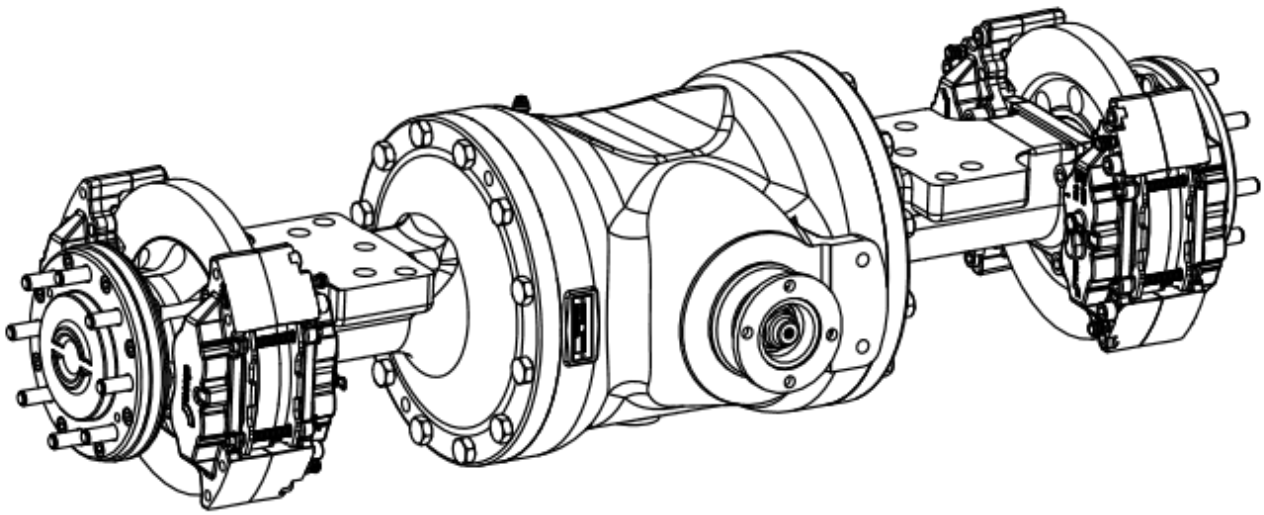
612
WORKSHOP MANUAL



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612 Service Manual
Issue: **1.4**
Created By: S Hylands
Updated Dated: June 2017

The following international symbols are used in this service manual:

WARNING! THIS SYMBOL WARNS OF POSSIBLE PERSONAL INJURY

CAUTION! THIS SYMBOL WARNS OF POSSIBLE DAMAGE TO TRANSMISSION

CONTENTS

INTRODUCTION

Spare parts for Newage axles may only be obtained from the original equipment manufacturer and not directly from Newage. Always quote your vehicle/machine serial number and axle serial number – see section titled 'Identification'.

If possible, the repair/service should be carried out in a clean environment. Where this is not possible and the work must be completed on site, appropriate measures must be taken to ensure that dirt or foreign matter does not enter the unit. Newage axles are designed to operate in the arduous conditions found in the construction industry; providing they are maintained regularly they will provide the service our customers expect from Newage products.

GENERAL DATA

Description

The 612 series axle is a double reduction unit featuring a Hydraulic Disc Braking system.

The Input Coupling is meshed with the 1st reduction Spiral Bevel Pinion and Crown Wheel driving a 4 Pinion Differential. Final drive is transmitted via the 2nd reduction in-board Planetary Assemblies. The Axle Shafts are fully floating (i.e. not subjected to wheel loads) with each Wheel Hub supported on opposed taper Roller Bearings.

Specification

Overall Ratio (:1)

13.2 / 15.79 / 19.74

Input Flange

Hardy Spicer (SAE) 1410

Axle Mountings

Pad Mounting Centres: 600mm (23.625” 4Deg) / 660 mm (26” 2 Deg) / 660 mm (26” 6 Deg)

Or

Cast Rib mounting Centres: 575mm (22.64”), 640mm (25.20”), 705mm (27.75”), 770mm (30.31”), 835mm (32.87”).
Mounting centres, across 120mm (4.72”) with cast Rad R12.5mm (0.492”).

Wheel Fixing

8 studs: 9/16” x 18 UNF-3A on 165.1mm (6.5”) PCD

or

8 studs: M20 x 1.5 on 275mm (10.83”) PCD

Maximum Dynamic Load Rating

6500Kg (14,330 lbs) based on 1,219mm (48”) wheel track

Maximum Output Torque

Intermittent at both wheels 32,373Nm (23,874 lbft) based on 13.2:1

Maximum Vehicle Drawbar Pull

Stated 62,275N (14,000 lbf)

Service Brakes

Dual Caliper Hydraulic Disc Brakes per wheel, 252mm (9.921”) effective diameter x 24mm (0.945”) wide case rotor of 300mm (11.811”) diameter.

Max brake torque at both wheels

22,600Nm (16,666 lbft) at 1,100psi (76Bar)

Park Brake

Optional (disc mounted) Cable Operated

Approximate weight

340Kg (750lbs) dry weight

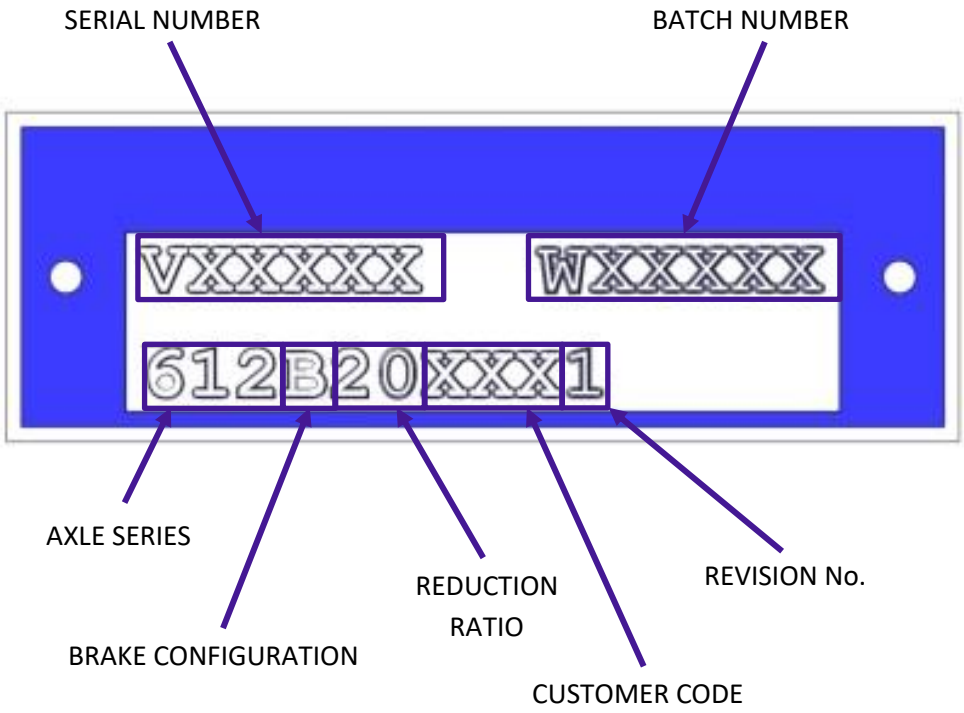
Oil Capacity

12.0 litres (3.12 US Gallons)

IDENTIFICATION

If spares are required, please quote the axle model, the vehicle/machine model and serial number from the blue plate. 612 Axles are produced in a variety of configurations for individual customer requirements; therefore it is important to identify the Axle correctly.

The part number allocated to each Axle describes the basic specification as below:



GENERAL SERVICE INFORMATION

Routine Maintenance

Check	Frequency
Axle Oil change	After initial 300 Hrs then every 1,000 Hrs
Axle Oil Level check	Monthly
Axle Shaft Bolts	Monthly
Brake Fluid change	Annually
Brake Fluid Level check	Monthly
Check Axle Arm/Main Case joint securing Bolts	Monthly
Check Wheel Hub Bearing adjustment	1,000 Hrs
Check Wheel Nut	Weekly
Visual check for oil leaks around joints and Seals	Weekly
Prop Shaft Nut	Monthly
Service Brake Bolts	Weekly

Lubricants

Only those lubricants shown below or their direct equivalents must be used:

- 80W90 Gear oil for operation in ambient temperatures between 0°C and 30°C (32-86°F).

NOTE: An alternative engineering approved Gear oil may be used. Consult 'PRM Newage' before filling the axle.

The oil is added via the combined Filler/Level Plug positioned on the front of the axle Main Case. The Filler/Level Plug on the rear of the Transfer Case Assembly can also be used. **P80 OIL SEAL LUBRICANT** used when installing new Unitised Hub Seals.

Greases

Smear grease between Oil Seal lips and 'O' Rings at major overhauls, or whenever a repair to these areas is performed.

Only those greases shown below, their direct equivalents or alternative engineering approved grease must be used:

- Texaco Multifak EP2

Brake Fluid

The Axle Brakes operate with the fluid specification:

- FMVSS 116 DOT 4, SAEJ1703 and ISO4925 Brake Fluid

NOTE: An ISO VG32 Mineral Hydraulic Fluid Should NOT be used under any circumstance.

Liquid Sealant

The Main Case & Axle Arm joint faces must be sealed with either of the following:

- Threebond 1207D Silicone Liquid Gasket

NOTE: An alternative engineering approved silicon sealant may be used.

Fasteners – Tightening Torque

Fastener	A/F (mm)	Torque (Nm)	Torque (lb.ft)
Main Case Assembly			
Axle Arm/Main Case Bolts (M16)	24	260	200
Axle Shaft/Wheel Hub Cap Bolts (M10)	8	100	74
Brake Caliper mounting Cap Bolts (M14) +Loctite 270	12	220	162
Differential Bearing Carrier Cap Bolt (M10)	8	100	74
Differential assembly Nut (M12)	19	98	72
Differential Adjuster Cap Bolts (M6)	5	20	15
Differential Bearing Adjuster Housing – *(Special Tool required)*	---	20	15
Drain and Level Plug (1/2" BSP)	10	16	12
Hub Assembly Lock Nut (M80) – *(Special Tool required for KM16 Nut see TOOLING) Speed Brace & Back off 1 Tab – see page 25*	---		
Wheel Nuts (9/16" UNF x 18)	7/8"	230	170
Wheel Adaptor Cap Bolt (M20 x 45)	17	340	250
Wheel Nuts (M20)	30	400-448	295-330

Axle Backlash

Assembly	Pinion/Wheel	Drive Flange	P.C.D	Backlash
916-9820	916-2000 916-2010	612-2180 (HS1410) 612-2181 (HS1410) - **(613PB ONLY)**	95.24mm (3.750")	0.41/0.47mm (0.0161/0.0185")

Tooling

The following tooling is used to aid in the servicing of the axle. These are available from the Original Equipment Manufacturer.

SERVICING AND REPAIRS – GENERAL

WARNING: Before carrying out any service work always ensure that the engine/motor is switched off

Before removal of the Axle for repair or overhaul, carefully study the following procedures. Use proper hand tools, slings and hoists for the job. WORK SAFELY

Keep all work areas, tools and Axle clean. All oil should be drained into a suitable container. Wipe up any spilled oil or fluids to prevent accidents. Wear correct safety equipment I.e. safety glasses and safety shoes to guard against personal injury

Remember HOT OIL CAN CAUSE BURNS – WORK SAFELY – USE COMMON SENSE

CAUTION: The above operations should be carried out by suitably qualified personnel and strictly in accordance with the procedures detailed in the workshop manual.

Drawings showing all internal components are contained in the parts lists at the back of this manual.

Seals

Remove Oil Seals carefully to prevent damage if they are to be re-used, however to prolong the life of the axle, it is best to replace these items.

Bearings

If removing taper roller Bearings for re-use keep them in matched sets and protect all Bearings from contamination.

Cleaning

WARNING: If using cleaning solvents these can be toxic, flammable, a skin irritant or give off harmful fumes. Avoid prolonged contact, vapour inhalation, or smoking. Failure to take care can result in injury or death.

Rinse all metal parts in solvent to remove dirt, grease and oil.

Be careful to remove solvent from items before re-fitting.

INSPECTION

Main Case and Arms

Inspect for cracks. Check sealing surfaces for any imperfections, damage, etc. which will lead to oil leaks. Check all threads for damage.

Gears

Inspect for any chipped, broken or cracked gear teeth, also for any excessive wear i.e. progressive gear pitting.

Bearings

Inspect for any damage, progressive pitting or over-heating. Each time a Bearing is removed for inspection, or replacement it will be necessary to recalculate the required shim thickness to pre-load the Bearings correctly, see Procedures for more information.

Threaded Parts

Inspect for stripped or damaged threads.

PROCEDURES

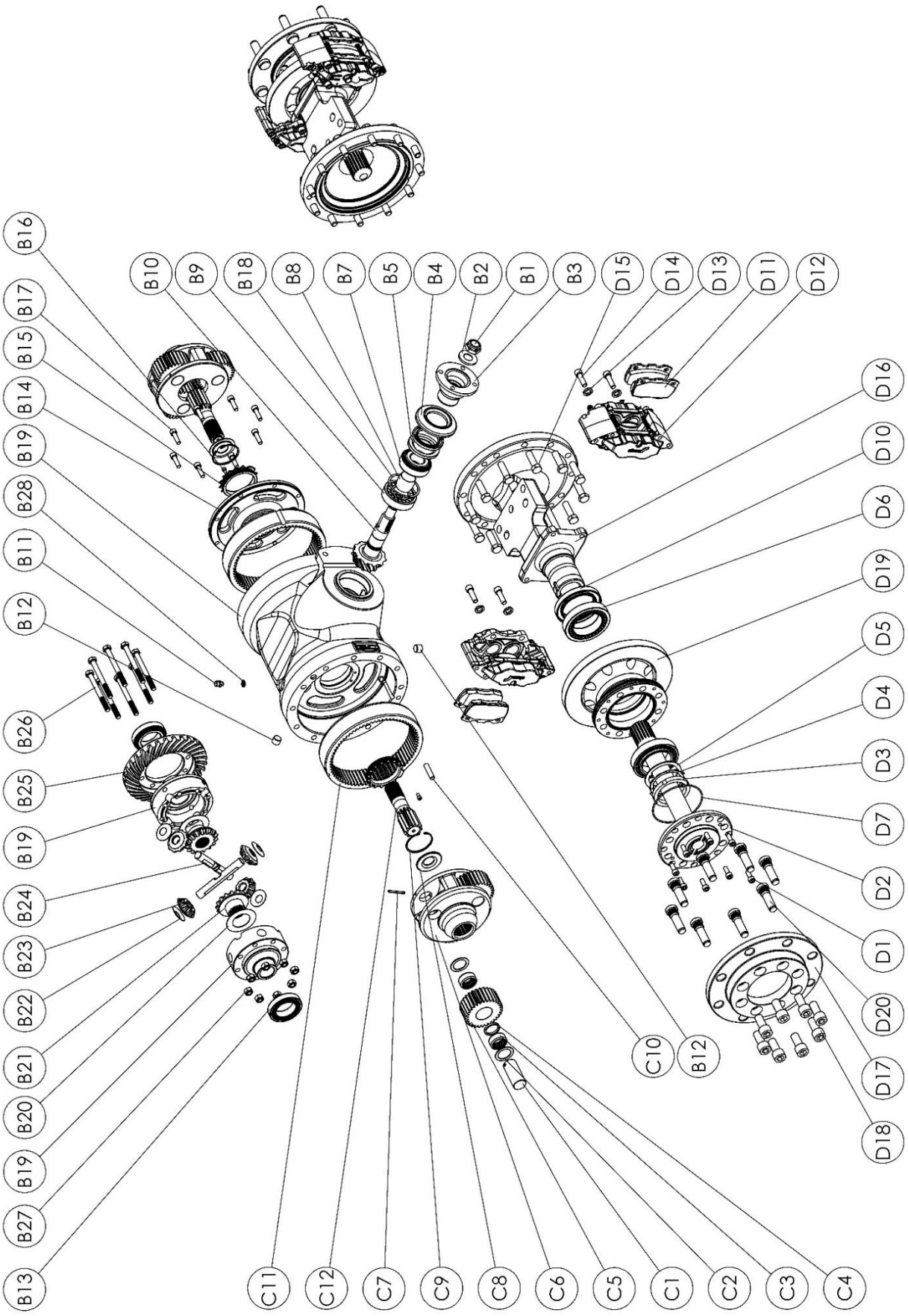
CAUTION: When re-assembling the Axle all threaded fasteners must be tightened to the specified torques to prevent premature failure.

Some servicing operations can be carried out with the Axle still mounted to the vehicle (provided, of course, that there is sufficient space); an example of this is the replacement or repair of the brake assemblies. The repair or replacing the Differential, Layshaft or Arm assemblies however will require the complete removal of the Axle from the vehicle.

NOTE: All procedures listed assume the Motor / Drive has already been removed from the Axle where required. This should be removed as detailed below.

If the details outlined below are carefully followed no difficulty will be found in stripping and rebuilding the Axle. It is most important that all components are perfectly clean and in good condition before reassembly.

CAUTION: The Input Pinion, Primary Wheel and Output Wheel assemblies are supported by taper roller Bearings. Each time a Shaft is stripped for inspection, component repair or replacement it will be necessary to recalculate the number of Shims required to pre-load the Bearings correctly. Re-Shimming of the Axle is detailed under the Axle Shimming procedure.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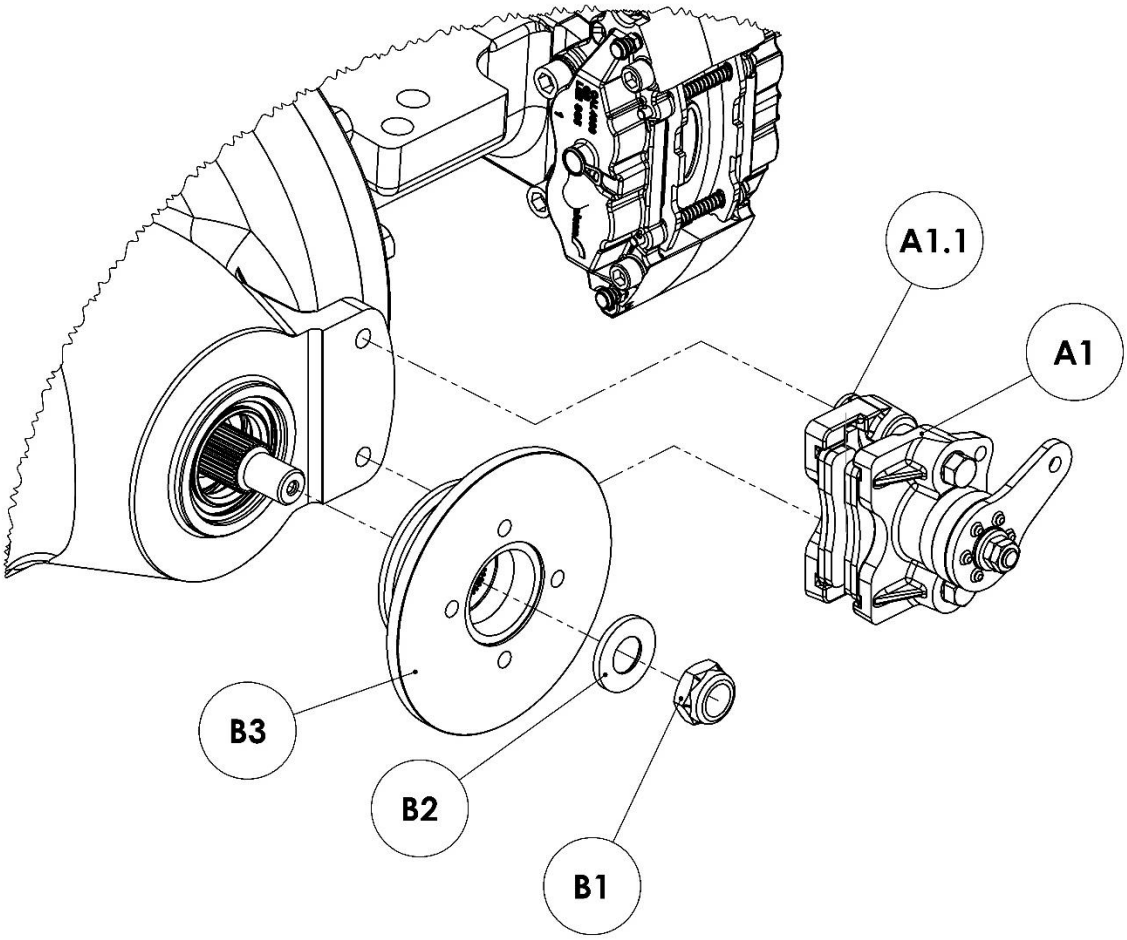
Section 'A' – Park Brake Assembly

NOTE: This only applies to 612PB specification axles.

Item	Part No	Qty	Description	B → PB Conversion
A1	512-2520	1	Park Brake Calliper	Bolt-on
B1	400-2200	1	M24 Nyloc Nut	
B2	915-2190	1	Washer	
B3	612-2180	1	Rotor SAE1410	



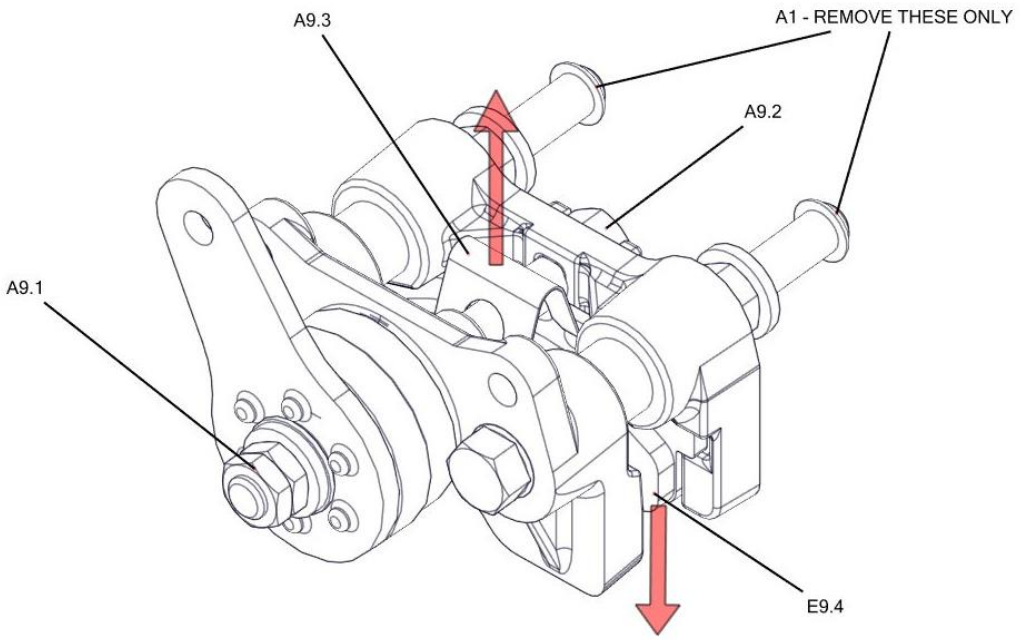
NOTE: Do not move or adjust the nuts (A1.1) as they are fitted to enable the Park Brake Caliper Assembly to float. If they are moved, a float of 0.06in (1.5mm) must exist between the Spacer and the Lock Nut for alignment & the Nut must be locked into position.

Servicing the Park Brake Assembly

1. Remove the Nuts and Washers from the Park Brake Caliper Bolts (A1).
2. Slide the Bolt assembly through the Main Case and Caliper (A1) holes towards the front of the Axle. The Caliper (A1) is now free to be removed radially away from the Park Brake Disc (A2).
3. To reassemble, follow procedure in reverse.

CAUTION: Great care must be taken when realigning the Park Brake Caliper with the Park Brake Disc. The Park Brake Caliper is self-aligning and so should have sufficient movement to slide along the Bolts.

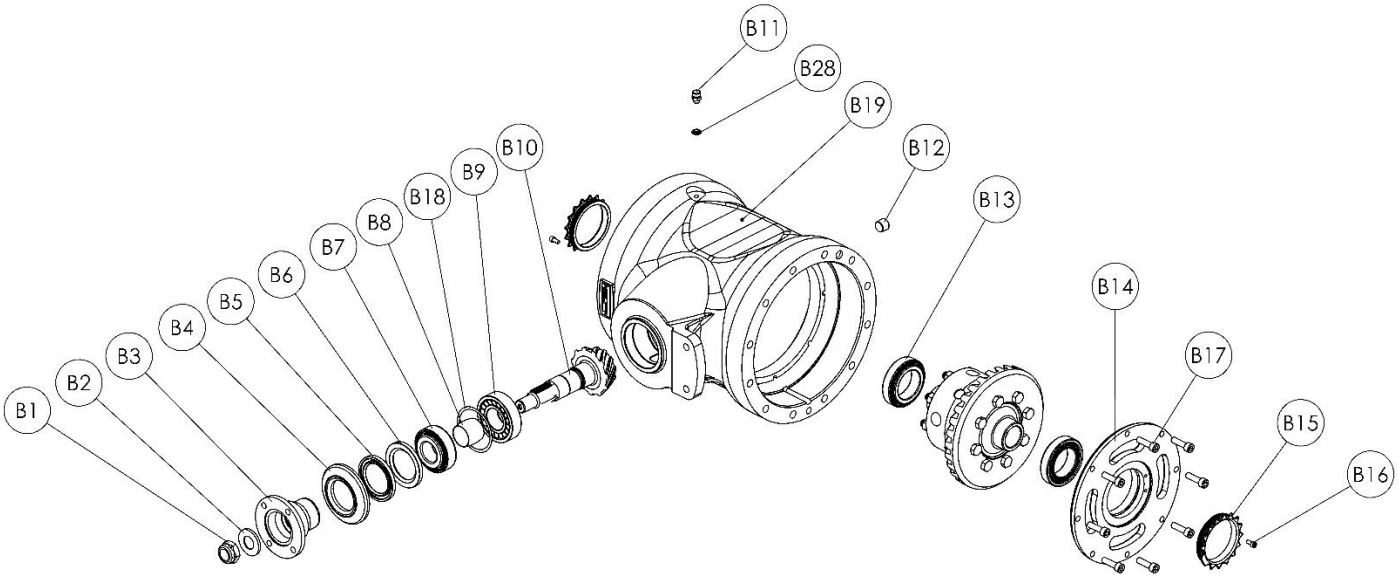
Replacing the Park Brake Caliper Pads



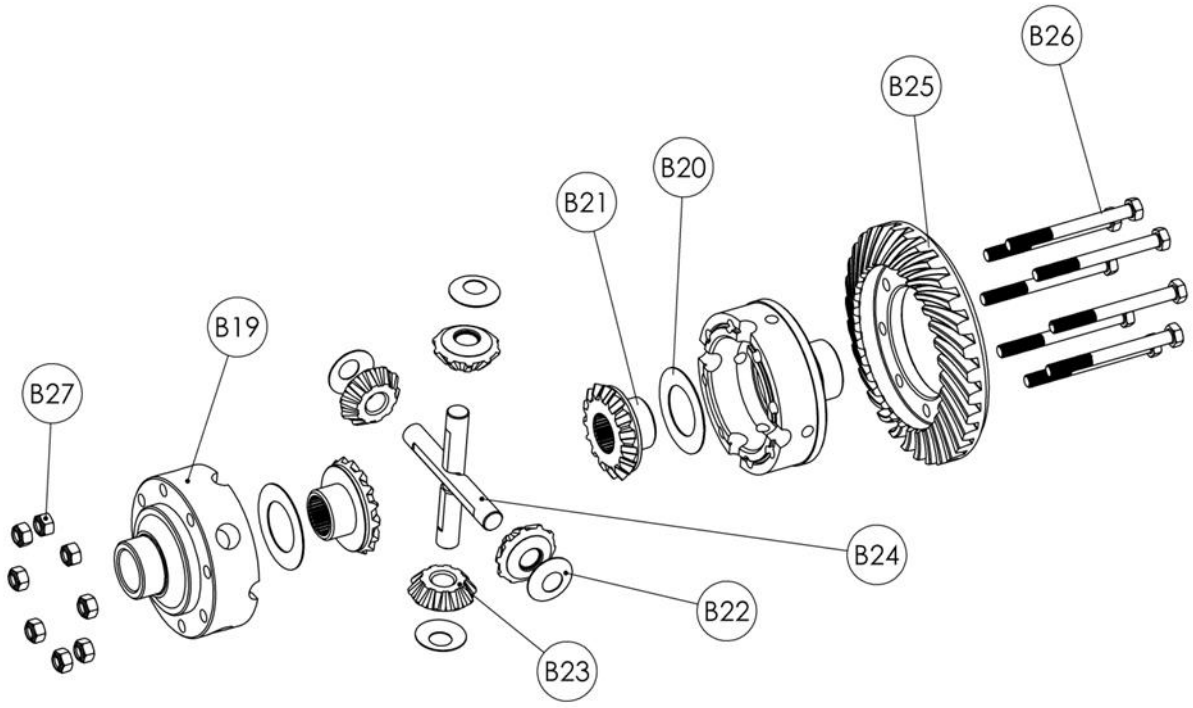
1. Loosen the Nut (A9.1) and slide the Bolt (A9.2) out through the Caliper body.
2. Remove the Spring (A9.3) once the Bolt (A9.2) has pass all the through the body.
3. The old Pads (A9.4) will slide out of the Caliper body.
4. Insert the new Pads and reposition the Spring (A9.3) so that it is reacting on the inside face of both Pads.
5. Reinsert the Bolt (A9.2) and tighten the Nut (A9.1).

Section 'B' – Main Case and Differential Assembly

Item	Part No	Qty	Description
B1	400-2200	1	M24 Nyloc Nut
B2	915-2190	1	Washer
B3	612-2180	1	Input Flange SAE1410
B4	400-0910	1	Seal Cover
B5	002-0070	1	Oil Seal
B6	002-0070	1	Oil Seal
B7	055CU024H	1	Taper Roller Bearing
B8	400-1050	1	Collapsible Spacer
B9	055C026U057	1	Taper Roller Bearing
B10	916-9820	1	Crown Wheel & Pinion Set
B11	CP1488	1	Breather
B12	0150250	2	Drain/Level Plug
B13	0540552	2	Taper Roller Bearing
B14	612-0731	1	Diff. Bearing Housing
B15	915-2151	2	Bearing Adjuster Nut
B16	008-1312L	2	Cap Screw M6x12mm
B17	008-1535	8	Cap Screw M10x35mm
B18	057340A 057340B 057340C	As Required	Shim 0.002" Shim 0.003" Shim 0.010"
B19	612-0010	1	Maincase



Item	Part No	Qty	Description
B19	612-9520	1	Differential Case
B20	915-2110	2	Thrust Washer
B21	915-2090	2	Differential Wheel
B22	915-2120	4	Thrust Washer
B23	915-2100	4	Differential Pinion
B24	915-2130	2	Spider
B25	916-9820	1	Crown Wheel & Pinion Set (Pinion not shown)
B26	0041225HT	8	M12 Bolt
B27	007-0360	8	M12 Nyloc Nut
B28	CP1224	1	Sealing Washer



Servicing the Main Case and Differential Assemblies

Removing the Differential

1. Remove the Axle Arm Assemblies – see Section D
2. Remove the Axle Arm planetary Assemblies and Sun Gear – see Section C
3. Remove bolts (B16), Bearing Adjuster Nut Lock Screw (B15).
4. Unscrew and remove Adjuster Nuts (B15), 8off Bolts (B17) and Bearing Housing (B14) using extractor screw holes. The Differential is now free and can be retracted.

CAUTION: Great care must be taken when removing the Differential Assembly from Main Case. Any damage to the Crown Wheel Bearings could be detrimental to the axles' performance.

WARNING: The space constraints around the Differential are very tight. The Differential Assembly weighs 20Kg, so ensure that you have a good grip on the Diff Casing before attempting to remove the assembly from the case. Do not drop the Differential Bearing Cups.

Servicing the Differential Assembly

1. Remove Nuts (B18) and Bolts if necessary (B26). The Crown Wheel (B25) is now loose and the differential assembly will split into 2 halves. Turn the differential vertically to avoid dropping any internals.
2. Remove the Differential Spider 2off (B24) with the respective Differential Pinions (B23), Pinion Washers (B22), Wheels (B21) & Wheel Washers (B20).
3. Inspect all Differential Wheels (B21), Pinions (B23), Spiders (B24), Bearings (B13), Wheel Washers (B20) and pinion Washers (B22) for damage and wear, replace if necessary.
4. To assemble, reverse the above procedure.

NOTE: Markings on Differential Case must coincide.

5. If new Differential Bearings (B13) are fitted, it will be necessary to reset the Bearing pre-load and Crown Wheel/Pinion backlash.

Drag Torque for Bearings:

1. The Pinion Assembly should be fitted before the Crown wheel/ Differential Assembly are positioned.
2. Tighten the new Pinion Nut (B1), with a bead of Loctite on the male thread, until the new Collapsible Spacer (B8) collapses and the entire end float between the Pinion Bearings is taken up.
3. Spin over several times and check drag torque of 20/26 lbin is achieved.

NOTE: This procedure must be checked prior to carrying out any shimming procedures.
This must be carried out with the Crown Wheel/ Pinion (B10/B25) out of mesh.

Resetting Backlash:

a. Refit Crown Wheel (B25), Differential Assembly (B18-B26), with Bearings (B13) also in Bearing Housing (B14) and secure Main Case bolts (B17). Screw new Differential Bearing Adjuster Nuts (B15) into position to remove all backlash from the gear mesh.
b. Adjust the Nuts to move the Crown Wheel out of mesh to achieve a 0.47/0.55mm backlash using the PR40164 tool holes. (Detail drawing can be found in Appendix A)
c. Tighten the Adjuster Nut (B15) opposite the Crown Wheel (B25) to 20Nm (15lbft) and fit new lock screw (B16) into hole in Adjuster Nut (B15). Check the opposing Bearing Adjuster Nut (B15) & tighten to 20Nm (15lbft). Lock in position using 1off Cap Screw (B16) tightened to 21Nm (15lbft).

Pinion Shimming Procedure

NOTE: The Shimming Procedure below assumes the Axle is stripped down following the above Service Procedures, and details the reassembly and shimming of the Spiral Bevel Pinion (B10), and Crown Wheel (B25) Assemby into the Main Case.

To Shim Bevel Pinion (example below):

If the Crown Wheel and Pinion (B25) or Pinion Head Bearing (B9) are replaced, the following procedure needs to be carried out for correct contact of the Bevel Gear set:

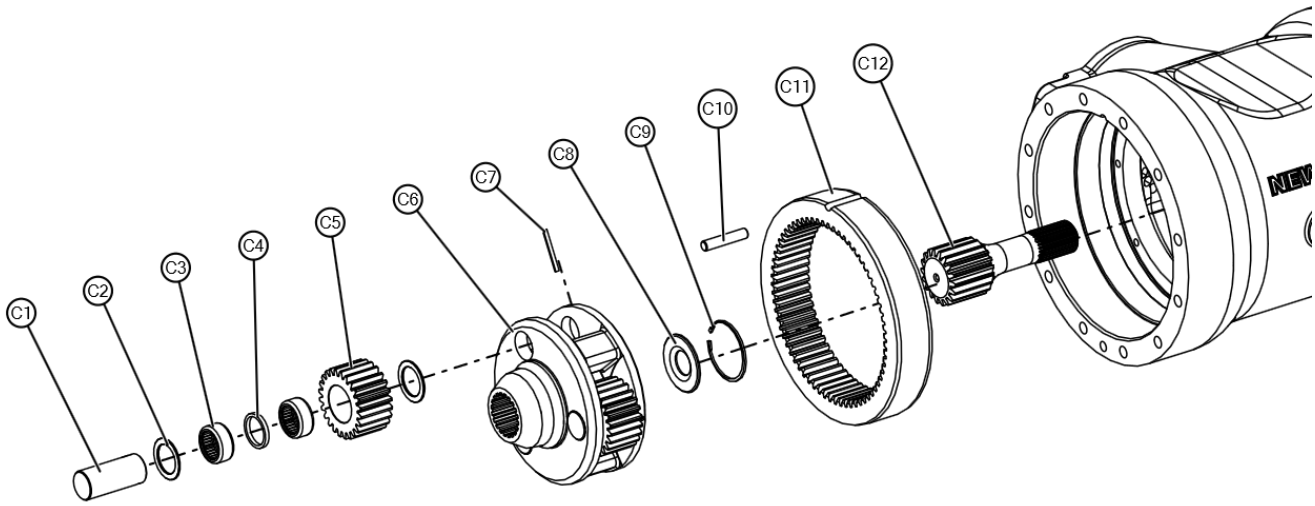
1. Note the new Spiral Bevel Pinion (B25) mounting distance (etched as MD) on the bottom of the head. (Assume for e.g. 115.00mm
2. Measure the new overall width of the Pinion Head Bearing (B9). (assume 30.16mm)
3. Note the Main Case Constant, this is 146.07mm
4. The required Shim thickness can then be calculated by using the following method:-
   =Case Constant – (Spiral Bevel Mounting Distance + Bearing Width).

   Therefore Shims Required using data above:-
   =Case Constant – (Mounting Distance + Bearing Width)
   =146.07mm – (115.00mm +30.16mm)
   =0.91mm required

Section 'C' – Planet Carrier Assembly

Item	Part No	Qty	Description
C1	612-0250	3	Planet Pin
C2	915-0270	6	Washer Thrust
C3	0564502	6	Needle Roller Bearing
C4	612-2560	3	Spacer
C5	612-0080 613-0080 614-0080	3	Planet Gear 19.7:1 Only Planet Gear 13.2:1 Only Planet Gear 15.8:1 Only
C6	612-0060	1	Planet Carrier
C7	010-0030	3	Spring Pin
C8	400-1320	1	Spacer
C9	003-0120	1	Circlip
C10	0211620	1	Dowel
C11	612-0070 613-0070 614-0070	1	Annulus 19.7:1 Only Annulus 13.2:1 Only Annulus 15.8:1 Only
C12	612-0090 613-0090 614-0090	1	Sun Gear 19.7:1 Only Sun Gear 13.2:1 Only Sun Gear 15.8:1 Only

NOTE: Quantities stated per side (2 Assemblies per Axle)



Servicing the Planet Carrier Assemblies

NOTE: This procedure assumes the Axle has had both arms removed – see section D.

1. The Planet Carrier Assembly can now be removed from the Centre Casing. Take care not the withdraw the floating Sun Gear (C12).
2. Check the Planet Gears (C5) and the mating gear teeth on the Annulus (C11) and Sun Gear (C12) for damage and wear. The planet Gears (C5) should run free in the Planet Pins (C1), without excessive radial "play". Replace if worn with the Needle Roller Bearing (C3).

NOTE: When servicing the Planet Assembly we recommend all three Planet Gears (C5), Planet Pins (C1), Needle Roller Bearings (C3), Spring Dowels (C7), Annulus (C11) & Sun Gear (C12) are replaced together as they are in constant mesh.
Dowels are replaced together.

3. To replace the Planet Gears, Pins or Bearings, drift each Spring Dowel (C7) through its hole, which locates the Planet Pins (C1) through the Planet Carrier (C6). Once the Dowels have been removed, lightly drift each Planet Pin (C1) through the Planet Gear (C5) and Planet Carrier (C6). Remove the loose Planet Gears (C5), Thrust Washers (C2) and Needle Roller Bearings (C3). Remove Circlip (C9), which secures the Spacer (C8).

NOTE: The Spacer (C8) is fitted with the large central chamfer facing outwards towards the Spline in the Planet Carrier (C6).

To reassemble:

1. Refit the Spacer & Circlip (C8 & C9) and slide the Needle Roller Bearings (C3) into the Planet Gears (C5). Fit the bottom Thrust Washer (C2) over the machined boss within the Planet Carrier (C6), place the planet Gear (C5) with the Needle Roller Bearing (C3) on top of the bottom Thrust Washer and from the underside gently tap the Planet pin (C1) through the Carrier (C6), bottom Thrust Washer (C2) & Planet Gear (C5).

NOTE:

Removing the Annulus Gear

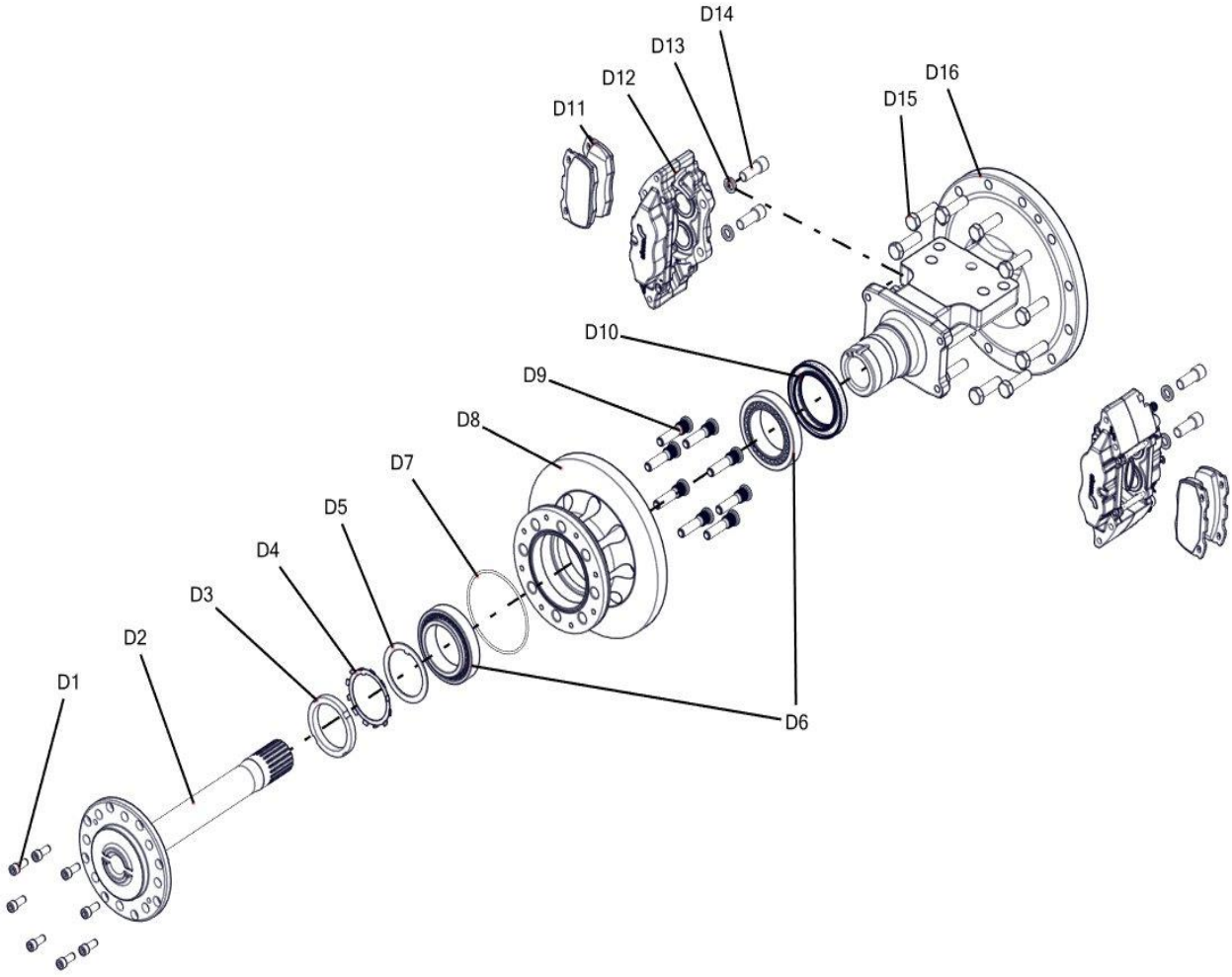
1. To remove Annulus (C11), use an extractor tool (PR40251 Appendix C) or pinch bars, located behind the Annulus (C11), in a scissor fashion to prise the Annulus clear of the case. Be careful not to damage the internal gear teeth.
2. To refit, reverse procedure ensuring that the Dowel (C10) is aligned with the slot at the bottom of the Annulus (C11).

Section 'D' – Axle Arm, Hub and Brake Assemblies

Arm Assembly 8 Studs 9/16 x 18 UNF-3A on 6.5" PCD (165.1mm) (2 per axle)			
Item	**Part No**	**Qty**	**Description**
D1	0081525	8	M10 Cap Bolt
D2	612-0100	1	Axle Shaft
D3	010N801	1	Lock Nut
D4	010W801	1	Lock Washer
D5	615-1440	1	Spacer
D6	0540803	2	Taper Roller Bearing
D7	0431343	1	O-Ring
D8	612-0040	1	Wheel Hub
D9	512-0452	8	9/16" UNF Wheel Studs
D10	613-2850	1	Hub Seal
D11	612-2520	2	Service Brake Pad Set
D12	614-2500	2	Brake Caliper
D13	0191314	4	Lock Washer
D14	00816A40MZP	4	M14 Cap Bolt
D15	0041614HTP	12	M16 Bolt
D16	613-0020 612-0024 612-0025 612-0026 612-0027 612-0028 612-0029	1	Axle Arm Cast Rib Mounting Axle Arm Pad 26" Mounting 6Deg L/H Axle Arm Pad 26" Mounting 6Deg R/H Axle Arm Pad 26" Mounting 2Deg L/H Axle Arm Pad 26" Mounting 2Deg R/H Axle Arm Pad 23.625" Mounting 4Deg L/H Axle Arm Pad 23.625" Mounting 4Deg R/H
D17	007-0400	8	Wheel Nut 9/16UNF (Not shown)

NOTE: Quantities stated per side (2 Assemblies per Axle)

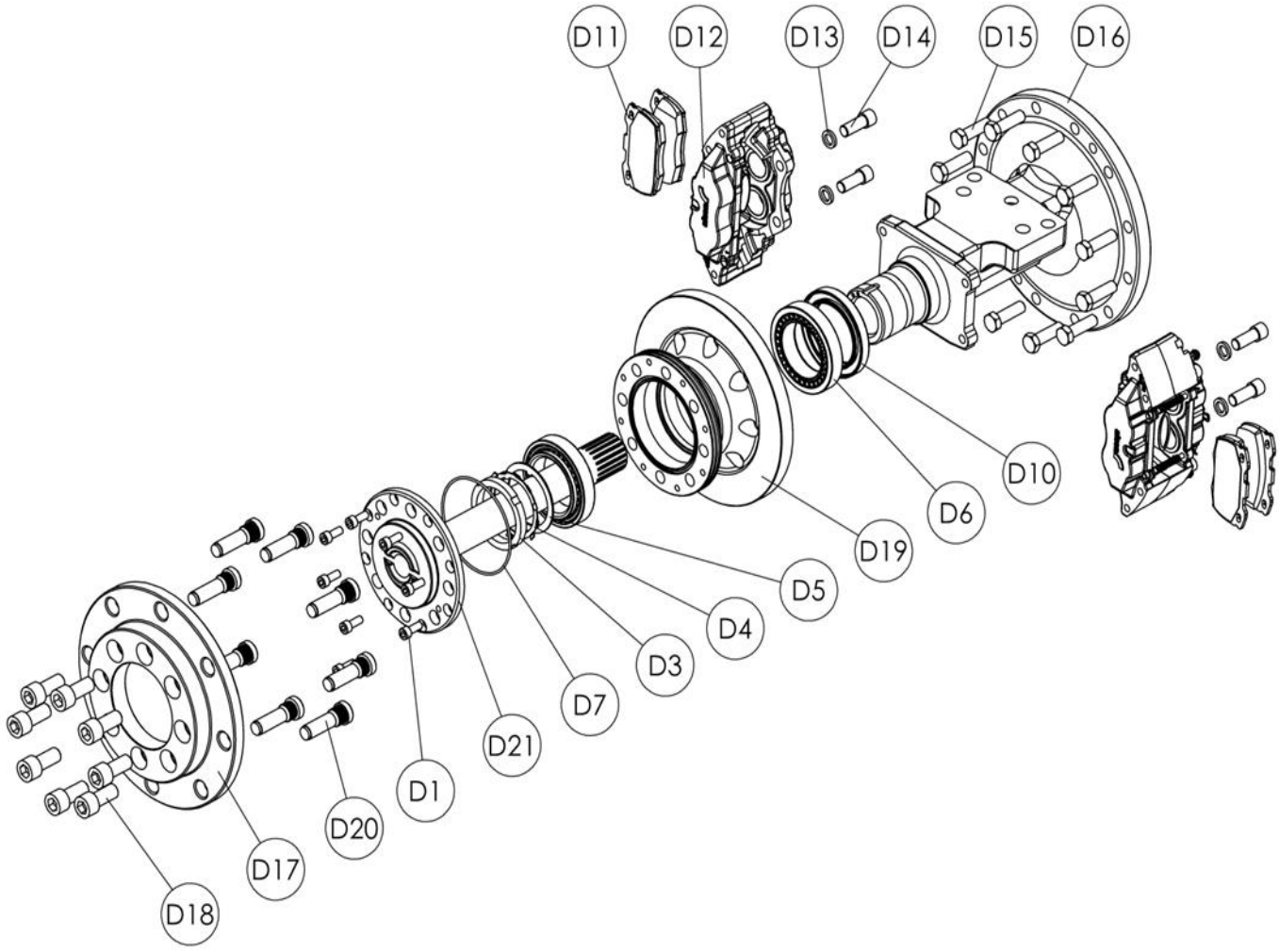
Arm Assembly 8 Studs 9/16 x 18 UNF-3A on 6.5” PCD (165.1mm)



Arm Assembly 8 Studs M20 x 1.5 on 10.83" PCD (275mm) (2 per axle)			
Item	**Part No**	**Qty**	**Description**
D1	0081525	8	M10 Cap Bolt
D3	010N801	1	Lock Nut
D4	010W801	1	Lock Washer
D5	615-1440	1	Spacer
D6	0540803	2	Taper Roller Bearing
D7	0431343	1	O-Ring
D10	613-2850	1	Hub Seal
D11	612-2520-KIT	4	Service Brake Pad Set
D12	614-2500	2	Brake Caliper
D13	0191314	4	Lock Washer
D14	00816A40MZP	4	M14 Cap Bolt
D15	0041614HTP	12	M16 Bolt
D16	613-0020 612-0024 612-0025 612-0026 612-0027 612-0028 612-0029	1	Axle Arm Cast Rib Mounting Axle Arm Pad 26" Mounting 6Deg L/H Axle Arm Pad 26" Mounting 6Deg R/H Axle Arm Pad 26" Mounting 2Deg L/H Axle Arm Pad 26" Mounting 2Deg R/H Axle Arm Pad 23.625" Mounting 4Deg L/H Axle Arm Pad 23.625" Mounting 4Deg R/H
D17	612-0050	1	Hub Adaptor
D18	0081845	8	Cap Head M20 x 45mm
D19	613-0040	1	Wheel Hub
D20	613-0450	8	M20 x 1.5 Wheel Studs
D21	613-0100	1	Axle Shaft
D22	007-0410	8	M20 x 1.5 Wheel Nut (NOT SHOWN)

NOTE: Quantities stated per side (2 Assemblies per Axle)

Arm Assembly 8 Studs M20 x 1.5 on 10.83” PCD (275mm)



Servicing the Axle Arm, Hub and Brake Assemblies

The Hub assembly can be serviced with the Axle Arm still connected to the Main Case. Procedure is as follows:

Note If Servicing the Arm Assembly 8 Studs M20 x 1.5 on 10.83" PCD (275mm) first remove 8 off (D18) & remove 1 off (D17) prior to using the procedure below.

1. Remove 8off bolts (D1) that secure Axle Shaft (D2) to the Wheel Hub/Brake Disc (D8). Withdraw the Axle Shaft (D2) using the extraction screws & inspect the spline for damage & wear.
2. Remove Brake Calliper Bolts (D14) & and pull out the Brake Calliper radially from the Brake Disc. Heat will need to applied to the bolts to break down Loctite compound.
3. Straighten locking tab ears on Lockwasher (D4), unscrew & remove the Lock Nut (D3) using a special tool. A gentle tap with a soft mallet on opposing sides of the Brake Disc will assist on pulling the assembly off the axle arm stub. Remove Lockwasher (D4) and Bearing Spacer (D5) from the keyway.
4. The Wheel Hub (D8) can now be withdrawn from the Axle Arm stub using a gentle tap from the mallet.

NOTE: Care must be taken not to drop the loose Bearing Cones from the stub arm axle.

5. Examine all Bearing Cups & Cones for wear or damage, replace as necessary.

NOTE: We recommend the Hub Oil Seals are always changed when the Hub has been removed.

6. The Bearing Cups (D6) can be drifted out of the Hub (D8) if they need replacing. When fitting new Bearing cups (D6) ensure that they are aligned squarely to the bores before pressing in.

NOTE: If the Rear Bearing (D6) is replaced Oil Seal (D10) will also need replacing.

7. To reassemble the Hub assembly, reverse the above procedure using a new Lockwasher (D4).
8. To adjust the Hub Bearings:
    i. Tighten the Lock Nut (D3) to the tightening torque of 135 Nm (100 lb.ft). When checking the torque setting, rotate the Wheel Hub 3 turns in each direction to ensure the Bearings have "seated" correctly and recheck tightening torque. Repeat this procedure 3 times.
    ii. Slacken the Lock Nut (D3) back a distance equal to 1 tab of the new Lock Washer (D4).
    iii. Bend ear of Lock Washer over to secure the Nut.

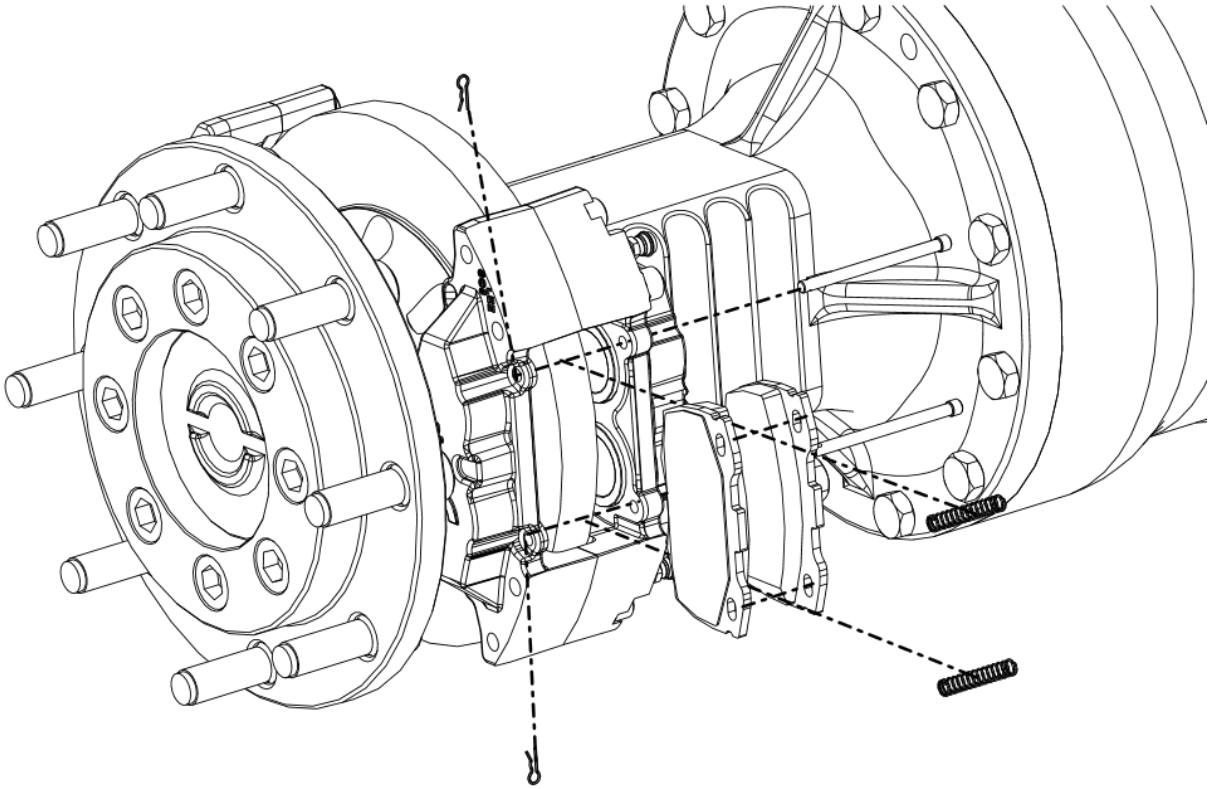
NOTE: Always use a new Lock Washer (D4).

Servicing the Brake Pad Assemblies

Each Brake Assembly consists of two fixed callipers per side (D12), so the Calliper needs to be removed to service the Pads.

1. Remove Calliper Guide pins which are secured with Spring Retainers or Split Pins and pull the Brake Pads (D11) away from the Axle Arms (D16).
2. Inspect for Pad wear and replace where necessary.

NOTE: It is recommended to replace all the Brake Pads (D11) at the same time.
Always use a new Split Pin.

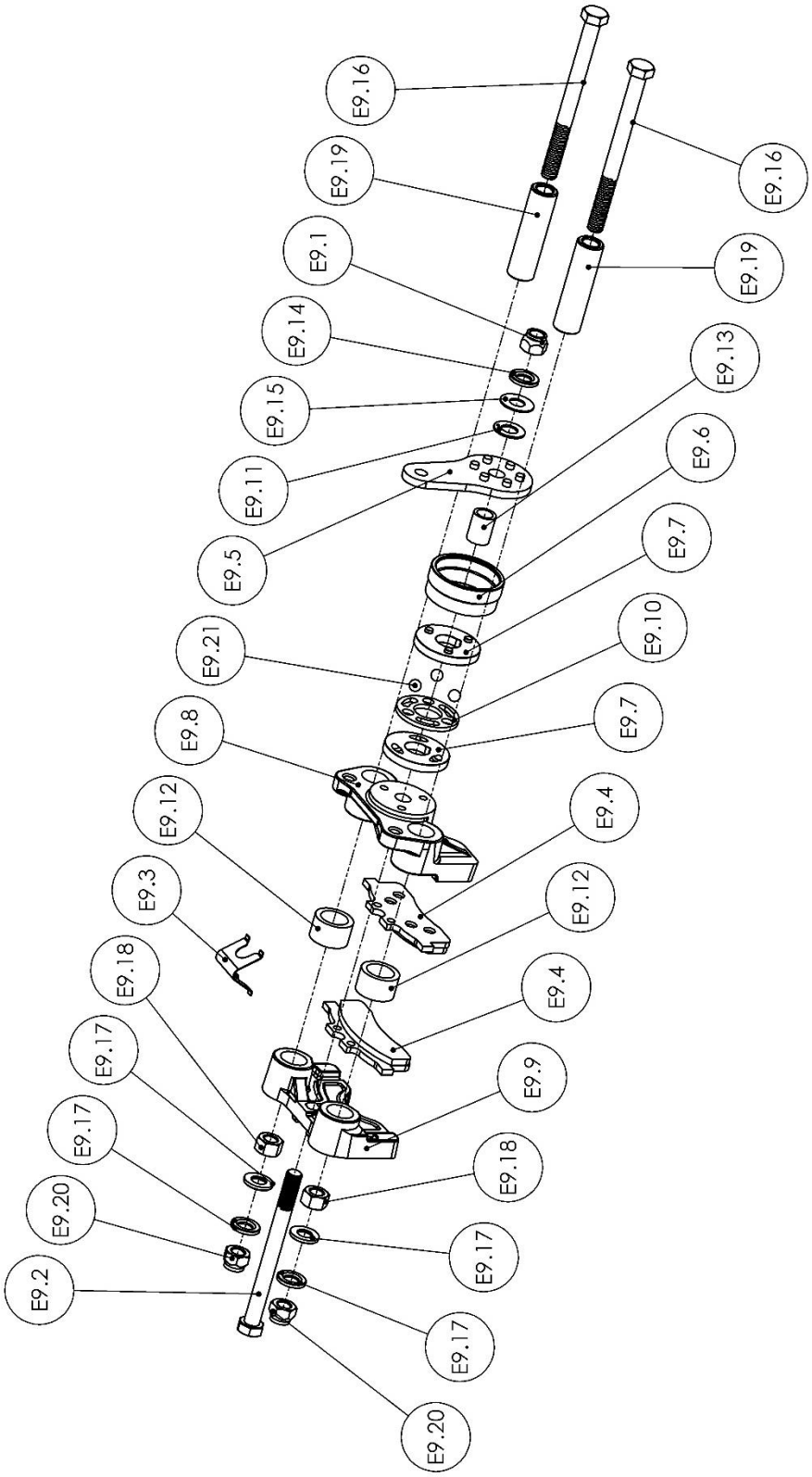


PARK BRAKE ASSEMBLY – PART No. 512-2520		
Item	**Description**	**Qty**
E9.1	NUT ½" X 20 UNF NYLOC	1
E9.2	BOLT ½" X 20 UNF X 5.25" LONG	1
E9.3	SPRING FLAT	1
E9.4 *	LINING AND CARRIER ASSEMBLY – Part No. 613-2530	2
E9.5	LEVER	1
E9.6	BOOT	1
E9.7	CAM	2
E9.8	TORQUE PLATE FRONT	1
E9.9	TORQUE PLATE REAR	1
E9.10	BALL/ RETAINER SUB ASSEMBLY	1
E9.11	GARLOCK THRUST BEARING	1
E9.12	SEAL SLEEVE	2
E9.13	ID SEAL	1
E9.14	WASHER HARDENED	1
E9.15	WASHER	1
E9.16	BOLT ½" X 13 UNC X 5.50" LONG	2
E9.17	WASHER	4
E9.18	NUT ½" X 13 UNC	2
E9.19	SPACER SLEEVE	2
E9.20	NUT ½" X 13 UNC NYLOC	2
E9.21	3/8" BALL BEARING	3

NOTE: THE PARTS ABOVE ARE NOT AVAILIABLE INDIVIDUALLY AND ARE SHOWN FOR ILLUSTRATION PURPOSES ONLY EXCEPT FOR THE * E9.4 REPLACEMENT BRAKE LINING AND CARRIER ASSEMBLY SUPPLIED AS 613-2530-KIT.

Section ‘F’ – Park Brake Overhaul

The Park Brake assembly is a ball and ramp, sliding caliper brake designed for use as a Park Brake. The Park brake has an open caliper design to facilitate changing the linings, along with a retraction spring to reduce parasitic drag. It is sealed from the environment to provide a long and trouble free service life.



Mounting Procedure

1. Feed the Bolts (E9.16) together with a Washer (E9.17) through the Transfer Cases (A9 & A24).
2. Once just through the Case feed another Washer (E9.17), Nut (E9.18) and the Assembled Caliper (E9) pre-aligned with the Park Brake Disc (E5) and continue to tighten the Nut (E9.18) to clamp the Tranfer Cases together.
3. Thread onto the Bolt (E9.16) the Locking Nuts (E9.20) until a 0.040" to 0.080" (1.00 mm to 2.00 mm) gap exists between the Sleeves (E9.19) and the Locking Nuts (E9.20).

Adjustment Procedure

1. Tighten Nut (E9.1) until firm contact is made between the Disc and the Linings. Torque to 11 N.m (8lbf.ft), making sure the Lever (E9.5) is in the correct operating position for application.
2. Back off Nut (E9.1) 4 to 5 flats and check that the Disc is free to rotate.

Lining Replacement

1. Replace both linings when either has worn to 2.3mm (0.090") remaining thickness.
2. Loosen the Nut (E9.1) enough to slide each of the Torque Plates (E9.8 & E9.9) away from the Disc and far enough to provide clearance to remove the old Carrier/ Lining assemblies (E9.4) and install new ones.
3. Collapse the Lining Reaction Spring (E9.3) and remove from the brake head assembly.
4. Slide the Torque Plates (E9.8 & E9.9) away from the Disc and move the Carrier/ Lining assemblies (E9.4) out of the pockets and remove from the Brake Head Assembly from the side.

   NOTE: PRIOR TO THE INSTALLATION OF THE NEW LININGS IT IS RECOMMENDED THAT "ALFA 2000" GREASE (ANTI-SEIZE & LUBRICATING COMPOUND) MANUFACTURED BY CHEMTOOL BE APPLIED TO THE INTERFACE OF THE SLEEVE (E9.19) AND THE TORQUE PLATES (E9.8 & E9.9). AFTER GREASE HAS BEEN APPLIED SLIDE THE TORQUE PLATES BACK AND FORTH ON THE SLEEVE AS FAR AS POSSIBLE TO ENSURE THAT GREASE HAS BEEN INTRODUCED INTO THE BORES OF THE TORQUE PLATES

5. Install new Carrier/ Lining assemblies (E9.4) in each of the Torque Plates (E9.8 & E9.9)
6. Install Lining Reaction Spring (E9.3) into the Brake Head Assembly, making sure that the feet on the springs locate securely into the holes in both Carrier/ Lining assemblies (E9.4)
7. Adjust Brake as per the ADJUSTMENT PROCEDURE.

SPARES KITS

To ease the procurement of spares, we offer a catalogue of Kits that group common parts together to simplify the ordering process. These Kits are detailed below:

612-9630-KIT Differential Kit (1 per axle)			
Item	**Part No**	**Qty**	**Description**
B19	612-9520	1	Differential Case
B20	915-2110	2	Thrust Washer
B21	915-2090	2	Differential Wheel
B22	915-2120	4	Thrust Washer
B23	915-2100	4	Differential Pinion
B24	915-2130	2	Spider
B26	0041225HT	8	M12 Bolt
B27	007-0360	8	M12 Nyloc Nut

612-9580-KIT (Uses 612-0070, 612-0080 & 612-0090) Planet Kit (2 per axle)			
Item	**Part No**	**Qty**	**Description**
C1	612-0250	3	Planet Pin
C2	915-0270	6	Washer Thrust
C3	0564502	6	Needle Roller Bearing
C4	612-2560	3	Spacer
C5	612-0080 613-0080 614-0080	3	Planet Gear 19.7:1 Only 13.2:1 Only 15.8:1 Only
C6	612-0060	1	Planet Carrier
C7	010-0030	3	Spring Pin
C8	400-1320	1	Spacer
C9	003-0120	1	Circlip
C10	0211620	1	Dowel
C11	612-0070 613-0070 614-0070	1	Annulus 19.7:1 Only 13.2:1 Only 15.8:1 Only
C12	612-0090 613-0090 614-0090	1	Sun Gear 19.7:1 Only 13.2:1 Only 15.8:1 Only

NOTE: 613-9580-KIT (Uses 613-0070, 613-0080 & 613-0090)

612-0040-KIT Brake Hub & Rotor Kit (8 Studs 9/16 x 18 UNF-3A on 6.5” PCD (165.1mm) (2 Per Axle)			
Item	**Part No**	**Qty**	**Description**
D4	010W801	1	Lock Washer
D6	0540803	2	Taper Roller Bearing
D7	0431343	1	O-Ring
D8	612-0040	1	Wheel Hub
D9	512-0452	8	9/16” UNF Wheel Studs
D10	613-2850	1	Hub Seal

613-0040-KIT Brake Hub & Rotor Kit (8 Studs 8 Studs M20 x 1.5 on 10.83” PCD (275mm) (2 Per Axle)			
Item	**Part No**	**Qty**	**Description**
D4	010W801	1	Lock Washer
D6	0540803	2	Taper Roller Bearing
D7	0431343	1	O-Ring
D10	613-2850	1	Hub Seal
D17	612-0050	1	Hub Adaptor
D18	0081845	8	Cap Head M20 x 45mm
D19	613-0040	1	Wheel Hub
D20	613-0450	8	M20 x 1.5 Wheel Studs

612-0041-KIT Brake Hub Kit (8 Studs 9/16 x 18 UNF-3A on 6.5” PCD (165.1mm) (2 Per Axle)			
Item	**Part No**	**Qty**	**Description**
D8	612-0040	1	HUB
D9	512-0452	8	WHEEL STUDS 9/16”UNF

612-0050-KIT Brake Hub Adaptor Kit (Hub Adaptor with 8 Studs M20 X 1.5 on 10.83” PCD (275mm) (2 Per Axle)			
Item	**Part No**	**Qty**	**Description**
D17	612-0050	1	HUB ADAPTOR
D20	613-0450	8	WHEEL STUDS M20 X 1.5

612-9820-KIT Crown Wheel & Pinion (1 kit per axle)			
Item	**Part No**	**Qty**	**Description**
B5	002-0070	2	Oil Seal
B7	055CU024H	1	Taper Roller Bearing
B8	400-1050	1	Collapsible Spacer
B9	055C026U057	1	Taper Roller Bearing
B10	916-9820	1	Crown Wheel & Pinion Set
B18	057340A	2	SHIM .002” (Qty As Required)
B18	057340B	2	SHIM .003” (Qty As Required)
B18	057340C	2	SHIM .010” (Qty As Required)

613-2520-KIT Service Brake Caliper Pad Kit (1 per axle)			
Item	**Part No**	**Qty**	**Description**
D11	612-2520	8	Brake Pads

613-2530-KIT Park Brake Caliper Kit (1 Per Axle)			
Item	**Part No**	**Qty**	**Description**
E9.4	613-2530	2	Park Brake Pads

612-2510-KIT Park Brake Conversion Kit (1 Per Axle)			
Item	**Part No**	**Qty**	**Description**
B3	612-2181	1	Rotor
B4	400-0910	1	Seal Cover (Fitted to 612-2181)
B2	915-2190	1	Washer
B1	400-2200	1	M42 x 2 Nyloc Nut
A1	512-2520	1	Park Brake Assembly (Including Bolts and Nuts)

Individual Parts			
Item	**Part No**	**Qty**	**Description**
B1	400-2210	1	Nut M24 x 2
B2	915-2190	1	Coupling Washer
B3	612-2181	1	Drive Flange
B4	400-0910	1	Oil Seal Cover
B11	008-0070	1	Breather
B12	0150250	2	½" Drain Plug
B14	612-0731	1	Bearing Housing
B17	0081535	8	M10 x 35mm Cap Bolt
D1	0081525	16	M10 x 25mm Cap Bolt
D2	612-0100	2	Axle Shaft
D3	010N801	2	M80 locking Nut
D4	010W801	2	Locking Washer
D5	615-1440	2	Spacer
D13	0191314	4	Lock Washer
D14	00816A40MZP	4	M14 Cap Bolt
D15	0041614HTP	12	M16 Bolt
D21	613-0100	1	Axle Shaft

All spares are available from your local Newage distributor. Check our website www.prm-newage.com to find your closest distributor.

Other spares are available upon request; however these may not be carried by the distributor as standard stock and may incur a delivery lead-time.

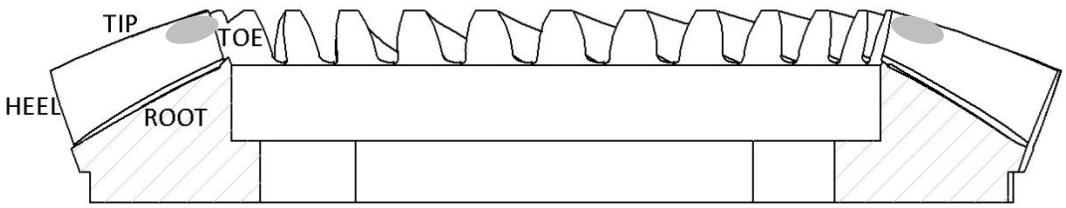
SPIRAL BEVEL GEAR TOOTH CONTACT

Contact may vary, but generally is approximately in the tooth centre, equi-spaced between root and tip. The marking may be towards toe on some gears on both flanks, or marking crossed slightly i.e. towards toe on convex flank and heel on concave flank or vice versa.

If, compared to the factory tooth contact, the contact appears as shown below, then corrective action should be taken as follows:

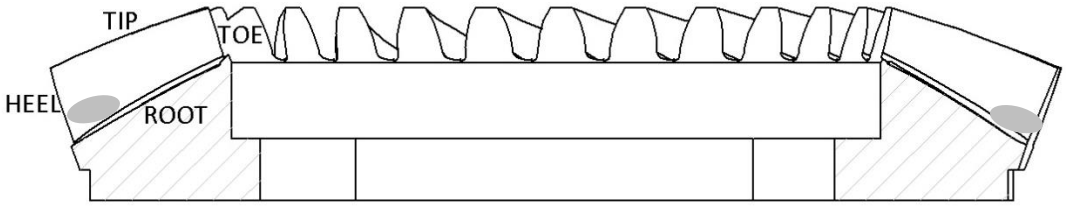
Error 1: Pinion too far out of Mesh

CONVEX FLANK



Contact further to toe and tip than factory marking.

CONCAVE FLANK

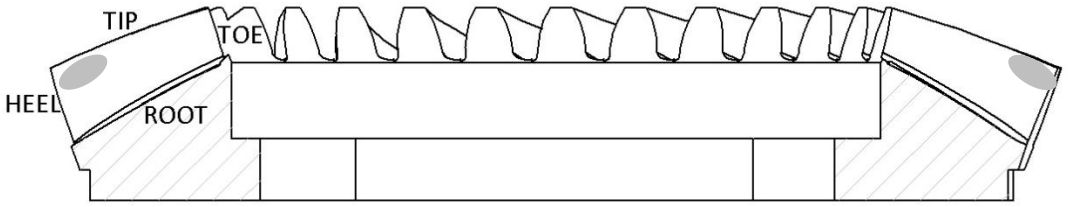


Contact further to heel and tip than factory marking.

ACTION: Recheck and decrease shims below pinion cartridge flange.

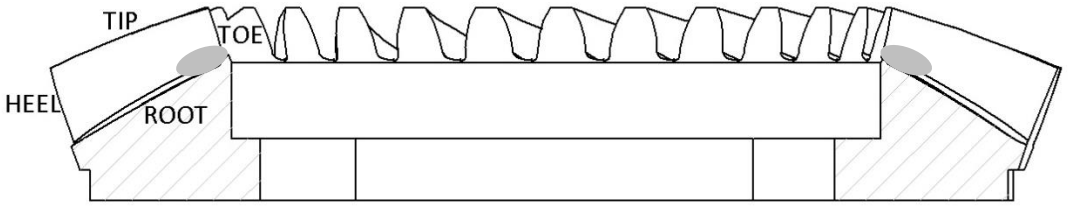
Error 2: Pinion too far into Mesh

CONVEX FLANK



Contact further to heel and root rather than factory marking.

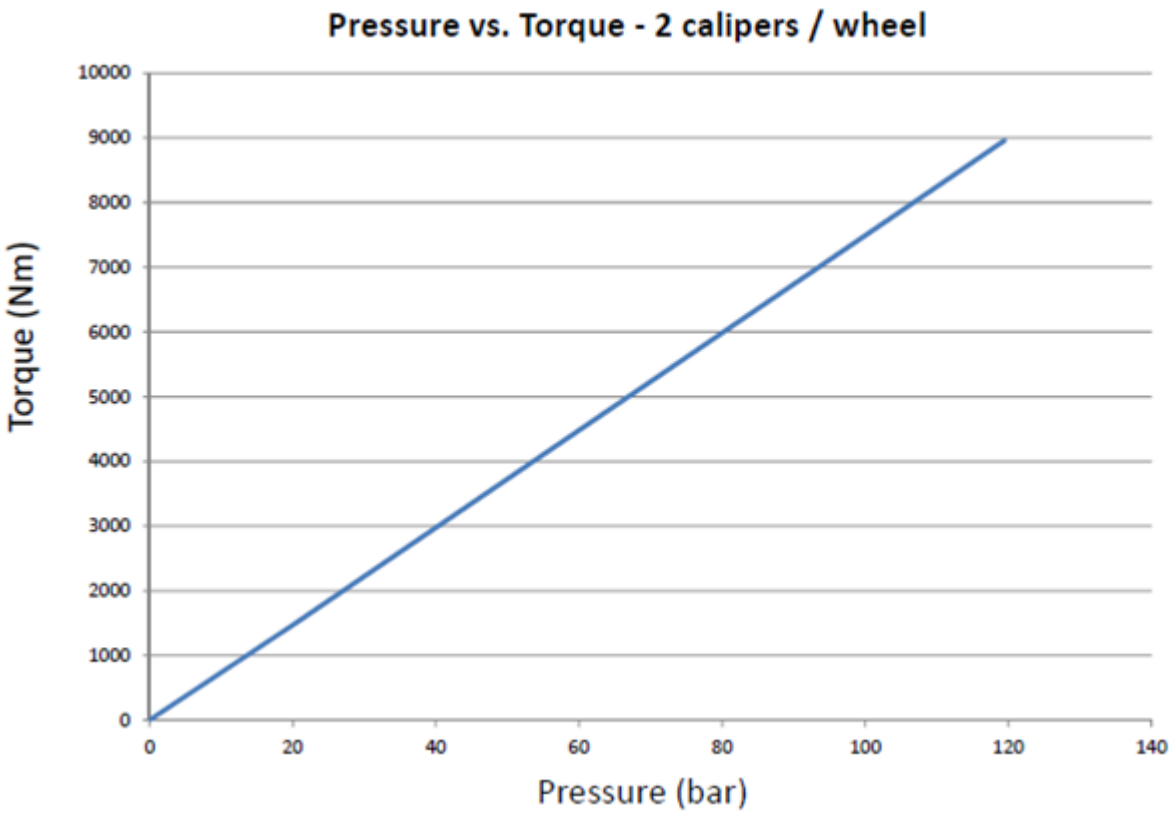
CONCAVE FLANK



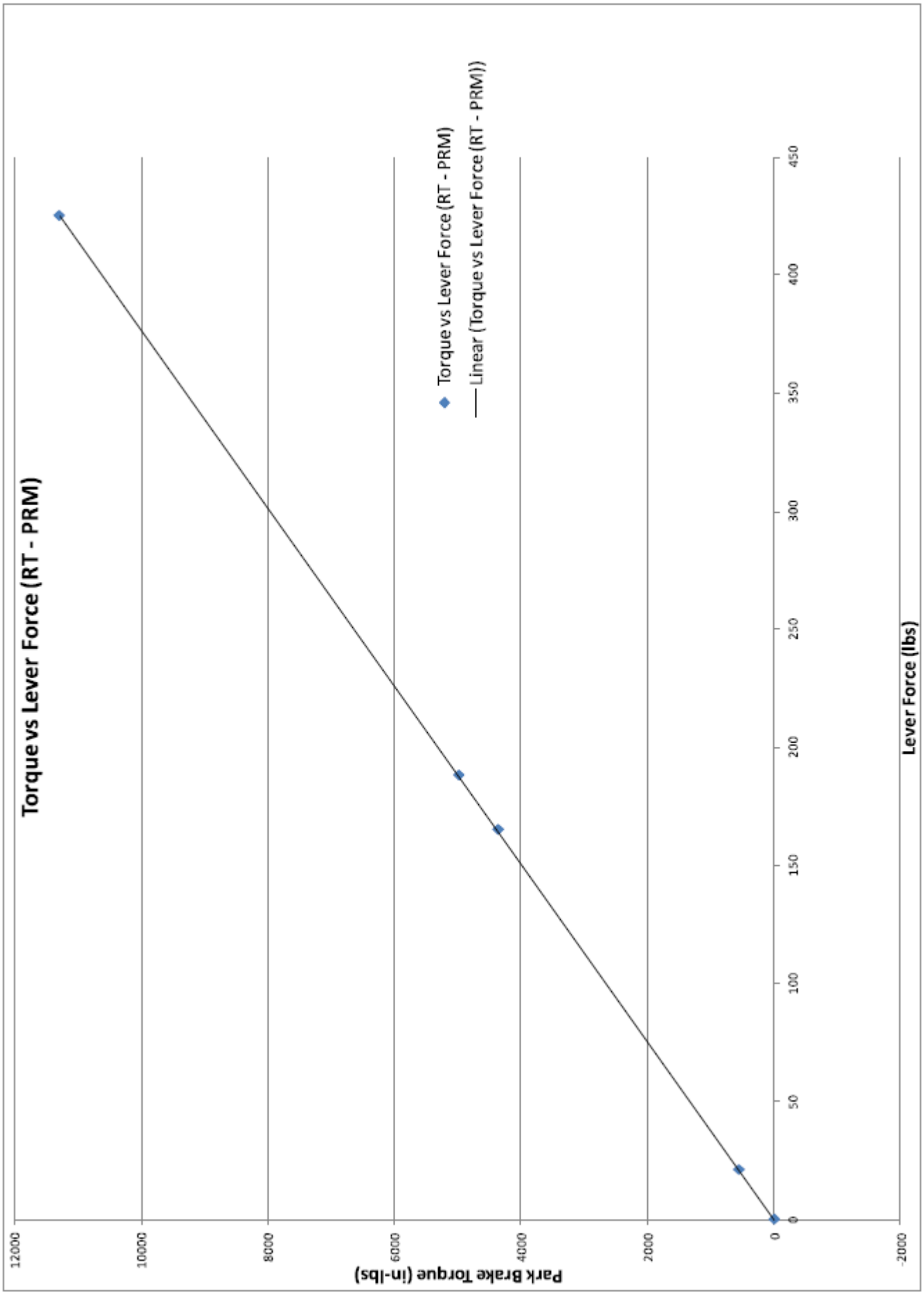
Contact further to toe and root than factory marking.

ACTION: Recheck and increase shims below pinion cartridge flange.

Appendix 1 :- Service Brake Graph



Appendix 2 :- Park Brake Graph



NOTES