SERVICING INSTRUCTIONS AND ILLUSTRATED PARTS LIST FOR HEWLAND NMT GEARBOXES

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CONTENTS :-

ILLUSTRATIONS :-

TECHNICAL SPECIFICATION

The NMT gearbox is a transaxle unit, designed for mid-engined, rear wheel drive cars. The unit is produced with six forward gears, reverse, and a powerflow differential.

The gear selection mechanism is sequential, with a separate, mechanically interlocked reverse engagement mechanism.

The drive is taken from the engine via the clutch shaft, which turns input and pinion gears to drive the final transmission assembly.

Gear changing is effected through non-synchronising face dogs. An extensive range of gear ratios provides a wide range of gearing requirements. The gear ratios and differential assembly can easily be changed without removing the gearbox from the vehicle.

Heat treated nickel chrome steel is used to manufacture all gears and shafts. The selector forks are also steel. Lubrication is by splash or optional internal pump with distribution circuit, and the oil is retained by lipped oil seals.
In general configuration, the NMT-200 is a high tech racing transaxle unit which achieves the maximum effective use of power, in conjunction with extremely stiff integral rear suspension mountings.

weight (AL)	128 lbs	(58 Kg)	1st to 6th gear ratios	from 3.31:1 to .89:1
oil type	SAE 80 or 90		final drive ratio	11/31, 10/31, 9/31
oil quantity	7 pints	(4 litres)	clutch shaft made to customer's requirements	
max. torque	320 lbs.ft (430 Nm)		Pinion shaft nut tightening torque = 120 lbs.ft (163 Nm)	
			Crownwheel bolts = 75 lbs.ft (100 Nm)	

GENERAL NOTES :-

a/ Read these instructions carefully and with reference to the illustrations.

b/ Before dismantling the gearbox, see that a clean tray is available, in which to place the parts.

c/ Thoroughly clean and inspect all parts before reassembly. Discard any worn or damaged components and replace with new ones.

d/ Use only genuine Hewland parts as replacements. These are manufactured in our workshops to the fine tolerances necessary and are rigorously inspected.

e/ Always ensure that locknuts, and oil seals are in good condition when reassembling.

f/ All studs and screws must be Loctited or wirelocked in position, unless stated otherwise

g/ Bearing Replacement :-
Bearings can only be removed or renewed if the casings have been warmed in an oven, or with a blowlamp. In the latter case, keep the blowlamp moving while heating the casing.
Note: Do not overheat. Test with a spot of water which will bounce off at the correct temperature.
Once a casing is heated, all bearings should be pressed into their respective seatings without delay, thus eliminating the need to reheat. At the correct temperature, fitting the bearings should present no difficulty.
During cooling, or when the casings have cooled, it is advisable to once more lightly press the bearings to ensure that they are correctly seated.

h/ Oil:
Fill the gearbox through the plug hole on top of the maincase. The oil will find it's own level within the gearbox.
Note: Too much oil will not directly cause any harm, but is undesirable as it may induce power loss and overheating of internals.

DIFFERENTIAL BEARING PRELOAD

Requires special tool No. SK-119-FGC

Assemble the differential case (57) and end cap (58), and bolt the crownwheel (56) to it. Fit the differential unit into the maincase (1) using dummy bearings SK-119-FGC, and fit the sideplate (3). Adjust the shims (103) if necessary, to achieve 4 – 6 lbs.ft of bearing preload torque (to turn the diff assembly in it's bearings when oiled.).

The table below is to inform you of which sideplate spacers should be used with which crownwheel when mounted on a TPT differential. The reason that there are two sets of spacers, is that the crownwheels have different mounting distances.

PART No.	RATIO	MOUNTING DIST	ITEM (90)	ITEM (91)
NMT-221-AW	11/31	2.316"	FGC-206-2A	NMT-205-2
NMT-221-BW	10/31	2.316"	FGC-206-2A	NMT-205-2
NLT-221-CW	9/35	2.200"	FGC-205-2A	NMT-205-2A

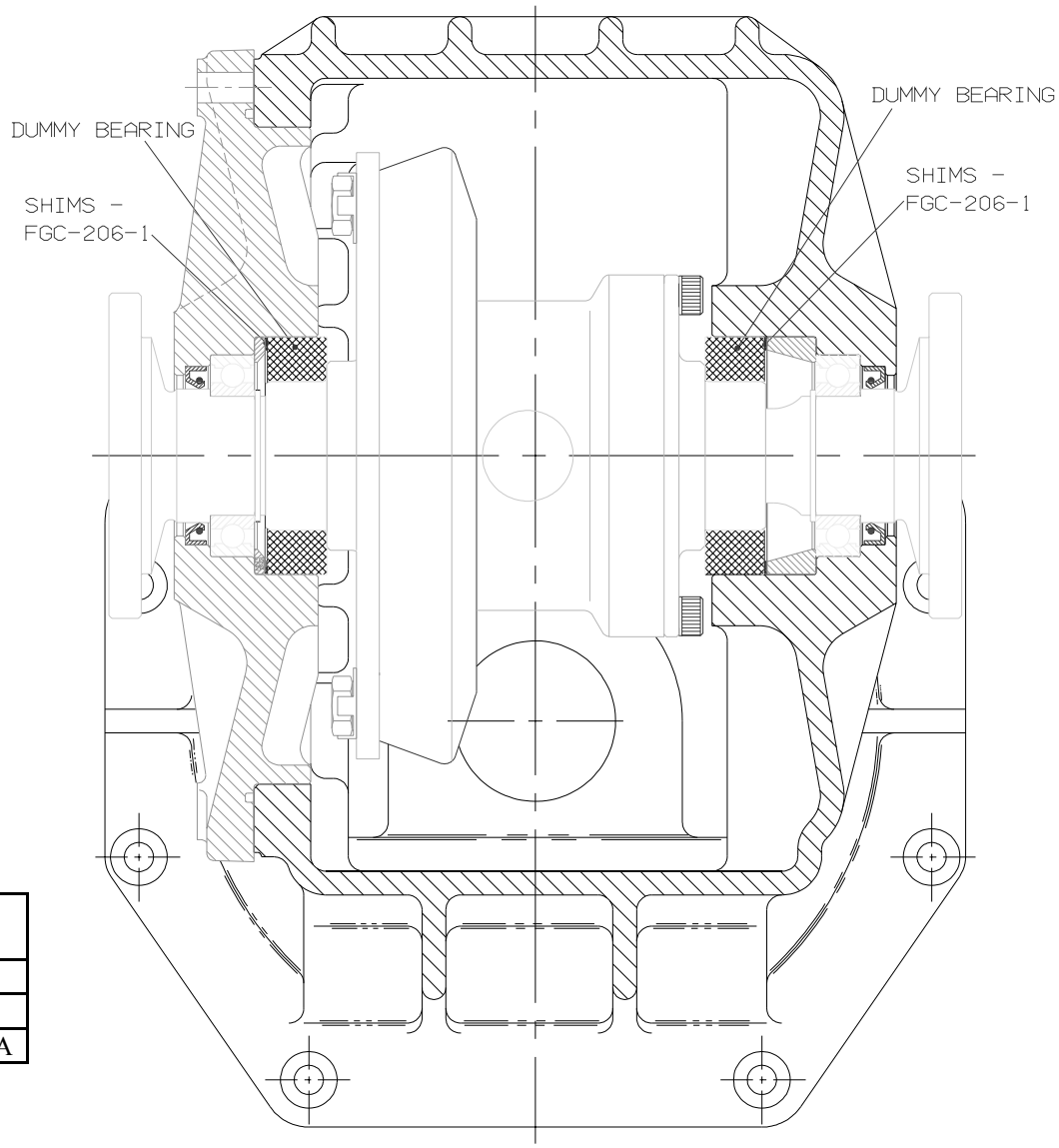


FIGURE 1

PINION SETTING

Requires special tool No.SK-1470-A & SK-1913

Press the pinion head bearing inner (37) onto the pinion shaft (4). Fit the bearing housing (37) and shims (40) into the maincase. Assemble the pinion shaft into the maincase (1) and fit the bearing carrier (2). Tighten the pinion shaft nut (111) onto the pinion shaft until the pinion shaft requires 20-25 lbs.ins to turn it in it's bearings (equivalent to a tangential force of 16-20 lbs at the outside diameter of tool SK-1913)

Fit tool SK-1470-A into the maincase diff bearing bore, and use feeler gauges to measure the gap between the tool and the pinion front face. This clearance should comply with the dimension indicated on the pinion shaft label (also stamped on the front face of the pinion shaft), and can be adjusted by adding or removing shims (40) from behind the pinion head bearing housing (37).

Alternatively, the pinion mounting distance can be measured with a height gauge, and set to the dimension on the pinion shaft label.

Note: It is not correct practice to replace a pinion shaft without measuring the setting distance, even if the old and new shafts have the same calibration.

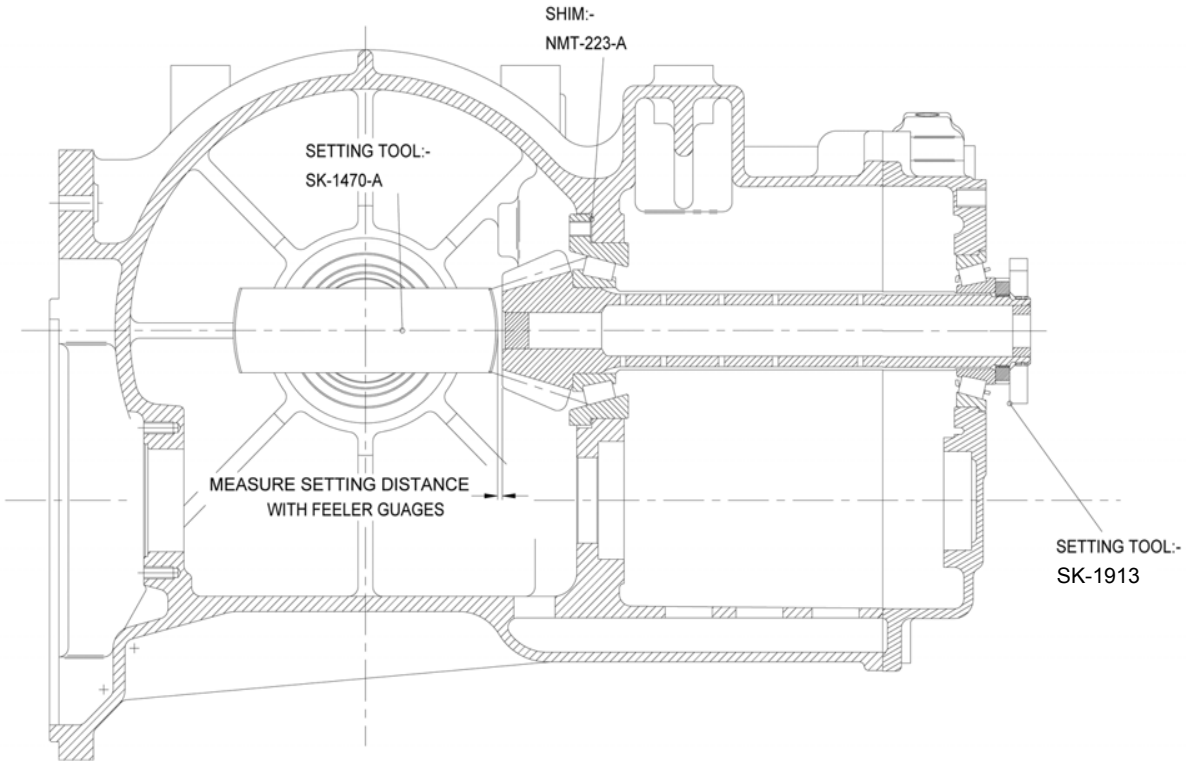


FIGURE 2

PINION BEARING PRELOAD

Requires special tool No.SK-1913

Having installed the correct pinion shaft bearing shims, remove the bearing carrier (2). Add the spacer (14) and hubs (20,33) to the pinion shaft, and replace the bearing carrier. The thickness of the spacer (14) should be adjusted, by grinding, to give a bearing preload torque of 20-25 lbs.ins with oiled bearings (measure torque as when setting pinion shaft, using tool SK-1913).

It is essential that the pinion bearing preload is checked and adjusted if any of the pinion shaft components are replaced, with the exception of the locknut and locking ring. Fitting a longer six gear spacer (14) will decrease the pinion bearing preload, whereas shortening the six gear spacer (14) will increase the pinion bearing preload.

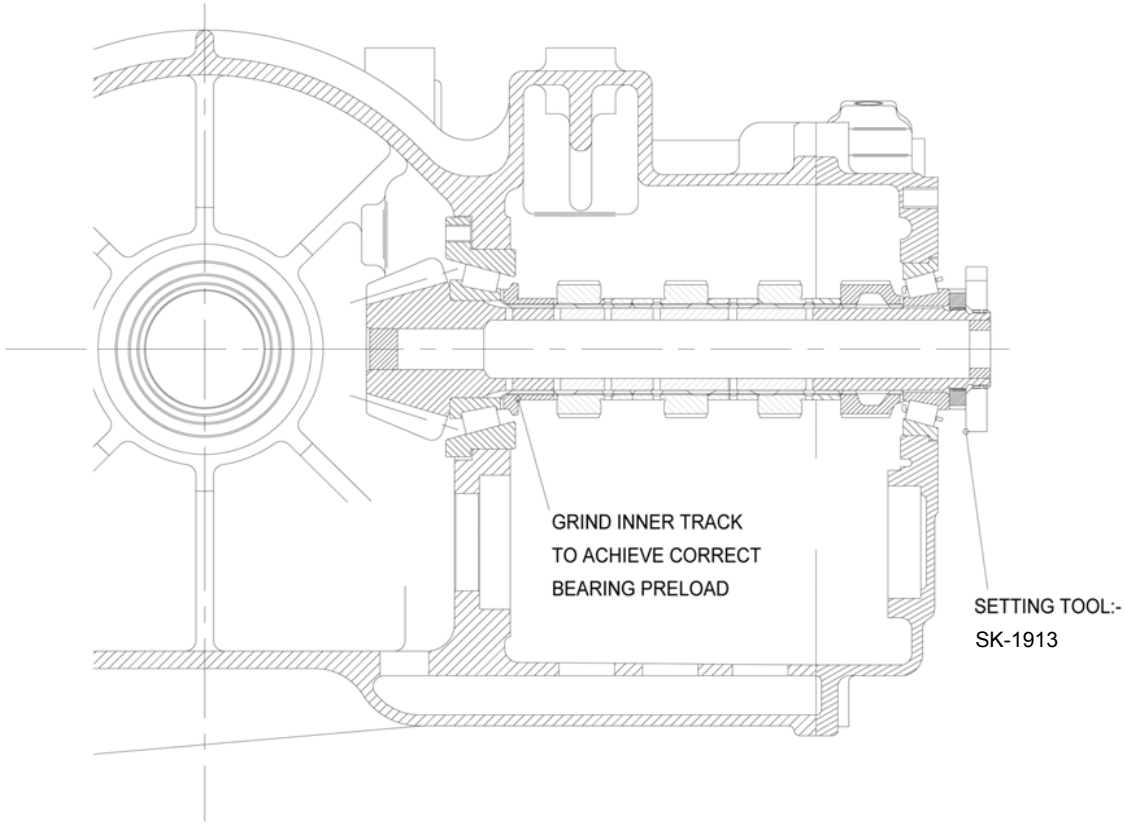


FIGURE 3

CROWNWHEEL & PINION BACKLASH SETTING

Requires special tool No. SK-1913

With the pinion shaft correctly fitted, and the correct diff bearing shims ascertained, the actual backlash can be measured by means of a dial test indicator against the notch in the outside diameter of tool SK-1913. Be sure to take at least 6 backlash readings, turning the crownwheel 30-45 degrees between each reading (this is to ensure that any variation due to manufacturing tolerances are taken account of.

The correct backlash figure should be taken from the card supplied with the gears. If the measured backlash is incorrect, rectify it by removing some shims (103) from behind one diff bearing, and inserting them behind the other, thus moving the diff across in the maincase. Do not add or discard any shims at this stage, as to do so would affect the diff bearing preload.

Once the correct backlash has been achieved, replace the dummy bearings with bearings (83) and confirm that the backlash is correct.

Note: Dummy are used so that it is easy to change the shims during the setting procedures. Before fitting the actual diff bearings, it is important compare thier width with that of the dummy bearings and compensate the shims accordingly for any difference.

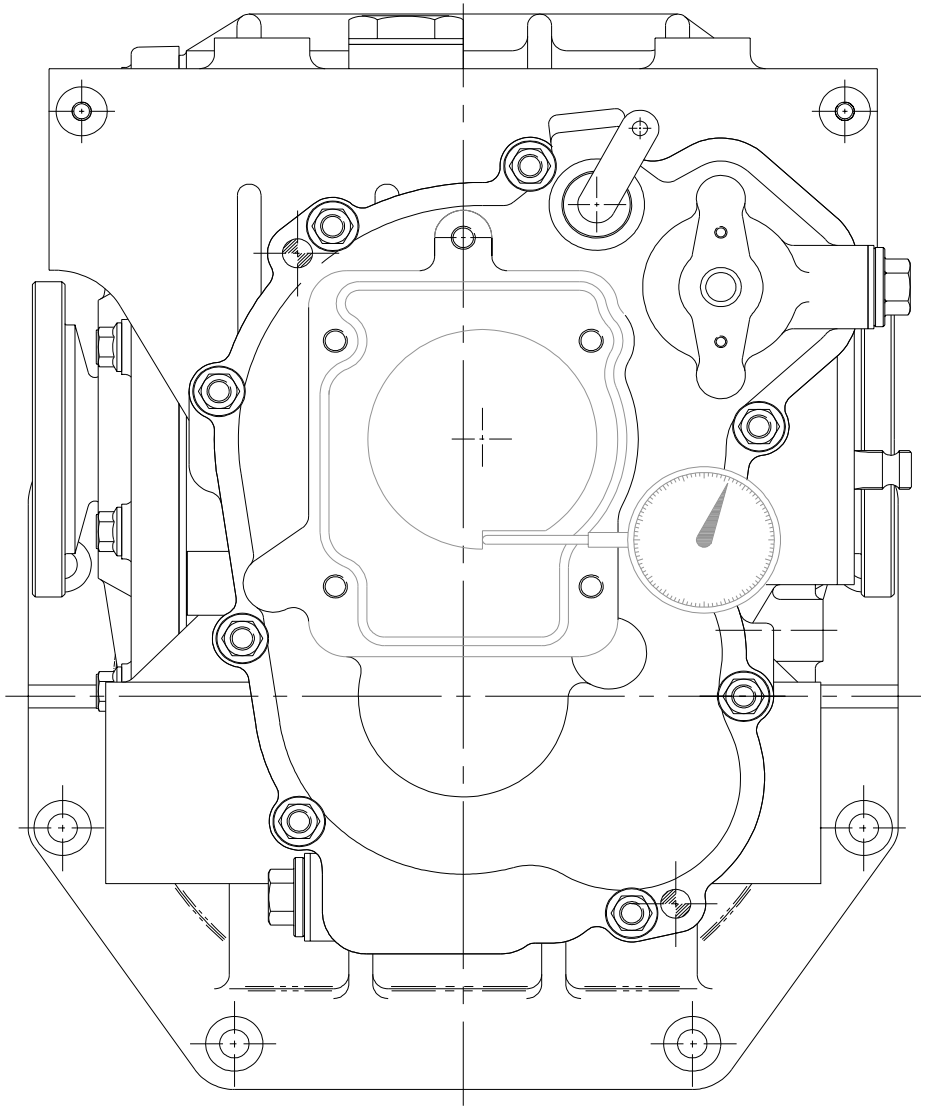


FIGURE 4

SEQUENTIAL BARREL SETTING - Requires special tool No.SK-1451

a/ Assemble the barrel (15), spacer (26), bearing retaining plate (25), bearing (27), and nut (29). Heat the bearing carrier (2), slide the barrel assembly into the bearing carrier, and secure using screws (12).

b/ Place the roller (24) onto the detent plunger (21), and insert them into the bearing carrier (2). Add the detent spring (22), bonded seal (115), and detent plug (23).

c/ Slide the selector forks (17) over the barrel (15), and secure using selector pins (18). For final assembly, Loctite the pins (18) into the forks (17).

d/ Stack the pinion gears (16), hubs (19,20), clutch rings (19) and spacer (14) in place in the bearing carrier, and slide the whole thing onto the dummy shaft of fixture SK-1451.

e/ Tighten the pinion shaft nut (111) onto the end of the dummy shaft, ensuring that the disc spring on the fixture preloads the bearings.

f/ Rotate the barrel to engage first gear. Measure and record the gap between the dogfaces of third through sixth gears. Engage third gear and repeat the measurement for first and second dogfaces. It is important that these dimensions are not taken when the barrel is in the neutral position.
First, third and fifth gear dog gap measurements will be similar (as will second, fourth and sixth). Any difference between the odd & even gear measurements must be corrected by replacing the barrel spacer (26) with one of the correct thickness.
Note: It is not possible (or necessary) to individually adjust each fork.

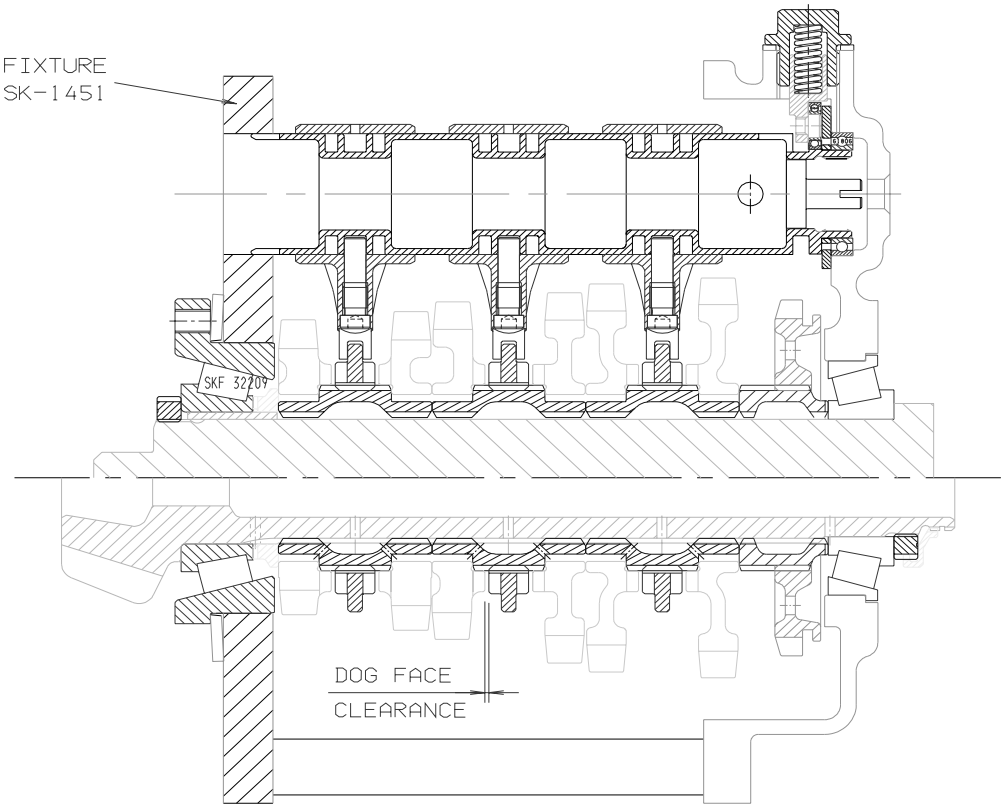


FIGURE 5

GEARBOX - ASSEMBLY

a/ It is assumed that all bearings, oil seals, studs, oil jets, and dowels are already fitted into casing. (see page 5).

b/ Assemble the oil pump components (if required). Heat the maincase, and drop the pump into position. Secure with screws , and add the drive gear and circlip.

c/ Place the reverse idler gear (104), bearing (106), and thrust washers (107) in position in the bearing carrier, and slide the spigot (105) into position. Secure with screw (12).

d/ Assemble the selector rack (75), washers (76), spring (77), and circlip (78), and slide into the maincase. Secure with the selector rack stop (80). Note: Check the gear linkage return spring length regularly (item 77). This spring has a finite life and will weaken with use. A new spring has a free height of 1.450”. It is also adviseable never to re-use the circlip (78).

e/ Assemble the drum (8), bearing (28), pin (10), retaining plate (11), barrel driver (13), and shifter spindle (7). Assemble the drum shifter (6), guide plate (9), pawls (64), springs (63), and plungers (62), and slide into engagement with the drum assembly. Push the complete assembly into it's location in the maincase, ensuring correct location with the selector rack teeth.

f/ Assemble the selector input shaft (70), bearing (68), seal (71), spacer (72), quadrant gear (73) and circlip (112) into their housing (66). Slide the whole assembly into the maincase, ensuring correct engagement with the selector rack (75).

g/ Build the selector barrel parts into the bearing carrier as described in the section 'Sequential Barrel Setting'.

h/ Fit the pinion shaft as described previously.

i/ Hold the reverse selector fork (31), with reverse pinion gear (121), in position in the bearing carrier (2). Slide the reverse selector shaft (110) into place and secure with screw (122).

j/ With the bearing carrier face up, add the layshaft (50), input gears (46), spacers (45), disc spring (44), and bearing inner track (43). Stack the reverse hub (33), hubs (20), pinion gears (16), bearings (120), clutch rings (19), and spacer (14) into position in the bearing carrier (2), and slide the dummy shaft through from the bearing carrier end.

k/ Locating the tip of the dummy shaft into the end of the pinion shaft, slide the completed gear cluster assembly into the maincase to engage the pinion shaft and layshaft bearing, allowing the dummy shaft to slide out of the gear cluster. Whilst locating the gear cluster, lightly operate the selector rack (75) to ensure correct location of the barrel and driver.
Tighten the pinion shaft nut using tool No. SK-1452

l/ Fit the rear cover (36) using nuts (49). and dowels (139).

m/ Fit the clutch spigot bearing (97) and seal (98) into their housing (99) and secure with circlip (101). Slide the housing assembly onto the clutch shaft (96) and secure with circlip (102). Fit the o'ring seal (100) onto the housing and slide the assembly into the maincase to engage the layshaft (50). Fix the housing in place using screws (124).
Note : If the oil pump is fitted, the diff assembly must be removed from the maincase to allow the clutch shaft to be fitted (or removed).

n/ Fit magnetic plug (114) and washer (115) to maincase.

CHANGING GEAR RATIOS

a/ With a drip tray placed beneath the gearbox, remove the drain plug (114) and drain the oil.

b/ Disconnect the reverse gear linkage from the gearbox.

c/ Remove the rear cover (36).

c/ Remove the M8 nuts (48) securing the bearing carrier (2), and slide it out of the maincase, complete with the gear cluster. It may be necessary to tap lightly on the lugs provided to break the seal. Use a soft hammer for this purpose, never use a screwdriver to lever between joint faces as this may damage the faces and impair the seal efficiency when reassembled. Take care not to drop any of the pinion shaft components as they won't be fully supported at this time. The dummy shaft from SK-1451 can be used to prevent the pinion shaft components from falling by inserting it into the rear end of the pinion shaft and sliding the loose parts onto it.

d/ Remove the pinion gears (16), hubs (20), and clutch rings (19). Slide the input gears (46), and spacers (45) from the layshaft (50), then withdraw the layshaft from the bearing carrier.

e/ Replace the gears with the required ratios. Gears are supplied in matched pairs, one for the mainshaft and one for the layshaft. Each gear is marked with two sets of numbers. The first of these indicates the number of teeth on the layshaft gear, while the second figure signifies the number of teeth on the mainshaft gear which mates with it. Both gears of each pair are marked in an identical manner. It is essential that gears are correctly paired to these numbers.
Note: On all first gears, and some second gears, the gear teeth are machined integral with the layshaft. In such cases, therefore, if a first (or second) gear ratio change is required, the layshaft itself must be changed.

f/ Whilst changing ratios it is advisable, as a matter of course, to wash and inspect all components which are to be used again before refitting. Check for wear and cracks, particularly to the clutch rings. Also examine the selector forks for heavy or uneven wear.

g/ Reassembly is the reverse of disassembly. Take care, when refitting the gear cluster into the maincase, to ensure location of the layshaft into it's bearing, and of the selector barrel (15) it's driver (13). Assembly of the pinion shaft components is made easier by use of the dummy shaft as described previously. [Some mechanics find assembly easier if the layshaft bearing inner track is pre-fitted in the casing, rather than onto the end of the layshaft.]

POWERFLOW DIFFERENTIAL

This powerflow differential unit is designed with versatility as it's major asset. Many factors will contribute to the settings required. A car with good traction and low power, may require a completely different arrangement to that of a car with poor traction and high power.

There are 10 friction plates within the unit (4 (87) splined to the diff casing (57), and 6 (88) splined to the side bevel gears(84). Slip limiting is dependant on the friction resistance between these plates, and is affected by clamping the plates together.. Four factors contribute to the total friction torque between the plates :-

1/ The side bevel gears (84) thrust apart to clamp the plates as they transmit the driving power. This is a feature of the gear geometry, and is not adjustable.

2/ The ramp angles cut on the side ring gears (85) have an effect on how much of the transmitted torque is converted into sideways (clamping) force onto the plates. For example, on the drive side ramp, 45 degrees transmits less sideways force than 30 degrees. Likewise on the coast side ramp, an 80 degree angle will transmit little or no clamping force onto the plates, whereas a 45 degree angle will transmit a much greater force. Side ring gears (85) are available with many different drive/coast ramp angle combinations.

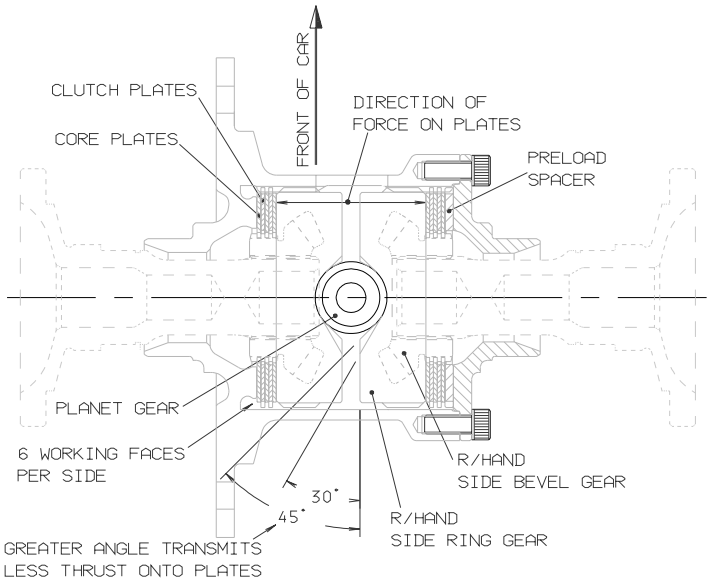


FIG URE 6

3/ The second adjustable factor is how tightly the plate stack is compressed on assembly (known as static preload). Included in the plate stack is a preload spacer (89). The preload torque is measured between the side bevel gears, by holding one side bevel gear (84) stationary, and measuring the torque required to turn the other using tool SK-____. When the diff is assembled, the preload torque must be at least 10 lbs.ft, but can be much greater if required. New plates 'run in' so a higher preload is advised than with used plates.

4/ The final adjustment is simply to re-order the plate stack so as to change the number of relatively rotating faces. The diagram shows the stack setup with the maximum 12 working faces. Standard stack may be shuffled to give as few as 2 working faces.

DGC-212 Diff Assembly (superseded March 2010)

Bill of Material		DGC–212	DGC DIFF ASSEMBLY
Position	Qty	PartNo	PartName
1	1	DGC–213	DIFF CASE
2	4	DGC–213–10	CLUTCH PLATE
3	8	DGC–213–12	SOCKET CAP SCREW
4	1	DGC–213–3#	SPACER PLATE
5	4	DGC–213–5AH	PLANET DIFF. GEAR
6	2	DGC–213–6AH	SIDE BEVEL GEAR
7	2	DGC–213–7	SIDE RING GEARS
8	6	DGC–213–8	CORE PLATE
9	1	DGC–214	END PLATE

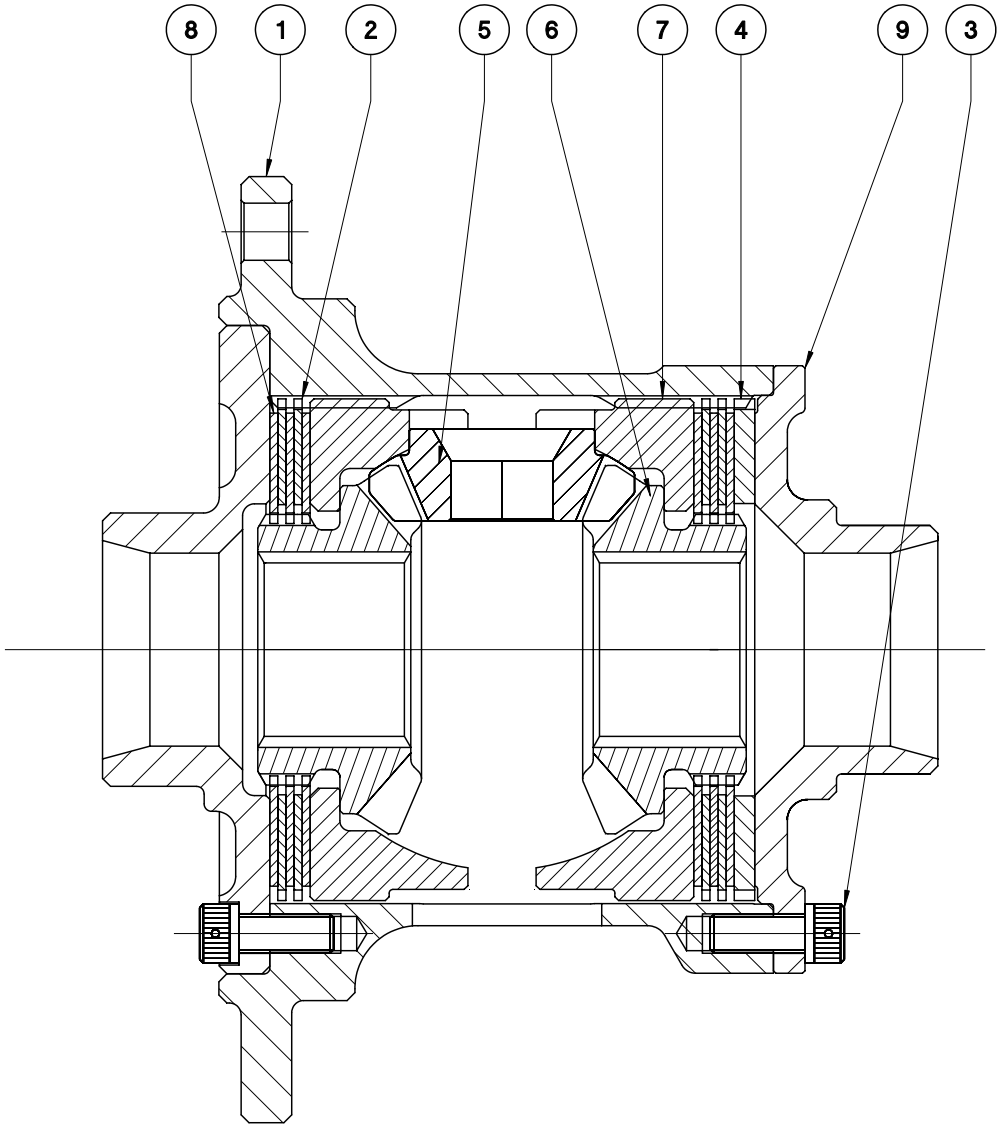


FIGURE 7

DGC-212 Diff Assembly (March 2010 onwards)

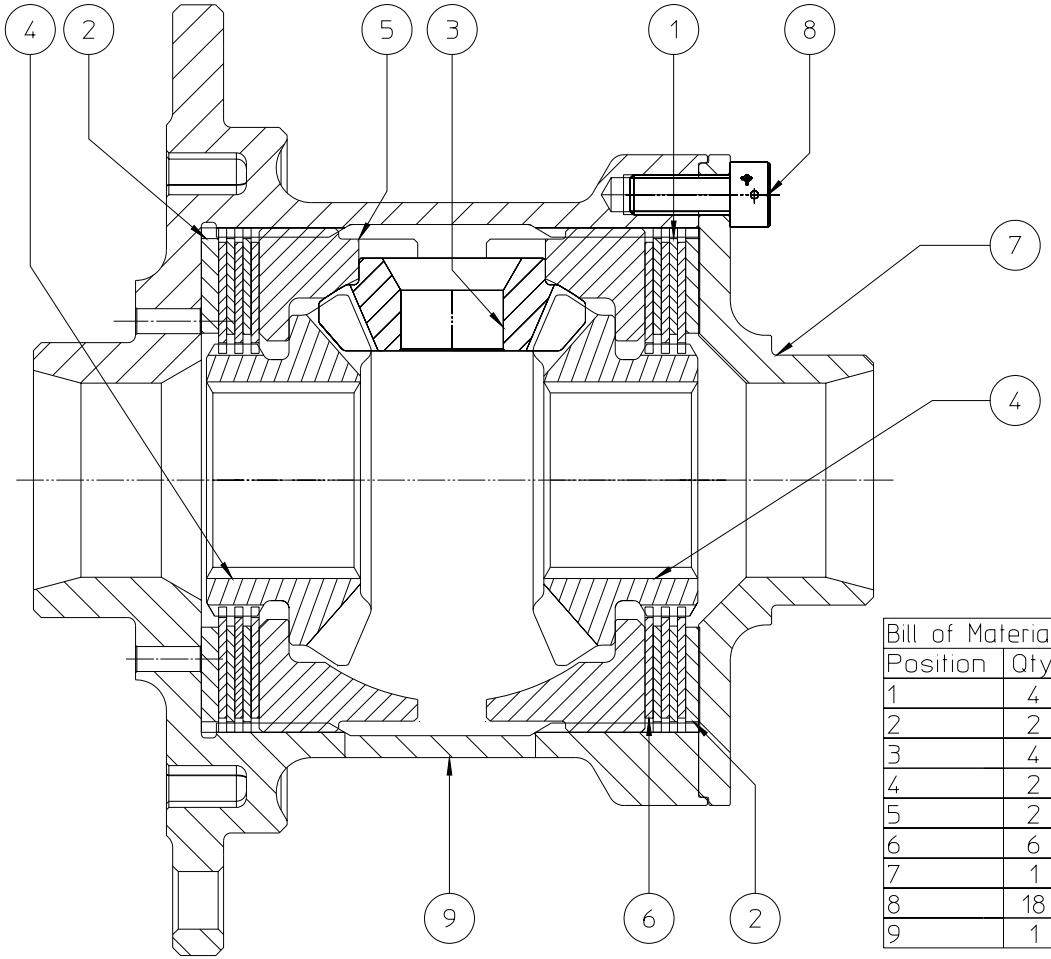


FIGURE 7a

Bill of Material		DGC-212	DGC DIFF ASSEMBLY
Position	Qty	PartNo	PartName
1	4	DGC-213-10	CLUTCH PLATE
2	2	DGC-213-3#	SPACER PLATE
3	4	DGC-213-5AH	PLANET DIFF. GEAR
4	2	DGC-213-6AH	SIDE BEVEL GEAR
5	2	DGC-213-7	SIDE RING GEARS
6	6	DGC-213-8	CORE PLATE
7	1	NLT-214-B	DIFF END CAP
8	18	SCR-017	SOCKET CAP SCREW
9	1	TLT-213	DIFF CASE

DGC-212-S Diff Assembly (superseded March 2010)

Bill of Material		DGC-212-S	DIFF ASSY WITH SPRING
Position	Qty	PartNo	PartName
1	1	DGC-213	DIFF CASE
2	4	DGC-213-10	CLUTCH PLATE
3	8	DGC-213-12	SOCKET CAP SCREW
4	2	DGC-213-6AH	SIDE BEVEL GEAR
5	4	DGC-213-5AH	PLANET DIFF. GEAR
6	1	DGC-213-7	SIDE RING GEARS
7	6	DGC-213-8	CORE PLATE
8	1	DGC-214	END PLATE
9	1	MGT-213-3	PRE-LOAD SPACER
10	1	SPR-083	DISK SPRING

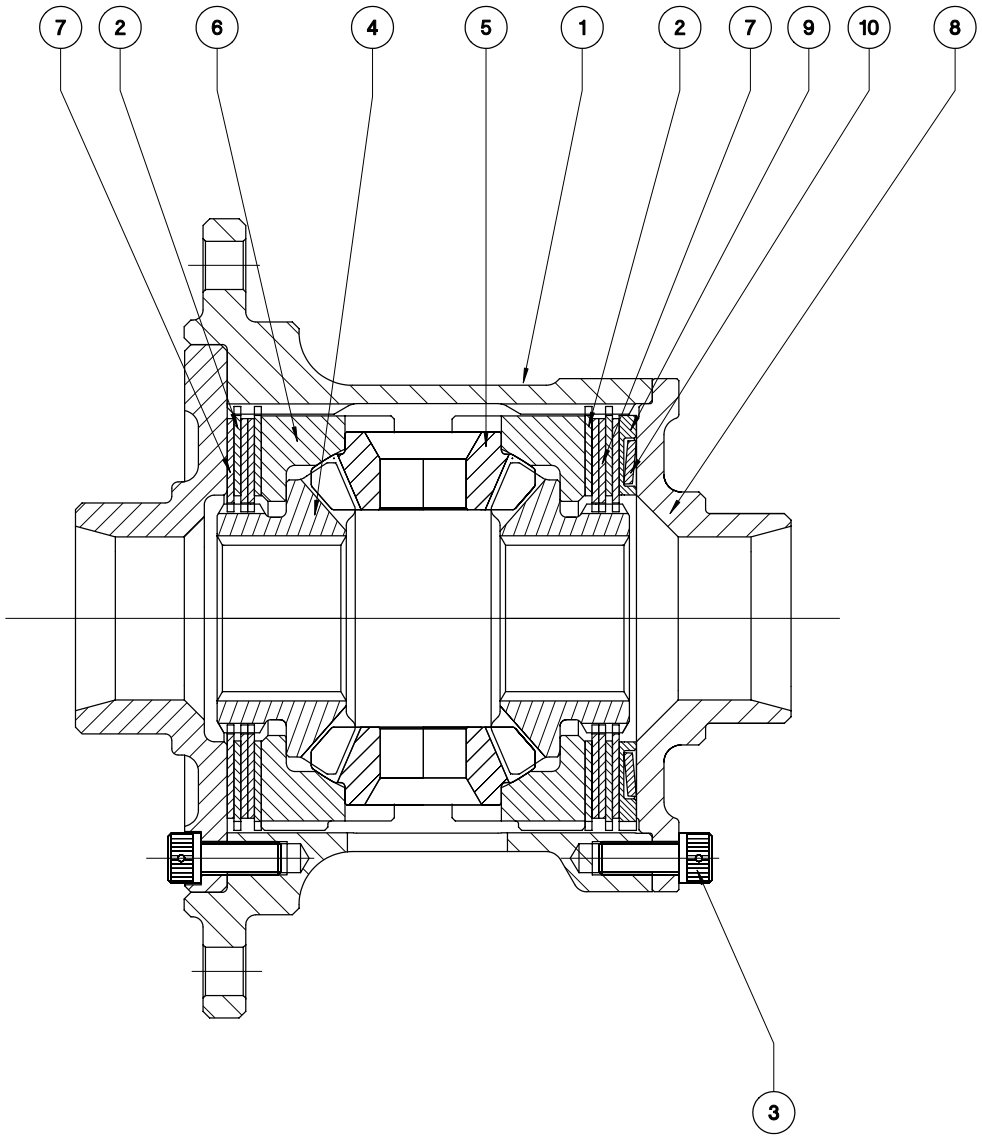


FIGURE 8

DGC-212-S Diff Assembly (March 2010 onwards)

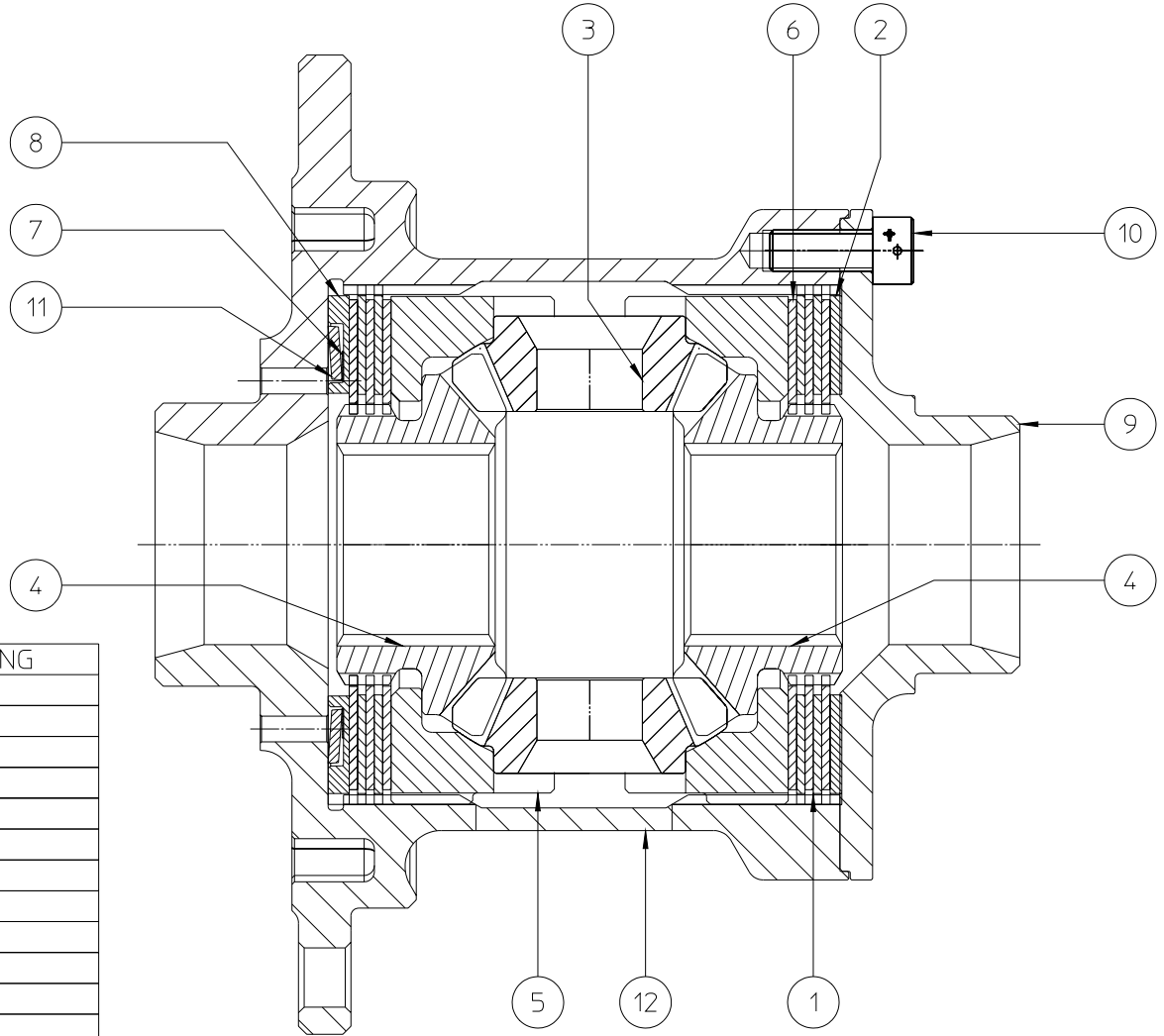


FIGURE 8a

Bill of Material		DGC-212-S	DIFF ASSY WITH SPRING
Position	Qty	PartNo	PartName
1	4	DGC-213-10	CLUTCH PLATE
2	1	DGC-213-3A	PRE-LOAD SPACER
3	4	DGC-213-5AH	PLANET DIFF. GEAR
4	2	DGC-213-6AH	SIDE BEVEL GEAR
5	1	DGC-213-7	SIDE RING GEARS
6	7	DGC-213-8	CORE PLATE
7	1	HC9-206-1	SIDEPLATE SHIM
8	1	MGT-213-3	PRE-LOAD SPACER
9	1	NLT-214-B	DIFF END CAP
10	18	SCR-017	SOCKET CAP SCREW
11	1	SPR-083	DISK SPRING
12	1	TLT-213	DIFF CASE

TPT-212 Diff Assembly

Bill of Material		TPT-212	TPT DIFF ASSEMBLY
Position	Qty	PartNo	PartName
1	4	TPT-213-10	OUTER DRIVE CLUTCH PLATE
2	6	TPT-213-12	CAP SCREW - MODIFIED
3	1	TPT-213-3	SPACER-PRELOAD SETTING
4	3	TPT-213-5D	PLANET DIFF. GEAR
5	2	TPT-213-6D	SIDE BEVEL GEAR
6	2	TPT-213-7	SIDE RING GEARS
7	6	TPT-213-8	CORE PLATE
8	1	TPTS-213	DIFF CASE ASSEMBLY
9	1	TPTS-214	DIFF END PLATE

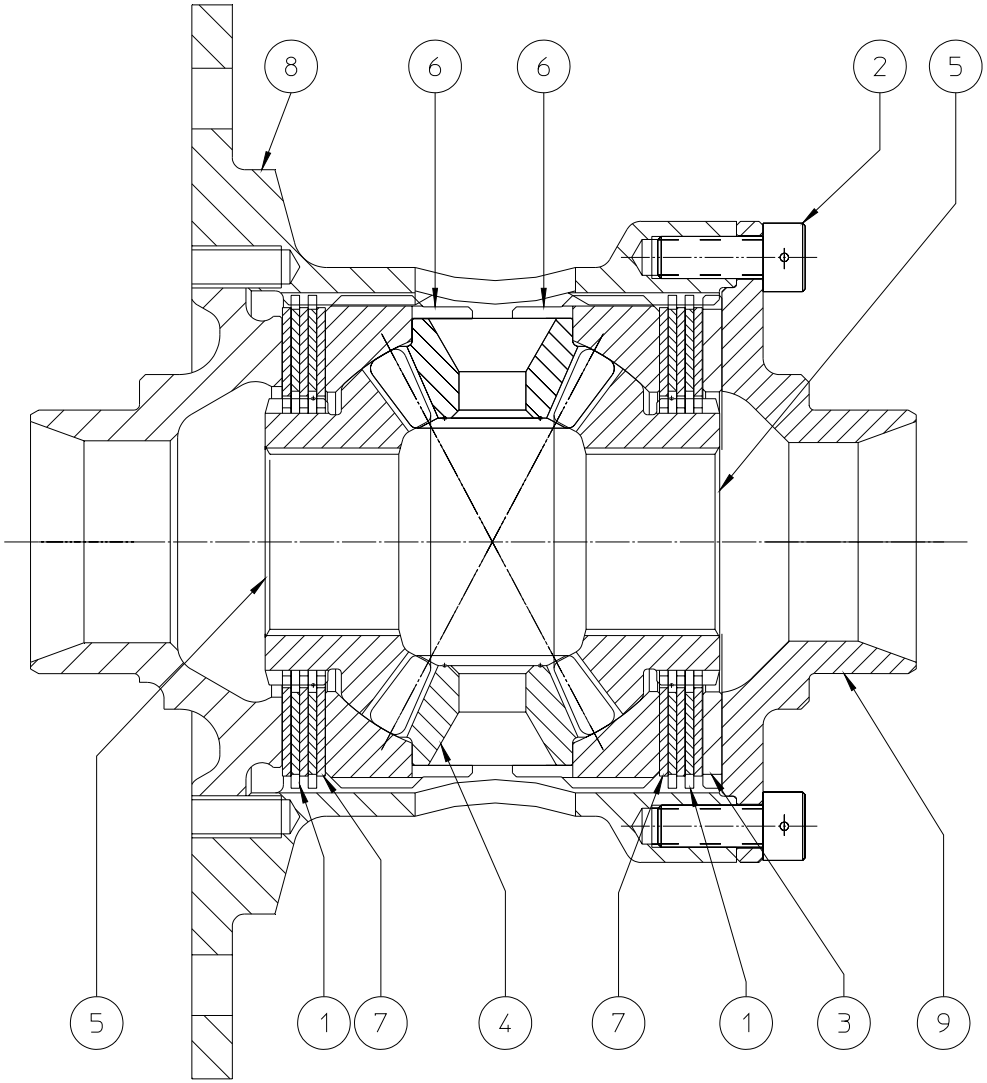


FIGURE 9

NLT-212 Diff Assembly (superseded March 2009)

Bill of Material	NLT–212	ADJUSTABLE DIFF ASSY
Position	Qty	PartNo	PartName
1	4	DGC–213–10	CLUTCH PLATE
2	8	DGC–213–12	SOCKET CAP SCREW
3	1	DGC–213–3#	SPACER PLATE
4	4	DGC–213–5AH	PLANET DIFF. GEAR
5	2	DGC–213–6AH	SIDE BEVEL GEAR
6	1	DGC–213–7	SIDE RING GEARS
7	6	DGC–213–8	CORE PLATE
8	1	DGC–213–B	FIXED END PLATE
9	1	DTR–213–4	ADJUSTER WHEEL
10	1	DTR–213–5	CARRIER
11	1	HSI–213–8C	WORM SCREW
12	1	NLT–213	ADJ DIFF CASE
13	1	SPR–066	DISK SPRING

IN ORDER TO FIT THE NLT DIFFERNETIAL IN THE NMT BOX, THE NLT SIDE PLATE (NLT-205) WILL NEED TO BE FITTED

This differential was superseded by the differential shown on the next page.

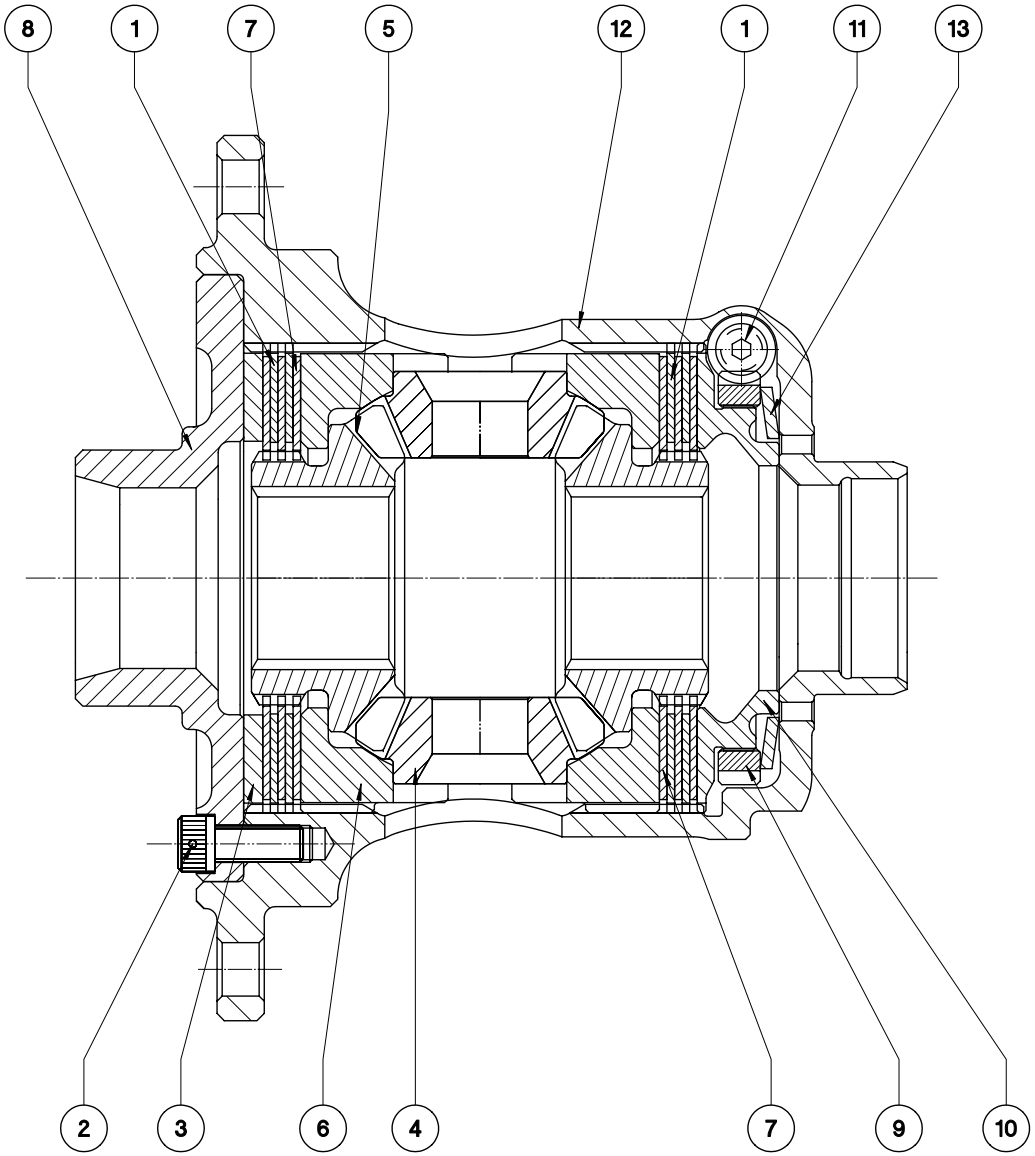
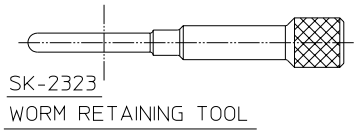


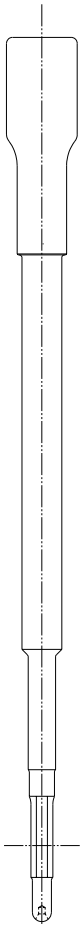
FIGURE 10

NLT-212 Diff Assembly (Post March 2009)

TOOLING



SK-2323
WORM RETAINING TOOL



SK-1623
DIFF ADJUSTMENT TOOL

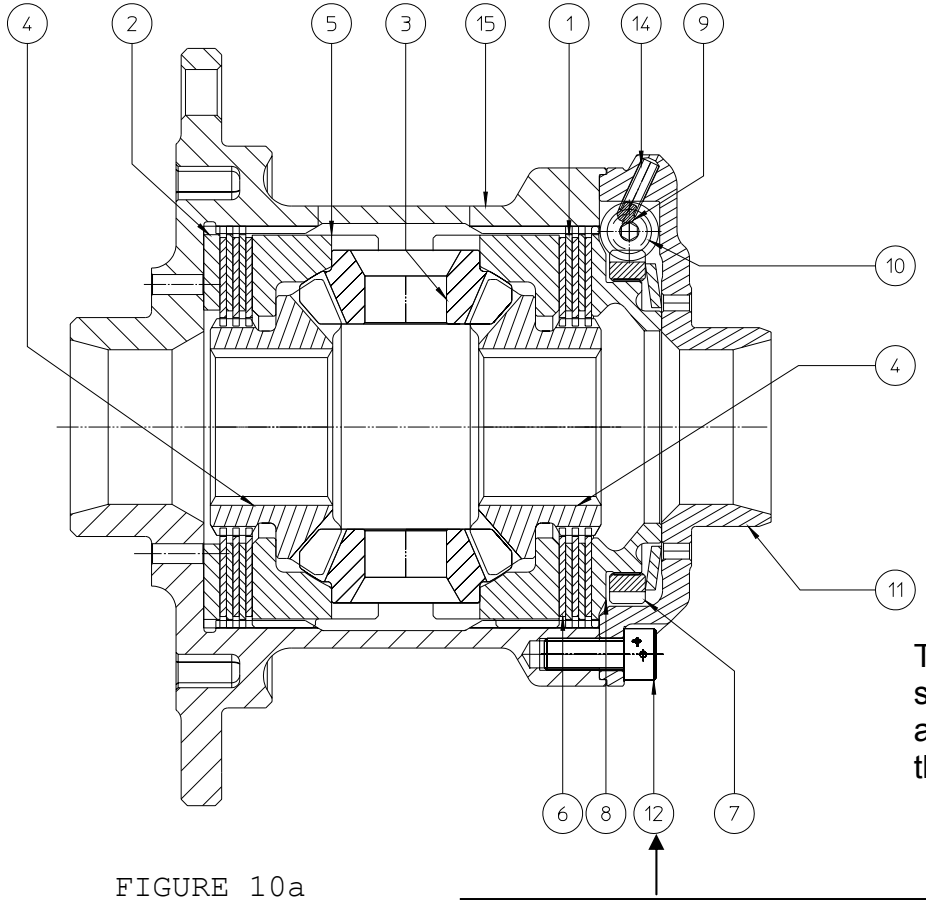


FIGURE 10a

Bill of Material		NLT-212	ADJUSTABLE DIFF ASSY
Position	Qty	PartNo	PartName
1	4	DGC-213-10	CLUTCH PLATE
2	1	DGC-213-3#	SPACER PLATE
3	4	DGC-213-5AH	PLANET DIFF. GEAR
4	2	DGC-213-6AH	SIDE BEVEL GEAR
5	1	DGC-213-7	SIDE RING GEARS
6	6	DGC-213-8	CORE PLATE
7	1	DTR-213-4	ADJUSTER WHEEL
8	1	DTR-213-5	CARRIER
9	1	FTR-213-20	DETENT PIN
10	1	HSI-213-8C	WORM SCREW
11	1	NLT-214-A	DIFF CAP
12	15	SCR-017	SOCKET CAP SCREW
13	1	SPR-066	DISK SPRING
14	1	SPR-119	COMPRESSION SPRING
15	1	TLT-213	DIFF CASE

This differential superseded the differential shown on the previous page. The differences are a new case, end cap, end cap screws and the addition of a sprung detent to the worm

THESE BOLTS MUST BE FITTED USING LOCTITE 648 RETAINER AND LOCKWIRE.

Please note that the NLT-201 maincase will need to be modified to fit this differential. Please contact Hewland Engineering for details.

ILLUSTRATED PARTS LIST

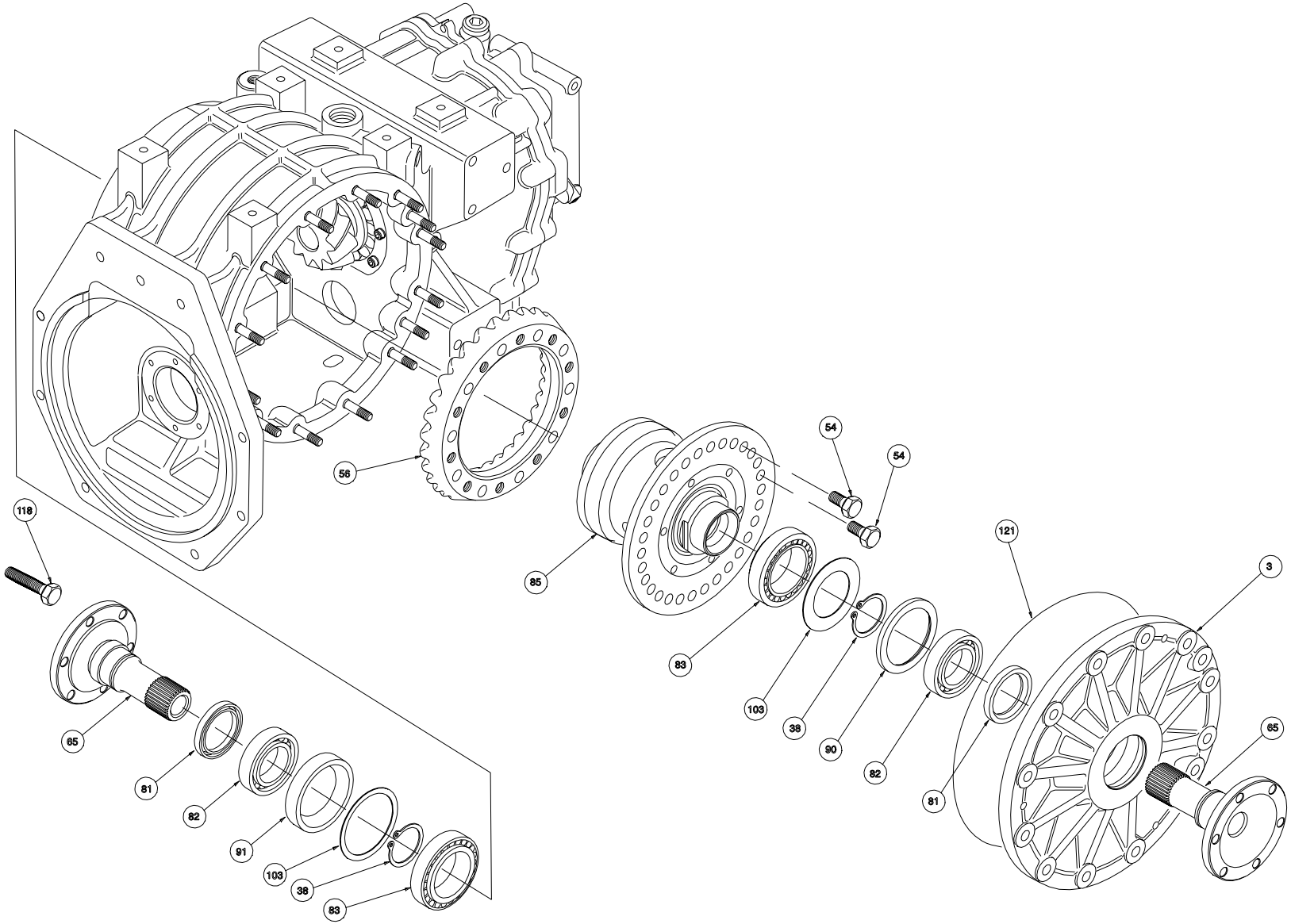


FIGURE 11

DIFFERENTIAL ASSEMBLY

ITEM No	PART No	DESCRIPTION	QTY
3	NMT-205	SIDEPLATE	1
38	DG-219-1A	CIRCLIP	2
54	CROWNWHEEL BOLT	CROWNWHEEL BOLT	10
56	NMT-221-AW	CROWNWHEEL	1
65	OUTPUT FLANGE	OUTPUT FLANGE	2
81	FGC-205-4	OIL SEAL	2
82	FGC-205-3	BALL BEARING	2
83	FGC-205-1	TAPER ROLLER BEARING	2
85	DIFFERENTIAL	DIFFERENTIAL	1
90	DIFF SPACER SIDEPLATE	SPACER	1
91	DIFF SPACER MAINCASE	SPACER	1
103	FGC-206-1#	SHIM	2
121	VG-201-9	SEALING STRIP	A/R

* See General Technical Bulletin No. 14

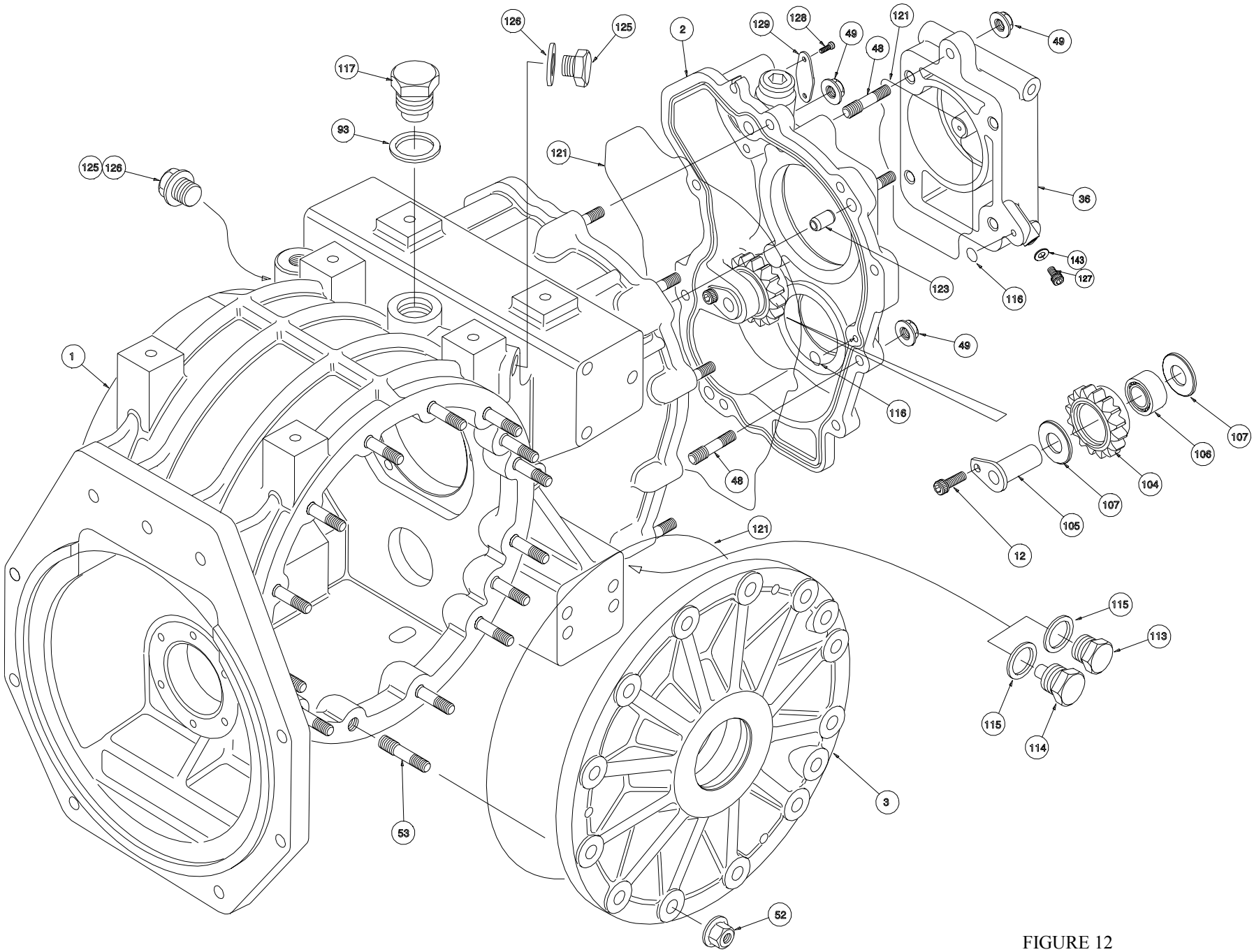


FIGURE 12

CASINGS AND ASSOCIATED PARTS

ITEM No	PART No	DESCRIPTION	QTY
1	NLT-201	MAINCASE	1
2	NMT-202	BEARING CARRIER	1
3	NMT-205	SIDEPLATE	1
12	HP-N-9006	SOCKET CAP SCREW	5
36	NMT-204	END COVER	1
48	HP-M-9010	STUD	8
49	NUT-004	NUT	13
52	NUT-011	NUT	14
53	STU-017	STUD	14
93	FGB-201-8	BONDED SEAL	1
104	TE-237-1	REVERSE IDLER	1
105	TE-237-3	REVERSE IDLER SPIGOT	1
106	HC-237-2	NEEDLE ROLLER BEARING	1
107	HC-237-4	THRUST WASHER	2
113	OIL FILTER	OIL FILTER	1
114	HP-M-9004	MAGNETIC PLUG	1
115	HP-M-9042	SEALING WASHER	3
116	ORI-001	O-RING	2
117	OIL SPRAY	OIL SPRAY	1
121	VG-201-9	SEALING STRIP	A/R
123	HP-M-9015	DOWL	2
125	PLU-002	1/4 BSP HEX. HD. PLUG	3
126	WSH-017	1/4 BSP BONDED WASHER	3
127	SCR-159	BUTTON HEAD SCREW	1
128	HP-M-9062	SCREW	2
129	TE-201-4	COVER PLATE	1
130	HP-M-9037	BANJIO JOINT	1
131	HP-M-9038	SEALING WASHER	2
132	HP-M-9039	BANJIO BOLT	1
139	DOW-032	DOWEL	2
141	STU-062	STUD	1
142	STU-066	STUD	4
143	WSH-053	DOWTY WASHER	1

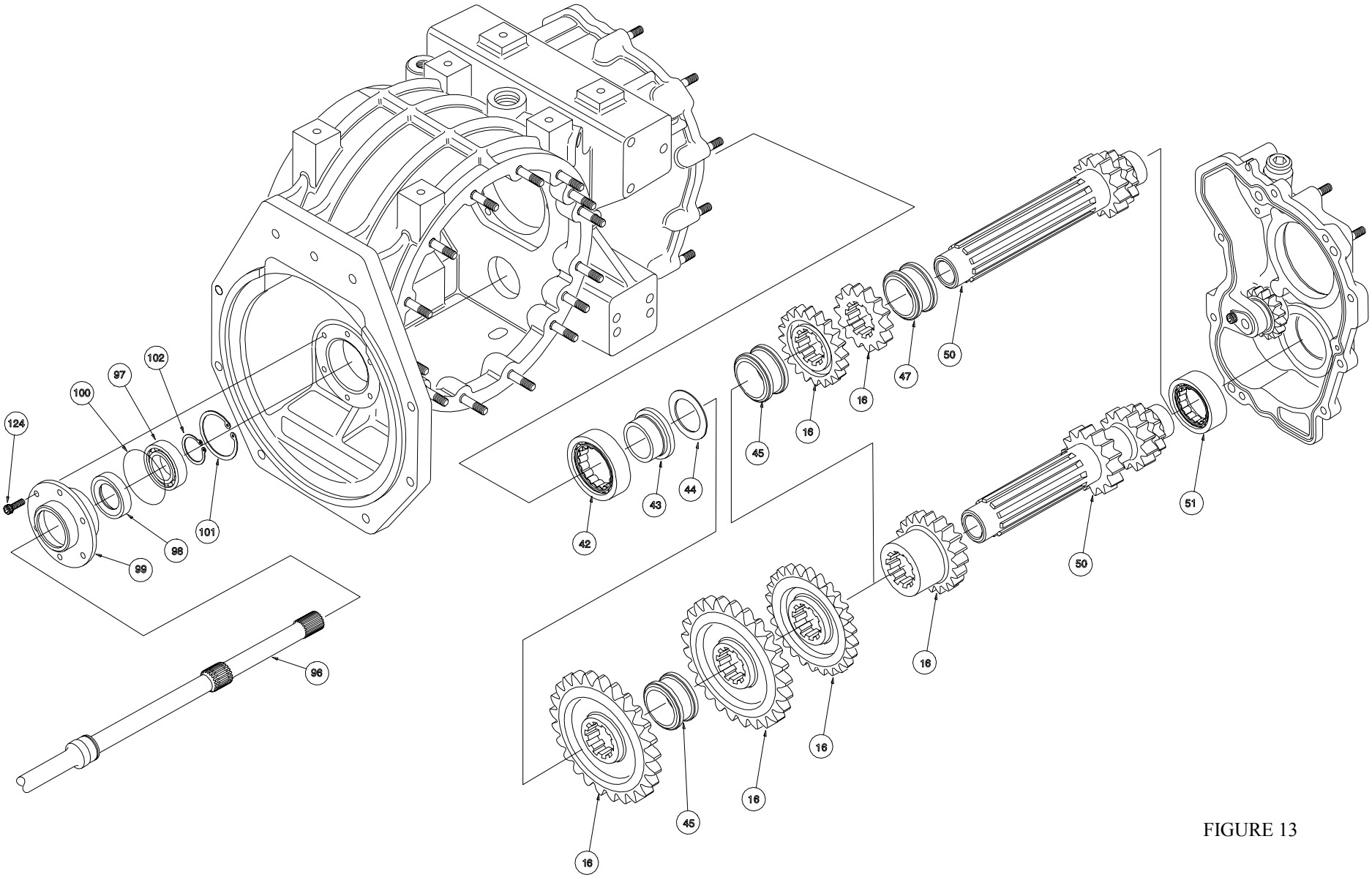


FIGURE 13

LAYSHAFT ASSEMBLY

ITEM No	PART No	DESCRIPTION	QTY
16	104-RATIO-STD	GEAR RATIO	5
42	BEA-093	ROLLER BEARING	1
43	TE-234-2	INNER TRACK	1
44	105-234-8	SPRING WASHER	1
45	104-234-4	LAYSHAFT SPACER	2
47	TE-234-1	SPACER	1
50	TE-234	LAYSHAFT	1
51	BEA-001	ROLLER BEARING	1
96	NMT-239-13	CLUTCH SHAFT	1
97	DGB-244-12	BALL BEARING	1
98	FT-244-11	OIL SEAL	1
99	DGB-244	CLUTCH SHAFT BRG. HOUSING	1
100	DGB-244-14	'O' RING	1
101	DGB-244-10	CIRCLIP	1
102	DGB-239-0	CIRCLIP	1
124	VG-224-13	CAP SCREW	6

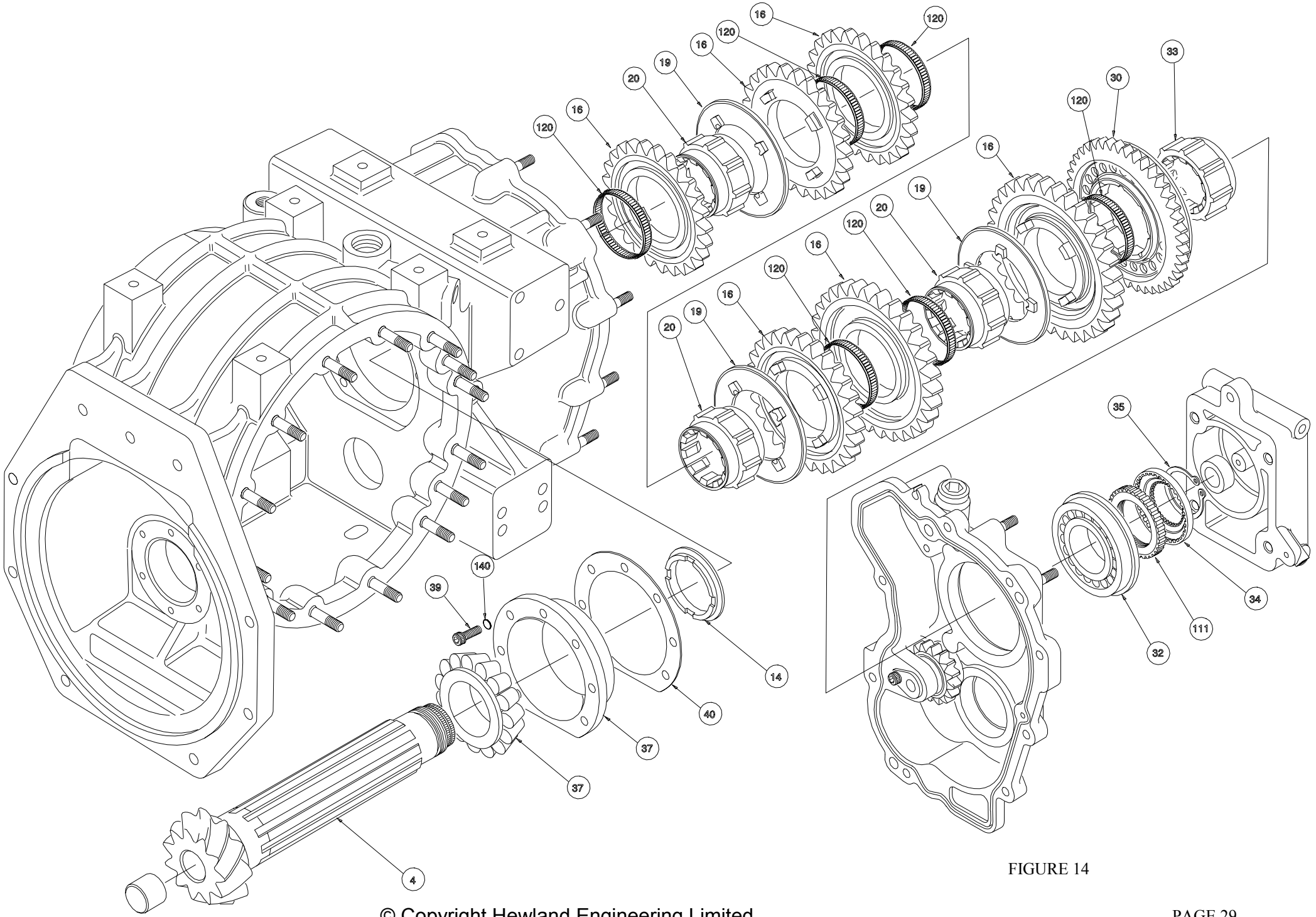


FIGURE 14

PINION SHAFT ASSEMBLY

ITEM No	PART No	DESCRIPTION	QTY
4	NMT-221-AP	PINION SHAFT	1
14	NMT-229	PRELOAD SHIM	1
16	104-RATIO-STD	GEAR RATIO	6
19	DG-232-A4D	CLUTCH RING	3
20	104-226-1	HUB	3
30	TE-231	REVERSE PINION GEAR	1
32	BEA-062	TAPER ROLLER BEARING	1
33	NMT-228	REVERSE HUB	1
34	NMT-230-1	LOCKING RING	1
35	FT-219-1A	CIRCLIP	1
37	NLT-222	TAPER ROLLER BEARING	1
39	SCR-109	SOCKET CAP SCREW	5
40	NLT-223-2	SHIM	1
111	NMT-230	NUT	1
120	104-226-2	NEEDLE BEARING	6
140	WSH-036	WASHER	5

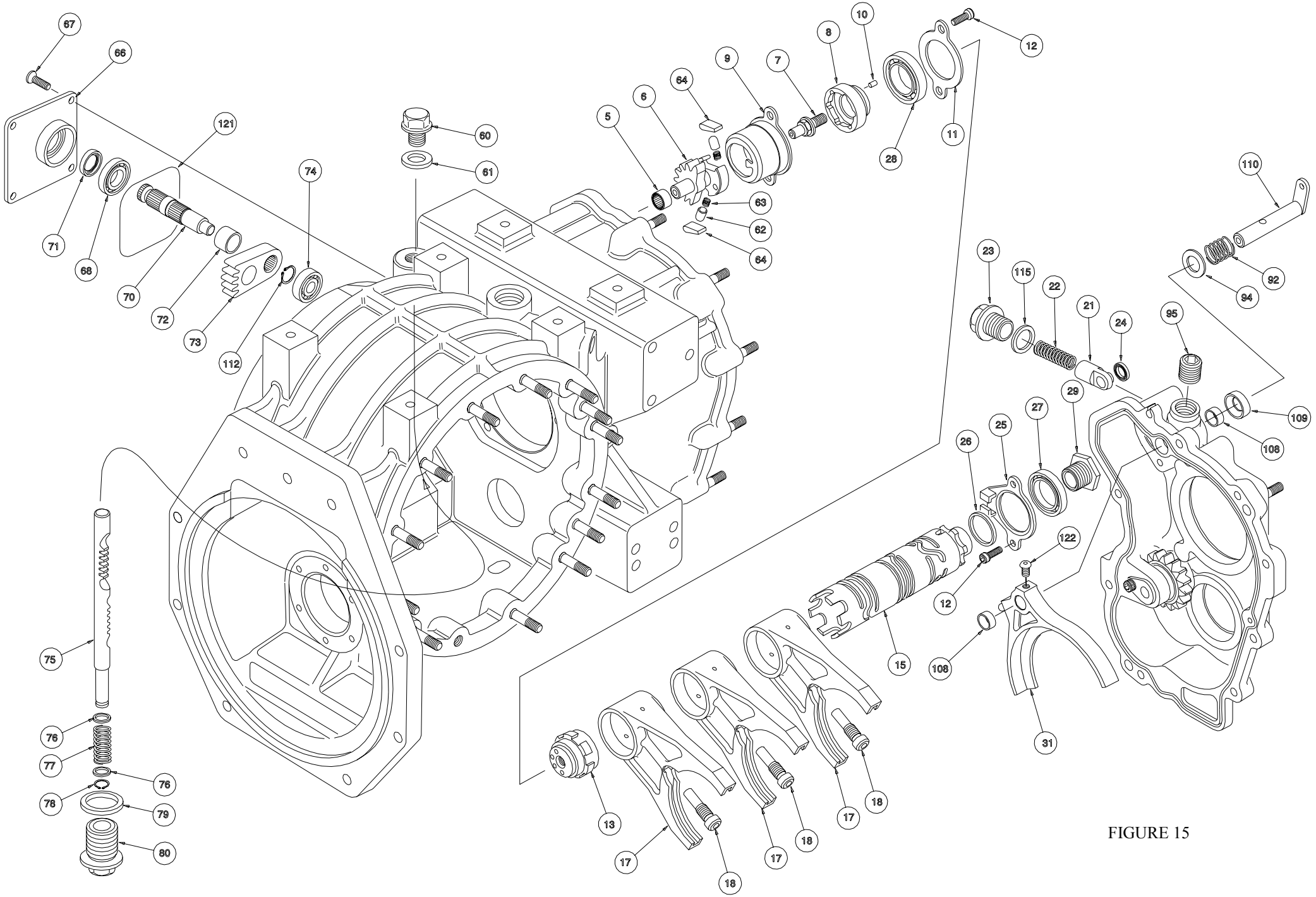


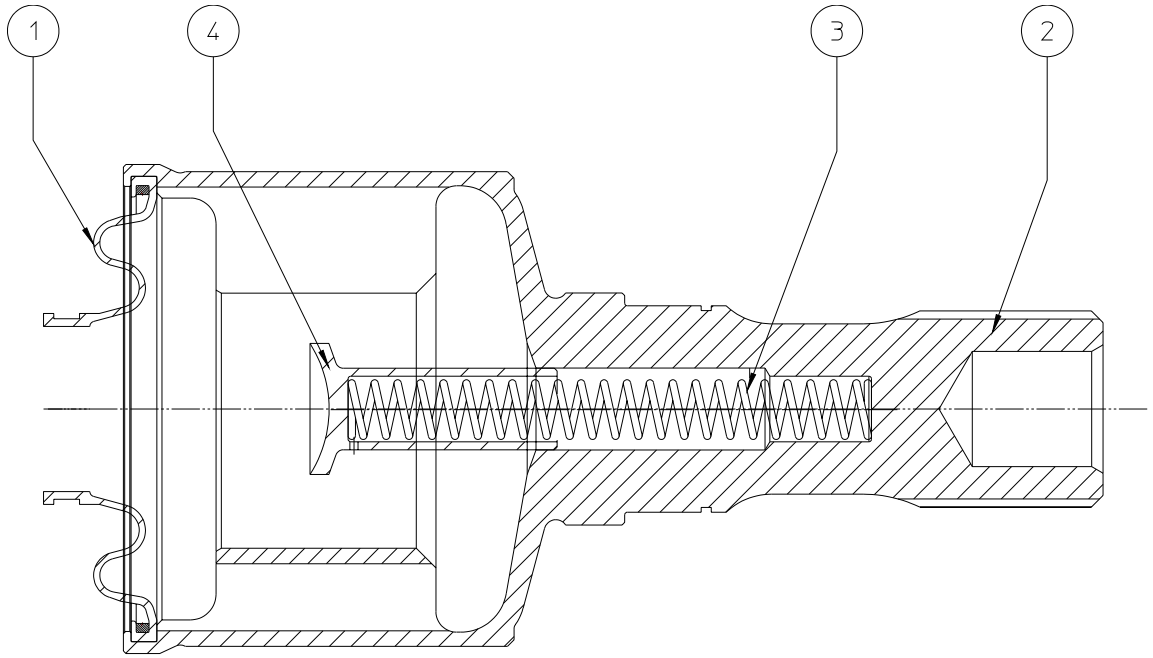
FIGURE 15

SELECTOR ASSEMBLY

ITEM No	PART No	DESCRIPTION	QTY
5	BEA-035	NEEDLE ROLLER BEARING	1
6	TE-260-6A	DRUM SHIFTER	1
7	TE-260-4	SHIFTER SPINDLE	1
8	105-260-4	DRUM	1
9	NMT-260-5	GUIDE PLATE	1
10	HP-M-7022	DOWEL	1
11	NMT-260-2	KEEP PLATE	1
12	HP-N-9006	SOCKET CAP SCREW	5
13	TE-260-1	BARREL DRIVER	1
15	NMT-260	BARREL	1
17	IGT-250	SELECTOR FORK	3
18	IGT-250-1	SELECTOR FORK PIN	3
21	102-260-4	PLUNGER	1
22	102-205-11	SPRING	1
23	TE-202-1	DETENT PLUG	1
24	BEA-059	ROLLER	1
25	NMT-202-1	BEARING RETAINING PLATE	1
26	TE-260-7	BARREL SPACER	1
27	BEA-037	BALL BEARING	1
28	HP-M-8008	BALL BEARING	1
29	TE-260-5	BARREL BOLT	1
31	TE-249	REVERSE SELECTOR FORK	1
60	TGTA-206-2	SELECTOR RACK STOP	1
61	WSH-013	BONDED SEAL	1
62	HP-M-7018	PLUNGER	2
63	HP-M-7018-A	SPRING	2

ITEM No	PART No	DESCRIPTION	QTY
64	HP-M-7017	PAWL	2
66	NMT-252-2	BEARING PLATE	1
67	LD-253-4	SOCKET COUNTERSUNK SCREW	4
68	BEA-051	BALL BEARING	1
70	NMT-252	SELECTOR INPUT SHAFT	1
71	HP-M-8012	OIL SEAL	1
72	NMT-252-3	SPACER	1
73	NMT-252-1	QUADRANT GEAR	1
74	BEA-052	BALL BEARING	1
75	NMT-260-3	SELECTOR RACK	1
76	NLT-260-11	WASHER	2
77	102-260-9	SPRING	1
78	102-260-8	CIRCLIP	1
79	WSH-10	BONDED SEAL	1
80	NMT-202-2	SELECTOR RACK STOP	1
92	SPR-011	COMPRESSION SPRING	1
94	WSH-018	1/2” PLAIN WASHER	1
95	HC-202-8	PLUG	2
108	BEA-038	BUSH	2
109	LIP-015	LIP SEAL	1
110	TE-246-1	REVERSE SELECTOR SHAFT	1
112	CIR-033	CIRCLIP	1
115	HP-M-9042	BONDED WASHER	3
121	VG-201-9	SEALING STRIP	A/R
122	SCR-046	SCREW	1

NLT-218-TRIPOD ASSEMBLY



Bill of Material		NLT-218-TRIPOD	NLT TRIPOD ASSEMBLY
Position	Qty	PartNo	PartName
1	1	GTR-005	TRIPOD GAITOR
2	1	NLT-218-A	TRIPOD
3	1	SPR-118	COMPRESSION SPRING
4	1	TLS-218-2	PLUNGER

FIGURE 16

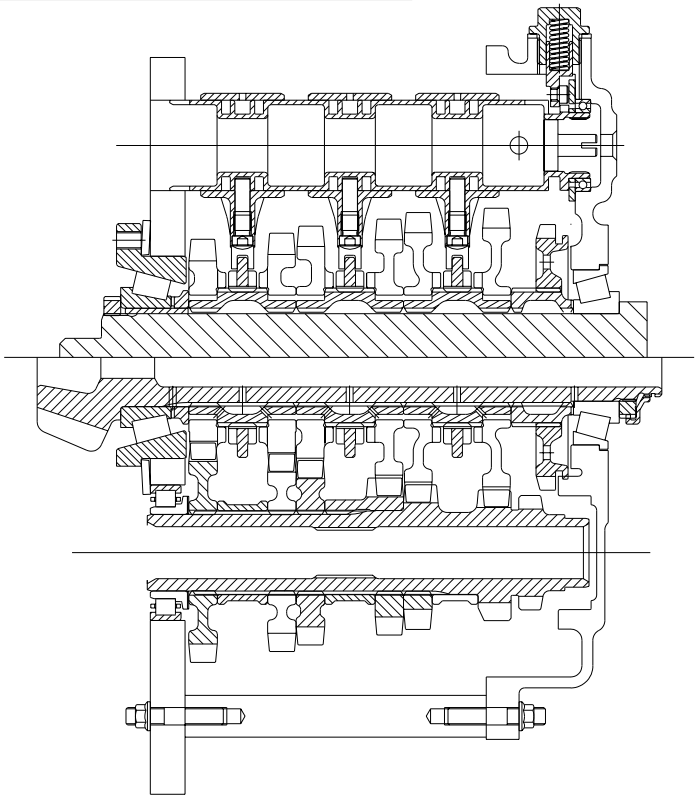
Variable Parts

VARIABLE PARTS TO SUIT FINAL DRIVE RATIOS

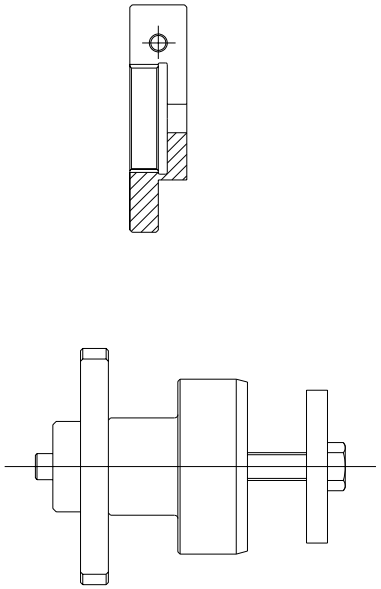
ITEM No	PART No	9:35 FINAL DRIVE STD TPT DIFF NO OIL PUMP	10:31 FINAL DRIVE STD TPT DIFF NO OIL PUMP	11:31 FINAL DRIVE STD TPT DIFF NO OIL PUMP	9:35 FINAL DRIVE STD TPT DIFF WITH OIL PUMP	10:31 FINAL DRIVE STD TPT DIFF WITH OIL PUMP	11:31 FINAL DRIVE STD TPT DIFF WITH OIL PUMP
		QTY	QTY	QTY	QTY	QTY	QTY
4 & 56	NMT-221-9:35	1			1		
	NMT-221-10:31		1			1	
	NMT-221-11:31			1			1
90	FGC-205-2A	1			1		
	FGC-206-2A		1	1		1	1
91	NMT-205-2A	1			1		
	NMT-205-2		1	1		1	1
54	VG-221-1	10	10		10	10	
	VG-221-1B			10			10
117	VG-204-4	1	1	1			
	FGB-201-7				1	1	1
113	HP-M-9003	1	1	1			
	TE-266				1	1	1

Gearbox Tooling

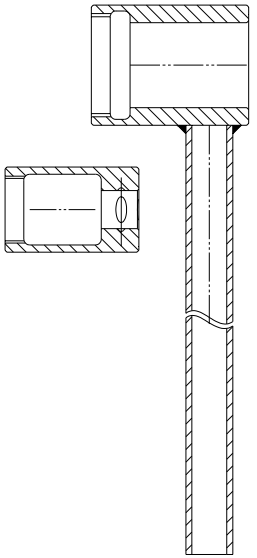
SK-1451 FORK SETTING JIG



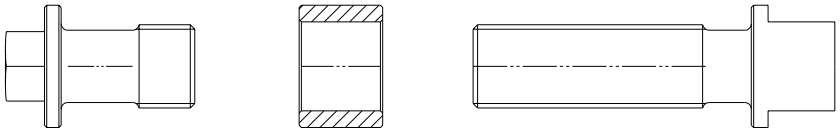
SK-1913 SETTING DISK



SK-1452 SOCKET &
REACTION BAR



SK-1470-A PINION SETTING JIG



SK-838T 10 SPLINE DIFF PRE-LOAD TOOL

SK-838 32 SPLINE DIFF PRE-LOAD TOOL

FIGURE 17

11 April 2000

General Technical Bulletin No. 13

TPT Differential Bevel Gears

In line with Hewland Engineering's constant quest to improve and develop its products, the TPT differential bevel gears have been redesigned to improve the tooth strength and smoothness of operation.

In order to identify the new designs, all variations of the TPT gears cut to the revised specification will have a "D" suffix in the part number. e.g.

TPT-213-6D

TPT-213-5AD

On the new components there will also be a tool tip groove to indicate the new form, on the side bevels this will be on the o.d. of the core plate splines, on the planet bevels it will be on the front face, toe end of gear.

It is recommended that that the "D" specification bevels are always run with a mating gear of the same specification.

In extreme circumstances it may be possible to run "D" specification bevels with the older spec. bevels. **The user must realise this is not condoned by Hewland Engineering.**

Note:

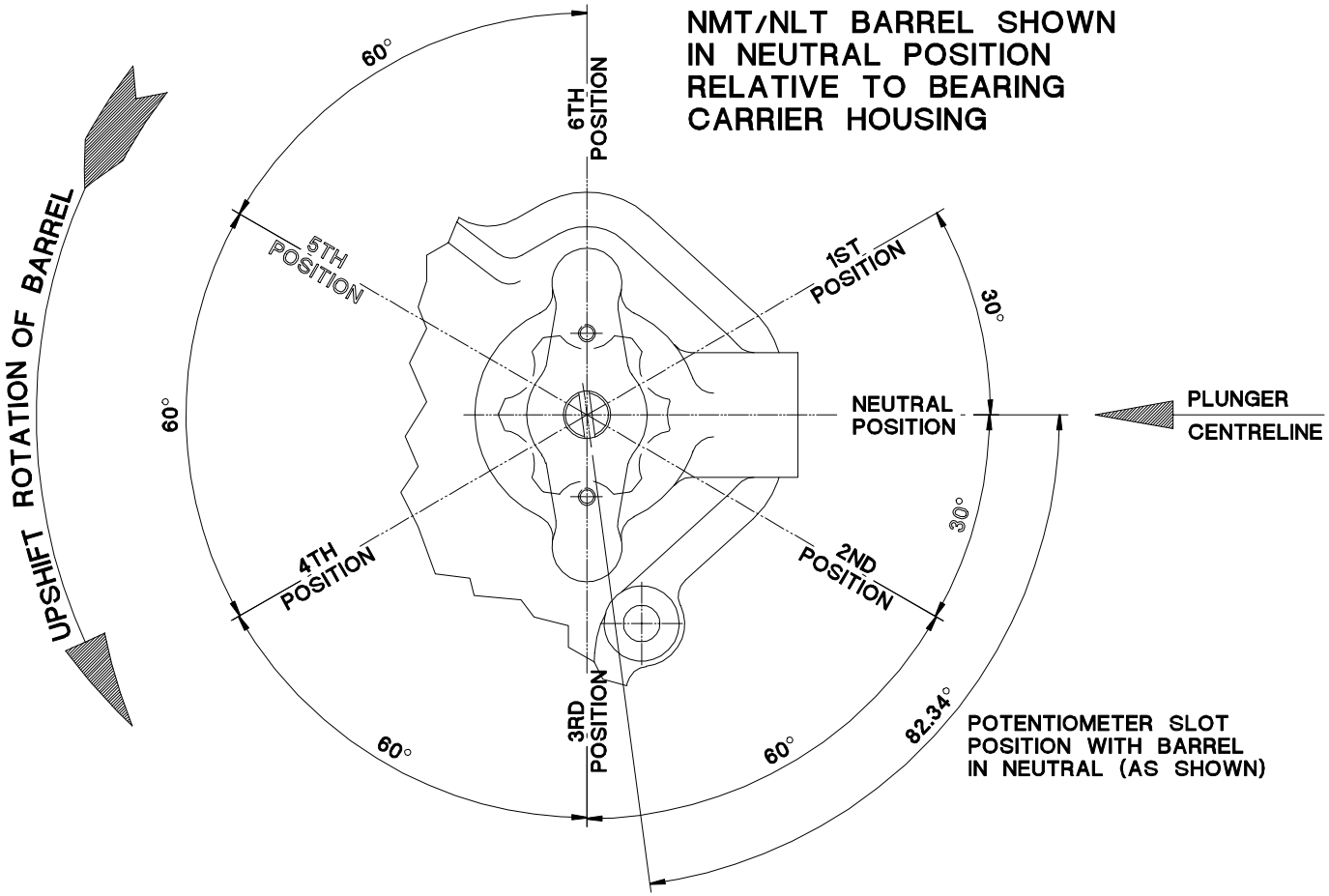
If the new "D" spec. planet gears are run with the older spec TPT side bevel gears, they will have a reduced backlash/clearance figure. This may result in incorrect operation of the differential, as the preload will be applied across the bevel gear teeth and not the side ring gears/ramps, causing premature wear of the components.

If "D" specification side bevel gears are run with older spec. TPT planet gears there will be an increase in the backlash/clearance, which may result in failure due to increased shock loads.

Colin Reynolds

NMT Technical Bulletin No.001

POSITION OF GEAR INDICATOR POTENTIOMETER



NMT OIL SYSTEM LAYOUT

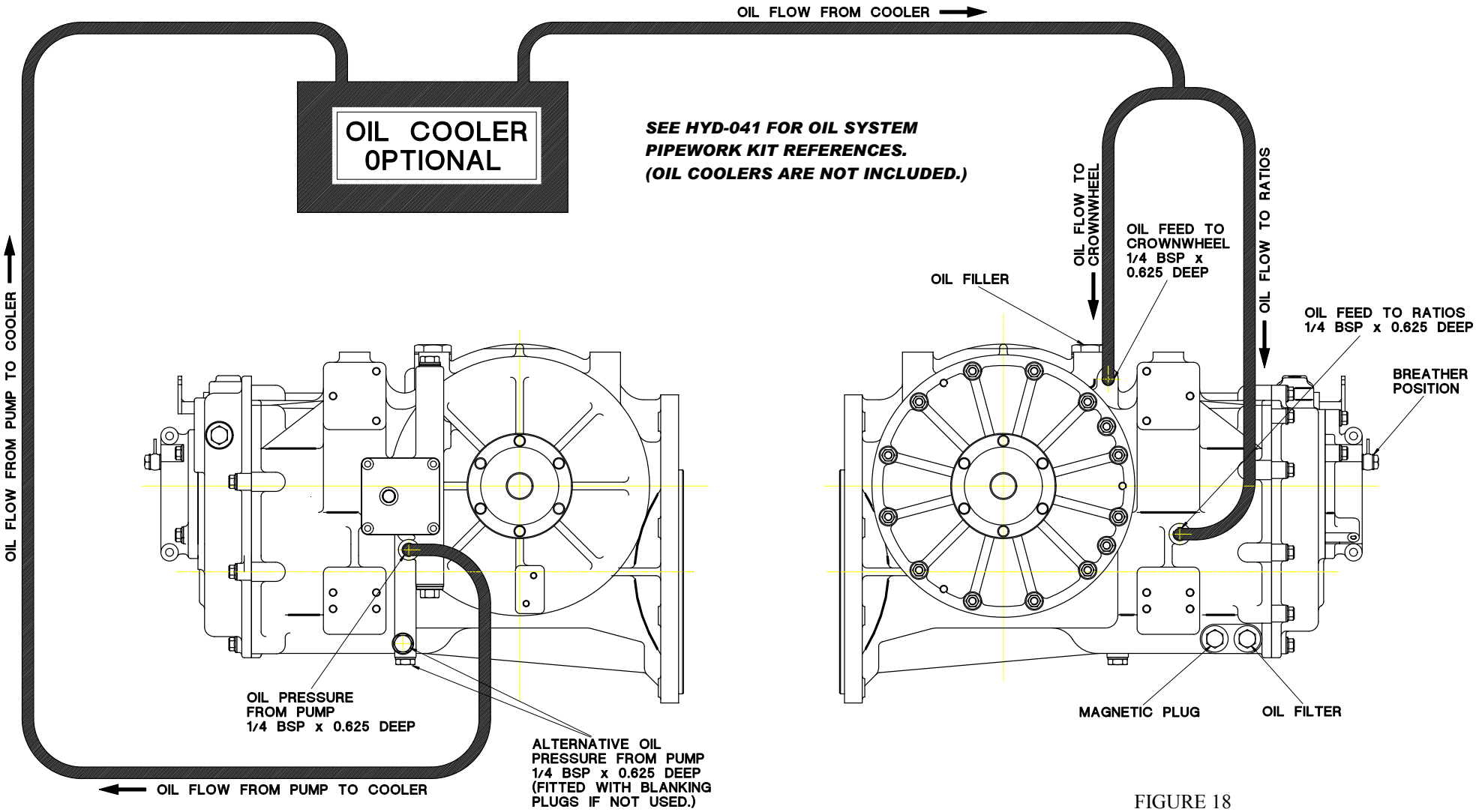


FIGURE 18

RECOMMENDED TIGHTENING TORQUES

General nut and bolt torque settings:-

RECOMMENDED TIGHTENING TORQUES FOR METRIC COARSE SERIES BOLTS CLASS 12.9		
THREAD	(Nm)	(lbs.ins)
M5	6.7	59
M6	11.2	99
M8	27.3	242
M10	53.9	477

RECOMMENDED TIGHTENING TORQUES FOR UNIFIED FINE SERIES BOLTS CLASS 12.9		
THREAD	(Nm)	(lbs.ins)
1/4	14.2	126
5/16	28.4	252
3/8	52.2	462
7/16	82.5	731.0

RECOMMENDED TIGHTENING TORQUES FOR UNIFIED COARSE SERIES BOLTS CLASS 12.9		
THREAD	(Nm)	(lbs.ins)
1/4	12.5	110
5/16	25.6	227
3/8	46.0	407

RECOMMENDED TIGHTENING TORQUES FOR METRIC COARSE SERIES K-NUTS			
THREAD	FITTING TO EN16T STUDS		
	(Nm)	(lbs.ins)	(lbs.ft)
M5	8.4	75	6.2
M6	12.7	112	9.3
M8	27.0	239	19.9
M10 x 1.50	40.0	354	29.5
M10 x 1.25	50.0	443	36.9

Specific component torque settings:-
(Where Specific component thread details are similar to General nut and bolt details, the tightening torques listed in this section must be adhered to for these components.)

The tightening torques for specific components within the gearbox are given on page 4

Manual Modification History

DATE	MODIFICATION
21/10/2011	Page 40 added
	Page 25 & 26 - Item 127 updated and item 143 added
10/07/2012	Page 33 - Figure 16 updated to show latest parts