JOB NO. 406

TRACTION MOTOR GEARS AND GEARCASE - EXAMINE, LUBRICATE

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/UNIT**	**BR CAT NO**
1	Grease, Crater (12.5kg Drum)		027/002181
2	Grease, Crater (0.5kg Sachet)		027/002187

Safety:- Unit isolated from traction supply.

1. Check that all securing bolts are in position and secure.

2. Examine gearcase for damage or defects.

3. Check that gear teeth are covered with a uniform coat of lubricant (black and shiny).

4. Top up with lubricant compound (see Materials items 1 or 2) if required. Gearcases should not be overfilled and it is necessary to base the amount of 'top up' on the visual check.

Note:- Initial charge of lubricant per gearcase is 10lb.

5. Ensure that all fixing bolts, studs and locking devices are secure.

6. Carry out items 1 to 5 on all other gearcases.

MOTOR GENERATOR SET - EXAMINE

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/ UNIT**	**BR CAT NO**
1	Brush, PM50P for EE704 A & G		053/000295
2	Brush, EG14D for EE704H		053/001857
3	Brush, EG319P for EE704 H & K (Constant Force CF)		098/005456
4	Oil for Commutator Cover		027/023022

Safety:- Unit isolated from traction and auxiliary supply.

1. Check that the air inlets and outlets in the frame are clear. Clean out where necessary.

2. Wipe clean the motor and generator commutator covers and surrounding areas with a dry cloth.

3. Remove the covers, and check for signs of broken brushes or other debris.

4. Examine the motor and generator commutators for damage, copper drag, bar burning or other abnormal marks. (Minor bar edge burning can be ignored).

5. Examine brushes for signs of overheating, chipping, cracking, electrical erosion on the narrow faces, uneven or excessive wear and frayed pigtails.

6. If any of the above defects are present check the commutator profile using a dial gauge or profile recorder.

7. If the commutator has any of the following defects the MG must be changed.

   (a) The commutator is damaged.

   (b) There is copper dragged beyond the bar edges.

   (c) There is bar burning beyond minor edge burning.

   (d) The total indicated run-out is greater than 0.005 in. where measurement has been required (see item 6).

8. Examine as far as possible armature, field coils, internal cables and connections for damage and other defects.

9. Clean the vee ring, brush boxes and support insulators with a dry cloth.

10. Examine brush holder support insulators for signs of movement, cracking or chipping. Change any that are defective.

For clockspring brushgear, carry out items 11-13:-

11. Examine brush boxes for signs of burning and wear. Examine clock springs for tension, security of pressure pad or guide and wear. Check brush box slots for signs of wear, distortion or ridging caused by incorrectly set brush boxes.

12. Fit new brushes to the motor end of 704G MGs. Check the generator brushes for length/condition, renew as required.

13. Check that the hammers are correctly positioned on top of the brush, clear of the pigtails.

For constant force brushgear, carry out items 14-16:-

14. Examine brush boxes for signs of burning and wear. Examine all brushes. Brushes may be removed by squeezing together the legs of the constant force spring to release the locating tongue and removing the spring. Check brush length, and renew if less than minimum 'put back' length.

15. Examine the constant force spring for separating of coils, kinking of the spring and security of rivets.

16. Check brushes are the correct way round. Check brushes for freedom of movement in the brush holder. Check that the constant force spring is correctly located and the tongue correctly located. Check that the brush tension spring works freely.

Note:- For both types of brushgear, it is not permitted to file brushes to ease tightness in their holders. If tight, change the holder.

17. Wipe clean the inside of the commutator covers, lightly lubricate cover catches and refit.

18. Check that all mounting bolts and locking devices are secure.

Note:- For minimum brush 'put back' lengths see Data Section.

MOTOR GENERATOR BEARINGS - LUBRICATE

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/UNIT**	**BR CAT NO**
1	Grease, Lithium 3 (50kg)		027/001356

Safety: Unit isolated from traction and auxiliary supplies.

1. Clean accumulated dirt from the grease nipples.

2. Add grease (see Materials item 1) as follows:

   Motor end - 1/4 oz (7 grammes)
   Commutator end - 1/4 oz (7 grammes)

3. Wipe surplus grease from the greas nipples.

JOB NO. 410

COMPRESSOR - EXAMINE, LUBRICATE

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/UNIT**	**BR CAT NO**
1	Compressor Oil, MO68		027/023221

Safety:- Unit initially isolated from traction and auxiliary supplies at start of job. At the relevant point in this job the auxiliary supply will need to be connected (see text).

1. Clean filler cap surround on each compressor, and check oil level.
2. Top up as required to within 12mm (1/2") of the top of the filler elbow.
3. Refit filler cap.
4. Examine compressor for damage or defects.
5. Carry out items 1to 4 on other compressor, if fitted.
6. **Connect the auxiliary supply in accordance with Maintenance Procedure MP9-003.**
7. With the compressors running check for irregular noises or leaking gaskets.

COMPRESSOR OIL CHANGE

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/UNIT**	**BR CAT NO**
1	Magnetic Drain Plug		070/024027
2	Compressor Oil, MO68		027/023221

Safety:- Unit initially isolated from traction and auxiliary supplies at start of job. At the relevant point in this job the auxiliary supply will need to be connected (see text).

Note:- To be carried out at the first suitable exam between 1 October and 30 November.

1. Remove both 3/8" BSP drain plugs accessible from the side of the vehicle and drain the oil into a 5 litre container.

Note:- The oil should be drained immediately after the compressor has been running, i.e. when the oil is warm. Do not flush out the sump.

2. When the oil has fully drained clean and refit the drain plugs. Ensure that magnetic drain plugs only (see Materials item 1) are refitted.

3. Remove the filler cap and refill the compressor with 4.8 litres (8.5 pints) of oil (see Materials item 1). Refit the filler cap.

Note:- Due the small internal ports within the compressor body casting it may take some time for the oil to enter the sump. It is essential that the sump is fully filled to facilitate the splash lubrication system within.

4. **Connect the auxiliary supply in accordance with Maintenance Procedure MP9-003.**

5. After filling, run up the compressor and ensure that the drain plugs are secure and are not leaking.

6. Shut down the compressor and check that the the oil level is within 12mm (1/2") of the top of the oil filler elbow. If not, top up, run up the compressor again and re-check the oil level. Repeat if necessary.

TRACTION MOTOR SUSPENSION BEARINGS - LUBRICATE

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/UNIT**	**BR CAT NO**
1	Grease, Lithium 3 (50kg)		027/001356

TORQUE FIGURES		
ITEM	**DESCRIPTION**	**TORQUE lbf. ft.**
1	Suspension Tube Cannon Box Bolts	225

Safety:- Unit isolated from traction supply.

Roller Suspension Bearings

1. Clean accumulated dirt from the bearing housing grease nipples and add 2 oz (56 grammes) of grease to the commutator end and 4 oz (112 grammes) of grease to the pinion end (see Materials item 1). Wipe surplus grease from the grease nipples.

2. Ensure that all fixing bolts, studs and locking devices are secure and that the nylon insulation pieces are firmly in position.

3. Carry out items 1 and 2 on all other motors.

Note:- (a) Suspension tube cannon box bolts are to be tightened with a torque wrench.

(b) If bolts are removed for any reason new spring washers should always be fitted.

TRACTION MOTOR COVERS - WINTERISATION

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/UNIT**	**BR CAT NO**
1	Filter Pad		
2	Traction Motor bottom cover		
3	Traction Motor top cover		
4	Side Air Intake complete, Mesh & Filter Unit		
5	Spring Air intake		

Safety:- Wheels scotched. Unit isolated from traction and auxiliary supplies.

Note:- To be carried out at the first suitable exam between 1 October and 30 November.

1. Check if the traction motor covers and side air intakes have been fitted to prevent snow ingress, if not, carry out the following:-

2. Fit a filter pad (see Materials item 1) in the pad carrier of the side air intake (see Figure 1).

3. Remove the existing top and bottom traction motor covers.

4. Replace with the winterised traction motor covers (see Materials items 2 and 3) ensuring that the fasteners are effective and safety catches are engaged.

5. On modified or new bottom covers check the seals are effective.

6. Additionally check that the drain hole (pinion end of case, 6 o' clock position) is clear.

7. Take the removed covers to the stores.

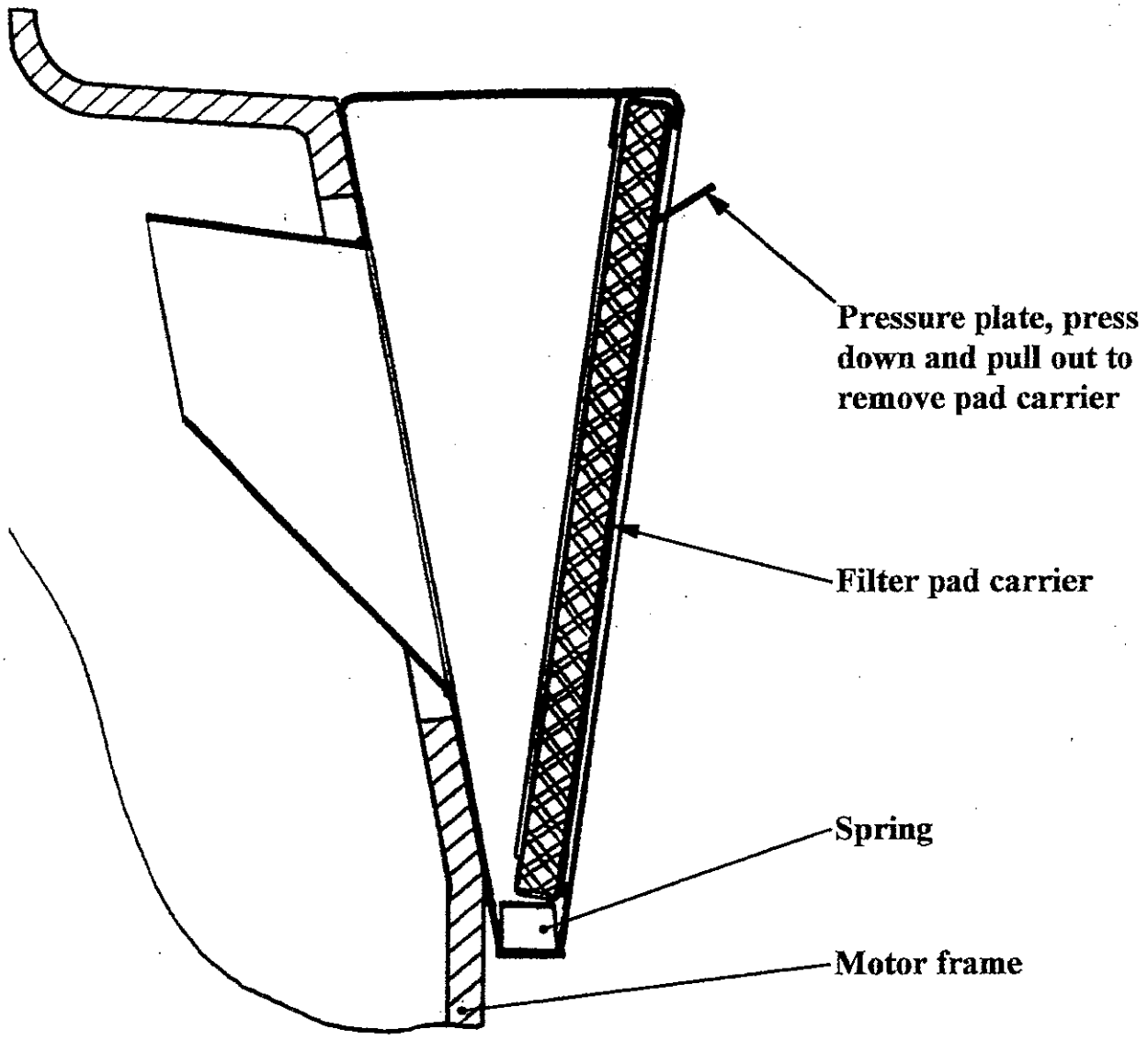
Pressure plate, press down and pull out to remove pad carrier
Filter pad carrier
Spring
Motor frame

Figure 1

TRACTION MOTOR SUSPENSION BEARINGS - PURGE LUBRICATE

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/UNIT**	**BR CAT NO**
1	Grease for Roller Bearings		027/001350

TORQUE FIGURES		
ITEM	**DESCRIPTION**	**TORQUE lbf. ft.**
1	Suspension Tube Cannon Box Bolts	225

Safety:- Unit isolated from traction supply.

Roller Suspension Bearings

1. Clean accumulated dirt from grease nipples and add grease to commutator end and pinion end until fresh grease emerges from bearing housing vents. Wipe surplus grease from nipples.

2. Ensure that all fixing bolts, studs and locking devices are secure and that the nylon insulation pieces are firmly in position.

3. Carry out items 1-2 on all other motors.

Note:- (a) Suspension tube cannon box bolts are to be tightened with a torque wrench (see torque figures in the above table).

(b) If bolts are removed for any reason new spring washers should always be fitted.

TRACTION MOTOR COVERS - WINTERISATION REMOVAL

Safety:- Wheels scotched. Unit isolated from traction and auxiliary supplies.

Note:- To be carried out at the first suitable exam between 15 March and 30 April.

1. Remove the filter pad from the carrier of the side air intake and discard.
2. Remove the winterised traction motor covers.
3. Obtain the standard top and bottom traction motor covers and fit ensuring that the fasteners are effective and safety catches are engaged.
4. Take the removed covers to the stores.

MOTOR GENERATOR SET COVER - WINTERISATION REMOVAL

Safety:- Wheels scotched. Unit isolated from traction and auxiliary supplies.

Note:- To be carried out at the first suitable exam between 15 March and 30 April.

1. Remove the plastic bag from the motor generator cover (where fitted).
2. Open flap on generator end cover.

TRACTION MOTOR DRYING - WINTER

Safety:- Unit isolated from traction and auxiliary supply. Auxiliary supply to be connected during this job.

Note:- This job should be applied when traction motors have become wet or have been subjected to snow and ice conditions i.e. ice, snow, or water within the machines.

Do not operate traction motors at line volts until they have been dried out otherwise damage may occur.

Before drying out motors

Check starting resistances and traction motors for defects or damage, and control circuits for correct operation.

1957 Stock

Use an EE 704 MG set which is not totally enclosed.

Nos. 1 and 2 motors - No. 1 end

Preparation

1. Remove battery fuses, trip all MCB's except Compressors, Run Back, and Control.

   Put the Series switch to the SERIES ONLY position (on the end where the master controller is to be in use).

   Remove all commutator covers on the MG set, traction motor bottom covers, equipment fuses both ends.

   Lift the CLR moving contact and bridge out with a piece of card so that the contacts cannot make, insert paxolin in ISC power contacts.

   Remove sealed earth link where fitted.

1957 Stock (Cont'd)

Special Connections

2. Connect a positive lead from the output side of the positive MG fuse to ensure the fuse remains in circuit (right hand side, GF) to the equipment side connection on the equipment fuse box (left hand connection, S5), with 0-200 amp ammeter in circuit.

   Connect a negative lead from the input side of the negative MG fuse (right hand side LT –), to G4 connection on the Reverser.

   Connect a normally open pushbutton switch to the terminals that are normally bridged by the CLR moving contacts.

   Connect the auxiliary shed supply, close AIS.

   Operate the master controller and allow the brake pipe and main reservoir to fully charge.

Heating

3. Make a full EP brake application, operate the controller handle to position 2 and hold. Close the equipment test switch (TSS). Check the ammeter reading is between 25 and 35 amps. Operate the CLR pushbutton until an ammeter reading of 90 amps is obtained. (Do not exceed this figure). Run for 4 hours at 90 amps, then shut down the unit.

Testing

4. Shut down the unit and disconnect the auxiliary shed supply. Megger all motors.

5. If a satisfactory reading is not obtained, repeat item 3 and then carry out item 4 again. If the reading is still unsatisfactory, then the motor of the associated equipment may be damaged and the defect should be investigated and located.

1957 Stock (Cont'd)

Nos. 1 and 2 Motors - No. 2 end

Preparation

6. Place a unit with a suitable MG set (i.e. not totally enclosed) on an adjacent road opposite the equipment.

On the unit with the MG set

7. Isolate unit from traction and auxiliary supply. Remove the battery fuses, trip all MCB's. Remove all commutator covers on the MG set on 1957 stock or the motor end covers on 1963 stock.

On the unit to be heated

8. Carry out items 1 - 3.

Completion

9. With unit disconnected from the auxiliary supply, remove the connections and insulation pieces, refit bolts, fuses and links and reset MCB's. Refit covers and secure.

1963 Stock

Use an EE 704 MG set which is not totally enclosed.

Nos. 1 and 3 motors

Preparation

10. Remove battery fuses, trip all MCB's except Compressors, Run Back, and Control.

    Put the Series switch to the SERIES ONLY position (on the end where the master controller is to be in use).

    Remove all commutator covers on the MG set, traction motor bottom covers, equipment link, G2 copper strap fixing bolt on CLR (Do not touch current coil fixing bolts).

    Lift the CLR moving contact and bridge out with a piece of card so that the contacts cannot make. Insert paxolin in the top right hand pairs of power contacts (C2, C6) on No. 1 and No. 2 reversers, and L2 power contacts.

Special Connections

11. Connect a positive lead from the output side of the positive MG fuse to ensure the fuse remains in circuit (right hand side, GF) to the equipment side (lower S2) connection for the e quipment link, with 0 - 200 amp ammeter in circuit.

    Connect a negative lead from the input side of the negative MG fuse (right hand side LT-) to G3 strap/CLR connection.

    Connect a normally open pushbutton switch to the terminals that are normally bridged by the CLR moving contact.

    Connect the auxiliary shed supply, close AIS.

    Operate the master controller and allow the brake pipe and main reservoir to fully charge.

1963 Stock (Cont'd)

Heating

12. Make a full EP brake application. Operate the controller handle to position 2 and hold. Close the equipment test switch (TSS). Check the ammeter reading is between 50 and 60 amps. Operate the CLR pushbutton until an ammeter reading of 150 - 160 amps is obtained. (Do not exceed this figure). Run for 4 hours at 150 amps, then shut down unit.

Testing

13. Shut down the unit and disconnect the auxiliary shed supply. Megger all motors.

14. If a satisfactory reading is not obtained, repeat item 12 and then carry out item 13 again. If the reading is still unsatisfactory, then the motor of the associated equipment may be damaged and the defect should be investigated and located.

Nos. 2 and 4 motors

Preparation

15. Carry out item 10 except that in this case the paxolin should be inserted in the bottom right hand pairs of power contacts (C2, C6) on No. 1 and No. 2 reversers.

Special Connections

16. Carry out item 11.

Heating

17. Carry out item 12.

Testing

18. Carry out items 13 and 14.

Completion

19. With unit disconnected from the auxiliary supply, remove the connections and insulation pieces, refit bolts, fuses and links, and reset MCB's. Refit covers and secure.

BUFFET CAR ANTI-FROST HEATERS - RE-INSTATE WINTERISATION

Safety:- Auxiliary supply connected.

Note:- To be carried out at the first exam after 15 September.

1. Check that the anti - frost heaters are functioning correctly, repair if defective.

BUFFET CAR ANTI-FROST HEATERS - ISOLATION

Safety:- Auxiliary supply connected.

Note:- To be carried out at the first suitable exam between 15 March and 30 April.

1. Check that the anti - frost heaters are isolated.

JOB NO. 450

MOTOR GENERATOR SET COVER - WINTERISATION

MATERIALS			
ITEM	**DESCRIPTION**	**QTY/UNIT**	**BR CAT NO**
1	Plastic bag	As req	

Safety:- Wheels scotched. Unit isolated from traction and auxiliary supplies.

Note:- To be carried out at the first suitable exam between 1 October and 30 November.

1. Check if the motor generator ventilated covers have been fitted to prevent snow ingress, if not, carry out the following:-

2. Blank off any ventilated motor generator cover with a plastic bag (see Materials item 1).