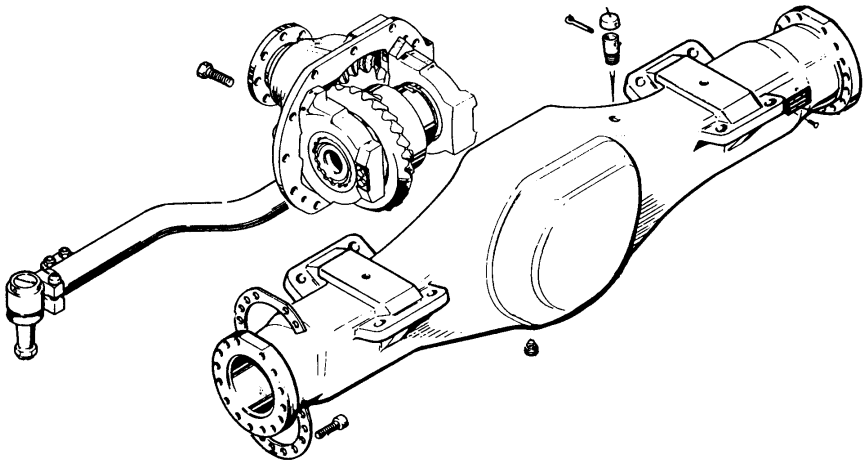
SISU Axles

MAINTENANCE MANUAL

FSDP & FSMP - 09/10
SSDP - 10/12 Drive Steer Axles



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XSDP10AX 4/2008

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NOTE ! This Manual is intended for use by experienced mechanics using safe procedures in properly equipped shops.
Safety precautions should always be followed such as wearing safety glasses, using adequate lifting aids, and using tools and equipment in good condition. Sisu Axles, Inc., its agents, associates or representatives are not responsible for damage or injury occurring while working on their components.

1 DESIGN AND FUNCTION

1.1 XSDP AXLE DESIGN

The axle primary gearing is composed of a pair of bevel wheels located among the drive gear between the axles.

Power from the drive gear is transmitted by an axle shaft equipped with two universal joints to the wheel hub, which has a five-planet type planetary gear to act as a secondary gearing.

The sun wheel connected to the end of the axle shaft rotates the planet wheel carrier by means of the planet wheels, which are connected to the wheel hub. The ring gear is locked to the swivel axle. The drive gear and differential, gear, together with bearings, are lubricated with oil from the drive gear housing. The hubs of the wheels have their own separate oil reservoirs to lubricate the planetary gears.

These axles are used as follows:

- Low ratio axle in industrial applications : SSDP-10/12
- High ratio axle in automotive applications: FSDP-09/10

Drive gear is in separate manual.

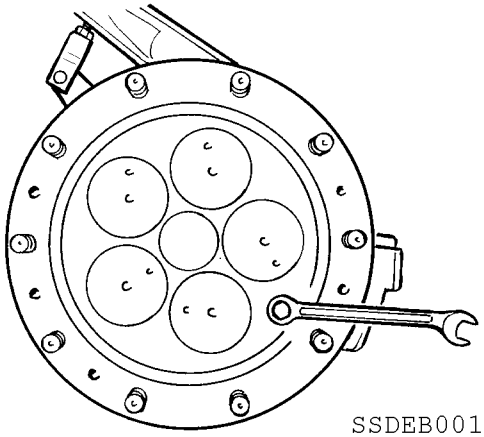
WDB brakes are in separate manual.

2 DESCRIPTION OF THE SERVICE AND REPAIR WORKS

2.1 PLANETARY HUBS - DISASSEMBLY

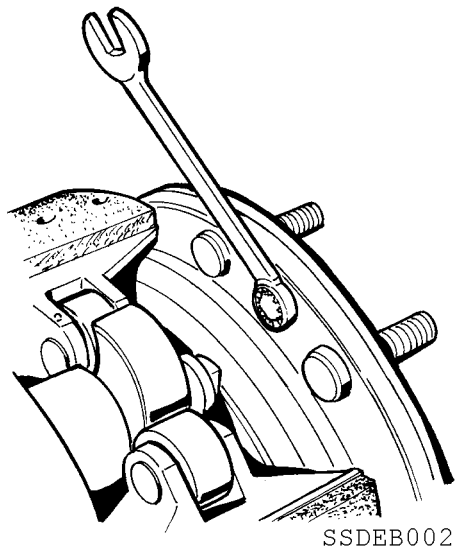
Raise the wheels off the ground. Release the wheel and brake drum.

1. Open the oil plugs and let the oil drain out of the hub.



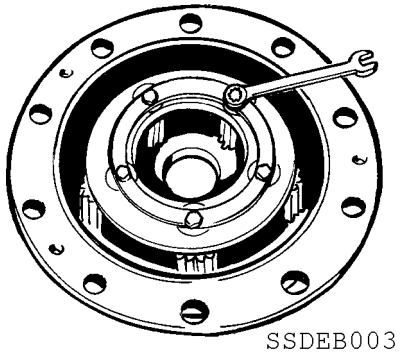
Picture 1

2. Release the planet wheel carrier by opening the four bolts on the inside of the hub. Take off the planet wheel carrier by pulling it out. If necessary, turn extractor bolts in screw threads located on the carrier flange.



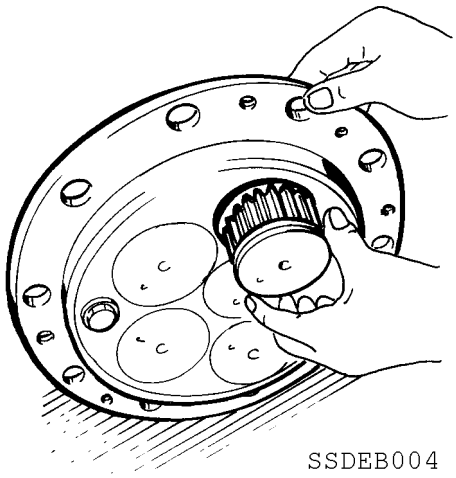
Picture 2

3. Unfasten the bolts on the planet wheel carrier and remove the lock washer.



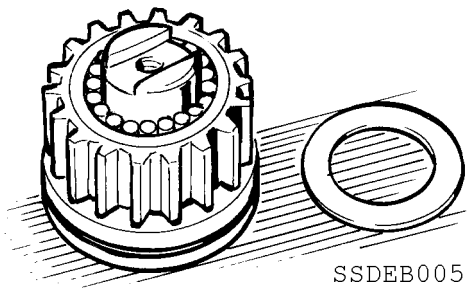
Picture 3

4. Unfasten the planetary wheel axles from the planet wheel carrier, taking care not to drop the gear wheels.

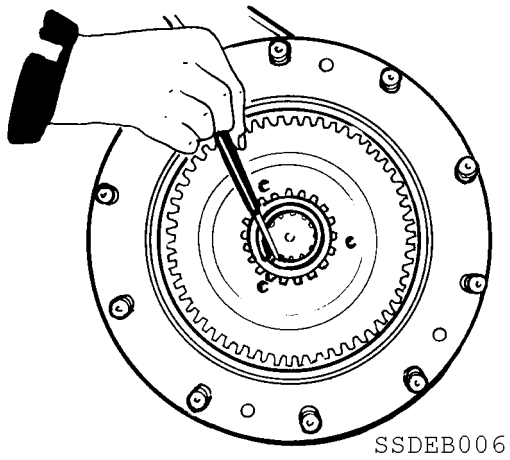


Picture 4

5. Take off the upper shim plate and lift up the gear wheel, taking care not to lose the bearing rollers (they are loose!) Also remove the lower shim plate.

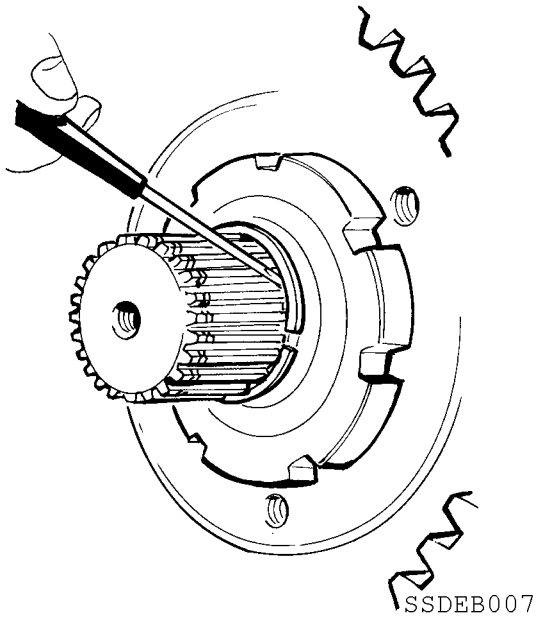


Picture 5



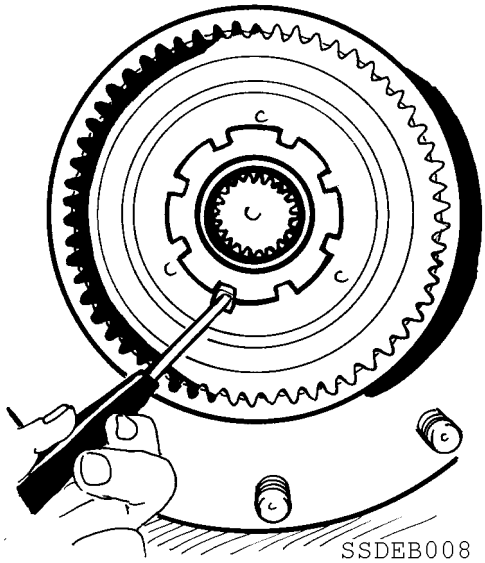
Picture 6

6. Unfasten the circlip at the end of the axle shaft, and remove the sun wheel by pulling it outward.



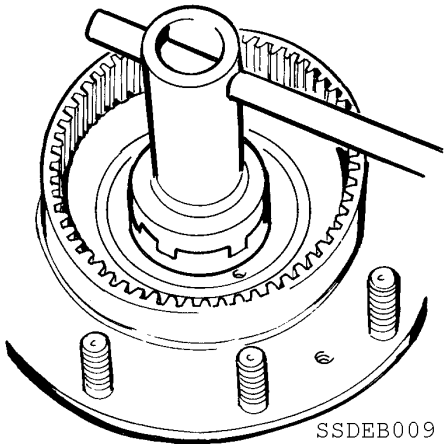
Picture 7

7. Remove the inner lock washer.



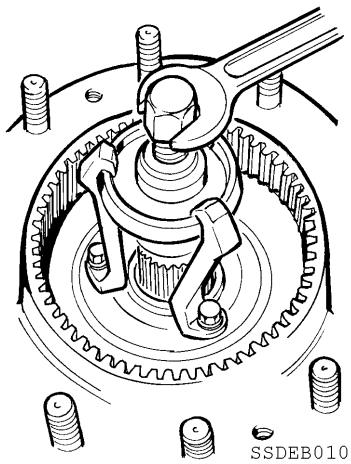
Picture 8

8. Open the hub nut lock with a suitable tool or with a drift.



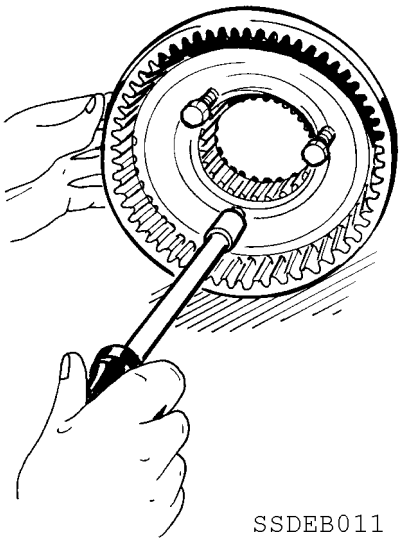
Picture 9

9. Open the hub nut with special tool no. 7141-014-020. Remove the nut, washer and locking washer.



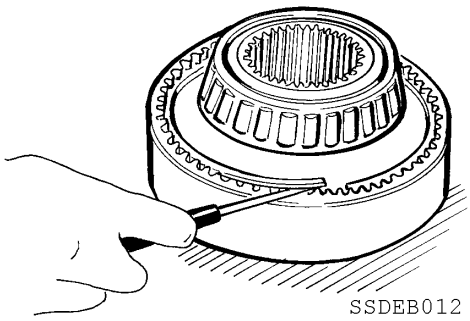
Picture 10

10. Unfasten the ring gear by tapping it lightly with a hammer and pulling it outward at the same time. If necessary, use an extractor.



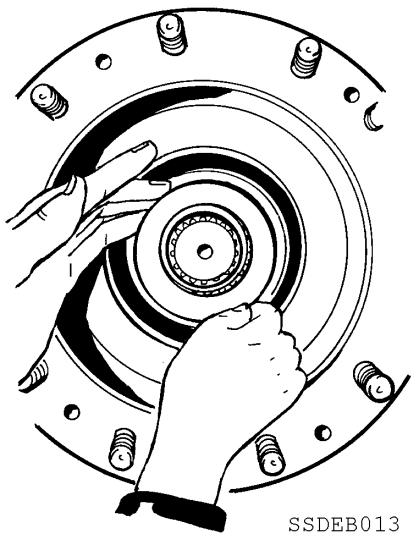
Picture 11

11. Unfasten the ring gear by screwing three M10 bolts into the hub of the ring gear.
    Tighten the bolts evenly in turn.



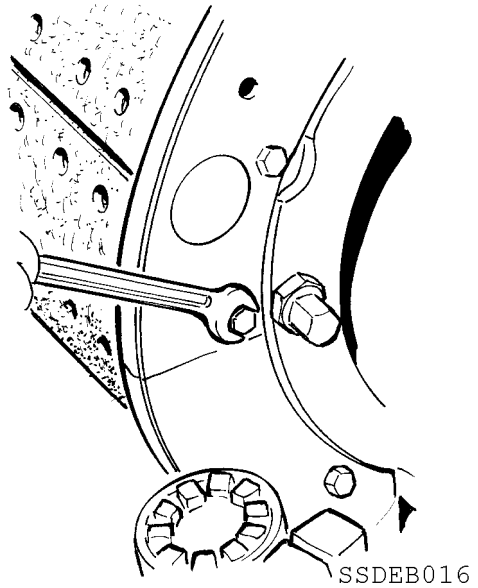
Picture 12

12. Unfasten the ring gear hub lock washer. Separate the ring gear and the hub by tapping lightly with a hammer.



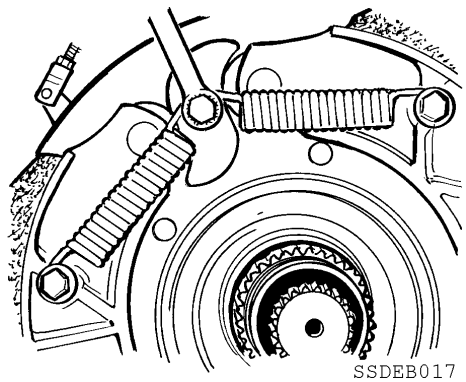
Picture 13

13. Remove the shim plates and spacer. Remove the hub by pulling it out.
14. Press the sealing ring and inner bearing of the hub away from the hub.
15. Unfasten the outer bearing by pressing the outer race.



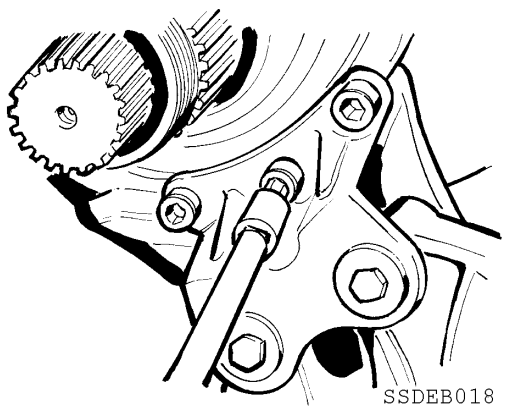
Picture 14

16. Unfasten the two halves of the brake plate.



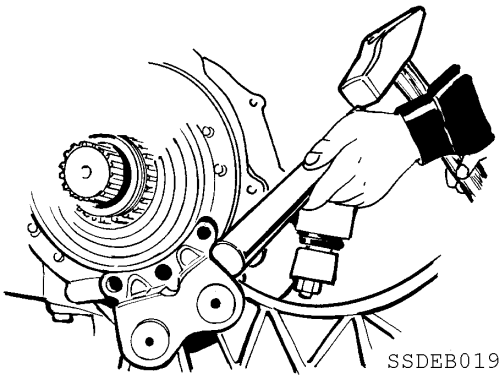
Picture 15

17. Release the brake shoe springs by unfastening the bolt which anchors the springs.



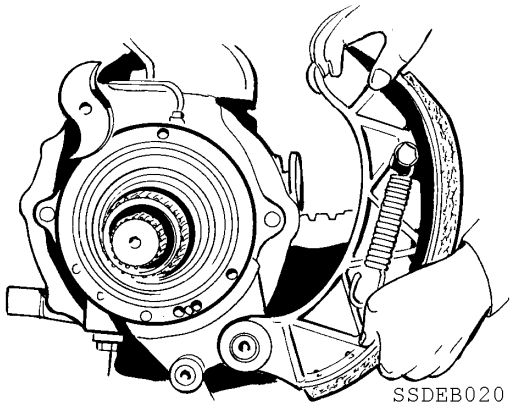
Picture 16

18. Unfasten the three Allen head bolts holding the lug securing the brake shoes and the two bolts at the end of the anchor pins.



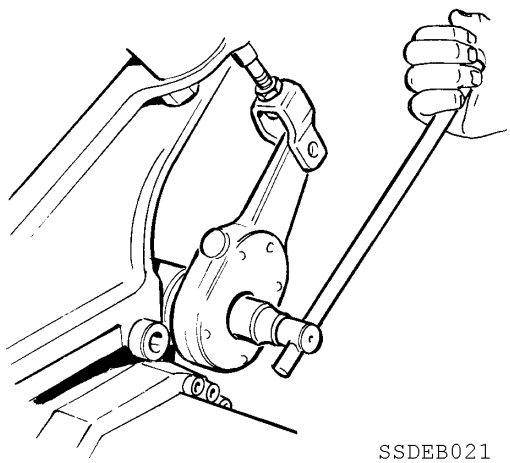
Picture 17

19. Unfasten the fastening lug of the brake shoes by tapping carefully.



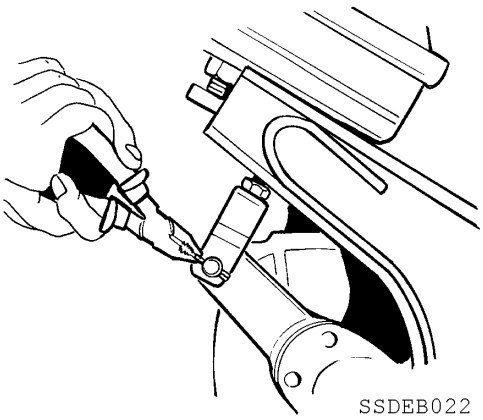
Picture 18

20. Unfasten the brake shoes.



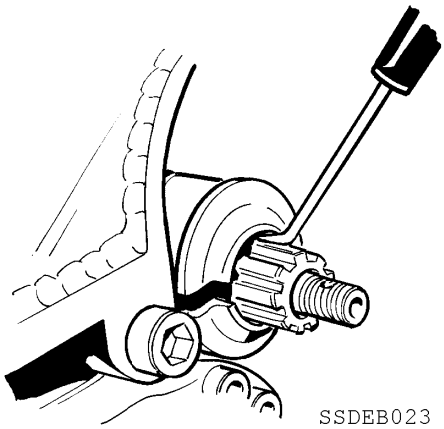
Picture 19

21. Loosen the fastening nut on the brake lever.



Picture 20

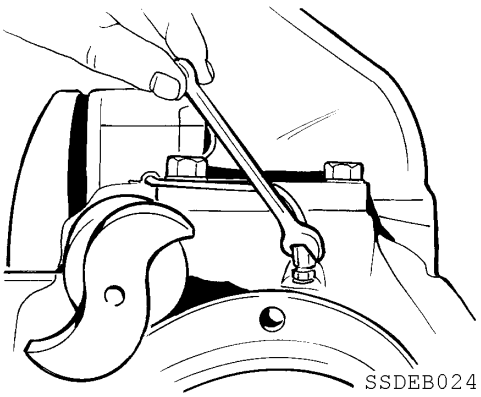
22. Unfasten the pin and cotter pin. Remove the brake lever.



Picture 21

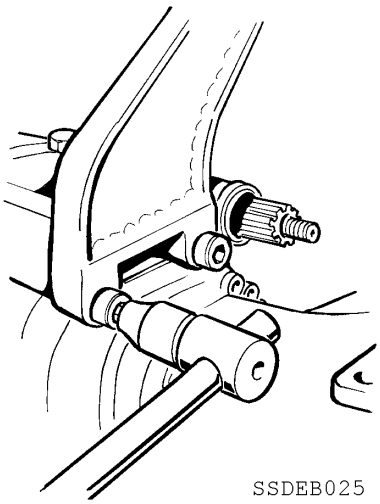
23. Unfasten the two halves of the locking plate. Remove the spreader shaft by pulling outward from the side facing the cam.

2.2 DISASSEMBLY - STEERING KNUCKLES



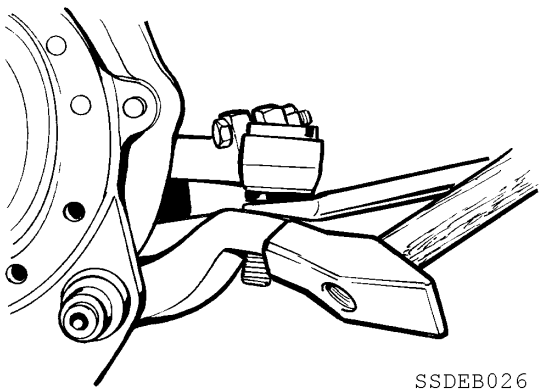
Picture 22

1. Unfasten the breather tube.



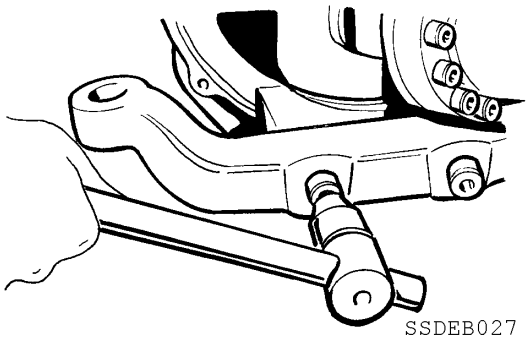
Picture 23

2. Unfasten the brake cylinder bracket.



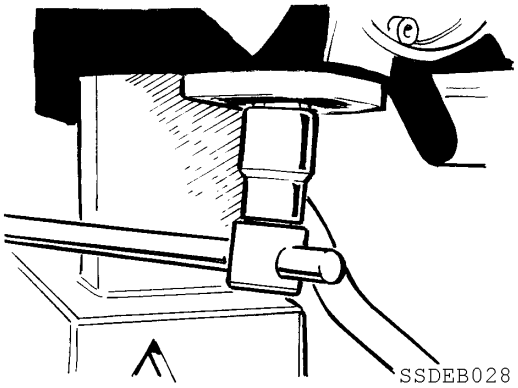
Picture 24

3. Open the nut on the tie rod swivel joint. Unfasten the swivel joints with an extractor or, if no such tool is available, as in the illustration. Unfasten the arms of the steering cylinder from the track arm.



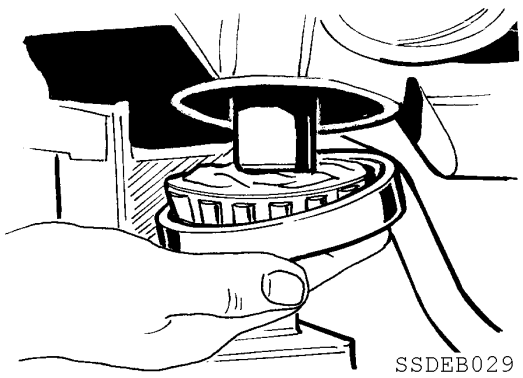
Picture 25

4. Unfasten the track arm.



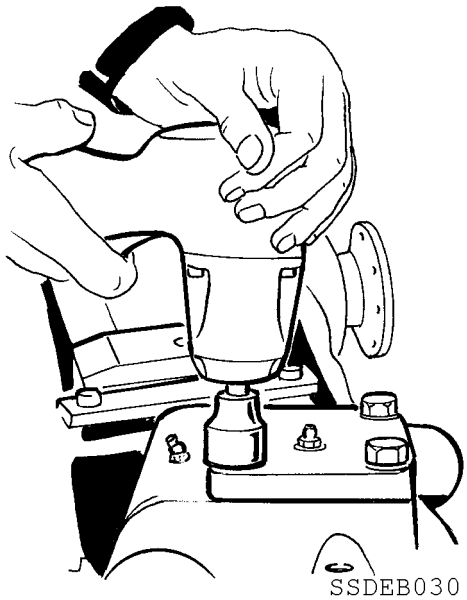
Picture 26

5. Unfasten the cover plate of the lower steering pivot pin by opening the four bolts. Unfasten the lower steering pivot pin. This can be made easier by heating the swivel head to approx. +150°C, whereupon the adhesive in the thread will melt.



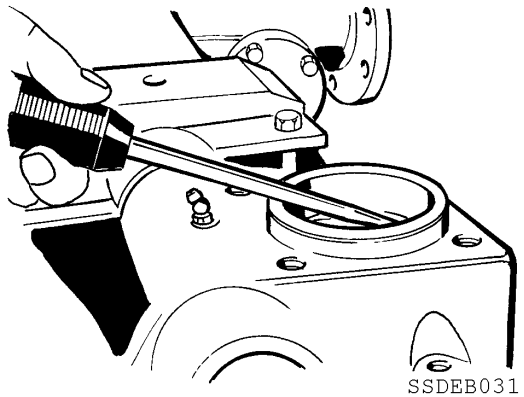
Picture 27

6. Remove the lower steering pivot pin and bearing.



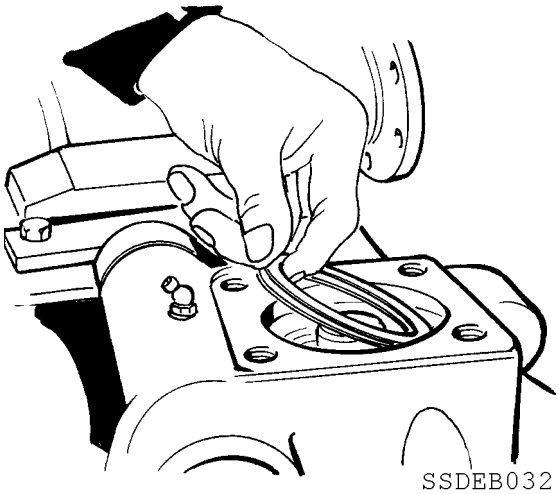
Picture 28

7. Unfasten the cover plate of the upper steering pivot pin by opening the four bolts.



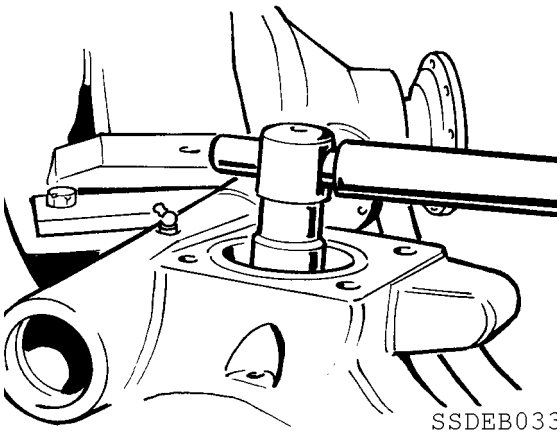
Picture 29

8. Clean the grease out of the steering pivot pin housing and remove the spacer.



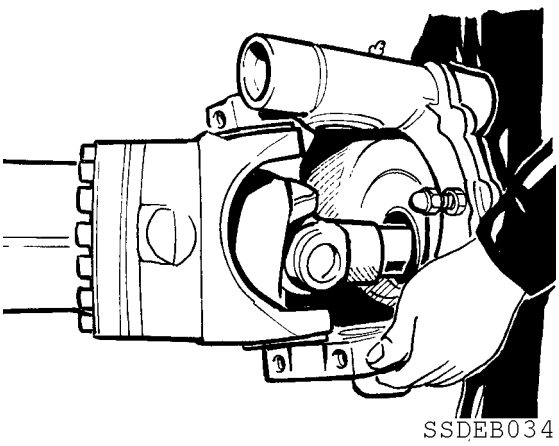
Picture 30

9. Remove the shim plates.



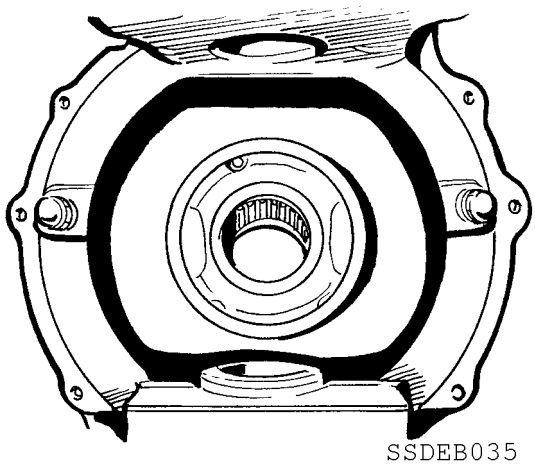
Picture 31

10. Unfasten the upper steering pivot pin and bearing.



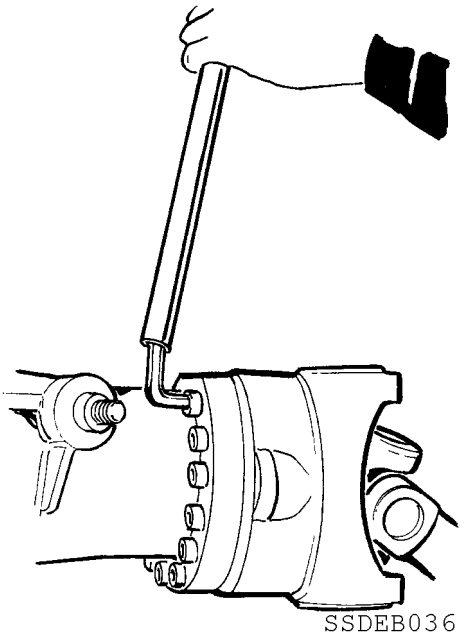
Picture 32

11. Unfasten the swivel axle by pulling it out. This can be done more easily if the sealing plate of the lower steering pivot pin is tapped down with a drift.



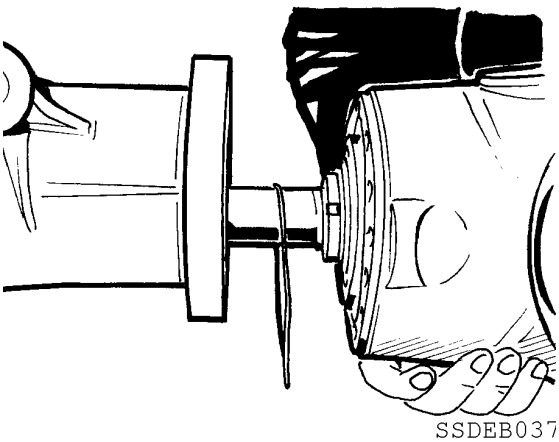
Picture 33

12. Unfasten the lock washer of the swivel axle housing. Unfasten the sleeve, the sealing ring and the needle bearing by pressing them.



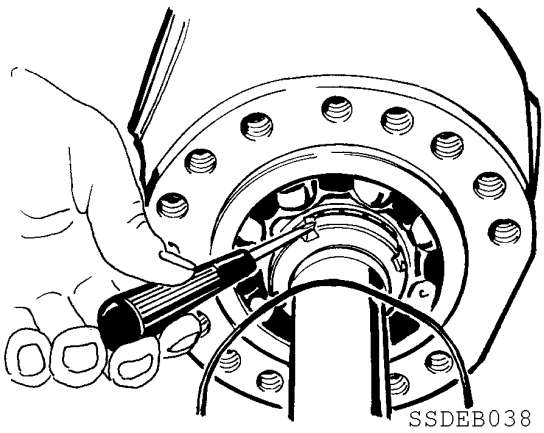
Picture 34

13. Open the Allen bolts from the axle housing end.



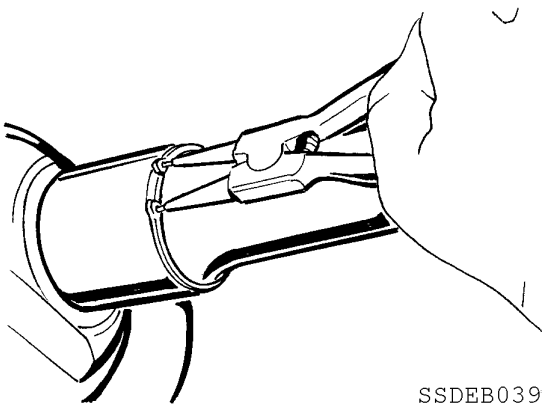
Picture 35

14. Remove the swivel head and the axle shaft by pulling them out.



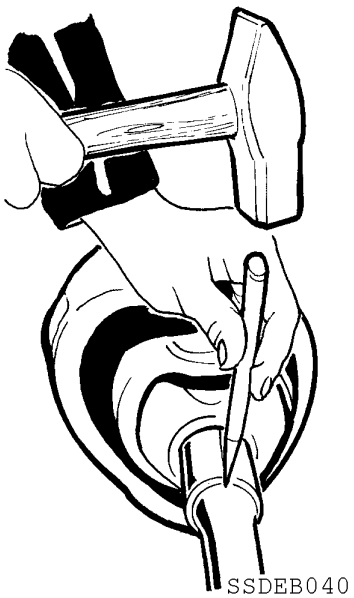
Picture 36

15. Unlock the nut on axle shaft. Open the nut with suitable spanner wrench. Unfasten the axle from the swivel head by pressing outwards. Unfasten the bearing and the sealing ring.



Picture 37

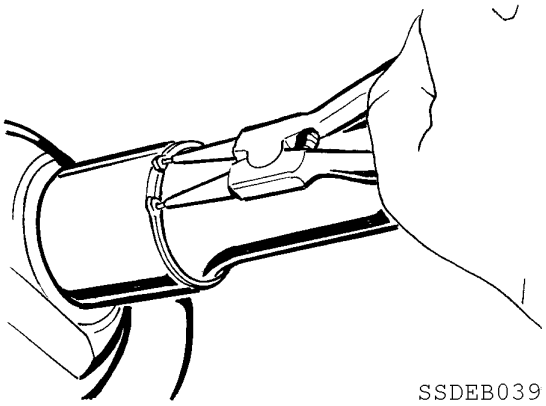
16. Unfasten the axle shaft ring.



17. Remove the inner race of the needle bearing from the axle shaft by making a groove in it with a cutting wheel and splitting the bearing with a chisel.

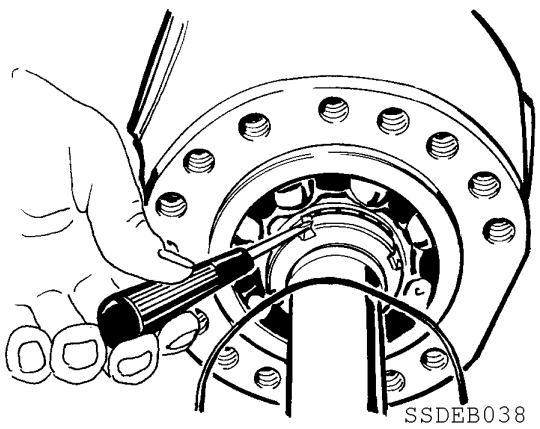
Use protective goggles and ensure that the axle does not get damaged.

2.3 ASSEMBLY- STEERING KNUCKLES



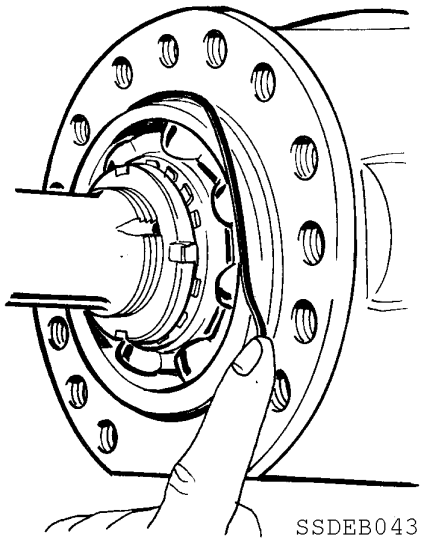
Picture 38

1. Press the inner race of the needle bearing onto the axle shaft and fit a lock washer.



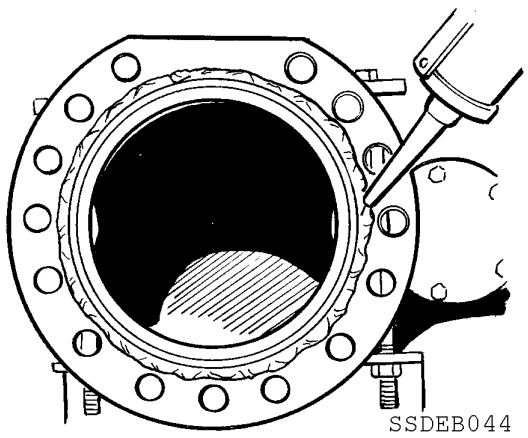
Picture 39

2. Fit the swivel head with a new sealing ring and bearing. Fit the axle shaft, washer and locking plate in the swivel head. Tighten the nut with a torque of 110 Nm (11 kgm). Lock the nut by bending the lock washer.



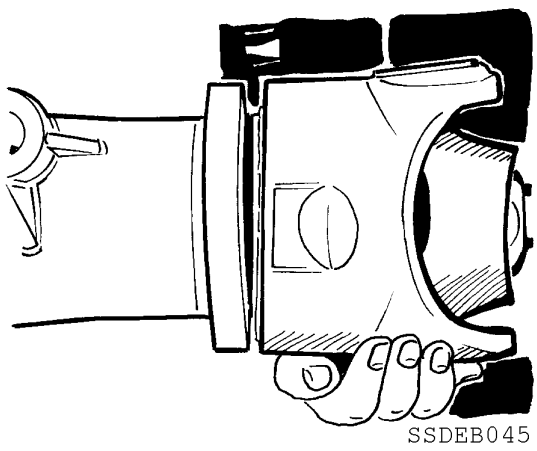
Picture 40

3. Fit a new O-ring to the outer race of the swivel head bearing.



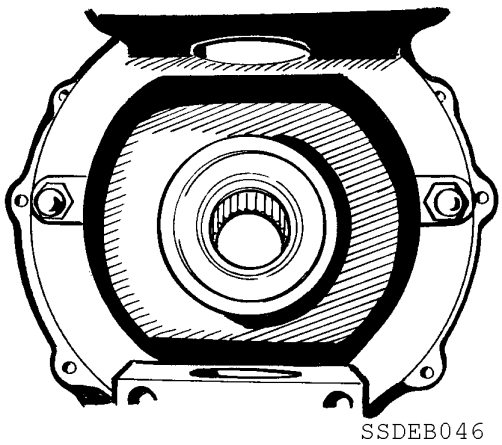
Picture 41

4. Apply sealing compound to the axle housing flange.



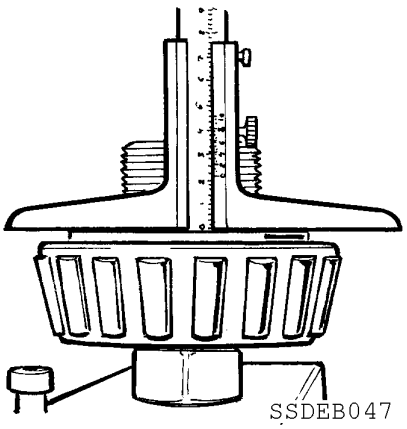
Picture 42

5. Fit the swivel head and axle shaft to the axle housing. Fit washers, and tighten the Allen bolts with 210 Nm torque.



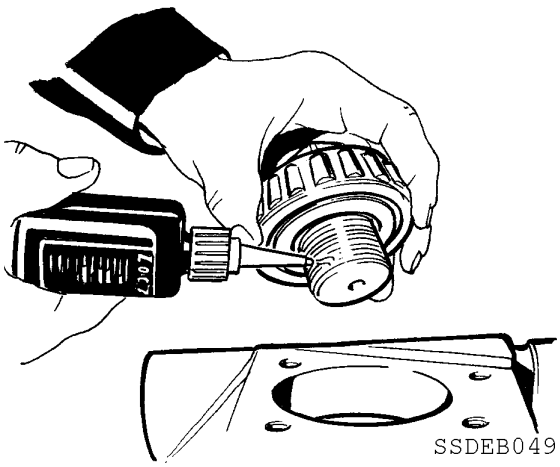
Picture 43

6. Fit the axle shaft housing with a new needle bearing, a new sealing ring and sleeve. Fit a new lock washer. Fit the steering pivot pins' bearings with new seals. Also replace the sealing plates.



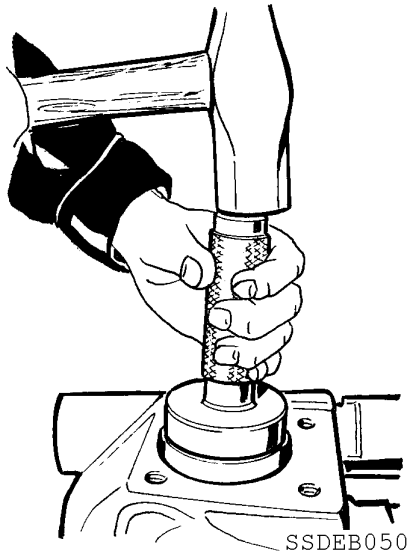
Picture 44

7. Fit the steering pivot pins with new bearings in such a way that the surface of the bearing's inner race is approx. 1 mm higher than the lower edge of the steering pivot pin face. Lubricate the bearing.
8. Fit the swivel axle to the swivel head. Take care not to damage the seals of the steering pivot pins.



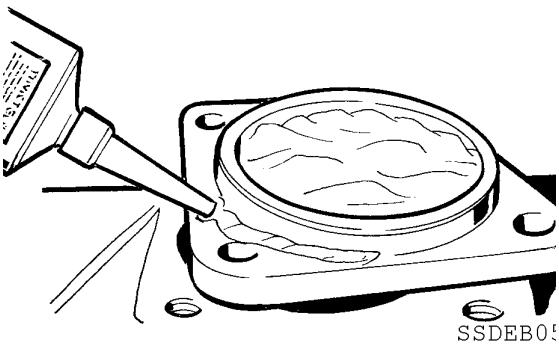
Picture 45

9. Put Loctite or equivalent on the screw threads of the steering pivot pins and screw the pins in place a few turns short of the bottom.



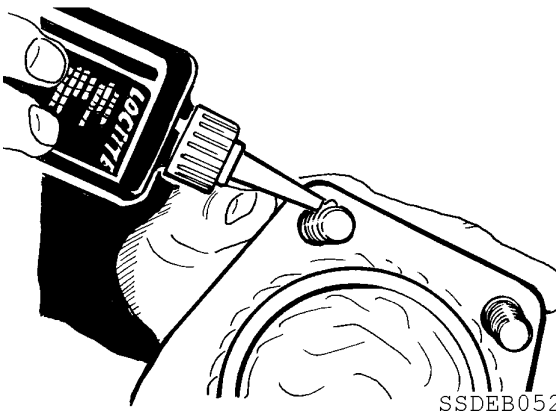
Picture 46

10. Fit the outer races of the steering pivot pin bearings tapping carefully with suitable drift. Tighten the steering pivot pins with 900 Nm torque.



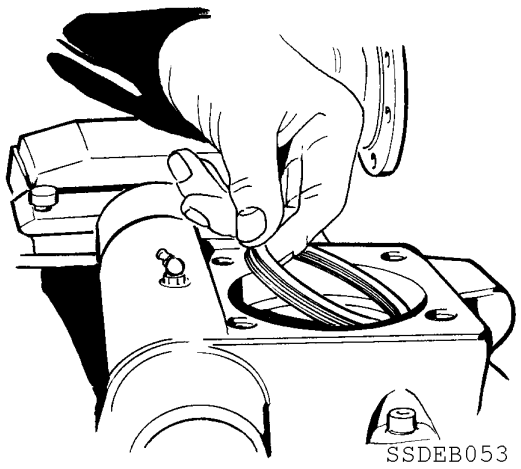
Picture 47

11. Put sealing compound on the surfaces of the seals on the pivot pin covers.



Picture 48

12. Put Loctite or equivalent on the screw threads of the bolts and fit the lower steering pivot pin cover. Tighten the bolts with 240 Nm torque.

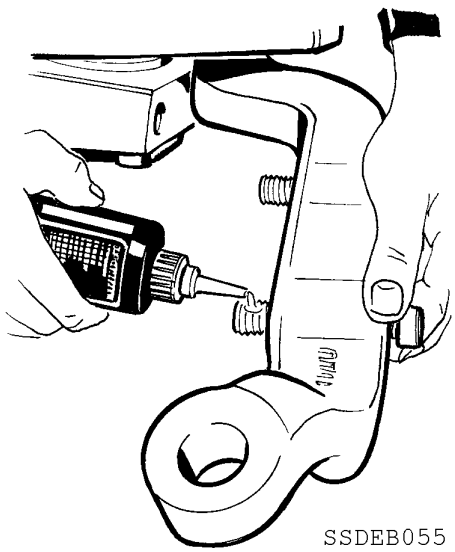


Picture 49

13. Put the original shim plates and sleeve back in the upper steering pivot pin housing.

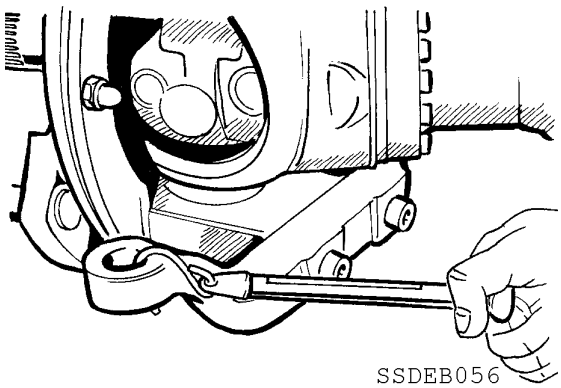
Picture 50

14. Put Loctite or equivalent on the screw threads of the bolts and fit the upper steering pivot pin cover. Tighten the bolts with 240 Nm torque.



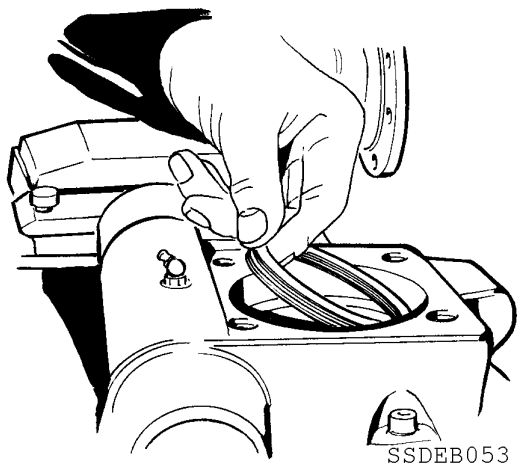
Picture 51

15. Apply Loctite or equivalent to the screw threads of the track arm bolts. Fit the track arm and tighten the earlier M20 bolts with 630 Nm torque and later (1991 onwards) M24 bolts with 940 Nm torque.



Picture 52

16. Measure the resistance of the steering pivot pins' bearing mounting with a spring balance. Fix the balance to the tie rod fulcrum pin ring and draw it horizontally against the beam. The resistance should be approx. 200 N (20 kg) while moving.

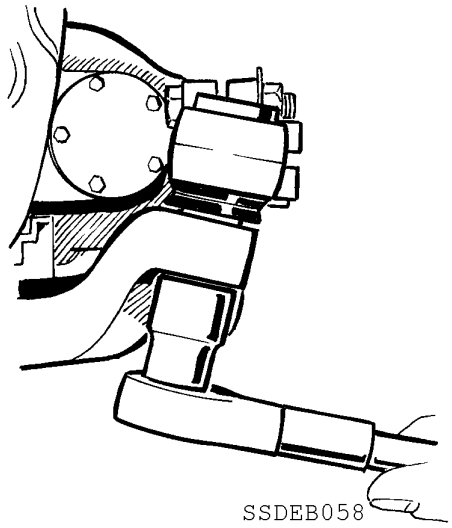


Picture 53

17. If necessary, adjust the bearing clearance by changing the shim plates in the upper steering pivot pin housing.

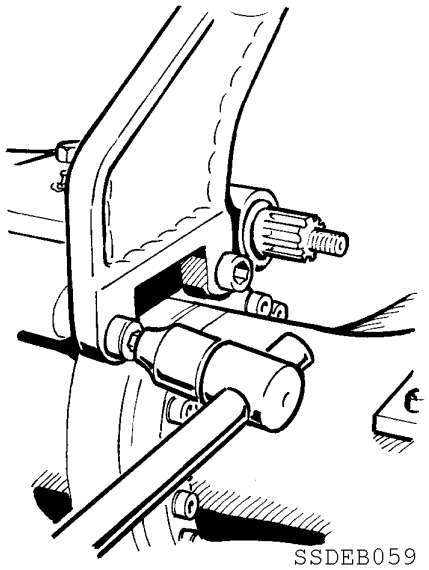
Table 1: Shims

Spare no.	thickness/ mm
099 518 0010	0,05
099 518 0011	0,10
099 518 0012	0,20
099 518 0013	0,50



Picture 54

18. Fit the arms and tie rod of the steering cylinders. Tighten the nuts with 300 Nm torque and secure with a cotter pin.



Picture 55

19. Fit the brake cylinder bracket, apply Loctite or equivalent to the bolt threads and tighten bracket/ steering arm M20 retaining bolts with 630 Nm torque. Fit the breather tube.

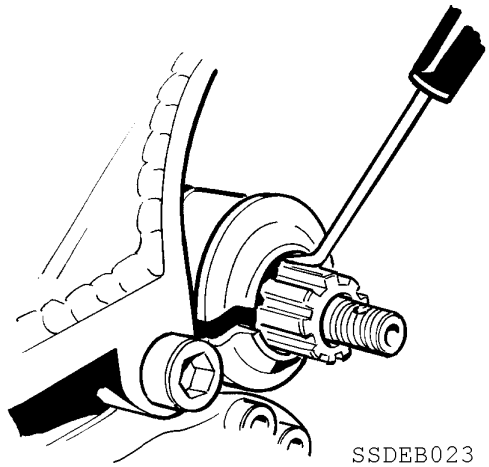
2.4 PLANETARY HUBS - ASSEMBLY

Before assembly, carefully clean all the parts. Check the condition of the threads especially carefully.

Table 2: Shims

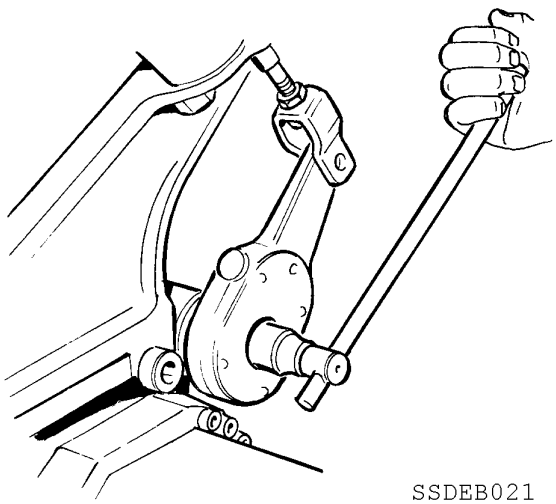
Spare no.	Thickness/ mm
099 519 1000	0,05
099 519 1001	0,10
099 519 1002	0,20
099 519 1003	0,50

1. Lubricate the S-camshaft carefully and fit it in place. Fit the lock washers.

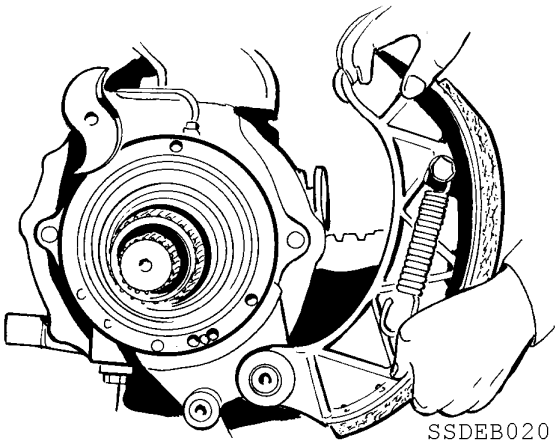


Picture 56

2. Fit the brake lever and tighten the nut until the S-camshaft torsion resistance is 40-60 N (4-6 kg) when measured with a spring balance.

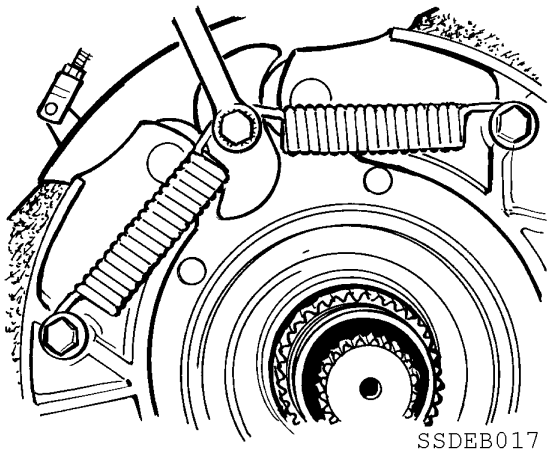


Picture 57



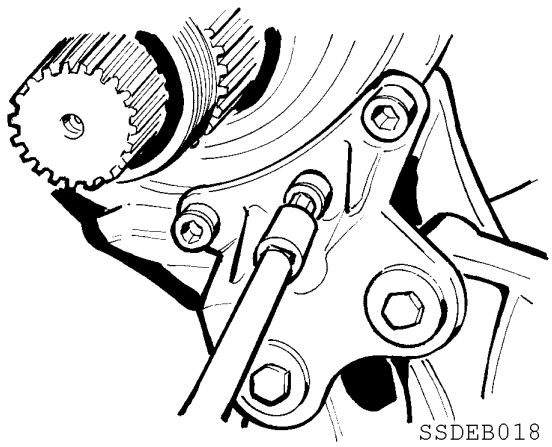
Picture 58

3. Lubricate the anchor pins with heat-resistant grease and fit the brake shoes.



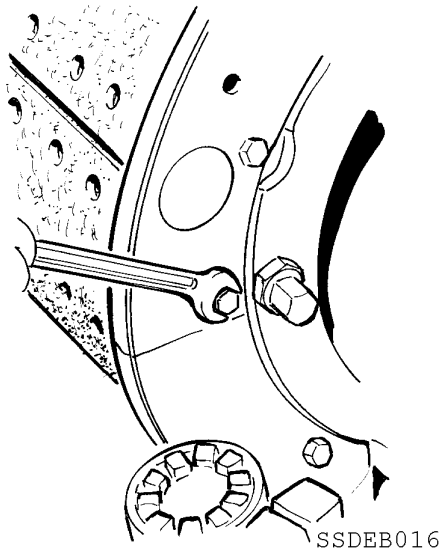
Picture 59

4. Fit the brake shoes' spring pivot.
   The spring pivot screw in the middle of the s-cam shaft and spring retaining screws in the brake shoes shall be tightened to 67 Nm torque. Apply Loctite or equivalent to the screw threads.



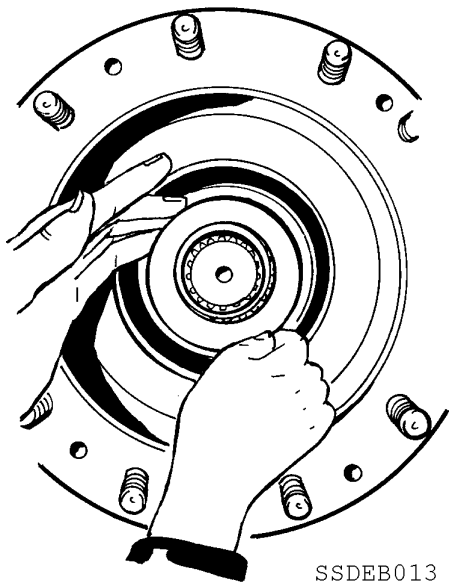
Picture 60

5. Fit the brake shoes fastening lug. Tighten the Allen bolts with 320 Nm torque and the anchor pin bolts with 70 Nm torque. Use Loctite or equivalent.



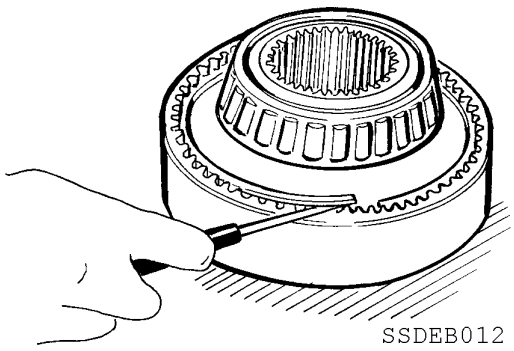
Picture 61

6. Fit the halves of the brake plate.
7. Fit the bearing outer races to the hub.
8. Lubricate the hub inner bearing with oil and the sealing ring with grease.
9. Fit the hub inner bearing and sealing ring to the hub.



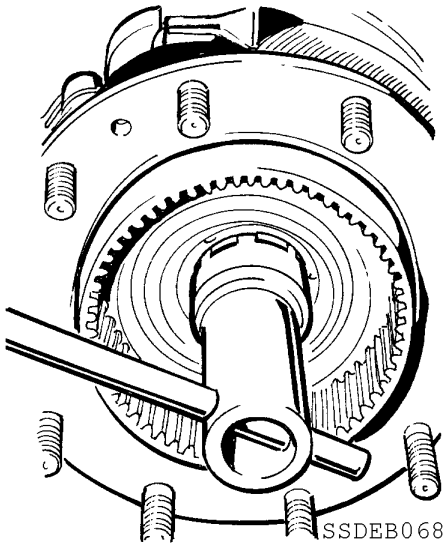
Picture 62

10. Fit the hub to the swivel axle. Fit the spacer and the shim plates that were removed from the hub previously.



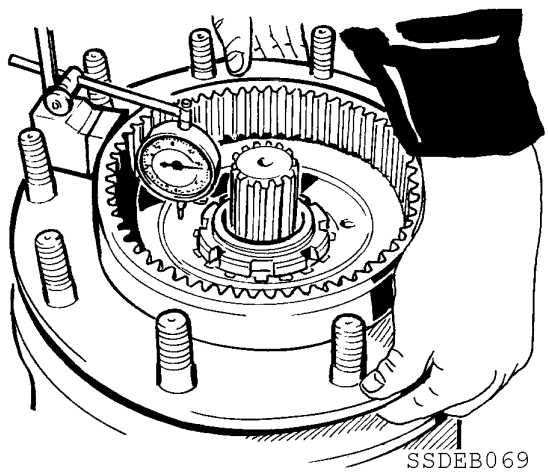
Picture 63

11. Fit a new bearing on the hub of the ring gear. Fit the ring gear on the ring gear hub. Attach a lock washer.



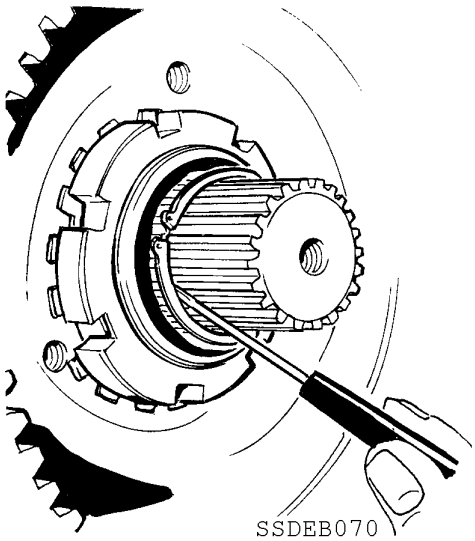
Picture 64

12. Lubricate and fit the hub outer bearing. Attach the hub to the swivel axle. Fit the washer and lock washer, and tighten the nut with special tool 7141-014-020 while rotating the hub at the same time. If the hub rotation is heavy, open the nut and put more shim plates on the axle. Tighten the nut with 1000 Nm torque.



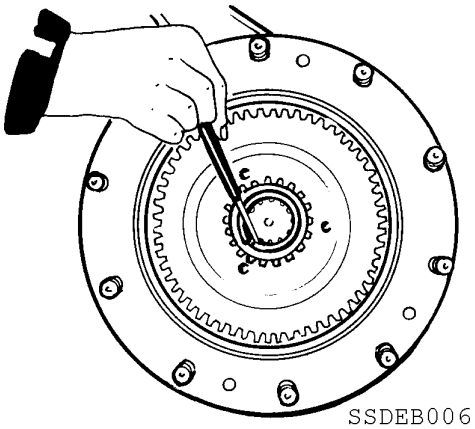
Picture 65

13. Attach a dial gauge by its magnetic holder to the hub, and place the tip of the gauge against the ring gear hub. Move the hub in the direction of the axle and read the bearing clearance on the dial. The correct clearance is 0.00-0.10 mm. Adjust the clearance, if necessary, by changing the shim plates. Thicker plates increase the clearance.



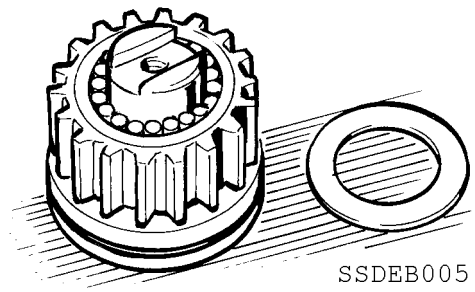
Picture 66

14. Fit the half shaft inner locking washer. Bend the hub nut locking washer dog into the groove with suitable tool.



Picture 67

15. Fit the sun wheel and the outer lock washer.



Picture 68

16. Assemble the planet wheels' axle:

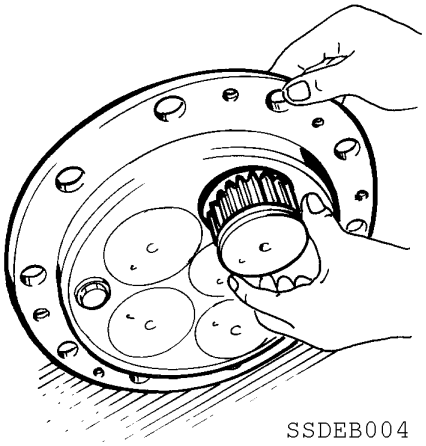
16/1 Shim plate, smooth side towards the gear wheel (the other edge is bevelled)

16/2 Gear wheel

16/3 26 Bearing rollers

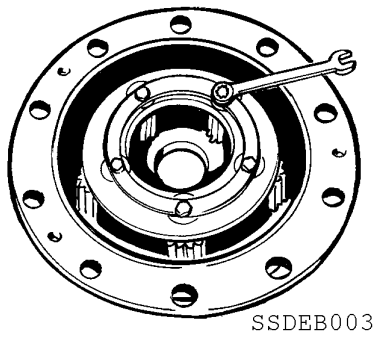
16/4 Shim plate, smooth side towards the gear wheel

16/5 O-ring



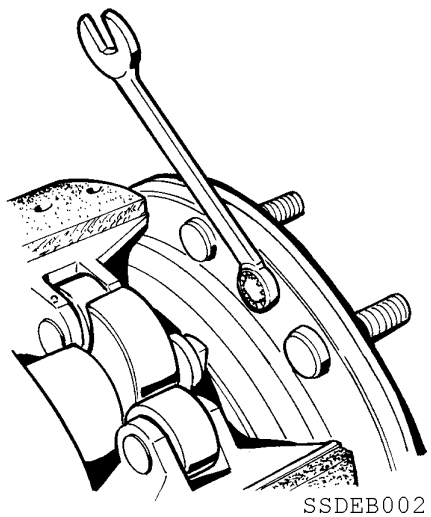
Picture 69

17. Fit the planet wheels' axles onto the planet wheel carrier so that the tension washer fits in place.



Picture 70

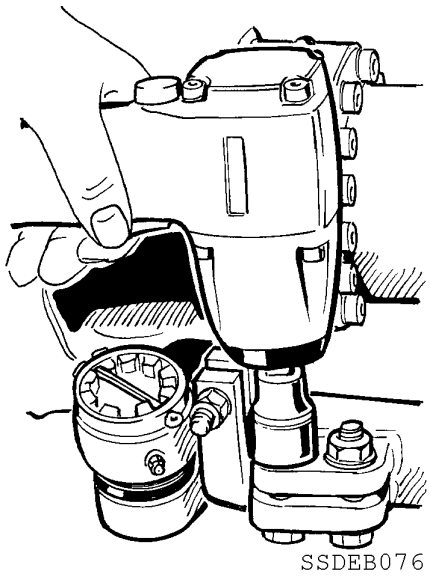
18. Apply adhesive to the bolts' screw threads and tighten the bolts with 40 Nm torque, tapping the axles at the same time. Make sure that the gear wheels rotate freely.



Picture 71

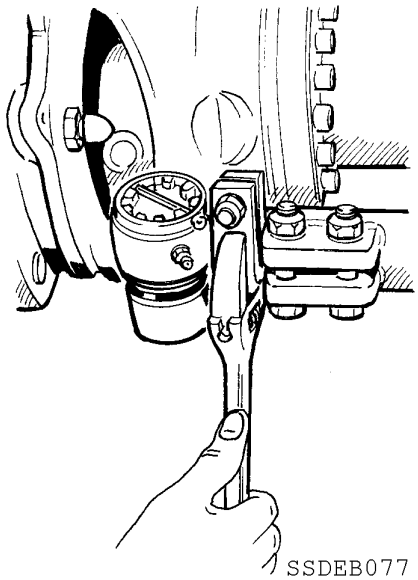
19. Fit a new O-ring to the planet wheel carrier and fit the carrier on the hub.
    Spread adhesive on the bolts' screw threads.
    Tighten the bolts with 70 Nm torque.
    Fit the brake drum and wheel.

2.5 TOE-IN ADJUSTMENT



Picture 72

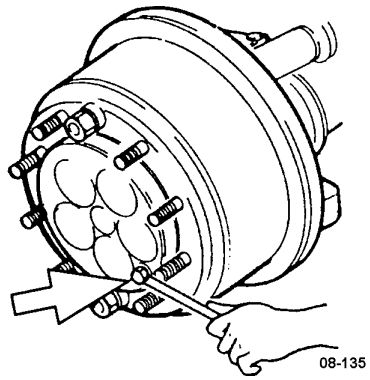
1. Clean the screw threads of the adjustment nut on the left side of the tie rod.
2. Open the locking bolts both from the adjustment nut and from the tie rod.
3. The toe-in is measured from the tire tread.
   Guideline value 0...+1 mm.



Picture 73

4. Adjust the toe-in by turning the adjustment nut.
5. Tighten the locking bolts with 140 Nm torque.

2.6 WHEEL HUB - OIL LEVEL CHECK

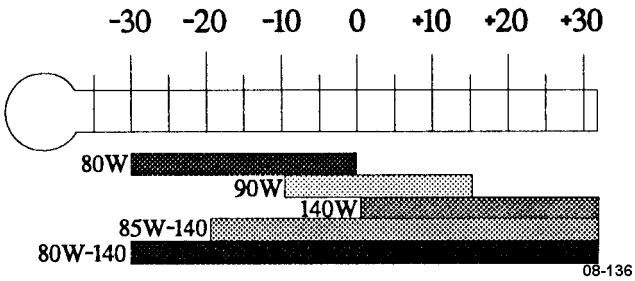


Picture 74

1. Turn the wheel so that the oil plug is in the “4 o’clock“ position.
2. The oil level must be even with the lower edge of the oil plug bore.
3. OIL CHANGE The oil should be changed immediately after driving, before the oil cools.
4. Turn the wheel so that the plug is turned downward.
5. Open the plug and drain the oil out of the hub. Turn the wheel so that the oil plug is upward, and fill with approx. 0.6 l of a recommended grade of oil.
6. Check the oil level by turning the wheel so that the oil plug is in the “4 o’clock“ position.

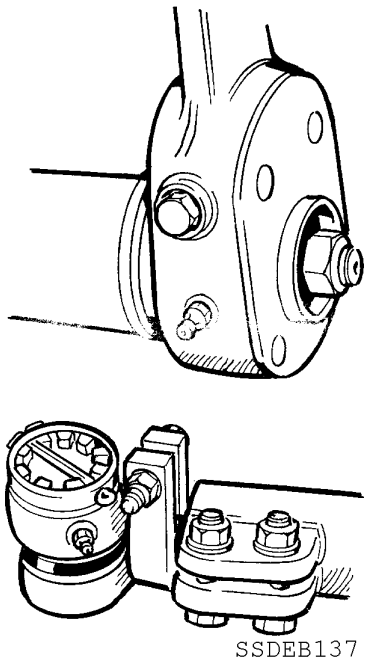
2.7 OIL RECOMMENDATION

Oil grade: API GL 5
Viscosity: selected from the following chart according to the ambient atmospheric temperature. The same oil is to be used for both the drive gear and the hubs.



Picture 75 Recommended oil viscosity (SAE) according to the ambient atmospheric temperature.

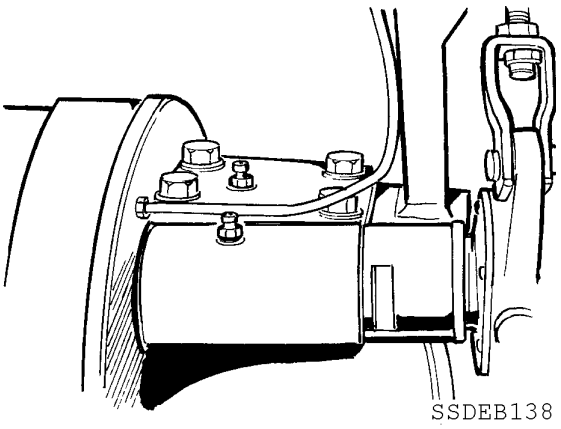
2.8 GREASING



Picture 76

Use general purpose grease. Apply with a hand gun. There are grease nipples in the following places on the axles.

1. Brake lever (1 nipple/side)
2. Tie rod coupling (1 nipple/side)



Picture 77

3. Steering pivot pin covers (2 nipples/side)
4. S-camshaft (1 nipple/side)

3 Brakes

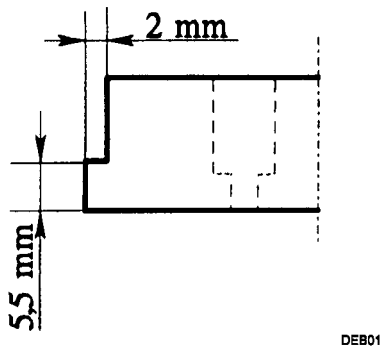
3.1 SERVICING

3.1.1 Lubrication

To ensure long, trouble-free operation, it is essential to service the brakes carefully and at regular intervals. The service required is presented below.
Use a good grade of chassis grease. At each service, squeeze grease into the brake slack adjusters and S-camshaft bearings. Before greasing, clean the nipple heads carefully to prevent any dirt getting into the bearings.
While greasing the S-camshaft bearings, it is advisable to depress and release the brake pedal so that the grease spreads more evenly on the bearing surfaces.
Over-greasing must be avoided, as the excess grease may get into the brake drum.

Note! From beginning 1997 the anchor bolts don´t have grease nipples. The anchor bolts have to be greased only when servicing brake shoes.

3.1.2 Inspection



Picture 78 Brake lining wear indicator

Checking and adjusting the brakes at regular intervals will ensure safe brakes. Wear to the brake linings can be checked through the inspection hole in the dust shield.

It is advisable to make this check before adjusting the brakes. Brake linings have a 2 mm wide and 5.5 mm deep wear indicator on the leading surface of the brake lining.

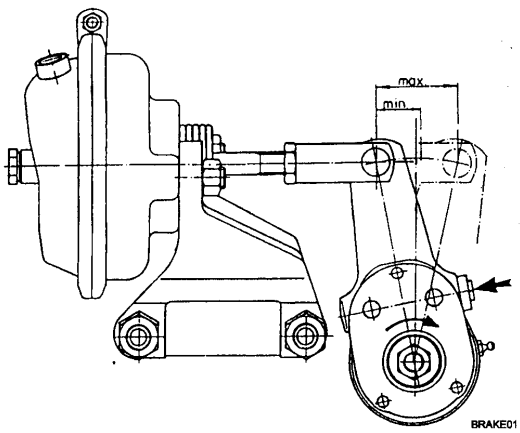
The brake assembly must be dismantled, checked and cleaned at least once a year. The brake linings must be changed in good time before the rivet heads begin to touch the brake drum.

3.1.3 Adjustment with manual adjusters

The brakes must be adjusted at the latest when the brake chamber push rod stroke exceeds the values shown in the table below.

Table 3: Brake lever travel

Brake lever travel on braking with a pressure of 600 kPa (6 kp/cm²)		
Brake cylinder	Adjust if travel exceeds	Adjustment (min. travel)
30”	52 mm	32 mm
24”	45 mm	25 mm
20”	45 mm	25 mm



Picture 79 Brake lever travel adjustment

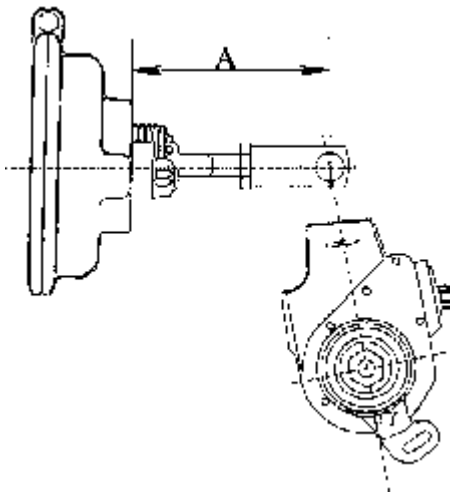
1. The recommended method to adjust the linings to the drag limit is as follows:
2. Raise the wheel concerned off the ground.
3. Depress the adjustment screw locking sleeve of the brake slack adjuster to release the screw.
4. Using the adjustment screw, tighten the linings against the brake drum so that the wheel is prevented from turning.
5. Slacken the adjustment screw until the wheel rotates freely.
6. Make sure the adjustment screw is locked.

NOTE: A brake pressure of 600 kPa (6 kp/cm²) must be applied when the lever movement is measured.

7. If the wheel cannot be jacked up for the adjustment to be made, use the movement of the lever as the basis for the adjustment. Turn the brake lever adjustment screw until the movement of the lever reaches its minimum; this is then close to the drag limit (the point where the brake shoes just touch the drum).

NOTE: When turning the adjustment screw, note the direction of rotation of the S-camshaft in the middle of the brake slack adjustment lever. The brakes become tighter when the end of the S-camshaft rotates in the same direction as during the braking movement.

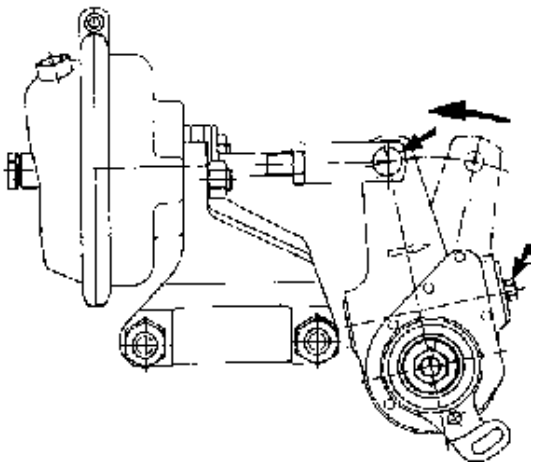
3.1.4 Adjustment with automatic aqdjusters



Picture 80 Brake lever travel adjustment

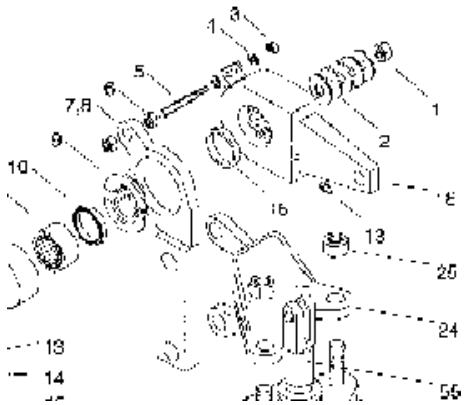
Installation

1. Check that the brake cylinder pushrod is in its rest position, as in Picture 80. Adjust the length if necessary.
2. Check that bushing halves (9 inPicture 83) and nylon bush (16) are in position before installation of the brake adjuster lever.
   Install the brake adjuster lever (18) and five Bellewille springs (2) on the S-cam shaft as instructed in – section *„S-Cam shaft adjustment in front axles - Bellewille spring adjustment"* on page -42.



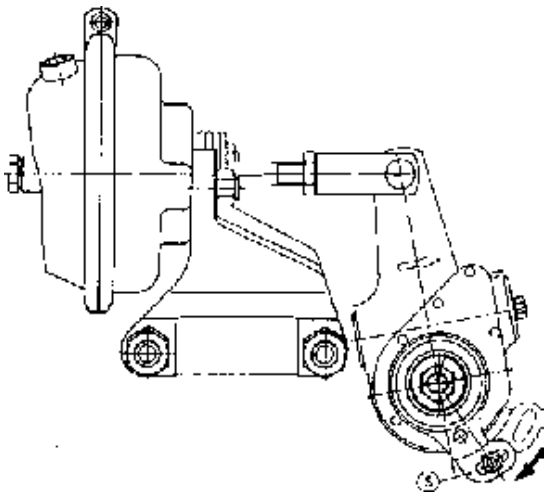
Picture 81 Adjuster installation to the push rod

3. Adjust the pre-tension of the bellewille springs and the S-cam shaft by means of the nut (1 Picture 83).
4. Tighten the nut until the S-cam shaft does hardly return by means of the brake shoe return springs.
5. Leave the self locking nut (1) in this position.
6. Pls. Note that this adjustment shall be done before the installation of the of the brake cylinder push rod.
7. Place the anchor pin (5 in fig 3) loosely into its hole.
8. Brake adjuster lever shall be installed so that the arrow on the lever arm indicates the direction of braking, with the arm in front of he pushrod fork (Picture 81).
9. Turn the hexagonal-head adjustment screw clockwise until the holes in the lever arm and pushrod fork are in line, and the fork pin slides easily into place. Lock the pin with a cotter (Picture 81).



Picture 82 Adjuster installation details

10. **IMPORTANT!** Turn the control arm (s) in the direction of the arrow on the lever arm as far as it will go. Do not hammer the control arm! Tighten the nuts to secure the anchor pin in its hole and fix the control arm onto the anchor pin using a nut and washer. Make sure the arm is not deflected sideways. Also check to see that this procedure does not change the set position (Picture 83).
11. Adjust the clearance between the friction blocks and the brake drum as follows: Turn the adjustment screw until the brake clearance is zero, either by measuring or by feeling the wheel turn against the drum. Now turn the screw 3/4 of a turn back (loud ratchet noise).



Picture 83 Fastening of the control arm

12. Check the operation of the brake slack adjuster by braking several times in succession. Anti-clockwise rotation of the adjustment screw during the return stroke shows that the adjuster is working. Continue braking until the correct clearance of 0.4 - 0.8 mm is obtained. Also check the stroke of the brake chamber pushrod at a pressure of 6.5 - 7 bar: the rod should move 23-40 mm.

3.1.5 Brake inspection (in use)

About every 40,000 km, check that the movement of the pushrod has not changed greatly from its normal value.

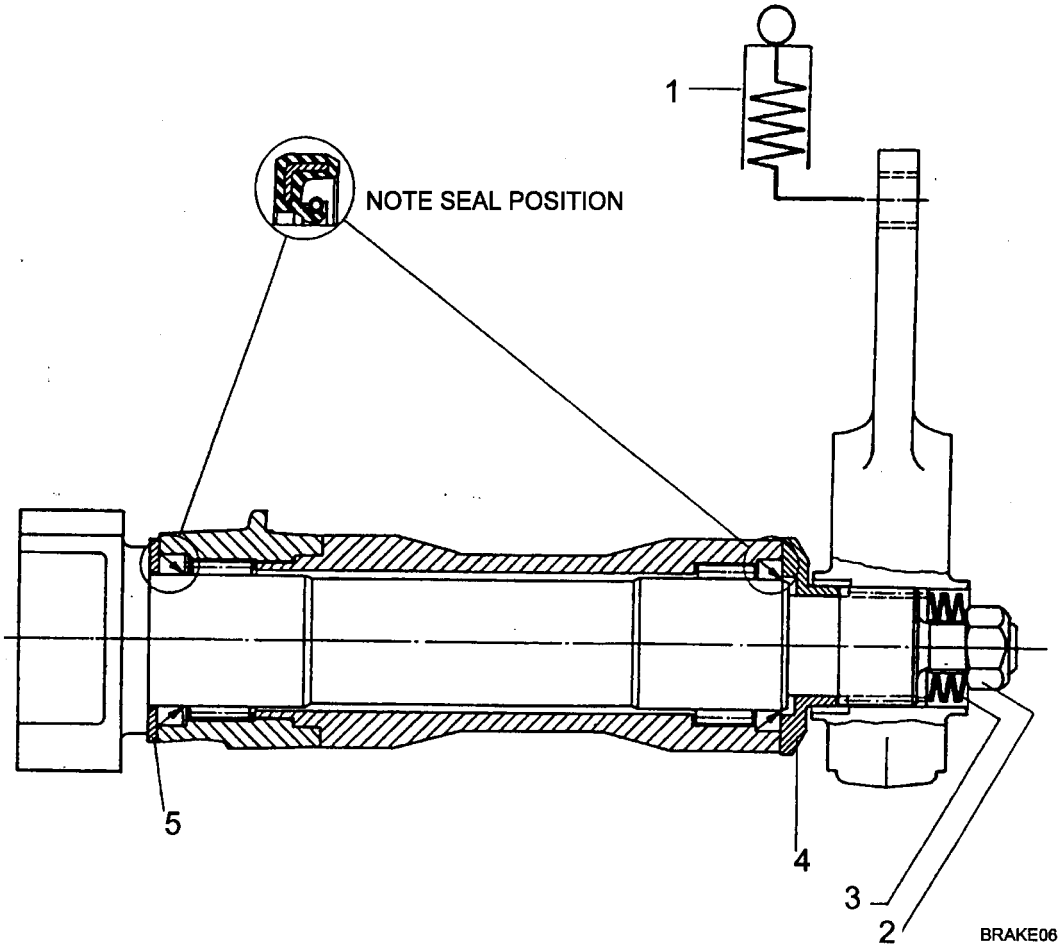
Check the adjustment resistance of the lever once a year. Measure the resistance by turning the hexagonal head of the adjustment screw with a torque wrench. Turn the wrench anti-clockwise and check that the one-way clutch or conical clutch does not slip at torque below 18 Nm. Carry out the measurement three times with the same slack adjuster. If slippage occurs, change the slack adjuster.

If there is any suspicion of greater than normal wear to the friction blocks, possibly caused by the action of the adjuster, measure the brake clearance with the brakes cool twice during 1000-2000 km. If the clearance is less than 0.25 mm (minimum value) check the position of the adjustment arm according to the instructions and repeat the clearance measurement.

The brake clearance varies from one braking to another from 0.25 mm (min.) to 1.0 mm (max.), depending on the force with which the brakes are applied, the braking frequency and the brake drum temperature.

3.1.6 S-Cam shaft adjustment in front axles - Bellewille spring adjustment

S-cam shaft resistance shall be adjusted as follows:



Picture 84 S-cam shaft installation and adjustment details

1. Spring scale for measurement 2. Adjustment/retaining nut
3. Bellewille springs 4. Bushing halves
5. Support ring

1. Place the support ring (5 in Picture 84) on the shaft and install the shaft.
2. Install the bushing halves (4) around the shaft and place the slack adjuster on the splines of the shaft.
3. Place 5 pcs Bellewille springs (3) on the shaft end according the illustration.
4. Tighten self locking nut (2) until the resistance of the s-cam shaft is 40 - 60 N when measured by a spring scale (1).
   The turning resistance of the slack adjuster shall measured at the most outside pin hole.

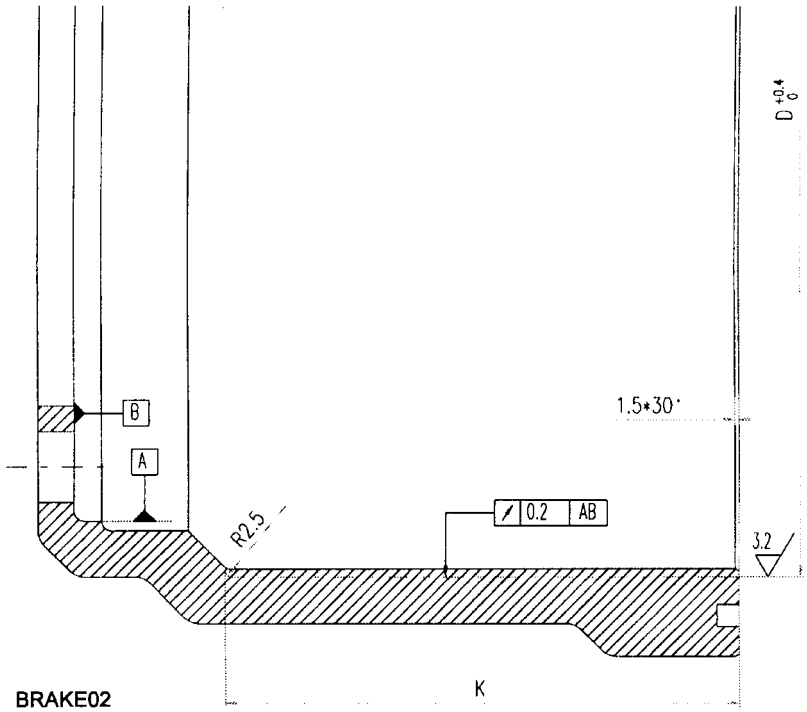
3.2 BRAKE DRUM

Table 4: Brake drum diameters “D”

Nominal diameter	410 mm
Nominal diameter for over-sized linings	414 mm

Table 4: Brake drum diameters “D”

Largest permitted turning diameter	416 mm
Rejection limit	418 mm



Picture 85 Brake drum measure details

3.2.1 Brake drum machining

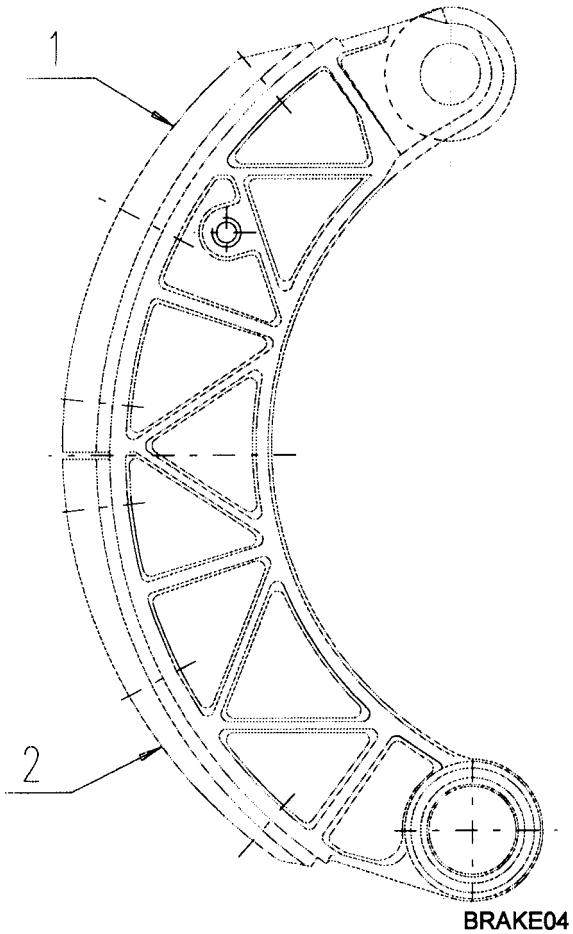
Machine the drum as shown in Picture 85. Standard size brake linings are used for brake drum diameters of 410-413.5 mm. It should be remembered, however, that brake linings do not “sit” against a re-machined drum and must be carefully “run in” by braking.
We recommend a hub lathe for machining the linings to the correct radius when the size is over 412 mm.
Oversize linings must be used for drum diameters of 414-416 mm.
With oversize linings, machining the friction blocks is not necessary.

3.2.2 Brake linings

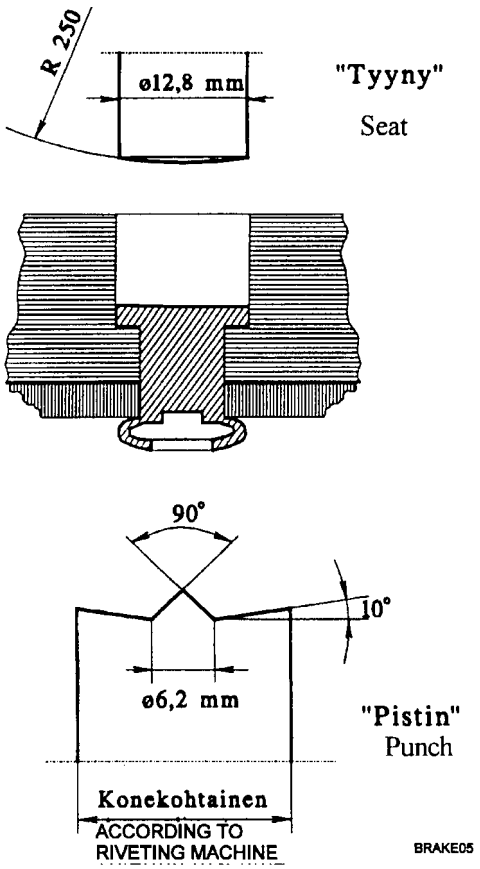
Brake linings shall be ordered according to the respective spare part manual.
All linings are asbestos free.
In linings, the lining wear indicator is marked on the leading surface of the lining with a 5,5 x 2 mm shoulder.

3.2.3 Riveting brake linings

Note that friction blocks differ, and must be mounted with the thinner block (2) on the anchor pin side and the other block (1) on the expander roll side.



Picture 86 Brake shoe with the linings



Picture 87 Riveting tools

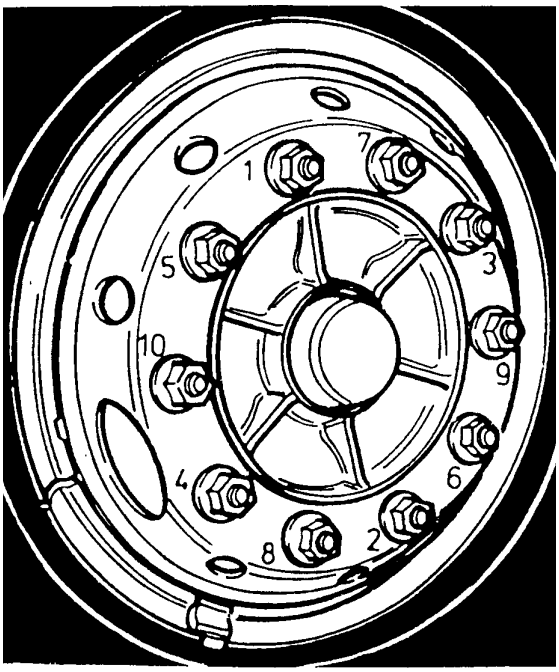
To rivet the linings, use tools like those shown in the above diagram. The correct punch force is 25 ... 28 kN.

3.2.4 BRAKE VIBRATIONS

During braking, the brakes may develop noise and vibration. Should this be serious enough to warrant repairs, a clear explanation must be given to the workshop to avoid unnecessary work.
Find out which wheel or pair of wheels is causing the problem, and establish the nature of the vibration (frequency, intensity and conditions under which it occurs, e.g. speed, braking force).

1. During braking, a jerky type of vibration that varies with speed indicates out-of-roundness of the brake drums.
2. This defect can be checked by inserting a dial gauge through the inspection hole without removing the disc wheel. The maximum permitted reading on the gauge is 0.20 mm. If a corresponding defect is not found with the drum detached, check the fastening of the drum and disc wheel. The wrong torque in the wheel fastening screws can cause this defect.
3. Very high-frequency vibration or noise in the front axle brakes can often be rectified by shortening the friction blocks at the end of the anchor pin side by about 50 mm. This results in a smaller opening angle, which reduces the pressure at this end, making the brake shoes less susceptible to vibration.
4. Strong low-frequency vibration in the driving axle brakes and affecting the entire vehicle may occur at low speeds just before the vehicle stops. The vibration is caused by masses outside the wheel brakes being brought onto the same vibration frequency.
5. To rectify this, adjust the turning resistance of the S-camshaft by adjusting the tension in the Belleville springs
6. In brakes with bearing bushings in S-cam shaft there brake vibrations are rare.

3.2.5 Attaching the wheel



Picture 88 Wheel nut tightening sequence

Check that the wheel nuts and bolts are clean and undamaged. Lubricate the bolt threads with a little oil. The tightening torque of the nuts is 550...650 Nm. Check the tightness of the nuts again at the latest after one day's driving.

3.3 BRAKE MAINTENANCE - Dismatling

(Items in text refer to Picture 89)

3.3.1 Removing the brake shoes

Raise the wheels off the ground.

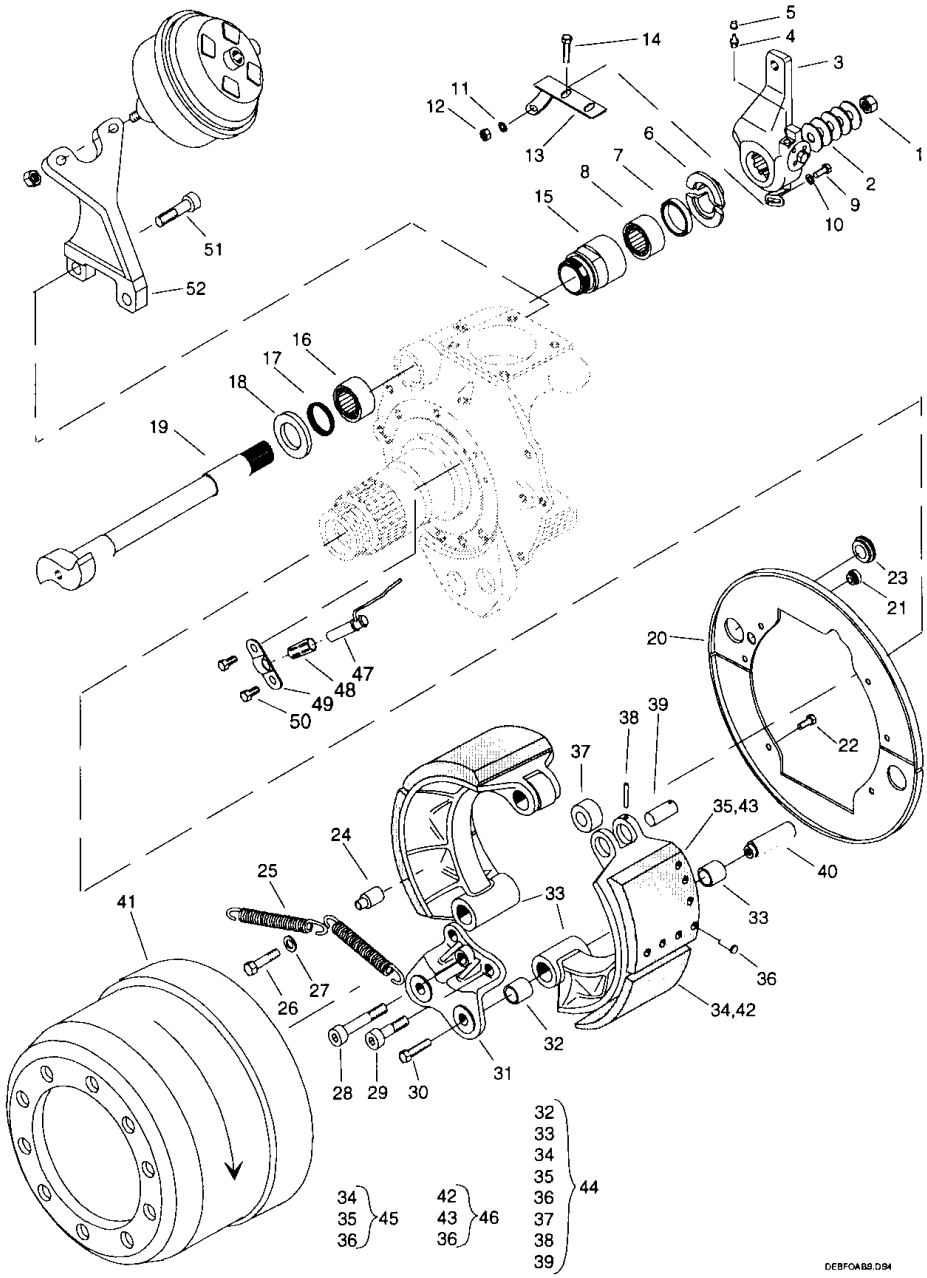
Remove the wheels.

1. Remove the brake drum by pulling outwards. Utilize pulling screws if necessary. Clean the brake drum centring surface with abrasive tape.
2. Release the brake shoe springs by removing the spring pivot screw (26).
3. Remove the anchor bolt screws (30).
4. Remove the brake shoe anchor bolt support (31) by unscrewing the screws (28 and 29). Use suitable Allen key. Turn the hub until the extension arm goes into the hole in the hub flange.
5. Carefully remove the support by tapping with a bar.
6. Remove the brake shoes by pulling outwards.

3.3.2 Attaching the brake shoes

Grease the anchor bolts (40) and mount the brake shoes.

1. Mount the brake shoe springs using the anchor screws (26). Apply thread securing medium (Loctite 242 or equivalent) to the threads and tighten the screws to a torque of 67 Nm (also the screws in the brake shoes).
2. Mount the brake shoe anchor bolt support (31) and tighten the screws (28 and 29) to a torque of 320 Nm.
3. Apply thread securing medium (Loctite 242 or equivalent) to the anchor bolt screw (30) threads and tighten to a torque of 70 Nm.



Picture 89 Brake parts exploded (typical)

4 TECHNICAL DATA

Wheel Hub		
Oil volume approx.	0,6	l
Wheel hub bearing clearance	0,00...0,10	mm
Tightening torques		
Wheel hub nut	1000	Nm
Planet wheel carrier bolts	70	Nm
Planet wheel pin bolts	40	Nm (cement)
Wheel nut	550...650	Nm
Oil plugs	50...70	Nm
Steering pivot pins - swivel heads - half shafts		
Steering pivot pin bearing clearance (torsional resistance measured at the perforation in the tie rod coupling)	200	N
Tightening torques		
Steering pivot pins	900	Nm (cement)
Steering pivot pin covers	240	Nm (cement)
Swivel head flange bolts	210	Nm (cement)
Track arm bolts (earlier design M20 bolts)	630	Nm (cement)
Track arm bolts (later design M24 bolts)	940	Nm (cement)
Steering arm bolts	630	Nm (cement)
Axle shaft nut	110	Nm
Steering angles		
Camber	0°	
Steering pivot pin camber KPI	6°	
Caster	1,5°	
Toe-in measured from tread	0...+1	mm

5 SPECIAL TOOLS

Number: 7141 014 020
Name: Wheel hub wrench