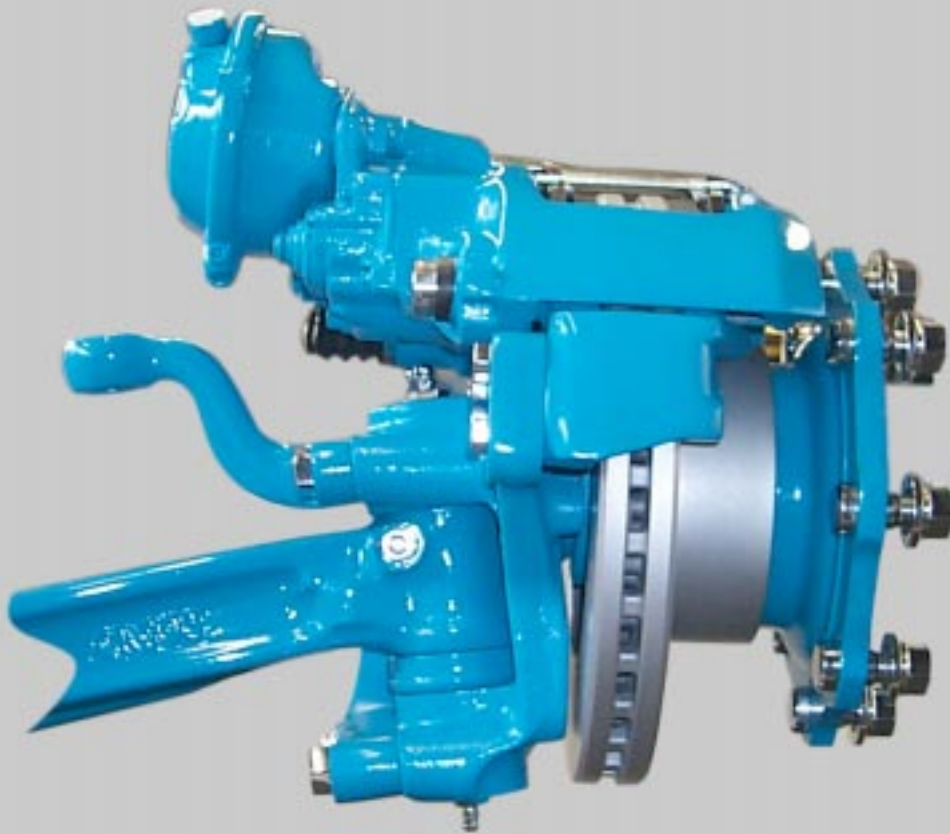


Maintenance Manual
NDS axles
Lubrication and Maintenance
NDS Axle range
Issue D



SPICER SPECIALITY AXLE DIVISION





MANUAL ISSUE SHEET

Page No.	Issue	Description / Alteration	Reason	Date
All	A	New Manual		Nov. 99
5	B	Mileage interval altered	Updated spec.	Mar.2000
9	B	Mileage interval altered	Updated spec.	Mar.2000
13	B	Tie rod torques added	New tie rod	Mar.2000
14	B	Tie rod torques added	New tie rod	Mar.2000
15	B	Air cylinder torques added	New spec	Mar.2000
18	B	Air cylinder torques added	New spec	Mar.2000
4	B	Lockstop setting info added	Clarification see SB1258	Sep.2000
3	B	Greasing period altered	Standardisation	Jan.2001
4	C	End float checking period added	Standardisation	Jan.2001

SECTION 1 LUBRICATION

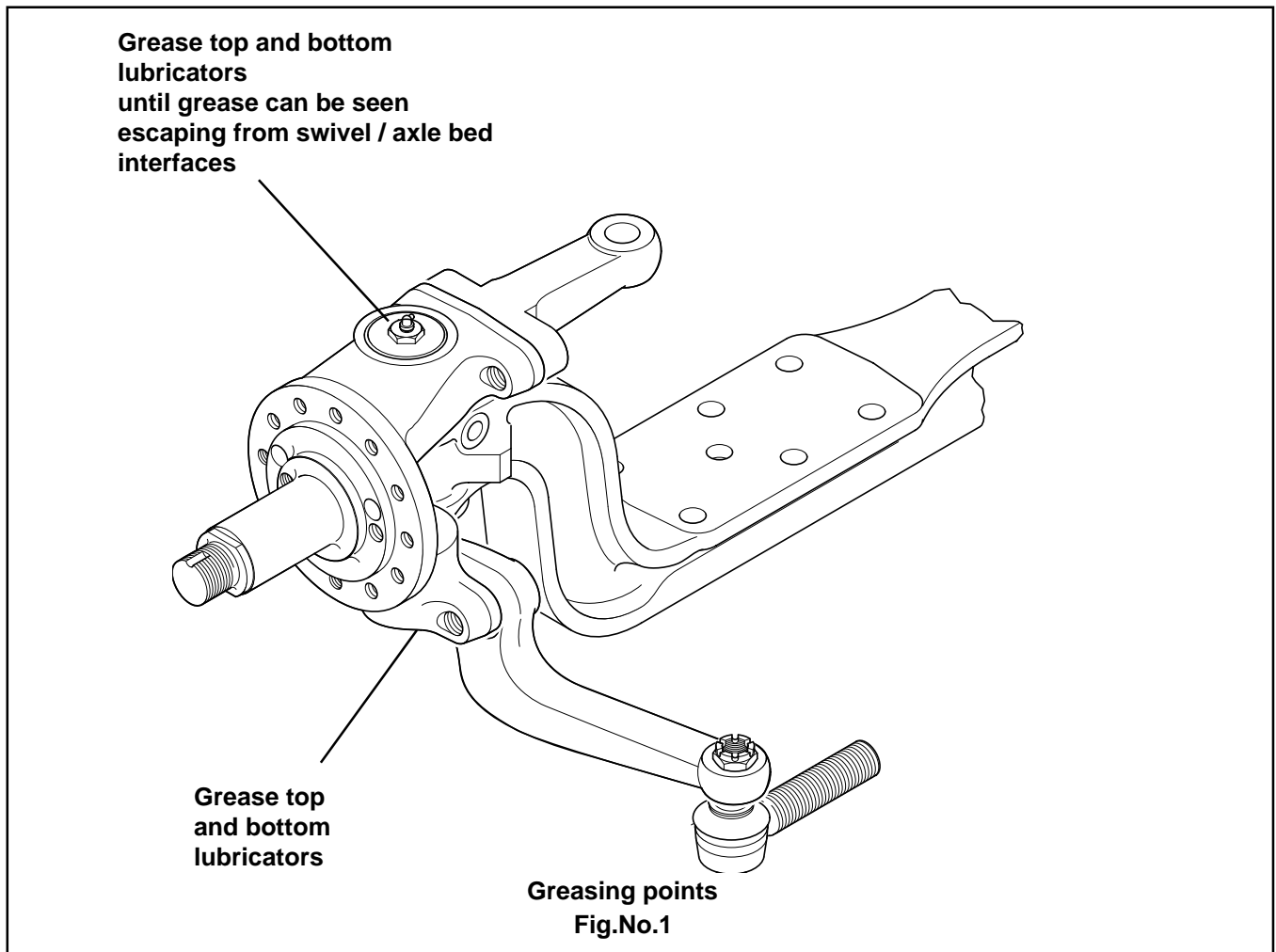
1.1 GREASING PERIODS

1.1.1 ON HIGHWAY APPLICATIONS

Pressure lubricate every 6 months or 30000 miles (48000 km)

A more frequent lubrication cycle is required for axles used in on/off highway, refuse, or other severe service applications.

1.1.2 Grease points as shown in fig.no.1.



NOTE :- ALL OTHER COMPONENTS IN THE NDS RANGE OF AXLES ARE GREASED FOR LIFE AND REQUIRE NO FURTHER LUBRICATION DURING THE LIFE OF THE COMPONENT.

Recommended lubrication - LITHIUM BASE ROLLER BEARING GREASE NLGI NUMBER 2

1.2 Recommended Greases

Use greases to grade "F" in lubrication manual

SECTION 2 ROUTINE MAINTENANCE

- 2.1 Hub bearing check should be carried out every 30000 miles (48000 km)
- a) Before commencing checks, apply parking brake, raise wheels off ground and support axle on stands. and remove brake drum (if fitted) .



WARNING!
NEVER WORK UNDER A VEHICLE SUPPORTED ONLY BY JACKS!
ALWAYS USE SUITABLE AXSLE STANDS!

- b) Place magnetic base of a dial indicator on brake shoe / caliper and position dial indicator stem against a convenient marked spot on face of Hub flange
- c) With dial indicator in position pull hard but steadily on Hub flange and oscillate at same time until a steady reading is achieved.
- d) Without releasing the pressure, turn bearing so that dial indicator stem contacts marked spot and note reading on indicator.
- e) Push bearing flange hard and oscillate as before until a steady reading is achieved.
- f) Without releasing the pressure, turn bearing so that indicator stem again contacts the marked spot and note new reading on indicator.
- g) The difference between readings is amount of mounted end play in bearing unit .
- h) The mounted end play figure should not exceed 0.050mm for a new bearing.

NOTE:-
IF ORIGINAL BEARING UNIT IS RE-FITTED, AND END FLOAT IS MEASURED AT 1MM, WITH HUB NUT FULLY TIGHTENED TO CORRECT TORQUE, THEN THE RETAINING CLIP WITHIN THE UNIT IS DAMAGED / DISPLACED AND A NEW UNIT MUST BE FITTED.



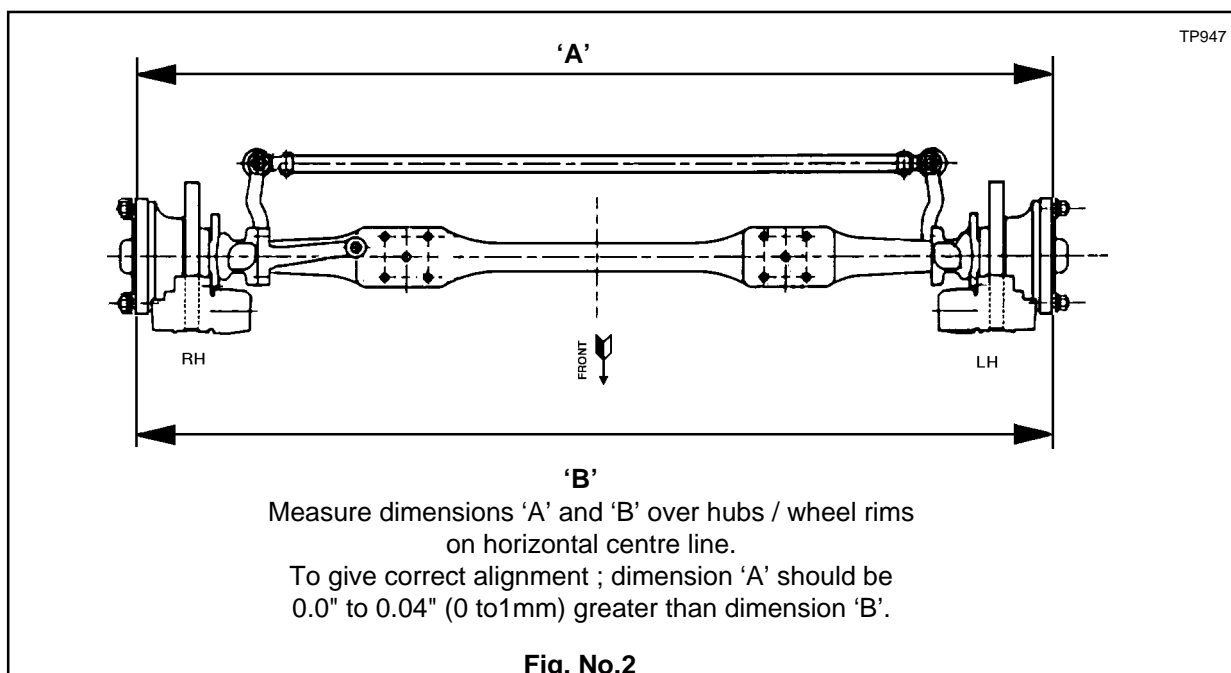
To check front wheel ' Toe In '

- a) To preserve correct steering and avoid excessive tyre wear, tracking (or alignment) of front wheels should be checked periodically, as follows :-
 Set front wheels in straight ahead position and at points level with wheel centre, measure distance over hubs / wheel rims, both in front and behind axle centre.
 For correct 'Toe In' front measurement 'B' should be 0" to 0.04" (0 to1mm) smaller than rear measurement 'A' .
- b) To allow for inaccuracies in wheels, same check should be made with vehicle moved an equivalent to half of a wheel revolution (180°). Any adjustment required can be effected by backing off clamp bolts in ball sockets and rotating tie (track) rod tube. After adjustment, tighten clamp bolts to specified torque.

All steer axles supplied by Spicer Speciality Axle Division have their lockstops set to customer requirements.

It is important that when the power assisted steering is fitted, the steering gear is adjusted so that the hydraulic assistance cuts out just before the lockstops come into contact with the axle beam, to avoid excessive loads being transmitted through the steering linkages.

Incorrectly adjusted steering could lead to premature failure or shortened life of all steering components.



- 2.3 Check condition of brake pads as described in relevant brake manufacturers service manual.

SECTION 2 ROUTINE MAINTENANCE Cont.

2.4 Check permissible slackness in swivel (king) pins every 30000 miles (48000 km) as follows :-

Aspects to be considered are :-

- a) Lateral slackness.
- b) Vertical slackness.

Before commencing checks, apply parking brake, raise wheels off ground and support axle on stands.

a) Checking lateral slackness

Whilst this is being carried out the brake must be applied.

Place a set -square with its stock on ground and its blade against tyre wall.

Place a mark on ground to indicate position of stock end.

Insert a lever through bottom cut-out of wheel and lever it upwards thus moving set-square outboard.

Mark changed position of stock end.

Maximum allowable stock displacement is given as follows:-

for 17.5" wheels	=	6mm.
for 19.5" wheels	=	7mm.
for 22.5" wheels	=	8mm.
for 24.0" wheels	=	9mm.

If displacement exceeds stated allowance then need for bush / bearing attention and possible renewal, is in evidence.

b) Checking vertical slackness

This is measured by a dial indicator anchored to axle beam and having its pointer placed vertical against swivel top.

Place a jack against underside of swivel and, whilst applying a lifting force, observe any movement on indicator dial.

If vertical movement is evident and it exceeds 0.040" (1.02mm) then re-adjustment of swivel is required by adjusting thickness of bearing adjusting washers.

2.5 Every 6 months, check for movement in ball joints as follows :-



NOTE :-

THIS TEST IS TO BE CARRIED OUT WITH VEHICLE IN LOADED CONDITION, DO NOT JACK UP VEHICLE

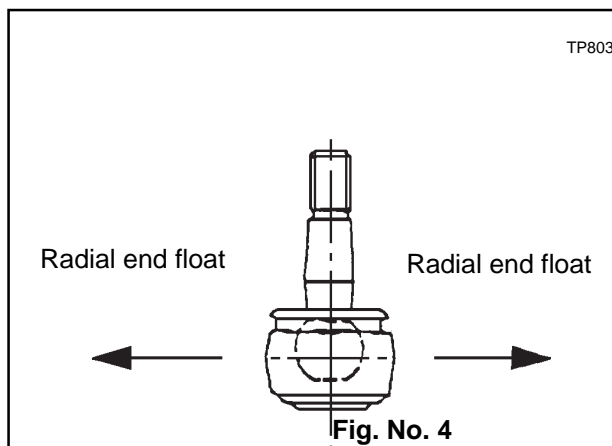
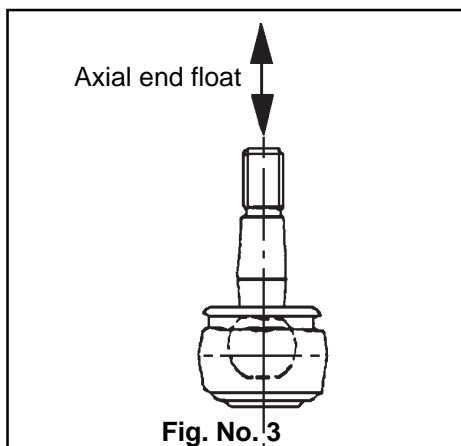
a) Axial end float (axial travel)

End float in direction of axis of ball pin, as shown in fig. no.3 should be within limits of 0.4mm to 2.0mm max. using a test force of 850N.

b) Radial end float (radial travel)

Radial end float at right angles to axis of ball pin as shown in fig. no. 4 should be within limits of 0.4mm to 0.8mm max. using a test force of 6000N.

Replace ball joints if outside limits given in a) and / or b).



SECTION 2 ROUTINE MAINTENANCE Cont.

2.6 Every 6 months inspect ball joints for corrosion as follows :-

**NOTE:-**

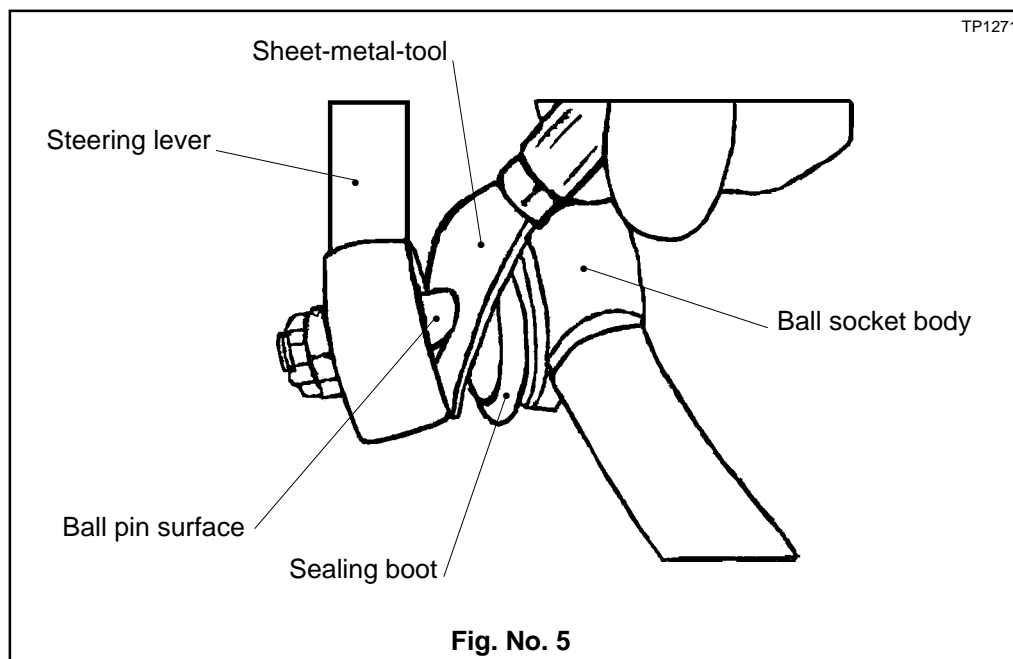
INSPECTION OF BALL JOINTS IS IMPORTANT, ESPECIALLY THOSE IN OLDER VEHICLES. DAMAGED SEALING BOOTS, SALT ON ROADS IN WINTER AND CLIMATIC CONDITIONS CAN CAUSE LOSS OF THE CORROSION PROTECTION COATING APPLIED DURING MANUFACTURE.

Inspection instructions:-

Ensure that ball joint is in an easy access-position.

Carefully clean the sealing boot contact area, to ensure that pollutants cannot get under the sealing boot during the following inspection procedure.

Use an appropriate inspection sheet-metal-tool, eg. spatula with cut out, (fig. no.5) to push up the sealing boot (without damaging it) until ball pin surface is visible. Degrease the ball pin surface.



If there is corrosion of the ball pin or the sealing boot has deteriorated through ageing or is damaged, replace the ball joint in question, or the complete tie rod or drag link as appropriate.

If there is corrosion of the steering lever area which is in contact with the sealing boot, clean and eliminate all surface irregularities.

If there is no corrosion or damage to the sealing boot, smear the steering lever surface with Lithium grease and push the sealing boot back into its properly seated position.

When dismantling tie rods, drag links or drop arms ensure that no damage is caused to the sealing boots or ball joint housings.

SECTION 3 CARE OF WHEELS AND FIXING FACES (ALL AXLES WITH SPIGOT FIXING)

At approximately 100 miles after fitting wheels, wheel nut torque should be checked with wheel ends in " cold " condition (ie not after prolonged braking.).

If any relaxation of original torque (**see specification**) has occurred, re-tighten.

Relaxation of initial torque may occur because of " **Bedding Down**" of hub and wheel surfaces.

**NOTE:-**

TIGHTENING SHOULD NOT BE DONE IMMEDIATELY AFTER PROLONGED BRAKING I.E. WHEN WHEEL ENDS ARE HOT. A RELAXATION OF WHEEL NUT TORQUE DOES OCCUR WHEN WHEEL END IS HOT BUT SHOULD REVERT BACK TO THE ORIGINAL SETTING AS THE WHEEL END COOLS DOWN. RE- TIGHTENING WHEN HOT WILL PRODUCE A HIGHER TORQUE READING WHEN COLD!

Although this single re-tightening after first 100 miles should be sufficient to ensure wheels stay tight, extra checks are recommended within at least the first 1000 miles to check that wheel assembly is stable and that no further relaxation is occurring.

see graphic on following page for correct tightening sequence of wheel nuts

3.1 Care of wheels :-

Check for **CRACKS** in wheels, especially around the fixing holes, and in studs, nuts and washers. If in doubt **RENEW** .

DO NOT simply re-tighten very loose wheel fixings or wheels which are continually becoming loose. Find out why they are loose and whether any damage has been caused.

Use **TRAINED** personnel and keep **RECORDS** of all attention to wheels and fixings, including which parts were renewed and when.

**NOTE :-**

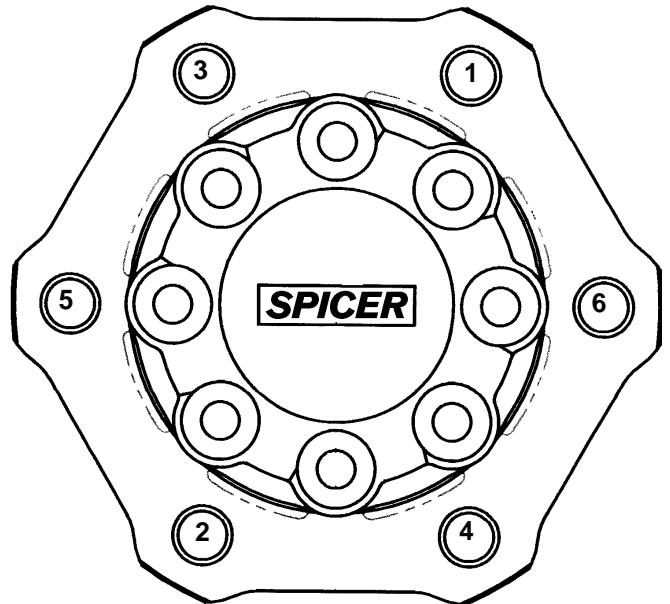
FURTHER DETAILS ARE GIVEN IN BRITISH STANDARD CODE OF PRACTICE FOR THE SELECTION AND CARE OF TYRES AND WHEELS FOR COMMERCIAL VEHICLES:- BSAU50 : PART2 : SECTION 7A : 1995

3.2 PROTECTION OF SPIGOT WHEEL FIXING DIAMETERS AND PRESSURE SURFACES.

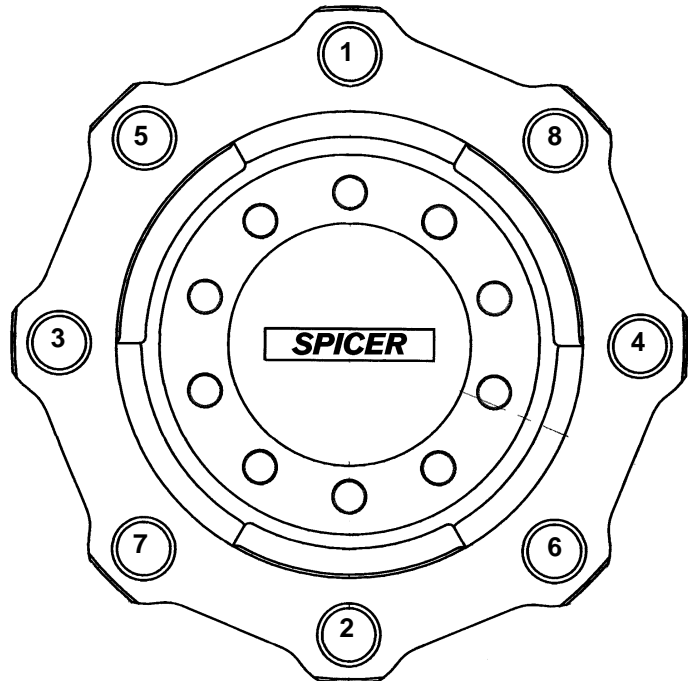
Although **Spicer Speciality Axles Division** apply an initial surface coating to wheel rim mating faces on spigot to stop rusting and facilitate easy removal of wheels. The application of P.B.C. grease such as 'Rocol Tufgear' or equivalent to wheel register is recommended.

The above P.B.C. grease is available from Rocol Ltd., Rocol House, Wakefield Road, Swillington, Leeds, UK. Phone: 44 (113) 2322600. Fax: 44 (113) 2322740.

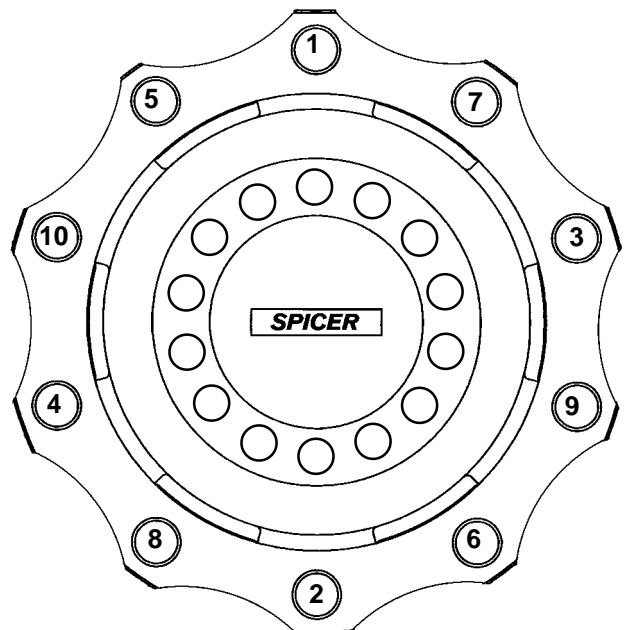
**WHEELNUT TIGHTENING
TORQUE SEQUENCE
6 - STUD FIXING**



**WHEELNUT TIGHTENING
TORQUE SEQUENCE
8 - STUD FIXING**



**WHEELNUT TIGHTENING
TORQUE SEQUENCE
10 - STUD FIXING**



SECTION 4 **Guidance standards for acceptable brake drum crazing (if fitted).**

Every 30000 miles (48000 km) or whenever brake drums are removed for axle maintenance purposes they should be checked for crazing.

Brake drums with crazing in excess of that shown in fig.6 below, and which are of Spicer Speciality axle division manufacture should not be re introduced into service.

Figs.7 & 8 show examples of unacceptable crazing.



fig.6



fig.7



fig.8

EVALUATION OF BRAKE DISC SURFACE

TP1627

Upon removal of brake disc Fig. 9. It's surface should be checked for defects. Inspection should cover both sides of the braking surface as well as the outer diameter of the disc.

Brake disc thickness should be checked in accordance with manufacturers dimensional recommendations.

You should inspect for the following:-

- Heat checking
- Cracks
- Grooves - scoring
- Blue marks - Banding
- Polished discs

Heat checking can be light or heavy,

If **light heat checking** type cracks (fine and light) are found as shown in Fig.10 the disc can continue to be used.

If **heavy heat checking** type cracks (deep and wide) are found the disc **must be replaced.**



Fig. 9



Fig. 10

Cracks can be of 2 types **Radial or Through.**

If any **radial** cracks are found in the brake disc surface as shown in fig. 11. then the disc **must be replaced.**

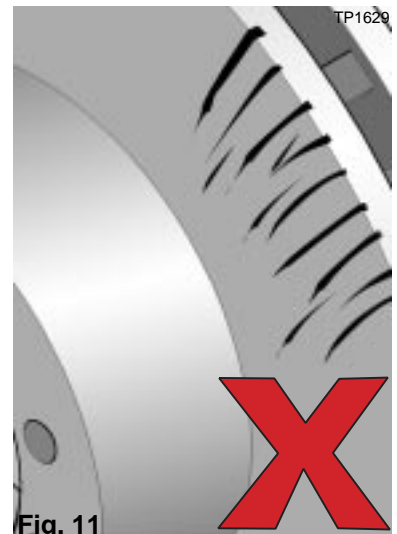


Fig. 11

If any **Through** cracks are found in the brake disc as shown in fig. 12. then the disc **must be replaced.**

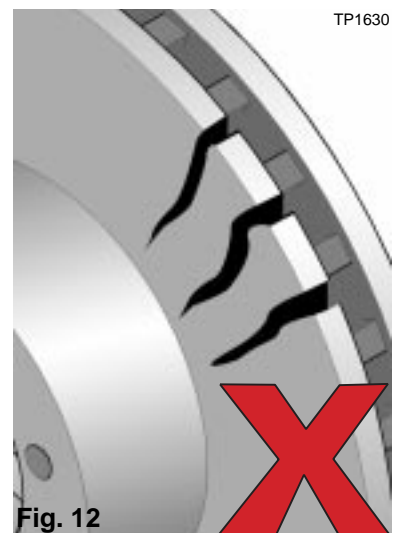


Fig. 12

EVALUATION OF BRAKE DISC SURFACE CONTINUED

Grooving - Scoring can be light or heavy,

If **light** grooving is found as shown in Fig. 13 then the disc can continue to be used.

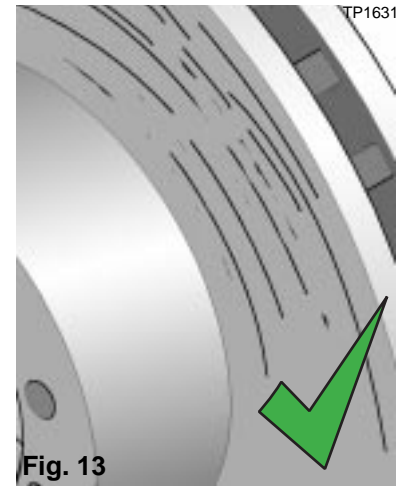


Fig. 13

If **heavy** grooving is found as shown in Fig. 14 then the disc must be replaced.

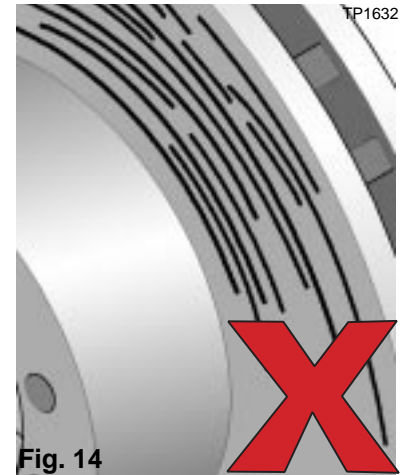


Fig. 14

Blue marks - banding indicates that the disc has been exposed to very high temperatures.

If **Blue marks - banding** are found, the reason for the high temperatures must be investigated and corrected.

Refer to the Brake manufacturer for details.

if left uncorrected the formation of heavy heat checking / cracks will occur.



Fig. 15

Polished discs indicate the use of improper lining material or that the disc has been re-machined to too fine a surface finish.

The **Gloss / polish** should be removed using (80) grit Emery cloth and the brake manufacturer should be contacted for an alternate liner material.

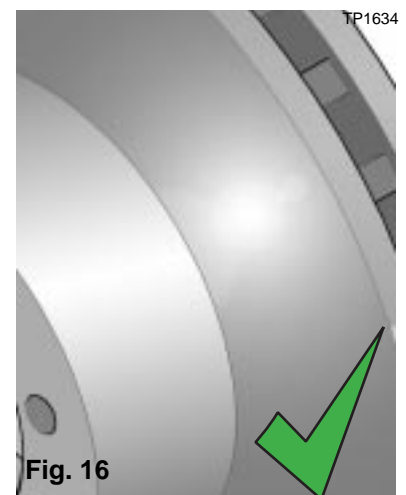


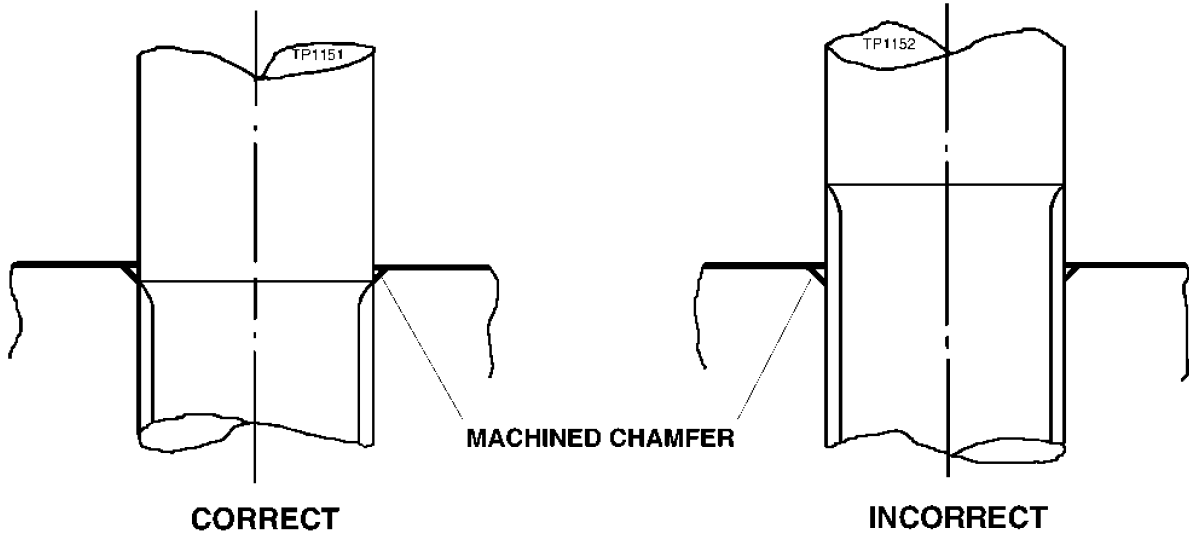
Fig. 16



SPICER SPECIALITY AXLE DIVISION

STANDARD STUDS - FITTED INTO MACHINED CHAMFERED HOLES

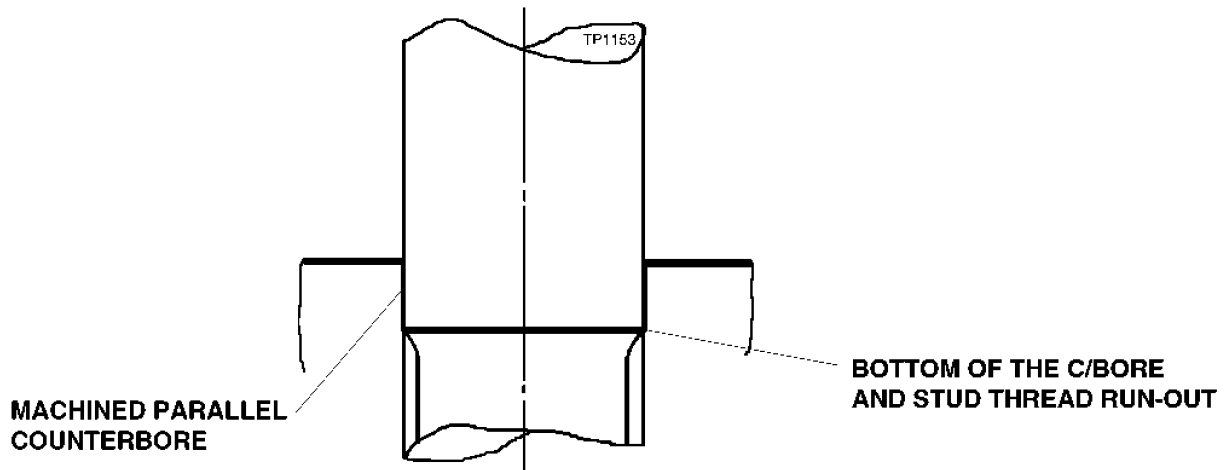
STUDS TO BE INSERTED UNTIL THREAD RUN-OUT LOCKS INTO PARENT METAL



IMPORTANT :- THIS STUD FITTING PROCEDURE IS TO BE USED IN LIEU OF STATED TORQUE VALUES ON EXISTING ARRANGEMENTS. NEW ARRANGEMENTS WILL SPECIFY TD183/1 FROM THE DATE OF ISSUE.

SPECIAL STUDS - FITTED INTO MACHINED PARALLEL COUNTERBORE

STUDS TO BE INSERTED UNTIL CORRECT TORQUE VALUE IS OBTAINED - AS SHOWN ON RELEVANT ARRANGEMENT DRAWING



THIS SPECIFICATION IS FOR STUD FITTING ONLY ; NUTS & SETSCREWS MUST BE TORQUED TO VALUE SPECIFIED

Alteration Numbers

ISSUE A									
---------	--	--	--	--	--	--	--	--	--

<p>DISTRIBUTION Front Axle B.U. Drive Axle B. U. Production</p>	<p>STUD FITTING PROCEDURES</p>	<p>TD183/1 SHT 1 OF 1</p>
--	---------------------------------------	--------------------------------------

SWIVEL / AXLE BED TIGHTENING TORQUES

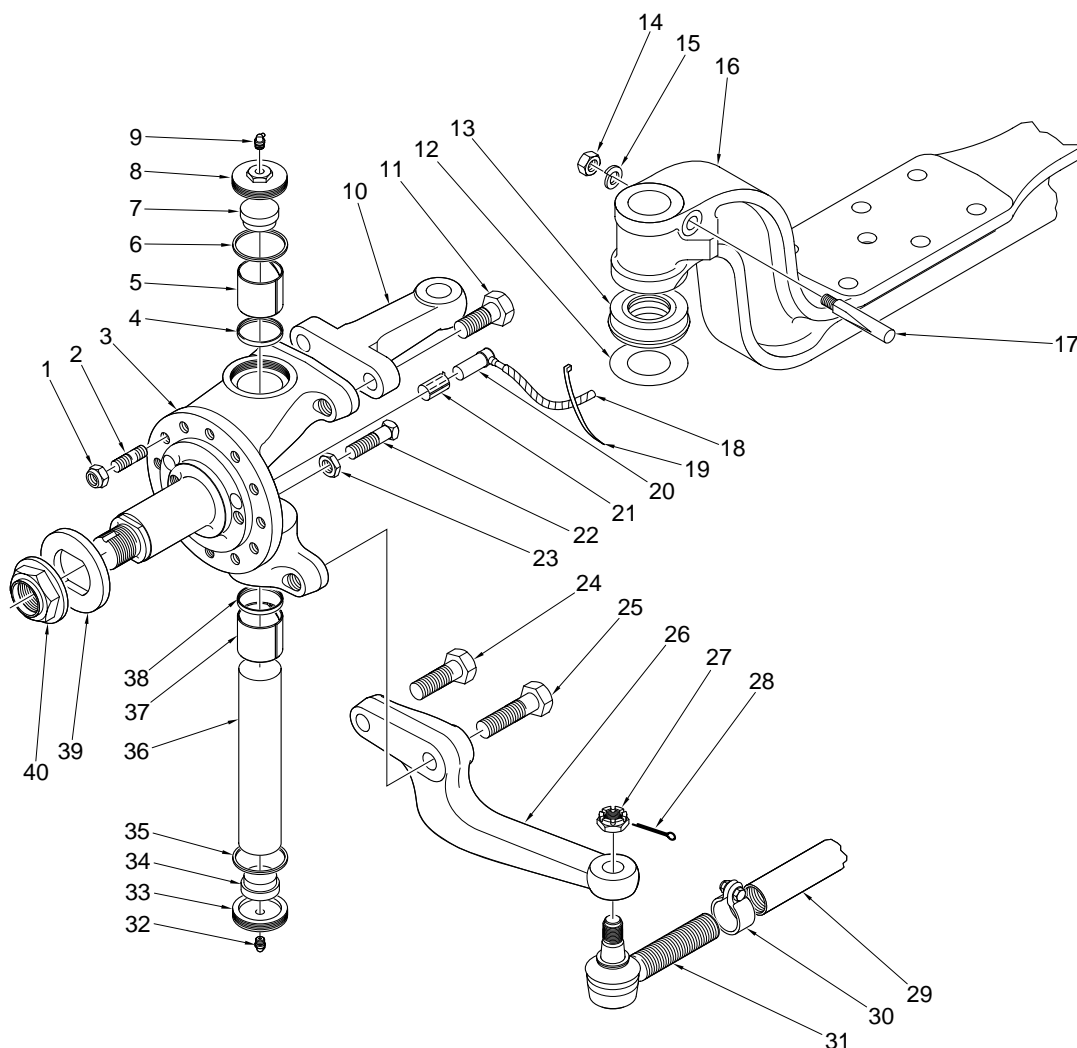


Fig.No.17

PART N° --- DESCRIPTION ----- TIGHTENING TORQUE

1	Brake backplate nut 1/2" UNF	85 - 103 lbs.ft	115 - 140 NM	(All axles)
2	Brake backplate stud 1/2" UNF	See TD 183/1		(All axles)
8	Swivel top cap	25 - 75 lbs.ft	34 - 102 NM	(All axles)
9	Swivel top cap lubricator	10 - 15 lbs.ft	14 - 20 NM	(All axles)
11	Top lever bolts M20 x 2.5 grade 10.9	433 - 479 lbs.ft	587 - 649 NM	(NDS 35/41/56)
	Top lever bolts M20 x 2.5 grade 12.9	520 - 575 lbs.ft	705 - 780NM	(NDS 56)
	Top lever bolts M24 x 3 grade 10.9	751 - 830 lbs.ft	1018 - 1125 NM	(NDS 80)
14	Cotter pin nut 1/2" UNF	51 - 61 lbs.ft	69 - 82 NM	(All axles)
23	Lockstop nut	90 - 120 lbs.ft	122 - 162 NM	(All axles)
24 & 25	Bottom lever bolts M20 x 2.5 grade 10.9	433 - 479 lbs.ft	587 - 649 NM	(NDS 35/41/56)
	Bottom lever bolts M20 x 2.5 grade 12.9	520 - 575 lbs.ft	705 - 780NM	(NDS 80)
	Bottom lever bolts M24 x 3 grade 10.9	751 - 830 lbs.ft	1018 - 1125 NM	(NDS 80)
27	Ball pin nut (F4845T assembly)	155 - 170 lbs.ft	210 - 230 NM	(All axles)
	Ball pin nut (F4109T assembly)	184 - 206 lbs.ft	249 - 279 NM	(All axles)
	Ball pin nut (F4779S assembly)	100 - 170 lbs.ft	135 - 230 NM	(All axles)
	Ball pin nut (F4897S assembly)	190 - 220 lbs.ft	257 - 298 NM	(All axles)
30	Socket pinch bolt (F4845T assembly)	33 - 37 lbs.ft	45 - 50 NM	(All axles)
	Socket pinch bolt (F4109T assembly)	52 - 59 lbs.ft	70 - 80 NM	(All axles)
	Socket pinch bolt (F4779S assembly)	65 - 75 lbs.ft	88 - 102 NM	(All axles)
	Socket pinch bolt (F4897S assembly)	118 - 155 lbs.ft	160 - 210 NM	(All axles)
33	Swivel bottom cap lubricator	10 - 15 lbs.ft	14 - 20 NM	(All axles)
34	Swivel bottom cap	25 - 75 lbs.ft	34 - 102 NM	(All axles)
41	Hub nut	350 - 400 lbs.ft	475 - 542 NM	(NDS 35/41/56)
	Hub nut	575 - 626 lbs.ft	778 - 849 NM	(NDS 80)

SWIVEL / AXLE BED TIGHTENING TORQUES

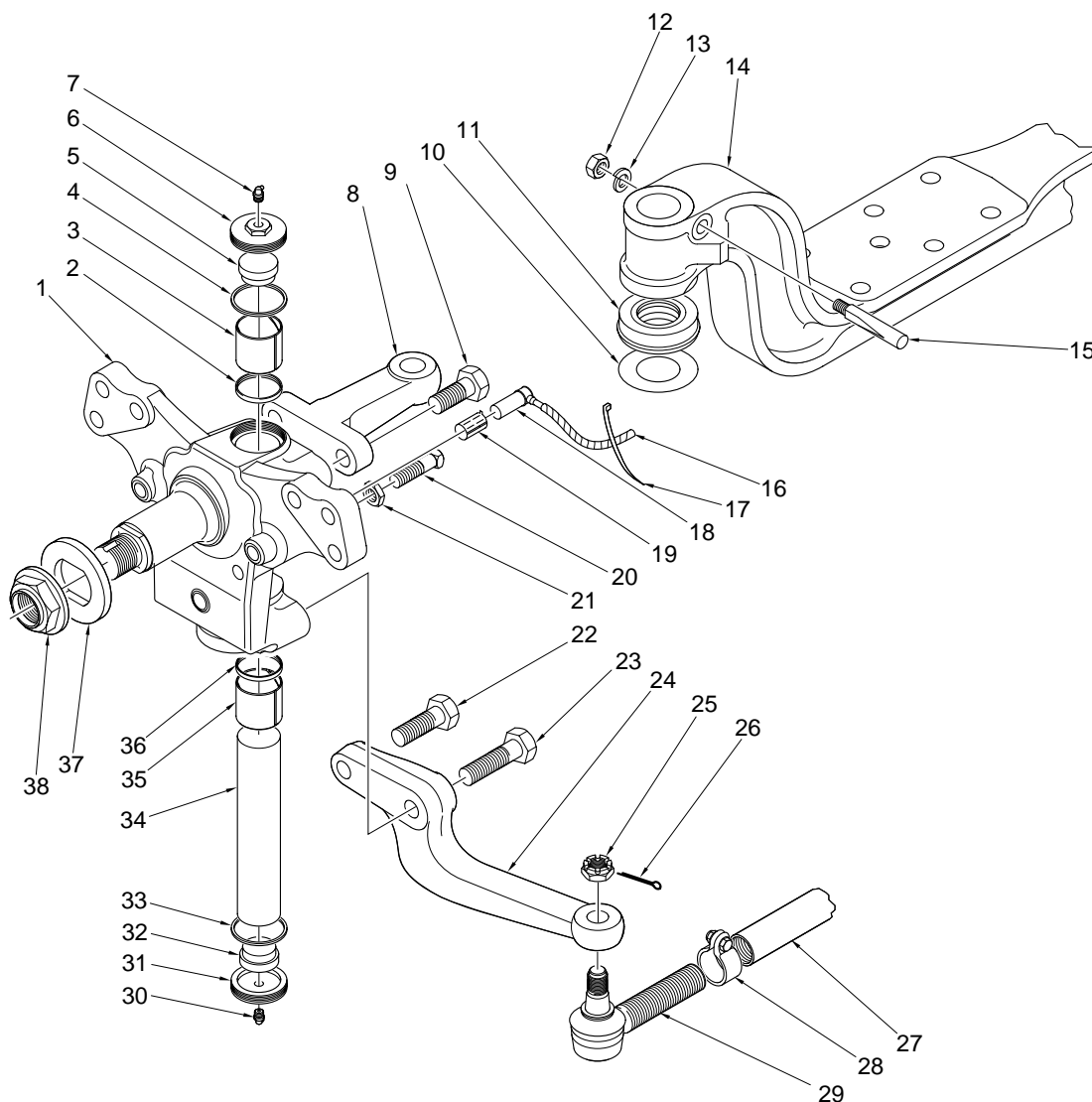


Fig.No.18

PART N° --- DESCRIPTION ----- TIGHTENING TORQUE

6	Swivel top cap	25 - 75 lbs.ft	34 - 102 NM	(All axles)
7	Swivel top cap lubricator	10 - 15 lbs.ft	14 - 20 NM	(All axles)
9	Top lever bolts M20 x 2.5 grade 10.9	433 - 479 lbs.ft	587 - 649 NM	(NDS 35/41/56)
	Top lever bolts M20 x 2.5 grade 12.9	520 - 575 lbs.ft	705 - 780NM	(NDS 56)
	Top lever bolts M24 x 3 grade 10.9	751 - 830 lbs.ft	1018 - 1125 NM	(NDS 80)
12	Cotter pin nut 1/2" UNF	51 - 61 lbs.ft	69 - 82 NM	(All axles)
21	Lockstop nut	90 - 120 lbs.ft	122 - 162 NM	(All axles)
22 & 23	Bottom lever bolts M20 x 2.5 grade 10.9	433 - 479 lbs.ft	587 - 649 NM	(NDS 35/41/56)
	Bottom lever bolts M20 x 2.5 grade 12.9	520 - 575 lbs.ft	705 - 780NM	(NDS 80)
	Bottom lever bolts M24 x 3 grade 10.9	751 - 830 lbs.ft	1018 - 1125 NM	(NDS 80)
25	Ball pin nut (F4845T assembly)	155 - 170 lbs.ft	210 - 230 NM	(All axles)
	Ball pin nut (F4109T assembly)	184 - 206 lbs.ft	249 - 279 NM	(All axles)
	Ball pin nut (F4779S assembly)	100 - 170 lbs.ft	135 - 230 NM	(All axles)
	Ball pin nut (F4897S assembly)	190 - 220 lbs.ft	257 - 298 NM	(All axles)
28	Socket pinch bolt (F4845T assembly)	33 - 37 lbs.ft	45 - 50 NM	(All axles)
	Socket pinch bolt (F4109T assembly)	52 - 59 lbs.ft	70 - 80 NM	(All axles)
	Socket pinch bolt (F4779S assembly)	65 - 75 lbs.ft	88 - 102 NM	(All axles)
	Socket pinch bolt (F4897S assembly)	118 - 155 lbs.ft	160 - 210 NM	(All axles)
30	Swivel bottom cap lubricator	10 - 15 lbs.ft	14 - 20 NM	(All axles)
31	Swivel bottom cap	25 - 75 lbs.ft	34 - 102 NM	(All axles)
38	Hub nut	350 - 400 lbs.ft	475 - 542 NM	(NDS 35/41/56)
	Hub nut	575 - 626 lbs.ft	778 - 849 NM	(NDS 80)

SWIVEL / HUB END TIGHTENING TORQUES

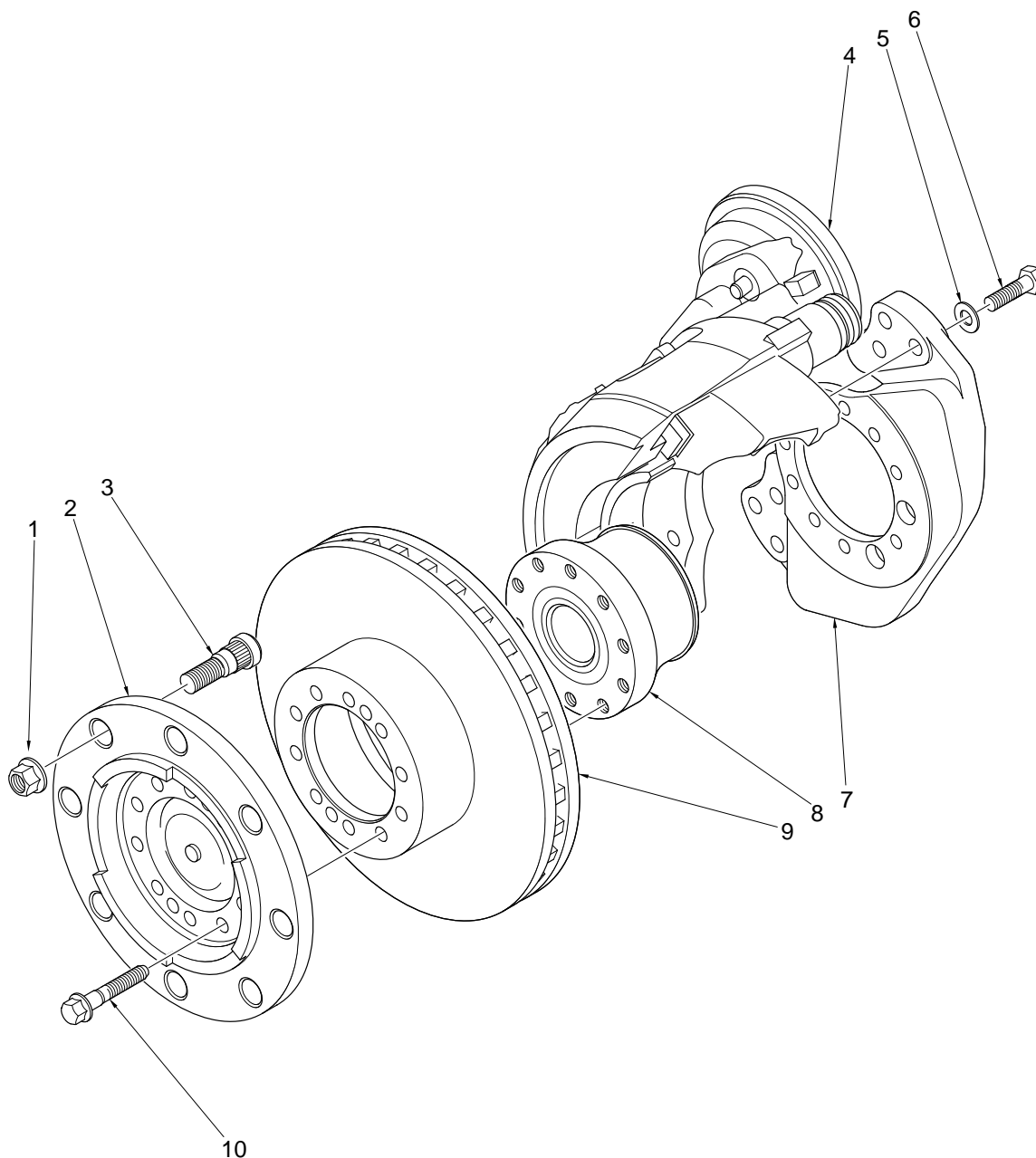


Fig.No.19

PART N°	DESCRIPTION	TIGHTENING TORQUE	
1	Wheel nut M18 x 1.5 -----	235 - 260 lbs.ft	318 - 352NM
	Wheel nut M20 x 1.5 -----	285 - 315 lbs.ft	386 - 427NM
	Wheel nut M22 x 1.5 -----	475 - 525 lbs.ft	644 - 712NM
6	Brake Caliper Mounting Bolt M14 x 1.5 -----	174 - 192 lbs.ft	236 - 260NM
	Brake Caliper Mounting Bolt M16 x 1.5 -----	266 - 294 lbs.ft	360 - 399NM
	Brake Caliper Mounting Bolt M18 x 1.5 -----	372 - 412 lbs.ft	504 - 559NM
	Brake Caliper Mounting Bolt M20 x 1.5 -----	520 - 574 lbs.ft	705 - 778NM
4	Brake air cylinder retaining nuts M16 X 1.5 -----	133 - 155 lbs.ft	180 - 210NM
10	Hub flange retaining bolt M14 x 1.5 -----	174 - 192 lbs.ft	236 - 260NM

SWIVEL / HUB END TIGHTENING TORQUES

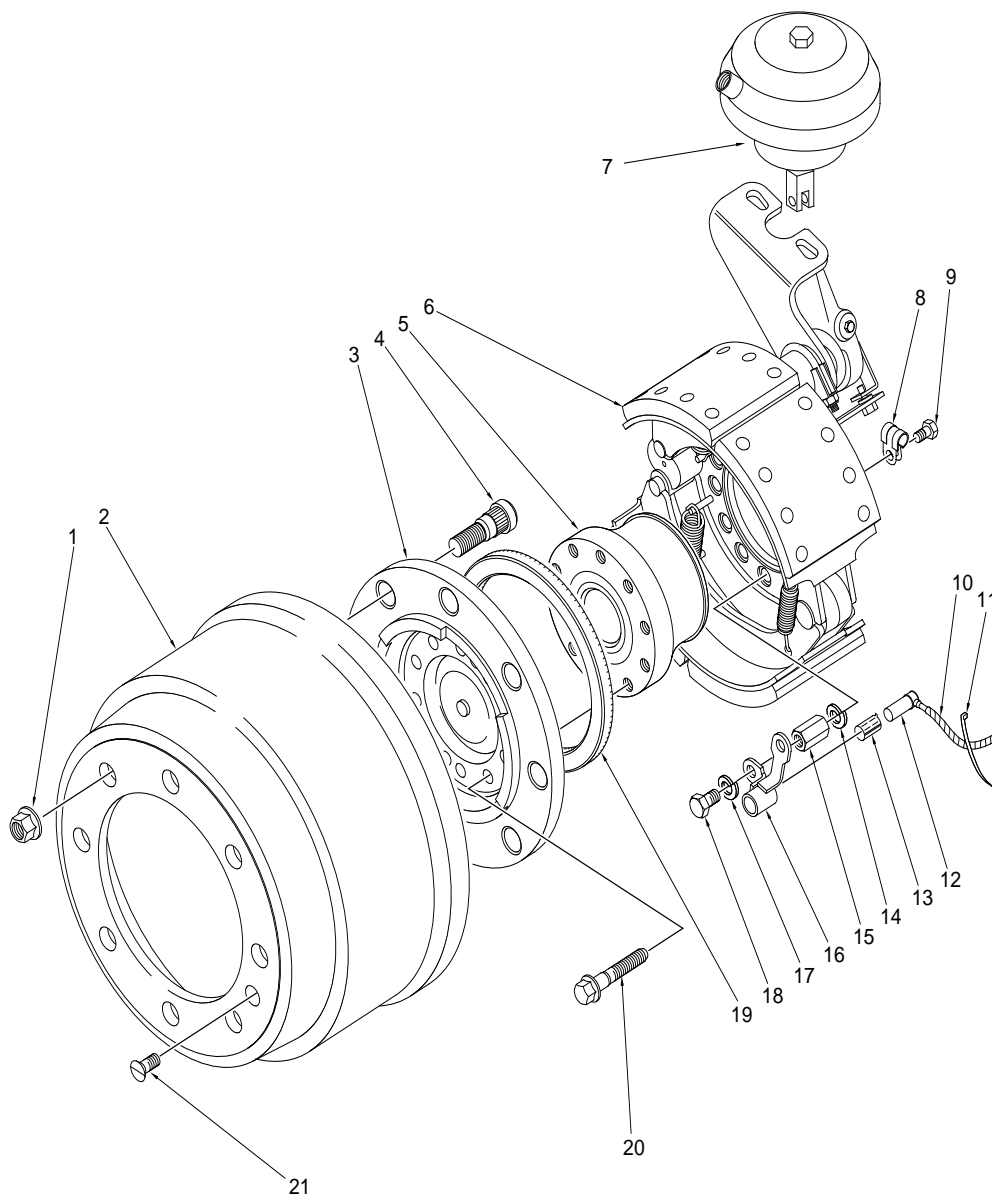


Fig.No.20

PART N°	DESCRIPTION	TIGHTENING TORQUE	
1	Wheel nut M18 x 1.5 -----	235 - 260 lbs.ft	318 - 352NM
	Wheel nut M20 x 1.5 -----	285 - 315 lbs.ft	386 - 427NM
	Wheel nut M22 x 1.5 -----	475 - 525 lbs.ft	644 - 712NM
8	Hub flange retaining bolt M14 x 1.5-----	174 - 192 lbs.ft	236 - 260NM
9	Brake drum retaining screw -----	26 - 32 lbs.ft	35 - 43NM

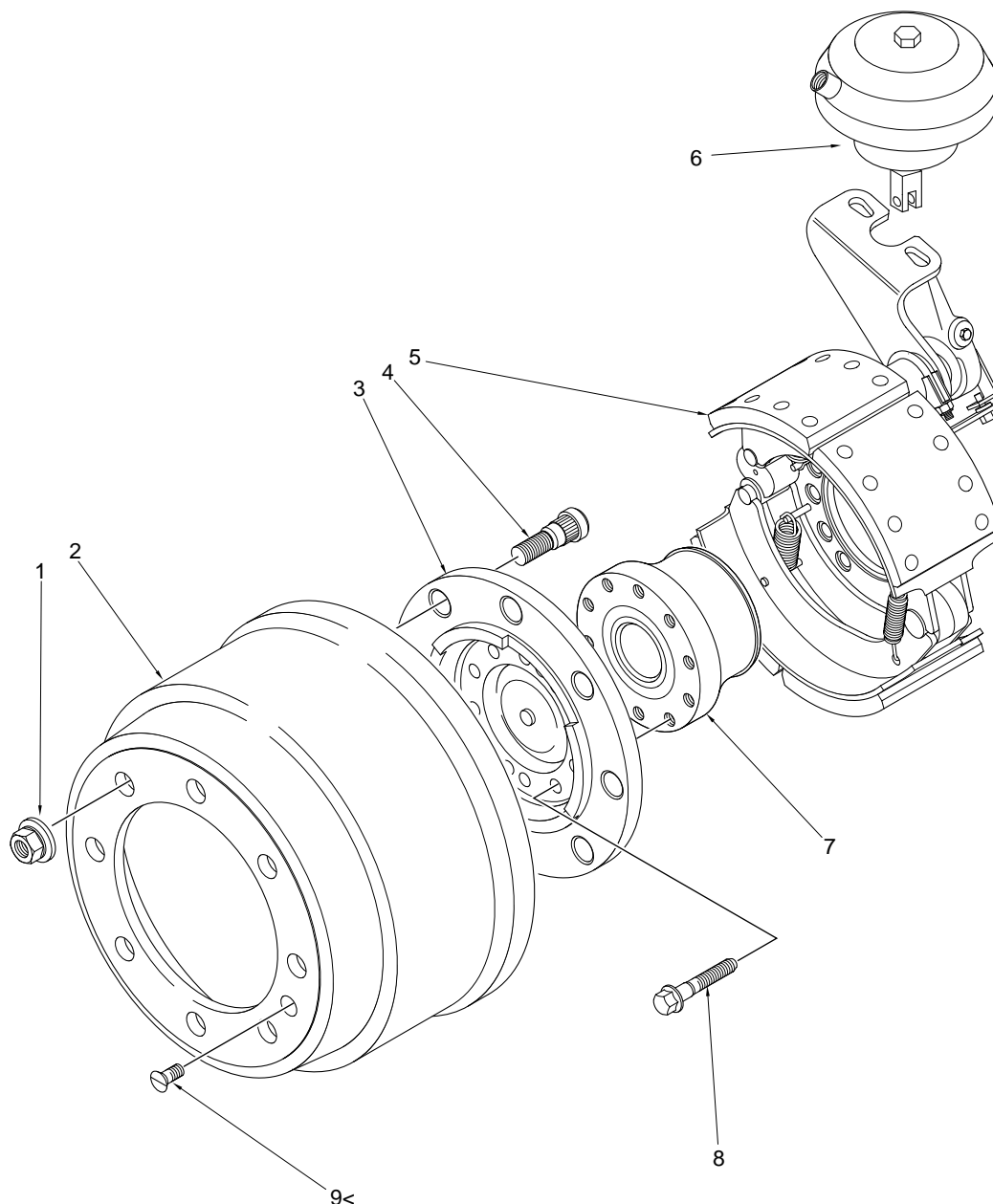


Fig.No.21

PART N°	DESCRIPTION	TIGHTENING TORQUE	
1	Wheel nut M18 x 1.5 -----	235 - 260 lbs.ft	318 - 352NM
	Wheel nut M20 x 1.5 -----	285 - 315 lbs.ft	386 - 427NM
	Wheel nut M22 x 1.5 -----	475 - 525 lbs.ft	644 - 712NM
20	Hub flange retaining bolt M14 x 1.5 -----	174 - 192 lbs.ft	236 - 260NM
21	Brake drum retaining screw -----	26 - 32 lbs.ft	35 - 43NM

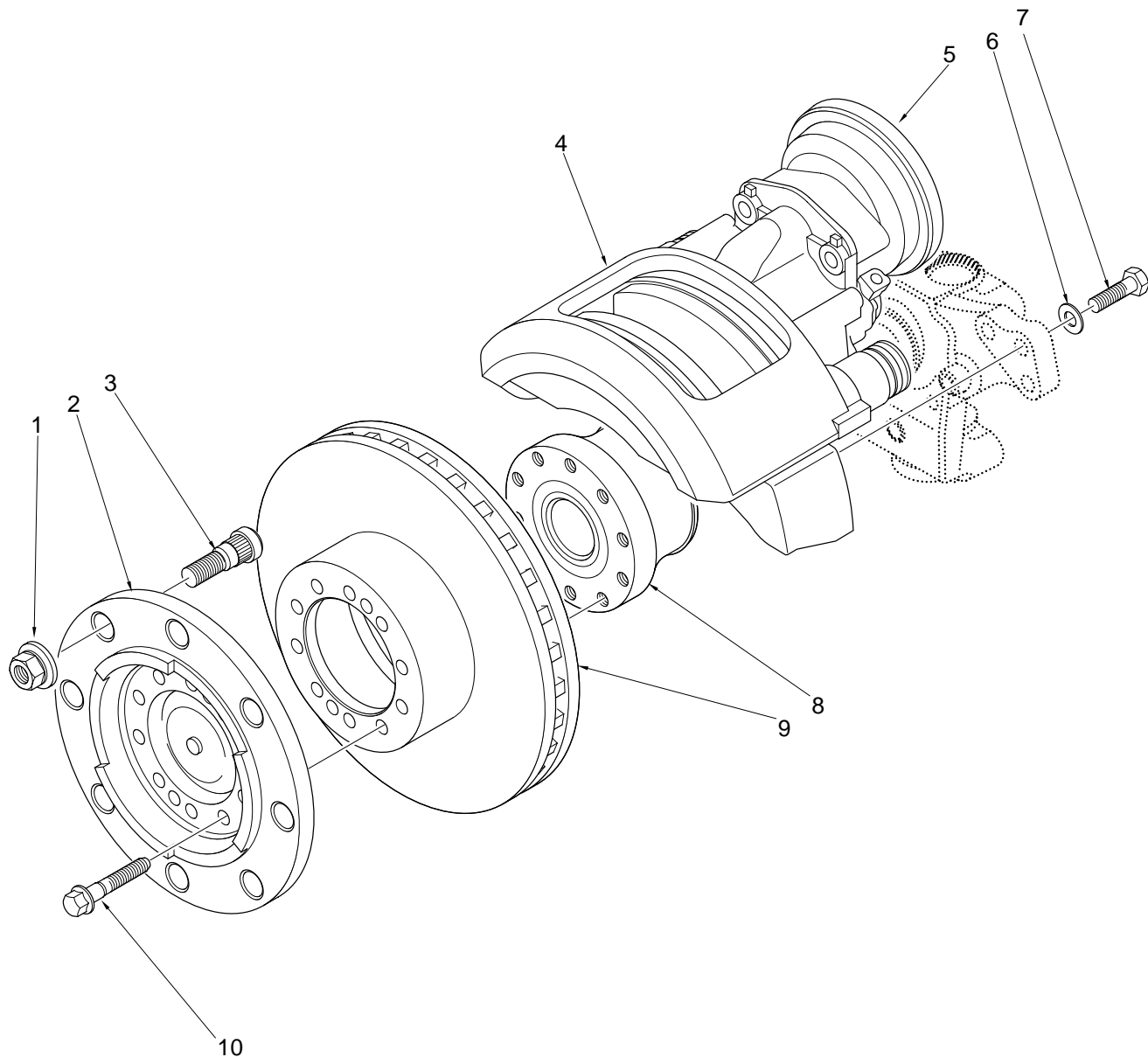


Fig.No.22

PART N ^o	DESCRIPTION	TIGHTENING TORQUE	
1	Wheel nut M18 x 1.5 -----	235 - 260 lbs.ft	318 - 352NM
	Wheel nut M20 x 1.5 -----	285 - 315 lbs.ft	386 - 427NM
	Wheel nut M22 x 1.5 -----	475 - 525 lbs.ft	644 - 712NM
5	Brake air cylinder retaining nuts M16 X 1.5-----	133 - 155 lbs.ft	180 - 210NM
6	Brake Caliper Mounting Bolt M14 x 1.5 -----	174 - 192 lbs.ft	236 - 260NM
	Brake Caliper Mounting Bolt M16 x 1.5 -----	266 - 294 lbs.ft	360 - 399NM
	Brake Caliper Mounting Bolt M18 x 1.5 -----	372 - 412 lbs.ft	504 - 559NM
	Brake Caliper Mounting Bolt M20 x 1.5 -----	520 - 574 lbs.ft	705 - 778NM
10	Hub flange retaining bolt M14 x 1.5-----	174 - 192 lbs.ft	236 - 260NM

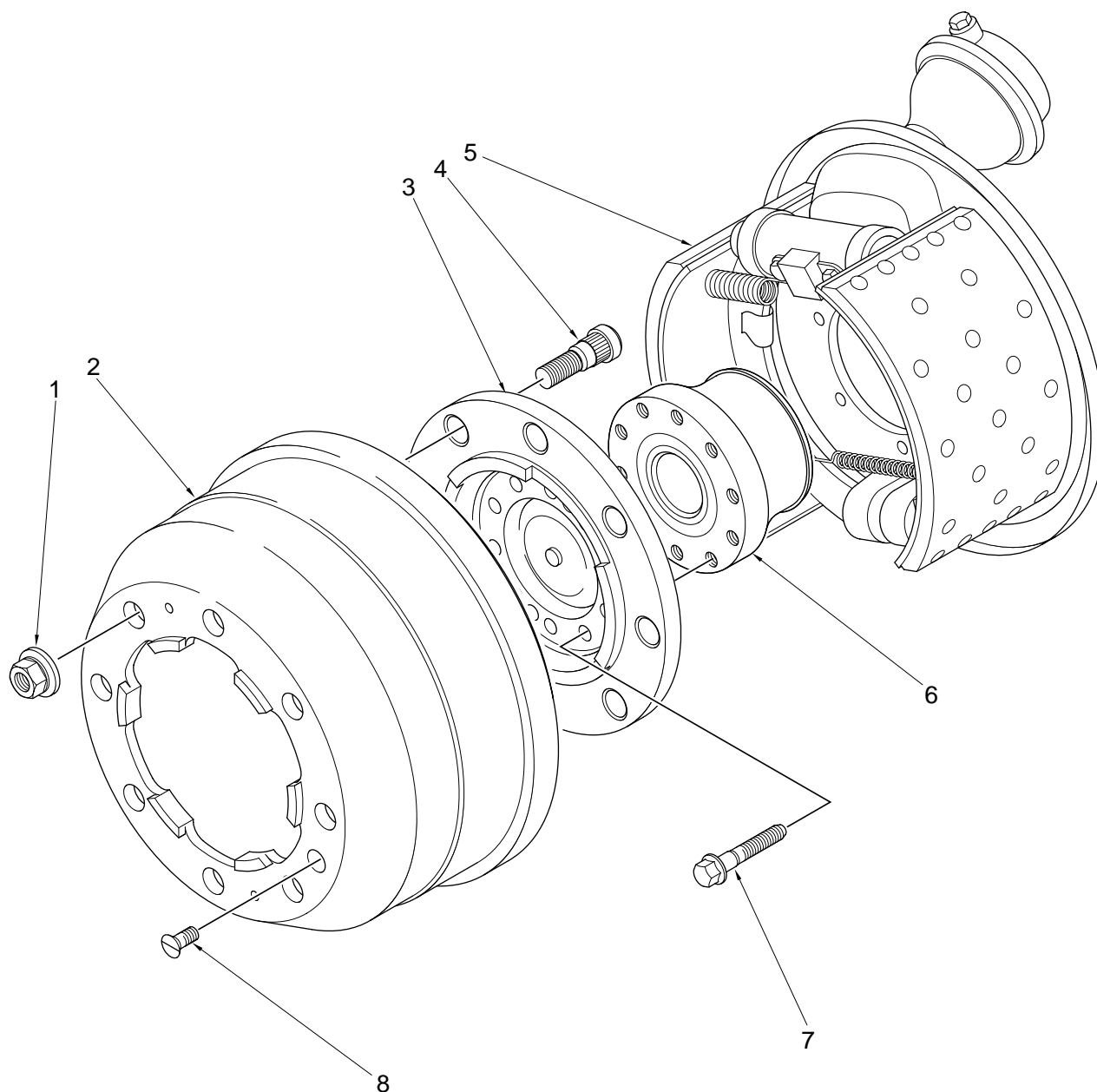


Fig.No.23

PART N°	DESCRIPTION	TIGHTENING TORQUE	
1	Wheel nut M18 x 1.5-----	235 - 260 lbs.ft	318 - 352NM
	Wheel nut M20 x 1.5-----	285 - 315 lbs.ft	386 - 427NM
	Wheel nut M22 x 1.5-----	475 - 525 lbs.ft	644 - 712NM
7	Hub flange retaining bolt M14 x 1.5-----	174 - 192 lbs.ft	236 - 260NM
8	Brake drum retaining screw-----	26 - 32 lbs.ft	35 - 43NM

APPLICATION POLICY

Capability ratings, features and specifications vary depending upon the model type of service. Applications approvals must be obtained from Spicer Speciality Axle Division. We reserve the right to change or modify our product specifications, configurations, or dimensions at any time without notice.



SPICER SPECIALITY AXLE DIVISION

Abbey Road, Kirkstall

Leeds LS5 3NF

England

Tel: (113) 2584611 Fax: (113) 2586097