Air Suspensions & Axles manual

Whilst every effort has been made to ensure that This manual is as accurate as possible, Granning Axles cannot be held responsible for any omissions or errors. We reserve the right to alter specification without prior notice.

Revision: April 2004

Granningaxles
Engineered transport solutions

Air Suspensions & Axles

Date Fitted:	/ /
Chassis Number:	
Axle Model Code:	
Axle Serial Number:	

Granningaxles
Engineered transport solutions

Congratulations

On your purchase of a Granning axle.

Granning Axles are one of the UK's primary Air Suspension and Axle Manufacturers. Part of the Toughline Manufacturing Group, we are experts in road vehicle axles, brakes and suspensions. Operators throughout the world are reaping the benefits of our road friendly air suspensions and high quality non driven axles.

Granningaxles
Engineered transport solutions

Contents

Health & Safety

Do's

» ALWAYS use genuine GRANNING components.

» ALWAYS use suitable tools for the job.

» ALWAYS work in good, safe working conditions.

» ALWAYS use safety equipment.

Don'ts

» NEVER work under an unproped body or axle.

» NEVER leave an unproped body or axle unattended.

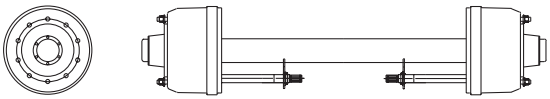
» NEVER work without supervision.

In line with industry health & safety guidelines.

This does not preclude you from following your companies Health & Safety Guidelines.

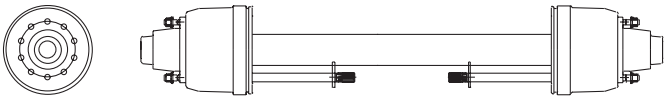
All Granning axles employ Asbestos Free friction material, however, when servicing a used axle, take care Asbestos might be present in brake linings. Always assume that Asbestos is present and take appropriate steps to ensure the safety of all involved.

Granningaxles
Engineered transport solutions

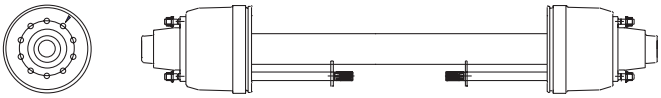


100 SERIES STRAIGHT AXLE

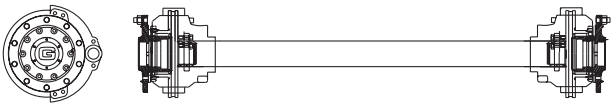
200 SERIES STRAIGHT AXLE



300 SERIES STRAIGHT AXLE



400 SERIES STRAIGHT AXLE



DISC BRAKED STRAIGHT AXLE

All the above axles are shown as being straight, although most are available with a drop centre in the centre or offset at varying distances.

Read this section before installing the axle saddle

Beam Stresses

Granning Axles' beams are manufactured from high tensile, hot rolled hollow tube. In service these beams are subjected to combined bending and torsional stresses. Maximum combined stresses occur along the top and lower surface of the beam. The minimum stresses occur along the front and rear centre line, called the neutral axis. It is an accepted fact that welding steel causes a heat effected zone which enbrittles the metal in that area. Therefore, any welding on the axle beam must always be away from the high stress lines and near to the neutral axis. See Fig. 1.1 and Fig. 1.2.

Although it is possible to make a 10 mm fillet weld in one pass, we recommend that this be done in three passes. The order of which are shown in the close up of Fig. 1.1 below.

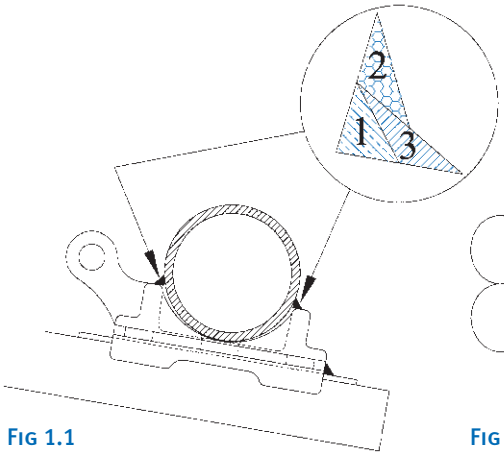


Fig 1.1

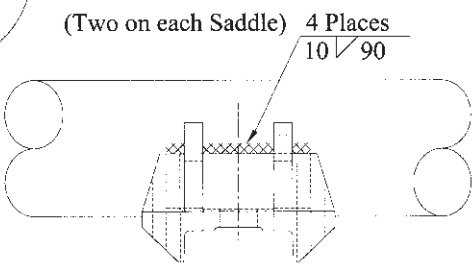


Fig 1.2

Granningaxles
Engineered transport solutions

Effects of Beam Welding

When a weld is made on the beam, it creates in effect an area of extreme localised heat treatment. The heat generated by the welding process will cause the beam material, within the immediate vicinity of the weld, to become hardened. This results in a small area of brittleness replacing the required property of ductility. This area then becomes the weakest part of the tube. See Fig. 2.1 below.

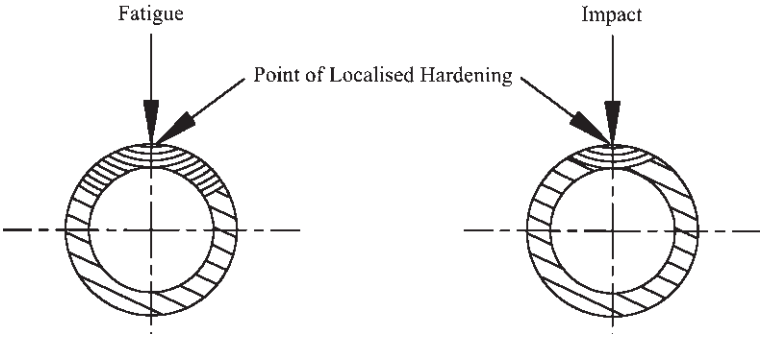


Fig 2.1

It can be seen that should an area of localised hardening appear at either point of maximum stress, the strength of the beam could seriously be affected.

Welding precautions

a) Connect the earth directly to the work piece.
b) NEVER weld to the upper or lower surfaces of the axle.
   Confine welds to axle surfaces not exceeding 40° above or below the horizontal.
c) As far as possible, try to avoid overheating the axle.
d) Protect the spring link and rubber components from weld splatter.
e) Welds must contain NO voids, craters, inclusions or cracks.
f) When ambient conditions are below 20°C, preheat the weld areas.

Axle Fitment

1. Ascertain the suspension spring/hanger centres ensuring that the maximum 'Outset' is not exceeded (See Fig. 3.1 below).
2. Set saddle centres to the given dimension.
3. Ensure that the axle tube and saddle cup are clean.
4. Centre axle between the saddles.
5. Locate camshaft/brake position ensuring correct rotation and position (see page 7).
6. Set saddle spring surfaces parallel to one another.
7. Once all of the above has been assured and re-checked, weld saddles as on page 4.

To ensure that the maximum bending moment is not exceeded, please ensure that the load (in tonnes) multiplied by the distance from the centre of the saddle to track line (in millimetres) does not exceed 4250 tonne millimetres. This is shown below in Fig. 3.1

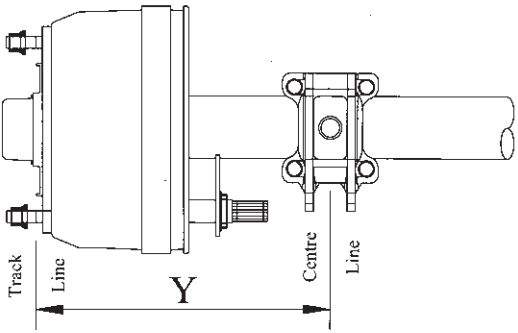


Fig 3.1

Max Y (mm) = 4250 ÷ Load (tonnes)

Exceeding these dimensions may cause the high bending moments involved to move the point of contact between the tyre and road, resulting in excessive tyre wear and premature failure.

Granningaxles
Engineered transport solutions

Brake Camshaft Rotation

To assure safe operation and maximum durability on parts such as brake linings and tyres, it is necessary to position and install the axle properly. It is essential that the axle assembly be installed so that the cams rotate in the same direction as the wheels in FORWARD travel.

Installation in which the camshaft rotation is opposite to that of the wheel rotation could cause noisy brakes, chatter and wheel 'hop'. With this in mind, the axle should be ordered with placement of air chamber and slack adjuster assemblies that will ensure the correct directional rotation of the cams when the axle is installed. See Fig. 4.1 below.

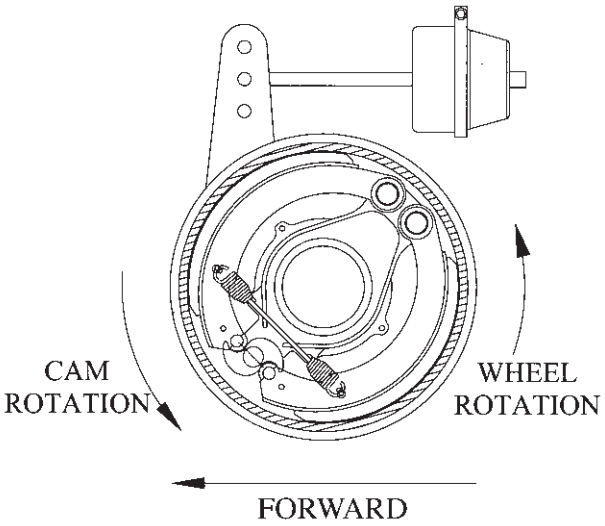


Fig 4.1

Tracking

All Granning axles are constructed so that the toe in / out is less than 2 mm / metre. Responsibility for proper axle alignment lies with the axle installer. The Granning Axle Range includes Trailer axles and Truck axles.

Trailer axles are aligned (tracked) from the trailer king pin to fixed points on the front axle. Following axles are tracked from the front axle (See fig. 5.1).

Truck Axles should be fitted parallel to the DRIVE axle (see fig. 5.2)

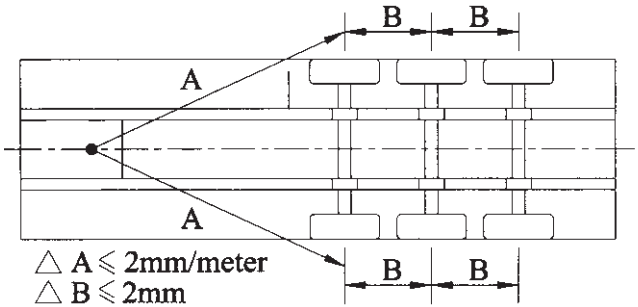


Fig 5.1

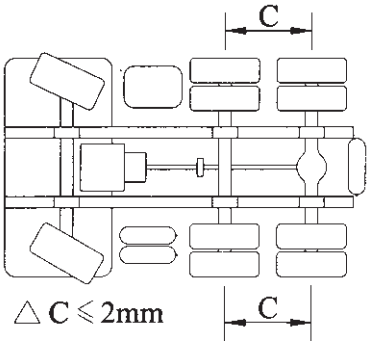


Fig 5.2

Granningaxles
Engineered transport solutions

Important Note

It is vital that operators and manufacturers ensure that the correct type of wheel cones and nuts are fitted to specified bolts, before torquing to full setting. Fig. 6.1, 6.2, 6.3 & 6.4 show the four main nut and bolt configurations.

Wheel Rims and Fasteners of different standards must not be interchanged or mixed in any combination.

Metric ISO Standard

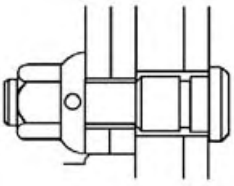


Fig 6.1

Metric ISO Alloy

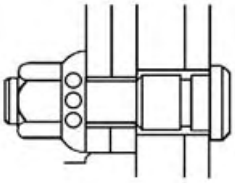


Fig 6.2

BSF SMMT

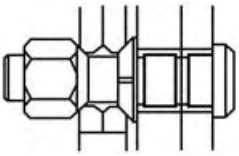


Fig 6.3

Metric DIN Standard

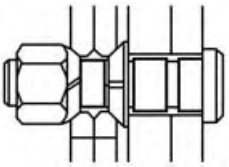


Fig 6.4

Mating surfaces between Hubs and Wheel Rims should be primer painted only. Thick gloss will result in loss of torque.

Tightening Torques

	Ft. lb.	N.m
Wheel nuts - BSF / DIN	400 - 500	542 - 678
Wheel nuts - ISO	550 - 600	746 - 814
Wheel nuts - Alloy	500 - 550	678 - 746

Wheel Tightening Sequence

Tighten wheel nuts in this order

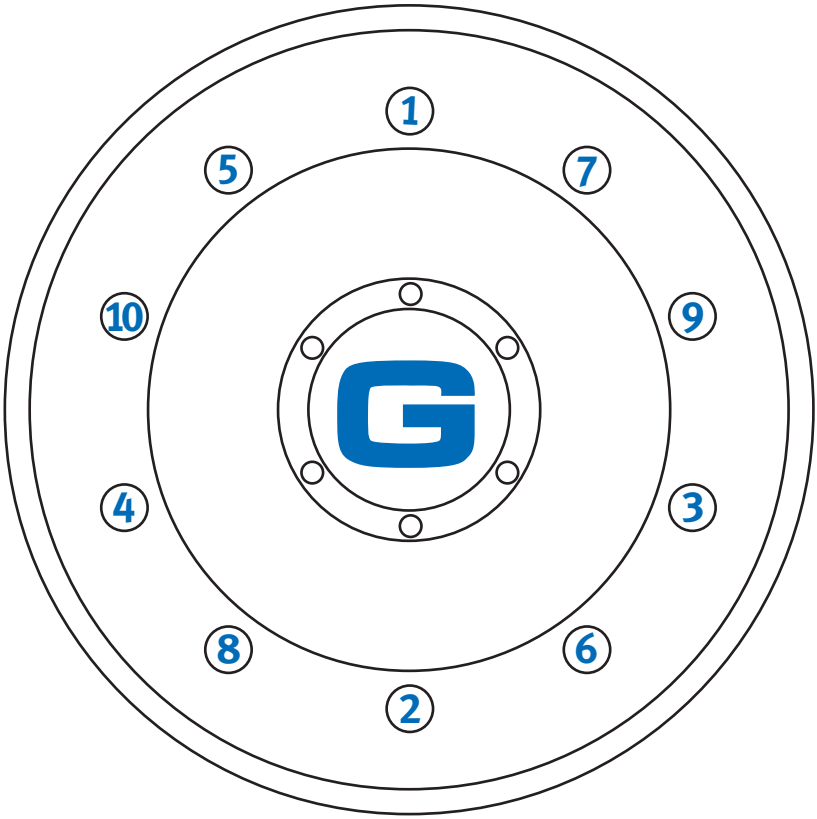


Fig 7.1

Granningaxles
Engineered transport solutions

Service intervals depend on operating conditions and are best decided by the Operators Fleet Engineer, having considered the following guide lines.

On Initial Receipt →

Check all nuts, etc. for recommended torque. It is strongly recommended that wheel nut torque is checked every 7 days or 1000 km, whichever is the sooner.

First 300 miles (500 km) →

Check all wheel nuts daily for first week, due to seating effects.
It is suggested that the hubs are checked for end-float, again due to seating effects.
Lubricate all grease points, using Lithium soap-based EP2 grease.

At 3,000 miles (5,000 km) →

Check same as first 300 miles (500 km).
Check wear pattern of brake linings, if not satisfactory, make correct adjustment.
Check hubs for end-float. Reset adjustment nut if necessary.

At 10,000 miles (15,000 km) and every 10,000 miles thereafter →

Lubricate all grease points.
Check hubs for bearing end-float. Adjust as necessary.
Lubricate slack adjusters.
Check brake linings for wear.

At 30,000 miles (50,000 km) and and every 30,000 miles thereafter →

Remove hubs, check brake linings for wear, check anchor pins for sticking (remove and re-grease if necessary), check camshafts for sticking.
Completely clean out grease from hub.
Re-pack, using fresh grease.
Check grease seals for signs of wear, replace if necessary.
Re-set bearing adjustment nuts to give bearing end-float.

Bearings

The bearings used in Granning axles are of the finest materials, and produced to exacting standards. They are selected to give the user considerable service life. To protect this longevity, the following procedure is recommended when servicing is required:-

a) Immerse cups and cones in a suitable cleaning solution. After soaking, agitate bearings around in fluid to flush out any old residue grease. Never spin a bearing, this could cause the rollers to skid, thus damaging the highly finished internal surfaces of the bearing.

b) When clean, thoroughly drain and dry, preferably in warm air at around 65 - 80°C.

c) The bearing must be now checked for any signs of corrosion, discolouring, pitting or flaking. Should there be any doubts as to the condition of the bearing, replacement is strongly advised.

d) If the bearing is to be refitted immediately, ensure the rollers are fully pre-packed with lubricant (see recommended lubricants) before fitment. Alternatively, immerse the bearing in rust-preventative oil, wrap in wax paper, and box for storage.

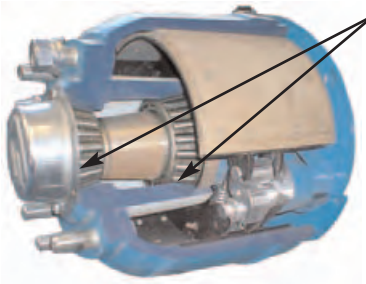
Note:- If sealed for life bearings (UNIPAC) are fitted, do not tamper with or attempt to service. Any tampering with the bearing may drastically reduce the service life of the bearing and hubs, as well as invalidate the warranty. The only action required for sealed for life bearings is the addition of anti fretting lubricant onto the spindle prior to any reassembly. Timkin recommend 'Optimol White T', or 'Copperslip' as an alternative.

Recommended Lubricants

Manufacturer	Recommended	Alternative
Shell	Shell Retinax 'LX2'	Shell Retinax 'LX'
Mobil	Mobil Grease H. P. 222	Mobil Grease H. P.
Castrol	Castrol LMX	Spheerol A. P. T. Z.
Texaco	Hytex EP2	
Esso	Unirex EP2	
BP	Energrease LC2	

Granningaxles
Engineered transport solutions

Greasing the Bearings



Apply grease to these areas.
It is important not to overfill the hub with grease!

I.E.

Hub:-	400 grams
Hub Cap:-	200 grams

Care: Greasing at high pressure may cause damage to the seals

Fig 8.1

End Float

All Granning Drum Braked axles are fitted with two rows of tapered roller bearings. To protect normal bearing life, these bearings must not be subjected to preload during assembly and service. End float of between 0.05 and 0.15 mm is therefore recommended.

End Float

Most Granning axles are fitted with 2 rows of tapered roller bearings. To protect normal bearing life, these bearings must not be subjected to preload during service. End float of between 0.05 and 0.15mm is therefore required. The correct method for setting End Float is as follows:

1. While spinning the hub assembly, torque the adjusting nut to 375Nm.
2. Spin the hub a further 4 revolutions and torque the adjusting nut to 375Nm.
3. Loosen the adjusting nut by at least one full revolution.
4. Torque the adjusting nut to 25Nm.
5. Back off the adjusting nut 2 to 2.5 flats.
6. Fit the lock washer so the dowel pin of the adjusting nut slides into one of the holes of the lock washer. If necessary flip the washer to achieve this alignment.
7. Fit the lock nut and torque it to 375Nm.
8. The end float must be confirmed to be between 0.05 and 0.15mm using the dial gauge method described below.
9. Pack the grease cap with grease, replace the gasket and refit the grease cap.

Using a dial gauge to measure Bearing End Float is described below:

1. Using a magnetic block mounted dial gauge, mount the indicator base on the hub as close to the centre of the spindle as possible.
2. Place the indicator tip against the end of the spindle. It is important that the direction of travel of the indicator tip is perpendicular to the end of the spindle.
3. Grasp the wheel hub at 3 o' clock and 9 o' clock. Pull the hub out while oscillating it to seat the bearings.
4. Set the indicator at zero.
5. Push the wheel hub in while oscillating.
6. Read the bearing end float as the total indicator movement.

Granning axles have developed a special tool for reading end float. It uses a digital indicator and is available upon request. This indicator has also been used successfully on other manufacturer's axles in line with their end float setting procedures.

Granningaxles
Engineered transport solutions

Brakes

It is important that operators develop a schedule for periodic cleaning, inspection, adjustment and lubrication of brake components. This will provide the prevention rather than cure of brake problems. Adjustment of brakes should be carried out as frequently as required, in order to maintain the original safety standard. Slack adjuster travel and uniform lining clearance must be maintained.

At regular intervals, brake drums should be removed and linings checked for wear. The linings must not be allowed to wear down beyond the wear line, or to the rivets. After fitting new or re-lined shoes, always fit new return springs. Each time the hubs are removed for brake inspection, check the following parts for wear:-

1) All hub components.
2) Grease seals. (It is recommended that new seals are fitted, see Pg. 23)
3) Bearing cups, cones & rollers.
4) Brake anchor pins and location holes.
5) Cam rollers and retaining pins.
6) Wheel studs and nuts.
7) Check brake drum for cracks, scoring or any form of deterioration.

Prior to re-assembly, the following parts should be coated with 'Copperslip' or equivalent product:

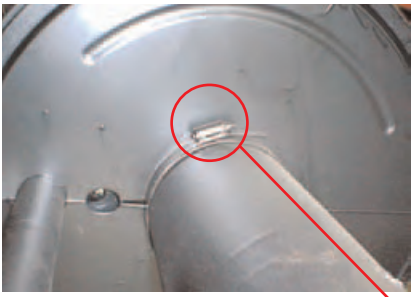
1) Cam roller location diameters and journals.
2) Anchor pin location holes in brake shoes.
3) Brake Anchor Brackets (spiders) camshaft bores.

Note:-Brake linings should be replaced as a complete axle set !
Once new linings have been fitted braking performance will be reduced until the new linings have 'bedded in'. This can take up to 1000 km depending on operating conditions. Therefore it is recommended that linings are replaced well before critical brake performance inspections such as MOT tests etc. Check with the manufacturer of your slack adjusters for any adjustment that it requires.

Dust Cover Removal

Above is a dished style dust cover found on most axle series.

The dished dust cover is easily removed by unscrewing the retaining screws.



Above is a one-piece style dust cover mainly found on the 100 series axles.

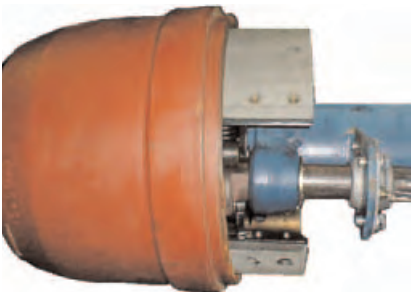
The one-piece dust cover is easily removed by releasing the worm drive clip, then opening out the two halves.

Granningaxles
Engineered transport solutions

400 Series Drum Removal

As the 400 Series axle employs an EXTERNAL Drum, the brakes can be easily accessed by removal of the drum alone, leaving the hub and bearings untouched.

First remove any remaining wheel nuts. Then remove the two countersink screws.



Back off brakes, then remove the drum, taking care not to drop it. Also remember that the removal of this will affect the balance of the axle.

Note: The two countersink screws should not be transported without at least two wheel nuts per drum, torqued to 40 Nm to ensure the drum remains in place.

If you wish to remove the hub and bearings, please follow the sequence on the next page.

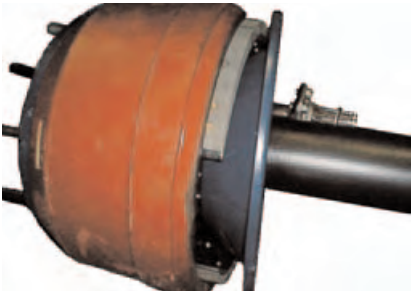
Hub Removal

Below is the Hub removal sequence for 100, 200, 300 & 400 Series axles.

By releasing the six retaining screws, the hub cap is easily removed.

The next step is to remove the locking nut & washer.

Then the adjusting nut...



...and finally back off the brakes and pull off the hub/drum assembly, taking care as the removal of this will change the balance of the axle. Furthermore, take care as not to drop the drum. It is advisable to use a hub puller to remove the hub, if one is available.

Granningaxles
Engineered transport solutions

Brake Identification

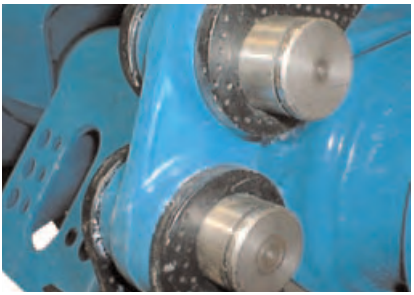
There are two types of brake shoe fitted to Granning Drum Braked Axles, they are the Quick Fit & Standard Shoes. These both come in two different sizes, either 420 x 180 mm or 310 x 190 mm.

Quick fit brake shoe

Standard brake shoe

Removal of Standard Brake Shoes

Removal of Brake Shoes from 400 Series axles does not require the removal of the Hub, as the drum can be pulled over this assembly without disturbing it.



Firstly remove the E-clips from the anchor pins, then remove the anchor pins.

The next step is to lift the bottom brake shoe off the anchor bracket (spider) and allow it to relax around the hub.

Next lift the top brake shoe up and away from the cam shaft, both shoes should come off the cam shaft and remain connected by the return spring.

The last step is to remove the return spring and anchor bars from the brake shoes.

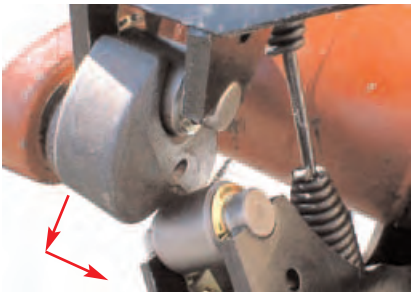
Grannings axles
Engineered transport solutions

Removal of Quick Fit Brake Shoes

Removal of Brake Shoes from 400 Series axles does not require the removal of the Hub, as the drum can be pulled over this assembly without disturbing it.

First complete the previous procedures for hub and drum removal, then carefully remove the two tensioning springs. Taking care as not to release them while under tension.

Lift off both brake shoes from the brake anchor pin and allow them to close around the axle.



Push the lower brake shoe down and pull the shoe outwards.

Lastly remove the return spring and anchor bars

Removal of Cam Shafts

Firstly, if the brake shoes are still fitted, then you can either open them out using the appropriate tool or remove the brake shoes.

Remove the slack adjusters (if they are still fitted), then move the circlips and washers...

...while knocking the cam-shaft back using the appropriate mallet and drift. Remember to do this progressively and keep moving the circlips and washer in stages.

Granningaxles
Engineered transport solutions

Bearing Removal

The inner race and rollers should easily be removed, leaving the outer race in place.

If you wish to remove the outer race, then you will need to use a hammer and drift to knock the race out of the hub. Use the two slots in the hub for the location of the drift.

(See pages 12 & 13 for information about care needed for the bearing)

The inner bearing is removed in much the same way, however, the grease seal must first be removed. See opposite page for grease seal removal.

Removal of Bearings:

It is far more difficult to remove bearings from a shaft than to put them on. It is necessary to remove the bearings by using the correct tools, otherwise damage may be sustained to the balls/rollers or races. Since such damage is seldom visible, it does not become known until after complete reassembly. It is good preventative maintenance to replace most bearings during the overhaul period. If a bearing is not going to be replaced, avoid removal during low mileage rebuild.

Interchangeability:

Most bearings are interchangeable in regard to standardised dimensions, tolerances and fits.

It as acceptable to remove the grease seal with a screwdriver as long as great care is taken as not to damage the bearing and journal beneath it.

Once a grease seal has been removed, NEVER refit it as the seal will have been broken and will only be the cause of further problems.

Never Refit a Grease Seal once it has been removed.

Always fit genuine Granning Grease Seals.

The grease seal fitment is shown here for clarity, remember to fit the inner bearing before the grease seal. See page 28 for bearing fitment.

When fitting a grease seal always take care as not to damage the seal on fitment. Granning advise the use of a grease seal driver, as this will help to correctly fit the grease seal.

Granningaxles
Engineered transport solutions

Fitment of Cam Shafts

The first task is to check that the cam shaft is the correct 'hand'. Gently knock the cam shaft through the anchor bracket (Spider) and adding the necessary washers and circlips before knocking it through the greasing bracket.

Remember to move the circlips into the correct grooves. Again check that the cam shaft is the correct hand and that the washers and circlips are in the correct places. See Fig. 9.1 below.

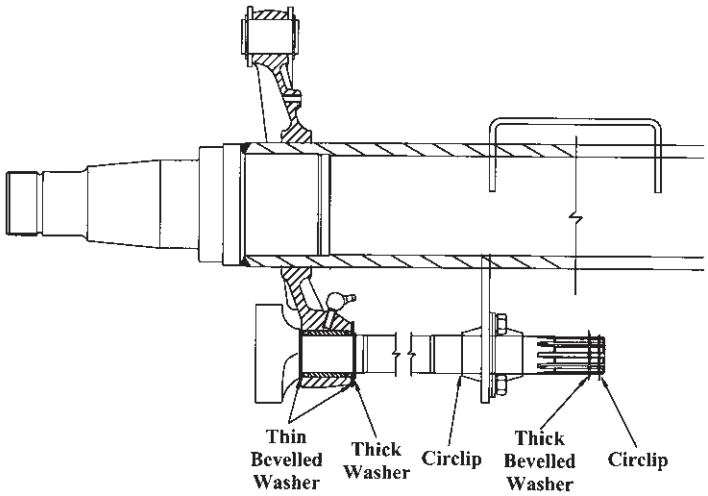
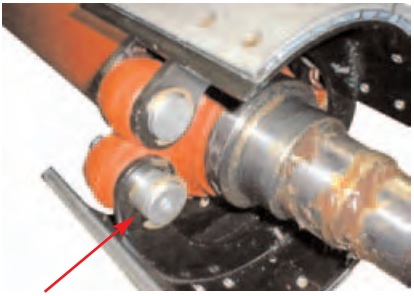
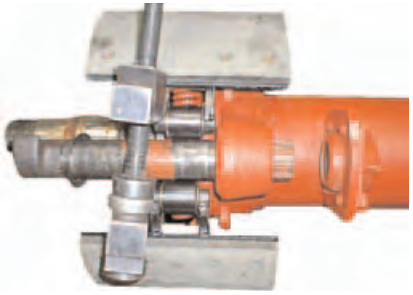


Fig 9.1

Fitment of Standard Brakes



Firstly fit one 'E' clip to each brake anchor pin, as this will ease the fitment. Then connect both brake shoes together using the tensioning spring. Place the brake shoes onto the anchor bracket (spider) apply lubricant to the anchor pins, then insert them into the anchor bracket. Connect the remaining 'E' clips.



Using the appropriate tool, open out the two brake shoes and insert the cam shaft. Remembering to check that it is the correct 'hand'. Cam shaft fitment is shown on the previous page (Pg. 25).

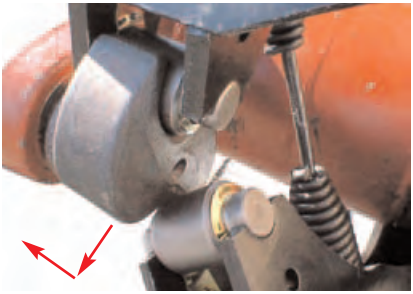
Before the cam shaft is knocked home, insert the necessary washers and circlips in the correct places.

There is a diagram showing the correct washer and circlips locations on the previous page (Pg. 25).

Granningaxles
Engineered transport solutions

Fitment of Quick Fit Brakes

First attach the cam rollers to the brake shoes. Next apply lubricant to the brake anchor pin, and place both brake anchor pins into the anchor bracket. Then connect both brake shoes together via the tensioning spring and place the top shoe onto the top brake anchor pin.



By pushing the lower shoe into place at an angle, the two cam rollers should easily be located onto the cam shaft. Ensure that the cam shaft is the correct 'hand'. Check that the operation of the brake lever opens out the brake shoes. (See Pg. 7 for more information)

Next pull the two brake shoes apart and place onto the brake anchor pins.

Lastly connect the two remaining springs. The easiest way is to use a bar to lever the springs open. Remember to use caution doing this, as not to accidentally release them while under tension.

Bearing Fitment

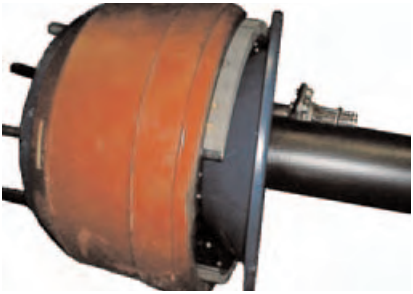
Before fitment remember to check that the bearing is fully pre-packed with grease.

When fitting bearings it is essential to use proper tools that have been designed for the task. Using these tools will help to prevent damage to the bearing. Damaging a bearing on fitment could cause increased wear and premature failure.

(See pages 12 & 13 for more information)

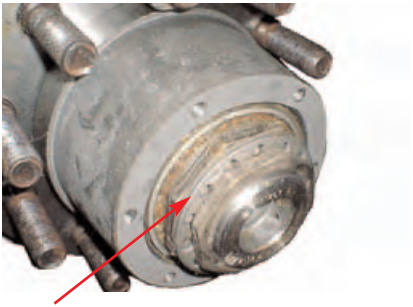
Granningaxles
Engineered transport solutions

Hub & Drum Fitment



First, align the hub and drum, then push the drum on until the grease seal is engaged.

Add the adjusting nut, then spin the wheel and tighten the adjusting nut until resistance is observed. Then back off adjusting nut 2½ to 3 flats.



Insert the lock washer engaging the insert into the grove and engage one of the holes with the dowel in the adjusting nut by the minimum rotation of the adjusting nut. Next add the locking nut and torque to 275 lbs.Ft. or 373 N.m. Check the free rotation of the wheel.

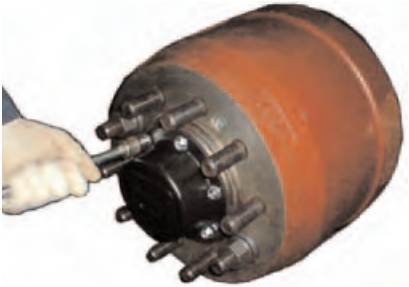
400 Series ONLY

For the 400 Series Axle add the Drum after the Hub, so complete the two previous stages first. As for the 100, 200 & 300 Series Axles, align the drum holes with the hub holes and insert the two locating screws. Tighten these to between 20 & 25 Nm(or between 15 & 18 lbs.ft.).

Hub Cap Fitment

Add the gasket and align the gasket holes with the holes in the hub.

Fill the hub cap with 200 grams of grease (see recommended lubricants on Pg. 12) and locate on the gasket, again aligning the holes in the hub cap with that of the gasket and hub.



Insert the locating screws and tighten to between 20 & 25 Nm. (or between 15 & 18 lbs.ft.).

Care! It is important not to overfill the hub with grease. Greasing at high pressure may cause damage to the seals.

Disc Braked Axles

Granning Axles' disc braked axles use Knorr-Bremse Axial Disc Brakes.

Pads

The thickness of the Pads must be checked regularly dependant on the usage of the vehicle. The Pads should be checked corresponding to any legal requirements that may apply.

If no wear indicator has been connected this should be at least every 3 months. If friction material is less than 2mm (See E in Fig 10.1.), the Pads must be replaced.
Discs

Discs

Measure thickness at thinnest point. Avoid measuring near the edge of the disc as a burr may be present.

A = Disc thickness (new condition) 45mm.
B = Disc thickness (worn) 37mm, Disc must be replaced.
C = Overall thickness of Pad (new condition) 30mm
D = Backplate 9mm
E = Minimum thickness of friction material 2mm.
F = Minimum allowed thickness in worn condition for backplate and friction material 11mm. (replacement of Pads necessary).

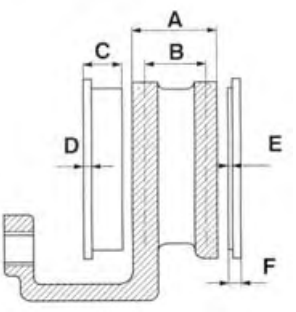


Fig 10.1

If the Disc Thickness is less than 37mm, the Disc must be replaced.

For more details on Calliper Repairs refer to Knorr-Bremse RA-SB0002-EN

WARNING! For Optimum Safety, stay within the Disc and Pad Wear Limits.
If these recommendations are ignored, there is a danger of brake failure.

Disc Braked Axles

Granning Axles' disc braked axles use Knorr-Bremse Axial Disc Brakes.

Check Disc at each change of Pads for grooves and cracks. Fig. 11.1. shows possible conditions of the surface.

A1 - Small Cracks spread over the surface are allowed.
B1 - Cracks less than 1.5mm deep or wide, running in a Radial direction, are allowed.
C1 - Grooves (circumferential) less than 1.5mm wide are allowed.
D1 - Cracks in the vanes are NOT allowed and the Disc MUST BE REPLACED.

a = Pad Contact area

Note: In case of surface conditions A1 - C1, the Disc can continue to be used until the minimum thickness of 37mm is reached.

Granning Axles Discs are normally service free and grinding when changing Pads is not necessary. However, grinding could be useful, e.g. to increase the load-bearing surface of the pads after severe grooving on the entire friction surface has occurred. To meet safety requirements, the minimum thickness after regrinding is 39 - 40 mm.

In addition, the recommendation of the vehicle manufacturer MUST be followed.

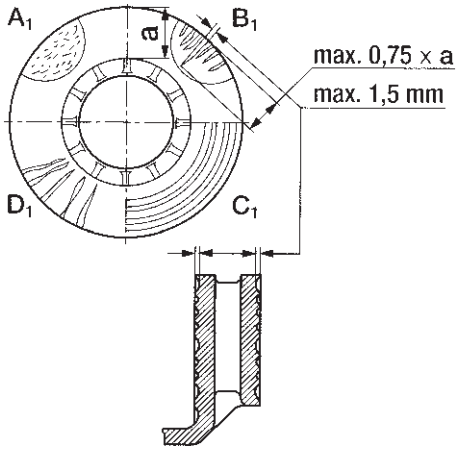


Fig 11.1

WARNING! If these recommendations are ignored , there is a danger of brake failure. If the Pads are worn down to the backplate or if the Disc wear is excessive, brake performance will be severely affected and may be lost completely.

Important Procedure

Granningaxles
Engineered transport solutions

When locating and correcting axle troubles, a schematic procedure should be followed.

Check Functioning Prior to Disassembly:

Many times the answer to the trouble is apparent when the unit is inspected prior to disassembly, but this evidence is often lost when parts are separated. If possible, check the unit prior to disassembly. Bear in mind that a careful inspection of the unit should be made as each disassembly step is performed.

Inspect Thoroughly During Disassembly:

It is poor practice to disassemble an axle as quickly as possible without bothering to examine the parts as they come off. It happens many times that a mechanic has completely disassembled a unit and failed to find the cause of the trouble because he did not bother to examine the parts as they came apart. After the axle is disassembled, check the lubricant for foreign particles which often reveal sources of troubles that are overlooked during the disassembly.

Repair or Replace Defective Parts:

Many times the parts or critical adjustments that have caused the trouble are not replaced or corrected because the mechanic will only inspect and replace parts that have failed completely. All pieces should be accurately examined because the broken parts are often just the result and not the cause of the trouble. All parts that are broken or worn and no longer meet specifications should be replaced with genuine NEW components.

Excessive Brake Drum Wear:

Possible Causes:

a) Overheating through excessive braking
b) Contaminated Brake linings

Grease or Oil Leaks:

Possible Causes:

a) Incorrect assembly or damaged seal
b) Seal lips distorted (low loader)
c) Damaged / worn hub cap gasket
d) Hubometer stem leaks

Loose Wheels:

Possible Causes:

a) Incorrect torque
b) Worn Cones / bolts
c) Mismatched wheels and fasteners
d) Damaged wheels
e) Excessive paint on hub

Hubs Overheating:

Possible Causes:

a) Bearing adjustment too tight
b) Insufficient lubrication
c) Low loader on heavy duty operation

Brakes Binding or Dragging:

Possible Causes:

a) Failed brake shoe return spring
b) Badly worn bearings
c) Incorrectly adjusted brakes
d) Brakes not releasing properly
e) Faulty valve in brake system
f) Faulty trailer air coupling

Bearing Failure:

Possible Causes:

a) Abrasive contamination
b) Overheating due to lack of end float
c) Forcible assembly
d) Incorrect end float

Important Procedure

Bearing Failures:

More than 90% of all bearing failures are caused by dirt, which is always abrasive. Dirt may enter the bearings during assembly of the unit, or be carried into the bearing by the lubricant while in service. Dirt may enter through seals, or even dirty containers used for the addition or change of lubricant.

Softer material such as dirt, dust etc., usually form abrasive paste or lapping compounds within the bearings themselves since the unit pressure between the balls/rollers and raceways makes a perfect pulverizer. The rolling motion tends to entrap and hold the abrasives. As the balls/rollers and raceways wear, the bearings become noisy. The lapping action tends to increase rapidly as the fine steel from the balls/rollers and raceway adds to the lapping material.

Hard, coarse material such as chips etc., may enter the bearings during assembly from the hammers, drifts, power chisels etc., or may be manufactured within the unit during service from raking teeth, etc. These chips produce small indentations in balls/rollers and races. Jamming of these hard particles between balls/rollers and races may cause the inner race to turn in the housing.

Corrosion:

Water, acid and corrosive materials formed by deterioration of lubricant, will produce a reddish-brown coating and small etched holes over outer and exposed surfaces of race. Corrosive oxides also act as a lapping agent.

Brinelling is caused by improper assembly or removal, usually hammering with off-centre blows. Use tubes, preferably under a press or extractor.

Fatigue:

All bearings are subject to fatigue and must be replaced eventually. Your own operating experience will dictate mileage replacement of bearings showing only normal wear.

Shaft Fits:

Excessive looseness under load is very objectionable because it produces a creeping or slipping of the inner ring on the rotating shaft. This causes the surface metal of shafts to scrub or wear off.

When play or looseness even 0.0025 mm exists between the bearing and shaft, there is a very powerful force tending to rotate the inner race on the shaft.

Tightening Torques (found on page 9)

	Ft. lb.	N.m
Wheel nuts - BSF / DIN	400 - 500	542 - 678
Wheel nuts - ISO	550 - 600	746 - 814
Wheel nuts - Alloy	500 - 550	678 - 746

Recommended Lubricants (found on page 12)

Manufacturer	Recommended	Alternative
Shell	Shell Retinax 'LX2'	Shell Retinax 'LX'
Mobil	Mobil Grease H. P. 222	Mobil Grease H. P.
Castrol	Castrol LMX	Spheerol A. P. T. Z.
Texaco	Hytex EP2	
Esso	Unirex EP2	
BP	Energrease LC2	

Granning Axles Ltd. (Toughline)
Naas Industrial Estate,
Naas, Co. Kildare.
Ireland.

Phone: +353 45 897553
Fax: +353 45 876291
Email: info@granningaxles.ie