



**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**MAINTENANCE SCHEDULE MANUAL
FOR
TAMPING EXPRESS MACHINE
(09-3X)**

Report No.TM-85

MAY- 2005

**RESEARCH DESIGNS & STANDARDS ORGANISATION
LUCKNOW-226011**

PREFACE

Maintenance of On-Track Machine is a challenging task. Presently, about 418 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 Dynamic Track Stabilizer (DGS-62N), Ballast Regulating Machine (BRM), Points and Crossings Changing Machine (T-28), Plasser Quick Relaying System (PQRS), Multipurpose Tamping Machine (MP), Track relaying train (TRT) and final maintenance schedule manual of CSM (09-32), BCM(RM-80),FRM-80,Unimat, Duomatic machine (DUO) and Unomatic machine (UNO) have been issued by RDSO. The preparation of Maintenance Schedule Manual of Tamping Express (09-3X) is also an effort in same direction.

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 Maintenance Schedule Manual of Tamping Express (09-3X), 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.

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SCHEDULE – I
(TO BE DONE DAILY)
DURATION –ONE HOUR

1. ENGINES:

- i) Check the engine oil level for both engines and top up if required.
- ii) Check coolant level in radiator for both engines.
- iii) Check and prevent the water leaks, if any.
- iv) Check the air cleaner vacuum indicator for both engines If indicator is red, the outer filter is to be cleaned.
- v) Check the tension of V-belts and correct it, if required for both engines.
- vi) Drain the air tanks after the day's work.
- vii) Drain the water separator before starting the engine.
- viii) Record the maximum engine temperature of the day's work.
- ix) Clean the engine and premises.
- x) Check fuel level in Diesel tank.
- xi) Check oil pressure of both the engines on load after two hours working.
- xii) Check the oil leakage from fuel line.
- xiii) Check the oil pressure at idle RPM.

2. MACHINE GENERAL:

- i) Check level of hydraulic oil in tank.
- ii) Check and top up reservoir of tamping arm bearing.
- iii) Check and top up the oil reservoir for lubrication of tamping arm (55mm pin) bearing of all units.
- iv) Change the worn out tamping tools.
- v) Check the tightness and infringement of tamping tools with one another.
- vi) Check up locking device.
- vii) Check and prevent leakage from hydraulic hose and connections, If any.
- viii) Top up the air oiler with hydraulic oil.
- ix) Check and prevent the air leakage from the pneumatic system, if any.
- x) Check the air brake pressure and adjust if required.
- xi) Check for any unusual sound from machine.
- xii) Record the maximum hydraulic temperature of the day's work
- xiii) Observe the leakage from all gear boxes and prevent if noticed.
- xiv) Check the grease in central lubrication box and do needful.
- xv) Test the brake operation.
- xvi) Check the function of central lubrication system of Tamping Units.
- xvii) Check the leakage of all grease pipes of Tamping Units.
- xviii) Check the indication of choking of central lubrication system.
- xix) Check head light, flasher light and pneumatic horn.
- xx) Test all the function of machine in siding before block.
- xxi) Inspect the bolts of cordon shaft for tightness.

SCHEDULE - II

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

1. ENGINES:

- i) Check the condition of V- belts.
- ii) Check the condition of brake shoes.
- iii) Check electrolyte level and Specific Gravity of batteries.
- iv) Clean the outer air filter element.
- v) Drain the water bowl of diesel tank.

2. MACHINE GENERAL:

- i) Check the oil level of all gear boxes and top up if required.
- ii) Lubricate all cordon shafts with grease.
- iii) Lubricate clamp pivot pins and lining rollers pins of lifting and lining unit with grease.
- iv) Lubricate guide bushing of front feeler with engine oil.
- v) Lubricate pendulums bridge pivots with engine oil.
- vi) Lubricate feeler rods of middle feeler with grease.
- vii) Lubricate guide bushing of rear feeler with engine oil.
- viii) Check guide rods of lining trolley.
- ix) Clean longitudinal sliding arm of satellite and lubricate with grease.
- x) Clean horizontal sliding arm of satellite and lubricate with grease.
- xi) Check all nuts and bolts of tamping units for tightness.
- xii) Lubricate the pins of lifting cylinders with lube oil.
- xiii) Check the clearances of brake shoes and adjust if required.
- xiv) Check the tightness of holding bracket bolts of tamping cylinder.
- xv) Lubricate all locking devices with oil.
- xvi) Check the clearances between lifting rollers and bottom of rail head.
- xvii) Grease the flange cover of satellite and driving axles.
- xviii) Check the tension of lining/ leveling chord wire and adjust it, if required.
- xix) Check the proper fixing of guide rods and fork of versine and height transducers.
- xx) Lubricate the satellite supports and guide rollers with grease
- xxi) Lubricate all the lining roller pins with grease.
- xxii) Apply lube oil on bush bearing of feeler rods of shadow board trolley and all balls socket pivot joints.
- xxiii) Check the condition of versine transducer fork and change if required.
- xxiv) Check and top up the oil in clutch of funk gear box.
- xxv) Check battery terminals for any damage and apply petroleum jelly.

SCHEDULE – III

**(TO BE DONE AFTER 100 HOURS OF ENGINE RUNNING)
DURATION- ONE DAY**

1. ENGINES:

- i) Check high water temperature safety device.
- ii) Check low lube oil pressure safety device.
- iii) Check the throttle control linkage
- iv) Examine the mounting bolts of the engine.

2. MACHINE GENERAL:

- i) Check the operation of limit switches.
- ii) Check the hydraulic hoses for leakage and replace if required.
- iii) Inspect the hydraulic pumps for any abnormal sound.
- iv) Inspect the hydraulic motor for any abnormal sound.
- v) Inspect the water separator for proper functioning.
- vi) Lubricate the pin of tamping unit lateral adjusting cylinder with grease.
- vii) Grease all the air brake linkages.
- viii) Check the function of air dryer in pneumatic system.

SCHEDULE-IV

(TO BE DONE AFTER 200 HOURS OF ENGINE RUNNING) DURATION-TWO DAYS

1. ENGINES:

- i) Change the engine oil.
- ii) Change lube oil filter element.
- iii) Change fuel filter element.
- iv) Lubricate the bearings of all the engine pulleys with grease.
- v) Change super lube. oil by-pass filter element.
- vi) Clean crank case breather.
- vii) Clean the mesh of radiator by pressurized air.
- viii) Replace the outer and inner engine air cleaner element.

Note: Item no. (i),(ii) and(iii) will be done after 250 engine hours.
Item no. (viii) will be done after 500 engine hours.

2. MACHINE GENERAL:

- i) Lubricate the torque arm pivot of powered bogie with grease.
- ii) Lubricate the mounting pins of pre load cylinder of front and rear tightening, lining and measuring trolley with grease.
- iii) Lubricate the mounting pins of lifting cylinder of front and rear tightening lining and measuring trolley with grease.
- iv) Replace the servo filter element.
- v) Replace the proportional valve filter element.
- vi) Replace the filter element of power shift gear box.
- vii) Replace the return line filter.
- viii) Replace the suction filter of axial piston pump.
- ix) Replace the suction filter for pumps mounted on ZF.
- x) Replace the suction filter for pumps mounted on funk gear box.
- xi) Change the oil of hydraulic working drive reduction gear box.
- xii) Change the oil of axle gear boxes.
- xiii) Change the oil of drive intermediate shaft.
- xiv) Change the oil of distributor gear box.
- xv) Lubricate the pins of horizontal sliding cylinder of satellite with grease.

- xvi) Change oil of satellite axle gear box.
- xvii) Change oil of satellite axle reduction gear box.
- xviii) Change the oil of funk gear box.
- xix) Check the tightness of foundation bolts of brake cylinder.
- xx) Check the preload pressure of all trolleys and adjust if required.
- xxi) Lubricate the king pin pivot of driving, running and satellite bogie with grease.
- xxii) Change oil of power shift gear box.
- xxiii) Replace the filter screen of squeezing valve.
- xxiv) Change oil of clutch of funk gear box.
- xxv) Change oil of hydraulic working drive reduction gear box of powered bogie.
- xxvi) Clean all the axles and check for any crack.

- Note:**
- a) Item vi, vii and xxiii have to be done after 250 engine hours by engine-I
 - b) Item iv and v have to be done after 250 engine hours by engine-II.
 - c) Item ix, xii, xiii, xiv, xvii, xxii, xxiv and xxv have to be done after 500 engine hours by engine-I.
 - d) Item viii, x, xi, xiv, xviii have to be done after 500 engine hours by engine-II

SCHEDULE-V

**(TO BE DONE AFTER 1000, 3000 and 5000 HOURS OF ENGINE RUNNING)
DURATION- 7 DAYS**

1. ENGINES:

- i) Change worn out water hoses.
- ii) Overhaul the self starter.
- iii) Overhaul the alternators.
- iv) Overhaul the injectors.
- v) Overhaul the fuel injection pumps.
- vi) Replace the rocker cover gaskets.
- vii) Clean the engine radiator externally.
- viii) Clean the diesel tank.
- ix) Clean the cooling coil.
- x) Replace the batteries on condition basis.
- xi) Check the water pump pulley.
- xii) Check coolant for PH value.
- xiii) Change the filter cartridge of air dryer

2. MACHINE GENERAL:

- i) Send the sample of hydraulic oil for chemical testing.
- ii) Clean the hydraulic oil tank.
- iii) Clean the hydraulic oil through 10 μ filter and refill it if found O.K. in chemical testing, Otherwise renew the oil.
- iv) Check the bearings of all the axles and lubricate with grease.
- v) Check the condition of meggi springs and replace them if required.
- vi) Check bearing of trolley wheels and lubricate them with grease.
- vii) Clean the air reservoir.
- viii) Overhaul/ Replace the tamping units, if required.
- ix) Overhaul/Replace the lifting/lining unit, if required.
- x) Lubricate king pin pivot of powered bogie with grease.
- xi) Change grease of hand brake gear.
- xii) Change granulate cartridges of air dryer.
- xiii) Calibrate all pendulums if required.
- xiv) Overhaul all the transducer and replace chord wire.

**SCHEDULE-VI
(IOH)**

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

1. ENGINES:

- i) Top overhauls the engines, if required.
- ii) Overhaul the air compressor.
- iii) Replace all the water hoses.
- iv) Overhaul the water separator and air oiler.
- v) Overhaul the air unloader.

2. MACHINE GENERAL:

- i) Replace the seal of brake cylinders, if required.
- ii) Clean and repair the hydraulic oil cooler, if it is blocked more than 20%or badly leaking.
- iii) Check the hydraulic pumps for rated delivery and replace if required.
- iv) Inspect the hydraulic hoses and replace as required.
- v) Replace the damaged and chocked pneumatic pipes.
- vi) Overhaul all the pneumatic valves and change unserviceable ones.
- vii) Replace the seals of all pneumatic cylinders on condition basis.
- viii) Check the machine wheels for tyre defects, Reprofile or replace if, required.
- ix) Replace the defective switches and potentiometer.
- x) Check the high accumulator pressure.
- xi) Check all shock absorbers of wheel set suspension and repair/replace on condition basis.
- xii) Calibrate the machine on track for all functions.

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

1. ENGINES:

- i) Overhaul or replace the engine.
- ii) Overhaul the radiator fan drive assembly.
- iii) Replace the engine mounting pads.
- iv) Check the engine damper for dynamic balance.
- v) Replace the water separator and air oiler.
- vi) Replace the air unloader.
- vii) Check and clean the cooling coil.
- viii) Test the air tank for rated air pressure

2. MACHINE GENERAL:

- i) Replace all hydraulic pumps
- ii) Check and recharge the hydraulic accumulators.
- iii) Replace all the hydraulic motors.
- iv) Replace the hydraulic cylinders on condition basis otherwise replace all the seals.
- v) Replace all the D.C. and pilot operated valves.
- vi) Get calibrated the proportional and servo valves, if possible, Otherwise replace them with new ones.
- vii) Replace all pressure control valves.
- viii) Check the functioning of all stop cock and flow control valves, if anyone found defective then replace it with new one.
- ix) Replace all hydraulic hoses along with crimped fittings.
- x) Clean the hydraulic tank. Inside to be painted with approved quality paint.
- xi) Flush the complete hydraulic system.
- xii) Replace all pneumatic hoses.
- xiii) Replace all pneumatic valves.

- xiv) Replace the pneumatic cylinders on condition basis, which were creating the frequent trouble during work. Otherwise replace seals only.
- xv) Renew the complete wiring of the machine if existing wiring found more than 40% damaged otherwise replace only the damaged circuits.
- xvi) Check all gear boxes and repair/replace all worn out or defective components of gear box.
- xvii) Recondition the worn out wheels of all trolleys.
- xviii) Check king pin of bogie and repair/replace if required.
- xix) Replace the potentiometer of all transducer.
- xx) Overhaul the transducers.
- xxi) Replace all the SSB of lubrication system if required.
- xxii) Replace all proximity switches.
- xxiii) Replace the battery of ALC and laser lining.
- xxiv) Check all rubber springs of wheel set suspension and repair/replace on condition basis.

Annexure – I

LIST OF SPARES TO BE KEPT IN MACHINE'S STORE

S. No.	DESCRIPTION	PART No.	QUANTITY
A.	Tamping Unit		
1.	Seal kit	HZS.DS.401	02 Nos
2.	Screw	M16x35	04 Nos
3.	Washer	16MM	04 Nos
4.	Piston	2E35.303	01 No
5.	Thread pin	M6x18	02 Nos
6.	Grease nipple small		10 Nos
7.	Piston Screw	2E36.48	02 Nos
8.	Flap cylinder	2E34.1508	02 Nos
9.	Seal kit	HZ002.080.040	02 Nos
10.	Seal kit	HZ201.080	02 Nos
11.	Hex bolt	M16x50	04 Nos
12.	Washer	16MM	04 Nos
13.	Cylinder pin	20M6x4	02 Nos
14.	Hex socket head cap screw	M16x110	04 Nos
15.	Spring washer	16MM	10 Nos
16.	Hex nut	16MM	05 Nos
17.	Screw	M16x35	06 Nos
18.	Hex socket head cap	M8x25	02 Nos
19.	Nut	UD65.1177	01 No.
20.	Tamping tools		01 Set
21.	Seal kit	UD50.100DS	01 No.
22.	Hex socket head cap	M16x35	04 Nos
23.	Meggi spring	730273-MG650-54	04 Nos
24.	Seal kit	HZS-DS-243	02 Nos.
25.	Piston	2E36.457	01 No.
26.	Hex bolt	M20X1.5X80	50 Nos
27.	Washer	20mm	50 Nos
28.	Washer	UD19.209	25 Nos
29.	Washer	10mm	25 Nos
30.	Hex bolt	M10x30	15 Nos
31.	Hex bolt	M10x40	15 Nos
32.	Seal kit	UD50.200D5	01 No.

S. No.	DESCRIPTION	PART No.	QUANTITY
B. Torque support			
1.	Bolt	U61.104	02 Nos
2.	Castle nut	20mm	02 Nos
3.	Washer	21DIN125	02 Nos
4.	Universal joint	GE25DO	02 Nos
5.	Circular clip	142DIN472	02 Nos
C. Lifting and lining unit			
1.	Seal kit	HZ01.125	01 No.
2.	Seal kit	HZ01.100	01 No.
3.	Seal kit	HZ02.100	45 Nos
4.	Roller clamp	UD311.505	01 No.
D. Bogie			
1.	Seal kit for brake cylinder	HZ01.040	01 No.
2.	Seal kit for brake cylinder	HZ02.040.025	01 No.
3.	Angle joint	16mm	02 Nos
E. Versine transducer			
1.	Chord	EL-T576.08	7mts
2.	Carrier	EL-T67.00B	01 No.
3.	Potentiometer	EL-T595A	01 No.
4.	Cheese head screw	M4x30	04 Nos
5.	Rod	EL-T609.45	02 Nos
6.	Hex bolt	M5X20	04 Nos
F. Tamping Depth Transducer			
1.	Chord	EL-T576.1.35	7mts
2.	Potentiometer	EL-T500HQA	01 No.
G. Height Transducer			
1.	Potentiometer	EL-T595A	01 No.

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.	Wooden blocks off sizes	8 nos.
9.	Rail thermometer (Dial type)	1 no.
10.	Banner flag	2 nos.
11.	Portable Control Phone	1 no
12.	First Aid Box	1 no
13.	Skid	4 nos.
14.	Working Time Table	01no

Annexure - III

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.
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 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.

Annexure -- IV

IMPORTANT

- i) Premixed CAC will be used for topping up the radiator.
- 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 and 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.

Annexure -V

Consumables To Be Used

S.N.	Section	Lubricant	Grade	Frequency
1.	Engine Crank Case	Lube oil	APICF4-15W40	300 Hrs
2.	Axle gear boxes	Hydraulic oil	HLP-68	500Hrs
3.	Main gear boxes	Hydraulic oil	15W40	250Hrs
4.	Funk gear box	Lube oil	APICF4-15W40	200 Hrs
5.	Clutch for funk gear box	Lube oil	APICF4-15W40	500 Hrs
6.	Distributor gear box	Gear oil	SAE-90	500Hrs
7.	Hydraulic working drive reduction gear box	Gear oil	SAE-90	500Hrs
8.	Hydraulic working drive reduction gear box of powered bogie	Gear oil	SAE-90	500Hrs
9.	Lubrication of tamping units	Hyd. Oil and grease	SAE-90 and MP2 or RR3	Daily
10.	All moving parts	Hyd. Oil and grease as applicable	Lube oil and MP2 or RR3	As per schedule otherwise at 50 Hrs
11.	Hydraulic tank	Hydraulic oil	HLP-68	1000 Hrs.
12.	Radiator	Coolant	Premixed coolant or prepared coolant additive concentrate	Daily

ACKNOWLEDGEMENT

Following officers and staff have made their valuable contributions in finalization of the Final Maintenance Schedules Manual for Tamping Express (09-3X).

RAILWAYS

- | | | | |
|----|--------|---------------|--------------|
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