

MT/43

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# British Railways Board

Mechanical & Electrical Engineer's Department

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## WORKSHOP PROCESS SPECIFICATION

Timken Roller Bearings  
Used in Axleboxes



PREFACE

This Workshop Process Specification is to be used in connection with Timken roller bearings used in axleboxes.

See Engineering Instruction No. G/65.

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WORKSHOP PROCESS SPECIFICATION NO. MT/43TIMKEN ROLLER BEARINGS USED IN AXLEBOXESCOACHING AND FREIGHT STOCK - AT TYRE TURNINGPROCEDURE1.1 CLEANING

Clean outside of box to remove road dirt (by means of tunnel washing machine, high pressure water spray, hand scraping, etc.). This external cleaning must be carried out at some distance from the bearing maintenance area.

1.2 EXAMINATION

Remove front cover to provide access for journal centre for tyre turning. Only remove body shell if this is necessary for wheel pair to enter lathe, and then proceed as for tyre renewal. Remove locking plate and any driving fixture on the designs where this is present if necessary to provide access to the journal centre.

The exposed end of the box, following the front cover removal or the exposed races in the event of the shell being removed, must be protected by a cover to prevent the entry of metal turnings.

After tyre turning examine condition of grease at end of bearing to ensure that it has not become contaminated with metal particles, water or grit whilst in service. Remove grease, clean and examine end of bearing. Rotate axlebox to ensure that it turns freely without any feeling of roughness. Any box found to be unsatisfactory in any of the above respects must receive further attention to determine whether any damage to the bearing has occurred. The shell or complete unit must be removed, then proceed as for tyre renewal.

1.3 RE-ASSEMBLY & GREASING

If satisfactory, refit locking cap on those designs where this is present and torque load bolts, then secure with locking wire to prevent the bolts becoming loose, as shown in Appendix 8.

Top up with grease to cat. no. 9/27/1350 by either of the following methods which ensure that only 60%-70% of the free space of the box is filled with grease.

Replace the front cover finger tight. Fill the box with grease, via the grease nipple provided on the box or by fitting a grease pump adaptor in place of the grease plug, until it emerges from the rear seal. Take off the front cover and remove grease from the top hat space. Then replace the front cover, cork gasket where fitted, and grease plug.

Alternatively, a dummy cover incorporating a grease pipe and packing piece of equivalent volume to the required air space can be fitted and grease pumped into the box through the dummy cover until it starts to exude from the rear seal. The dummy cover should then be removed.

and the front cover and cork gasket, where present, re-fitted.

Secure front cover bolts by means of locking wire or other approved method as appropriate to the type of axlebox.

Secure front cover bolts by means of approved lock washers as shown in Appendix 9 (page 20).

## 2 COACHING STOCK - AT TYRE RENEWAL

### PROCEDURE

#### 2.1 CLEANING

After tyre renewal, clean outside of box to remove road dirt (by means of tunnel washing machine, high pressure water spray, hand scraping, etc.). This external cleaning must be carried out at some distance from the bearing maintenance area.

#### 2.2 PRELIMINARY EXAMINATION

Remove front cover to provide access for journal centre for tyre turning. Only remove body shell if this is necessary for tyre renewal or for wheelset to enter lathe. Remove locking plate and any driving fixture on the designs where this is present, if necessary to provide access to the journal centre.

The exposed end of the box, following the front cover removal or the exposed races in the event of the shell being removed, must be protected by a cover to prevent the entry of metal turnings.

After tyre turning examine condition of grease at end of bearing to ensure that it has not become contaminated with metal particles, water or grit whilst in service. Rotate axlebox to ensure that it turns freely without any feeling of roughness. The results of these quick tests will indicate whether any bearing defects should be expected.

Check end play which should be in range .002" - .030". If axlebox has more than .030" end play the box must be adjusted to bring the end play to the as new condition i.e. .002" - .008" following degreasing and cleaning.

NOTE. Procedure for checking and adjusting end play is detailed in Appendix 5.

If bearing shell has to be removed, for tyre renewal or to permit entry into lathe, end play must be checked prior to removal.

#### 2.3 REMOVAL OF AXLEBOX BODY

DIRECT MOUNTED BEARINGS\* Remove bearing shell as follows:- Place wooden wedges between wheel boss and rear cover of axlebox on horizontal centre line. Then release nuts securing axlebox shell to rear cover. Steadily withdraw shell forward off bearings, the outer cup will be retained in the axlebox shell. Clean and etch top vertical position of the outer and inner bearing at dismantling to identify position of previous load zone.

Remove wooden blocks from between wheel boss and rear cover. Clean

and degrease the exposed roller assembly on the journal using a spray-pump apparatus or with brushes, lint-free cloth, and white spirit or other approved liquid. Also degrease and clean the bearing shell and front cover similarly.

2.3.2 INDIRECT-MOUNTED BEARINGS\*. Remove complete unit from journal as detailed in Appendices 1 and 2. Remove bearings, degrease and clean on bench as above.

## 2.4 INSPECTION OF BEARINGS

Examine inner and outer rings, rollers and cages for defects. If these are found, refer to B.R. Manual MT/32 for details of action to be taken. Bearings which have defects in the outer ring track above the permitted limit can be repaired by fitting new outer rings to the existing roller assemblies. No other component change is permitted. Procedure for the removal and replacement of defective direct mounted bearings is given in Appendices 1, 2, 3 and 4.

## 2.5 RE-ASSEMBLY

If no defects are found or if defects are below the permitted level of B.R. MT/32 the box should be re-assembled as follows:-

2.5.1 DIRECT MOUNTED BEARINGS - Replace outer rings in axlebox shell and on inner rollers respectively and position rear cover in correct position and then apply wooden wedges as for disassembly. Outer rings are to be replaced turned clockwise through 90° from the previous load zone. Replace axlebox shell and tighten up onto rear cover.

NOTE. Apply Anti-Fret compound to bore of axlebox.

2.5.2 INDIRECT MOUNTED BEARINGS - Re-assemble bearings, then press complete unit onto journal as described in Appendices 3 and 4.

NOTE. Apply Anti-Fret compound to bore of outer shell.

Check end play if an adjustment has been made or if new outer ring(s) have been fitted. Detailed procedure is given in Appendix 5. Axleboxes must not be fitted with less than .002" end play.

Refit bearing locking plate (axle end cap) on those designs where applicable and torque load bolts, then secure with locking wire to prevent the bolts working loose, as shown in Appendix 8.

## 2.6 GREASING, ETC.

Fill box with grease to cat. no. 9/27/1350 by either of the following methods which ensure that only 60%-70% of the free space of the box is filled with grease. Use the grease nipple provided on the box or fit a grease pump adaptor in place of the grease plug.

\* Diagrams of direct and indirect bearings are shown in Appendix 7.

Replace the front cover finger tight. Fill the box with grease until it emerges from the rear seal. Take off the front cover and remove grease from the top hat space. Then replace the front cover, cork gasket where fitted, and grease plug.

Alternatively, a dummy cover incorporating a grease pipe and packing piece of equivalent volume to the required air space can be fitted and grease pumped into the box through the dummy cover until it starts to exude from the rear seal. The dummy cover should then be removed and the front cover and cork gasket where present, refitted.

Secure front cover bolts by means of approved lock washers as shown in Appendix 9 (page 20).

### 3 COACHING AND FREIGHT STOCK - AT WHEEL/AXLE RENEWAL

#### PROCEDURE

##### 3.1 CLEANING

Clean outside of box to remove road dirt (by means of tunnel washing machine, high pressure water spray, hand scraping, etc.). This external cleaning must be carried out at some distance from the bearing maintenance area.

##### 3.2 PRELIMINARY EXAMINATION

Remove front cover, examine condition of grease at end of bearing to ensure it has not become contaminated with metal particles, water or grit whilst in service. Rotate axlebox to ensure it turns freely without any feeling of roughness. The results of these quick tests will indicate whether any bearing defects should be expected. Check end play which should be in range .002" - .030". If axlebox has more than .030" end play the box must be adjusted to bring the end play to the as new condition i.e. .002" - .008" following degreasing and cleaning.

NOTE. Procedure for checking and adjusting end play is detailed in Appendix 5.

##### 3.3 REMOVAL OF AXLEBOX AND BEARINGS

3.3.1 DIRECT MOUNTED BEARINGS Remove bearing shell as follows:- Place wooden wedges between wheel boss and rear cover of axlebox on horizontal centre line. Then release nuts securing axlebox shell to rear cover. Steadily withdraw shell forward off bearings, the outer cup will be retained in the axlebox shell. Clean and etch top vertical position of the outer and inner bearing at dismantling to identify position of previous load zone.

Remove wooden blocks from between wheel boss and rear cover. Clean and degrease the exposed roller assembly on the journal using a spray-pump apparatus or with brushes, lint-free cloth and white spirit or other approved liquid. Also degrease and clean the bearing shell and front cover similarly.

Remove bearing races from the axle journal as detailed in Appendices 1 and 2. Degrease and clean on bench as above.

3.3.2 INDIRECT-MOUNTED BEARINGS Remove complete unit from journal as detailed in Appendices 1 and 2. Remove bearings, degrease and clean on bench as above.

### 3.4 INSPECTION OF BEARINGS

Examine inner and outer rings, rollers and cages for defects. If these are found, refer to B.R. Manual MT/32 for details of action to be taken. Bearings which have defects in the outer ring track above the permitted limit can be repaired by fitting new outer rings to the existing roller assemblies. No other component change is permitted.

### 3.5 RE-ASSEMBLY

If no defects are found or if defects are below the permitted level of B.R. MT/32 the box should be re-assembled as follows:-

3.5.1 DIRECT MOUNTED BEARINGS Press bearing races onto journal as detailed in Appendices 3 and 4, replace outer rings in axlebox shell and on inner rollers respectively and position rear cover in correct position and then apply wooden wedges as for disassembly. Outer rings are to be replaced turned clockwise through 90° from the previous load zone. Replace axlebox shell and tighten up onto rear cover.

NOTE. Apply Anti-Fret compound to bore of axlebox.

3.5.2 INDIRECT MOUNTED BEARINGS Re-assemble bearings, then press complete unit onto journal as described in Appendices 3 and 4.

NOTE. Apply Anti-Fret compound to bore of axlebox.

Check end play if an adjustment has been made or if new outer ring(s) have been fitted. Detailed procedure is given in Appendix 5. Axleboxes must not be fitted with less than .002" end play. Refit bearing locking plate (axle end cap) on those designs where applicable and torque load bolts, then secure with locking wire to prevent bolts working loose, as shown in Appendix 8.

### 3.6 GREASING ETC.

Fill box with grease to cat. no. 9/27/1350 by either of the following methods which ensure that only 60% - 70% of the free space of the box is filled with grease. Use the grease nipple provided on the box or fit a grease pump adaptor in place of the grease plug.

Replace the front cover finger tight. Fill the box with grease until it emerges from the rear seal. Take off the front cover and remove grease from the top hat space. Then replace the front cover, cork gasket where fitted, and grease plug.

Alternatively, a dummy cover incorporating a grease pipe and packing piece of equivalent volume to the required air space can be fitted and grease pumped into the box through the dummy cover until it

starts to exude from the rear seal. The dummy cover should then be removed and the front cover and cork gasket where present, refitted.

Secure front cover bolts by means of locking wire or other approved method as appropriate to the type of axlebox.

Secure front cover bolts by means of approved lock washers as shown in Appendix 9 (page 20).

## LOCOMOTIVES (EXCEPT DIESEL HYDRAULICS) - AT EVERY CLASSIFIED BOGIE OVERHAUL

### PROCEDURE

#### 4.1 CLEANING

Clean outside of box to remove road dirt (by means of tunnel washing machine, high pressure water spray, hand scraping, etc.). This external cleaning must be carried out at some distance from the bearing maintenance area.

#### 4.2 PRELIMINARY EXAMINATION

Remove front cover to provide access for journal centre for tyre turning. Only remove body shell if this is necessary for wheelpair to enter lathe. Remove locking plate on the designs where this is present, if necessary to provide access to the journal centre.

The exposed end of the box, following the front cover removal, or the exposed races in the event of the shell being removed, must be protected by a cover to prevent the entry of metal turnings.

After tyre turning examine condition of grease at end of bearing to ensure that it has not become contaminated with metal particles, water or grit whilst in service. Rotate axlebox to ensure that it turns freely without any feeling of roughness. The results of these quick tests will indicate whether any bearing defects should be expected.

Check end play which should be in range .002" -.030". If axlebox has more than .030" end play the box must be adjusted to bring the end play to the as new condition i.e. .002" - .008".

NOTE. Procedure for checking and adjusting end play is detailed in Appendix 5.

If bearing shell has to be removed, to permit entry into lathe, end play must be checked prior to removal.

#### 4.3 REMOVAL OF AXLEBOX BODY

4.3.1 DIRECT MOUNTED BEARINGS Remove bearing shell as follows:- place wooden wedges between wheel boss and rear cover of axlebox on horizontal centre line. Then release nuts securing axlebox shell to rear cover. Steadily withdraw shell forward off bearings, the outer cup will be retained in the axlebox shell. Clean and etch top vertical position of the inner and



outer bearing at dismantling to identify position of previous load zone.

Remove wedges from between wheel boss and rear cover. Clean and degrease the exposed roller assembly, on the journal, using a spray-pump apparatus or with brushes, lint-free cloth and white spirit or other approved liquid. Also degrease and clean the bearing shell and front cover similarly.

- 4.3.2 INDIRECT MOUNTED BEARINGS Remove complete unit from journals as detailed in Appendices 1 and 2. Remove bearings, degrease and clean on bench as above.

#### 4.4 INSPECTION OF BEARINGS

Examine inner and outer rings, rollers and cages for defects. If these are found refer to B.R. Manual MT/32 for details of action to be taken. Bearings which have defects in the outer ring tracks, above the permitted limits, can be repaired by fitting new outer rings to the existing roller assemblies. No other component change is permitted. Procedure for the removal and replacement of defective direct mounted bearings is given in Appendices 1, 2, 3 and 4.

#### 4.5 RE-ASSEMBLY

If no defects are found or if defects are below the permitted level of B.R. MT/32 the box should be re-assembled as follows:-

- 4.5.1 DIRECT MOUNTED BEARINGS Replace outer rings in axlebox shell and on inner rollers respectively and position rear cover in correct position and then apply wooden wedges as for disassembly. Outer rings are to be replaced turned through 90° from the previous load zone. Replace axlebox shell and tighten up onto rear cover.

NOTE. Apply Anti-Fret compound to bore of axlebox.

- 4.5.2 INDIRECT MOUNTED BEARINGS Re-assemble bearings, then press complete unit onto journal as described in Appendices 3 and 4.

NOTE. Apply Anti-Fret compound to bore of outer shell.

Check end play if an adjustment has been made or if new outer ring(s) have been fitted. Detailed procedure is given in Appendix 5. Axle boxes must not be fitted with less than .002" end play.

Refit bearing locking cap (axle end cap) on those designs where applicable and torque load bolts, then secure with locking wire to prevent bolts working loose, as shown in Appendix 8.

#### 4.6 GREASING ETC.

Top up with grease to cat. no. 9/27/1350 by either of the following methods which ensure that only 60% - 70% of the free space of the box

is filled with grease.

Replace the front cover finger tight. Fill the box with grease via the grease nipple provided on the box or by fitting a grease pump adaptor in place of the grease plug until it emerges from the rear seal. Take off the front cover and remove the grease from the top hat space. Then replace the front cover, cork gasket where fitted and grease plug.

Alternatively, a dummy cover incorporating a grease pipe and packing piece of equivalent volume to the required air space can be fitted and grease pumped into the box through the dummy cover until it starts to exude from the rear seal. The dummy cover should then be removed and the front cover and cork gasket, where present, refitted.

Secure front cover bolts by means of approved lock washers as shown in Appendix 9 (page 20).

APPENDIX 1REMOVAL OF BEARING RACES (DIRECT MOUNTED) AND INDIRECT MOUNTED BEARINGS (INCLUDING WAGON AND A.P. UNITS) USING A WHEEL PRESS

A cast or fabricated steel withdrawal box is used. This is split horizontally and bolted together. It is secured to lugs on the resistance head of the press by four adjustable tie bars. Withdrawal pressure is taken by the abutment piece of the bearing races or bearing unit.

The inner machined face of the withdrawal box contacts the outer face of the abutment piece. It is essential that no pressure is applied to the cupholder axlebox body during withdrawal.

PROCEDURE

The sequence of operations for bearing races, axlebox or bearing unit removal is as follows:-

- 1.1 Clean the outside of the box as detailed in item 1 of the maintenance procedure. Remove the inspection plate. In the case of the direct mounted bearings remove the rear cover nuts and spring washers and withdraw the axlebox shell.
- 1.2 Fit the screwed pilot to the axle end. For axles with spigot ends of diameter smaller than the journal a threaded split insert ring is required. The halves of this split insert ring are placed round the groove in the axle end, with the located peg in the hole. The vertical side of the buttress thread must face the wheel.
- 1.3 Place the top half of the withdrawal box in position behind the rear cover and secure temporarily with a wooden wedge.
- 1.4 Insert bottom two tie bars into bottom lugs on press and secure tie bar pins.
- 1.5 Place bottom half of withdrawal box in position on free ends and secure with tie bar pins.
- 1.6 Insert the two top tie bars in the upper lugs on press.
- 1.7 Lift wheelset into press, at the same time engaging top and bottom halves of withdrawal box.
- 1.8 Engage top tie bars into the top lugs on the withdrawal box and secure with tie bar pins.
- 1.9 Bolt withdrawal box together.
- 1.10 Adjust all tie rods to a common length.
- 1.11 Press of bearings (axlebox or bearing unit), the ram extension contacting the screwed pilot and driving the axle through the bearing inner race.

- 1.12 Swing top tie rods clear and unbolt withdrawal box.
- 1.13 Lift wheelset clear.
- 1.14 Remove bearings (axlebox components or bearing unit) from pilot.
- 1.15 Remove the pilot (and screwed insert ring where applicable) from the axle.
- 1.16 Coat the axle journal, and the bearing components if these are not to be worked on immediately, with a light machine oil and protect from dust and foreign matter.

APPENDIX 2REMOVAL OF BEARING RACES (DIRECT MOUNTED) AND INDIRECT MOUNTED BEARINGS  
(INCLUDING WAGON AND A.P. UNITS) USING A PORTABLE HYDRAULIC PRESSPROCEDURE

The sequence of operations is similar to that described in Appendix 1 (removal using wheel press). In this case, however, a tension support bar is screwed into the end of the pilot, thus providing a support for the portable press.

The withdrawal box is attached to the body of the press by means of adjustable bars. The press ram contacts the end of the pilot and as pressure is applied the cylinder of the press recedes and draws the withdrawal box and bearings off the axle.

APPENDIX 3PRESSING ON BEARING RACES (DIRECT MOUNTED) AND INDIRECT MOUNTED BEARINGS (INCLUDING WAGON AND A.P. UNITS) USING A WHEEL PRESSPROCEDURE

The sequence of operations for bearing race, axlebox or bearing unit replacement is as follows:-

- 1.1 Place the wheelset in the press and line it up by sighting along the tie bar of the press.
- 1.2 Check the axle journal with a spirit level to make sure it is horizontal
- 1.3 Fit the pilot to the axle end. On axles with plain ends the pilot is secured with 3 socket head retaining screws. On axle ends with recessed spigots the pilot is threaded and is secured by means of a threaded split insert ring. On axle ends with plain spigots the pilot locates on the spigot.
- 1.4 At the opposite end of the axle fit an adaptor which will allow the pressure to be taken squarely on the extreme end of the axle during the pressing-on operation.
- 1.5 Spread thin film of lubricant, castor oil or heavy mineral oil over the bearing and abutment seatings. Similarly treat the bearing cone and abutment piece bores.
- 1.6 Lift the bearing races/axlebox/unit onto the pilot with the abutment piece/rear cover facing the wheel.
- 1.7 Place the pressing-on sleeve over the end of the pilot keeping it square against the outer face of the bearing cone as the pressing-on is commenced. Slowly revolve the bearing/axlebox/unit during the pressing-on operation; it should turn quite freely.

The normal pressure required is 10 - 15 tons, depending on the size and section of the bearing core, but to make sure the bearing is firmly sealed against its abutment, the pressure should be allowed to rise momentarily to approximately 50% over that attained whilst pressing-on.

- 1.8 After the first bearing/axlebox/unit is pressed-on, remove the pressing on sleeve and pilot.
- 1.9 Fit the pilot (plus split insert ring where applicable) to the opposite end of the axle. Apply an adaptor to the other axle end, this will allow pressure to be taken squarely on the extreme end of the axle during the pressing-on of the second bearing/box/unit. Under no circumstances must the first bearing/box/unit be subject to any pressure.
- 1.10 Spread a thin film of lubricant, castor oil or heavy mineral oil over

the bearing and abutment seatings and also over the bearing cone and abutment piece bores.

- 1.11 Lift the second bearing/hox/unit onto the pilot and proceed as for the first.
- 1.12 Remove the pressing-on sleeve and pilot (and split insert ring where applicable).

APPENDIX 4PRESSING ON BEARING RACES (DIRECT MOUNTED) AND INDIRECT MOUNTED BEARINGS (INCLUDING WAGON AND A.P. UNITS) USING A PORTABLE HYDRAULIC PRESSPROCEDURE

The sequence of operations for bearing race, axlebox or bearing unit replacement is as follows:-

- 1.1 Lubricate the bearing and abutment seatings and the bearing cone and abutment piece bores with the zinc oxide/boiled linseed oil mixture.
- 1.2 Lift the bearing/box/unit on to the pilot with the abutment piece/rear cover facing the wheel.
- 1.3 Fit threaded split insert ring and pilot as detailed in Appendix 3.
- 1.4 Screw the tension support bar into the rear of the pilot.
- 1.5 Locate the pressing-on sleeve on the pilot.
- 1.6 Lift the press onto the tension support bar.
- 1.7 Screw the retaining nut up to the rear face of the press body.
- 1.8 Close the return valve and commence pumping. During the pressing-on operation slowly revolve the bearing/box/unit, it should turn quite freely. The normal pressure required is 10 to 15 tons, depending on the size and section of the bearing cone, but to ensure that the bearing/box/unit is firmly seated against the abutment, the pressure should be allowed to rise momentarily to approximately 50% over that attained whilst pressing-on.
- 1.9 Open the relief valve and allow the pressure to return to zero.
- 1.10 Return the ram to its original position and dismantle the rig.



APPENDIX 5CHECKING AND ADJUSTING END PLAYPROCEDURECHECKING END PLAY

- 1.1 Check for end play using a magnetic base indicator stand and a dial test indicator with 0.001" graduations as follows:- attach the magnetic base indicator stand to the axlebox shell. Mark a convenient spot on the axle end as near to the axle centre as possible. The stem of the indicator must contact the axle end.
- 1.2 With the dial indicator in position pull very hard but steadily on the axlebox and rotate it at the same time. Without releasing the pressure, steady the axlebox so that the plunger contacts the marked spot on the axle end and note the dial indicator reading.
- 1.3 Now push hard on the axlebox, rotating it as before, turn the axlebox until the stem of the dial indicator contacts the marked spot on the axle end, then take a second dial indicator reading. The difference between the two readings is the amount of end play in the bearing. (N.B. if bearing shell has been removed for tyre-turning, end play measurements will have to be taken at re-assembly).
- 1.4 End play measurements should be within the range .002" - .030". If the axlebox has more than .030" end play the box must be readjusted to bring the end play to the "as new" condition, i.e. .002" - .008", following degreasing and cleaning.

2 ADJUSTING END PLAY

- 2.1 For direct mounted bearings end play is decreased by removing a shim from between the rear cover and the face of the axlebox housing.
- 2.2 For indirect mounted bearings (including wagon bearing units and A.P. units) the axlebox must be withdrawn from the journal as described in Appendices 1 or 2.

Measure the cone spacer length, then adjust by removing an equal amount of metal from each side of the spacer.

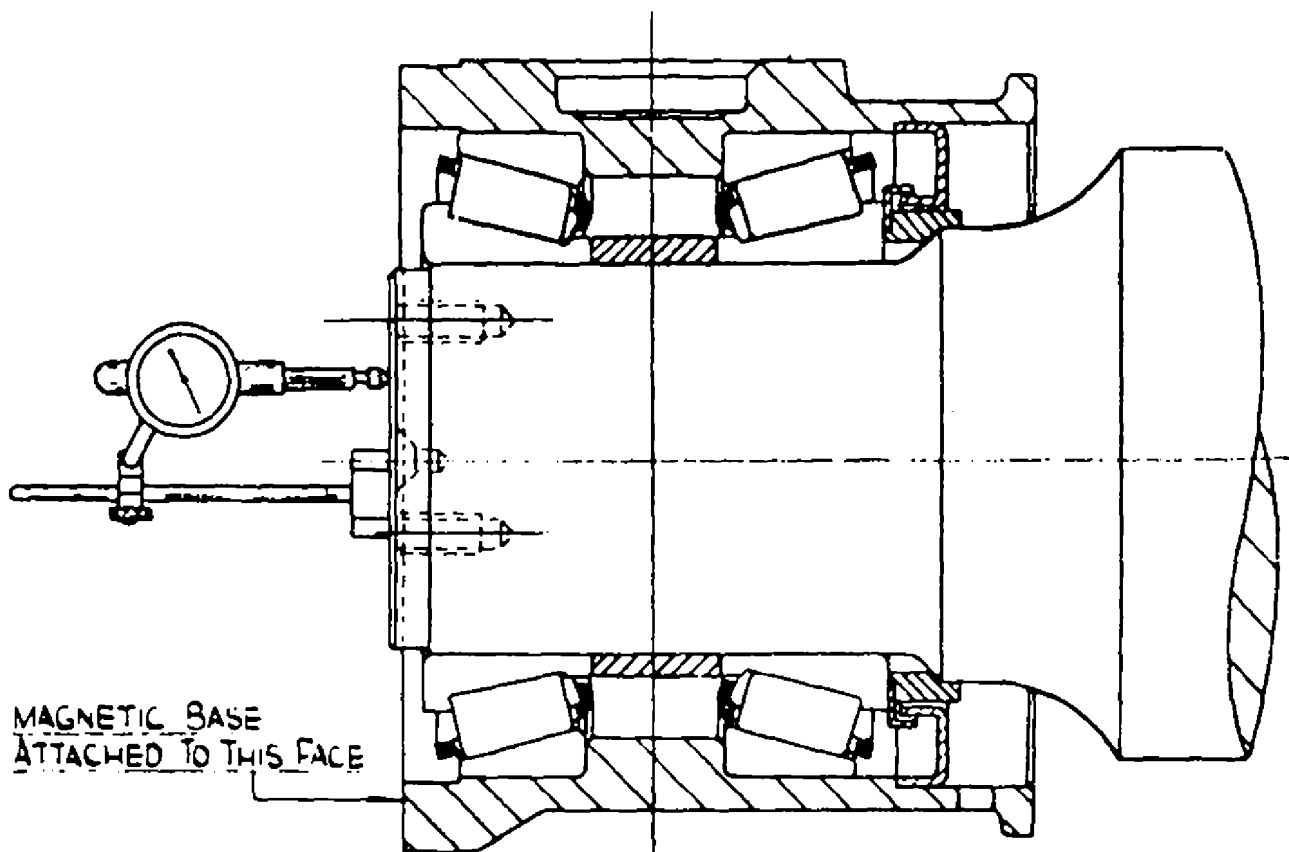
e.g. if measured length of spacer is 1.482"  
 and measured end play is .032"  
 required end play is .002" - .008" (say .005")  
 revised length of spacer required will be:  

$$1.482" \text{ minus } (.032" - .005")$$

$$= 1.455"$$

- 2.3 Where the end play has been decreased at overhaul it must be checked at bearing re-assembly. On no account must a box be assembled with less than .002" end play.

3. ILLUSTRATION



MAGNETIC BASE  
ATTACHED TO THIS FACE

END PLAY CHECK

## APPENDIX 6

### TOOLS FOR PRESSING ON OR WITHDRAWING BEARINGS

Details of their use are to be found in the appropriate sections of this process specification.

1 For direct mounted bearings these are:-

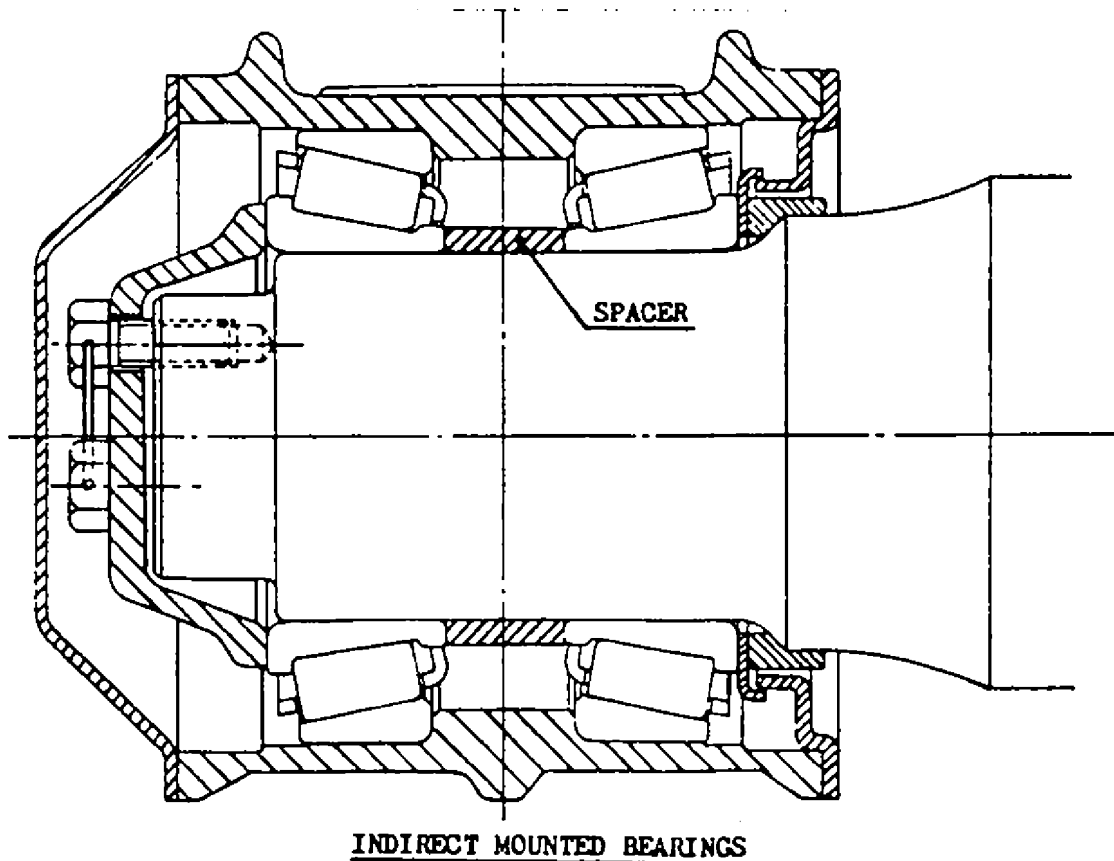
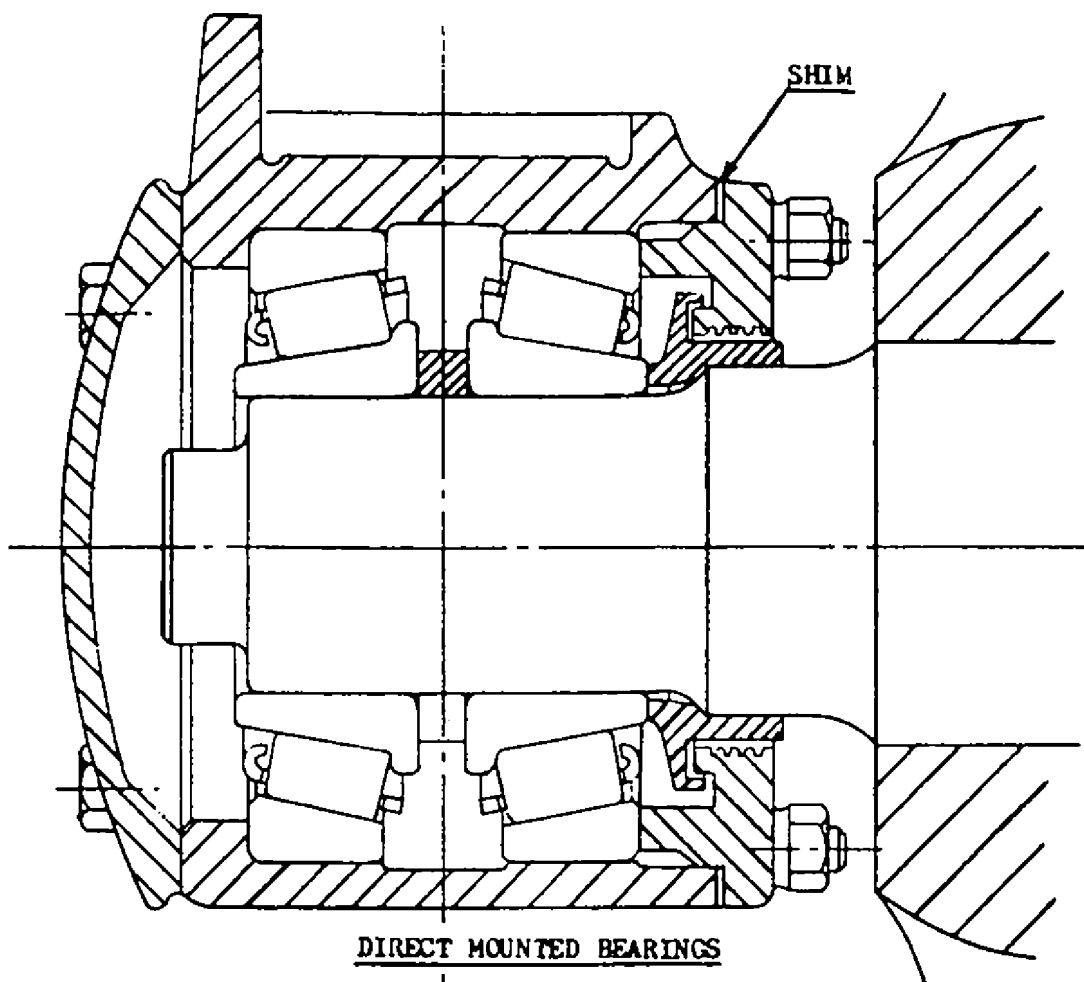
- Withdrawal box
- Pilot
- Threaded split insert ring
- Pressing-on sleeve
- Adaptor

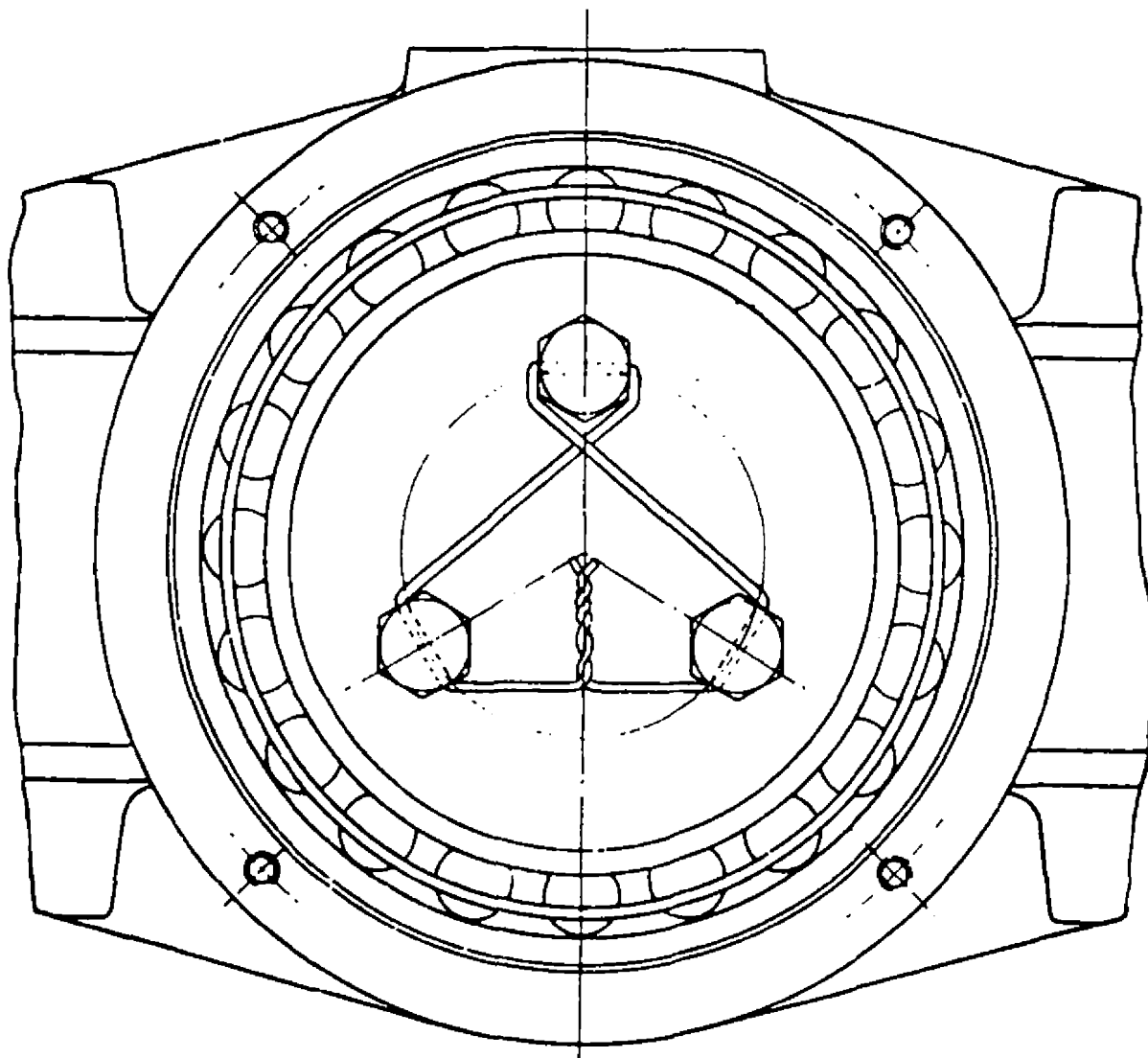
2 For indirect mounted bearings, wagon bearing units and A.P. units, these are:-

- Withdrawal box
- Pilot
- Pressing-on sleeve
- Adaptor
- Socket head retaining screws and key

APPENDIX 7

DIAGRAMS OF DIRECT & INDIRECT MOUNTED BEARINGS



APPENDIX 8RE-FITTING OF LOCKING CAP AND BOLTS

1. Tighten bolts to specified torque :-

3/8"	Nominal dia	-	15/20 lb.ft
1/2"	"	"	- 35/40 lb.ft
5/8"	"	"	- 70/80 lb.ft
3/4"	"	"	- 110/120 lb.ft
7/8"	"	"	- 140/150 lb.ft

2. Use 14 or 15 S.W.G. galvanised, annealed mild steel or soft iron, wire.
3. Ensure wire is fitted as illustrated, and pulled tight.
4. Spring or Tab washers, used on certain locomotive axlebox designs, must be renewed every time the locking caps are refitted.

APPENDIX 9SECURING OF FRONT COVER

The wire locking of the front cover bolts/studs on Timken axleboxes to be discontinued.

The front cover bolts/studs are to be fitted with positive lock washers as listed below. The size depending on the bolt/stud involved.

<u>BOLT/STUD DIAMETER</u>	<u>B.R. CATALOGUE NO.</u>
3/8"	9/3/80512
1/2"	9/3/90520
5/8"	9/3/90528
3/4"	9/3/90532