimbles off sizes	20 nos.
55.	Distilled water	4 lit.
D.	Tools	
56.	Standard tools provided on the machine	One set
57.	Special socket spanner with lever for opening of piston locking screw	One no
58.	Digital multimeter	1 no.
E.	Special tools	
59.	Gauge-cum-level	1 no.
60.	Jack 50 t (Mech.) with traversing base	1 no.
61.	Jack 5 t with foot lifting arrangement	1 no.
62.	Turfer 2 t capacity	1 no.

Annexure -- III

IMPORTANT

- i) Nal cool 2000 to be added in radiator water @ 500 ml for every 15 litre of water.
- ii) API CF-4 15W40 lube oil to be used in engine.
- iii) Engine oil pressure should be minimum 1.5 kg/sq.cm at idle & 2.5 kg/sq.cm on load at rated RPM after two hours working.
- iv) Gear oil for all gear boxes except ZF gear box will be SAE -90.
- v) Maximum 20% wear on area basis is permitted for changing the worn out tamping tools.
- vi) Air brake pressure should be Min. 4 bar at lock position.
- vii) Clearance of lifting roller disc below the rail head will be 5 mm for rear and 12 mm for front in lowered condition.
- viii) Adjust the brake shoe clearance between 3 to 5 mm.
- ix) Brake shoes will be changed when minimum thickness at any point will become 13 mm or less.
- x) Gap of carrier of lining transducer should be 0.1 mm more than the dia of chord wire.
- xi) RPM of engine radiator fan should not be less than 1600 for proper cooling.
- xii) The length of the hoses between clamps or adopter should be 4% more than required to provide allowance for shortening of hose under pressure.
- xiii) Radiator may be replaced if it is blocked more than 20% during service or badly leaking and not economical to repair.
- xiv) A diesel driven porta filter (10 micron) may be installed on the machine. This will have a small 7.5 HP engine, porta filter and one 5 GPM pump with relief valve. Through this power pack, emergency backup system should also be provided on the machine.
- xv) Tension of V-belt will be checked at center of belt and it should not be more than 15mm.
- xvi) API CF-4 15W40 lube oil will be used in ZF-gear box.
- xvii) Complete set of tamping tools should be changed at a time instead of replacement of individual worn out tools as far as possible to obtain better quality of packing.
- xviii) Hydraulic oil should be sent for physical and chemical test after every 1000hrs.

ACKNOWLEDGEMENT

Following officers and staff have made their valuable contributions in finalization of the maintenance schedule manual of continuous tamping machine (CSM 09-32).

RAILWAYS

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