INTER PLANT STANDARD IN STEEL INDUSTRY		
IPSS	**METHOD OF PERIODIC MAINTENANCE OF WDS-6 LOCOMOTIVES IN STEEL PLANTS**	**IPSS:3-02-008-18**
	Corresponding IS does not exist	Formerly : IPSS : 3-02-008-01

0. FOREWORD

0.1 Interplant standardization in steel industry was initiated under the aegis of the Indian Standards Institution (ISI) and the Steel Authority of India Limited (SAIL). This IPSS was prepared by the standard committee on Operation and Maintenance, IPSS 3:2 and firstly published in 2001. Lastly, this has been revised by the standard committee in July 2018 with the active participation of the representatives from major Indian steel plants and leading consultants.

0.2 This standard is derived from Indian Railway Practice, modified to meet the specific requirement of steel plant locomotives.

0.3 This standard is intended to be a guide to the locomotive maintenance shops of steel plants to establish and continue the practice of preventive maintenance in WDS-6 Locomotives owned and maintained by them.

1. SCOPE

1.1 This Inter Plant Standard covers the range of maintenance activities which are to be done on periodic basis up to an interval of one year. These maintenance schedules are hence termed as LOWER ECHELON SCHEDULES. The schedules are grouped under 4 time based categories and are :

a) Daily checks

b) Fortnightly schedules

c) Monthly schedules

d) Annual schedules

In addition to above, plants may adopt six monthly schedule also depending upon their typical requirements of respective plants.

2.0 PHILOSOPHY OF MAINTENANCE OF WDS-6 LOCOMOTIVES IN STEEL PLANTS

2.1 The maintenance requirement of the WDS-6 Locomotives of steel plant shall be totally met by carrying out the maintenance activities on periodic basis, programmed on the following schedules :

a) Daily checks b) Fortnightly schedules

c) Monthly schedules d) Annual schedules

e) Three year schedules f) 6 year periodic overhaul(POH) schedules

2.2 Out of the above, this standard covers the schedules which are to be carried out on daily, fortnightly, monthly and annual basis.

3.0 DEFINITIONS

3.1 For the purpose of this standard, the following terms and definitions will be used:

a) Jobs covered in daily checks will be termed as RD schedules

b) Jobs covered in fortnightly schedules will be termed as RBM schedules

c) Jobs covered in monthly schedules will be termed as RM schedules

d) Jobs covered in annual schedules will be termed as RY schedules

4.0 METHODOLOGY

4.1 **Time allotted for each schedule** :

The jobs specified in each of the schedules are to be completed as per the following norms in terms of working hours :

a) Daily checks (RD) : 30 minutes

b) Fortnightly schedules (RBM) : 8 hours (one shift)

c) Monthly schedules (RM) : 16 hours (2 shifts)

d) Annual schedules (RY) : 56 hours (seven shifts)

4.2 Monthly maintenance program

The Loco Repair Shop in association with user department will prepare a maintenance program for the WDS-6 locos covering all the above three schedules besides daily checks. This program will identify the Loco No., type of schedule, duration of Maintenance and time of reporting of the loco at the Loco Repair Shop. A specimen format for compiling this program is given in **Annexure-I**. Copies of this program will be given to all concerned agencies for information and compliance.

5.0 MONITORING & DOCUMENTATION

5.1 Since these Schedules are essential for ensuring good and reliable performance of these Locomotives in service, monitoring of Maintenance Schedules deserve special attention. For the purpose of ensuring that all

the activities of each of the Schedules have been completed, the Schedules are prepared in the form of Checklist, which the supervisor of the executing agency can fill up.

5.2 In order to assess the deviation from the monthly maintenance program, a chart to indicate the fulfillment of the program is suggested. A recommended format for such a chart is given in **Annexure-II**.

5.3 Entries regarding the fulfillment of activities of different schedules are also to be made in the history book of each Locomotive.

5.4 Wherever Computer Managed Maintenance System (CMMS) is in vogue, the above documentations can be made through the system after developing suitable software.

6.0 MAINTENANCE SCHEDULES

6.1 The list of activities for each of the four schedules, namely DAILY, FORTNIGHTLY, MONTHLY AND ANNUALLY are given in **Annexure-III, IV, V & VI.** In each of these Annexures the jobs coming under Mechanical Category are grouped under “A” and jobs coming under Electrical Category are grouped under “B”.

6.2 In order to take care of the safety aspects of loco and to liquidate specific complaints about the performance of the Loco by the Operator, each Loco on its every arrival at the shop, will be specially inspected based on a schedule called “INCOMING SCHEDULED CHECK ON EVERY SHED ARRIVAL”. This schedule is given in **Annexure-VII**.

6.3 Similarly on overall check of the loco based on the schedule called “OUTGOING SCHEDULE CHECK ON EVERY OUTGOING LOCO” is also to be carried out. This schedule is given in **Annexure-VIII**.

7. SPARE PARTS MANAGEMENT

7.1 Satisfactory maintenance calls for availability of all spare parts, big & small, vital and not so vital. The goal to be achieved is 100% availability of all types of spares.

7.2 For keeping the maintenance time for each category of schedule, unit exchange method is recommended. A list of recommended unit exchange spares for WDS-6 locomotives is placed at **Annexure-IX**. The quantity of each of these spares can be fixed depending on the total fleet size of WDS-6 locos to be maintained by each shop.

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ANNEXURE-I

MONTHLY MAINTENANCE PROGRAMME OF WDS-6 LOCOMOTIVES

PLANT : MONTH & YEAR :

Sl No.	Locomotive Identification No.	Type of Scheduled Maint.	Duration of Maint.	Date & Time for reporting of Loco	REMARKS

ANNEXURE-II

MONITORING CHART FOR SCHEDULED MAINTENANCE OF WDS-6 LOCOMOTIVES

PLANT : MONTH & YEAR :

Sl No.	Loco No.	DATES												
		1			2			3			4			Upto 31
		A	B	C	A	B	C	A	B	C	A	B	C	

COLOUR CODE :

PLAN EXECUTION

RBM =

RM =

RY =

ANNEXURE-III

RD DAILY OPERATORS CHECKS

PERIODICITY: EVERY SHIFTS

LOCOMOTIVE NO. _____ TIME ALLOWED : 30 MINUTES

DATE _____

Under mentioned items should be examined in accordance with the instructions contained in manufacturers' Maintenance Manual of the Locomotive.

Sl No.	Items to be examined	Condition / Action taken	Signature of operator

ENGINE RUNNING

1. Engine Room & Compressor
   - i) Check for leakage of fuel oil, lube oil and water. Rectify/Report.
   - ii) Check for abnormal sound & odour. Rectify/Report.
   - iii) Check for smooth running of compressor/ expressor. Report abnormality.
   - iv) Vaccum indicator for filter healthiness to be checked
2. Batteries
   Check for normal charging, no charging and over-charging. Report abnormality.
3. Driver's Cabin
   - i) Check for signals. Report abnormality.
   - ii) Check for proper working of all lights and horns. Rectify, if defective.
   - iii) Check for compressor loading-unloading function, main reservoir air pressure (8.5-10 Kg/cm^2), control air pressure (5 Kg/cm^2) and break air pressure (2.5 Kg/cm^2).

ANNEXURE-III Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of operator

iv) Check for vacuum pressure and function of vacuum break.

v) Check for fuel oil pressure and engine lube - oil pressure.

ENGINE SHUT DOWN

4. Engine

i) Check lube oil level on dip-stick. If low, Lube oil to be topped up and also check diesel and water level.

ii) Check engine bed bolts and tightening, If necessary

5. Compressor

Check crank case oil. Refill, if less.

6. Undergear

i) Check visually, electric cables for rubbing against metal components. Secure Properly.

ii) Check brake blocks & adjust or inform for renewal.

7. Under Carridge

i) Gearbox oil level check

ii) Check cardon shaft play

iii) Joint bolts tightening and greasing

iv) Drainage water from oiltank

v) Brake block adjustment / replacement

vi) Check axle spring set

8. Fire extinguisher

Check for seals if broken, Report

ANNEXURE-III Contd.

Check for validity and replace, if required.

9. Check for foot steps, hand railings, window glass and driver's seat.
10. Check open main reservoir air drain valve to drain condensate.

Signature of Operator

MECHANICAL

MAINTENANCE SCHEDULES

FOR

WDS6 LOCOMOTIVES

(FOR INTERNAL CIRCULATION ONLY)

ANNEXURE-IV

RBM SCHEDULE EXAMINATION (MECHANICAL)

PERIODICITY : EVERY 15 DAYS

LOCOMOTIVE NO. : _____ TIME ALLOWED : 8 HOURS

DATE _____

Under mentioned items in addition to the items of RD schedule, should be examined in accordance with the instructions contained in manufacturers' Maintenance Manual of the Locomotive.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

ENGINE RUNNING

1. General Examination

   i) Check following for unusual sound, leakages and high temperature. Record and rectify.

      a) Engine including exhaust manifold and turbo supercharger.

      b) Expressor / Compressor.

      c) Pipeline joints.

   ii) Check engine lube oil pressures at idle and 8^{th} notch positions. Record. Report abnormality.

   iii) Check functioning of Air and Vacuum brake system. Record, Adjust and Rectify.

      a) A9 & SA9 valves in service and emergency positions.

      b) Main reservoir pressure (8.5-10 Kg/ Cm^2) Control air pressure (5 kg/cm^2) and brake cylinder pressure 2.5 kg/cm^2)

ANNEXURE-IV Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

c) Brake cylinder piston travel and braking effect. Adjust travel, replace brake blocks where required.

d) Brake pipe pressure (5 kg/cm^2) and equalising reservoir pressure (5 kg/cm^2)

e) Expressor crank case pressure (1.7 kg/cm^2)

f) Vacuum in vacuum brake pipe (56 cm water column)

g) Operation of horns & wipers.

ENGINE STOPPED

2. Engine cooling system

a) Check fan drive universal joint for looseness and working out. Rectify, if required.

b) Water pump telltale/inspection hole for leakage. Rectify leakage, if any.

c) Check cooling water level. Add treated water, if required.

d) Send water sample to laboratory for testing chromate content. Record test results in the log book. Maintain a minimum of 2500 ppm of chromate or 200 ppm of $CaCo_3$ and pH 8.5 to 9.5.

3. Lube oil System :

a) Check oil level in Engine crank case. Top up, if required.

b) Send lube oil sample to laboratory for analysis. Record the test results in the log book.

ANNEXURE-IV Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

4. Fuel Oil System :
   a) Check intactness of strainer and filler cap of fuel tank.
   b) Send fuel oil sample taken from primary filter housing to lab for checking water contamination. Record the results in the log book.
5. Air Maze Oil bath panel filters :
   - Check oil level. Top up, to maintain within high and low marks.
   - Change air filter as per OEM Schedule replacement plan.
6. Expresser :
   - Check oil level. Top up, if required.
7. Traction Motor Blowers :
   a) Check V belts for condition and tension adjust, if required.
   b) Grease the blower bearings.
   c) Check adopter nut for tightness. Ensure washer is in position and locked.
8. Engine Governor :
   - Check oil level. Add oil, if necessary.
   - Check for leakage and foaming of oil.
9. Traction Motor Suspension Bearings :
   a) Clean suspension bearing caps. Check bolts for tightness, sealing and locking.
   b) Check oil level in traction motor suspension bearing caps. If low refill & Top up and record.

ANNEXURE-IV Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

10. Traction Motor Gear Cases :
    a) Check condition of bolts for missing, tightness and locking. Rectify as required.
    b) Check compound level in the gear cases. Top up, if necessary.
11. Exciter and Auxiliary Generator :
    - Check condition and tension of belts of Exciter generator and auxiliary generator drive. Replace and/or adjust if necessary.
12. Axle Roller Bearings & Axle Boxes :
    a) Check for signs of over heating and securing of parts. Rectify/Report abnormality.
    b) Check for leakage of lubricant.
13. Bogies :
    a) Check frame, links, pins, springs, brake gear etc. Lubricate where necessary.
    Change brake shoes, if required.
    b) Check oil level of centre casting. Top up, if required.
14. CBC (Centre Buffer Coupler) & Bottom Coupler :
    - Check for wear, fracture and for missing parts. Rectify if necessary.
15. Miscellaneous items :
    a) Check condition of rubber seal and clamps of vacuum hose.
    b) Drain condensate from :
        i) Main & control air reservoirs.
        ii) Dirt collector
        iii) Inter cooler.

ANNEXURE-IV Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

c) Replace car body panel filters with clean filters.

16. Cleaning :

a) Clean engine room, radiator room, expressor compartment. It should be free of oil, water and dirt.

b) Clean cab including windows, look out glass etc.

17. Fire extinguishers

Check for validity. If not valid, replace.

ENGINE RUNNING

18. Start the engine and check all the above items from S. No. 1 to 18 for normal operation. Rectify, if necessary.

Signature of Technician / Supervisor & Date

ANNEXURE-V

RM SCHEDULE EXAMINATION (MECHANICAL)

PERIODICITY ; MONTHLY

LOCOMOTIVE NO. : _____ TIME ALLOWED ; 16 HOURS

DATE _____

Under mentioned items in addition to the items of RD & RBM schedules, should be examined in accordance with the instructions contained in manufacturers' Maintenance Manual of the Locomotive.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

ENGINE RUNNING

1. General Examination
   - i) Check operation of Main reservoir safety valve. Must blow off at 10 kg/cm sq. Rectify, if required.
   - ii) Check for leakage from Main reservoir, its piping, brake pipe and control air reservoir. Rectify, if required.
   - iii) Raise engine speed to fourth notch and shut down the engine. Record turbo run down time. It should not be less than 90 seconds. Report, if adverse.

ENGINE SHUT DOWN

2. Fuel Oil System
   - i) Renew primary filter and housing gasket clean tank and cage.

ANNEXURE-V Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

ii) Renew secondary filter and housing gasket (every 3rd month)

iii) Check FIP (Fuel Injection Pump) control rack for for freeness, correct setting and lubricate.

iv) Check governor linkage for slackness & bearing wear, missing pins and nuts. Rectify, if necessary, and lubricate.

3. Lube Oil System

i) Renew lube oil filter elements and gasket. Thoroughly clean filter housing from inside and outside, wipe inside to ensure that it is free of any cotton waste or cloth.

ii) Examine lube oil strainer screen, sock spring and inlet seat for breakage or leaks. Rectify, if necessary. Thoroughly clean inside and outside of strainer shell and renew the gasket.

4. Engine Crank Case :

i) Remove crank case covers and check screens for foreign materials. Report presence, if any.

ii) Check lube oil header jumper pipes for tightness and leakage. Rectify, if required.

iii) Check connecting rod bolts and nuts and ensure that these are tight, ensure that split pins are in position.

ANNEXURE-V Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

5. Air-maze Oil Bath Filter Engine Intake :
   Inspect filtering media. Rectify, if necessary.
   Check condition of oil and presence of dust in it. Dust layer thickness in the sump should not exceed ½ inch. If so remove dirt clean & refill oil.
6. Expressor :
   i) Clean and oil compressor side air intake GF strainer filter.
   ii) Clean strainer of Expressor governor.
   iii) Clean lube oil strainer in the crank case.
   iv) Check sprocket chain, tightness of oil pump change expressor oil.
   v) Change GD 80 filter & clean unloading point.
7. Flexible coupling :
   Lubricate flexible coupling.
8. Turbo Surper charger :
   Check water return pipe for cracks. Rectify, if required.
   Examine clamps and brackets.
   Check safety clamps and brackets of vent pipe.
9. Cooling Water Rediators :
   Blow with compressed air in the direction opposite to normal air flow. Inspect for clogging. Rectify, if required.
10. Radiator Fan Gear Unit :
    i) Check oil level. Top up, if required.
    ii) Tighten bolts of Eddy current clutch foundation.
    iii) Propeller shaft bolts tightening and greasing.

ANNEXURE-V Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

11. Air Brake System :

    Examine A9 and SA9 valves for correct movement.

    Lubricate valve arms with light machine oil.

12. Traction Motor Blower :

    i) Check tightness of lock nuts of both the bearings.

    ii) Greezing of bearings.

    iii) Check blower impellar for shifting. Rectify as required.

13. Bogies :

    i) Lubricate slack adjusters.

    ii) Check oil level of central casting and side mounting pads. Replenish oil, if required.

14. Traction Motor Suspension Bearings :

    i) Check condition of suspension bearing felt wicks for glazing (every sixth month)

    ii) Check condition of suspension pads.

15. Rail Guard :

    Check for loose bolts and/or missing Rail Guards.

    Rectify.

16. .Axle roller bearing and axle boxes

    Check for loose/deficient pedestal lug liner.

    Report abnormality, if any.

17 Miscellaneous :

    i) Check look out glasses & Weather strips.

    Replace, if necessary.

    ii) Check driver seat and arm rest Repair, if necessary

ANNEXURE-V Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

iii) Lubricate hinges, locking devices, engine doors and windows etc.

iv) Clean vacuum oil bath filters and fill oil.

v) Replace car body panel filters with clean filters.

ENGINE RUNNING

18. Start engine after completion of schedule inspection. Check all above items for proper operation.
19. Expressor oil pressure to be checked 14 psi at idle RPM.
20. Greasing of axle boxes.
21. Load testing before and after the schedule.

Signature of Technician/Supervisor

ANNEXURE-VI

RY SCHEDULE EXAMINATION (MECHANICAL)

PERIODICITY : YEARLY

LOCOMOTIVE NO.:_____TIME ALLOWED ; 56 HOURS (7 SHIFTS)

DATE _____

Under mentioned items in addition to the items of RD, RBM & RM schedule, should be examined in accordance with the instructions contained in manufacturers' Maintenance Manual of the Locomotive.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

ENGINE SHUT DOWN

1. Fuel oil system

   Drain condensate and sludge from fuel tank.

2. Engine Cylinders :

   Check blow by on all cylinders and record.

   Report, if adverse.

3. Injectors :

   h) Overhaul and record breaking pressure.

   i) Tighten injectors at a specified torque of 40 ft. lbs.

4. Fuel injection Pumps :

   i) Check timing and uniformity of racks.

   ii) Check fuel rack linkage to governor for free movement and secure cotter pins.

5. Manifolds :

   Tighten all air and exhaust elbow bolts at specified torque (1/2" cap screws at 75 ft. lbs,

ANNEXURE-VI Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

5/8” cap screws at 150 ft. lbs and 7/8” cap screws at 300 ft. lbs).

6. Tappet Clearance :
   Check tappet clearance and adjust to 0.034”, if required.
7. Turbo Super Charger :
   i) Remove and overhaul turbo supercharger. Refit after overhauling.
   ii) Check air discharge coupling flange bolts for tightness.
   iii) Check water drain pipe to be clear.
8. After Cooler :
   Remove and clean with solvent as per prescribed procedure. Refit and renew gaskets.
9. After Cooler Blower :
   Check condition of blower blades and back lash between drive gear and idle gear.
10. Engine Governor Drive :
    Remove inspection cover from cam shaft gear, inspect gear drive for correct back-lash gear drive for correct back lash and gear contact.
11. Engine Governor :
    Drain governor oil, clean filter and strainer cap. Refill with fresh oil, bleed governor lubricating system.
12. Mounting & Foundation Bolts :
    Check tightness of foundation and/or mounting bolts of all equipment in Engine Room.

ANNEXURE-VI Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

13. Vibration Damper :

    Check for free movement of outer rings.

14. Flexible coupling :

    Clean, inspect and lubricate.

15. Cylinder Heads :

    i) Clean top deck before removing valve lever covers. Replace cylinder head with reconditioned one.

    ii) Inspect valve operating mechanism for lubrication.

    iii) Clean surface and inspect valve levers, equalising yokes. Replace push rods, if bent or damaged.

16. Crank case Explosion covers and Doors :

    i) Remove covers, inspect gaskets and diaphram for deterioration. Renew, if necessary.

    ii) Inspect explosion door gasket, stainless spring and spacers for wear & tear. Renew, if necessary.

17. Expressor :

    i) Clean and inspect valve assemblies.

    ii) Recondition unloaders.

    iii) Drain, clean and refill crank case oil. Before filling check split pin of chain drive and gears of lube oil pump.

    iv) Clean strainer.

    v) Clean all valves of exhauster.

    vi) Check alignments of the drive.

    vii) Inspect piping of crank case vacuum.

    Check valve for tightness. Ensure orifice is not obstructed.

ANNEXURE-VI Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

viii) Check and clean lube oil relief value.

ix) Clean inlet and delivery valve of compressor cylinder.

18. Expressor Governor :

i) Remove & Overhaul.

ii) Clean and put few drops of governor oil on the bearing surface of cutting in and cutting out valves.

iii) Check to ensure that exhaust opening is free of dirt and dust.

iv) Clean strainer.

19. Radiator Fan :

i) Check radiator fan gear unit for leakage, and tightness of bolts. Rectify.

ii) Drain oil, clean and refill with fresh oil.

20. Compressed Air & Vacuum System :

i) Check, clean and recondition the intake strainer.

ii) Test all Air & Vac gauges. Replace, if defective.

iii) Check, clean and recondition, grease cup washer, `O' ring and piston of brake cylinder.

iv) Control Air Reservoir, Main & Aux. Reservoirs – Blow down & clean.

v) Remove & overhaul A-9, SA-9 & C2 Relay Valves.

21. Roller Bearing Axle Boxes :

ANNEXURE-VI Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

i) Check for loose bolts, loss of grease, condition of grease and for signs of overheating and dis-colouration.

ii) Check thrust cup bolts for tightness and proper locking.

iii) Top up grease.

22. Traction Motor Blower :

i) Check impeller for shifting. Rectify, if required.

ii) Ensure greasing of bearings.

iii) Check air ducts for damage.

iv) Blower replacement by recondition one, if required.

23. Traction Motor Suspension Bearings :

i) Drain suspension bearing oil and refill with new oil.

ii) Check felt wick for glazing. If glazed, replace.

iii) Check bearings and axles through felt wick windows.

iv) Check suspension bearing cap bolts for tightness and sealing.

v) Check wear in motor nose suspension.

vi) Record lateral and radial clearance. Lateral clearance should be 5/16” & radial clearance should be 1/16”.

24. Wheels :

Check wheels with gauge and record flanges wears, tread wears and root wears.

ANNEXURE-VI Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

25. Dry Run Test :
Carry out dry run operational test and record, if anything adverse.

26. Doors & Windows :
Check for defects & deficiency. Repair, renew.
Lubricate all locking devices.

ENGINE RUNNING

27. Start the engine and check for leakages and normal operation of equipment.

28. General Examination :
Check operation of engine over-speed trip.
Engine must trip at 1230-1260 RPM.
Adjust, if required.
Check expressor crank case vacuum. It should be maintained at 20-21” hg. Rectify, if necessary.

29. Expressor :
Check and record crank case vacuum through orifice test as prescribed.

30. Load Box Test :
Carry out load box test of the locomotive as per prescribed procedure and record.

31. Replacement of FIP by reconditioned one.

32. Removal and complete overhauling of fuel booster pump, brake and re-fitting.

ANNEXURE-VI Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

33. Engine Cylinder :
Check blow by on all cylinder, Record/ Report if adverse.

34. After cooler :
Check for air manifold pressure and rectify leakages.

Signature of Technician/Supervisor & Date

ANNEXURE-VII

INCOMING SCHEDULE CHECK

PERIODICITY : ON EVERY SHED ARRIVAL

LOCOMOTIVE NO.:_____ TIME ALLOWED : 30 MINUTES

DATE _____

Under mentioned items should be checked every time the loco is arriving shed for maintenance or repair :

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor
1.	Check for abnormal sound and behaviour of Loco. Record.		
2.	Check fuel oil, Lub oil and cooling water system for leakage and record.		
3.	Check loco brake power, mention brake blocks to be replaced and slot to be changed.		
4.	Check loco deficiencies and record.		
5.	Check condition of cab door glasses, windows glasses, engine room doors for proper closing and locking. Mention defective ones.		
6.	Check traction motor cables and their proper securing.		
7.	Check traction motor gear case for deficient bolts and hanging.		
8.	Check for battery charging current		
9.	Check for proper blowing of horns.		
10.	Check for proper burning of head lights, engine room and cap lights. Mention location of fuse bulbs.		

Signature of Technician/Supervisor & Date

ANNEXURE-VIII

OUTGOING SCHEDULE CHECK

PERIODICITY : ON EVERY SHED ARRIVAL

LOCOMOTIVE NO. :_____ TIME ALLOWED : 30 MINUTES

DATE _____

Under mentioned items should be checked every time the loco is leaving shed for maintenance or repair :

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

1. Check brake power of the loco
2. Check universal shaft for loose or missing bolts.
3. Check condition of v-belts.
4. Check expressor lube oil level.
5. Check if both fire extinguishers are on the loco and in working condition and also check the validity of fire extinguisher
6. Check for any leakage in the loco.
7. Check if fuel tank filling strainer and caps are fitted. Do not permit the loco otherwise.
8. Check for any abnormal sound in loco.
9. Check engine & loco cleanliness. There should be no spilt oil, rag or cotton waste anywhere in engine, expressor & radiator comprtment.
10. Check working of horn, head light and wipers.
11. Check operations of power contractors, BKTs, F.S. Contactors & Reversers.
12. Check charging rate of batteries.
13. Check proper securing of traction motor cables.

ANNEXURE-VIII Contd.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

14. Pick up any 2 important items of the schedule for which loco was in shed and check for their proper execution. Record your observations.
15. Check that all the booked-repairs of drivers and incoming loco examiner have been attended.

Signature of Technician/Supervisor & Date

ELECTRICAL

MAINTENANCE SCHEDULES

FOR

WDS6 LOCOMOTIVES

(FOR INTERNAL CIRCULATION ONLY)

RBM SCHEDULE EXAMINATION (ELECTRICAL)

PERIODICITY : EVERY 15 DAYS

LOCOMOTIVE NO. _____ TIME ALLOWED : 8 HOURS

DATE _____

Under mentioned items in addition to the items of RD schedule, should be examined in accordance with the instructions contained in manufacturers' Maintenance Manual of the Locomotive.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

ENGINE RUNNING

1. General Examination
   - i) Check following for unusual sound,
     Sparking, high temperature and odour.
     Report abnormality.
     - a) Traction generator
     - b) Auxiliary generator
     - c) Excitor generator
     - d) Fuel booster pump motor
     - e) Crank case exhauster motor
     - f) Eddy current clutch gear unit.
2. Check the following for their normal operations.
   Report any abnormality.
   - a) PCS in motoring and braking position.
   - b) Load meter.
   - c) Radiator fan through manual operation of R1 and R2 contactors.
   - d) Charging rate of batteries and zero

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

error of battery ammeter.

e) Movement of governor brush arms.

f) All contactors and relays

3. Governor :

Check Amphenol plug for tightness.

Tighten, if required.

ENGINE STOPPED

4. Blow Out :

Blow out with dry compressed air the

following and clean :

a) Traction motor

b) Traction generator

c) Auxiliary generator

d) Excitor generator

5. Batteries :

Check water level in the pilot cell of each battery.

Check specific gravity (min. 1120gm/cm2,

max. 1250 gm/cm2 for conventional batteries)

and level of electrolyte of each cell. Fill distilled

water and top up, if required.

Conventional batteries to be phased out

& VRLA batteries to be adopted

6. Carbon brushes

(Composition and grade to be mentioned)

Check carbon brushes of the following machines.

Record their length. Replace, if necessary.

Record replacement.

a) Traction motor

b) Traction generator

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

c) Auxiliary generator

d) Excitor generator

e) Fuel pump booster motor

f) Crank case excitor motor

g) Eddy current clutch.

7. Interlocks :

Check interlock gaps of contactors in the control compartment. Adjust the gaps and tighten the nuts.

8. General Examination :

a) Check operation of switches and circuit breakers for correctness. Rectify, if required.

b) Check for operation of ground relay and sealing of cut-out switch. Rectify, Report abnormality.

c) Check operation of head lights, cab lights, gauge lights, warning lights, marker lights, engine room lights. Replace defective bulbs.

d) Check operation of throttle handle, selector handle and reverser handles for interlocking and free movements.

e) Check operation of reverser - BKT assemblies and power contactors manually.

f) Check foundation bolts of Axle alternator for tightness. Rectify abnormality.

g) Check eddy current clutch flexible conduits and cables for proper securing.

h) Check traction motor cable for rubbing against metallic parts. Dress & secure.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

ENGINE RUNNING

9. Start engine and check for normal operation of the electrical equipment.

Signature of Technician/Supervisor & Date

RM SCHEDULE EXAMINATION (ELECTRICAL)

PERIODICITY : MONTHLY

LOCOMOTIVE NO. _____ TIME ALLOWED : 16 HOURS

DATE _____

Under mentioned items in addition to the items of RD & RBM schedules, should be examined in accordance with the instructions contained in manufacturers' Maintenance Manual of the Locomotive.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

ENGINE RUNNING / SHUTDOWN

1. Check the following :
   - i) Check for adjustment of output voltage of voltage regulator. Adjust to 74 $\pm$ 1V.
   - ii) Check cooling water temperature control switch relay for proper operation of radiator fan at medium and full speeds. Set R1 & R2 contactors to pick up at 68 degree centigrade and 74 degree centigrade.
   - iii) Check excitor generator voltage.
   - iv) Check low water switch (LWS) for proper operation.
   - v) Check reverser for operation manually.
2. Master controller :
   Clean and inspect contact fingers. Check mechanical interlocks on both control stands.
3. Control Equipment – Terminal Connections :
   Check terminal connections of all control equipment in the control compartments for tightness.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

Check shunts for flexibility. Renew, if necessary.

4. Alternator & Self Starters
   - i) Commutator cleaning
   - j) Brush checking/ replacement
   - k) Terminal tightning

5. Power contactors :

   Check, clean and dress contact tips.

   Renew contact tips, if badly worn out.

6. Magnetic Contactors :

   Check, clean and dress contact tips.

   Renew contact tips, if badly worn out.

7. Main Generator :
   - l) Remove covers, blow out with clean dry compressed air. Wipe clean oil and grease with approved solvent soaked cloth.
   - ii) Clean Teflon insulating sleeves of brush holder support studs, brush holder insulators.
   - iii) Inspect brush holders and brushes for any damage, burning, flash overs. Rectify/replace, if necessary.

     Check for damaged pressure spring, shunts and levers. Replace defective parts, if necessary.

     Inspect commutator. It should have clean, smooth and polished surface. Smoothen where necessary. Report anything abnormal and record.
   - iv) Inspect leads and connections. Clean the leads, joints and tighten them.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

8. Excitor generator & Auxiliary Generator :
   - i) Remove covers and blow out with dry compressed air. Wipe clean.
   - ii) Inspect brush holders for damaging, burning, arcing. Look for damaged pressure springs and replace as required.
   - iii) Inspect commutator for smooth and polished surface. Report, if anything adverse.
   - iv) Inspect leads and connections for cleanliness and tightness.
9. Eddy Current Clutch :
   - i) Remove cover, blow out with clean dry compressed air. Wipe clean all traces of grease and oils.
   - ii) Inspect brush holders and brushes for wear, damages, burning, arcing, etc. Replace, if defective or of insufficient lengths (C/Brushes). Quality of brush to be used as per prescribed grade
   - iii) Inspect condition of slip rings for smooth and polished surface. Report, if adverse. Slip ring alignment to be checked
   - iv) Inspect leads and connections for cleanliness and tightness.
10. Control Equipment :
   - i) Blow out with clean and dry compressed air : Contactors including reversers, controllers and resistors in the panel.
   - ii) Clean relays with brush and not with compressed air.
   - iii) Check overcurrent relay for trip setting

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

iv) Operate wheel slip relay manually and check contacts for proper operation.

v) Check voltage regulating panel & its parts for signs of overheating & damage.

11. Crank Case Exhauster Motor :
    - Blow out with dry compressed air.
    - Clean brush holders, insulators.
    - Look for defects while cleaning.

12. Fuel Booster Pump Motor :
    - Blow out with dry compressed air.
    - Clean brush holders, insulators.
    - Look for defects while cleaning.

13. Insulation Resistance :
    Check and record insulation resistance of control circuit and power circuit. Rectify for low IR. Report, if anything adverse.

14. Batteries :
    - Clean the batteries
    - Check tightness of all connections and apply petroleum jelly.
    - Clamp tightning
    - Record battery voltage. Report, if anything adverse.

15. Axle Generator :
    Wipe clean the outside of generator.
    Check pipe joint where the cable enters the generator for ingress of water & damage to joint inspect the leads for damages.

Sl No.	Items to be examined	Condition / Action taken	Signature of Technician/ Supervisor

16. Traction Motors :

i) Remove covers and blow out the interior of the motor with clean dry compressed air. Wipe clean all t races of oils and grease.

ii) Inspect commutator and wipe clean string band. Check commutator surfaces. It should be smooth and polished. It should be free of copper beads, flash overs. Report for any adverse observation.

iii) Inspect brush holders & brushes for any damages, burning, flash over etc. Replace, if necessary. Report anything adverse.

iv) Check traction motor cables for damages and rubbing against metallic parts. Clean all cables, repair damaged portions, dress and secure the cables properly.

17. Traction Motor Air Duct & Bellows :

i) Check Air Ducts and Bellows for damages.

ii) Check for proper tightness of the Air Duct and Bellows. Tighten them as required.

ENGINE RUNNING

18. Start the engine. Check operation of parts. Record speeds and voltages as mentioned above.

Signature of Engineer/Supervisor & Date

RY SCHEDULE EXAMINATION (ELECTRICAL)

PERIODICITY : YEARLY

LOCOMOTIVE NO. :_____ TIME ALLOWED :56 HOURS(7 Shifts)

DATE _____

Under mentioned items in addition to the items of RD, RBM & RM schedules, should be examined in accordance with the instructions contained in manufacturers' Maintenance Manual of the Locomotive.

Sl No.	Items to be examined	Condition / Action taken	Signature of Engineer/ Supervisor

ENGINE SHUT DOWN

1. Governor :
   Clean surface of the silver faced contacts
   of governor Rheostat, governor brush arm.
2. Relays :
   Check and clean contact tips with cleaning
   solvent. Adjust the gap.
3. Reverser :
   i) Inspect and clean interlocks. Renew, if badly worn out.
   ii) Overhauling of reverser.
4. Batteries :
   i) Remove batteries from the locomotive.
   ii) Clean and repaint battery boxes.
   iii) Carry out capacity test on the batteries.
   If capacity is less than 75%, change battery.
   iv) Reinstall tested batteries on the locomotive.
5. Load Meter :
   Check calibration, Rectify.

Sl No.	Items to be examined	Condition / Action taken	Signature of Engineer/ Supervisor

6. Hot Engine Alarm/Idling Switches
(ETS-1 & ETS-2)
Check for loose connection and proper operation. Set at 85^{o}C and 95^{o}C respectively.

7. Power Cut Off Switch :
Clean contact tips and check for loose connections.

8. Engine Starting & Stopping Switches :
Inspect and clean contacts.

9. Self Starter
   h) Commutator cleaning
   i) Brush checking / replacement
   j) Terminal tightening
   k) Pinion Lubrication

10. Eddy Current Clutch :
   i) Check coupling bolts for slackness.
   ii) Check insulation resistance (IR) of clutch coil.
   iii) Check slipring and remove ridges, if any.

11. Insulation Resistance :
Check insulation resistance of control circuit and power circuit of the locomotive. Rectify for low insulation resistance.

12. Load Box Test :
Carry out load box test as per prescribed procedure and record.

Sl No.	Items to be examined	Condition / Action taken	Signature of Engineer/ Supervisor

ENGINE RUNNING

13. Check the following :

i) Engine speed at idle and 8th notch. Record. It should be 400 RPM and 1100 RPM respectively.

ii) Check no load voltage of traction generator at 8th notch engine speed. Record. Adjust if required.

Signature of Supervisor / Engineer & Date

INCOMING SCHEDULE CHECK

PERIODICITY : ON EVERY SHED ARRIVAL

LOCOMOTIVE NO. _____ TIME ALLOWED : 30 MINUTES

DATE _____

Under mentioned items should be checked every time the loco is arriving shed for maintenance or repair :

Sl No.	Items to be examined	Condition / Action taken	Signature of Supervisor

1. Check for abnormal sound and behavior of Loco. Record.
2. Check fuel oil, Lub. oil and cooling water system for leakage and record.
3. Check drivers booked repairs and record if anything missed or incorrectly booked.
4. Check loco brake power, mention brake blocks to be replaced and slot to be changed.
5. Check turbo run down time and record.
6. Check loco deficiencies and enter.
7. Check condition of cab door glasses, windows glasses, engine room doors for proper closing and locking. Mention defective ones.
8. Check traction motor cables and their proper securing.
9. Check traction motor gear case for deficient bolts and hanging.
10. Check for battery charging.
11. Check for proper burning of head lights, engine room and cab lights. Mention location of fused bulbs.
12. Check for proper blowing of horns.

Signature of Supervisor & Date

OUTGOING SCHEDULE CHECK

PERIODICITY : ON EVERY SHED ARRIVAL

LOCOMOTIVE NO. _____ TIME ALLOWED : 30 MINUTES

DATE _____

Under mentioned items should be checked every time the loco is leaving shed after schedule and/or other repair :

Sl No.	Items to be examined	Condition / Action taken	Signature of Supervisor

1. Check brake power of the loco
2. Check universal shaft for loose or missing bolts.
3. Check condition of v-belts.
4. Check expressor lub oil level.
5. Check if both fire extinguishers are on the loco and in working condition.
6. Check for any leakage in the loco.
7. Check if fuel tank filling strainer and caps are fitted. Do not permit the loco otherwise.
8. Check for any abnormal sound in loco.
9. Check engine & loco cleanliness. There should be no spilt oil, rag or cotton waste anywhere in engine, expressor & radiator comprtment.
10. Check working of horn, head light and wipers.
11. Check operations of power contractors, BKTs, F.S. Contactors & Reversers.
12. Check charging rate of batteries.

Sl No.	Items to be examined	Condition / Action taken	Signature of Supervisor

13. Check proper securing of traction motor cables.
14. Check that all the booked repairs of driver and incoming loco examiner have been attended.
15. Pick up any 2 important items of the schedule for which loco was in shed and check for their proper execution. Record your observations.

Signature of Supervisor & Date

ANNEXURE-IX Contd.

RECOMMENDED UNIT EXCHANGE SPARES FOR WDS-6 LOCOS

I. MAJOR ASSEMBLIES

a) Traction Generator
b) Traction motors
c) Wheel sets with axles & brgs.
d) Turbo charger
e) Aux. Generator & excitor
f) Expressor complete
g) PGEV GOVERNOR
h) Eddy current clutch gear unit (once in 4/5 years)
i) Air after cooler blower
j) Engine crank shaft
k) Engine cam shaft

II. MINOR ASSEMBLIES

a) Cylinder head complete
b) Pistons
c) Connecting rods
d) Turbo-rotor assembly
e) Nozzle guide ring
f) Fuel injection pumps
g) Water pump aux.
h) Lub. Oil pump
i) Brake valves
j) Brake cylinders
k) Gear unit fan drive
l) After cooler care
m) Power contactors
n) Reversor

ANNEXURE-IX (Contd.)

o) Relays
p) Batteries
q) Fuel injectors
r) Fuel pump motor
s) Crank case exhauster motor
t) Blower within (front & rare)
u) Inter cooler
v) Master controller
w) Fuel pump support bracket complete assembly
x) Traction motor blower
y) Oil cooler
z) Eddy current clutch
aa) Radiator cooling fan
bb) ECC drive shaft assembly
cc) Traction motor gear case cover
dd) Engine governor drive mechanism
ee) Fuel booster pump/motor

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