

Meritor Inc. Trailer Axle Service Manual TM Series

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1 General Information

Service Notes

This manual describes the correct lubrication, service and installation procedures for MERITOR HVS™ series axles. Information contained in this publication was in effect at the time the publication was approved for printing and is subject to change without notice or liability.

The designated trademarks are registered marks of their respective owners and Meritor HVS and its affiliates are not commercially connected, affiliated, or associated with any of the owners of such marks. The Meritor HVS products presented herein are not endorsed or authorized by any of the trademark owners.

You must follow company procedures and understand all procedures and instructions before you begin to service or repair a unit. Some procedures require the use of special tools and lubricants for safe and correct service. Failure to use special tools when required can cause serious personal injury to service personnel, as well as damage to equipment and components.

MERITOR HVS uses the following notations to warn the user of possible safety issues and to provide information that will prevent damage to equipment and components.



WARNING

A Warning indicates you must follow a procedure exactly. Otherwise serious Personal injury can occur.

NOTE:

A NOTE indicates an operation, procedure or instruction that is important for correct service. A NOTE can also supply information that can help to make service quicker and easier.



CAUTION

A caution indicates that you must follow a procedure exactly. Otherwise, damage to equipment or components can occur. Serious personal injury can also result, in addition to damaged or malfunctioning equipment or components.



This symbol indicates that you must tighten fasteners to a specific torque value.

Safety Instructions

- Observe the manufacturer's safety instructions for jacking up and securing the vehicle
- Only use original Meritor Inc. parts
- Use only the tools recommended.
- Observe the following service instructions and notes
- When working on the brake assembly you must ensure that it cannot be activated inadvertently.
- Always ensure appropriate safety glasses and gloves are worn when carrying out the procedures detailed in this publication.
- Never use compressed air to remove brake dust or for the purpose of drying. Any type of dust can be injurious to health if inhaled. Use Meritor Inc. brake cleaner for cleaning the brake assembly.
- When removing or fitting a complete brake assembly, you should remember it has a dead weight of up to 120lbs (55kg). Use a lifting system, taking care not to damage the brake assembly.



CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.



CAUTION: Ensure any residue oil from oil filled hubs is caught in a suitable container and/or wiped clean with a suitable cloth. Dispose of any residue oil, or contaminated cloth, in accordance with local environmental regulations.



CAUTION: You must always renew the brake pads on both wheels of an axle. Only use brake pads that have been approved by the vehicle manufacturer.



CAUTION: Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.



CAUTION: You must always renew the rotor on both wheels of an axle. Only use rotors that have been approved by the vehicle manufacturer.

1 General Information

Access Information on Meritor Inc.'s Web Site

Additional maintenance and service information for Meritor Inc.'s commercial vehicle systems component lineup is also available at www.meritor.com

To access information go to Products & Services Icon; from drop down menu click on Literature on Demand. The screen will display an index of publications by type.

MERITOR HVS Axle Warranty

For full warranty terms and conditions see 'MERITOR HVS Warranty Terms and Conditions

Unless otherwise stated, Aftermarket components are warranted for 1 year, parts only, mechanical failure only.

Warranty Procedure

Should any MERITOR HVS equipment fitted to your trailer become unserviceable within the warranty period, contact the trailer manufacturer or MERITOR HVS Service Department who will advise on the appropriate action.

A comprehensive network of original parts distributors and service stations operate throughout Europe; this is supported internationally with agents strategically placed around the world.

MERITOR HVS reserves the right to make changes in specifications shown herein or add improvements at any time without notice or obligation.

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ARVINMERITOR, MERITOR, MERITOR HVS AND INDAIR ARE ALL REGISTERED TRADE MARKS IN THE UK AND ELSEWHERE



The high quality assurance management systems applied by MERITOR HVS are endorsed with the awarding of ISO 9001, Lloyd's Register Quality Assurance.

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Introduction

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2 Introduction

AXLE BEAMS

The Meritor HVS TM Series Axle is manufactured to a very high standard of beam engineering. The beam material is heat treated to provide an excellent yield strength whilst maintaining a good ductility.

The carbon equivalent of the beam material is controlled to ensure that pre-heating is not necessary when welding per the provisions of BS 5135.

It is advisable to have Meritor HVS Engineering Department review the application of any welded bracketry if not previously approved.

The Beam Spindles are forged and heat treated to high strength.

Quality is built-in; the whole process is self monitoring with 100% checks of critical dimensions.

All Meritor HVS beams are manufactured to ensure the beam is straight and in line. Some slight distortion will occur when suspension components are welded to the beam but in general this is negligible. If cambered beams are required – these must be ordered specially.

AIR CHAMBER BRACKETS AND CAM BRACKETS

All Mark III beams come equipped with air chamber brackets and cam brackets welded in the correct position to ensure brake actuators operate in the optimum way. Replacement beams are normally supplied without air chamber brackets or spring seats.

SPRING SEATS AND AIR SUSPENSION AXLE ADAPTERS

Meritor HVS can supply axles with the above components welded to individual customer requirements.

ANTI-LOCK OPTIONS

Axles can be ordered with anti-lock sensor equipment already installed and tested.

BRAKING

DRUM BRAKES

The Meritor HVS range of S-cam drum brakes are available in a number of sizes depending on the application. For further information refer to the appropriate Meritor HVS **Service Manual**;

S-cam **MM 1000.**

SAC **MM 0267**

As a general guide, Meritor HVS recommends:-

TANDEM AXLE TRAILER (Normal Use) 420x180 brakes (Q)

TRI-AXLE TRAILER (Normal Use) 420x180 brakes (Q)

TANDEM AXLE TRAILER (Heavy Duty Use) 420x220 brakes (Z)

Meritor HVS TM axles have been fitted with non-asbestos brake linings since January 1992 and meet UK/EEC braking regulations..

Brake Shoes

Meritor HVS quick-change design shoe is accurately produced by manufacturing processes ensuring all shoes are capable of being relined several times. When relined with the Meritor HVS original part the necessity to machine the linings on the axle is eliminated.

The anchor pin and roller areas are induction hardened to prevent wear.

Each shoe is coated with a rust inhibiting finish.

Every Meritor HVS shoe is marked with an Meritor HVS logo – look for this guarantee to avoid being the recipient of non-genuine lower quality shoes.

Anchor Pins & Bushes

The TM axle has new sealed anchor pins with indented greased bronze bushes. This unique feature keeps the pin working, providing consistent brake performance. The 'O' ring seals keep contaminants away from the bush area.

DISC BRAKES

The TM series axle is available with either DX 195/225 or ELSA 2 air disc brakes. For further information refer to the appropriate Meritor HVS **Service Manual** ;

DX 195/225 **MM 1147**

ELSA 2 **MM 1130**

2 Introduction

CAMSHAFTS – CAMSHAFT BUSHES & SPHERICAL BEARING ASSEMBLIES

The Mark III axle camshaft is an induction hardened one piece forging with an SAE 10 spline. It runs in bushes that are grease packed. The cam bush is bronze whilst the spherical bearing is glass-filled nylon encased in a heavy gauge steel housing. From June 1991 axles with 420 dia brakes have used a pressed steel anchor bracket with a bolt on spherical bearing at the cam head end of the camshaft.

SEALS

All Meritor HVS axles contain unitized seals. These seals are suitable for either grease filled or oil filled operation. Low Loader axles use special high temperature synthetic seals to prevent leakage even when operating at elevated temperatures.

HUBS

Hubs are normally grease filled but are available oil-filled on request.

HUBODOMETERS

Available on request. Specify tyre size and Kilometers or Miles.

SLACK ADJUSTERS

Meritor HVS will supply their own automatic slack adjuster on request.

RUBBER SEALING

From June 1991 all axles with 420mm brakes have camshaft rubber seals fitted as standard. For other brake sizes the camshaft sealing kit is available as an option.

2 Introduction

Exploded View - Hub Assembly (Drum Brakes)

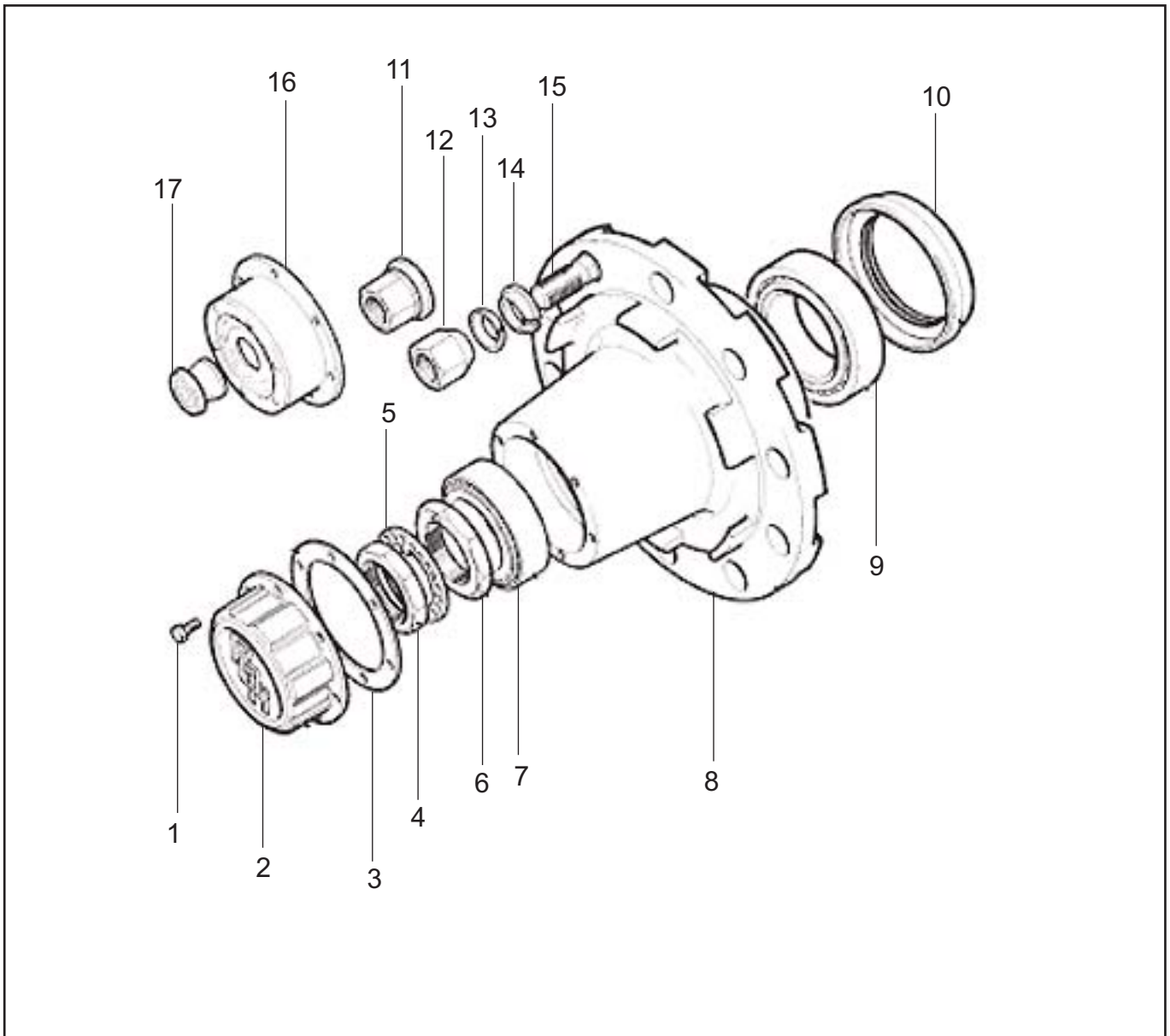


Fig 2.1

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Retaining Screw	12	Wheel Nut (alternative)
2	Hub Cap	13	Wheelcone - outer
3	Gasket	14	Wheelcone - inner
4	Locknut	15	Wheel Bolt
5	Lockwasher	16	Hub Cap - oil filled
6	Hub Nut	17	Vent Plug (oil filled hub cap)
7	Outer Bearing		
8	Hub		
9	Inner Bearing		
10	Oil Seal (untised shown)		
11	Wheel Nut		

2 Introduction

Exploded View - Hub Assembly (Disc Brakes)

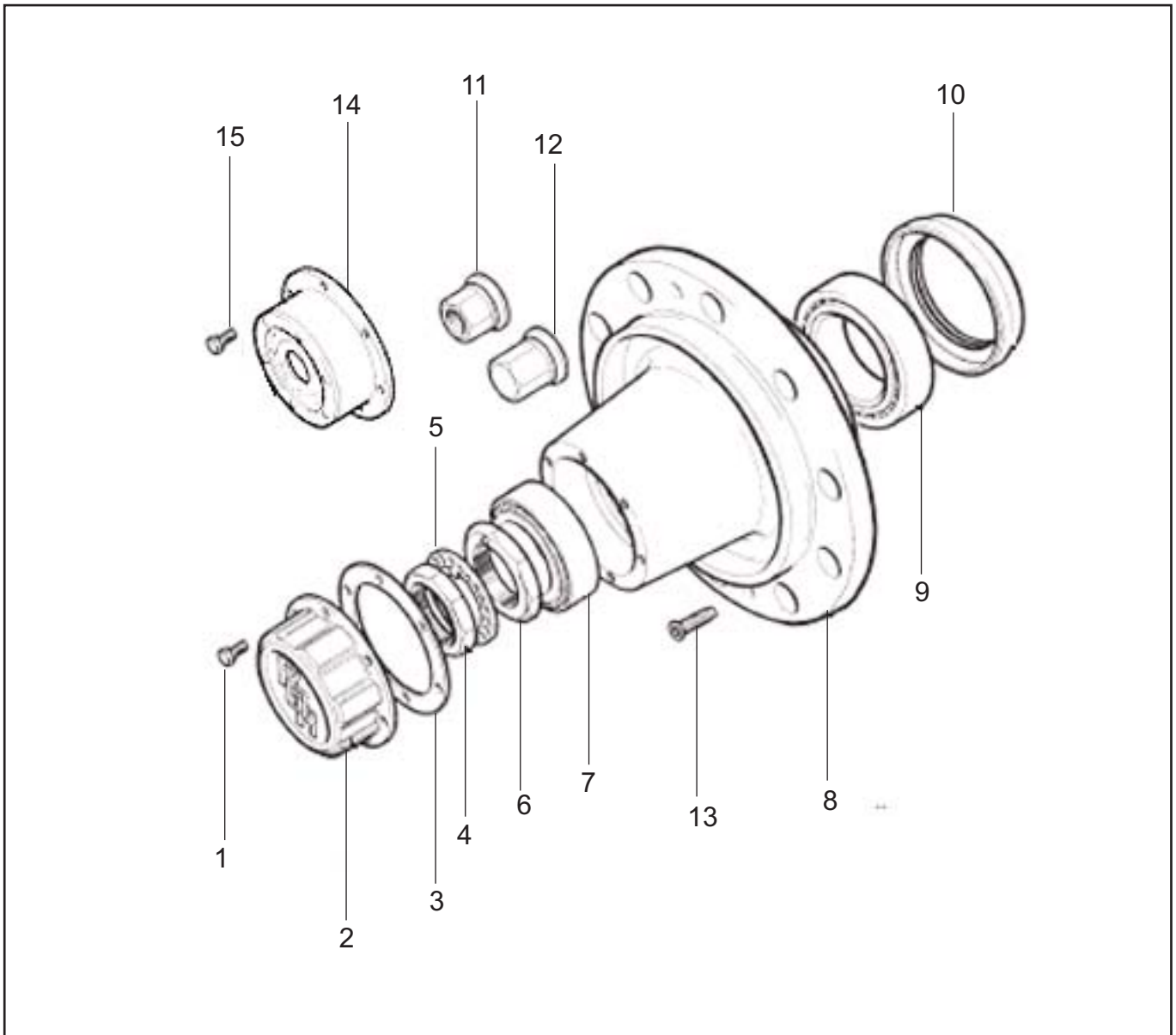
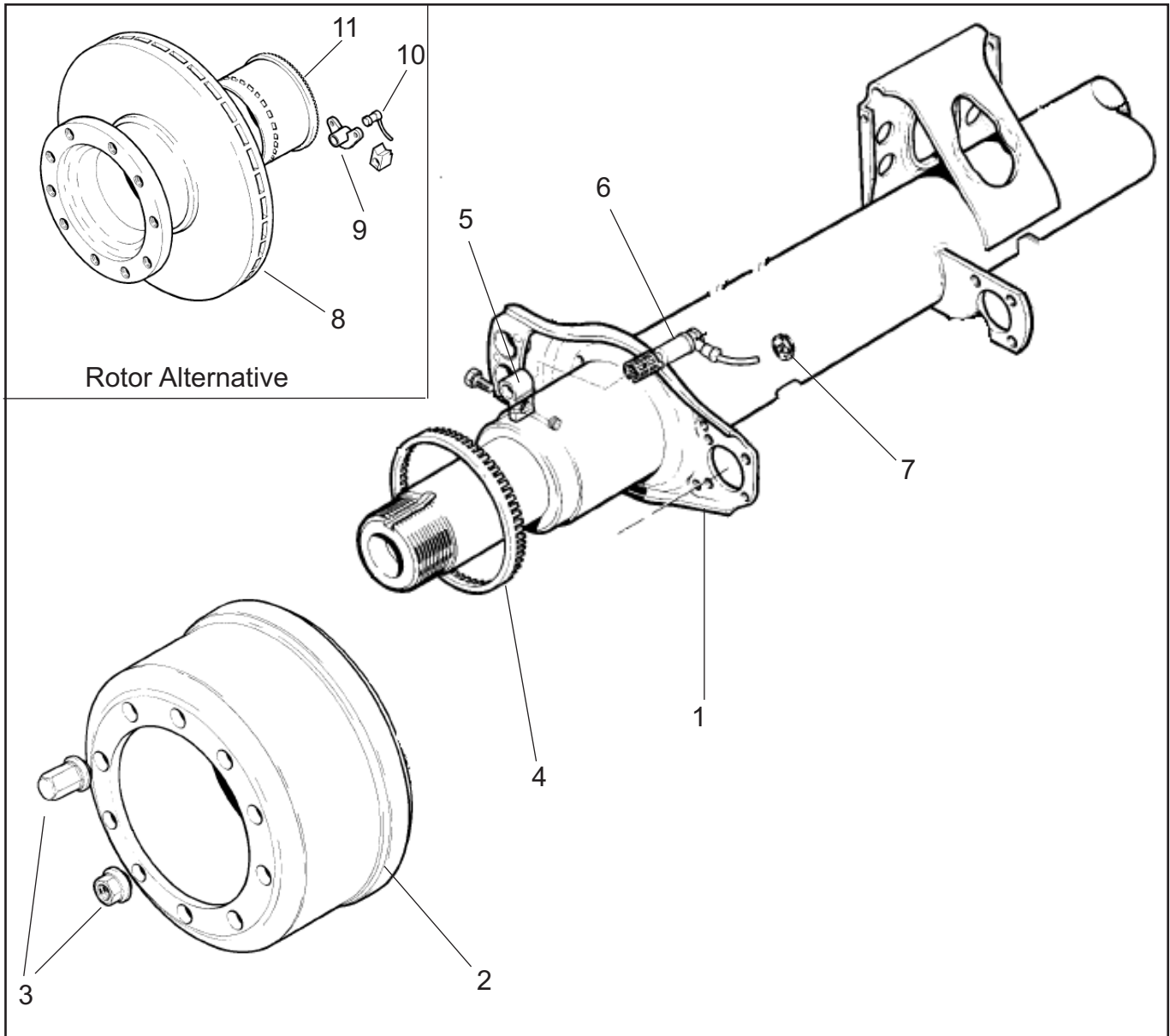


Fig 2.2

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Retaining Screw	12	Wheel Nut (alternative)
2	Hub Cap	13	Retaining Screw - Rotor
3	Gasket	14	Hub Cap - odometer
4	Locknut	15	Retaining Screw
5	Lockwasher		
6	Hub Nut		
7	Outer Bearing		
8	Hub		
9	Inner Bearing		
10	Oil Seal (untised shown)		
11	Wheel Nut		

2 Introduction

Exploded View - Axle

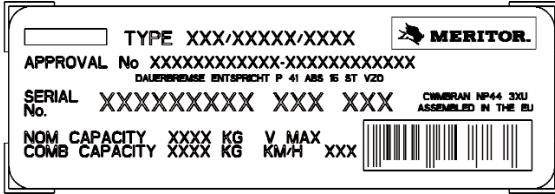


ITEM	DESCRIPTION
1	Axle Beam
2	Brake Drum
3	Wheel Bolt
4	ABS Pole Wheel
5	ABS Sensor Block
6	ABS Sensor
7	Grommet
8	Rotor
9	ABS Sensor Block
10	ABS Sensor
11	Pole Wheel (Later Rotors use an integral pole wheel)

2 Introduction

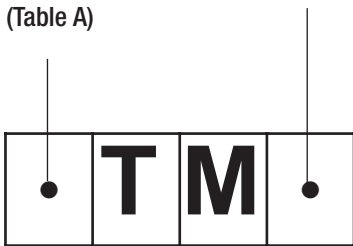
The Axle Identification Plate

Every axle leaving the Meritor factory is fitted with an identification plate which contains all the information needed to ensure correct replacement parts are obtained.



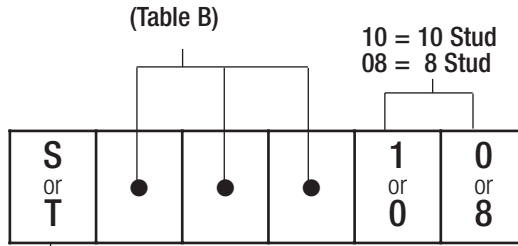
Identifying the Axle Type

Anti-Lock Type
(Table A)



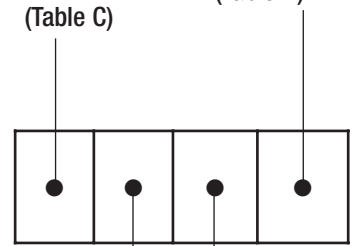
Steer Axle = S

Axle series loading
(Table B)



S = Single Wheel
T = Twin Wheel

Brake Type
(Table C)



For Offset Hubs
(Table D)

Type of Wheel Bolts
(Table D)

Table A

Axle Letter code	Exciter Ring Type	Suitable For
	60/45T Pressed Steel	Grau MGX2 & MGX2E Bendix MDR & MDRA
	100t / 80t Solid Ring	Wabco, Bosch Grau DGX & MGX 100 Bendix AL-4T

Table C

Axle Letter Code	Brake Type
AA	380mm x 180mm Stopmaster Drumbrake
AC	310mm x 190mm Drumbrake
B	350mm x 200mm Drumbrake
H	DX 195 Discbrake
K	ELSA 195 Discbrake
O	394mm x 180mm Drumbrake
P	420mm x 150mm Drumbrake
Q	420mm x 180mm Drumbrake
ZA	420mm x 200mm Drumbrake
Z	420mm x 220mm Drumbrake

Table B

Axle Series	Nominal Highway Rating. Kg	* Offset Max
20,000	9,500	460
22,500	10,170	490
25,000	11,690	490

Offset = Track Spring Centres

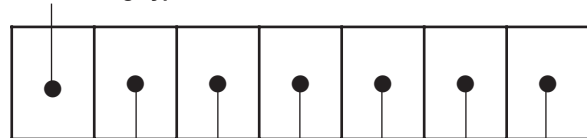
2

The axle ratings shown are for normal highway use only. Any special application must be approved by Meritor Technical Sales

Table D

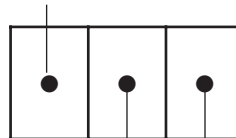
Axle Letter Code	Wheel Mounting Type
S	7/8in BSF (SMMT)
M	M22 x 1.5mm metric (DIN)
J	"Trilex" type
MX	ISO 4017 type - M22 x 1.5mm wheel bolts
MXA	ISO 4017 type - M22 x 1.5mm wheel bolts
B	Japanese M20 x 1.5mm
MXO	120 Wheel Offset

Brake lining Type



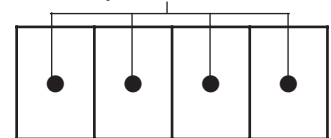
Order Number

Build Month



Build Year

Sequential Number



Inspection & Maintenance

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3 Inspection & Maintenance

Drumbrake Axles

Refer to the appropriate Meritor hvs drumbarke service manual for detailed disc brake inspection procedures.

Inspect Camshaft and Camshaft Bearings for Wear

Place a lever between the camshaft and axle beam close to the cam head bearing and lever up and down to detect free movement (Fig. 3.1). This should not exceed 3.0mm total movement at the bush (the amount at the lever will depend on the lever length so discretion and judgement is required).

Similarly place the lever between the axle and camshaft close to the spherical bearing at the spline end of the camshaft and lever up and down checking for similar play as at the cam head bearing. If the play exceeds the above amount this suggests wear has occurred and the camshaft and bearings should be replaced as necessary.

Inspect Brake Drum

With the brake drum removed from the vehicle.

Clean excess brake dust from the brake drum and inspect the drum braking surface for corrosion, excessive wear or other damage.



CAUTION: Never use an air line to blow dust from the brake/drum area. If inhaled any form of dust can at best be an irritant, at worst dangerous. Whenever possible remove dry brake dust with a vacuum brush. Alternatively wipe the areas with a damp cloth, never try to accelerate drying time by using an air line.

Remove light corrosion by using coarse emery cloth at an angle of 45 degrees in one direction and then 45 degrees in the other direction to produce a cross hatch effect. **DO NOT USE ANY FORM OF POWER TOOL.**

If the drum braking surface shows signs of light heat crazing it usually can be reused (Fig. 3.2) but if the heat crazing is severe the drum should be replaced. (Fig. 3.3)

Should the drum life be extended by turn-out machining the recommended machining limit should be 423 mm diameter so that during the projected wear-out life of the shoes the final drum diameter must not exceed 424.0 mm.

Similarly excessively worn drums should be inspected and on no account should drums of diameter exceeding 423 mm be re-assembled with new brake shoes.

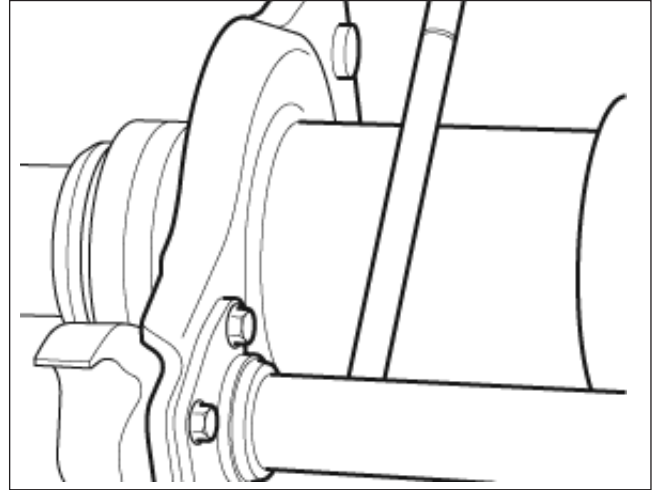


Fig. 3.1

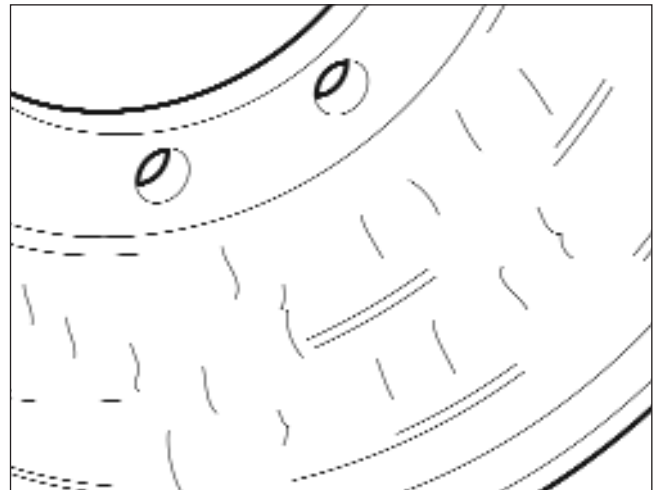


Fig. 3.2

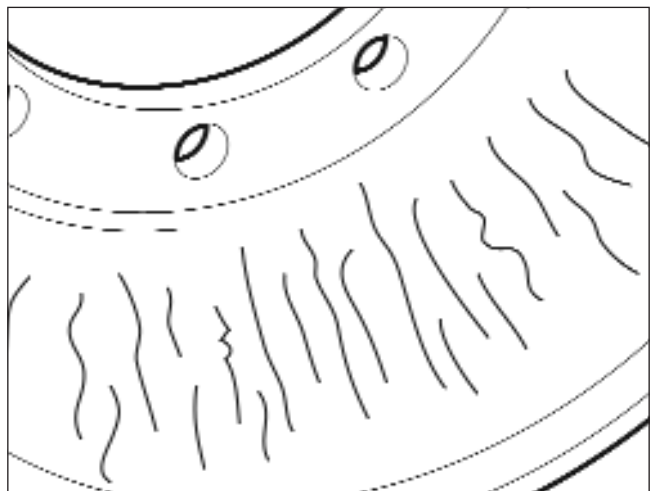


Fig. 3.3

3 Inspection & Maintenance

Inspect Brake Linings

Do not disturb the brake lining surfaces if these show normal working appearance. Do not contaminate the surface of the linings with grease etc. Clean any compressed lining debris from the rivet holes. The brake lining surface may be carefully cleaned by hand using suitable abrasive paper if contaminated by dirt etc.

DO NOT USE ANY FORM OF POWER TOOL.



CAUTION: Ensure any discarded friction product, or cloth contaminated with brake dust, is disposed of in accordance with local environmental regulations.

Lubricate Brake Chamber Clevis Pin Assembly

Lubricate the clevis pin assembly from both sides with oil, and make sure the brake can be operated easily by pulling the slack adjuster by hand

Push Rod Setting Lengths for Manual and Auto Slack Adjusters (Haldex & Meritor HVS)

To ensure the correct installed slack adjuster positions, it is necessary to identify the type of air chamber bracket installed.

Follow the published procedure for auto slack installation and setting provided in the **S Cam Trailer Drumbrake Service Manual MM 1000**.

Disc Brake Axles

The TM series axle is available with either DX 195/225 or ELSA 2 air disc brakes. For further information refer to the appropriate Meritor HVS **Service Manual detailed below;**

DX 195/225 MM 1147

ELSA 2 MM 1130



CAUTION: You must always renew the brake pads on both wheels of an axle. Only use the brake pads that have been approved by the vehicle manufacturer. Brake pads must be replaced when the lining thickness has worn to 3mm minimum.

Rotor Inspection

Rotors should be examined in situ, whenever the brakes are serviced or new pads are fitted - or immediately if erratic braking performance is noted. The rotor condition should be visually checked for the following surface conditions, and replaced with a new rotor as described in **Section 6 Rotor Replacement** if suspect or defective.



CAUTION: You must always renew the rotor on both wheels of an axle. Only use the rotors that have been approved by the vehicle manufacturer.

Cracks (Fig 3.4)

Cracks that extend through to the vent of a ventilated rotor or 25% through the thickness at the outer edge of a solid rotor: Replace the rotor.

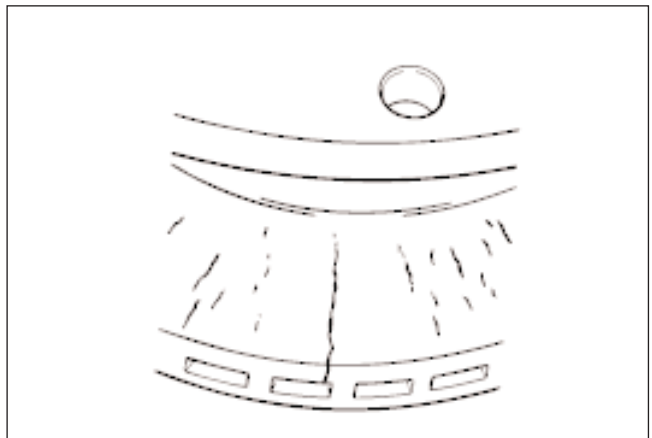


Fig. 3.4

3 Inspection & Maintenance

Heat Crazing (Fig 3.5 & Fig 3.6)

Heat crazing is fine cracks on the rotor's surface. This is a normal condition that results from continuous heating and cooling of the friction surface. Braking under normal operating conditions can cause cracks to separate and deepen, increasing lining wear. There are two types of heat crazing: light and heavy.

Light Heat Crazing (Fig 3.5)

Light heat crazing is fine, tight cracks in the rotor's surface. Continue to use a rotor with light heat crazing.

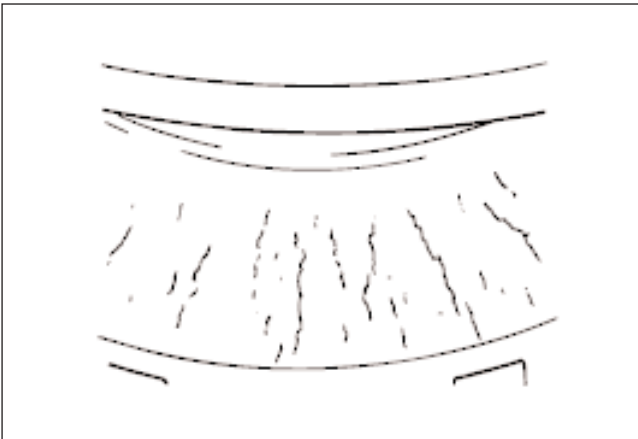


Fig. 3.5

Heavy Heat Crazing (Fig 3.6)

Heavy heat crazing is cracks in the rotor's surface that extend radially and have an individual length of up to 75% brake path width. Refinish or replace a rotor that has heavy heat crazing.

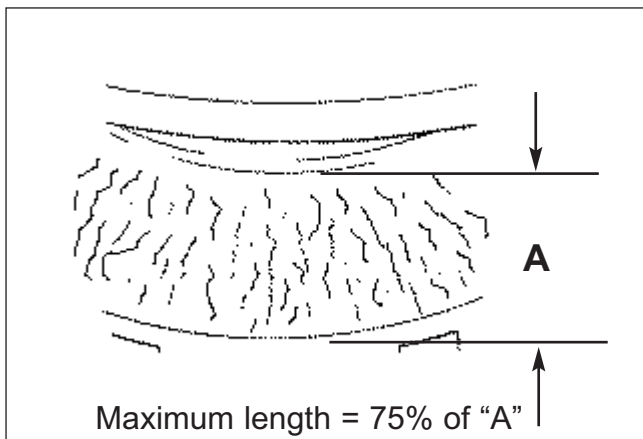


Fig. 3.6

NOTE: Surface finish after machining should be 5 microns maximum.

NOTE: Localised crazing / blue patches / cracking in only one part of the rotor could be caused by rotor run-out or thickness variation. Refer to vehicle manufacturer for tolerances.

Scoring (Fig 3.7)

Scoring is deep circumferential grooves that can occur on both sides of the rotor's surface. If the groove or multiple scores are of a depth less than 0.5 mm, continue to use the rotor. If the groove / scores are greater than 0.5 mm, refinishing the rotor is recommended.

Refinishing the rotor is recommended before fitting new brake pads.

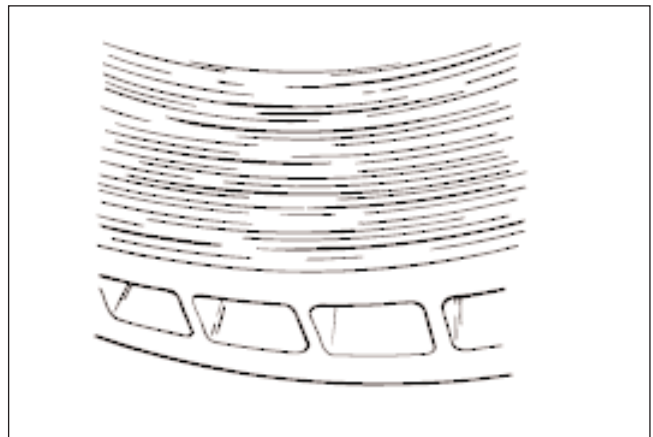


Fig. 3.7

3 Inspection & Maintenance

"Blue" Rotor (Fig 3.8)

Blue marks or bands on the rotor indicate that extremely high temperatures occurred during operation. Refinishing the rotor is recommended before fitting new brake pads.



CAUTION: Reasons for the excessively high temperatures must be investigated as this will adversely affect brake performance and lining wear rate. Continued operation at excessively high temperatures will eventually adversely affect brake function.

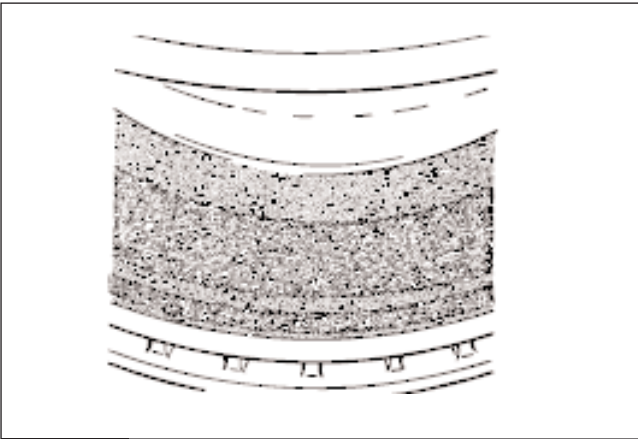


Fig. 3.8

ABS Ring

The toothed ABS ring, which may be a press fit component or an integral part of the rotor, should be inspected for damage and corrosion. If there is any doubt in the suitability for further service the ABS ring or rotor should be replaced as described in **Section 6 Rotor Replacement** or **Section 7 ABS Component Replacement**

Rotor Run Out

Use a Dial test Indicator (DTI) to check the run-out both axially and radially as in (Fig. 3.9).

Axial

Run-out should not exceed 0.3mm over the rotor braking surface when the rotor is turned on properly adjusted wheel bearings. Excessive run-out may be due to incorrect mounting of the hub, fastener torque's or mal-adjusted bearings.

Radial

Run out should not exceed 0.8mm total indicator reading.

Thickness

Rotor thickness must not vary by more than 0.13mm across any two points of the rotor faces.

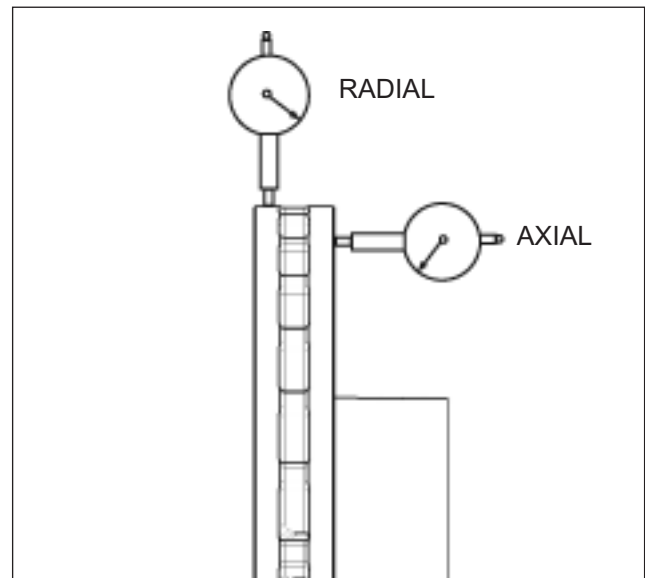


Fig. 3.9

Skimming

Resurfacing the rotor is permissible until the minimum thickness is reached 41mm. Refer to the appropriate Meritor service manual detailed below for full rotor wear parameters.

DX MM 1147 Elsa 2 MM 1130

Surface finish after machining should be 5 microns maximum.



CAUTION: You must always renew the rotor on both wheels of an axle. Only use rotors that have been approved by the vehicle manufacturer.

Hub Service

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4 Hub Service

Removal of the TM hub is required for all rotor replacements on disc brake applications.

The TM axle fitted with Q or Z drum brakes features an inboard mounted brake drum. Thus requiring the hub assembly to be removed for brake service. In addition, hub removal will also be required if a problem is identified during routine inspection, or at the major hub service interval, as prescribed in **Section 11**.

For hub removal and replacement follow the appropriate procedures detailed in this section.

DRUMBRAKE AXLES

Should it however prove necessary to remove the hub, the following procedure can be performed either with the road wheel and brake drum assembled to the hub or with the road wheel and brake drum removed. In the latter instance follow the procedure below.



CAUTION: Meritor HVS recommends the use of a wheel dolly to remove the wheel, hub, and drum as an assembly. The wheel dolly can be used easily by one man and will prevent seal and bearing damage.

Raise the vehicle enough to get clearance to remove the wheel and tyre. Support the axle with safety stands.



WARNING: Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause serious personal injury. Support the vehicle with safety stands, block the wheels to prevent the vehicle from moving.

Remove the road wheel.

DE-ADJUST BRAKES

Using the manual adjustment nut on the slack adjuster fully de-adjust the brake. Follow the appropriate procedure for the type of automatic slack adjuster fitted. Instructions are available through the Meritor Technical Sales Department.

NOTE: Comprehensive Drum Brake instructions can be found in the Meritor HVS service manual ;

S Cam Trailer Drumbrake - MM 1000

SAC Trailer Drumbrake - MM 0267

DISC BRAKE AXLES

NOTE: Comprehensive Disc Brake instructions can be found in the appropriate Meritor HVS Service Manual detailed below;

DX 195/225 **MM 1147**

ELSA 2 **MM 1130**

Raise the vehicle enough to get clearance to remove the wheel and tyre. Support the axle with safety stands.



WARNING: Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause serious personal injury. Support the vehicle with safety stands, block the wheels to prevent the vehicle from moving.

Remove the road wheel.

Deadjust the brake. Remove the brake pads and air chamber



WARNING: Always de-adjust/adjust the brake carefully by hand with a suitable wrench. Never exceed the maximum torque specified for the type of disc brake in either direction and NEVER use power tools.

Remove the caliper mounting bolts (Fig 4.1). Take care not to allow the caliper to fall. Remember that the caliper has a weight of upto 55kg.

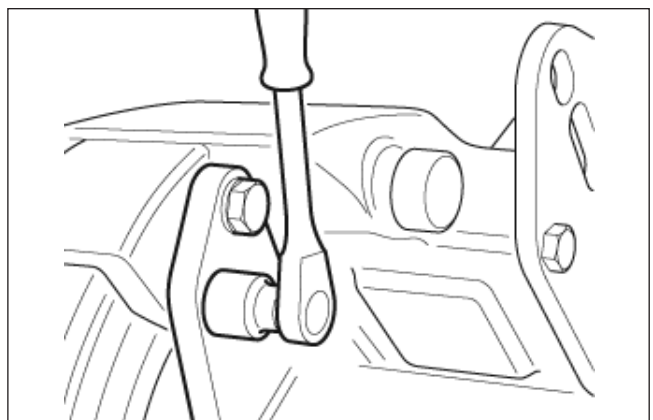


Fig. 4.1

Lift the caliper away from the axle.

4 Hub Service

DRUM & DISC BRAKE AXLES

HUB REMOVAL



CAUTION: For oil filled hubs, drain any oil from the hub, before removing the hub cap. Ensure any used oil drained from the hub is caught in a suitable container and disposed of in line with local environmental regulations.

Remove the five M8 hub cap retaining screws. Remove hub cap and gasket (Fig. 4.2).

Remove bearing locknut, lockwasher and adjusting nut using suitable Meritor CVA hub nut box spanner MST 3207.



WARNING: The hub locknut and adjusting nut should be removed using suitable size sockets ($\frac{3}{4}$ " drive recommended) Do not attempt to loosen/remove by striking the nut using a chisel or drift. Damage to the components will occur causing possible loss of wheel end retention and personal injury.

Remove the outer bearing cone and place it in a clean area. Identify the bearing cone clearly to ensure that it is refitted to its original position in the hub.

Withdraw hub/rotor, or hub/drum where applicable.

If necessary, remove the hub/drum assembly from the axle using a hub puller (Meritor CVA part number MST 3206) together with three M8 screws of a suitable length to provide secure retention of the hub puller to the hub face (Fig. 4.3).



CAUTION: Do not use the the hub cap screws to retain the hub puller. They may not provide adequate thread engagement and could result in damage to the threads in the hub.

NOTE: Refit two wheel nuts diagonally opposed and hand tighten only. This will ensure the inboard mounted brake drum is removed with the hub assembly.

With the hub/drum assembly removed from the vehicle, remove the two wheel nuts and separate the hub and drum.

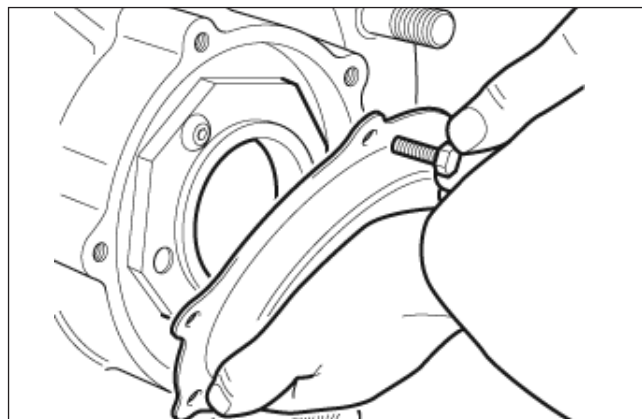


Fig. 4.2

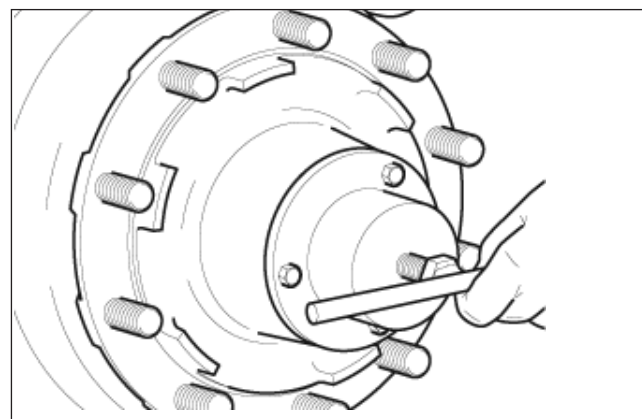


Fig. 4.3

REMOVAL OF OIL SEAL AND INNER BEARING CONE

The oil seal should be removed from the hub using an oil seal removal tool (Meritor CVA part number MST 3203) and suitable lever (Fig. 4.4).

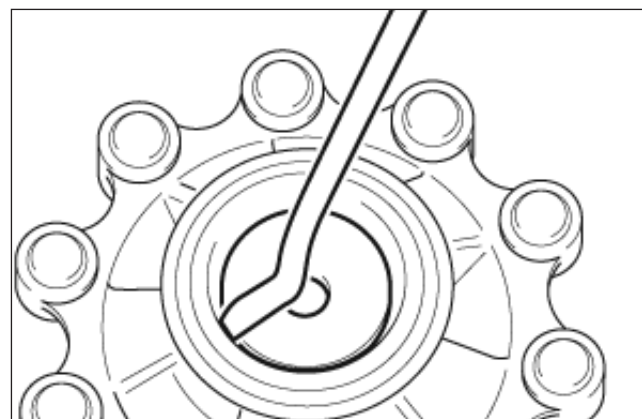


Fig. 4.4

4 Hub Service

THE SEAL MUST BE DISCARDED. NEVER RE-USE AN OIL SEAL AFTER THE HUB HAS BEEN DISMOUNTED FROM THE AXLE SPINDLE.

Remove the inner bearing cone and place it in a clean area. Identify the bearing cone clearly to ensure that it is refitted to its original position in the hub.

Two types of seal may be found on Meritor HVS TM axles:

1. Unitised seal – NO WEAR SLEEVE FITTED.
2. Grease seal with wear sleeve fitted to axle.

NOTE: From July 1980, all Meritor HVS axles are fitted with unitized seals and therefore NO wear sleeves are required.

Meritor HVS specifies Unitized seals, which do not require wear sleeves.

NOTE Unitized seals are directly interchangeable with the older grease seal after removal of the wear sleeve.

If the hub incorporated an early seal arrangement with wear sleeve, remove the wear sleeve carefully by tapping the sleeve with a ball hammer, or using a suitable slide hammer. Take care not to damage the spindle.

NOTE Prior to installing any seal in the hub make certain that the seal bore is free of any nicks, gouges or other damage. This will prevent any leakage around the seal's outer diameter.

CHECK GREASE CONDITION

If the grease within the bearing is clean and does not appear burnt there should be no necessity to totally clean down the assembly.

Check the hub cavity for any grease contamination caused during hub removal from the spindle. Any contamination must be removed or if this is excessive a complete hub clean down must be carried out.

CLEANING OF HUB

Wipe clean the hub cavity removing all the old grease and any contamination.



CAUTION: Ensure any grease removed from the assembly/components, or contaminated cloth, is disposed of in accordance with local environmental regulations.

INSPECT BEARINGS

Check both bearings, cones and raceways for:

- Cage damage
- Corrosion
- Roller and raceway damage or pitting
- Metallic debris or flaking
- Bearing cup security - Ensure both bearing cups are well secured in the hub, by checking they are fully seated within the hub bore, and with a good grip of the cups try to rotate them. If any movement of the cups is detected then the hub will have to be replaced. Do not attempt to fit new bearings into a hub with worn bores.

If any of the above defects are evident the complete bearing (cup and cone) MUST be replaced.

NOTE: It is advisable to replace with a complete new hub and bearing assembly which is available from Meritor Aftermarket Distributors.

INDIVIDUAL BEARING REPLACEMENT PROCEDURE

Drift out the bearing cup from the hub ensuring that the bearing bore within the hub is not damaged.

NOTE: Four cut-outs in the casting allow a soft steel drift to be used to remove inner cup, using each cut-out alternately. The bearing will be removed with relative ease and without damage. Hardened steel drifts or brass bars must not be used.

BEARING CUP REFITMENT

Ensure the hub cavity is clean and free from visual damage, debris, burrs or any oxidation.



CAUTION: The bearing 'Cups' and 'Cones' are clearly marked by manufacturer type for identification. Never assemble a bearing using a 'Cup' from one manufacturer with a 'Cone' from a different manufacturer. Always check the bearing components are from the same manufacturer before assembly continues.



CAUTION: ALWAYS USE GENUINE MERITOR BEARINGS - STANDARD ISO BEARINGS CANNOT BE USED.

4 Hub Service

Insert the bearing cup into the hub and using a bearing cup driver (Meritor CVA part number MST 3201) drive the cup fully home ensuring the cup sits squarely against the hub shoulder.

Check the bearing cup is retained correctly. Grip the bearing cup and ensure there is no axial or rotational movement present.

REGREASE BEARINGS

Thoroughly pack both bearing cones with Meritor Hub Grease, Blue Lithium EP2. The grease should be concentrated in the space between the roller cage and cone raceway. Refer to **Section 11** for correct grease quantities. Refill the bearing cavity. Refer to **Section 11** for correct grease quantity.

NOTE: Greased bearings should always be placed in a clean area.



CAUTION: Only use the grease supplied with replacement components/kits, or that specified. Under no circumstance should any other type of grease be used.

REFIT INNER BEARING

Refit inner bearing cone into the inner bearing cup pressing fully home to assist location of oil seal driver.

FIT NEW OIL SEAL

Apply 15 - 20gm of Meritor Hub Grease, Blue Lithium EP2 to the cavity of the new seal, working the grease in evenly around the circumference of the seal.

Apply a light smear of Meritor Hub Grease, Blue Lithium EP2 to the bore of the oil seal.

Press the new oil seal onto the oil seal driver (Meritor CVA part number MST 3202) ensuring the 'OIL SIDE' marking on the seal is visible (i.e. faces away from the plate of the driver) such that the seal will be installed the correct way round in the hub.

Locate the nose of the driver into the bore of the inner bearing cone and drive the seal fully home ensuring the seal remains square to the hub at all times (Fig. 4.5). The outer face of the seal should be flush with the back face of the hub when fully installed.

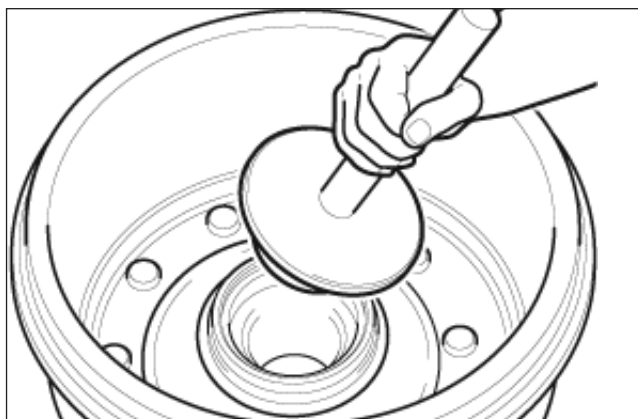


Fig. 4.5

Check the hub cavity grease and top up as necessary with Meritor Hub Grease, Blue Lithium EP2. Refer to **Section 11** for correct grease quantity.

NOTE: The grease must be distributed evenly within the cavity between the inner and outer bearings. Ensure the bearing bore/s are clean and free from any excess grease.

HUB REFITTING

CLEAN SPINDLE BEARING JOURNAL

Prior to re-assembling the hub onto the spindle, check the spindle for damage and remove any fretting or rust on bearing journals using medium grade emery cloth strip. Also ensure the inner bearing abutment shoulder is clean and free from damage.

Clean the oil seal journal, removing brake dust or corrosion from adjacent areas.

Although bearings are designed to creep on journal in order to distribute the load evenly – excessive journal wear may require beam replacement. The lower limit of journal sizes are:

Inner bearing 89.91mm

Outer bearing 64.91mm.

CHECK SPINDLE END THREAD

Any minor damage can be repaired using a Meritor CVA die nut MST 3208 and Meritor CVA die holder part number MST 3209.

4 Hub Service

Apply a thin, uniform coat of Optimol 'Optimoly Paste White T' evenly around the circumference of the inner and outer spindle bearing journals **A**, importantly including both spindle bearing shoulders **B** (Fig. 4.6).

Apply 0.5 to 1 grams of Optimol 'Optimoly White Paste T' to the outboard bearing bore and spread evenly around the circumference. Refer to **Section 11 Lubricants** for the Meritor CVA Optimol part numbers.



CAUTION: Only use the grease supplied with replacement components/kits, or that specified.

Under no circumstance should any other type of grease be used.

NOTE: Correct setting of bearing end float is essential. The following procedure has been proven to provide correct end float.



CAUTION: Noticeable end float in the cold (standing) condition will decrease when hub reaches normal operating temperature.

If the hub being serviced is fitted with an ABS sensor – make certain the sensor is clean and pushed outwards in its housing before refitting hub assembly (Fig. 4.7).

The action of replacing the hub assembly will correctly position the sensor against the Exciter Ring.



CAUTION: The following sequence must be strictly observed.



CAUTION: Ensure the hub is squarely aligned to the axle spindle during refitting.

Feed hub/drum, or hub/rotor assembly onto spindle until inner bearing reaches shoulder.



CAUTION: If the brake drum, road wheel and hub have been removed as an assembly, Meritor HVS recommends the use of a wheel dolly to refit the wheel, hub, and drum as an assembly.

The wheel dolly can be used easily by one man and will prevent seal and bearing damage.

Fit outer bearing and adjusting nut, drum/brake application shown (Fig. 4.8).

Tighten adjusting nut to lightly pinch bearings – AT THE SAME TIME ROTATING THE HUB TO SEAT THE BEARINGS.

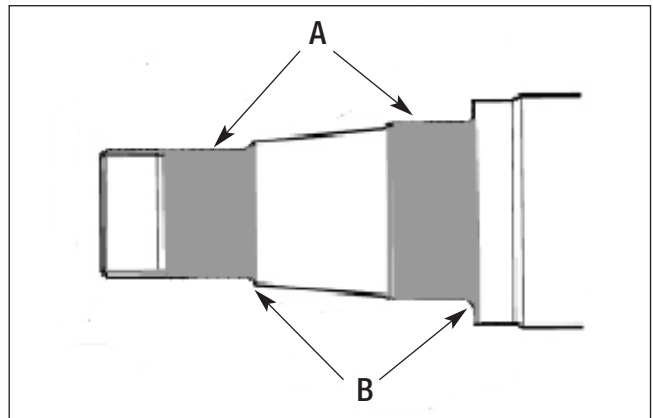


Fig. 4.6

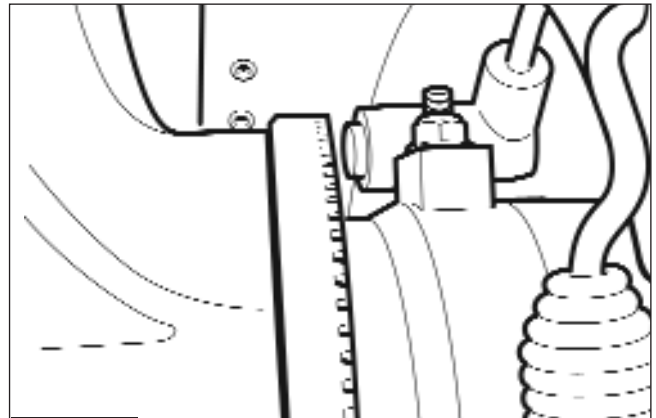


Fig. 4.7

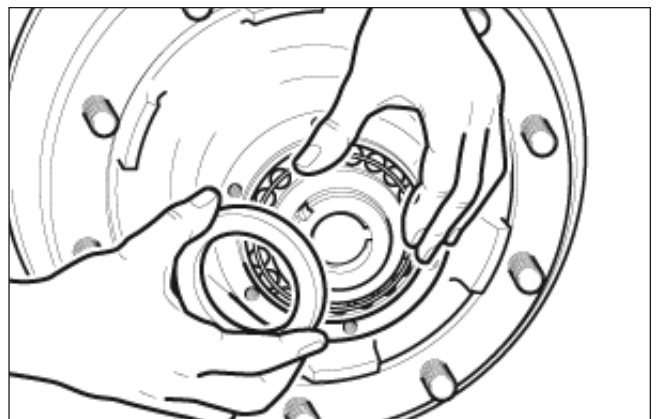


Fig. 4.8

4 Hub Service

T Tighten adjusting nut to 70Nm with special pre-set torque wrench (Part No. MST 3204), adaptor (MST 3205) and box spanner (MST 3207) (Fig. 4.9).

Back off adjusting nut .2-3 flats.

Assemble Lock Washer and Locknut, tighten to torque specified in Section 11, using a suitable torque wrench (Fig. 4.10).

Check that hub rotates freely.

HUB CAP FITTING

Grease Filled Hubs

Pack hub cap with correct grease quantity (see Fig. 4.11), refer to Section 11 for the specification and volume of grease.

Fit a new hub cap gasket, attach the hub cap to the hub and secure with the hub cap screws (Fig. 4.12). Tighten the screws to the torque specified in Section 11.

Oil Filled Hubs

Fit a new hub cap gasket, attach the hub cap to the hub and secure with the hub cap screws. Tighten the screws to the torque specified in Section 11.

Fill to a level between the rings found on the hub cap window (380ml approx.).

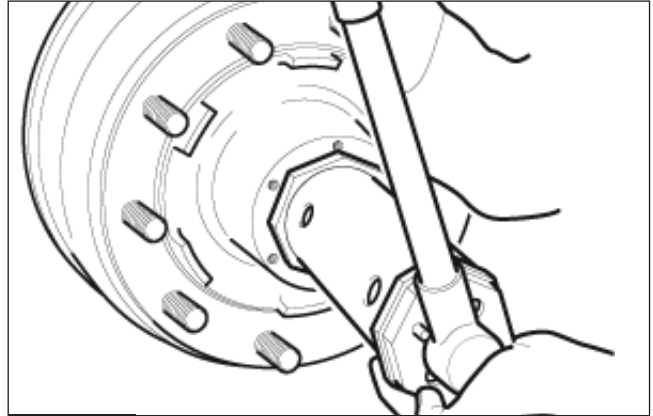


Fig. 4.9

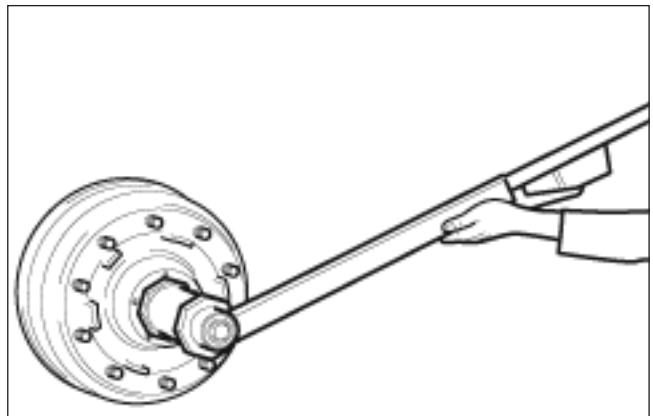


Fig. 4.10

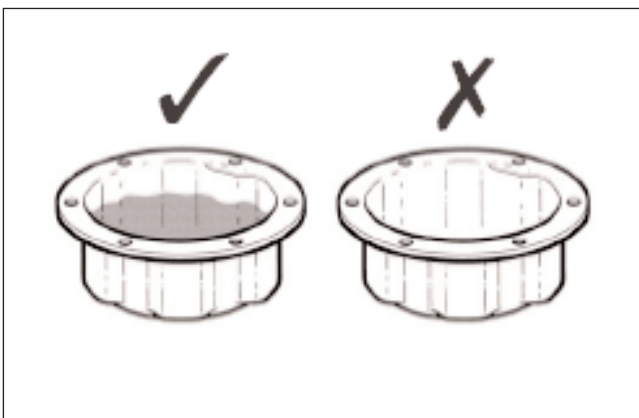


Fig. 4.11

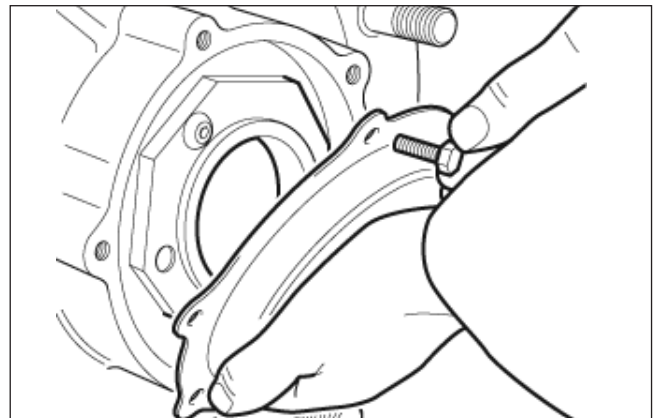


Fig. 4.12

4 Hub Service

DRUM BRAKES

Where applicable, refit the road wheel.

Adjust the brake.

DISC BRAKES

Lower the brake assembly into position over the rotor and align the bottom brake assembly fixing holes with the axle torque plate fixing holes. Fit one of the inner brake assembly fixing bolts together with a harded washer and hand tighten.

Fit the remaining brake assembly fixing bolts, beginning at the top of the torque plate, and hand tighten.

Tighten all six brake assembly fixing bolts to the torque value specified in Section 11 (Fig 4.13).

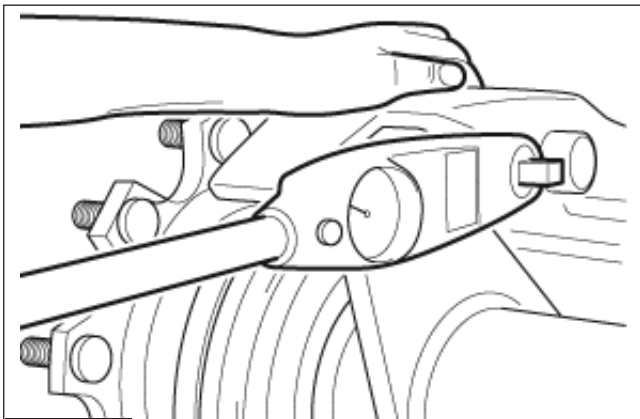


Fig. 4.11

Refit the air chamber (Fig 4.14).

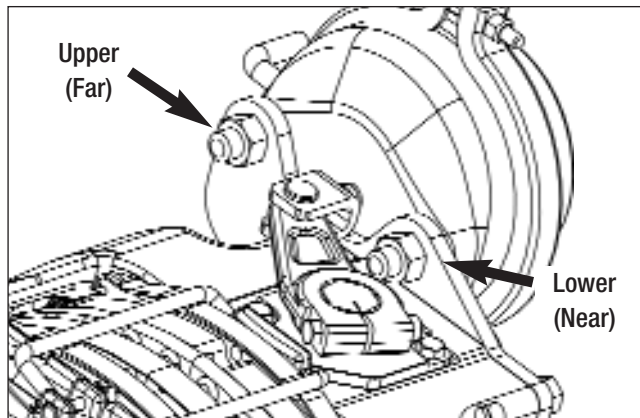


Fig. 4.12

IMPORTANT:

For 80mm brake lever, chamber fits lower (near) end of slot.

For 90mm brake lever, chamber fits upper (far) end of slot.

Tighten the air chamber retaining nuts to the torque value specified in Section 11.

Refit the brake pads and adjust as necessary.

Refit the wheel.

CONVERTING HUBS FROM GREASE TO OIL

Oil filled bearings are better lubricated and have proven to be necessary when running in hot conditions to give long life. Should you wish to convert to oil filled:-

1. Remove hub as described in Hub Removal, if original bearings are to be re-used ensure they are refitted in the original hubs.
2. Clean out the grease from the hub cavity and wash out both bearings with a suitable cleaner. If the bearings are dried with the use of an air jet avoid rotating the bearings at high speed.
3. Refit inner bearing into hub and fit a new unitized oil seal.
4. Refit hub, refit outer bearing and adjust bearings as described in Hub Refitting.
5. Fit new oil filled hub cap and gasket.

Standard Oil Filled	21200624
Hubodometer Oil Filled.....	21204834
Gasket Oil Filled	21021002

6. Fill to level marked in hub cap window with EP90 oil.

7. Readjust brakes.

Drum Replacement

5

pg. 31 Drum removal
pg. 31 Drum fitment


5 Drum Replacement

NOTE: Detail of the Meritor CVA service tools referred to in this section can be found in **Section 12 Service Tools**.

The following procedures can be performed either with the road wheel and brake drum assembled to the hub or with the road wheel and brake drum removed. In the latter instance follow the procedure below.

BRAKE DRUM REMOVAL

Raise the vehicle enough to get clearance to remove the wheel and tyre. Support the axle with safety stands. Remove the wheel and tyre.

 **WARNING:** Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause serious personal injury. Support the vehicle with safety stands, block the wheels to prevent the vehicle from moving.

DE-ADJUST BRAKES

Using the manual adjustment nut on the slack adjuster fully de-adjust the brake. Follow the appropriate procedure for the type of automatic slack adjuster fitted. Instructions are available through the Meritor Technical Sales Department.

Remove the Hub/Drum assembly and axle end fixings as described in **Section 4 Hub Service & Replacement**.

With the hub and drum assembly removed from the axle, place the back face of the drum onto a firm flat surface (so that the studs are pointing vertically upwards). Using the wheel bolt removal tool (Meritor CVA part number MST 3211), drive out the wheel bolts (Fig. 5.1).

The brake drum can now be lifted clear of the hub.

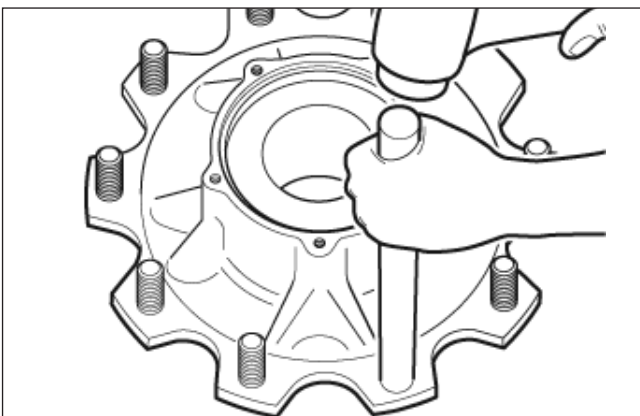




Fig. 5.1

REPLACEMENT OF BRAKE DRUM

Invert the hub and locate the drum onto the hub spigot and rotate to align the bolt holes.

 **CAUTION:** Ensure all mating surfaces are clean, dry and free from burrs prior to assembly.

If reusing the original hub, care should be taken to align the serrations on the bolt with the channels previous cut in the hub. Using the wheelbolt driving tool (Meritor CVA part number MST 3210) drive each bolt until the head is fully seated against the drum flange (Fig. 5.2). Fit the wheel bolts in a diagonal sequence.

 **CAUTION:** Ensure that there is NO gap between the hub flange and wheel bolt head after assembly.

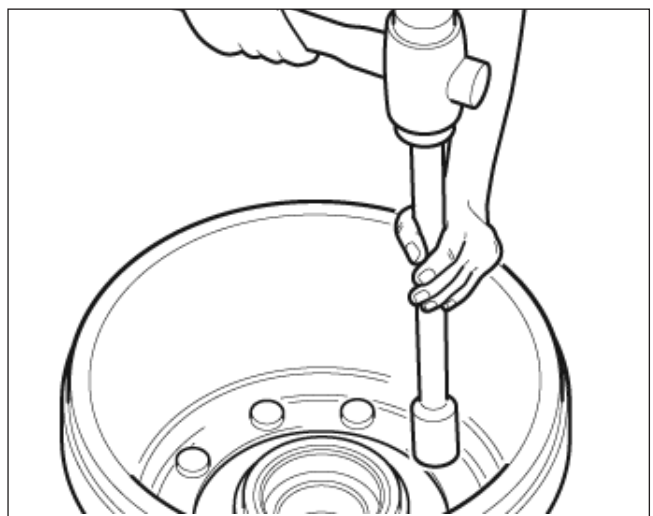


Fig. 5.2

Refit the Hub/Drum assembly and axle end fixings as described in **Section 4 Hub Service & Replacement**.

Refit the road wheel and adjust the brakes.

Remove the axle safety stands and lower the vehicle to the ground.

Rotor Replacement

6

pg. 33 Rotor removal
pg. 33 Rotor fitment

6 Rotor Replacement

ROTOR REMOVAL

Raise the vehicle enough to get clearance to remove the wheel and tyre. Support the axle with safety stands. Remove the wheel and tyre.



WARNING: Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause serious personal injury. Support the vehicle with safety stands, block the wheels to prevent the vehicle from moving.

Remove the disc brake assembly as described in **Section 4 Hub Service & Replacement**

Loosen the bolts securing the rotor to the hub assembly, **DO NOT REMOVE AT THIS STAGE**

Remove the Hub/Rotor assembly as described in **Section 4 Hub Service & Replacement**

Place the hub on a suitable flat clean surface with the rotor facing up and remove the rotor securing bolts. Lift the rotor from the hub and discard.

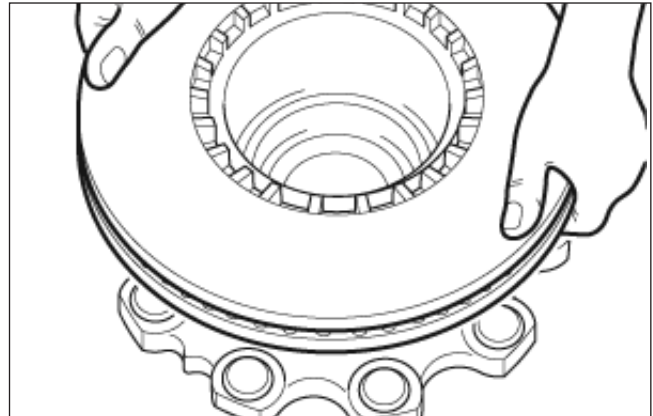


Fig. 6.1

ROTOR FITMENT

Place the new rotor loose on its hub mounting spigot and align the fixing holes (Fig 6.1).

NOTE: New rotors are supplied with the ABS ring as an integral component

By hand fit at least two opposite rotor mounting bolts before turning the assembly over.



Fit the remaining fasteners. Apply a nominal torque of no more than 30 Nm to all fasteners to seat the rotor. Check the correct length of bolt has been used in all positions.

Refit the Hub/Rotor assembly as described in **Section 4 Hub Service & Replacement**

Tighten the rotor securing nuts to the correct torque specified in **Section 11 Torque Values**

Refit the disc brake assembly as described in **Section 4 Hub Service & Replacement**

Refit the road wheel.

Remove the axle safety stands and lower the vehicle to the ground.

ABS Component Replacement

7

pg. 35 Drumbrake axles
pg. 36 Disc brake axles

7 ABS Component Replacement

NOTE: Detail of the Meritor CVA service tools referred to in this section can be found in **Section 12 Service Tools**.

DRUM BRAKE AXLES

FITTING AN ABS POLE WHEEL

With the hub removed from the axle, place it, oil seal end upwards, on a clean, flat surface and cover the bore with a clean cloth to protect the bearings and grease from contamination.

Check that the pole wheel mounting spigot on the hub is clean and free from rust using medium emery paper to clean it up if necessary. Ensure no emery dust or other debris contaminates the bearings or grease.

Locate the new pole wheel correctly onto the hub and drift into place using the Meritor CVA seal driver & Handle (MST 3202 & MST 3200) (Fig 7.1) ensuring the pole wheel bottoms out against the mounting shoulder on the hub.

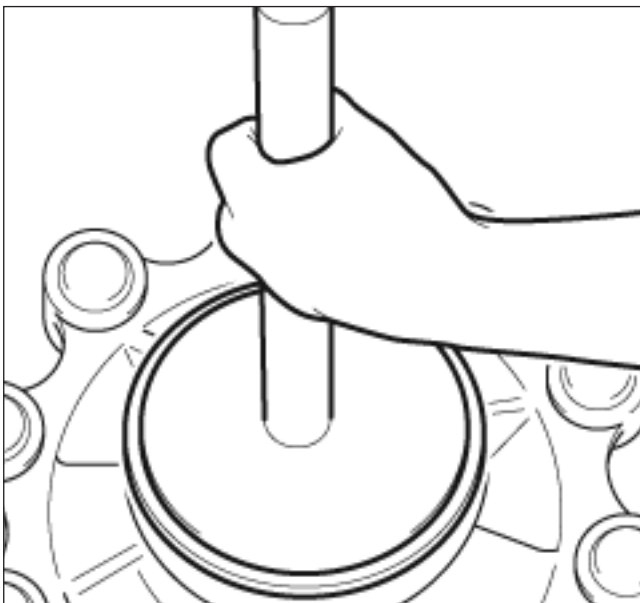


Fig. 7.1

FITTING AN ABS SENSOR

Sensor Block Assembly

Push the sensor fully into the mounting block assembly.

When the hub is refitted the pole wheel will push the sensor back thus attaining the correct clearance.

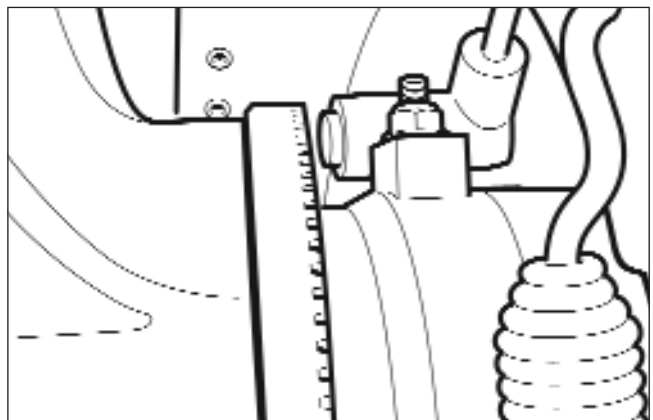


Fig. 7.2

Fix the sensor block assembly to the axle beam (Fig 7.2):

All axle beams are provided with a sensor block bolt fixing hole and location groove. The hole is located on the spindle end behind the oil seal journal and is orientated between the two anchor pin bushes.

NOTE: The sensor must be assembled into the sensor mounting block as described in this procedur, prior to fixing the block assembly to the axle beam. The sensor cannot be fitted once the block is in position.

Position the mounting block assembly so that the two small feet on the front edge of the block locate into the radial groove in the spindle just forward of the bolt hole.

Line up the bolt hole in the block with the hole in the beam and engage the M10 thread forming fixing bolt. **ALWAYS USE THE CORRECT BOLT.** Refer to Meritor Parts List.

Tighten the fixing bolt evenly to the torque specified in **Section 11**. Ensure the block is correctly seated and fully clamped.

7 ABS Component Replacement

The sensor may be rotated in the mounting block to allow the cable to pass either side of the anchor bracket.

Pass the sensor cable through the dust cover using the uppermost hole and fit the strain relief grommet.

Ensure the lower cable exit hole in the dust cover is fitted with a blanking plug.

CHECKING SENSOR OUTPUT

Connect the output cable to a suitable multimeter.

Rotate the hub by hand at a constant rate of approximately 30 rpm and note the maximum and minimum readings. The minimum permissible voltage reading is 400 millivolts and the ratio of maximum/minimum should not exceed 2.

If either values are not obtained check the installed air gap between the sensor and pole wheel does not exceed 0.7 millimeters and the pole wheel run out does not exceed 0.2 millimeters.

If the installation is still not correct, contact the supplier of the ABS equipment for further advice.

DISC BRAKE AXLES

Remove the Hub as described in **Section 4 Hub Removal & Replacement**

FITTING A NEW ABS RING

Most new rotors are supplied with the ABS ring as an integral component and if there is damage to the ABS ring a new rotor must be fitted. However, For DX disc brake applications the new rotor may utilise a press fit ABS ring, if necessary follow the procedure detailed below.

Place the hub on a suitable flat clean surface with the rotor placed loose on its mounting spigot. Push the ABS tube into the rotor (Fig. 7.3).

Using an LM oil seal driver (Meritor CVA part No. MST 3202), gently tap the ABS tube over its spigot on the hub (Fig. 7.4).

Keep the pole wheel square at all times and do not use excessive force to avoid damage to the thin tube.

When the pole wheel is approximately 4mm below the face of the rotor, gently lift the rotor up off the hub spigot and lower it back, to ensure the barbs on the tube engage properly onto the step in the rotor bore. (Fig. 7.5).

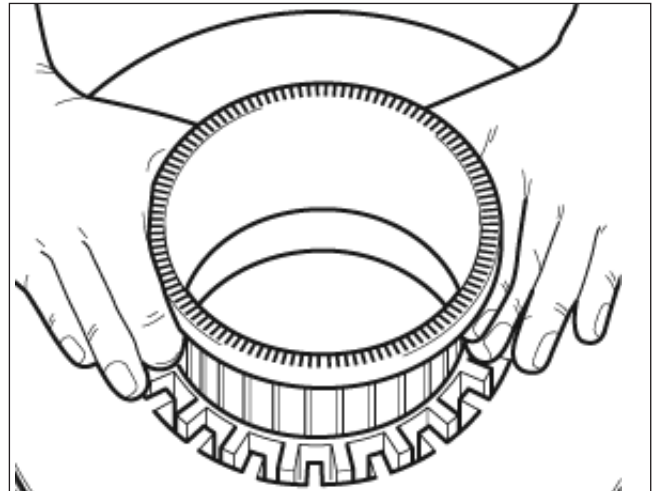


Fig. 7.3

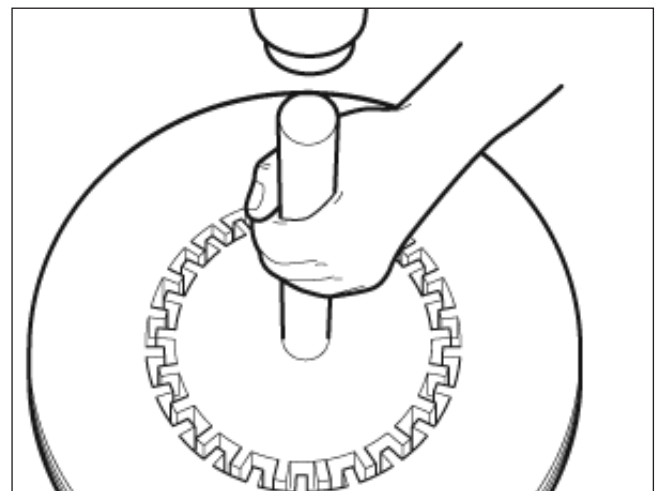


Fig. 7.4

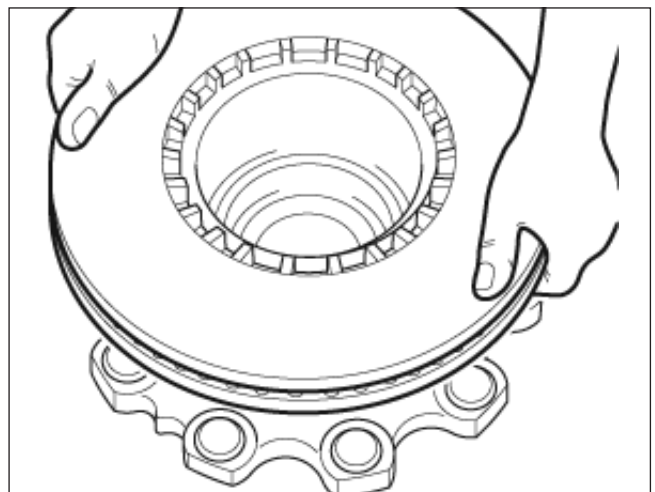


Fig. 7.5

7 ABS Component Replacement

By hand fit at least two opposite rotor mounting bolts before turning the assembly over.

Fit the remaining fasteners. Apply a nominal torque of no more than 30 Nm to all fasteners to seat the rotor. Check the correct length of bolt has been used in all 10 positions.

NOTE: All rotor fixings must be tightened to the torque value specified in **Section 11**

FITTING AN ABS SENSOR

Sensor Block Assembly:

Apply Meritor Brake Lubricant grease to the bush.

Assemble the spring bush into the sensor mounting block.

Push the sensor fully into the mounting block. Check when the hub and rotor has been fitted and that the sensor has been pushed up to the pole wheel (Fig 7.6).

Refit the hub as described in **Section 4 Hub Removal & Replacement**

NOTE: When the hub is refitted the pole wheel will push the sensor back thus attaining the correct clearance.

CHECKING SENSOR OUTPUT

Connect the output cable to a suitable multimeter.

Rotate the hub by hand at a constant rate of approximately 30 rpm and note the maximum and minimum readings.

The minimum permissible voltage reading is 400 millivolts and the ratio of maximum/minimum should not exceed 2.

If either values are not obtained check the installed air gap between the sensor and pole wheel does not exceed 0.7 millimeters and the pole wheel run out does not exceed 0.2 millimeters.

If the installation is still not correct, contact the supplier of the ABS equipment for further advice.

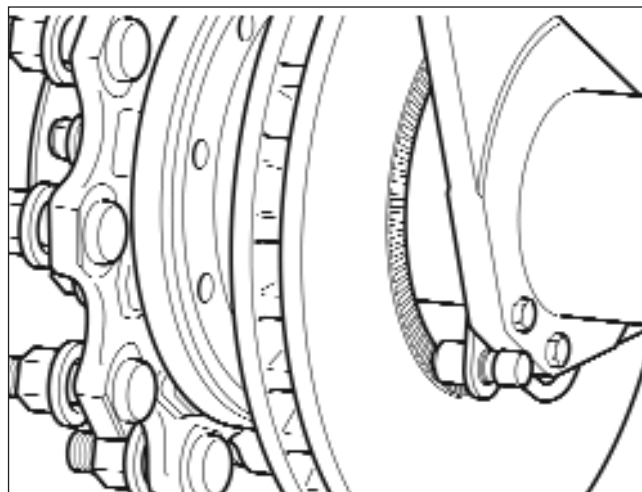


Fig. 7.6

DISC & DRUMBRAKE AXLES

Refit the road wheel.

Remove the axle safety stands and lower the vehicle to the ground.

Hub Odometer Replacement

8

pg. 39 Hub Odometer Fitment

8 Hub Odometer Replacement

HUBODOMETER FITMENT

The TM axle may be fitted with an hubodometer by using a special hub cap (Fig 8.1).

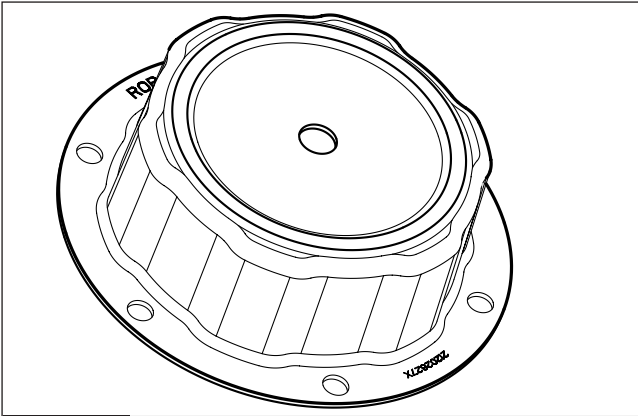


Fig. 8.1

It is not possible to fit an hubodometer to a standard hub cap (Fig 8.2) and attempting to do so will affect the hub sealing and may damage the spindle.

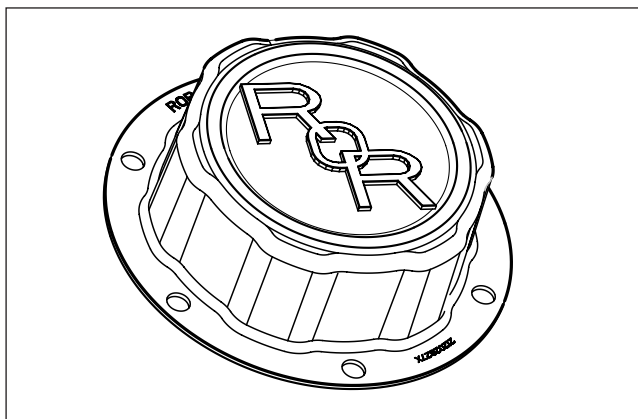


Fig. 8.2

For hubodometer types up to 85mm outside diameter use hub cap Meritor Part No. 21224904.

It is advisable to assemble the hubodometer to the hub cap prior to fitting the hub cap to the axle. Where applicable remove the hub cap from the hub as described in **Section 4 Hub Service & Replacement**

Place the hub cap on a clean, flat surface. Fit the nut to a suitable open ended spanner and using a small amount of grease place the washer onto the nut.

Using the spanner, position the nut and washer under the mounting hole in the cross bar of the hub cap.

T Lower the hubodometer through the hole to engage the thread. Rotate the hubodometer to screw the nut along the mounting stud until hand tight. Finally tighten the nut with the spanner in the normal way to a maximum of 27 Nm.

The hub cap and gasket can now be fitted to the axle as described in **Section 4 Hub Service & Replacement**.

Wheel Bolt Replacement

9

pg. 41 Wheel Fixings

pg. 41 Removing and Fitting Wheel Bolts

9 Wheel Bolt Replacement

WHEEL FIXINGS

Currently there are three different types of wheel mounting in common use:

1. British Standard system using 7.8" BSF thread and 80° conical seatings, (usually with L.H. and R.H. threads)
2. DIN metric system with M22 threads and spherical seatings .
3. ISO system again using M22 threads but locates the wheels by the centre bore on a spigot on the hub.

It is imperative that trailer manufacturers and operators ensure that the wheels and wheel mountings on the axle are compatible before assembling wheels to the axles and tightening to the recommended torque settings.

The achievable clamp load can vary considerably for a given applied torque depending upon a number of variable factors such as the surface condition of the bolts and nut threads.

To ensure accurate and positive location of the wheel, all mating surfaces should be free from dirt, excessive paint, rust and damage.

The only satisfactory method of maintaining the correct torque figures, which are based on coated and lightly oiled threads, is by using a correctly calibrated torque wrench.

All Meritor HVS axles with DIN and ISO fixings have RIGHT HAND THREADED BOLTS ON BOTH SIDES OF THE AXLES. Adhesive labels are available to highlight this.

If inspection reveals damage to bolts, cones or wheels, replacement is recommended. THIS CONDITION IS USUALLY DIRECTLY RELATED TO IMPROPER TIGHTENING.

The wheel bolt . being a safety critical component . should only be replaced with ORIGINAL Meritor HVS PARTS.

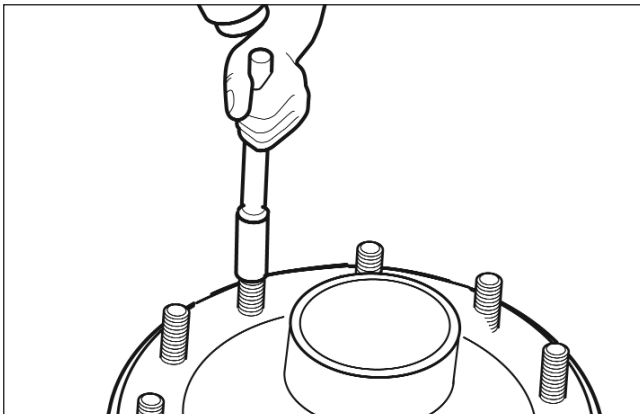


Fig. 9.1

NOTE: Detail of the Meritor CVA service tools referred to in this section can be found in **Section 12 Service Tools**.

REMOVAL AND REFITTING OF WHEEL BOLTS

(REFER TO WHEEL BOLT CHART FIG. 9.3)

Meritor HVS bolts are pressed into the hub and drum assembly and retained by serrations and the press fit in the hub.

Damage to wheelbolts is caused by:-

- . Loose wheel nuts
- . Over tightened wheel nuts
- . Mismatched wheel and fixings
- . Cross threadings
- . Mismatched bolts and nuts

Removal

They should be carefully pressed or hammered out using the wheel bolt removal tool (Meritor HVS Part No. MST 3211) (Fig. 9.1).

IMPORTANT ALL MATING SURFACES SHOULD BE CLEAN, DRY AND FREE OF BURRS PRIOR TO REASSEMBLY.

Refitting

Care should be taken to align the serrations of bolt and hub. They must be driven FULLY home with the wheel bolt driving tool (Meritor HVS Part No. MST 3210) (Fig. 9.2), using the sequence as for wheel nut tightening. Ensure no gap exists between hub, drum and wheelbolt head. When fitted the anti-lock Exciter Ring is retained by the wheel bolts. When driving the wheel bolts home great care should be taken not to damage the Exciter Ring.

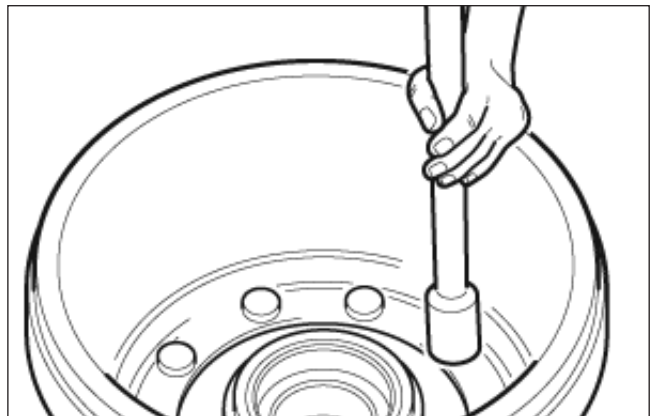
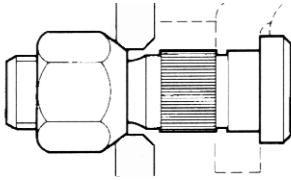
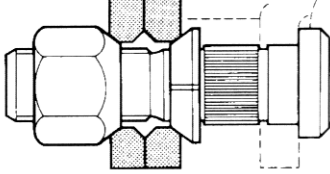
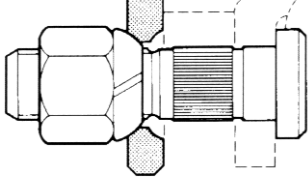
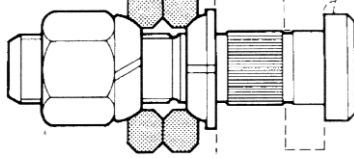
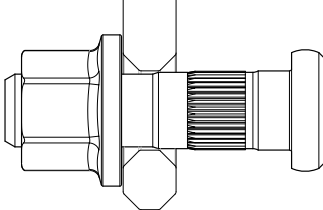
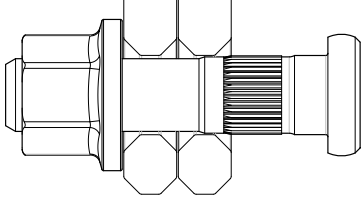
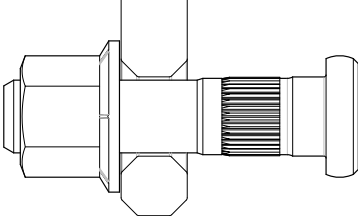
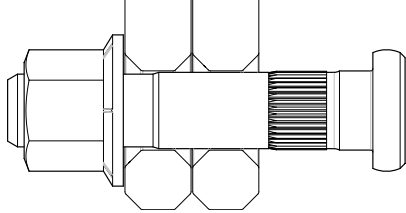
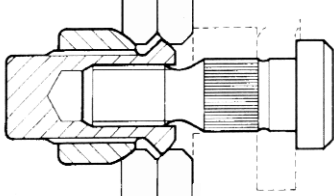
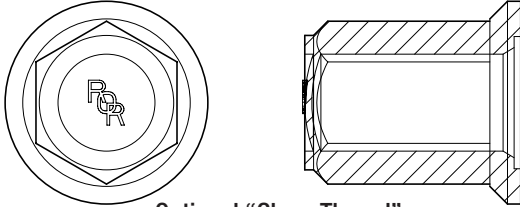


Fig. 9.2

9 Wheel Bolt Replacement

Wheel Bolts Fixings Fig 9.3

Type	Single Wheel	Twin Wheels
<p>B.S.F 7/8" 550 - 600 Nm (400 - 450 ibf. ft)</p>	 <p>Nut - 21016416/7 Bolt - 21020735/6</p>	 <p>Nut - 21016416/7 Bolt - 21018490/1 Cone - 21201588</p>
<p>DIN 550 - 600 Nm (400 - 450 ibf. ft)</p>	 <p>Nut - 21006511 Bolt - 21022167 Cone - 21006512</p>	 <p>Nut - 21006511 Bolt - 21020997 Outer Cone - 21006512 Inner Cone - 21019026</p>
<p>ISO 700 - 750 Nm (500 - 550 lbf. ft)</p>	 <p>Nut - 21226395 Bolt - 21022167</p>	 <p>Nut - 21226395 Bolt - 21022167</p>
<p>ISO Alloy Wheels 700 - 750 Nm (500 - 550 lbf. ft)</p>	 <p>Nut - 21226395 Bolt - 21022167</p>	 <p>Nut - 21226395 Bolt - 21022167</p>
 <p>Japanese (Twin Metric) Bolts - R.H. 21211162 L.H. 21211163</p>		 <p>Optional "Clean Thread" Closed End Nut (M22 x 1.5) For Steel & Alloy wheels 21226397</p>

Axle Installation & Welding Recommendations

10

- pg. 45 Stresses on Axle Beams
- pg. 46 Welding Affects on Axle Beams
- pg. 46 Recommended Location of Welds

10 Axle Installation & Welding Recommendations

INTRODUCTION

The following notes and recommendations are offered as a guide to the trailer manufacturer and service engineer. They are based on experience gained from both the manufacture and the servicing of single and multiple axle installations.

STRESSES ON AXLE BEAMS

The stresses on the axle beam under the load take two forms. The upper portion of the beam is subjected to a COMPRESSION stress equal to the TENSION stress of the lower portion. Along the beam centre is a zone of minimum stress, often named the neutral stress zone area. Fig. 10.1 is a simplified sketch of the transverse section of a tubular axle and spring showing these three zones. Fig. 10.2 is a graphic representation of the degree of stress in the wall of the tube when the beam is under load.

When an air suspension is assembled to the axle beam of a design which uses the beam as a torsional member of the air suspension, then an additional allowance must be added to determine overall beam strength. In this application beam strength is composed of maximum load, air suspension torsional stress and braking stress. In general the 22,500 Series axle beam should be applied as a minimum rating.

Meritor HVS Engineering should be contacted for written approval of application.

The length of the arrows "X" represents the amount of stress at a given point. From this illustration it is evident that the two opposite stresses diminish as the horizontal centre line is approached. The stress imparted by the action of braking is taken into consideration in rating axle capacity. The axle beam strength is computed by adding together the maximum load and braking stress to which the beam will be subjected. A reasonable allowance of both is then added as a safety factor.

When the axle beam is suddenly relieved of its load and torsional stresses, then torsion, compression and brake stresses are momentarily

relaxed. These stresses are re-applied and reversed many times during normal axle life. For this reason, the steel from which the beam is manufactured must have certain qualities of ductility which will permit it to absorb shock, and to flex whilst retaining its calculated strength.

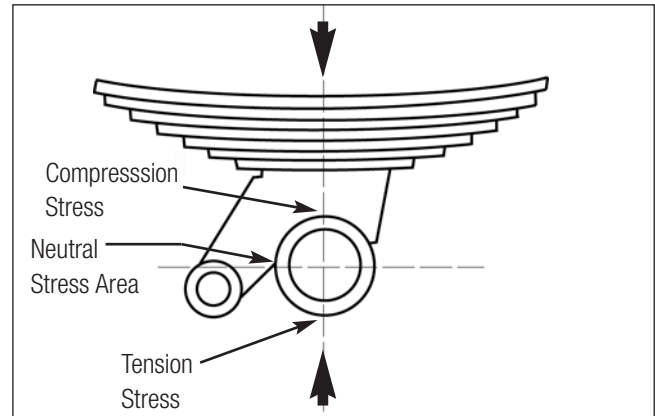


Fig. 10.1

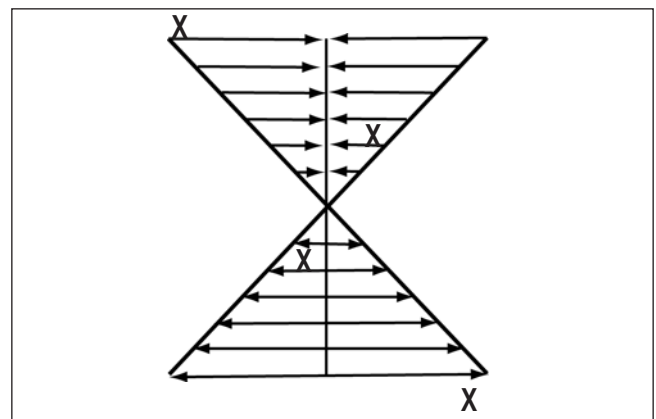


Fig. 10.2

10 Axle Installation & Welding Recommendations

HOW WELDING AFFECTS BEAM MATERIAL

All welds made on the beam create, in effect, an extreme local heat treatment. The heat generated by the weld causes the material immediately adjacent to the weld to become hardened, substituting the undesirable characteristic of brittleness for the original and desirable quality of ductility. This small hardened area becomes the weakest part of the tube creating a notch effect.

Since the same characteristics of relative stress apply in both cases it can be seen that the loss of strength at the weld area can cause failure. The notch can be at the bottom of the beam as well as at the top. Either case is at the maximum stress location.

Some welding tips to minimise the notch effect:

1. Make all “tack” welds at least one inch long.
2. Keep the number of tack welds to a minimum – if possible clamp the bracket tightly to the beam and eliminate tack welds.
3. If more than one bead of weld is required make the second run (third etc) runs with different start points and BEFORE the first run cools down (descaling between runs of course).
4. Remove oil, and if possible paint from surfaces to be joined.

RECOMMENDED LOCATION OF WELDS

Fig. 10.3 illustrates the recommended location of the weld fillet for round beams. All welds should be located in the area of minimum stress. The direction of welding should be as near the horizontal as possible.

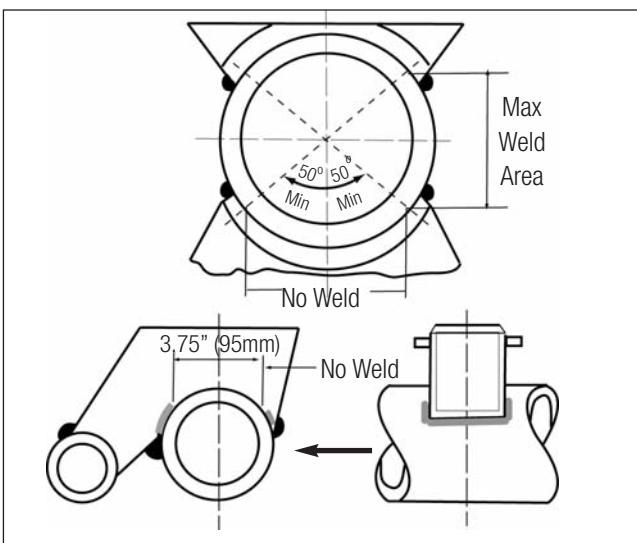


Fig. 10.3

Welding around the corners of brackets or spring seats should be avoided. It is important that all welds should be excluded from an area of 50° of either side of the bottom vertical centre line of the beam.

Avoid welds of a circumferential nature on the lower half of the beam.

Where the brackets fit down the side of the beam they should have a corner radius of approximately 1" (25mm). The purpose of this radius is to avoid local concentration of stress.

The illustrations show the recommended weld location for the various parts to be attached to the axle beam. None of these parts has been welded to the beam at points of maximum stress.

The welding rod used should meet BS 639 and BS 1719 (British Standard) specification.

They should not be broken at the end of the fillet, instead the electrode should be “backed-up” to fill the crater that would otherwise remain.

Use the voltage and amperage recommended by the electrode manufacturers. This will provide the best fusion and strongest weld and will minimise the detrimental side effects such as localised hardening and residual stress. Deposit the required amount of metal with the least number of passes practicable – one pass to be preferred. If a second pass is required first thoroughly clean the weld.

MOST IMPORTANT

1. Do not test the arc on the axle beam or springs.
2. Fillet welds up to 12mm (1/2") can be used on round axle beams and the attachment should fit as close as possible to avoid excessive welding – minimum recommended fitted weld 8mm (5/16") where practicable. It is important to remove all scale in fillet welds prior to painting. If this is not adhered to it will precipitate corrosion in these important weld areas.

Maintenance Schedules, Torque Values, Lubricants & Grease Volumes

11

pg. 49 Maintenance Schedules
pg. 50 Torque Values
pg. 50 Recommended Lubricants
pg. 50 Hub & Bearing Grease Fill Volumes

11 Maintenance schedules, Torque values, Lubricants & Grease volumes

MAINTENANCE SCHEDULES

TM – Disc & Drum

CHECK BRAKE ADJUSTMENT

CHECK WHEEL NUT TORQUES

- Before entering service.
- After 150 km.
- After 1500 km.
- Every 3 months.
- After any wheel fixing removal.
- After any brake service.

HUB AND BEARING INSPECTION

Including:

OIL SEAL REPLACEMENT.

HUB CAP GASKET REPLACEMENT.

HUB OIL RENEWAL (WHERE APPLICABLE).

- Whenever hubs are removed from axle.
- Annually after 1st major hub overhaul.

MAJOR HUB SERVICE

- If a problem is found during inspection.
- Prior to 2nd annual test or after 200,000 km, whichever occurs first.

THEN

Annually or subsequent 100,000 km intervals, whichever is most frequent.

TM – Drum

LUBRICATE CAMSHAFT BEARINGS.

CHECK BRAKE ADJUSTMENT.

CHECK OIL LEVEL (OIL FILLED HUBS)

- Recommended maximum at 3 monthly intervals.

NOTE: If other than ROR Brake Lubricant Total Fina is used or where vehicles are in contact with severe abrasives a max of 6 week interval necessary.

BRAKE INSPECTION & SERVICE

- Linings should be inspected every 6 weeks or 25,000 kms and must be replaced as an axle set if worn down to the wear indicator (8mm).
- Full stripdown should be prior to 2nd annual test or at 1st reline, whichever is soonest.

THEN

Annually or at every subsequent brake reline. Whichever is most frequent.

TM – Disc

BRAKE INSPECTION & SERVICE

- Pads, caliper and rotor should be inspected every 50,000 kms or 3 months. Pads must be replaced when worn to a minimum lining thickness of 3mm. Always replace pads as an axle set.
- At intervals of 100,000 kms, or every 6 months, (preferably when changing pads), the opportunity should be taken to remove any accumulations of wear debris and rust from the edge of the rotor, and from the pad location points in the caliper. Check also condition and location of sealing boots.

NOTE: The above service intervals are recommended maximums under normal operating conditions. Unusual ambient temperatures or adverse operating conditions (e.g. dusty atmospheres or severe gradients) will require more frequent service intervals. It is the responsibility of the vehicle operator to establish these intervals.

11 Maintenance schedules, Torque values, Lubricants & Grease volumes



FASTENER TORQUE VALUES - DRUM/DISC BRAKE

Hub cap bolts - grease.	11-15 Nm
Hub cap bolts - oil.	25-30 Nm
Dust cover bolts - forged anchor bracket.	16-30 Nm
Dust cover bolts - pressed anchor bracket.	50-60 Nm
Spherical bearing bolts (spline end)	50/60 Nm
Spherical bearing bolts (cam head end)	50/60 Nm
ABS Sensor fixing bolts	7.5-11 Nm
ABS Exciter ring (310-350 brakes).	7.5-11 Nm
Axle adjustment nut	Refer to setting procedure, Section 4
Axle lock nut	350-375 Nm

Additional Torque values - DISC BRAKE ONLY

Rotor flange bolts	230/270 Nm
Caliper retaining bolts	280/320 Nm
Blanking plug adjuster access	10/17 Nm
Lever clamp bolt/nut	31/37 Nm
Air chamber nuts	175-200 Nm

RECOMMENDED LUBRICANTS

Grease filled hubs:

Meritor hub grease Blue Lithium EP2, Total Multis EP2, Shell Calithia EP2T, Texaco Multifak EP2, BP LS EP2, Silkolene G62, Eurol Universalfett EP2, Axel Christiernsson Lithac 162 EP, Castrol Spheerol EPL2, Shell Alvania Grease EP(LF)2, Mobil Mobilux EP2, Fina Marson EPL2, SKF LGEP2, GB Lithium EP2, Esso Beacon EP2.

Oil filled hubs:

Shell Spirax EP90, Mobile Mobilube GX90, Castrol Hypoy EP90, Texaco Multigear EP85W/90, Total EP90, B.P. Gearoil 90EP, Esso GX 85/90.

Brake Components and Camshaft Bearings:

Meritor Brake Lubricant - (Total Fina CERAN WRC2)

Spindle Bearing Journal:

Optimol Optimoly White Paste T

HUB & BEARING GREASE FILL VOLUMES

Hub Cavity	325-375 gm
Inner Bearing	50-55 gm
Outer Bearing	23-28 gm
Hub Cap	150-200 gm



CAUTION: Only use the grease supplied with replacement components/kits, or that specified. Under no circumstance should any other type of grease be used.

Service Tools

12

- pg. 53 MST 3201 Bearing Driver
- pg. 53 MST 3202 Oil Seal Driver
- pg. 53 MST 3203 Oil Seal Removal Tool
- pg. 53 MST 3205 Adaptor (use with MST 3204 Torque Wrench)
- pg. 54 MST 3206 Hub Puller
- pg. 54 MST 3207 Hub Spanner
- pg. 54 MST 3208 Die Nut
- pg. 54 MST 3209 Die Nut Holder
- pg. 55 MST 3210 Wheel Bolt Driver
- pg. 55 MST 3211 Wheel Bolt Removal Tool

12 Service Tools

MST 3201 - Bearing Driver & Handle

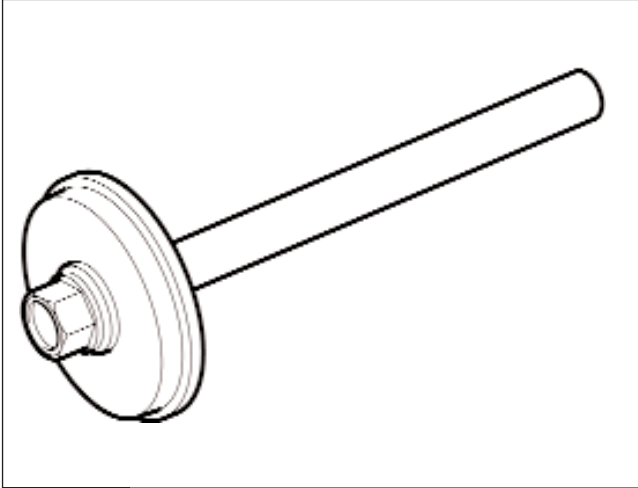


Fig. 12.1

MST 3202 - Oil Seal Driver & handle

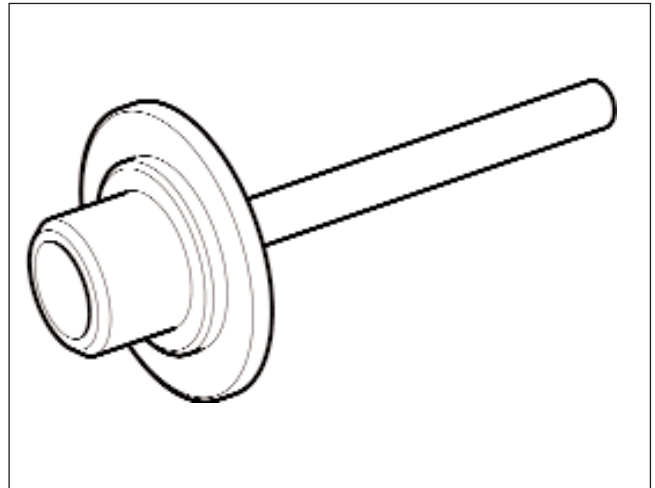


Fig. 12.2

MST 3203 - Oil Seal Removal Tool

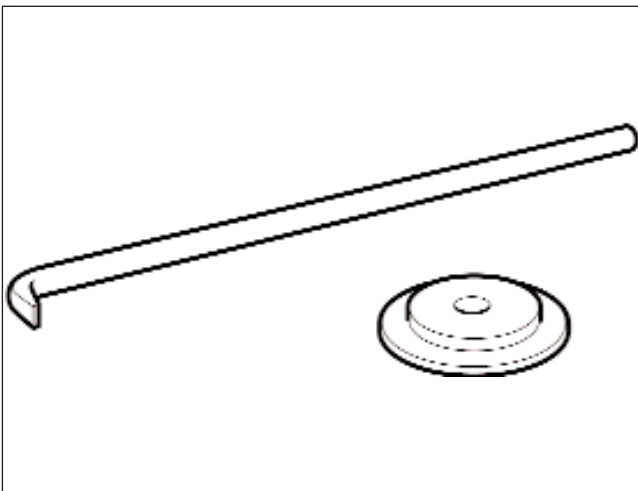


Fig. 12.3

MST 3205 - Adaptor (use with **MST 3204** - Torque Wrench)

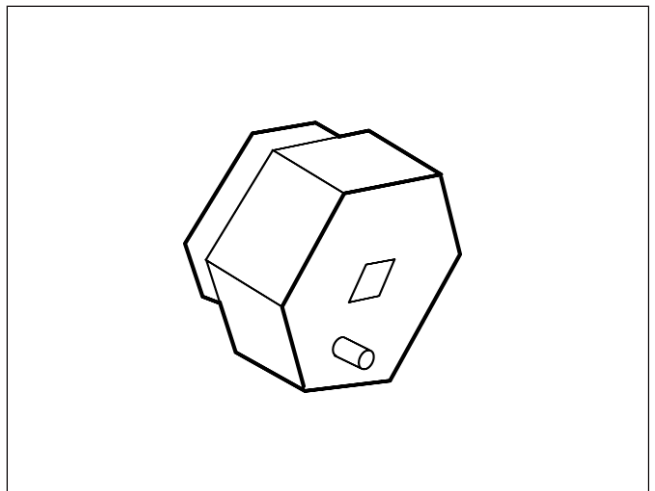


Fig. 12.4

12 Service Tools

MST 3206 - Hub Puller

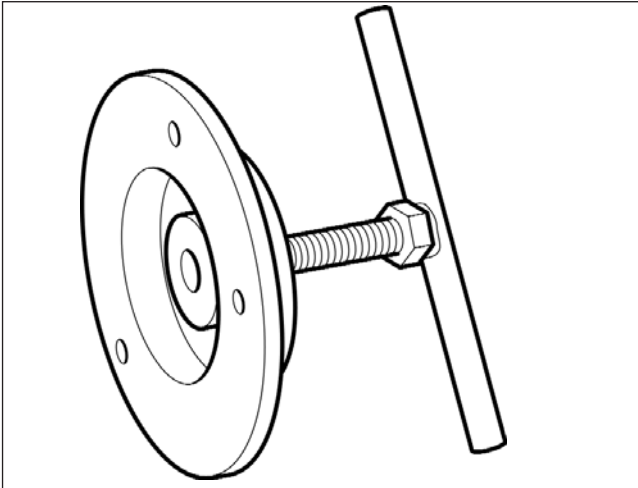


Fig. 12.5

MST 3207 - Hub Nut Spanner

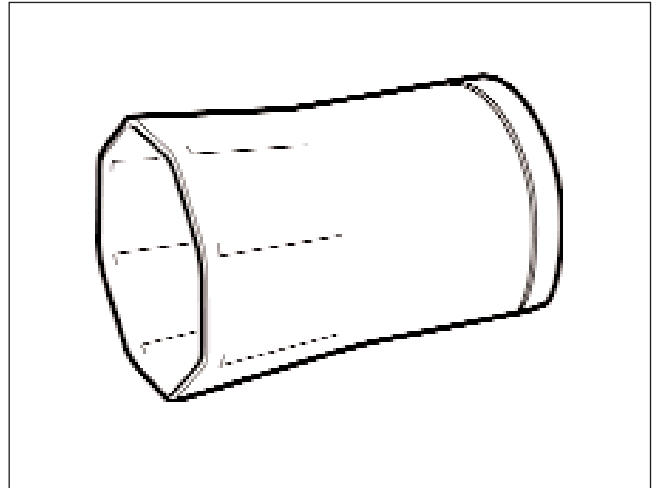


Fig. 12.6

MST 3208 - Die Nut

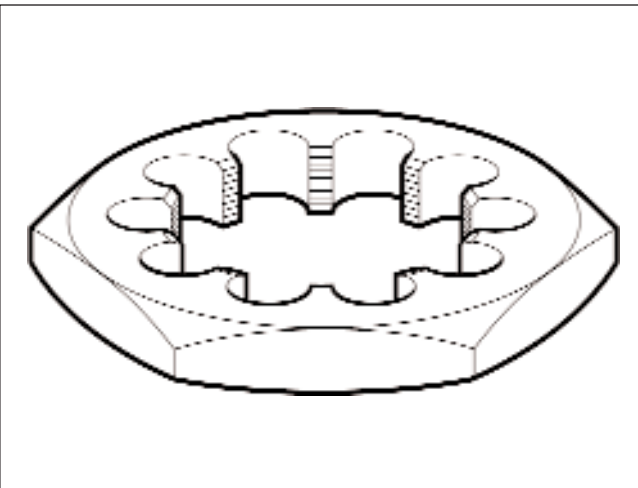


Fig. 12.7

MST 3209 - Die Nut Holder

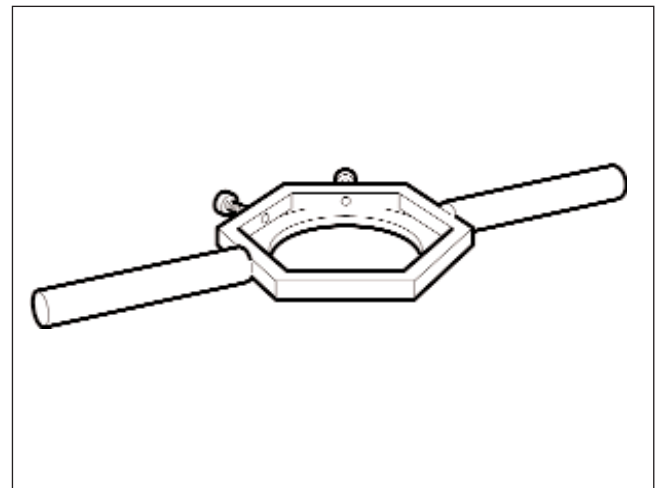


Fig. 12.8

12 Service Tools

MST 3210 - Wheel Bolt Driver

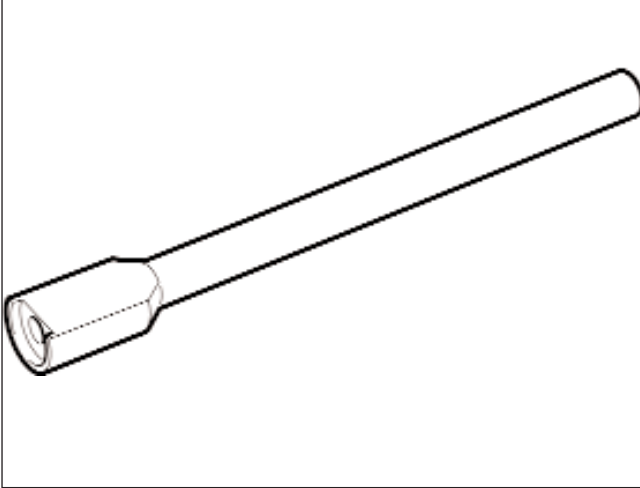


Fig. 12.9

MST 3211 - Wheel Bolt Removal Tool

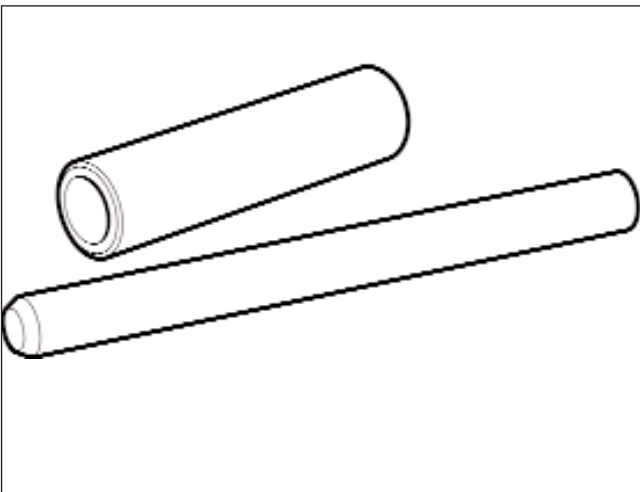


Fig. 12.10

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