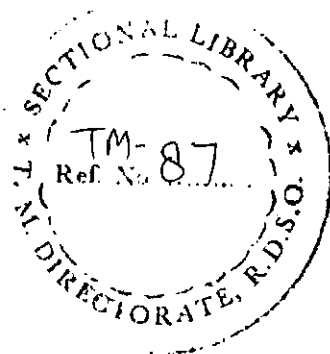


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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

MAINTENANCE SCHEDULE MANUAL
FOR
BALLAST REGULATING MACHINE
(BRM 66-4)



REPORT NO. TM - 87

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RESEARCH DESIGNS & STANDARDS ORGANISATION
LUCKNOW-226011

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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), Points and Crossings Changing Machine (T-28), Plasser Quick Relaying System (PQRS), Multipurpose Tamping Machine (MP), Track Relaying Train (TRT) and maintenance schedule manuals of CSM (09-32), BCM (RM-80), FRM-80, Unimat, Duomatic machine (DUO), Unomatic machine (UNO) and Tamping Express (09-3X) have been issued by RDSO. The preparation of Maintenance Schedule Manual of Ballast Regulating Machine (BRM 66-4) is also an effort in the same direction.

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.

JUNE -2005

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EXPLANATORY NOTES

While preparing the text of Maintenance Schedule Manual of Ballast Regulating Machine, 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**

1.0 ENGINE

- i) Check level of lube oil and top up if required.
- ii) Check fuel level and top up if required.
- iii) Check and correct the tension of engine V-belt if required.
- iv) Record the maximum engine temperature of the day.
- v) Check compressor for any pressure leakage.
- vi) Check coolant level of radiator and top up.
- vii) Drain out water from air tank and water separator after day's work
- viii) Check engine air cleaner vacuum indicator and do the needful.
- ix) Clean engine and their premises.
- x) Check battery-charging system.
- xi) Check any fuel leakage from the pump, injectors, fuel supply, returns pipes, filters, etc.
- xii) Check the lube oil pressure
 - a) At Low idle rpm
 - b) On load after two hours of working.
- xiii) Check up water leakage from hoses and water pump seals.
- xiv) Check battery terminal for tightness.

2.0 MACHINE GENERAL

- i) Check oil leakage from both the main gearboxes.
- ii) Check tightness of cardon shaft bolts.
- iii) Check oil level of axle gearboxes and top up, if required.
- iv) Check air brake pressure.
- v) Check for air leaks, after shutdown the engine and do the needful.
- vi) Check leakage in Hydraulic circuit and do the needful.
- vii) Check hydraulic oil level in tank and top up if required.
- viii) Record the maximum hydraulic temperature of the day.
- ix) Check for any rubbing of hoses, loose clamping etc. and do the needful.
- x) Check all hydraulic pressure for rated settings and adjust if necessary.
- xi) Check functioning of power pack/ emergency backup pump.
- xii) Check the tightness of sweeping elements on broom.
- xiii) Check chain for proper deflection.
- xiv) Check for any unusual sound from machine section.
- xv) Check all the spares and tools for emergency as per annexure-II & III
- xvi) Check safety items as per annexure--IV.
- xvii) Ensure proper functioning of parking brakes.
- xviii) Check all locking devices for proper functioning.
- xix) Grease rollers, universal joints and propeller shaft coupler.
- xx) Check level of two-speed transmission fluid. Drain/flush/clean magnetic drain plug and refill with recommended oil.
- xxi) Clean complete machine.
- xxii) Check all the functions of machine before block working.

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SCHEDULE II

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

1.0 ENGINE

- i) Inspect/clean air cleaner element (outer) with dry air.
- ii) Drain water/sediments etc. from HSD oil tank.
- iii) Clean radiator fins by blowing air from opposite direction.
- iv) Check engine drive V-belt for proper tension and damage. Replace if required.
- v) Clean battery plug connections and apply petroleum jelly.
- vi) Check electrolyte level and specific gravity in batteries.

2.0 MACHINE GENERAL

- i) Grease axle gear box flange cover of bogies.
- ii) Check gear oil of transmission gearbox.
- iii) Lubricate all cardon shafts with grease.
- iv) Check all pressure control valves for rated setting.
- v) Check bolts and nuts of all hydraulic cylinders.
- vi) Lubricate the wing ballast box pivot pins with grease.
- vii) Lubricate the wing lift frame, brake arm and wing pivot with grease.
- viii) Lubricate the wing mounting with grease.
- ix) Lubricate the broom reel bearing with grease.
- x) Check conditions of broom wheel bearing, bushes and grease it.
- xi) Check broom drive chain housing for oil level. Fill up if required.
- xii) Check for water in oil. If water is present, check cover seal and repair. Drain and refill with new oil.
- xiii) Check wear on brake shoes. Adjust gap between brake shoe and wheels.
- xiv) Check all grader blade for proper tightness and replace if required.
- xv) Lubricate the hopper door hinges with grease.
- xvi) Lubricate the lift frame locks front and rear.
- xvii) Lubricate the brake arms with grease.

SCHEDULE III

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

1.0 ENGINE

- i) Clean engine externally.
- ii) Change fuel pre-filter.
- iii) Check all hoses and clamps and tighten/replace as per requirement.
- iv) Lubricate the accelerating mechanism with grease.

2.0 MACHINE GENERAL

- i) Lubricate hand brake gear with grease.
- ii) Lubricate all cardon shafts.
- iii) Clean filters of axle gearbox clutch.
- iv) Lubricate bogie pivot bearing and clutch lever shaft.
- v) Lubricate guide column surface and bolts of torque supports.
- vi) Check foundation bolts of brake cylinders.
- vii) Lubricate the broom chain and plough rollers with grease.
- viii) Check condition of broom sticks and do needful.
- ix) Check tightness of chains fitted with broom unit.
- x) Check working of the manual lever arrangement for disconnecting engine to gear box working.
- xi) Check hinges of wing assembly for cracks and do needful.

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SCHEDULE IV

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

1.0 ENGINE

- i) Check fan hub and water pump drive pulley.
- ii) Clean crank case breather.
- iii) Replace inner and outer air cleaner elements.
- iv) Check engine mounting bolts.
- v) Change engine oil.
- vi) Change lube oil filter.
- vii) Check anti vibration mounting pads of radiator, Change if required

Note : i) Item no. (v), (vi) will be done after 300 engine hrs.
ii) Item no. (iii) will be done after 500 engine hrs.

2.0 MACHINE GENERAL

- i) Check function of shock absorber.
- ii) Lubricate hand brake linkage.
- iii) Change oil in the axle gear boxes. Replace clutch filter.
- iv) Check condition of hydraulic and pneumatic hoses. Replace if required.
- v) Check effectiveness of the brake both manually and pneumatically.
- vi) Change pump drive oil.
- vii) Check all working lights, push buttons, switches etc. Replace the defective / missing ones
- viii) Check working of water separator.
- ix) Check all pressure gauges for proper working.
- x) Check foundation and bracket bolts of compressor
- xi) Lubricate the bearing of sweeping element with grease.
- xii) Check broken/ crack brake shoes and do the needful.
- xiii) Check universal joint for play and replace if required.
- xiv) Check hydraulic pressures.
- xv) Change oil in the axle gear boxes. Replace clutch filter.
- xvi) Change oil of main gearbox.
- xvii) Change return line filter element.
- xviii) Change Suction filter element.
- xix) Replace the oil of transmission gear box.

Note : i) Item no. (iii), (vi), (xv),(xvi),(xvii) and (xviii) will be done after 500 engine hrs.

SCHEDULE-V

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

1.0 ENGINE

- i) Top overhaul the engine.
- ii) Check and overhaul the self-starter.
- iii) Check and overhaul the alternator.
- iv) Check and clean air reservoir.
- v) Replace V-belts.
- vi) Clean turbocharger and check for end and radial play.
- vii) Change batteries, if required.
- viii) Check exhausts manifold, pipes and silencer for tightness.
- ix) Check functioning of monitoring devices.
- x) Clean diesel tank.
- xi) Check safety circuit of engine electrically.
- xii) Check tightness of engine mounting bolts.
- xiii) Overhaul the fuel injection pump.

2.0 MACHINE GENERAL

- i) Grease axle bearing of the bogies.
- ii) Flush and drain entire hydraulic oil from the system.
- iii) Grease sliding surfaces.
- iv) Change air cleaner filter above the hydraulic tank.
- v) Send the hydraulic oil for chemical testing and refill it after filtering it by 10 μ porta filter if found O.K. Otherwise, replace with new oil.
- vi) Clean breather and magnetic drain plug.
- vii) Clean the hydraulic tank.
- viii) Check function of shock absorber.
- ix) Grease the bogie pivot.
- x) Replace defective lights.
- xi) Change sensors if required.
- xii) Replace defective seals of pneumatic cylinder, pipe joints and hoses, if required.
- xiii) Check pneumatic cylinders for their proper working.
- xiv) Check revolution of the sweeping unit. It should be 244 rpm.
- xv) Check condition of idler sprocket for its correct revolution and proper functioning of broom.
- xvi) Check wheel tyre defects and do needful.

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SCHEDULE VI

(IOH)

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

1.0 ENGINE

- i) Top overhaul the engine, if required.
- ii) Overhaul the air compressor.
- iii) Overhaul the radiator.
- iv) Clean the crank case breather.
- v) Change air inlet hoses.
- vi) Rewire the engine wiring with temperature proof wires on condition basis.
- vii) Change anti vibration mountings pads of the engine.

2.0 MACHINE GENERAL

- i) Check all gearboxes and repair, if required.
- ii) Check the wheel tyre profile and do the needful.
- iii) Replace old hoses along with clamps on condition basis.
- iv) Clean the hydraulic oil tank. Paint the surface of tank with approved quality of paint and fill new oil.
- v) Thoroughly clean all panel boxes.
- vi) Replace defective switches and potentiometers.
- vii) Replace defective indicative instruments.
- viii) Replace defective pneumatic cylinders.
- ix) Replace damaged hoses.
- x) Replace pneumatic valves, if required.
- xi) Overhaul broom reel bearing and bushes.
- xii) Overhaul broom chain.
- xiii) Change all fittings of rubber elements if found defective.
- xiv) Change worn out rubber pads provided at broom.
- xv) Repair/ replace missing and defective hand tools.
- xvi) Check function of all assemblies after IOH.

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

1.0 ENGINE

- i) Overhaul/Replace the engine on condition basis.
- ii) Overhaul the air compressor.
- iii) Overhaul the self-starter and alternator.
- iv) Change anti-vibration mounting pads of the engine.
- v) Clean diesel tank.
- vi) Change all the high-pressure fuel pipes, pipe clamp, flexible fuel hoses and rubber hoses.
- vii) Overhaul turbo charger.
- viii) Change shut down valve.
- ix) Change all engine filters along with lube oil.
- x) Overhaul blower assembly.
- xi) Replace air unloader, if required.

2.0 MACHINE GENERAL

- i) Strengthen the machine frame where cracks have developed.
- ii) Check the wheels for any tyre defects. Re-profile or change if required.
- iii) Check the axle bearing and grease them. Change, if required.
- iv) Change mounting pad of all gearboxes.
- v) Overhaul all the gearboxes.
- vi) Replace /overhaul the propeller shafts.
- vii) Overhaul the bogies.
- viii) Dismantle the clutch assembly. Inspect all parts for wear/ damage etc. and replace defective parts.
- ix) Replace all the hydraulic hoses along with clamps.
- x) Replace all hydraulic pumps and motors.
- xi) Check all hydraulic cylinders. Change, if required.
- xii) Clean hydraulic tank, inside surface is to be painted with approved type of paints.
- xiii) Replace the hydraulic oil.
- xiv) Check all the pressure control valves and change, if required.
- xv) Check all the stopcocks and flow control valves and change, if required.
- xvi) Flush complete hydraulic system.
- xvii) Test air tank for rated pressure.
- xviii) Check all pneumatic valves and change, if required.
- xix) Check all the pneumatic cylinders and do the needful.
- xx) Check brake cylinder bore and do the needful.
- xxi) Change all the brake shoes.
- xxii) Check calibration of all the indicative instruments.
- xxiii) Arrange insulation test of main cables and replace the defective ones.

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- xxiv) Overhaul the panel boxes.
- xxv) Change all the defective switches and lights.
- xxvi) Change sensors, if required.
- xxvii) Change worn out sweeping element.
- xxviii) Change bearing of the broom unit.
- xxix) Replace blade graders.
- xxx) Replace chains fitted for broom unit in order to correct revolution of unit.
- xxxi) Check the bogie pivot for wear and attend as necessary.
- xxxii) Change oil pump of drive gearbox.
- xxxiii) Paint complete machine with approved paint.
- xxxiv) Test the machine working for one week near POH Workshop, before it is put for actual working in the section on regular basis.

TABLE OF EQUIVALENT OILS AND GREASE for BRM

Sl. No.	Section	Lubricant	Grade	Frequency
1.	Engine crank case	Lube oil	API CF4 15W40	300 hrs
2.	Axle gear box flange cover	Grease	MP2 or RR3	50 hrs
3.	Transmission gear box	Gear oil	C-90	200 hrs
4.	All cardon shaft	Multipurpose grease	MP2 or RR3	50 hrs
5.	Wing ballast box pivot pin	Multipurpose grease	MP2 or RR3	50 hrs
6.	King pin pivots, wing lift frame & brake arms	Graphite grease	MP2 or RR3	50 hrs
7.	Wing mounting	Grease	MP2 or RR3	50 hrs
8.	Broom reel bearing & housing	Grease	MP2 or RR3	50 hrs
9.	Hopper door hinges	Grease	MP2 or RR3	50 hrs
10.	Brake arms hand brake gear	Grease	MP2 or RR3	50 hrs

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LIST OF SPARES TO BE KEPT IN MACHINE'S STORE

S. No.	Description	Part no.	Quantity
1.	Fuel filter	3166555	2
2.	Lube Oil Filter	3166554	1
3.	Lube Oil Bypass filter	3873576	1
4.	Air cleaner filter element outer	3237951	1
5.	Air cleaner filter element inner	3230338	1
6.	Screen filter for PT fuel pump	200743	1
7.	Injector pipe in let		1
8.	Injector pipe outlet		1
9.	Injector in-line filter		6
10.	Injector copper washer		12
11.	Injector fuel feed connection pipe		6
12.	Cable for propeller shaft		1
13.	Cable for engine accelerator		1
14.	Charge flow filter (Hydraulic)	P163324	1
15.	Return filter 10 Micron (Hyd.)	733692	2
16.	Broom element	230016	10
17.	Diaphragm for brake cylinder		1
18.	Brake shoe	732166	4
19.	Hydraulic pressure pipe	1509/4	10 Meter
20.	Hydraulic pressure pipe with end connections	1509/16 1100 mm	1
21.	Hydraulic pressure pipe with end connections	1509/20 1900 mm	2
22.	Hydraulic pressure pipe with end connections	2755/20 2000 mm	1
23.	Hydraulic pressure pipe with end connections	1509/10 2000 mm	1
24.	Broom driving chain 1" with chain lock	210011	1 No.
25.	Broom drive shaft bush and bearing	211222, 211620, 161099	1 each
26.	V-belt for engine	B-43, 41, 37	1 set
27.	Hydraulic return filter element	176521	1
28.	Seal set for hydraulic cylinders		1 set
29.	Self starter		1

LIST OF TOOLS AND PLANTS

S. No.	Description	Part no.	Quantity
1.	Jack 20 t with traversing base		1
2.	Jack 5 t with foot lifting arrangement		1
3.	Terfer 2 t capacity		1
4.	Socket 3/4 inch square drive	106763	1
5.	Chain wrench 5/8"-4, 1/2"	106766	1
6.	Open end wrench 1 -11/16"	773878	1
7.	Handle T-bar	031097	1
8.	Adopter T-bar	031010	1
9.	Socket 3/4" square drive	040891	1
10.	12 PT 2, 1/4, 3/4" drive	106298	1
11.	Pipe wrench 18"	106760	1
12.	Socket 3, 1/2 size, 6 PT	108321	1
13.	Grease gun having needle type nozzle with 18" flexible connection	300010	1
14.	Hammer ball pin	300054	1
15.	Pliers elbow joint combination 6"	300152	1
16.	Screw driver 4"	300256	1
17.	Screw driver 6"	300258	1
18.	Wrench ADJ 6"	300406	1
19.	Socket set 17 PCs 1/2" drive	300502	1
20.	Wrench ADJ 12"	300406	1
21.	Wrench 2-3/8 open end	301050	2
22.	Wrench set 9 PCs open end	301060	1
23.	Wrench set Hex Key	301061	1
24.	Wrench combination 1, 1/2"	106057	1
25.	Diesel driven Porta-filter (10 μ) having 7.5 HP engine.		1
26.	Emergency back up system.		1
27.	Torque wrench		1
28.	Wire Brush		1
29.	Aerosol can		1
30.	Pneumatic air gun for pressurized air (with pressure gauge)		1

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S. No.	Description	Part no.	Quantity
31.	Lamp arrangement for inspection		1
32.	Hot blower		1
33.	Calipers off sizes		1
34.	Pressure gauge (Digital)		1
35.	Litmus paper		1
36.	Wheel tyre defect gauge		1
37.	Compression measuring instrument		1
38.	Bench grinder		1
39.	Multi-meter		1
40.	Tachometer		1
41.	Vibration meter		1
42.	Bearing puller		1
43.	Flow meter		1
44.	Vacuum gauge		1
45.	Steel scale		1
46.	Taper gauge upto 1"		1
47.	Feeler gauge		1
48.	Cell Tester and battery charger		1
49.	Thread gauge		1

LIST OF SAFETY TOOLS

S. No.	Description	Quantity
1.	Detonators	1 box
2.	H.S. Flag Red	2 nos.
3.	H.S. Flag Green	1nos.
4.	Banner flag	2nos.
5.	H.S. Lamp	2 nos.
6.	Chain & Pad lock	1 set
7.	Terfor (7 t capacity)	1 no.
8.	50 t Jack with traverser	2 nos.
9.	Crow bars	2 nos.
10.	Wooden blocks off sizes	8 nos.
11.	Rail Thermometer	1 no.
12.	First Aid Box	1 no.
13.	Skids	4nos.
14.	Working time table	1nos.
15.	G&SR book	1nos.

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HYDRAULIC PRESSURES

- Hydraulic propelling pressure : 379 bar
- Motor threshold pressure : 310 bar
- Cab control end secondary valve of broom : 172 bar
- Broom circuit pressure : 138 bar
- Emergency pump pressure : 138 bar
- Driving / working (variable) pressure : 345 bars
- System pressure : 172 bars
- Broom motor drive pressure : 138 bars
- Driving pump charge pressure : 27.5bars
- Emergency pump pressure : 138 bars
- Air brake system pressure : 4 - 7.5 bar
- Air pressure in pneumatic tank : 7 bars

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