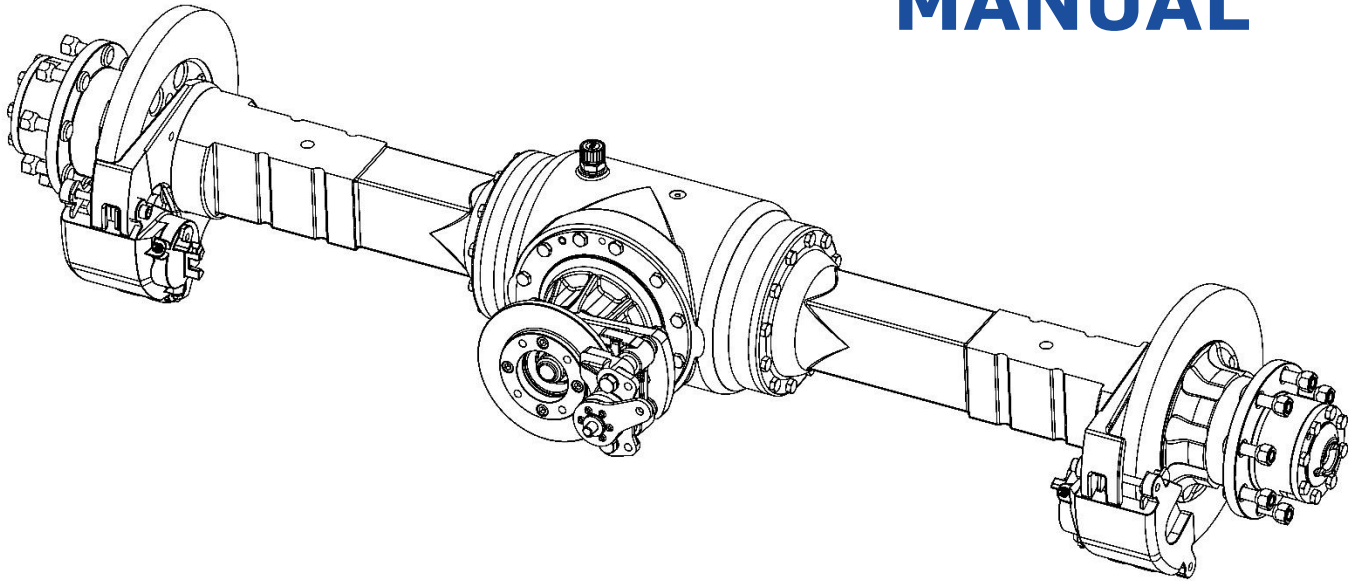


**216B14T073**  
**216PB14T073**  
**216B14T073**  
**21614T073**  
**WORKSHOP**  
**MANUAL**



**PRM**

**NEWAGE**

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**216B14T073 - 216PB14T073 - 216P14T073 – 21614T073 Manual**

Issue: 1.6

Created By: Steve Hylands

Updated: February 2020

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**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**

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## 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

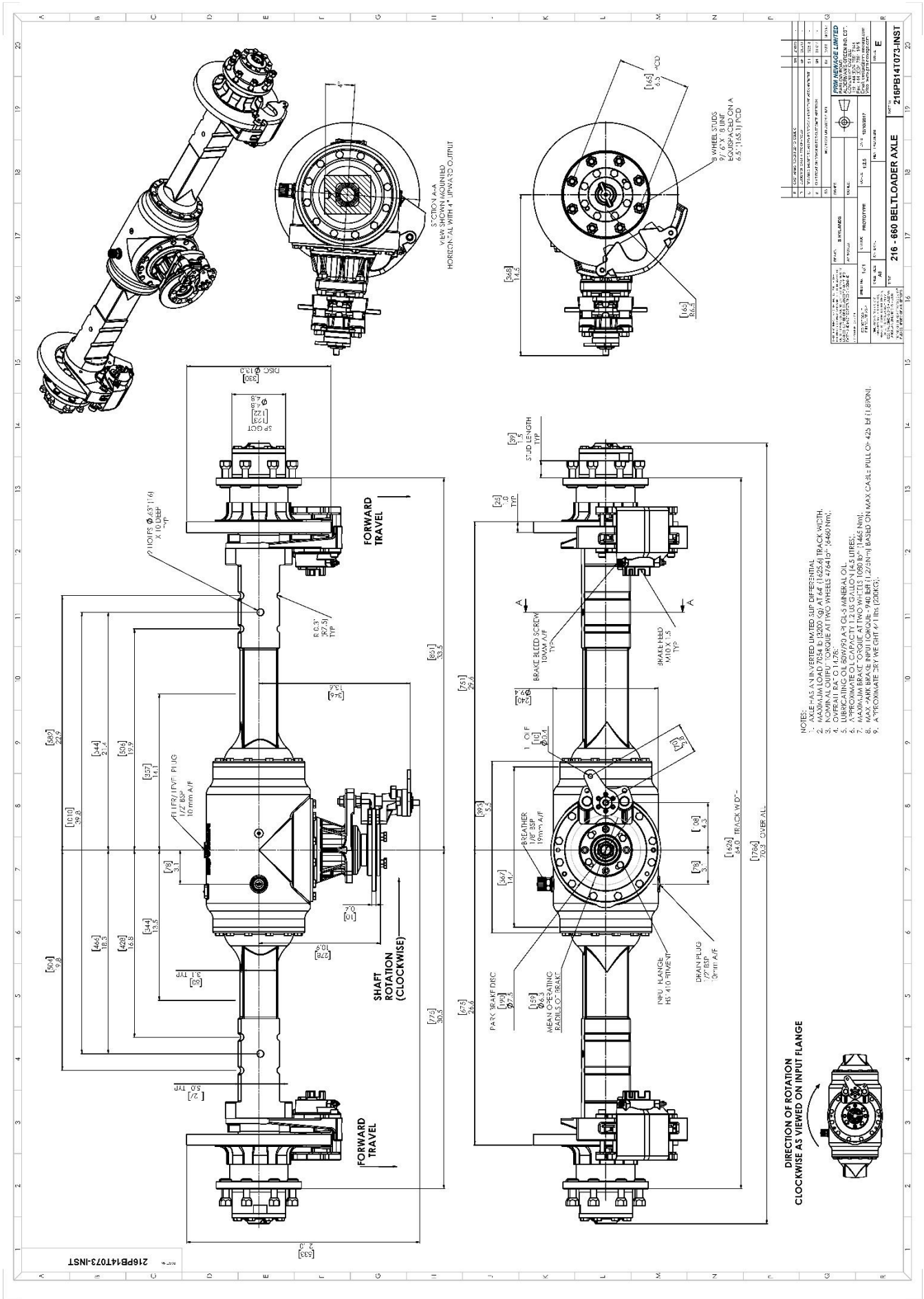
The 216B14T073, 216PB14T073, 216P14T073 & 21614T073 series axle is a double reduction unit featuring a Hydraulic Disc Braking system.

The 1st reduction Spiral Bevel Pinion and Crown Wheel driving a 4 Pinion Limited Slip 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

<b>Overall Ratio</b>	14.78:1
<b>Input Flange</b>	HS1410
<b>Wheel Fixing</b>	6 studs: 9/16" X 18 UNF-2B on 165.10 mm (6.50") PCD
<b>Dynamic Axle Load Rating</b>	Maximum load rating 3000 Kg (6600 lbs) based on 1625 mm (64.0") wheel track
<b>Service Brake</b>	See Torque/Pressure Graph
<b>Approximate weight</b>	194 kg (428 lb) dry
<b>Oil Capacity</b>	Approximately 4.5 litres (8 Pints)

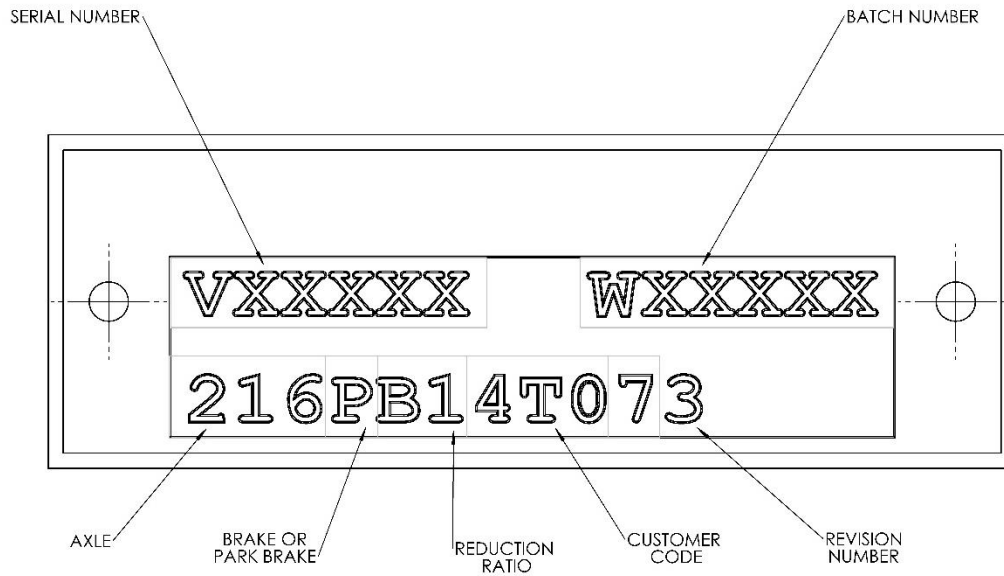
# Installation Drawing



## IDENTIFICATION

If spares are required, please quote the axle model, the vehicle/machine model and serial number from the blue plate. 216 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 Mounting Bolt	Weekly

### Lubricants

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

- SAE 80W-90 API Service GL-5 Spec Limited Slip Diff Oil.

**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 rear of the axle Main Case.

Apply P-80 Oil Seal lubricant to clean Wheel Hub Stub Axle when installing a new unitized Hub Seal.

### 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

### Service Brake Fluid

The Service Brakes operate with the Brake 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.**

For locking features, the following compound must be used:

- Loctite 270

**NOTE: An alternative engineering approved locking compound may be used.**



## Fastener Tightening Torques

Fastener	A/F (mm)	Torque (N.m)	Torque (lbf.ft)
	Across Flats	Newton Metres	Pounds Force Feet
Axle Arm/Main Case High Tensile Bolts (M10)	17	84	62
Axle Shaft/Wheel Hub Cap Bolt (M10) Use Loctite 243	17	84	62
Brake Calliper Bracket Mounting Socket Screw (M16)	14	230	170
Differential assembly Nut (M10)	17	57	42
Differential Bearing Adjuster Nut – (Special Tool required – SEE BELOW)	½” SQUARE DRIVE	20	15
Differential/ Pinion Housing Bolt (M10)	17	84	62
Drain and Level Plug (1/2” BSP)	10	16	12
Hub Assembly Lock Nut (M55) – TMFS11 (See Below)	---	135	100
Wheel Nuts (9/16” UNF)	7/8”	230	170
Differential Housing Bolt (M8)	13	30	22
Calliper Guide Bolt (use Loctite 270) 7/16” UNF	5/16”	47/54	35/40
Pinion Nut (use Loctite 243) M24	36	340	250

## Axle Backlash

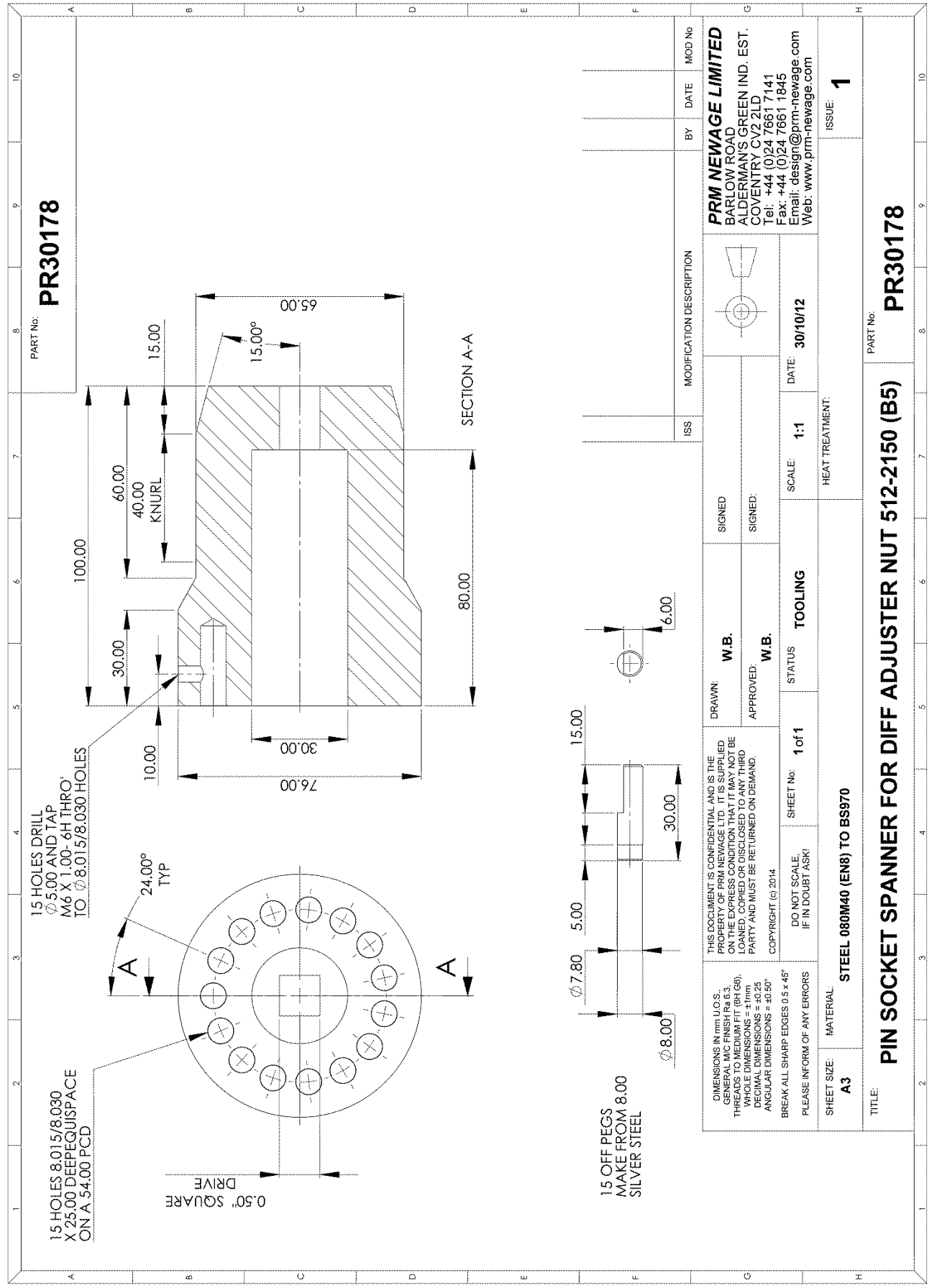
Assembly	Pinion/Wheel	Drive Flange	P.C.D	Backlash
620-9820	618-2000 620-2010	216-2181 (HS 1410)	95.25 mm (3.750”)	0.31-0.39mm (0.012-0.015”)

## Tooling

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

**PR30178** Pin Socket Spanner for Diff Adjuster 216-2150 (B8)

**TMFS11** - ¾” Drive Socket Tool available from SKF Bearings.



PART No: **PR30178**

15 HOLES DRILL  
 $\phi$  5.00 AND TAP  
 M6 X 1.00-6H THRO'  
 TO  $\phi$  8.015/8.030 HOLES

15 HOLES 8.015/8.030  
 X 25.00 DEEP EQUISPACE  
 ON A 54.00 PCD

24.00°  
 TYP

0.50" SQUARE  
 DRIVE

SECTION A-A

15 OFF PEGS  
 MAKE FROM 8.00  
 SILVER STEEL

DIMENSIONS IN mm U.O.S.  
 GENERAL MC FINISH Ra 6.3.  
 THREADS TO MEDIUM FIT (9H G6).  
 WHOLE DIMENSIONS =  $\pm$  1mm  
 DECIMAL DIMENSIONS =  $\pm$  0.25  
 ANGULAR DIMENSIONS =  $\pm$  0.50°  
 BREAK ALL SHARP EDGES 0.5 x 45°  
 PLEASE INFORM OF ANY ERRORS

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DO NOT SCALE,  
 IF IN DOUBT ASK!

STATUS: **TOOLING**  
 SHEET No: **1 of 1**

SCALE: **1:1**  
 DATE: **30/10/12**

HEAT TREATMENT:

SHEET SIZE: **A3**  
 MATERIAL: **STEEL 080M40 (EN8) TO BS970**

ISSUE: **1**

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 Email: design@prm-newage.com  
 Web: www.prm-newage.com

PART No: **PR30178**

TITLE: **PIN SOCKET SPANNER FOR DIFF ADJUSTER NUT 512-2150 (B5)**

## SERVICING AND REPAIRS

**WARNING:** Before carrying out any service work always ensure that the engine 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

**IMPORTANT NOTICE: ONLY REMOVE BREATHER, OIL DRAIN PLUG OR OIL LEVEL PLUG ONCE THE AXLE IS AT AMBIENT TEMPERATURE. REMEMBER HOT OIL CAN CAUSE BURNS – WORK SAFELY.**

**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. initial or progressive gear pitting.

### Bearings

Inspect for any damage, denting, initial or progressive pitting and 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. Refer to Fastner Tightening Torque on page 9.**



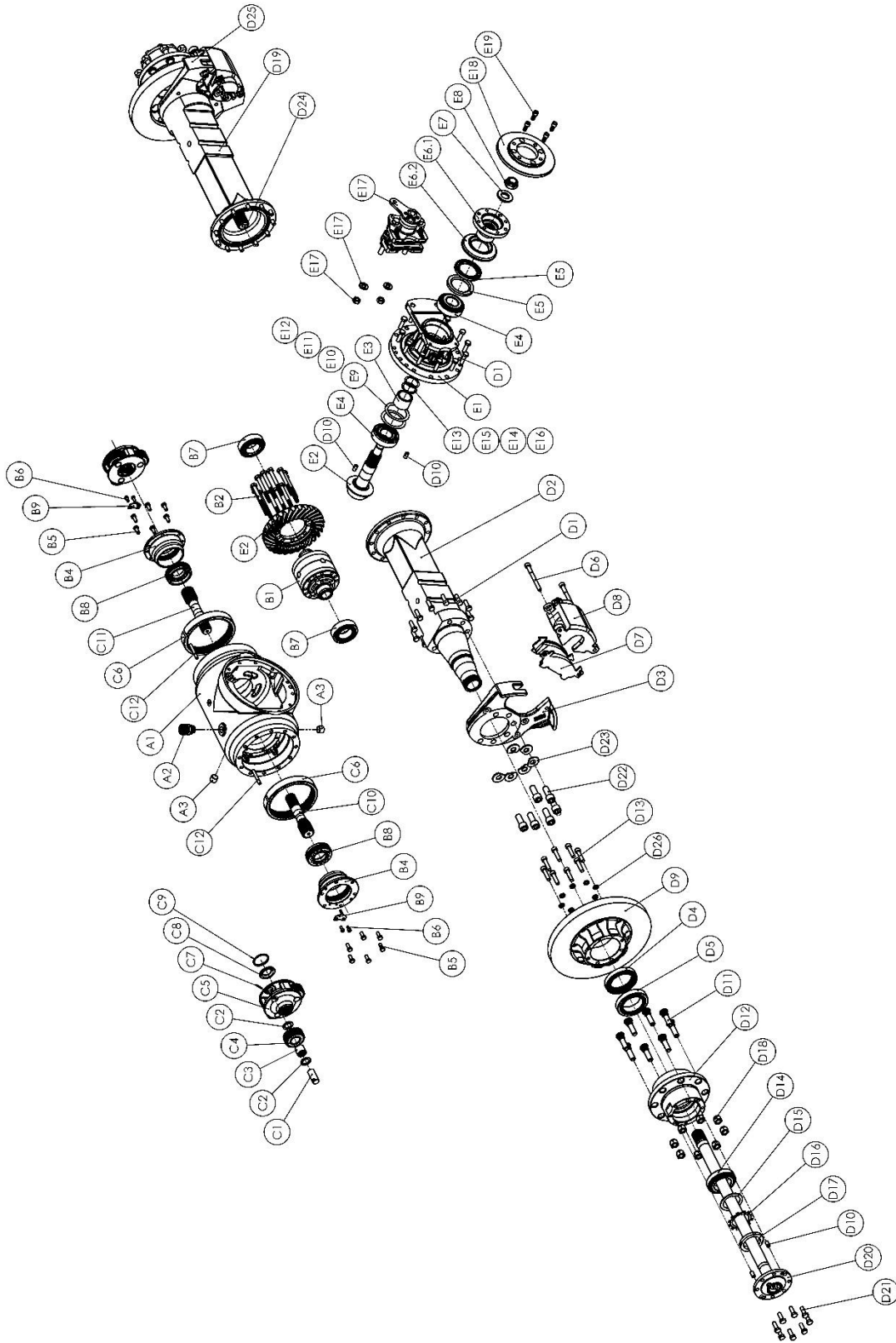
Some servicing operations can be carried out with the Axle still mounted to the vehicle (provided, of course, that there is sufficient space); an example of this is the replacement or repair of the brake assemblies. The repair or replacing the Differential, Planetaries or Arm assemblies however will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

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: All gears are supported by taper roller Bearings. Each time a bearing has been removed for inspection, component repair or replacement it will be necessary to recalculate the number of Shims or adjust the Wheel and Differential Bearing to give the required pre-load. Re-Shimming of the Axle is detailed under the Axle Shimming procedure.**



# Section 'A' – 216B14T073 - 216PB14T073 Axle Assembly

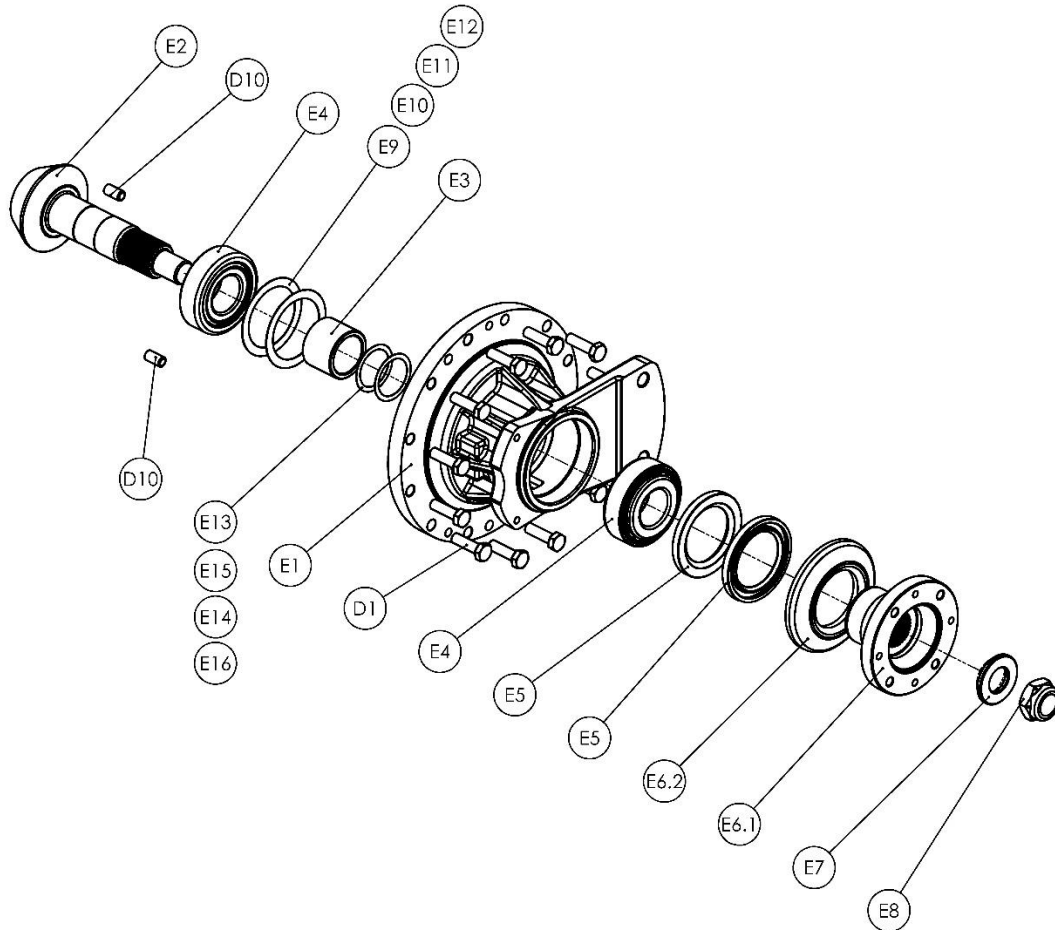


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
A1	216-0012	MAIN CASE	1
A2	CP1498	BREATHER ASSEMBLY	1
A3	0150250	FILLER/ LEVEL/ DRAIN PLUG 1/2" BSP	1
B1	616-9631	LIMITED SLIP DIFFERENTIAL ASSY	1
B2	0041022HT	BOLT (PART OF "B1" 616-9631)	12
B3			
B4	216-0730	BEARING HOUSING	2
B5	0040807	BOLT	12
B6	0081312P	SCREW	4
B7	0540453	BEARING	2
B8	216-2150	BEARING ADJUSTER NUT	2
B9	616-2160	LOCK PLATE	2
B10	216-2590	FIXED CLUTCH PLATE	10
B11	216-2600	SINTERED CLUTCH PLATE 1.6 THICK	8
B12	216-2580	SINTERED CLUTCH PLATE 2.8 THICK	2
B13	216-2090	DIFFERENTIAL WHEEL	2
B14	410-2100	DIFFERENTIAL PINION	4
B15	216-2120	DIFFERENTIAL PINION THRUST WASHER	4
B16	216-2130	DIFFERENTIAL SPIDER	2
C1	220-0250	PLANET PIN	6
C2	250-0270	PLANET THRUST WASHER	12
C3	0562002	NEEDLE BEARING	6
C4	220-0080	PLANET GEAR	6
C5	220-0061	PLANET CARRIER	2
C6	210-0070	ANNULUS	2
C7	028T330	TUBULAR PIN	6
C8	220-1320	SPACER	2
C9	003-0140	CIRCLIP	2
C10	216-0091	SUN GEAR - LH	1
C11	216-0092	SUN GEAR - RH	1
C12	010-0160	DOWEL D8 X 60	4
D1	0041009HTP	BOLT	28
D2	216-0022	AXLE ARM - LH	1
D3	216-2401	SERVICE BRAKE BRACKET LEFT HAND	1
D4	217-2850	VITON SEAL	2
D5	0540604H	BEARING	2
D6	NA	CALLIPER BOLT (ONLY SOLD WITH D8)	4
D7	512-2510	BRAKE PADS (IF FITTED)	4

D8	512-2500	SERVICE BRAKE ASSEMBLY (IF FITTED)	2
D9	216-0750	BRAKE DISC	2
D10	010-0040	DOWEL D10 X 20	6
D11	512-0454	WHEEL STUD - 9/16" UNF	16
D12	216-0041	HUB ADAPTOR	2
D13	0081535	CAP SCREW	16
D14	0540552H	BEARING	2
D15	350-1440	SPACER	2
D16	010W551	LOCK WASHER M55	2
D17	010N551	LOCK NUT M55	2
D18	007-0400	WHEEL NUT - 9/16 UNF	16
D19	216-0023	AXLE ARM - RH	1
D20	216-0101	AXLE SHAFT - LH	1
D21	0041009HTP	BOLT	16
D22	0081740P	BOLT	12
D23	0191316	HEICO LOCK WASHER	12
D24	216-0102	AXLE SHAFT - RH	1
D25	216-2402	SERVICE BRAKE BRACKET RIGHT HAND	1
D26	0191308	HEICO WASHER	16
E1	216-2301	INPUT PINION CARTRIDGE	1
E2	620-9820	GLEASON WHEEL & PINION	1
E3	216-2890A	SOLID SPACER	1
E4	055CU024H	BEARING	2
E5	002-0070V	VITON SEAL	2
E6.1	216-2182	INPUT DRIVE FLANGE - HS1410	1
E6.2	400-0910	SEAL COVER - PART OF E6.1	1
E7	400-2190	WASHER	1
E8	400-2200	PINION NUT M24 X 2 NYLOC	1
E9	057313A	SHIM 0.002"	AS REQ
E10	057313B	SHIM 0.003"	AS REQ
E11	057313C	SHIM 0.010"	AS REQ
E12	057313E	SHIM 0.031"	AS REQ
E13	057189A	SHIM 0.05 mm	AS REQ
E14	057189B	SHIM 0.125 mm	AS REQ
E15	057189C	SHIM 0.25 mm	AS REQ
E16	057189F	SHIM 0.30 mm	AS REQ
E17	512-2520	MECHANICAL PARK BRAKE	1
E18	216-0751	PARK BRAKE ROTOR	1
E19	UFC614	BOLT	4
* MECHANICAL PARK BRAKE KIT – 216-2520-KIT (COMPRISING OF E17, E18 & E19)			

## Pinion Shimming Procedure for correct Crown Wheel & Pinion Tooth Contact

**NOTE:** The below procedures assume the Axle is stripped down following the above Service Procedures and details the reassembly and shimming of the Input Pinion (E2) into the Main Case.



If the Crown Wheel and Pinion (E2) or Pinion Head Bearing (E4) are replaced, the following procedure needs to be carried out for correct contact of the Bevel Gear set:

Record the following information of the current components fitted as follows:-

- (1) The new Pinion (E2) mounting distance etched on the head.
- (2) The new overall Bearing (E4) width of Pinion head bearing.
- (3) Pinion Cartridge (A1) mounting distance case constant for 216 = 132.27mm.
- (4) Shim thickness (E9, E10, E11) = Case Constant – (Mounting Distance + Bearing

Width)

$$= 132.27\text{mm} - (1 + 2)$$

e.g. For theoretical normal shims:

$$= \text{Case Constant} - (\text{Mounting Distance} + \text{Bearing Width})$$

$$= 132.27\text{mm} - (102.00\text{mm} + 29.37\text{mm})$$

$$= 0.90\text{mm required}$$



## Pinion Shimming Procedure for the Pinion Bearings (E4) Pre-load using Solid Spacer (E3) and Shims (E13)

Note: This Procedure must be carried out after the Pinion Shimming Procedure for Contact.

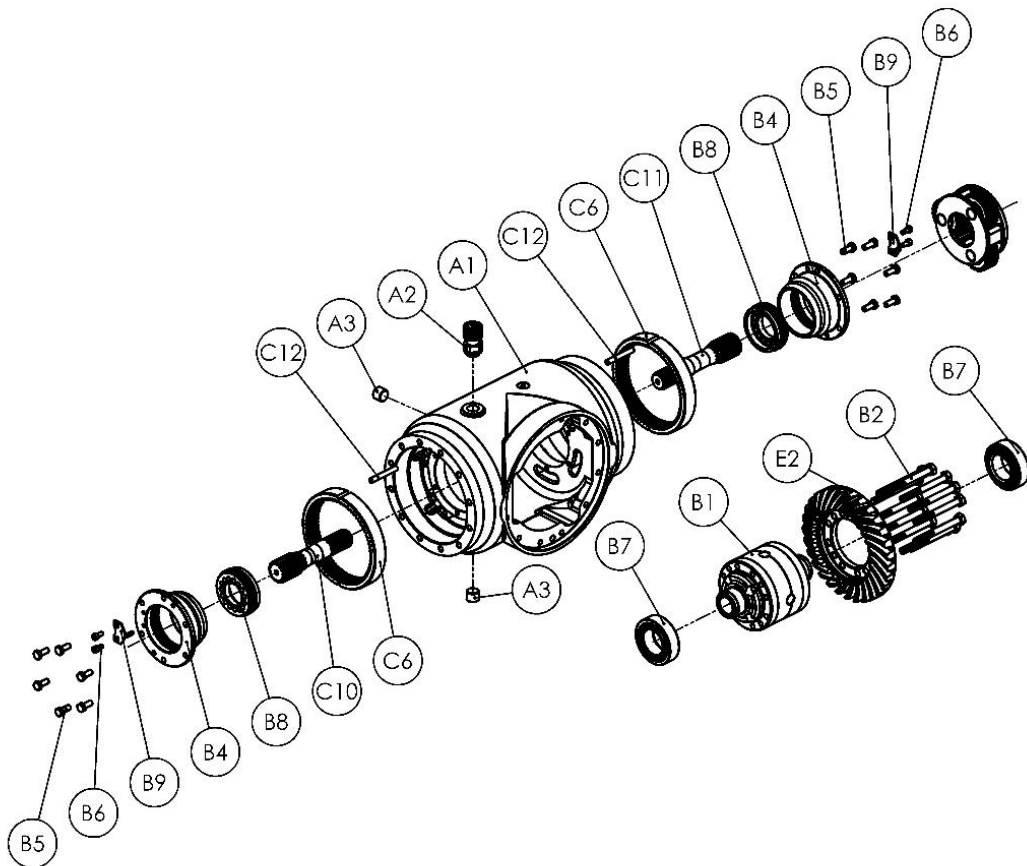
1. Measure the combined overall length of the Solid Spacer (E3) & Shims (E13 – E16)
2. Fit the Solid Spacer (E3) with the counterbored recess towards the head of the Pinion and approximately 0.080" thickness Shims (E13 – E16) afterwards
3. Drift on the taper Bearing (B4) onto the Pinion (E2) on top of the shims through the Pinion Cartridge (E1) & turn the Input Flange (E6.1) with the Seal Cover (E6.2) and Washer (E7) and tighten the M24 Nyloc Nut (E8) to 250lbft
4. Fit the Pinion Cartridge Assembly to the Main Case (A1) with 4 off Bolts (D1) equally spaced
5. Magnetise a Dial Test Indicator (DTI) base to the MainCase (A1)and position the plunger on the end of the Pinion Shaft (E2) or the Drive Flange (E6.1)
6. Push and Pull the Flange (E6.1) to record the Maximum movement
7. Remove the Nyloc Nut (E8), Washer (E7), Drive Flange & Cover (E6.1, E6.2) & 4 off Bolts (D1)
8. Pull off the Cartridge Assembly (E1) and drift through the Pinion (E2)
9. Remove the recorded movement figure from the fitted shims – 0.001"and refit adjusted shims (E13), Bearings (E4) , Seals (E5), Drive Flange (E6.1) with Cover (E6.2) with sealant applied to the face and a new Lyloc Nut (E8) with Loctite 243 applied to the thread and tighten.
10. Apply a continuous bead of sealant between and around the holes to the Main Case (A1) clean joint face and fit the cartridge (B1) ensuring both faces are clean.
11. Fit 12 of Bolts (D4) through the cartridge holes into the Main Case and tighten to the recommended torque.
12. Tighten the new M24 Nyloc Nut (E8) to 250 lbft.
13. This arrangement complete and with the Pinion disengaged from the Crown Wheel mesh would produce approximately 17/22 lbin of drag torque which equates to 0.001" pre-load on the Pinion Bearings.

### *Resetting Backlash:*

1. Refit Crown Wheel (E2), Differential Assembly (B1-B10), with Bearings (B8) within the Main Case (A1) Tighten Cap Screws (D1) to the recommended torque and adjust the Bearing Adjuster Nuts (B8) into position to remove all backlash from the Crown Wheel & Pinion (E2) mesh.
2. Re-adjust the Bearing Adjuster Nuts to move the Crown Wheel out of mesh to achieve a 0.31/0.39 mm backlash, when measured on the HS1410 Drive Flange 3.75-inch bolt circle.
3. Tighten the Bearing Adjuster Nut (B8) opposite the Crown Wheel (E2) to 20Nm (15lbft) and fit new 1 off cap screw (B6) into hole in Adjuster Nut (B8). Check the opposing Bearing Adjuster Nut (B8) & tighten to 20Nm (15lbft). Lock in position using 2 off Cap Screw (B6) tightened to 20Nm (15lbft).

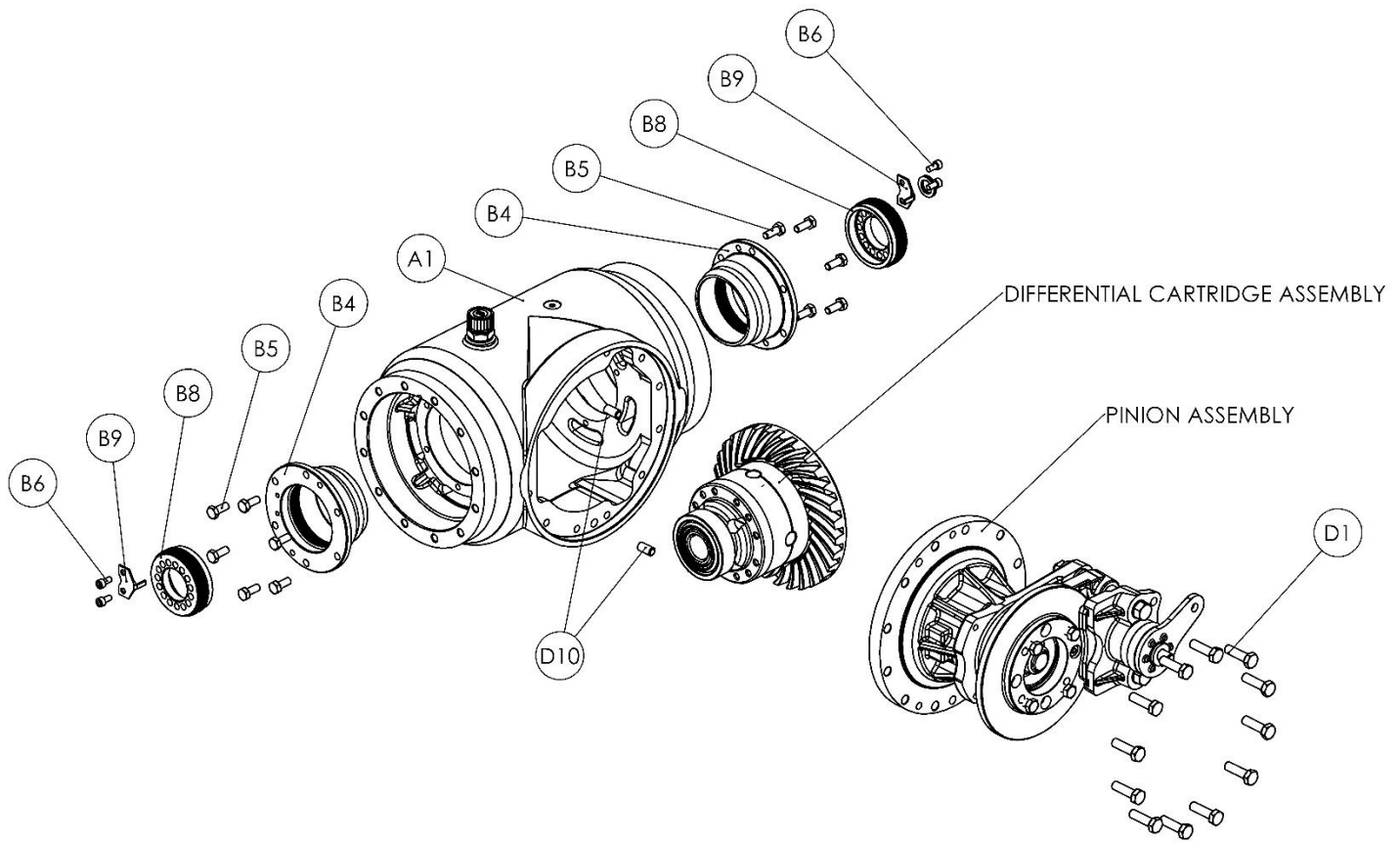
## Section 'B' – Main Case and Differential Assembly

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
A1	216-0012	MAIN CASE	1
A2	CP1498	BREATHER ASSEMBLY	1
A3	0150250	FILLER/ LEVEL/ DRAIN PLUG 1/2" BSP	2
B1	616-9631	LIMITED SLIP DIFFERENTIAL	1
B2	0041022HT	BOLT	12
B3			
B4	216-0730	BEARING HOUSING	2
B5	0040807	BOLT	12
B6	0081312P	SCREW	4
B7	0540453	BEARING	2
B8	216-2150	BEARING ADJUSTER NUT	2
B9	616-2160	LOCK PLATE	2
C6	210-0070	ANNULUS	2
C10	216-0091	SUN GEAR - LH	1
C11	216-0092	SUN GEAR - RH	1
C12	010-0160	DOWEL D8 X 60	2
E2	620-9820	GLEASON WHEEL & PINION	1



## Servicing the Main Case and Differential Assemblies (Section “B”)

### 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 (D1) and withdraw the Pinion cartridge assembly complete, retaining the Dowels (D10). The extraction screw holes will assist in withdrawal.
4. Remove Screws (B6) and Lock Plate (B9) from both sides.
5. Support the Differential Assembly with a sling through the Pinion access bore.
6. Remove the Adjuster Nuts (B8) from the Bearing Housing (B4) both ends.
7. Remove Bolts (B5) and Bearing Housing (B4) from both ends.
8. The Differential can now be lifted and removed from the Main Case (A1).

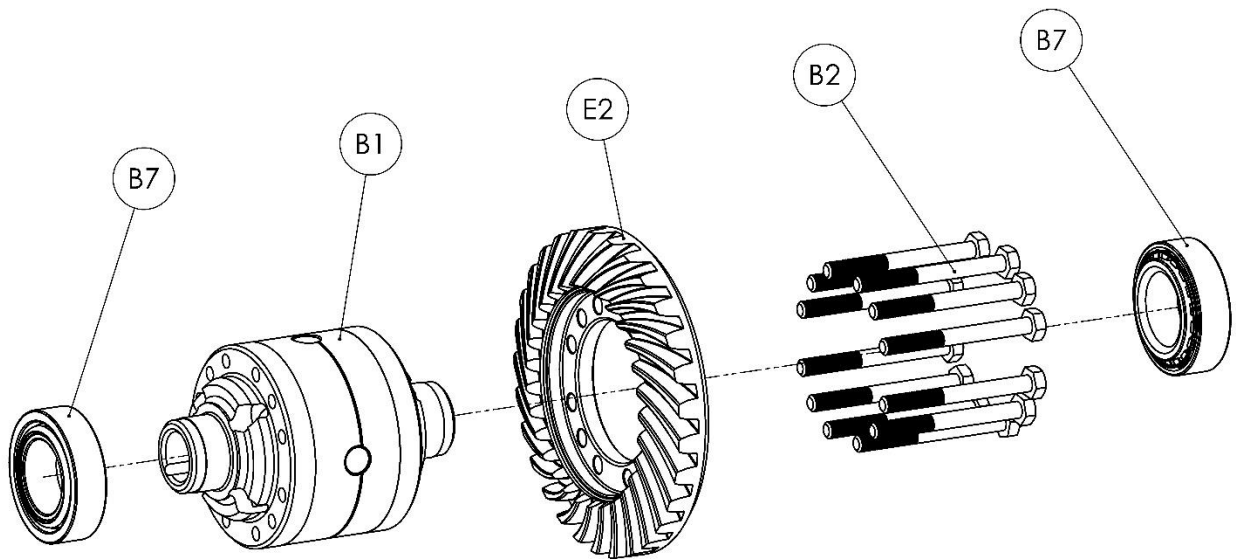


**CAUTION:** Great care must be taken when removing the Differential Assembly from Main Case. Any damage to the Crown Wheel would be detrimental to the axles' performance.



**WARNING:** The space constraints around the differential are very tight. The Differential/ Pinion Assembly weights 20Kg, so ensure that you have a good grip on the casing before attempting to remove the assembly from the case.

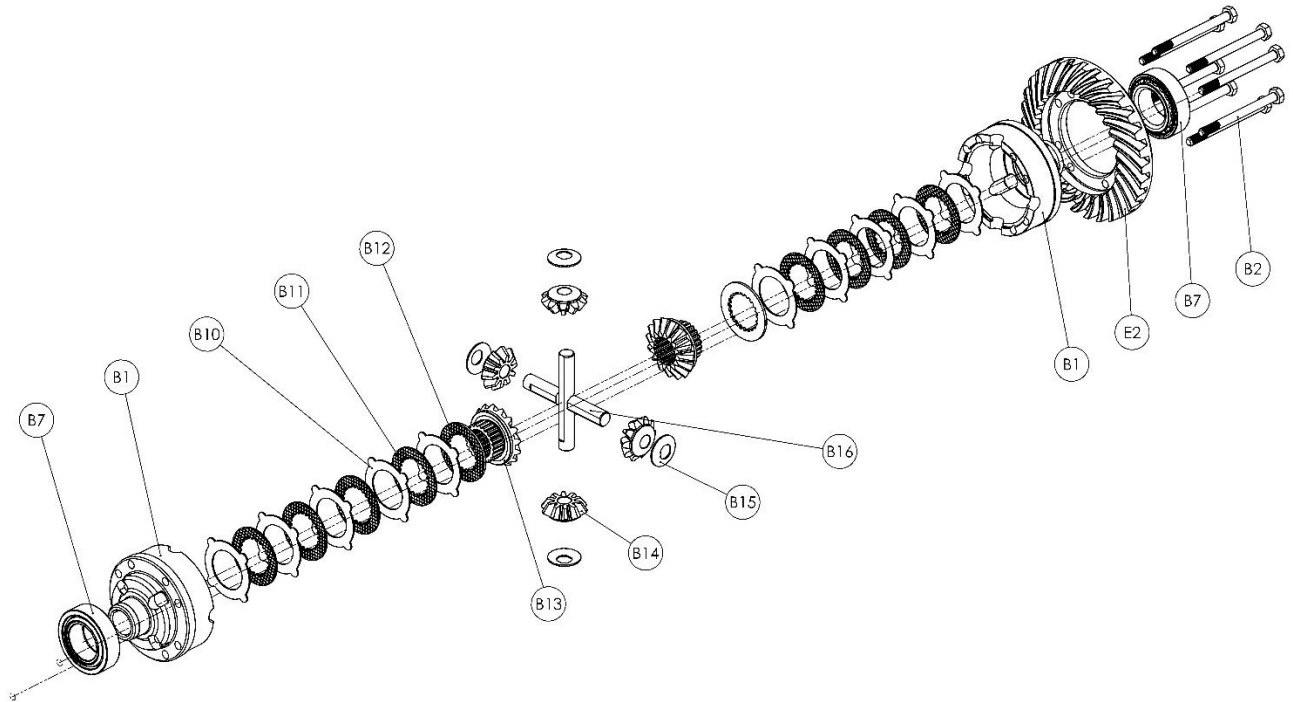
## Servicing the Limited Slip Differential Assembly (Section “B”) for Crown Wheel replacement



1. Remove the Bolts (B2).
2. The Crown Wheel (E2) is now loose and can be withdrawn from the Differential Assembly Case.
3. Replace at least 3 Bolts (B2) to keep the Differential (B1) together.

**NOTE:** To reset the backlash, see page 15 for the procedure. The acceptable range can be found on page 9

## Servicing the Limited Slip Differential Assembly 616-9631

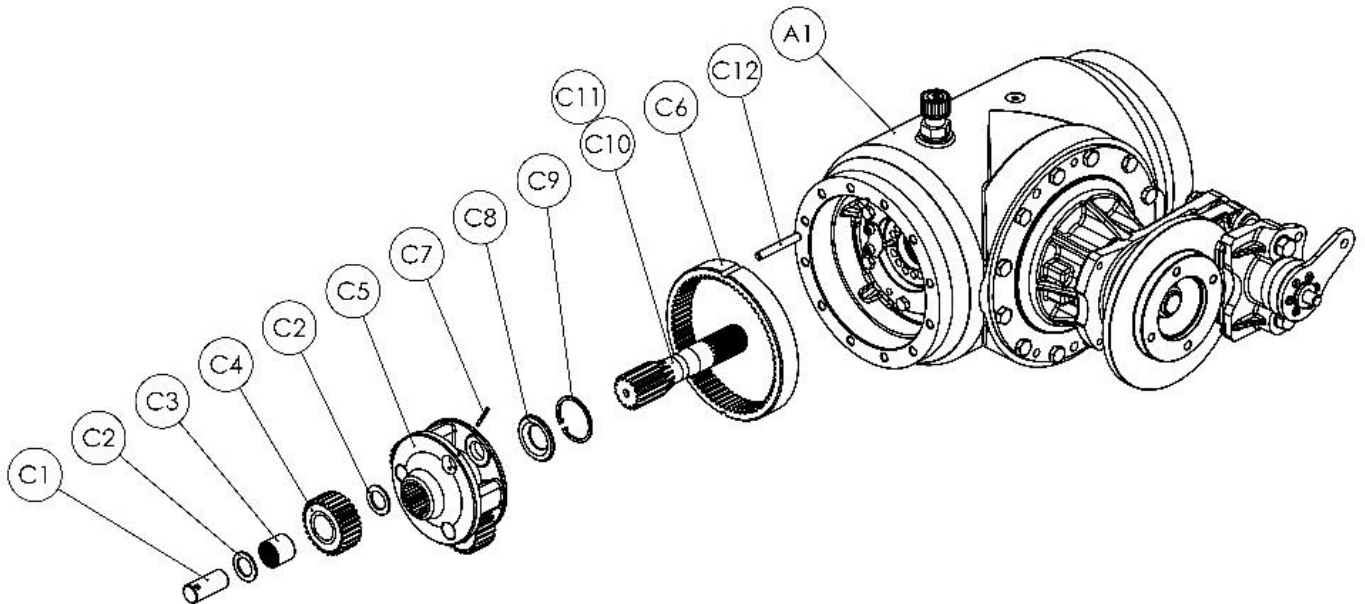


1. Place the Assembly vertically with the Crown Wheel (E2) towards the top
2. Remove Bolts (B2).
3. The Crown Wheel (E2) is now loose and can be withdrawn from the Differential Assembly (B1)
4. Remove the top half of the Diff (B1) taking care that the Clutch Plates (B10, B11 & B12) and the Diff Wheel (B13) do not drop and get damaged.
5. Place all retrieved Clutch Plates (B10, B11 & B12) in order and check for damage.
6. Place Diff Wheel (B13) to one side, check for damage and replace if necessary.
7. Carefully remove Spider (B16) together with Pinion Wheel (B14) and Pinion Thrust Washer (B15) and inspect for damage, replace as necessary .
8. Remove the lower Diff Wheel (B13) together with the lower Clutch Plates (B10, B11 & B12) in order and check for damage, replace as necessary
9. Any wear or damage to the Clutch Plates (B10, B11 & B12) should be replaced as a set.
10. Assemble in the reverse order making sure that all parts are clean.
11. Place top half of Diff Housing (B1) onto assembly.
12. Replace Diff Wheel (E2) and Bolts (B2) and tighten to 57 lbft (77Nm)

## Section 'C' – Planet Carrier Assembly

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
C1	220-0250	PLANET PIN	6
C2	250-0270	PLANET THRUST WASHER	12
C3	0562002	NEEDLE BEARING	6
C4	220-0080	PLANET GEAR	6
C5	220-0061	PLANET CARRIER	2
C6	210-0070	ANNULUS	2
C7	028T330	TUBULAR PIN	6
C8	220-1320	SPACER	2
C9	003-0140	CIRCLIP	2
C10	216-0091	SUN GEAR - LH	1
C11	216-0092	SUN GEAR - RH	1
C12	010-0160	DOWEL D8 X 60	2
A1	212-0010	MAIN CASE	1

**NOTE: Quantities stated per Axle**



### Servicing the Planet Carrier Assemblies (Section "C")

**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 to withdraw the floating Sun Gear (C10/C11).
2. Check the Planet Gears (C4) and the mating gear teeth on the Annulus (C6) and Sun Gear (C10) for damage and wear. The Planet Gears (C4) should run free in the Planet Pins (C1), without excessive radial "play". Replace if worn.

**NOTE: When servicing the Planet assembly, we recommend all three Planet Gears (C4), Planet Pins (C1), Needle Roller Bearings (C3), Spring Dowels (C7), Annulus (C6) & Sun Gear (C10 or C11) are replaced together. Dowels (C12) 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 (C5). Once the Dowels have been removed, lightly drift each Planet Pin (C1) through the Planet Gear (C4) and Planet Carrier (C5). Remove the loose Planet Gears (C4), 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 (C5).**

To reassemble:

1. Replace the Spacer & Circlip (C8 & C9) and slide the Needle Roller Bearings (C3) into the Planet Gears (C4). Fit the bottom Thrust Washer (C2) over the machined boss within the Planet Carrier (C5), place the Planet Gear (C4) 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 (C5), bottom Thrust Washer (C2) & Planet Gear (C4).

**NOTE: When you begin this procedure, the cross hole in the Planet Pin (C1) must be aligned with the cross hole in the Planet Carrier (C5).**

2. When part way through fit the top Thrust Washer (C2) and continue to drift the Planet Pin (C1) all the way through the Planet Carrier until it is flush with the Planet Carrier machined face (C5).
3. Secure by fitting a new Spring Dowel (C7) in the Planet Carrier (C5). To prevent the Spring Dowel (C7) from drifting out of position. The end should be peined into the Planet Carrier (C5). Failure to do this can cause the Spring Dowel (C7) of the Planet Gear (C4) to work loose.
4. Check for free rotation of the Planet Gears (C4) off their respective Planet Pin (C1).
5. This process is repeated for all three Planet Gear fitment (C4).
6. To refit, engage the Teeth of the Sun Gear (C10/C11) with those of the Planet Gears (C4). Mesh the Planet Gears with the Annulus (C6) and push into position.

## Removing the Annulus Gear

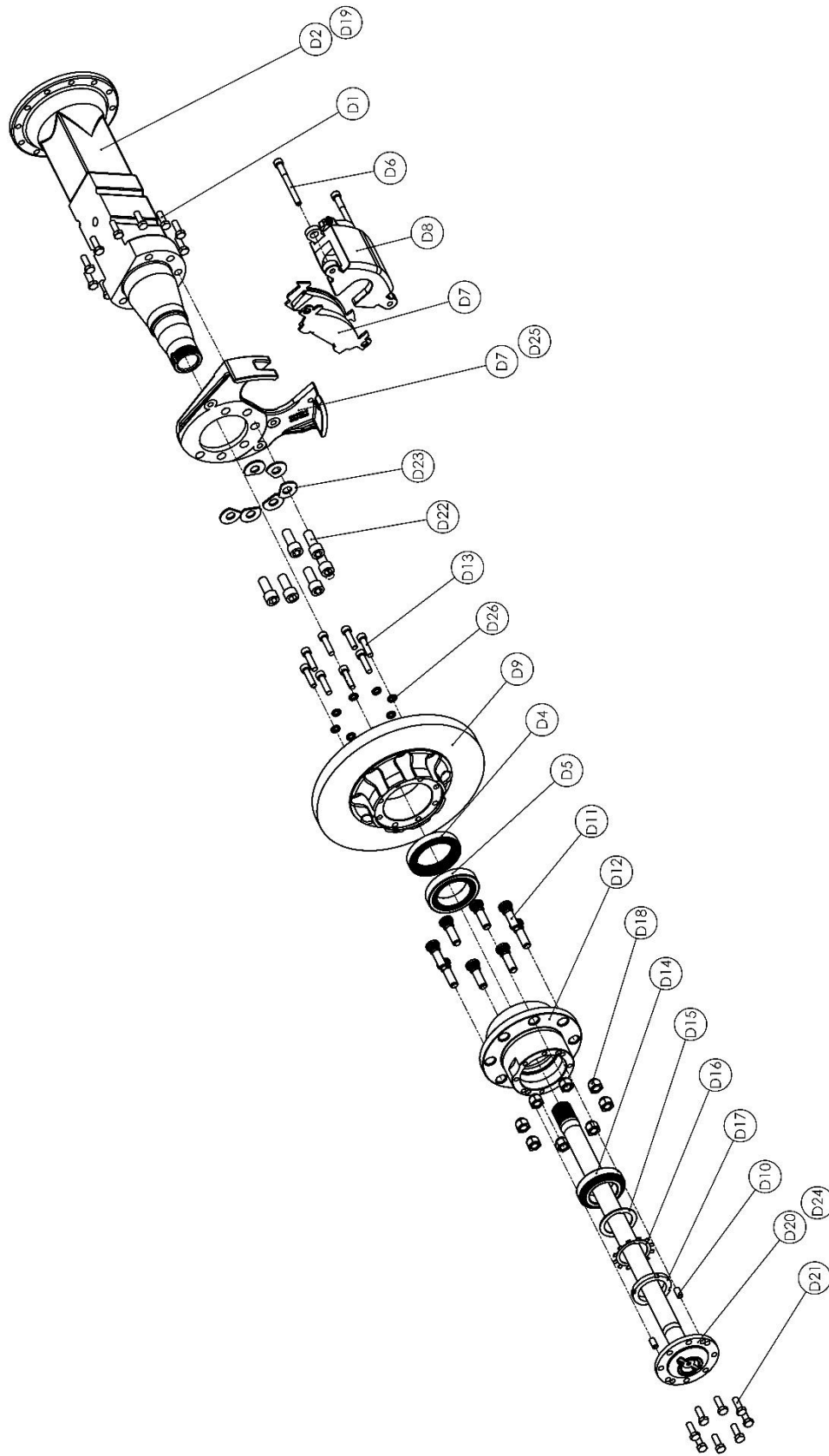
1. To remove Annulus (C6), use a special purpose extractor tool or pinch bars, located behind the Annulus (C6) diametrically opposed, in a scissor fashion to prise the Annulus clear of the Maincase bore (A1).
2. To refit, drift home the Annulus ensuring that the Dowels (C12) are aligned with the half holes at the top and bottom of the Annulus (C6).

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

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
D1	0041009HTP	BOLT M10 X 30 ESLOK	16
D2	216-0022	AXLE ARM - RH	1
D3	216-2401	SERVICE BRAKE MOUNTING BRACKET - LH	1
D4	217-2850	VITON SEAL	2
D5	0540604H	BEARING	2
D6	SEE D8	CALLIPER BOLT	4
D7	512-2510	BRAKE PADS (2 Pairs – 4 Pads)	1
D8	512-2500	SERVICE BRAKE CALLIPER (INCLUDES D6 & D7)	2
D9	216-0750	BRAKE DISC	2
D10	010-0040	DOWEL D10 X 20	4
D11	512-0454	WHEEL STUD – 9/16" UNF	16
D12	216-0041	HUB ADAPTOR	2
D13	0081535	CAP SCREW	16
D14	0540552H	BEARING	2
D15	350-1440	SPACER	2
D16	010W551	LOCK WASHER M55	2
D17	010N551	LOCK NUT M55	2
D18	007-0400	WHEEL NUT - 9/16" UNF	16
D19	216-0023	AXLE ARM - LH	1
D20	216-0101	AXLE SHAFT - LH	1
D21	0041009HTP	BOLT M10 X 30 ESLOK	16
D22	0081740P	BOLT	12
D23	0191316	HEICO LOCK WASHER	12
D24	216-0102	AXLE SHAFT - RH	1
D25	216-2402	SERVICE BRAKE MOUNTING BRACKET - RH	1
D26	0191308	WASHER-M8 HEICO	16

**NOTE: Quantities stated per Axle**





## Servicing the Axle Arm, Hub and Brake Assemblies (Section “D”)

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

1. Remove Guide Bolts (D6) from the Service Brakes (D8) and remove Brake Calliper to one side.
2. Remove 8 off Bolts (D21) that secures the Axle Shaft (D20) to the Wheel Hub/Brake Disc. Withdraw the Axle Shaft (D20) using the extractor screws, and inspect the Spline form for damage and wear.
3. Straighten locking tab ears on Lock Washer (D16), unscrew & remove the Lock Nut (D17) 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 Lock Washer (D16) and Bearing Spacer (D15).
4. The Wheel Hub Adaptor (D12) and Brake Disc (D9) assembly can now be withdrawn from the Axle Arm stub.  
**NOTE: Care must be taken not to drop the loose Bearing Cones from the Wheel Adaptor**
5. Examine all Bearing Cups & Cones (D5 & D14) for wear or damage, replace as necessary.  
**NOTE: We recommend the Hub Oil Seals (D4) are always changed when the Wheel Hub Adaptor has been removed.**
6. The Bearing Cups (D5 & D14) can be drifted out of the Wheel Hub Adaptor (D12) and Brake Disc (D9) if they need replacing. When fitting new Bearing cups (D5 & D14) ensure that they are aligned squarely to the bores before pressing in or drifting into the bore.  
**NOTE: If the Rear Bearing (D5) is replaced Oil Seal (D4) will also need replacing. Ensure p-80 Oil Seal lubricant is used for a clean installation.**
7. To reassemble the Wheel Hub assembly, reverse the above procedure using a new Lock-washer (D16).
8. To adjust the Wheel Hub Bearings:
  - i. Tighten the Lock Nut (D17) 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 (D17) back a distance equal to 1 tab of the new Lock Washer (D16).
  - iii. Bend ear of Lock Washer (D16) over to secure the Lock Nut (D17).  
**NOTE: Never re-use a Lock Washer (D16).**
9. Refit Brake Calliper ensuring old Loctite is all removed from Mounting Bracket internal Guide Bolt threads using Loctite 7060 solvent Cleaner. Re-apply a continuous bead of Loctite 270 High Strength Thread Locker Adhesive into the internal thread mounting hole and a continuous bead on the new Bolt ((D6) and tighten to 35lbft (47 Nm). A cure time of 24 hours is recommended before usage for full 100% strength.

## Servicing the Brake Assemblies (Section “D”)

Each Brake Assembly consists of one floating Calliper per Arm, secured with 2 Guide Bolts (D6) and so the Calliper (D8) needs to be removed to service the Pads.

1. Remove Brake Calliper Guide Bolts (D6) and pull the Calliper assembly away from the Brake Bracket (D3/D19).
2. Remove the Brake Pads (D7) by depressing the clips within the Calliper body.
3. Inspect for Pad wear and replace where necessary. Recommended minimum Pad Thickness 3.18mm (0.125 in)
4. Inspect for Brake Disc (D9) for wear and replace where necessary. Recommended minimum Disc Thickness 20mm (0.787 in)

**NOTE: 512-2530-KIT consists of 4 Brake Pads, and we recommend replacing all the Brake Pads at the same time.**

## 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:

616-9631-KIT Differential Kit (1 kit per axle)			
Item	Part No	Description	Qty
B1	616-9631	LIMITED SLIP DIFF	1
B2	0041022HT	BOLT SUPPLIED WITH B1	12
B7	0540453	BEARING	2

216-9580-KIT Planet Kit – Left Hand (1 kit per axle)			
Item	Part No	Description	Qty
C1	220-0250	PLANET PIN	3
C2	250-0270	PLANET THRUST WASHER	6
C3	0562002	NEEDLE BEARING	3
C4	220-0080	PLANET GEAR	3
C5	220-0061	PLANET CARRIER	1
C6	210-0070	ANNULUS	1
C7	028T330	TUBULAR PIN	3
C8	220-1320	SPACER	1
C9	003-0140	CIRCLIP	1
C10	216-0091	SUN GEAR - LH	1
C12	010-0160	DOWEL D8 X 60	2

216-9581-KIT Planet Kit – Right Hand (1 kit per axle)			
Item	Part No	Description	Qty
C1	220-0250	PLANET PIN	3
C2	250-0270	PLANET THRUST WASHER	6
C3	0562002	NEEDLE BEARING	3
C4	220-0080	PLANET GEAR	3
C5	220-0061	PLANET CARRIER	1
C6	210-0070	ANNULUS	1
C7	028T330	TUBULAR PIN	3
C8	220-1320	SPACER	1
C9	003-0140	CIRCLIP	1
C11	216-0092	SUN GEAR - LH	1
C12	010-0160	DOWEL D8 X 60	2

512-2500-KIT Service Brake Calliper Kit (1 per axle)			
Item	Part No	Qty	Description
D8	512-2500	2	SERVICE BRAKE CALLIPER

512-2530-KIT Service Brake Calliper Pad Kit (1 per axle)			
Item	Part No	Qty	Description
D7	512-2510	1	SERVICE BRAKE PADS (2 PER CALLIPER – 4 PADS PER KIT)

216-9542-KIT Wheel Hub Kit (2 kits per axle)			
Item	Part No	Qty	Description
D4	217-2850	1	OIL SEAL - VITON
D5	0540604H	1	TAPER ROLLER BEARING
D9	216-0750	1	BRAKE DISC
D10	010-0040	2	DOWEL D10 X 20
D11	512-0454	8	WHEEL STUD - 9/16" UNF
D12	216-0041	1	HUB ADAPTOR
D13	0081535	8	CAP SCREW
D14	0540552H	1	BEARING
D15	350-1440	1	SPACER
D16	010W551	1	LOCK WASHER M55
D17	010N551	1	LOCK NUT M55
D18	007-0400	8	WHEEL NUT - 9/16 UNF
D21	0041009HTP	8	BOLT
D26	0191308	8	HEICO WASHER

216-9623-KIT Crown Wheel & Pinion (1 kit per axle)			
Item	Part No	Qty	Description
D1	0041010HTP	12	BOLT
D10	010-0040	2	DOWEL D10 X 20
E1	216-2301	1	INPUT PINION CARTRIDGE
E2	620-9820	1	GLEASON WHEEL & PINION
E3	216-2890A	1	SOLID SPACER
E4	055CU024H	2	BEARING
E5	002-0070V	2	VITON SEAL
E6.1*	216-2181	1	PARK BRAKE READY FLANGE - HS1410
E6.2*	400-0910	1	SEAL COVER - PART OF E6.1
E7	400-2190	1	WASHER
E8	400-2200	1	PINION NUT M20 X 205 NYLOC
E9	057313A	AS REQ	SHIM 0.002"
E10	057313B	AS REQ	SHIM 0.003"
E11	057313C	AS REQ	SHIM 0.010"
E12	057313E	AS REQ	SHIM 0.031"
E13	057189A	AS REQ	SHIM 0.05 mm
E14	057189B	AS REQ	SHIM 0.125 mm
E15	057189C	AS REQ	SHIM 0.25 mm
E16	057189F	AS REQ	SHIM 0.30 mm

\*NOTE: PARTS E6.1 & E6.2 ARE SUPPLIED AS A SUBASSEMBLY PART NUMBER 216-2181S/A

216-2520-KIT			
Mechanical Park Brake Conversion Kit (1 kit per axle)			
Item	Part No	Description	Qty
E17	512-2520	Mechanical Park Brake	1
E18	216-0751	Park Brake Rotor	1
E19	UFC614	Bolt	4

All spares are available from your local Newage distributor. Check our website [www.newage-prm.com](http://www.newage-prm.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

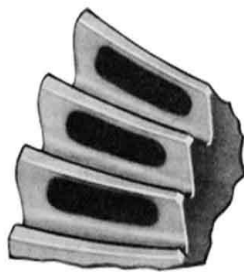
Contact may vary, but generally is approximately in the tooth centre, equi-spaced between root and tip. The marking may be towards toe on some gears on both flanks or marking crossed slightly i.e. towards toe on convex flank and heel on concave flank or vice versa.

Apply gear marking compound on both sides of 7 to 10 teeth on the Crown Wheel (E2). Whilst applying resistance to the Pinion (E2) rotate the Crown Wheel back and forth (Not Full revolutions) until a clear contact pattern is shown. Compare the contact pattern to the illustrations below and re-shim the Pinion Bearing bore in the Input Pinion Cartridge Case (E1).

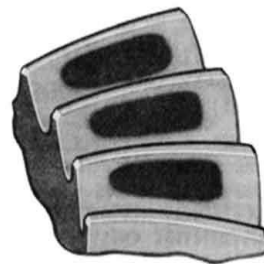
If the Taper Roller Pinion Bearing (E4) is Re-shimmed (E9 – E12) the backlash must be re-set between the Crown Wheel and Pinion (E2).

Go back and repeat all procedures in setting the backlash.

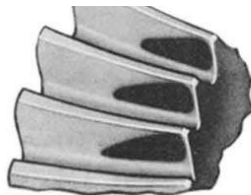
### Correct Pattern



**Ideal contact pattern**  
Correct shim  
Correct backlash

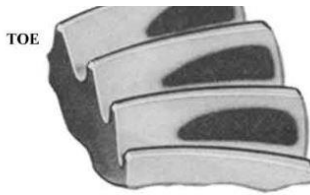


### Incorrect Pattern



TOE

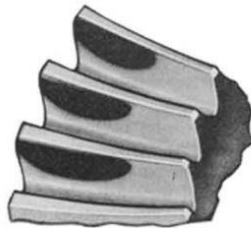
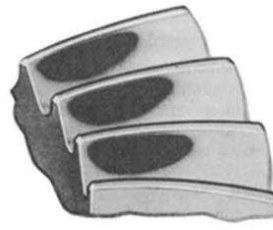
**Backlash is correct**  
Add 0.004" shim



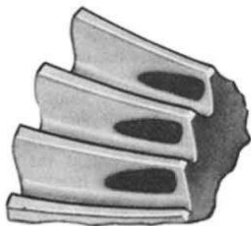
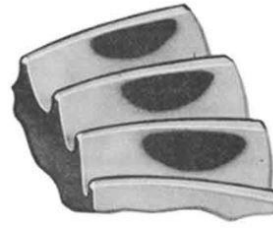
TOE



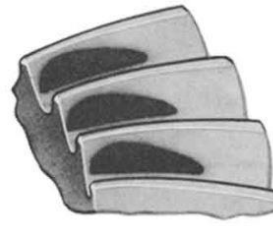
**Backlash is correct**  
Subtract 0.004" shim



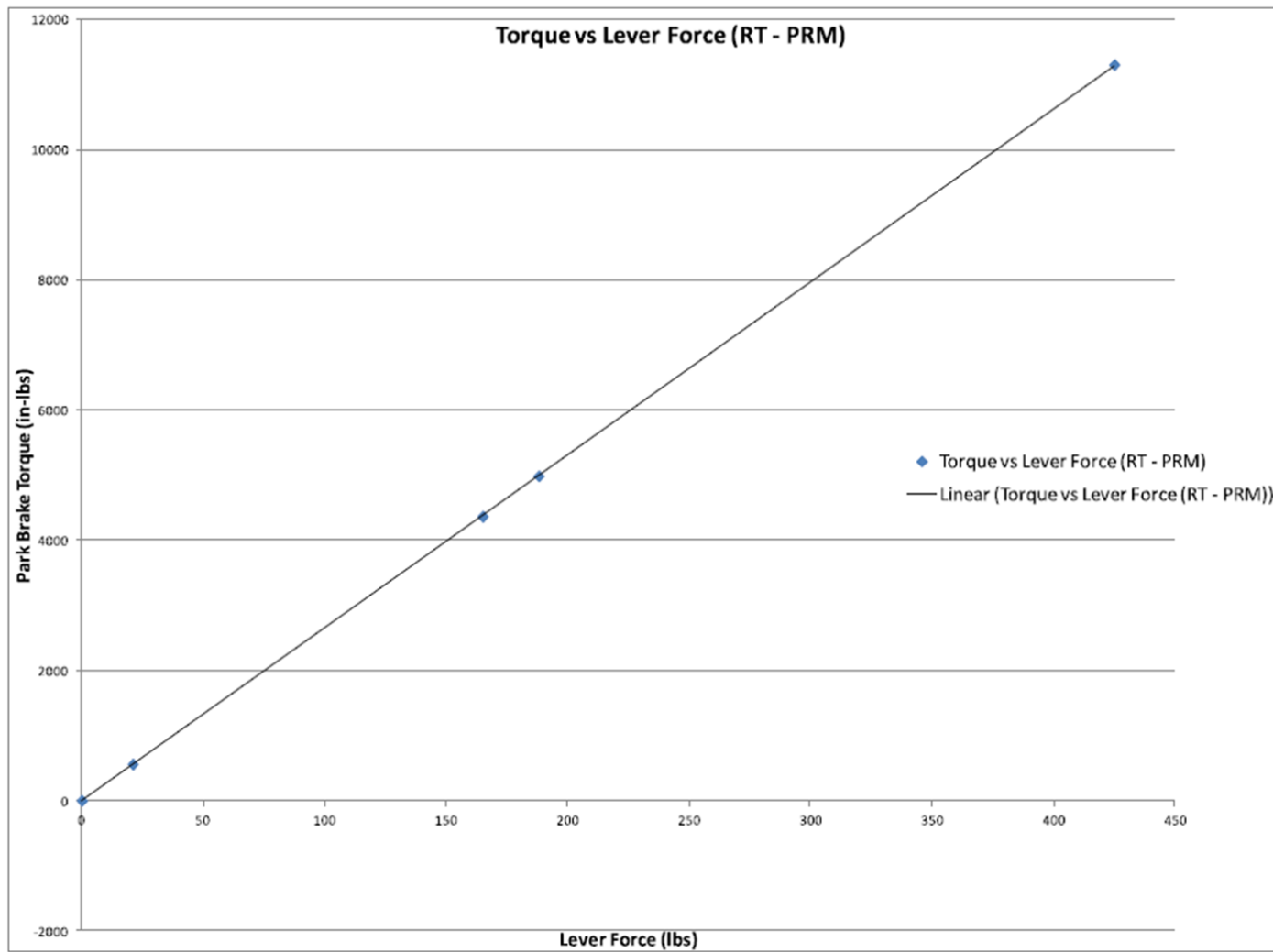
**Shim is correct**  
Decrease backlash 0.004"



**Shim is correct**  
Increase backlash 0.004"

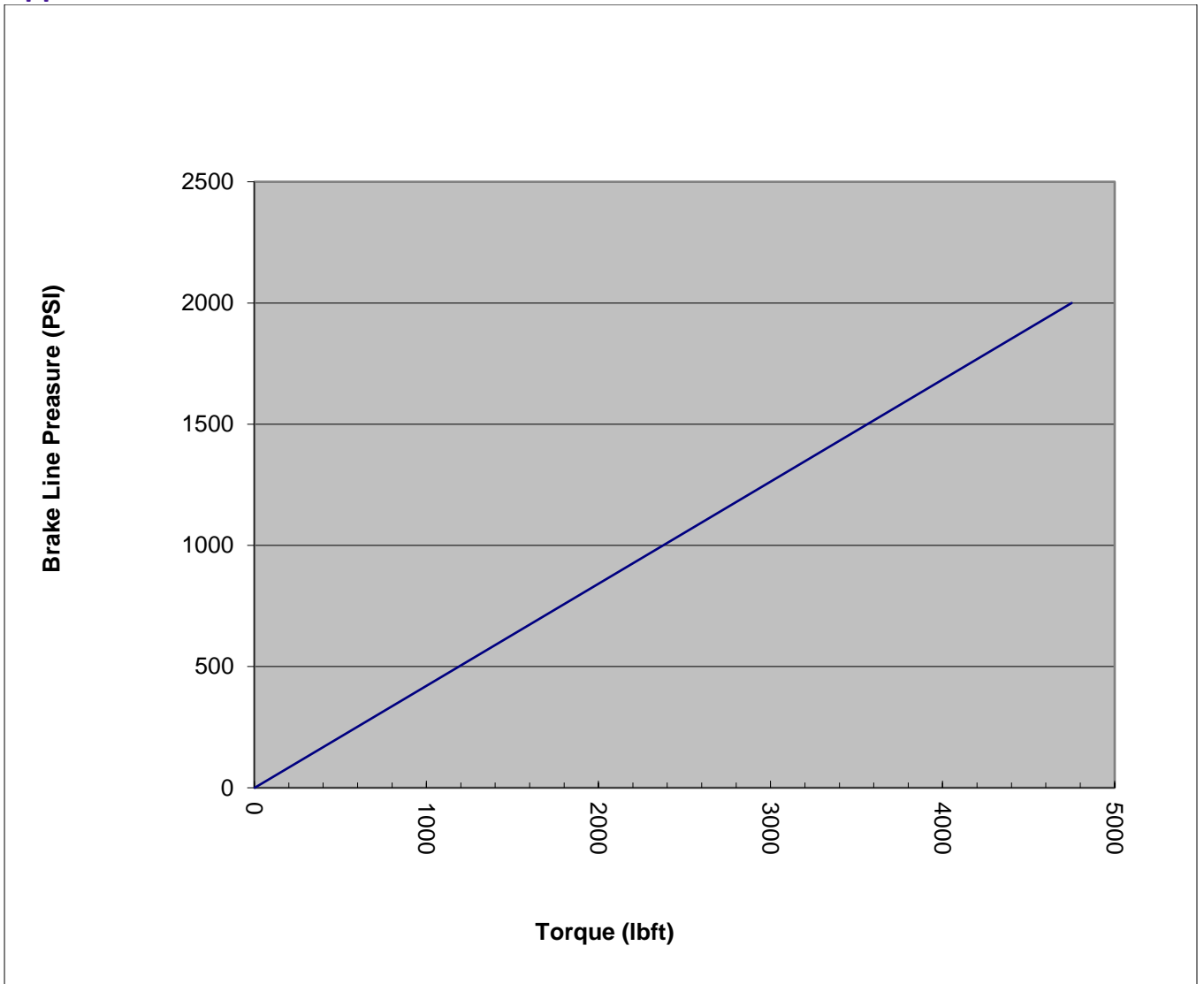


## Appendix 1 – Park Brake





## Appendix 2- Service Brake



## NOTES