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1 GENERAL

1.1 DO's

1. Do keep all tools gauges and instruments in working condition.
2. Do keep all tools, gauges and instruments in easily accessible and earmarked places.
3. Do use only recommended tools, gauges and instruments with due care.
4. Do clean the tools, gauges and instruments after use and keep those back in proper place.
5. Do follow proper instructions for the use of tools, gauges and instruments.
6. Do ensure, all the gauges are periodically checked for their accuracy.
7. Do keep all commonly used tools & gauges in a handy tool box.
8. Do carry tools and gauges in the tool-box to working place.



Figure 1.1

9. Do wear shoes and helmet from safety point of view, wherever necessary.
10. Do be vigilant & careful in workplace & surroundings.
11. Do tighten nuts & bolts fully by applying proper torque.
12. Do work with full of confidence.
13. Do protect bearings from dust/cotton/metal particles by keeping it covered.
14. Do add a few drops of mineral oil to the bearings.
15. Do test the property/quality of new as well as released grease.
16. Do fill new grease/oil for lubrication.
17. Do check all the tools, jigs & fixtures for any deviation.
18. Do ensure use of torque wrench for tightening bolts, whenever recommended.
19. Do follow recommended maintenance practices only.

1.2 DON'Ts

1. Don't wear loose clothes and chappals.
2. Don't use defective tools, gauges and instruments.
3. Don't use over size/improper tools.
4. Don't carry loose tools , gauges etc. separately.
5. Don't apply unsafe methods of working.
6. Don't use oversize bolts/screws, nuts
7. Don't use flat spring washer.
8. Don't leave tools, gauges and instruments at the working place after completion of work.
9. Don't smoke at work place.
10. Don't leave nuts and screws/ bolts half tighten.
11. Don't use nuts and bolts having different pitches together.
12. Don't apply excessive pressure for tightening the nuts, bolts and screw.



Figure 1.2

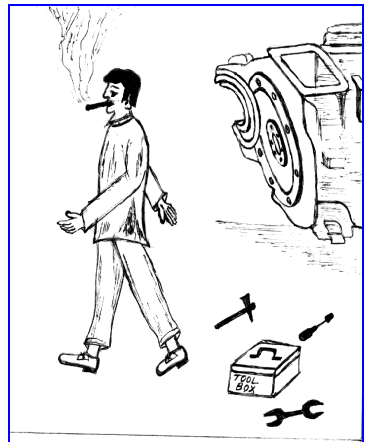


Figure 1.3

13. Don't carry out cleaning work by petrol and welding or cutting work by gas simultaneously & nearby.

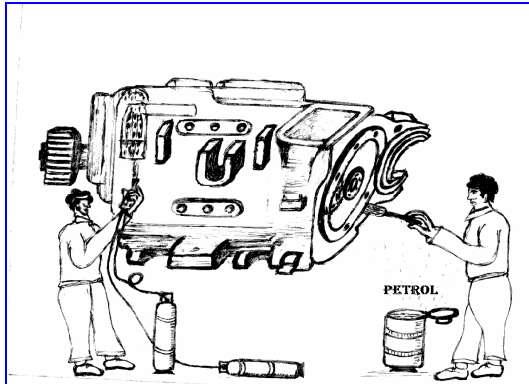


Figure 1.4

14. Don't handle the Tool/Gauges/Instrument/ Equipment with oily or greasy hand.
15. Don't reuse used grease or oil.

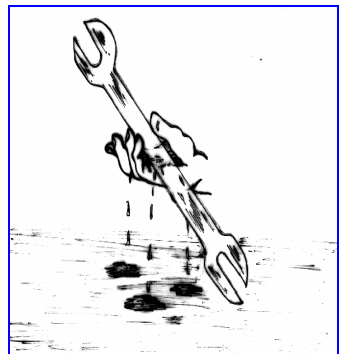


Figure 1.5

2 DURING INSPECTION SCHEDULE

2.1 DO's

2.1.1 During IA, IB, IC Schedule

1. Do ensure the proper cleaning and cooling of TM.
2. Do ensure that the new carbon brushes are of the same grade and size, as the old ones.
3. Do ensure correct brush pressure, between 2.2 kgf to 2.4 kgf, in case of any abnormality.
4. Do ensure free vertical movement of brush in holder guide.
5. Do ensure inspection cover is fitted properly with gasket after checking.
6. Do ensure commutator surface is free from grooves, score marks/ damage etc.
7. Do ensure no carbon or other dust is collected on commutator & insulators.
8. Do check the condition of commutator or any flash marks, burns etc.
9. Do clear the meshes on TMs with a suitable wire

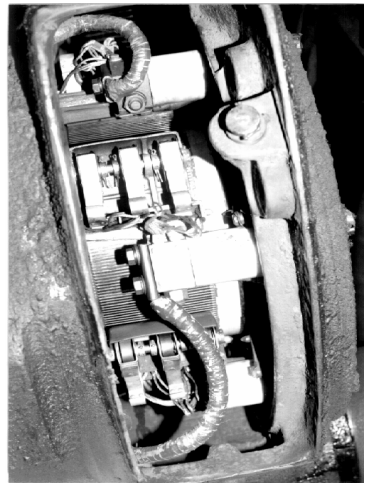


Figure 2.1

brush, with MVMT kept ON.

10. Do check each TM on loco, for proper ventilation with MANOMETER as per ELRS/SMI/39, for ensuring the quantity of air passing through the commutator chamber thus must not fall below 80 cubic meters/ min.
11. Do ensure that none of the cable is rubbing against motor body/cleat bolts, bottom oil sump cover on axle cap.
12. Do check the condition of bellows for any cracks/damage etc. and bellow jallies for any obstruction blocking the air.
13. Do check for any sign of risers overheated.
14. Do check condition of flexible assembly.
15. Do examine the brush holder and all insulators for proper glaze.

2.1.2 During IB & IC Schedule

1. Do check the tightness of all the connections.
2. Do check the tightness of bolts on TM including terminal box, end shields, oil pumps etc.
3. Do ensure washers & locking plates are properly provided.
4. Do check the condition of cable socket of mid-point cables in WAP locos. Ensure that these are properly tightened.
5. Do check the values for any heating sign on resiglass, by throwing light on PE side expended metal.

6. Do maintain a distance of 1.5 mm to 3.5 mm between commutator and brush holder.

2.1.3 During IC & AOH Schedule

1. Do check clearance between carbon brush and brush box (0.3 mm max.) and brush holder spring tension (2.2 Kgf to 2.4 Kgf.)
2. Do ensure the tightness of commutator steel V-cone bolt before assembling.
3. Do clean the inter- bar space on commutator.
4. Do clean commutator with sprit/petrol, wherever required.
5. Do inspect visually commutator end banding and risers for abnormality.
6. Do measure spring tension and check-up condition of brush gear during overhauling.
7. Do examine the condition of pig tails and size of carbon brushes.
8. Do replace carbon brushes, if reached to condemning size/ worn out/ cracked or chipped.
9. Do check spring pins by hand.
10. Do rotate rocker arm and check brush holders and insulators.
11. Do clean V-cone Teflon band ring.
12. Do check inter pole out going lead for crack.
13. Do grease both the end bearings.

14. Do use wood spitula for removing used grease.
15. Do ensure removal of old grease completely and carefully during overhauling.

2.2 DON'TS

2.2.1 During IA, IB & IC Schedule

1. Don't carry any alteration or modification without the approval of competent authority.
2. Don't allow inspection cover open, after completion of work.
3. Don't clear the meshes on TMs, keeping MVMT off.
4. Don't use improper size/ cable cleats.
5. Don't allow loose cable cleating.
6. Don't over tight cable cleats because cable insulation may damage.
7. Don't allow rubbing of cables with TM itself or elsewhere.
8. Don't release the loco without bellow jallies.
9. Don't ignore any symptom, which may cause failure in service.
10. Don't exceed the limit of clearance and other maintenance instruction.
11. Don't work in over confidence.
12. Don't allow dust or other foriegn particles i.e. jute particles, metal particles, scrapped insulation, scrapped mica particles, saw dust etc. mixed up in grease.

13. Don't remove the wrapper or cover of bearings, when not in use.
14. Don't allow entangling of pig tails with brush spring.
15. Don't allow accumulation of carbon dust in brush holders.

2.2.1 During IC & AOH Schedule

1. Don't use the carbon brushes of different grades on same Traction Motor.
2. Don't use higher voltage megger than specified.
3. Don't use detergent or any other volatile cleaning agent/solvent, for cleaning inside the Traction Motor, junction box, insulators etc.
4. Don't use scrapped insulating tape.
5. Don't try to rotate rocker arm without loosening gear by specific tool.
6. Don't mix-up the grease of same grade but different make.
7. Don't allow grease container as well as bearings, open to atmosphere.
8. Don't carry the grease in the empty container of different grade of grease oil, chemical/solvent/paints.
9. Don't reuse the grease, if fallen down on floor.
10. Don't carry out the work of cleaning and greasing

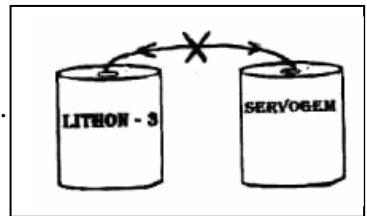


Figure 2.2



simultaneously.

11. Don't do the the greasing with dirty greasegun/ nozzel, greasing inlet valve or nipple.
12. Don't leave the nipple/grease cover in open condition after greasing.
13. Don't place the grease gun here and there.
14. Don't compromise with clearance on bearings.

Figure 2.3

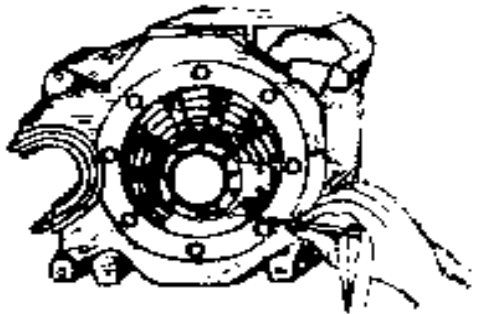


Figure 2.4

15. Don't take the commutator for turning, unless grooves or stepped wear or ovality is found on its surface.
16. Don't polish the commutator surface with sand paper or a file.
17. Don't allow wearing of carbon brush beyond specified dot mark.
18. Don't release brush spring suddenly.
19. Don't fall the brush spring upon the brush head quickly.

20. Don't allow contamination of insulating rod.
21. Don't allow brushes with loose pig tails.
22. Don't drop the locking stud while rotating the rocker-ring.

3 DURING OVERHAULING SCHEDULE

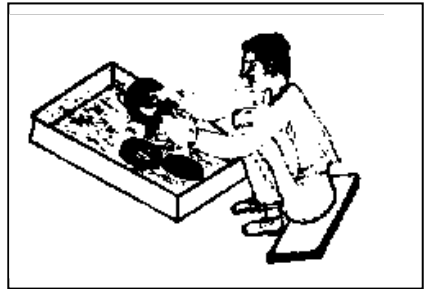
3.1 DO's

1. Do check, oven working for proper baking of stator/armature.
2. Do measure voltage drop during heat run test on overhauled TM.
3. Do tighten the terminal connection with Allen screw in junction box to avoid breakage of leads.
4. Do overhaul the TM in AOH schedule.
5. Do use shock pulse meter (SPM) for monitoring the condition of roller bearing & keep a record of the readings.
6. Do apply loctite 222 or ANR 124 at the threaded portion of bolts/screws.
7. Do use commutator turning lathe and its operating manual and SMIs 6,29 & 31 issued by RDSO, for turning of commutator.
8. Do ensure proper alignment of armature on lathe and correct the eccentricity, if any.

9. Do use recommended tool and align its height parallel to the horizontal centre line of the commutator.
10. Do use recommended cutting speed and feed of the tool to get good finish of 0.8 microns.
11. Do use a small overhang of the tool and set it parallel to the cutting face of job, so that it cuts & burnishes.
12. Do ensure parallel cutting bby mica under cutting blade in side the slot to cut upto recommended depth.
13. Do ensure proper chamfering of commutator copper segments.
14. Do ensure proper dynamic balancing of armature.
15. Do use specified pullers and fixtures for bearing removal.
16. Do use specified guns for greasing through nipples.
17. Do ensure that all specified clearances are maintained properly.
18. Do apply specified tests on overhauled TM.

3.2 DONT's

1. Don't interchange brush holder, rockering ring from one stator to another.
2. Don't interchange the axle cap from one stator to another stator.
3. Don't conduct dielectric proof tests at 1.5 KV AC in AOH
4. Don't clean the bearing in the chemicals/solvent other than kerosene or petrol.
5. Don't clean or remove the bearings by heat treatment method.
6. Don't re-use condemned bearing and racers.
7. Don't allow use of reconditioned bearings.
8. Don't mishandle the TM during overhauling on shop floor.
9. Don't dismantle the TM in careless manner or in hurry, and allow its each part to be given a number.
10. Don't assemble a TM interchanging End-shields, Rocker assembly and Armature from other TM.
11. Don't keep an over hauled TM open on shop floor, to avoid entering of foreign body.



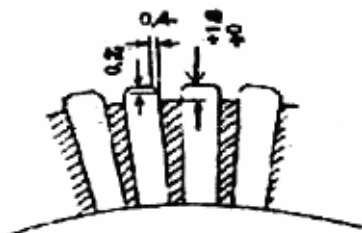
12. Don't strike or pressure fit the bearings unduly, during reassembling.
13. Don't assemble a Traction Motor unless its armature shaft is tested ultrasonically.
14. Don't assemble a Traction Motor without checking tightness of MP and IP.
15. Don't apply an excessive cut in turning, as it reduces the useful life of the commutator.
16. Don't increase the speed of the lathe beyond recommended limit while commutator turning.
17. Don't increase the feed of the tool beyond recommended limit while commutator turning.
18. Don't leave turned commutator uncovered.
19. Don't keep the commutator special screws in loose condition because it may cause high bar or low bar on the commutator.
20. Don't remove anti-rust coating of bearing while cleaning.
21. Don't strike the glass band with a hammer or polish with a file.
22. Don't remove the film on the commutator surface unless there is bad commutation or abnormal wear of carbon brushes.
23. Don't apply grinding stone to the commutator during high speed operation as it may cause vibration.

24. Don't expand the pinion by gas flame for fitment on Armature shaft.

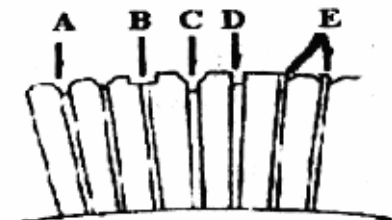
4 IMPORTANT CLEARANCES

4.1 COMMUTATOR

Diameter	New	380 mm
	Condm.	364 mm
Useful Length		140 mm
No. of Segments.		276 mm
Max. Permissible radial wear		8 mm
Mica under cutting depth		$1.8 + 0.2$ $+ 0$



Details of under cutting & chamfering



Example of under cutting

- A. Correct under cutting and chamfering.
- B. Excessively large under cutting.
- C. Excessively deep under cutting.
- D. Left un-chamfered.
- E. Left un-given under cutting.

Figure 4.1

4.2 **ARMATURE**

Radial air gap between

i) Armature & Main pole.	5.5 mm
ii) Armature & Com pole.	6.0 mm

4.3 **BRUSH & BRUSH HOLDER**

Distance between

i) Commutator and Brush Holder	1.5 to 3.5 mm
ii) Brush Holder and Riser	5 to 10 mm
iii) Brush and Brush Holder	0.3 mm (max)

Brush length	New	52 mm
	Condm.	27 mm

Brush width	43 mm
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Brush thickness	8 x 2 mm
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Brush Holder spring tension	2.2 to 2.4 Kgf
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4.4 **ARC HORNS**

Gap between arcing horns	10 ± 1 mm
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4.5 **BEARING**

Make	SKF, NORMA & FAG
Type	PE – NU 328, C4 CE – NH 318, C4

Diametrical clearances

	Avarage(Min)	Absolute(Min)
a) Assembled condition	CE– 0.06 mm	0.05 mm
	PE– 0.07 mm	0.06 mm
b) Before fixing	CE– 0.105 mm	0.125
mm		
	PE– 0.135 mm	0.160 mm
Axial play tentative limit	0.2 mm to 0.6 mm	