Road Wheel Inspection, Removal and Fitment Procedures

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE

ROAD WHEEL REMOVAL – COMPANY POLICY

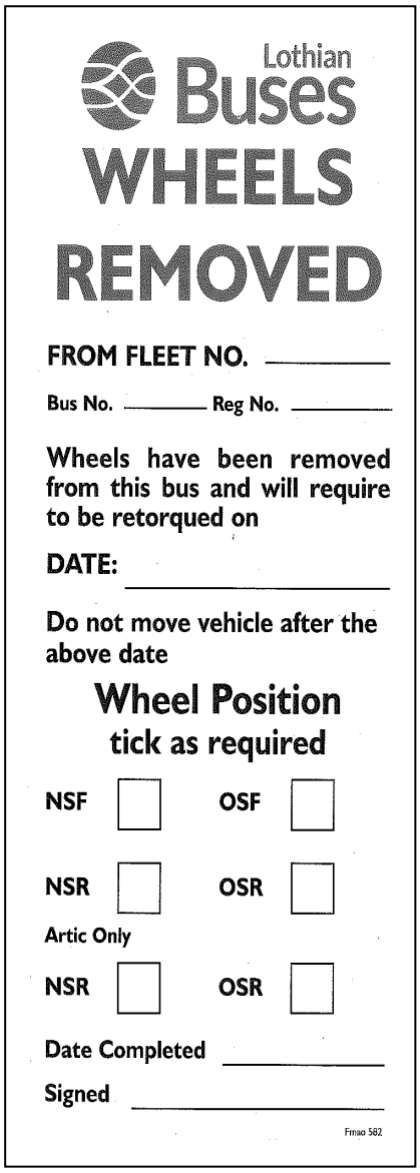
In addition to this booklet, please be advised of the following:

1. Before removing any wheels, permission should be sought from a supervisor when on duty.
2. After refitting wheels, the wheel removed warning should be fitted to the vehicle (figure 1). This should be removed after the 24 hours re-torque and passed to a supervisor.
3. Wheel fit re-torque record should be completed (figure 2)

Figure 1

<u>Re-torque Methods</u>

Any wheel which has been disturbed for any reason must be re-torqued after 30 minutes and again within 24 hours.


Lothian Buses

WHEELS REMOVED

FROM FLEET NO. _____

Bus No. _____ Reg No. _____

Wheels have been removed from this bus and will require to be retorqued on

DATE: _____

Do not move vehicle after the above date

Wheel Position
tick as required

NSF ☐ OSF ☐

NSR ☐ OSR ☐

Artic Only

NSR ☐ OSR ☐

Date Completed _____

Signed _____

Fmao 582

<u>IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE</u>

REMOVAL, INSPECTION & RE-FITMENT PROCEDURE FOR BUSES & COACHES

As part of its maintenance procedures, Lothian Buses Ltd has developed road wheel instructions based on the most recent recommendations.

The policy contained in this booklet will be followed as a minimum standard to ensure safe removal and re-fitment of road-wheels, adequate follow up for re-torques and correct record keeping.

CONTENTS

SAFETY PRECAUTIONS AND PROCEDURES FOR REMOVAL OF ROAD WHEELS

1. Immobilise vehicle, parking brake must be applied, isolator switch turned off, VOR label placed in windscreen
2. Loosen wheel nuts with loosening air gun (NOT TORQUE WRENCH)
3. Jack up vehicle until wheels are clear of floor
4. Support vehicle
5. Remove wheel nuts
6. Remove wheel, taking care not to damage hub odometer

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ROAD WHEEL INSPECTION

Before fitting a wheel to a vehicle it must be inspected. Do not assume that someone else (e.g. the contract tyre fitter) has already checked. If you are fitting the wheel to the vehicle the responsibility is yours.

Check for kerbing damage, dents, cracks, corrosion, worn stud holes, worn spigot mounting area.

i. **Dents/Damage**

A badly dented rim will not run true and also may not seal properly. Lothian Buses policy is to scrap damaged rims.

ii. **Cracks**

Cracks are most usually found:-

a. between the stud holes
b. from stud holes to the ventilation holes
c. from the disc to the rim

Lothian Buses policy is to scrap cracked rims.

Examples of typical cracks and their possible causes are shown in Appentix 1.

iii. **Corrosion**

Surface corrosion can be wire brushed and cleaned. Flaking or badly pitted metal indicates a need to scrap the rim. Contact or mating surfaces must be clean and smooth and NOT PAINTED.

iv. **Stud Holes**

Spigot wheels. Check that the washer contact area around the stud holes is flat and unmarked. Also check that the rim centre is undamaged. When fitted to the hub, a maximum of 3mm clearance is allowed across the diameter of the spigots.

REMEMBER: The spigots centralise the wheel to the hub, the studs and nuts clamp the wheel and hub together

v. **Hub**

Check the hub, drum, spigots and studs in the same way that you have checked the rim. If there are any signs that a wheel has run loose, the reason must be fully investigated and any damaged parts replaced. If a wheel stud has snapped, the whole set on that hub must be changed.

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PAINTING OF WHEELS

Do not allow layers of paint to build up on the wheels.

Do not paint the drum contact area.
Where possible, keep front and rear wheels separated.

If for some reason, a front wheel has to be moved to a rear position, the paint on the contact area must be cleaned off – THERE IS NO ALTERNATIVE TO THIS.
Layers of paint between rear wheels can melt at brake temperatures and the wheels will then run slack.

WHEEL FITMENT PROCEDURE

Ensure that the wheel you are fitting is the correct type for the vehicle.

NEVER MIX OR INTERCHANGE SPIGOT AND CONE MOUNTED WHEELS (see diagram at Appendix 3)

Contact surfaces of drum and hub location areas must be clean and undamaged. Stud threads must be clean, undamaged and free from corrosion. Lightly lubricate the stud threads with engine oil. DO NOT OVER-OIL. A paint brush dipped in oil and drained off, or a clean sponge dipped in oil and squeezed out is sufficient to wipe the studs. Do not lubricate with penetrating oil, diesel, paraffin or grease. A few drops of oil between the spigot nuts and their captive washers will ensure that they are free to move.

When fitting wheels to vehicles, the axle must be properly supported and the vehicle chocked to prevent movement. Volvo, in particular, recommend that the park brake is released at this time. It is important to appreciate that the wheel must be completely clear of the ground so that it can centralise freely on the hub.

After locating the wheel or wheels onto the hub (ensuring that the twin valves are opposite) fit the nuts, hand tight. Using a tightening air wrench, initially to run the nuts up to just touch the wheel, following a diagonally opposite sequence (see diagram at Appendix 2).

Then follow the sequence again, until the wheel is secure, before again following the sequence using a calibrated torque wrench. Ensure the correct torque setting is applied for the vehicle type. After use reset to the minimum scale setting.

There should be a chart or notice with torque settings – if not, ask. Never guess or assume.

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE

RE-TORQUE PROCEDURES & RECORDS

Any wheel which has been disturbed for any reason must be re-torqued after 30 minutes and again within 24 hours.

It is recognised that in some operations, the vehicle may not be available within 24 hours, and may have covered considerable mileage before it is available for re-torque. In these circumstances, the vehicle must be road tested for 25-50 miles and then re-torqued before vehicle use in service.

When re-torquing, DO NOT SLACKEN THE NUTS. Apply the same torque as for initial fitting and do not continue to tighten after that torque is reached. Pay special attention to Volvo re-torque procedures.

ALL WHEEL CHANGES AND RE-TORQUE FOLLOW UPS MUST BE RECORDED. The records will form part of the maintenance system and as such will be subject to audit by the Vehicle Inspectorate.

ENSURE THAT YOU SET TORQUE WRENCH SCALES IN GOOD LIGHT – BE SURE TO CHECK THAT YOU ARE USING THE CORRECT IMPERIAL OR METRIC SCALE.

As shown below Lothian Buses operate an inflexible system for recording wheel changes and re-torque follow up. You must record ALL wheel changes and re-torques. If you do not know how the system operates, ask. The responsibility is yours. An example of the pre-numbered record system is shown below.

Figure 2

Lothian Buses

Wheel Fitting & Re-Torque Record (Check Daily)

No. 001

ALL WHEEL NUTS ARE TO BE RE-TORQUED AFTER 30 MINUTES AND AGAIN WITHIN 24 HOURS OF RETURN TO SERVICE.
IF ANY WHEEL NUTS ARE FOUND LOOSE AT 1ST OR 2ND RE-TORQUE, REPORT TO YOUR SUPERVISOR IMMEDIATELY AND K.I. VEHICLE

Week Ending: _____ Depot: _____

Vehicle Reg. Number	Date Fitted	Fitted By	Vehicle Fleet Number	30 MINUTE CHECK Position: Front Axle N/S	Front Axle O/S	Back Axle N/S	Back Axle O/S	Re-Torque By Signature	Re-Torque By Signature	24 HOUR CHECK Position: Front Axle N/S	Front Axle O/S	Back Axle N/S	Back Axle O/S	Re-Torque By Signature	Re-Torque By Signature	Date	Coach Road Test (miles)	Loose? Yes	Loose? No

Week Ending: _____ Depot Foreman Signed: _____ Depot Engineer

THIS MAINTENANCE DOCUMENT IS SUBJECT TO AUDIT AND MUST BE RETAINED FOR 15 MONTHS

Form no 547

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE

The above sheet must be reviewed each morning and confirmed correct with a signature on the depot main sheet and followed up with supervisory endorsement.

TOOLS

Torque wrenches and other wheel changing equipment must be stored and maintained properly.

Torque wrenches must be calibrated at 3 month intervals or if damaged. Report damaged tools and equipment immediately.

NEVER USE A TORQUE WRENCH TO SLACKEN WHEEL NUTS OR ANY OTHER ITEMS.

ALLOY SPIGOT MOUNTED WHEELS

STEP 1

Clean the mating face of the hub / axle, remove dirt, oxidation and paint. Do not apply any rust inhibitor, surface coating, fat, grease, oil or paint. Follow the recommendations of axle / vehicle manufacturer.

STEP 2

Clean the mating face of the wheel (disc), remove dirt, oxidation and paint. Do not apply any rust inhibitor, surface coating, fat, grease, oil or paint. If the mating face(s) of wheel(s) is (are) severely corroded remove wheel(s) from service.

STEP 3

Clean the inner side of the hub bore of the wheel. Remove dirt, oxidation and other foreign residues.

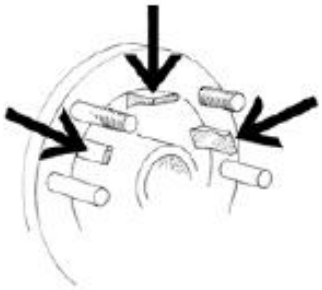
NOTE

The abrasive tools used in this documentation are available at 3M reference RolocTM Bristle-Discs. For full documentation contact your Alcoa sales representative or contact us at +32 11 458 460.

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE

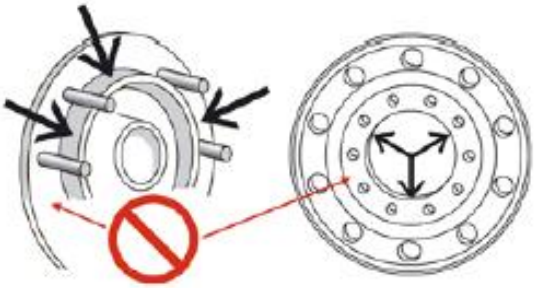
STEP 4

Apply a thin layer of ALgrease or any other equivalent fat (that does not contain metal nor water) on the inner side of the hub bore of the wheel. Alternatively apply the same product at the pilot tabs, spigots or centering edge of the hub / axle.



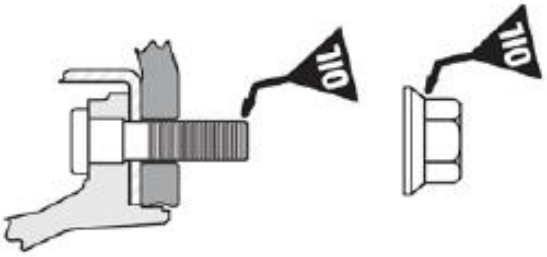
NOTE

Do not apply any rust inhibitor, surface coating, fat, grease, oil or paint on either mating face of hub nor mating face of wheel (disc). In case of an inner dual fitted wheel it applies to both sides of the wheel disc.



STEP 5

For nuts used on hub piloted wheels apply two drops to the point between the nut and the integrated washer (right) and two drops of (used) motor oil to the first two threads of the tip of each stud (left). This will minimize corrosion between the mating threading. Lubrication is not necessary with new hardware.



Check (1) if washer freely rotates on nut applying some pressure on the washer towards nut. Fit nut onto the stud and check (2) if the nut can freely rotate by hand turning the nut towards the hub.

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE

Inspect for exposure to excessive heat. A wheel that has been subjected to excessive heat may appear charred or burned. A wheel that has been exposed to excessive heat may appear to be in good condition if it has been cleaned. Do not use any wheel that has been overheated regardless of appearance. Even if a wheel does not appear to be obviously burned, check labels, tyre bead, brake components and DiscMate™ for evidence of charring, melting, blistering or burning.

A wheel may discolor from excessive heat. It can show a dull grayish color and will not polish to a bright finish as a typical wheel would.

Any wheel run with a flat tyre longer than the time necessary to immediately pull off the road should be checked for excessive heat damage.

Warning

Excessive heat from fire, brake malfunction, wheel bearing failure, tyre failure or other sources may weaken the metal and cause the wheel/tyre assembly to separate explosively.

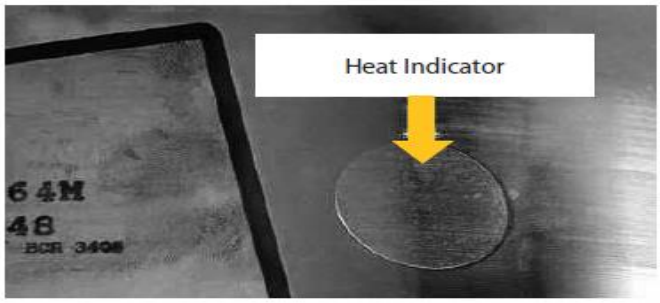
Exploding wheel/tyre assembly can cause serious injury or death.

Immediately and permanently remove from service any wheel that has been exposed to excessive heat.

A blistered, blackened or cracked looking logo decal on an Alcoa wheel may indicate that the wheel has been exposed to excessive heat as shown in picture to the right, or discoloration of the wheel as shown in picture below.

After January 2009 the new Alcoa logo may not show heat damage.

Inspect all axle end components for signs of exposure to excessive heat. Pay particular attention to brake drums or discs. If one of these components show signs of overheating, the entire assembly, including the wheel, should be replaced.



Wheels manufactured as from February 2009 will have a 1 in. or 2,5 cm clear round heat indicator sticker located next to the roll stamp on the inside shown on the left and right, along with the same 1 inch clear round heat indicator sticker located on the tyre side drop well as shown in the photo above.

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE

Warning

LUBRICATION

Lubricants should not be applied to the cap nut's washer i.e. nut-to-wheel contact surface.

Application of excessive lubricant to the threads of the stud and or nut can cause excessive torque. Over torque can stretch studs causing them to fail.

Oiled washers can lead to over-torquing which can stretch studs causing failure of studs. Failed studs can cause the wheel to disengage from the vehicle, causing serious injury or death.

Lubricants must be completely removed from the cap nut's washer i.e. nut-to-wheel contact surface if applied accidentally.

Do not allow oil to contact mounting surfaces of the wheel, hub or drum. Do not use aerosol cans for lubrication of stud threads.

See section 5.i. Lubrication / ALgrease.

UNDER & OVER TORQUE

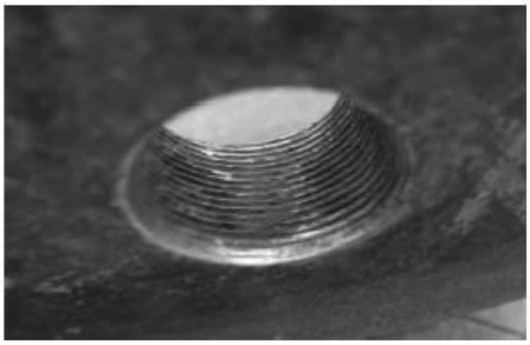
Undertorqued nuts allow wheels to run loose, pounding out (deforming) the bolt holes, fatiguing studs or losing nuts, as well as cause cracks in the bolt hole area.

Over torquing can stretch studs causing them to fail with loss to torque and may cause pre-mature fatigue.

Both under and over torquing can lead to wheel dis-engagement causing serious injury or death.

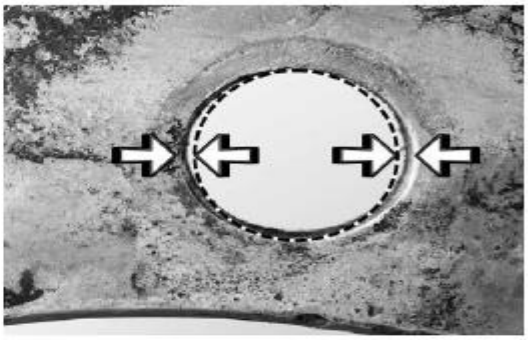
Check all parts, including wheels, studs and nuts. Check mounting faces of wheels, hubs and drums. Check for dirt, corrosion or damage. Remove dirt and rust; replace damaged parts. Follow correct tightening sequences and torque levels.

If wheels are run loose, both stud located wheels and hub piloted wheels can be damaged. Look for wallowed out or elongated ball seats on stud located wheels. On hub piloted wheels look for elongated stud holes. Over torquing can lead to damaged ball seats on stud located wheels and can damage the disc surface of hub piloted wheels. Remove damaged wheels from service.



UNACCEPTABLE

For hub piloted wheels - normally if you see thread marks on the inside diameter of the bolt holes, this would indicate the wheel ran loose.



UNACCEPTABLE

For hub piloted wheels - normally if you see a wallowed out bolt hole, this would indicate the wheel ran loose.

6.g.iv. Disc area

Inspect both sides of disc area for hand hole cracks. If cracks are found, remove the wheel from service.

Hand hole cracks are normally caused by overloading of the wheels.

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE

APPENDIX 1

CRACKS BETWEEN BOLT HOLES

Caused by:

- Loose wheel nuts
- Paint on contact surfaces
- Rust on contact surfaces
- Wheel nuts tightened too tight or in wrong sequence

CRACKS FROM VENTILATION HOLES TO BOLT HOLES

- Twin tyres at different pressures
- Excessive speeds

CRACKS IN DISC TO WHEEL RIM

Caused by:

- Rust damage
- Installation damage

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE

APPENDIX 2

WHEEL TIGHTENING SEQUENCE

Lightly lubricate threads with engine oil

Ensure that spigot nut captive washer is free on nut (lubricate lightly)

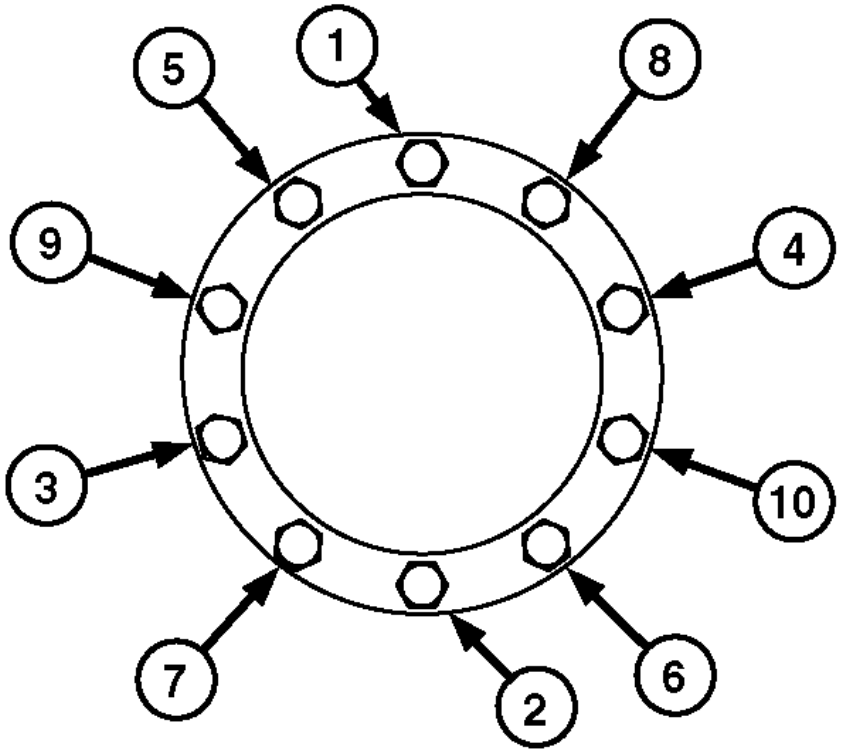
Wheel must be free of ground so that it can centre freely

Initially fit nuts by hand – they must be free

See air wrench as a nut runner only – follow sequence

Tighten with torque wrench – follow sequence

Re-torque after 30 minutes and again within 24 hours or after 25-50 mile road test according to vehicle availability (special circumstances only)



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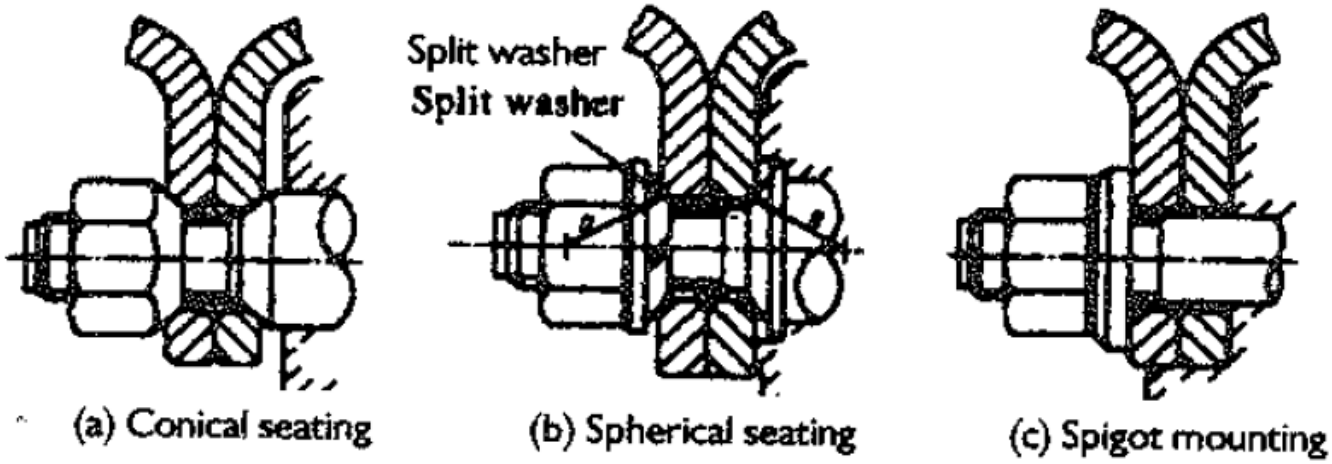
APPENDIX 3

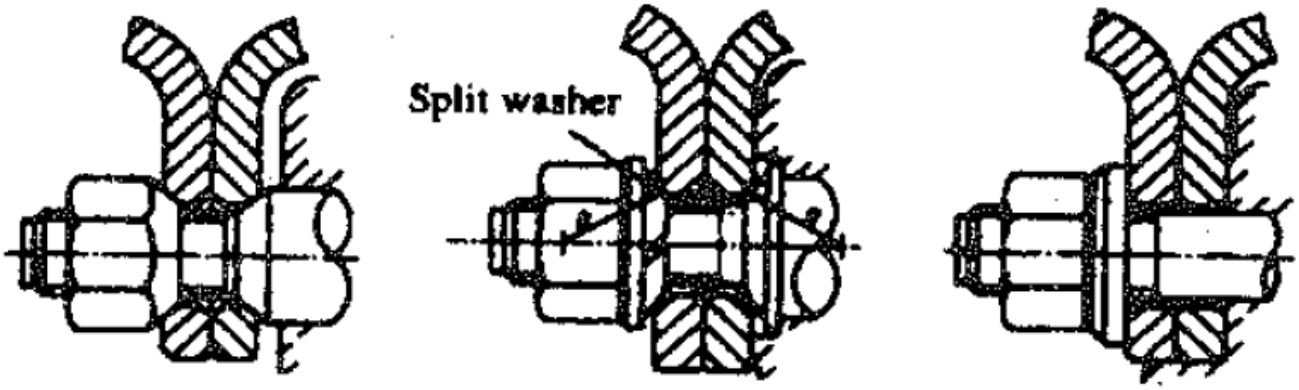
ROAD WHEELS AND HUBS

COMPATIBILITY OF WHEEL FIXINGS

Wheel Fixing Systems are NOT INTERCHANGEABLE

The two systems most commonly seen are spigot (plain stud holes, nuts with flat based captive washers) and cone fixed (countersunk stud holes, conical nuts). You may occasionally find rims or nuts with spherical fixings. These are not the same as come fixing and are NOT interchangeable with any other type.





Spigot mounted wheels must be examined carefully with regard to wear, corrosion or damage on the hub (spigot), wheel rim, wheel face and wheel nut spigot washers (spigot washers must be checked for dirt damage and free spinning).

IF YOU ARE IN ANY WAY UNSURE ABOUT THIS PROCEDURE, STOP. DO NOT RETURN THE VEHICLE TO SERVICE