

1.0 GENERAL NOTES

1.1 WORKING AREA

1.1.1 The working area to be kept clean at all times.

1.2 BEARINGS

1.2.1 Bearing mounting tackle to be kept scrupulously clean at all times.

1.2.2 Bearings to be unwrapped just prior to mounting.

1.2.3 Bearings maybe cleaned using suitable solvent (eg Lowtox) but should be re-lubricated with Shell Ensis Engine Oil 30.

Bearings are supplied grease packed however should it be required to grease pack a bearing ie in the case of a special lubricant being used, then the volume of grease used should be equal to 33% to 50% of the free volume space of the bearing.

1.2.4 Mounting of bearings to be carried out using designated tooling only.

Note: On no account should they be struck directly with a hammer or drift.

1.3 HAND FITTING COMPONENTS

1.3.1 When fitting any component part and it fails to meet requirements ie keys cannot be tapped into keyways, primary wheels will not push onto the intermediate shaft, they should be placed in the material non-conformity area for investigation / disposal.

1.3.2 Rectification of component parts using hand grinders etc. is strictly forbidden. Such tools are to be excluded totally from the assembly area.

1.3.3 Care should be taken when fitting circlips to ensure these are not over strained.

Note: Usage of hammers is restricted to the dead blow type (Nylon) for the fitting of oilseals using a guide and the tapping of keys into keyways.

1.4 SEALING

1.4.1 Liquid gasket material must be applied to clean faces. Any doubt then the face must be cleaned with a suitable solvent (Lowtox or Loctite 7063 Superclean).

The liquid gasket material must be applied to faces in an area outside of any possible leakage path in a continuous bead circling the fastener holes (Fig 1).

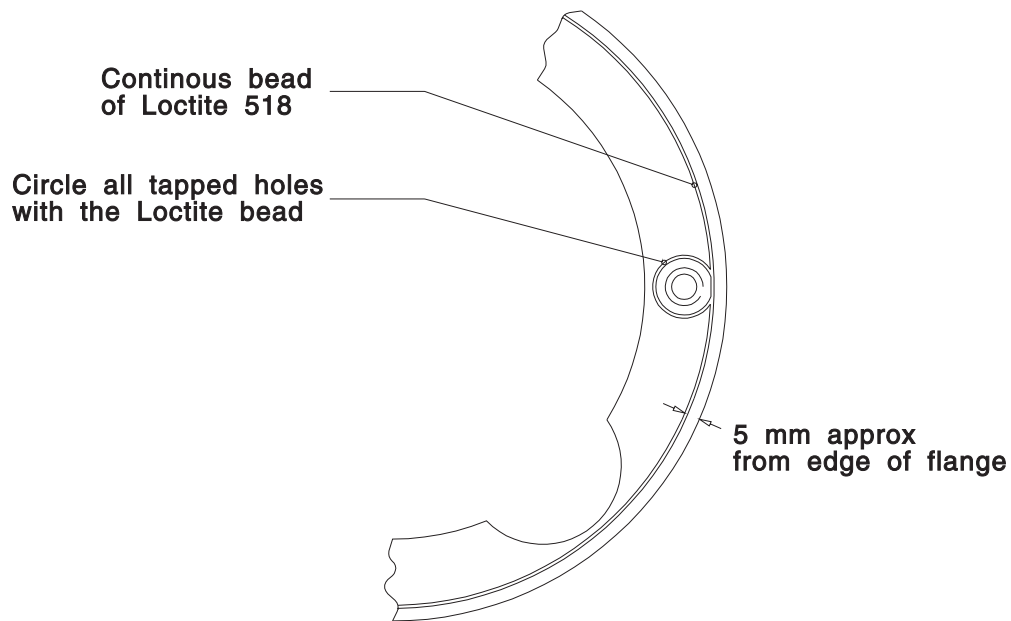


FIGURE 1

1.4.2 Oilseals should be fitted using the guides called for in the procedure and tapped into position using a dead blow type (Nylon) hammer.

1.5 LUBRICANT

Lubricant quantities for the mounting position requested must be strictly adhered to.

1.6 ALTERNATIVE MATERIALS

1.6.1 Throughout the following instructions the sealants, adhesives etc in current use at the time of writing are specified. However alternative materials are available.

1.7 PROTECTION

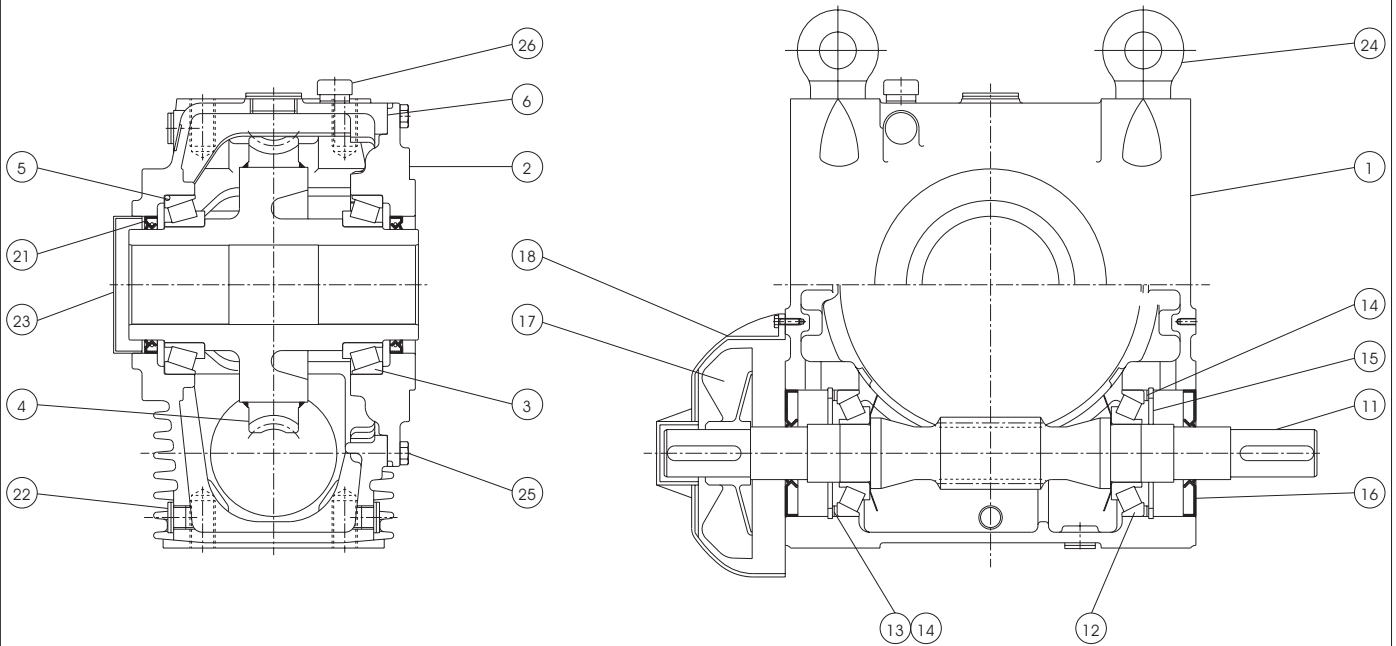
1.7.1 Reference must be made to Process Spec RP.05.02 for standard protection procedures for gear units, loose gears, and components for storage and / or despatch.

1.8 BACKSTOP

1.8.1 If a backstop is required refer to appendix 2 prior to commencing assembly.

2.0 GEARHEAD ASSEMBLY

2.1 COMPONENT PARTS

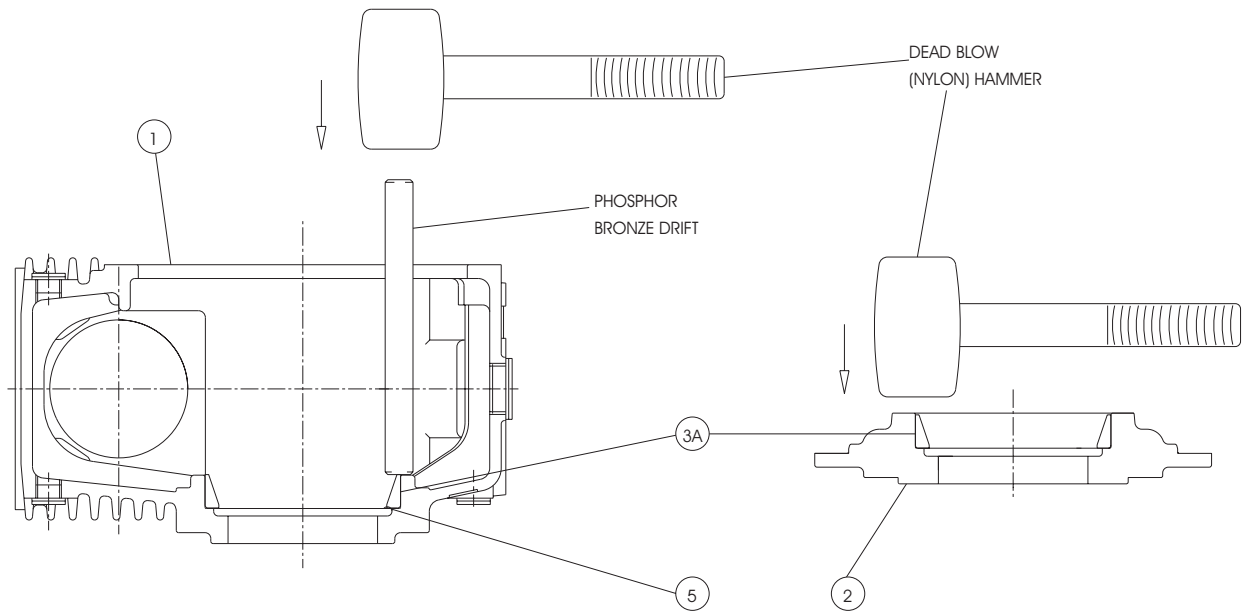


Part	Description	Qty
1	Gearcase	1
2	Bearing Housing	1
3	Wheel Line Bearing	2
4	Wheel Hub	1
5	Shim	As Req
6	Shim	As Req
11	Wormshaft	1
12	Wormshaft Bearing	2
13	Shims	As Req
14	Spacer	2

Part	Description	Qty
15	Circlip	2
16	Oilseal	2
17	Fan	1
18	Fan Cowl	1
21	Oil Seal	2
22	Drain Plug	
23	Shaft Cover	1
24	Eyebolt	2
25	Cover Fasteners	
26	Ventilator	1

2.2 WHEEL LINE SUB ASSEMBLY

2.2.1 Fit shims (5) (see table below) into gear case (1) and fit bearing cups (3A) into case (1) and bearing housing (2) as shown.



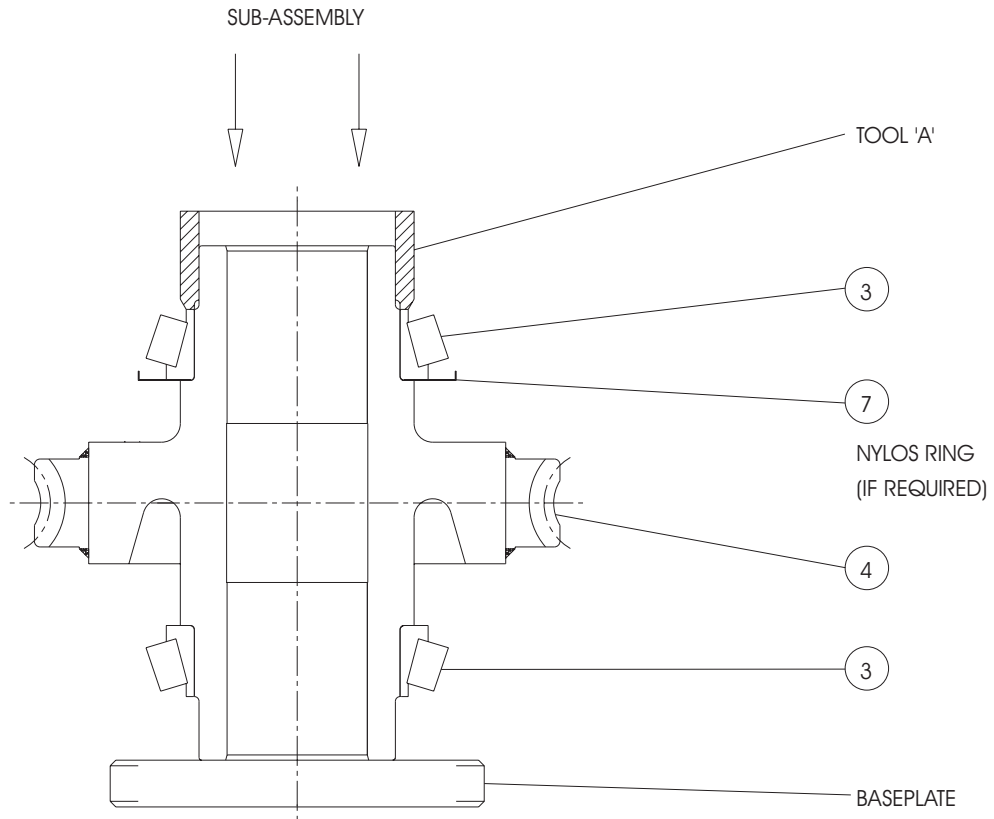
SHIM TABLE

UNIT SIZE	UNIT WITHOUT NYLOS RINGS	UNIT WITH NYLOS RINGS
A1002	0.75 mm (0.030")	0.25 mm (0.010")
A1252		
A1602		
A2002		

2.2.2 If build calls for a Nylos Ring (7) fit on to wheel hub prior to assembling bearings.

(Note: check unit mounting position and fit Nylos Ring under top bearing).

Press bearing cone (3) onto wheel hub (4) using tooling 'A'. Turn assembly over in fixture and repeat for opposite bearing.



TOOLING

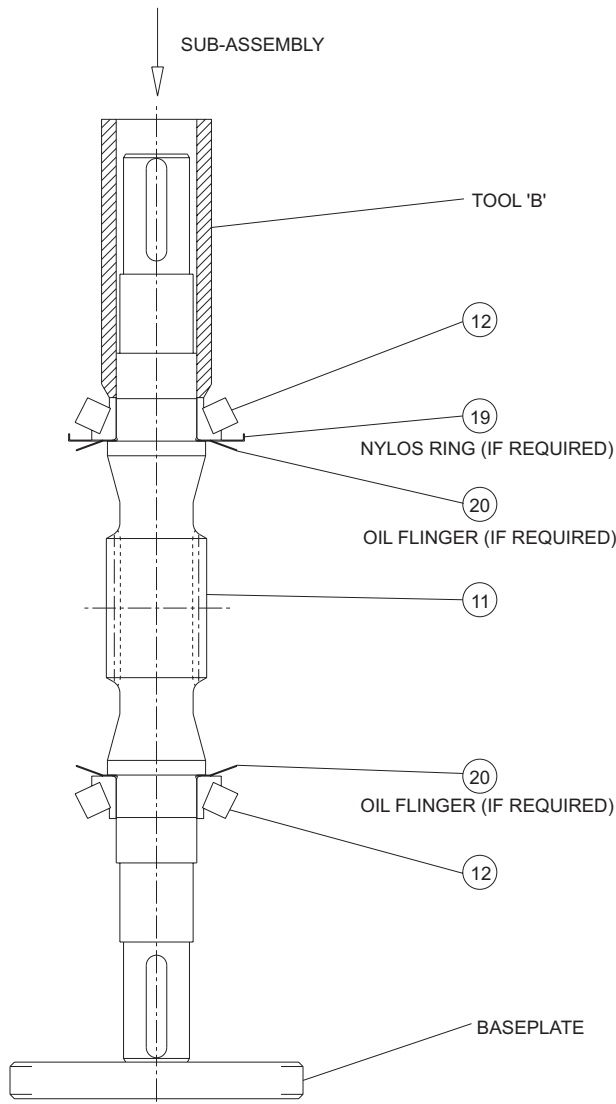
UNIT SIZE	TOOL 'A'
A1002	A32069ST-1
A1252	A32069ST-2
A1602	A32069ST-3
A2002	A32069ST-4

2.2.3 If build calls for a Nylos Ring (19) or oil flinger (20) fit on to worm shaft prior to assembling bearings.

(Note: check unit mounting position and fit Nylos Ring under top bearing).

Press bearing cone (12) onto worm shaft (11) using tooling 'B'. Turn assembly over in fixture and repeat for opposite bearing.

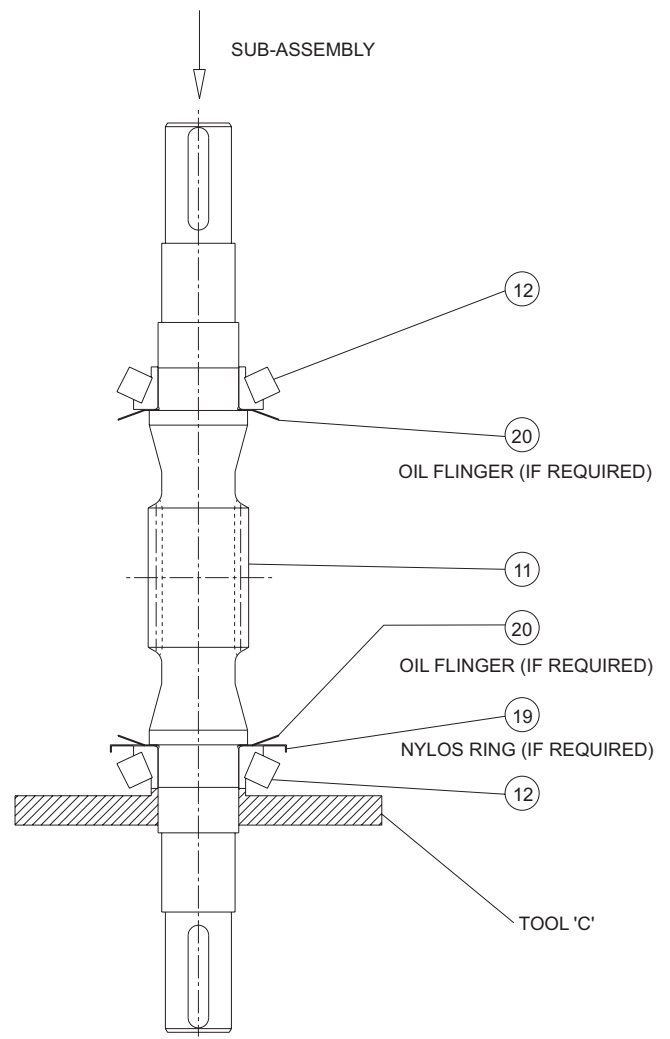
A1002, A1252 & A1602



TOOLING

UNIT SIZE	TOOL 'B'
A1002	B26226ST-1
A1252	B26226ST-2
A1602	B26226ST-3

A2002



TOOLING

UNIT SIZE	TOOL 'C'
A2002	2000 Wormwheel

2.2.4 Fit a bearing cup (12A), spacer (14) and circlip (15) into gear case (1) at one end.

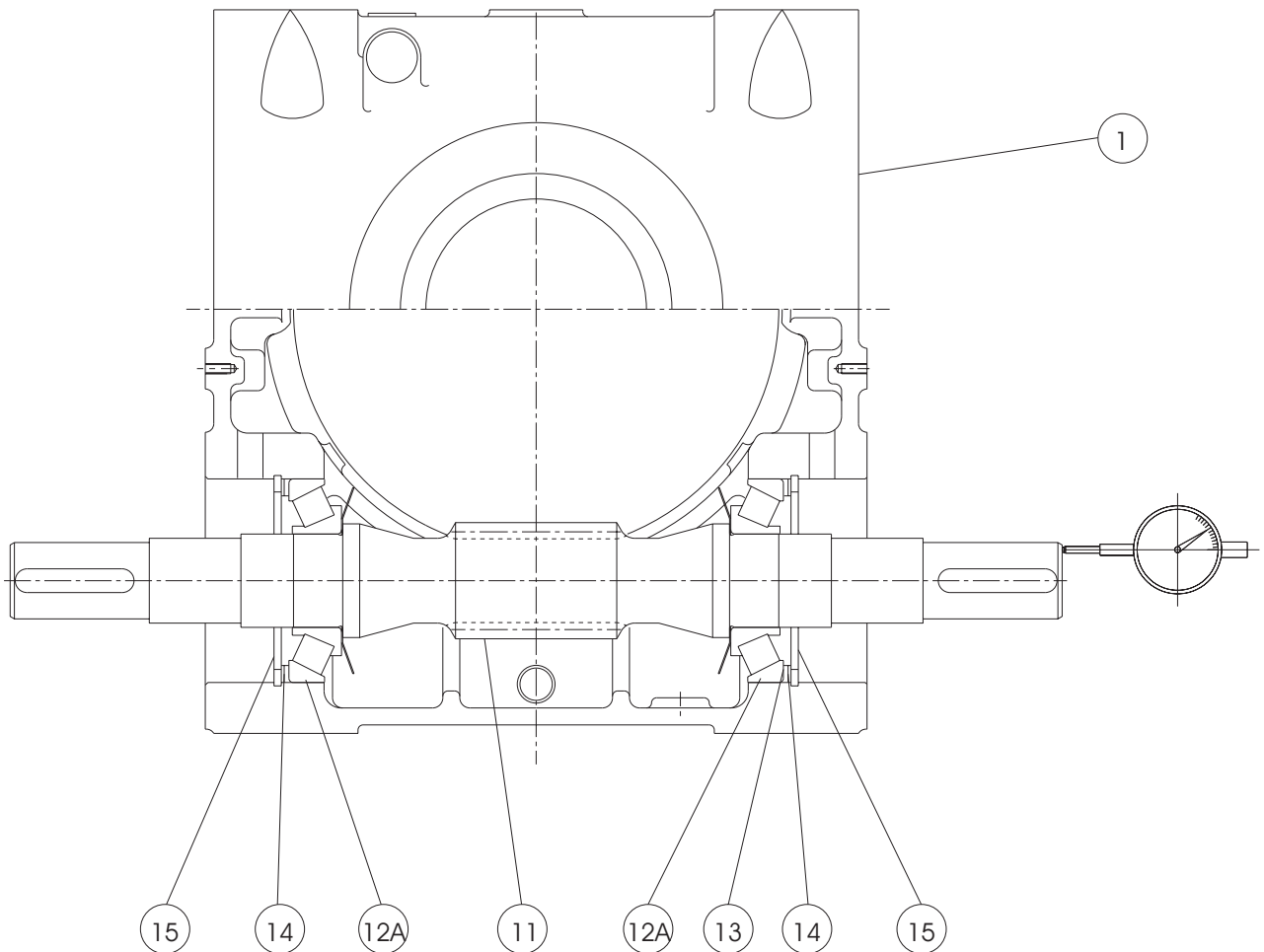
Fit worm shaft assembly (11) into gear case (1) from the other end. Fit bearing cup (12A) shims (13) (see table below), spacer (14) and circlip (15) into gear case (1).

Tap wormshaft (11) to ensure bearings are seated correctly. Check end float and adjust shims if necessary. Allowable axial movement 0.075 / 0.125 mm (0.003" / 0.005")

Remove wormline circlip, slide back wormshaft assembly - allow to lie in bottom of case.

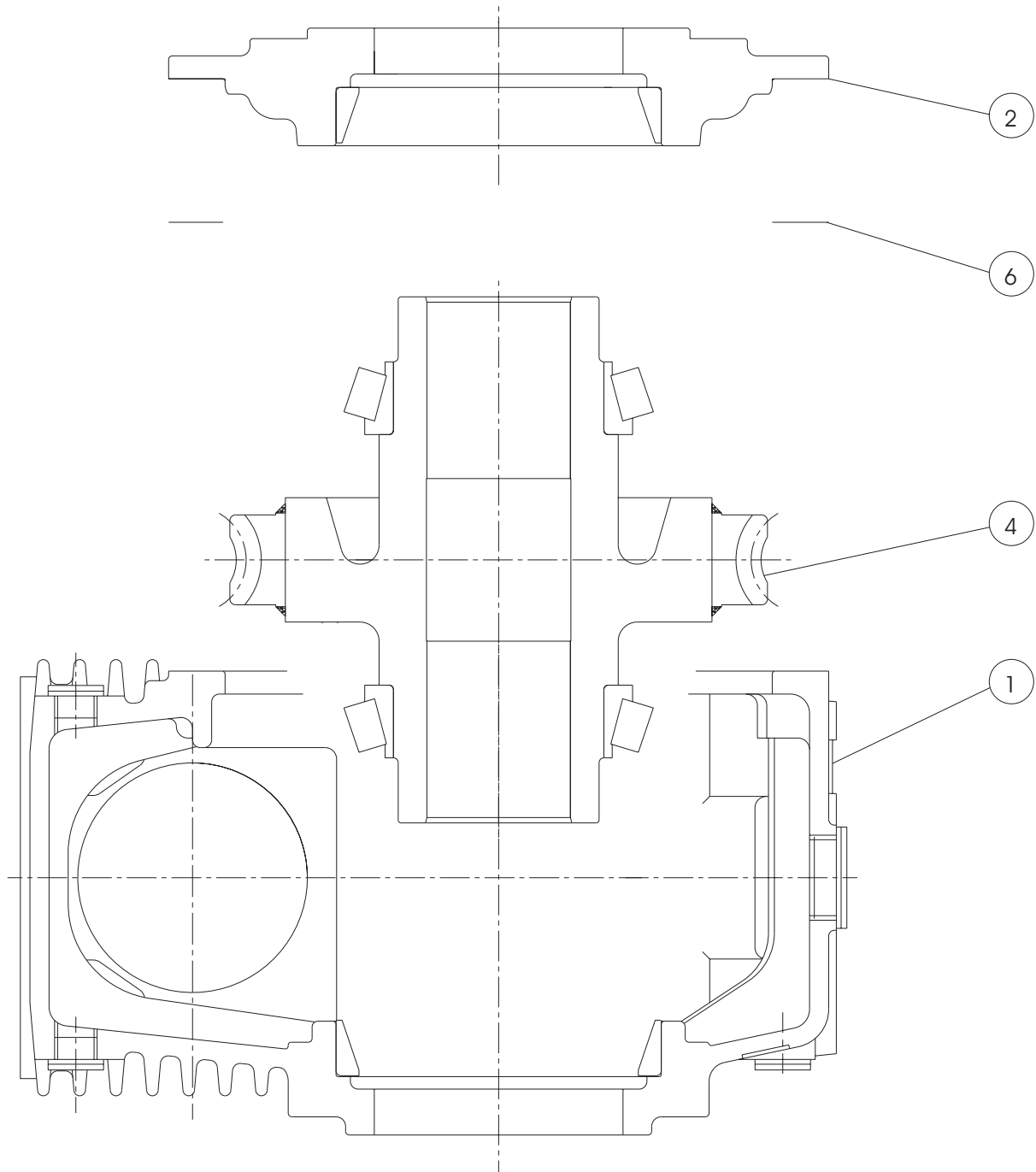
SHIM TABLE

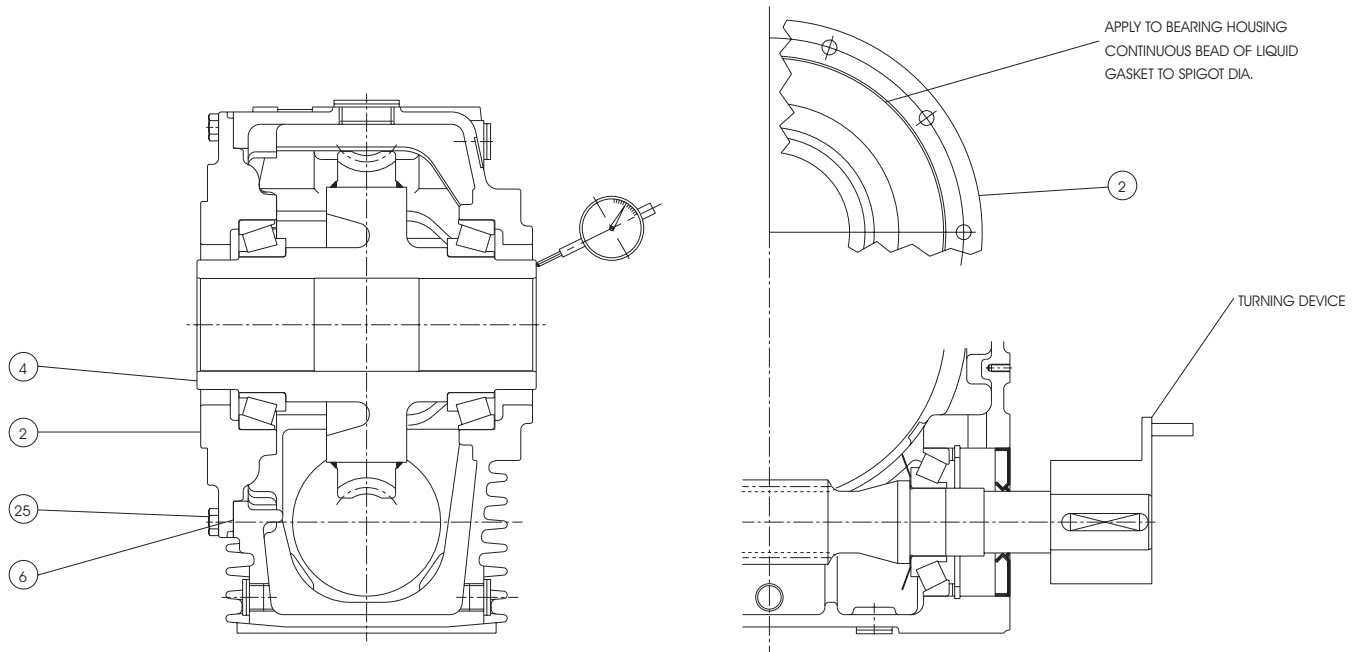
	SHIM SIZE
No Oil Flinger or Nylos Ring Fitted	1.50 mm (0.060")
Nylos Ring Fitted	1.00 mm (0.040")
2 Oil Flingers Fitted	No Shims Required



2.2.5 Prior to assembly, apply engineers blue to 4 / 5 wheel teeth. Fit wheel hub assembly (4) into gear case (1) and mesh with wormshaft. Re-fit the wormshaft shims, spacer and circlip (13, 14 and 15) securing the wormshaft in position.

Fit standard shim (6) (nominally 0.5 mm (0.020")) to bearing housing (2). Fit bearing housing (2) to gear case (1) and secure with two setscrews (diagonally opposite).





2.2.6 Tap wheel hub (4) to ensure bearings are seated correctly.

Fit turning device to wormshaft and turn shaft.

Check end float and adjust shims (6) if necessary. Allowable axial movement 0.00 / 0.050 mm (0.000" / 0.002"). Ensure Nylons rings are fully compressed when checking axial movement.

Check wormwheel contact in accordance with B40268-4-409, re-shim as necessary.

Apply liquid gasket material (Loctite 518) to bearing housing spigot face (2).

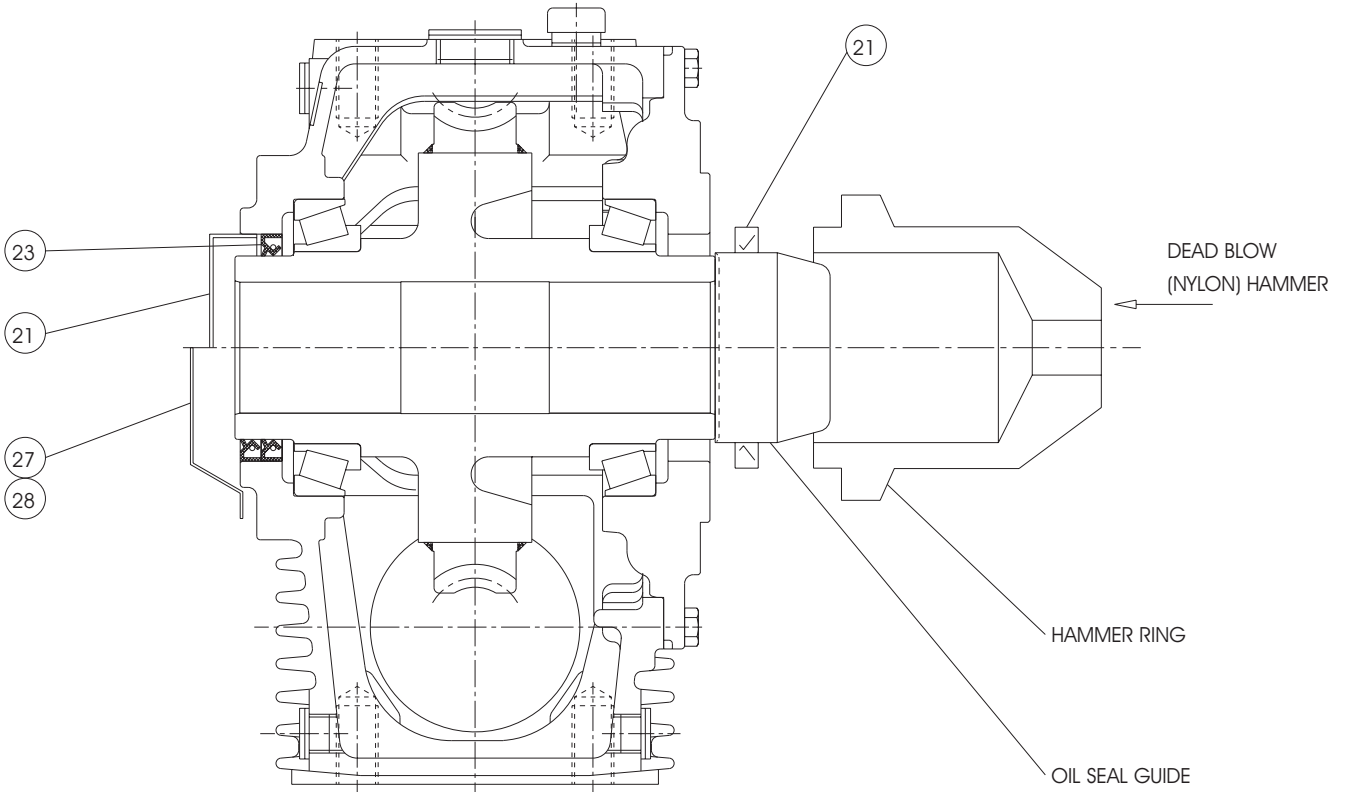
Fit bearing housing (2) and shims (6).

Fit and torque tighten setscrews (25).

Tightening Torque

UNIT SIZE	BOLT SIZE	TORQUE
A1002	M10	50 Nm
A1252	M10	50 Nm
A1602	M12	85 Nm
A2002	M12	85 Nm

2.3 Assembly: Oil Seals / Covers / Plugs / Painting & Packaging



2.3.1 Fit wheel line oil seals (21).

Lightly grease outside diameter and lip of oil seals (22) and fit to both sides of wormwheel using oil seal guide and hammer ring.

Fit steffa end cover (23) where single oil seals are fitted.

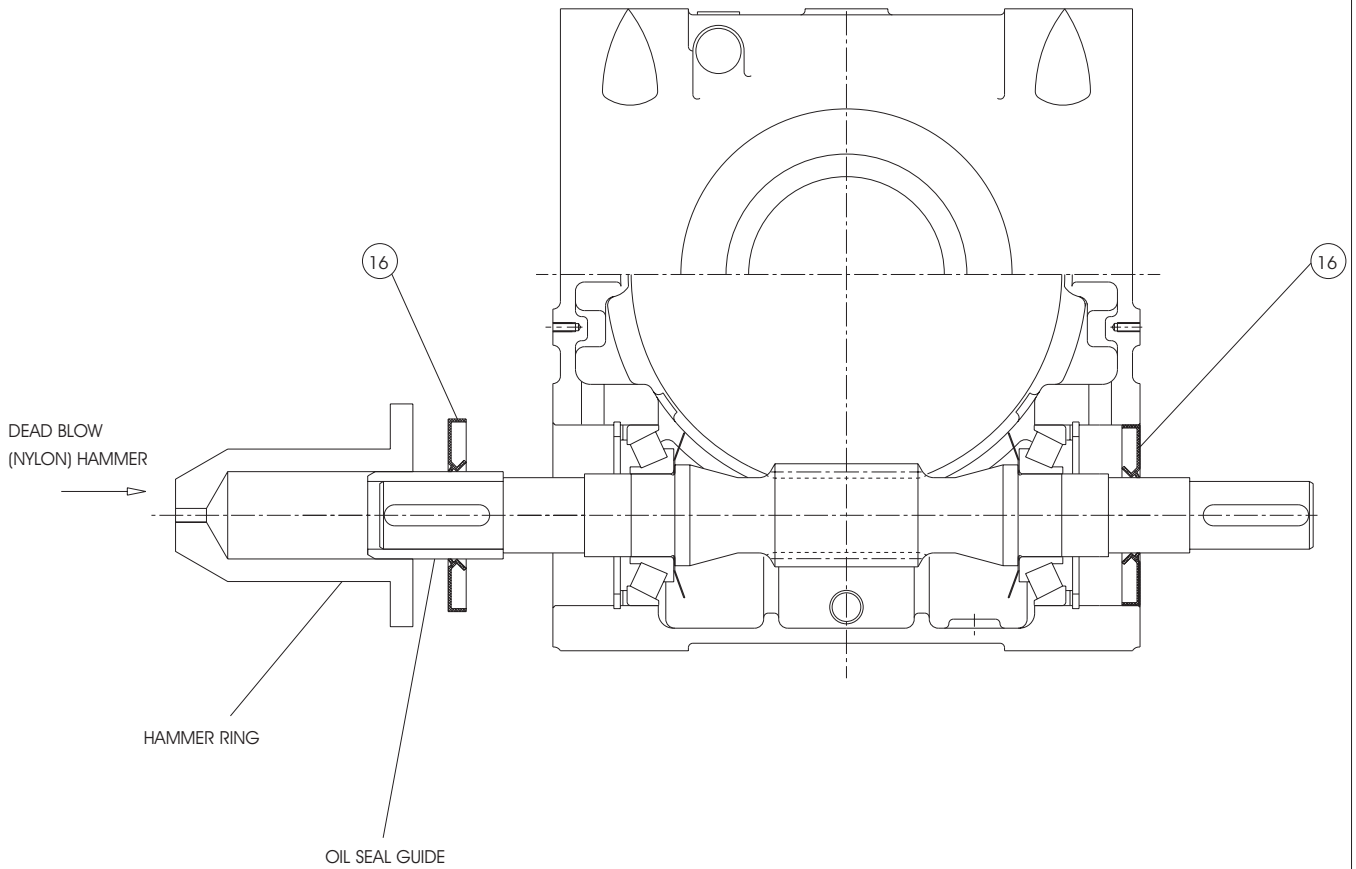
Fit metal protection cover (27) with distance pieces (28) where double oil seals are fitted.

Tooling - Metric Bore

UNIT	OIL SEAL GUIDE	HAMMER RING
A1002	A26211ST	B36039ST
A1252	A26212ST	B36040ST
A1602	A26213ST	B36041ST
A2002	A26214ST	B36042ST

Tooling - American Bore

UNIT	OIL SEAL GUIDE	HAMMER RING
A1002	B36113ST	B36039ST
A1252	B36114ST	B36040ST
A1602	B36115ST	B36041ST
A2002	B36116ST	B36042ST



2.3.2 Fit worm line oil seals (16).

Lightly grease outside diameter and lip of oil seals (16) and fit to both sides of worm shaft using oil seal guide and hammer ring.

Tooling - Metric Shaft

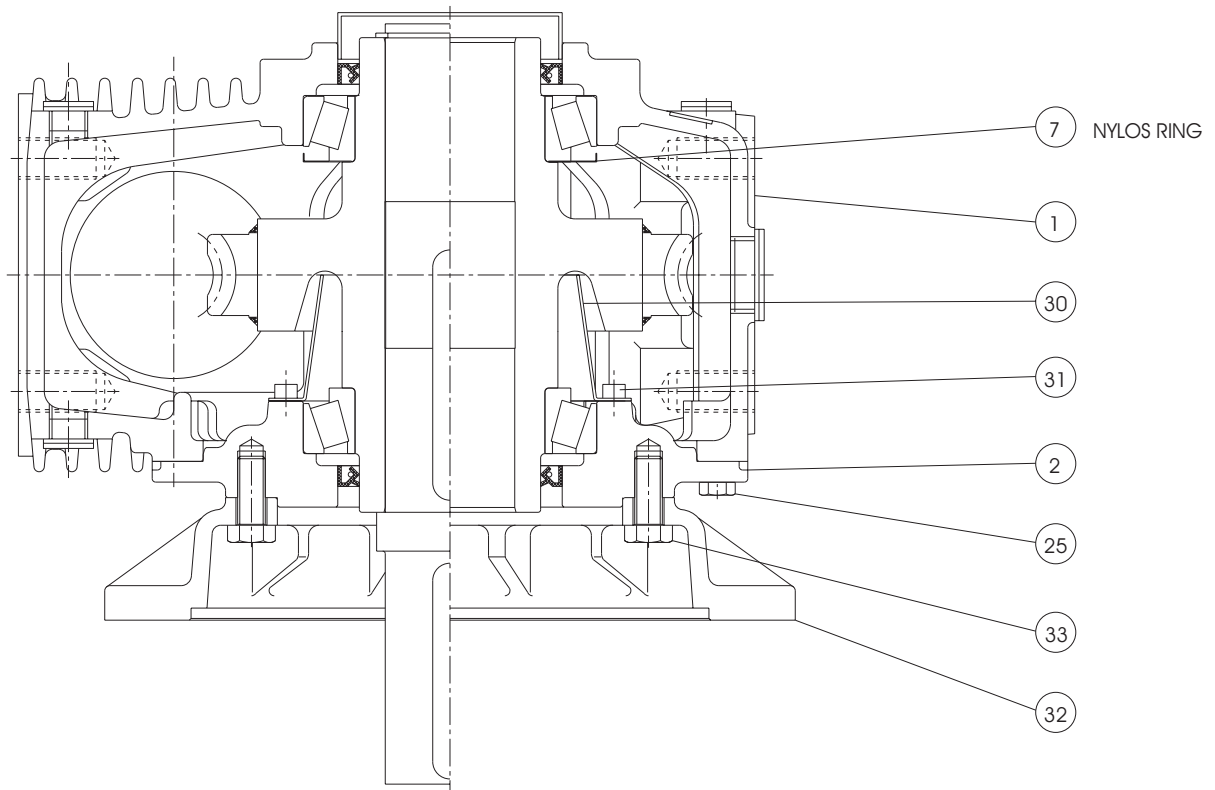
UNIT	OIL SEAL GUIDE	HAMMER RING
A1002	B26248ST-1	A26247ST-1
A1252	B26248ST-2	A26247ST-6
A1602	B26248ST-3	A26247ST-8
A2002	B26248ST-4	A26247ST-7

Tooling - American Shaft

UNIT	OIL SEAL GUIDE	HAMMER RING
A1002	B26248ST-1	A26247ST-1
A1252	B35340ST	A26247ST-6
A1602	B35341ST	A26247ST-8
A2002	B35342ST	A26247ST-7

- 2.3.3 Fit eyebolts (24) if eyebolt is removed for packaging refer to 2.3.7.
- 2.3.4 Fit drain plugs (22) in all positions, torque tighten to 45Nm.
- 2.3.5 Nameplate / Dutyplate to be fitted prior to painting. If the unit is a double reduction only fit nameplate / dutyplate to secondary unit. Remove nameplate / dutyplate from primary unit.
- 2.3.6 Painting: mask all surfaces not required painting and paint in accordance with standard product paint procedures. Allow to dry and remove all masking etc.
- 2.3.7 Package vent plug (26) (and eyebolt if removed) in bag and secure to gear unit.
- 2.3.8 Spray gear unit internals and any unpainted metal exterior surfaces with approved rust inhibitor (refer to process specification RP.05.02).
- 2.3.9 The assembly is now complete.

**APPENDIX 1 -
 DRYWELL ASSEMBLY / FLANGE ASSEMBLY**



Disassemble unit. Allow worm shaft assembly to lie in bottom of case. Remove bearing housing (2) and secure drywell shroud (30) to bearing housing (2) using Loctite 518 on the drywell. Fit socket head set-screws (31) using Loctite 243.

Grease wheel line bearings, then reassemble wheel line using liquid gasket material (Loctite 518) to bearing housing spigot face (2). Fit and torque tighten setscrews (25). Refit wormline.

Fit grease nipples (if required).

Fit base (32) (if required). Fit and torque tighten setscrews (33).

Check base recess diameter and face for run out. Allowable runout 0.15 mm (0.006") maximum.

TIGHTENING TORQUES - Base bolts

UNIT	BOLT SIZE (33)	TORQUE
A1002	M12	85 Nm
A1252	M12	85 Nm
A1602	M16	200 Nm
A2002	M16	200 Nm

Note: If the unit is ceiling mounted (position 4) then a special case is required which is machined, drilled and tapped internally on the non-cover side to accept a fabricated drywell shroud.

Secure drywell shroud (30) to case (1) using Loctite 518 on the drywell. Fit socket head setscrews (31) using Loctite 243.

**APPENDIX 2 -
 BACKSTOP ASSEMBLY**

Backstop rotation to be in accordance with drawing 02005ODS.

Check backstop location on wormshaft for hardness (to inspection procedure RP04.03) Minimum allowable hardness 58 Rockwell. If the hardness value is below the allowable limit, shaft to be induction hardened

Fit standard plastic shims (47) to housing (40).

Fit housing (40) (secure with 2 bolts)

Check worm line end float, adjust shims if necessary

Remove housing (40) and back off wormline

Fit oil seal (46) into housing

Fit spacer (42), fit backstop pack (44/45) & secure outer race (45)

Fit spacer (41)

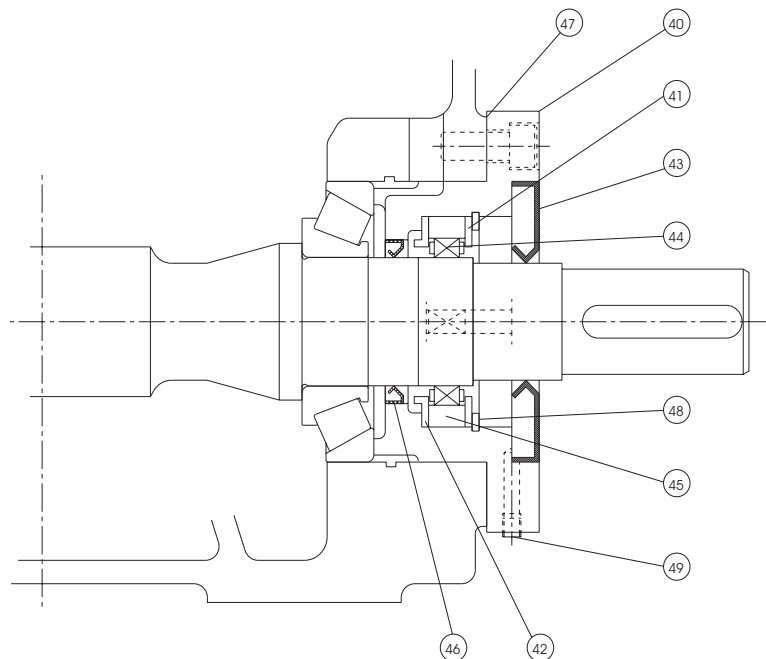
Fit circlip (48)

Pack backstop & cavity with grease (Shell Albida R21 or other approved alternative)

Re-fit wormline and apply liquid gasket (Loctite 518) to the spigot face.

Fit oil seal (43)

Fit grub screw (49)

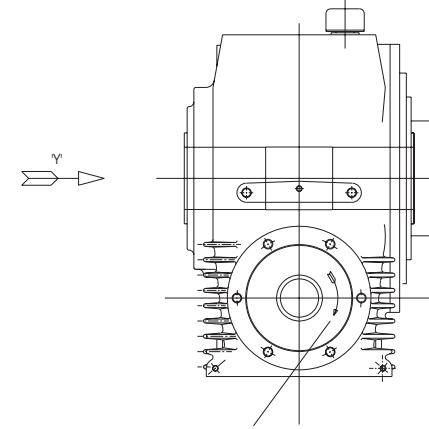
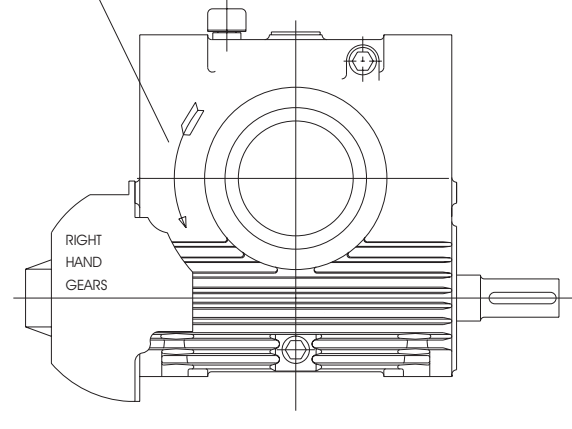
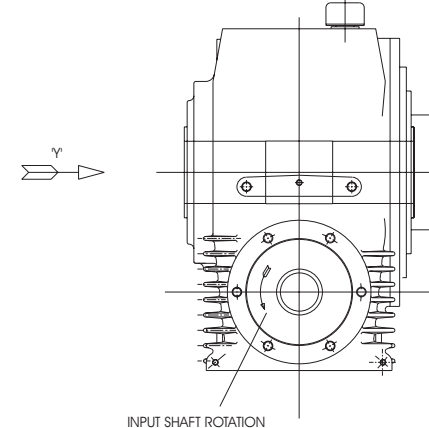
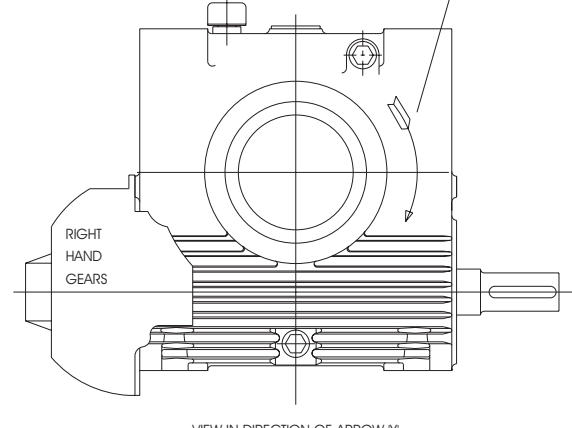
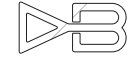


Axial movement - 0.075 / .125mm .003" / .005"

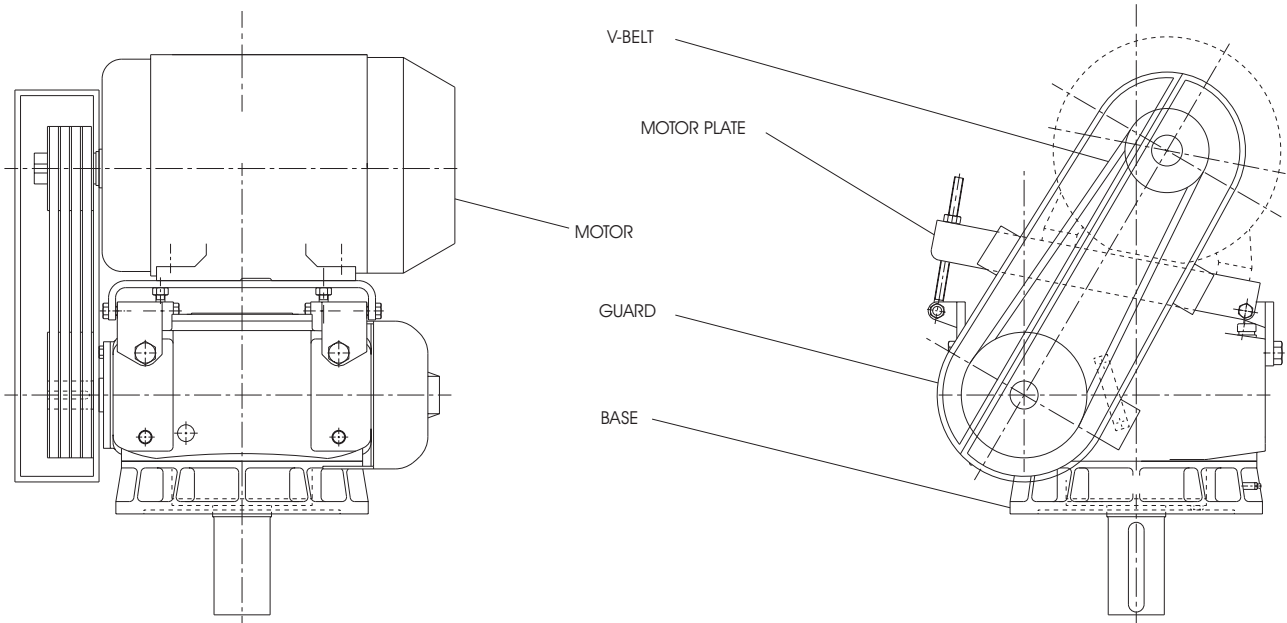
UNIT	STANDARD SHIMS (47)
A1002	31222-4-105/6/7
A1252	31223-4-146/7/8
A1602	31223-4-149/150/1
A2002	31232-4-112/3/4

UNIT	BOLT SIZE	TORQUE
A1002	M10	50NM
A1252	M10	50NM
A1602	M12	85NM
A2002	M12	85NM

APPENDIX 2 - Continued
BACKSTOP ASSEMBLY

02005	ODS	TITLE: 'A' SERIES ROTATION - HOLDBACK
COPYRIGHT - DAVID BROWN ENGINEERING LTD.		
OUTPUT SHAFT ROTATION TO BE SPECIFIED WHEN THE UNIT IS IN MOUNTING POSITION 1. (AS SHOWN BELOW)		
<p>OUTPUT SHAFT ROTATION AC FREE ROTATION - ANTICLOCKWISE LOCKED - CLOCKWISE</p>  <p style="text-align: center;">INPUT SHAFT ROTATION</p>		<p>OUTPUT SHAFT ROTATION</p>  <p style="text-align: center;">VIEW IN DIRECTION OF ARROW 'Y'</p>
<p>OUTPUT SHAFT ROTATION CW FREE ROTATION - CLOCKWISE LOCKED - ANTICLOCKWISE</p>  <p style="text-align: center;">INPUT SHAFT ROTATION</p>		<p>OUTPUT SHAFT ROTATION</p>  <p style="text-align: center;">VIEW IN DIRECTION OF ARROW 'Y'</p>
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1	ALTERATIONS	 DAVID BROWN ENGINEERING
DRAWN	A.S.	02005
CHECKED	A.S.	ODS
DATE	10-07-02	

**APPENDIX 3 -
V-Belt Radipack**



Basic unit in 'V' position (as shown) - may be Heavy Duty Stirrer type. Fitted with motor plate located with brackets on feet holes.

Motor fitted to plate after lining out.

Fit pulleys, belts and guard.

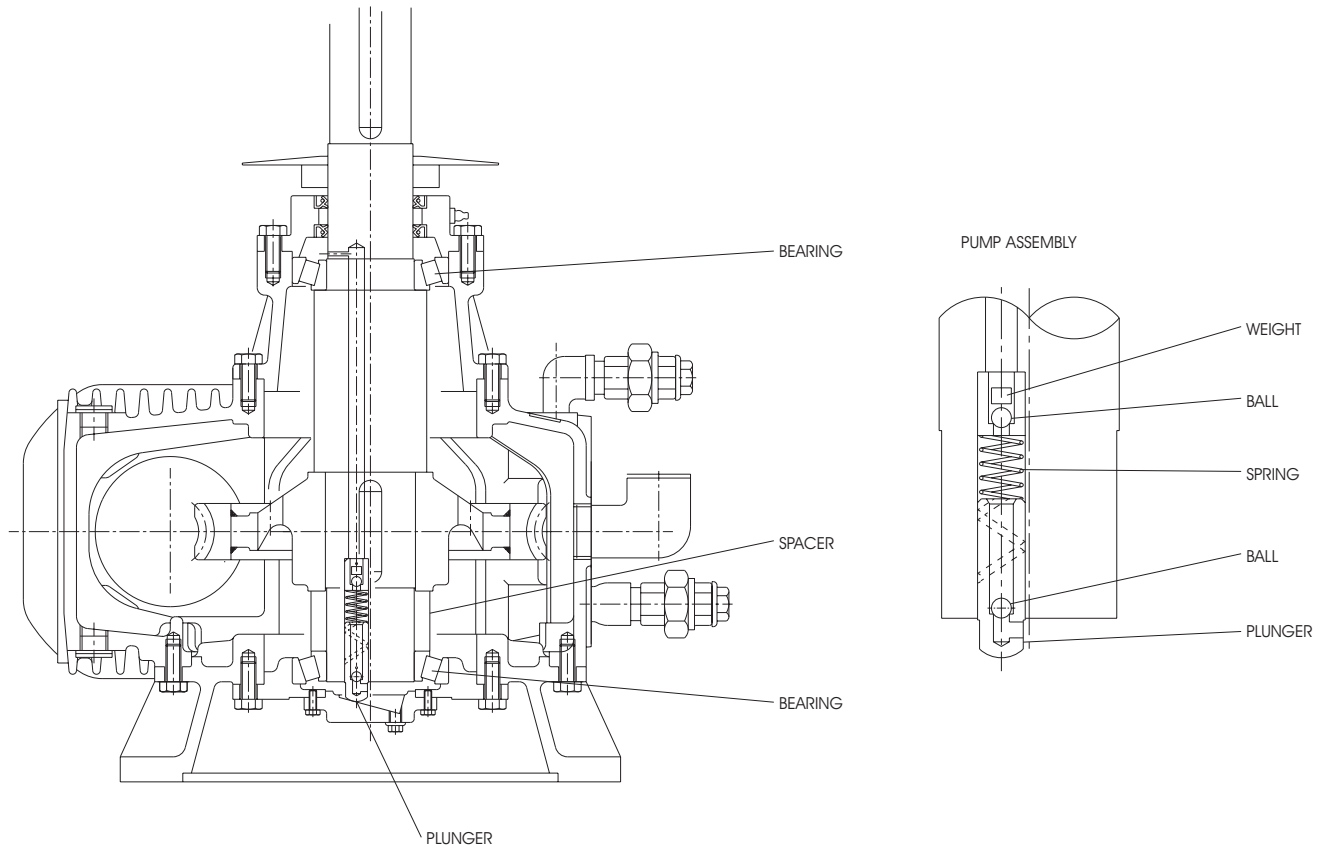
Jack bolts to tension belts.

Guard fitting

Guard supplied with 1 or 2 lugs for securing to unit. Use key which is bolted to case at double reduction pad and secure guard to key.

Alternatively metal strap supplied which is bent to suit and secured to motor plate and guard mesh.

**APPENDIX 4 -
Cooling Tower**



Special output shaft drilled full length and fitted with plunger at bottom end.

End cover fitted with cam to enable plunger to oscillate and pump oil to the top bearing.

Distance piece fitted between wormwheel and bottom bearing.

Shimming adjusted at bottom of wheel line for gear contact.

Shimming adjusted at top of wheel line for end float.

Oil Seals

Normally double oil seals fitted at both ends of wormshaft and top, (output), of wheel line.

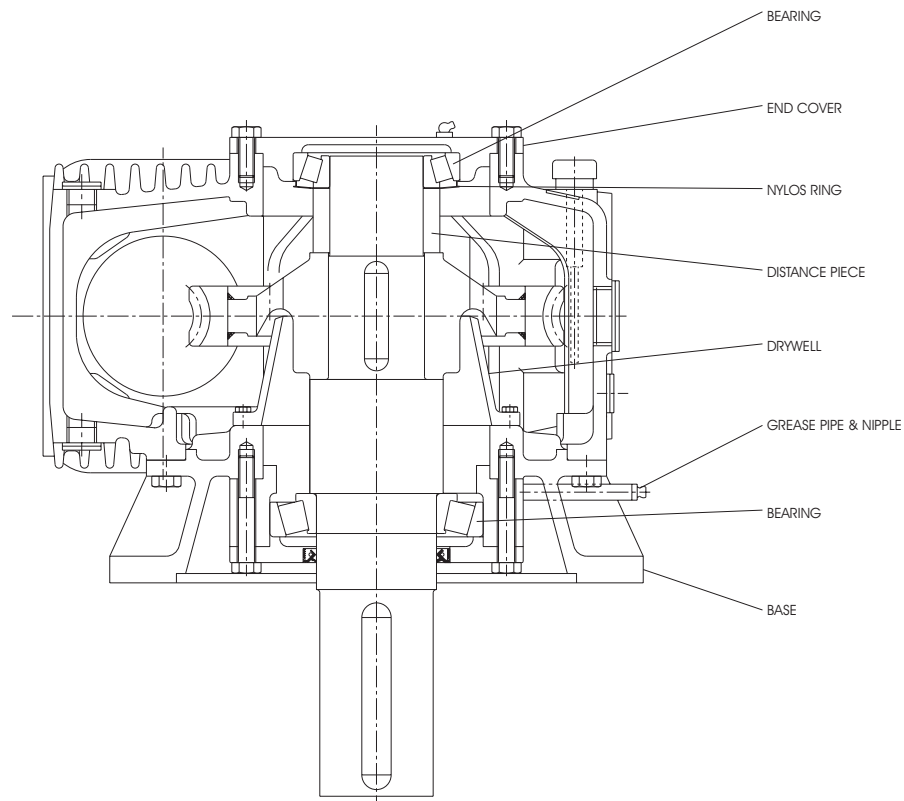
Grease nipple fitted at top bearing housing to charge the chamber between the double oil seals.

Fit all drain / filler plugs and external pipework as required. Units are continually flushed with oil in service.

Note: Additional hole in case for sight glass.

Paint: Two applications of standard paint system.

**APPENDIX 5 -
Heavy Duty Stirrer**



Special heavy duty output shaft - interference fit in worm wheel centre.

Assembly similar to cooling tower with distance piece and Nylos ring fitted.

Note: Ensure base has slot for grease pipe in correct position.

With unit in mounting position 1 ensure that slot in base is in 11 o'clock position (A1002, A1252 & A1602 units).

For A2002 unit the pipe is fitted in the 12 o'clock position.

APPENDIX 6 -
Lapmaster

Vertical position units have a grease nipple fitted.

A Nylos ring is fitted, but no drywell is required.

Double oil seals are required on the worm and wheel lines. Oil seal covers are required on worm line to accept double seals.

Output Shaft: Interference fit in centre
 Endface of shaft machined square, drilled and tapped (as per drawing).

Check run out of output shafts, allowable runout is:-

0.00 mm (0.000") on end face

0.10 mm (0.004") on outside diameter

**APPENDIX 7 -
Longwood**

Standard assembly procedure

Shortened wormshaft (No fan and cowl)

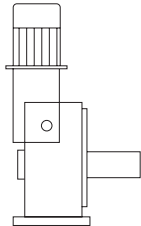
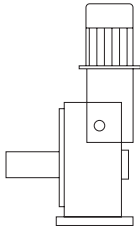
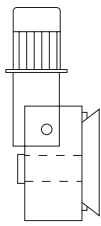
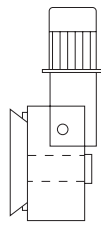
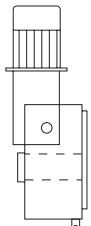
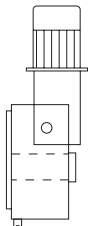
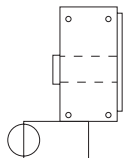
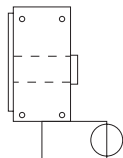
Additional hole in case for oil sight glass.

Double oil seals fitted on output shaft.

Longwood handings apply - refer to drawings below.

Tectyl to be applied to interface between 1st and 2nd reduction, (Double reduction units).

Longwood Handings

 <p>WC-22</p>	<p>Foot Mount</p>	 <p>YE-28</p>
 <p>FH-22</p>	<p>Flange / Shaft Mount</p>	 <p>HH-28</p>
 <p>WH-22</p>	<p>Shaft Mount</p>	 <p>YH-28</p>
	<p>Plan Elevations</p>	

APPENDIX 8 -
BNFL

No special build instructions as standard parts are used. The application determines the relevant BNFL Quality standard pertaining to the order - from a basic certificate of conformity to full traceability, etc.

Paint

The type of paint used can be standard or special depending on the application.

Lubrication

Lubrication can be Tivela A compound or standard synthetic, depending on application.