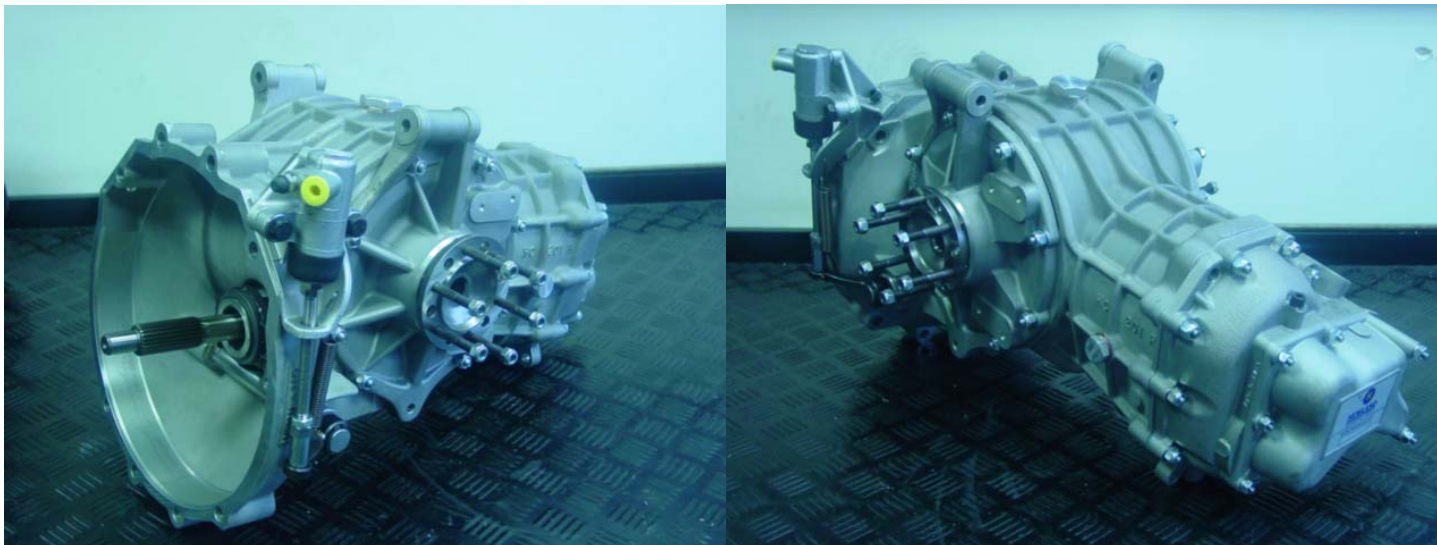




SERVICING INSTRUCTIONS AND ILLUSTRATED PARTS LIST FOR HEWLAND MK8/9 GEARBOXES



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TECHNICAL SPECIFICATION

The Mark 8/9 gearbox is a transaxle unit, designed for rear-engined, rear wheel drive cars. The unit is produced with four or five forward gears, reverse, and a choice of three differentials.

The gear selection mechanism is an H pattern, mechanically operated direct link and has a reverse engagement detent lock out. Gears can be selected in any order always going through a neutral position. Gear selection layout is shown in Figure 1.

The drive is taken from the engine via the clutch shaft, to the layshaft, through gears to the pinion shaft, and then on to the crownwheel and differential assembly.

GEAR SHIFT PATTERNS.

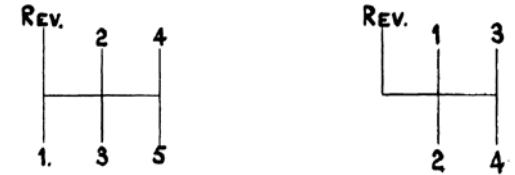


FIGURE 1

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 aluminium bronze. The gearbox components are lubricated by splash and the oil is retained by lipped oil seals.

In general configuration, the HC9-200 (Mk9) is a high tech racing transaxle unit which achieves the maximum effective use of power, being lightweight, for the power it is required to transmit.

1st to 5th gear ratios MK8 from 3.166:1 to 0.888:1, MK5 from 2.923:1 to 0.964

Final drive ratios 7/31, 8/31, 9/31 & 10/31, 13/36

Clutchshafts made to customer's requirements

Weight	~70 lbs (31.7Kg)
Oil type	SAE 80 or 90
Oil quantity	1 3/4 - 2 pints (1 - 1.12 litres)
Maximum torque	MK8 ratios: 150 lbs.ft (203 Nm), MK5 ratios: 180 lbs.ft (244 Nm),

RECOMMENDED FITTING TORQUES

General nut and bolt torque settings:-

RECOMMENDED TIGHTENING TORQUES FOR METRIC COARSE SERIES BOLTS CLASS 12.9			
THREAD	(Nm)	(lbs.ins)	(lbs.ft)
M5	6.7	59	4.9
M6	11.2	99	8.3
M8	27.3	242	20.2
M10	53.9	477	39.8

RECOMMENDED TIGHTENING TORQUES FOR UNIFIED FINE SERIES BOLTS CLASS 12.9			
THREAD	(Nm)	(lbs.ins)	(lbs.ft)
1/4	14.2	126	10.5
5/16	28.4	252	21.0
3/8	52.2	462	38.5
7/16	82.5	731.0	60.9

RECOMMENDED TIGHTENING TORQUES FOR UNIFIED COARSE SERIES BOLTS CLASS 12.9			
THREAD	(Nm)	(lbs.ins)	(lbs.ft)
1/4	12.5	110	9.2
5/16	25.6	227	18.9
3/8	46.0	407	33.9

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 nut and bolt torque settings:-

(Where specific nut and bolt details are a similar size to general nut and bolt details, the tightening torques listed in this section must be adhered to for these components.)

Pinion shaft nut tightening torque = 115 lbs.ft (156 Nm)

Crownwheel bolt tightening torque = 75 lbs.ft (102 Nm)

Layshaft nut tightening torque = 80 lbs.ft (108 Nm)

Pinion head bearing locking ring tightening torque = 150lbs.ft (203Nm)

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.
NB. 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 oil filler hole on top of the maincase. The oil will find its own level within the gearbox.
NB. Too much oil will not directly cause any harm, but is undesirable as it will induce power loss and overheating of the internals.

PINION HEIGHT SETTINGS

Requires special tools No.SK-143-B and SK-247

Press the new bearing (D20A) onto the pinionshaft (D17).

Warm up the outside of the casing (D1) and insert bearing pinion and shim. Insert the locking ring (21A) and tighten to torque 150lbsft using SK-247

Place the stack on the pinionshaft (D17), omitting the ratios, and torque up the pinion nut (A34).

When cool assemble the setting gauge (SK-143-B) to the maincase (D1) as shown in Figure 3 below

Using a feeler gauge, measure the clearance between the pinion face and the setting gauge as shown in Figure 2 right. The correct clearance is etched on the pinionshaft.

Adjust as necessary by substituting a thicker or thinner shim or shims (D22A). When satisfied remove the setting gauge.

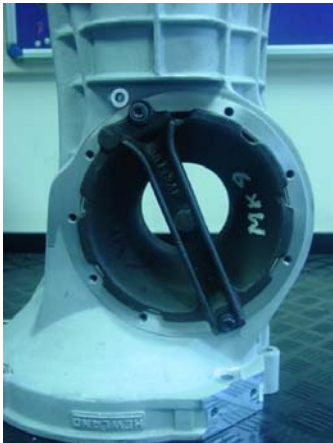


FIGURE 3

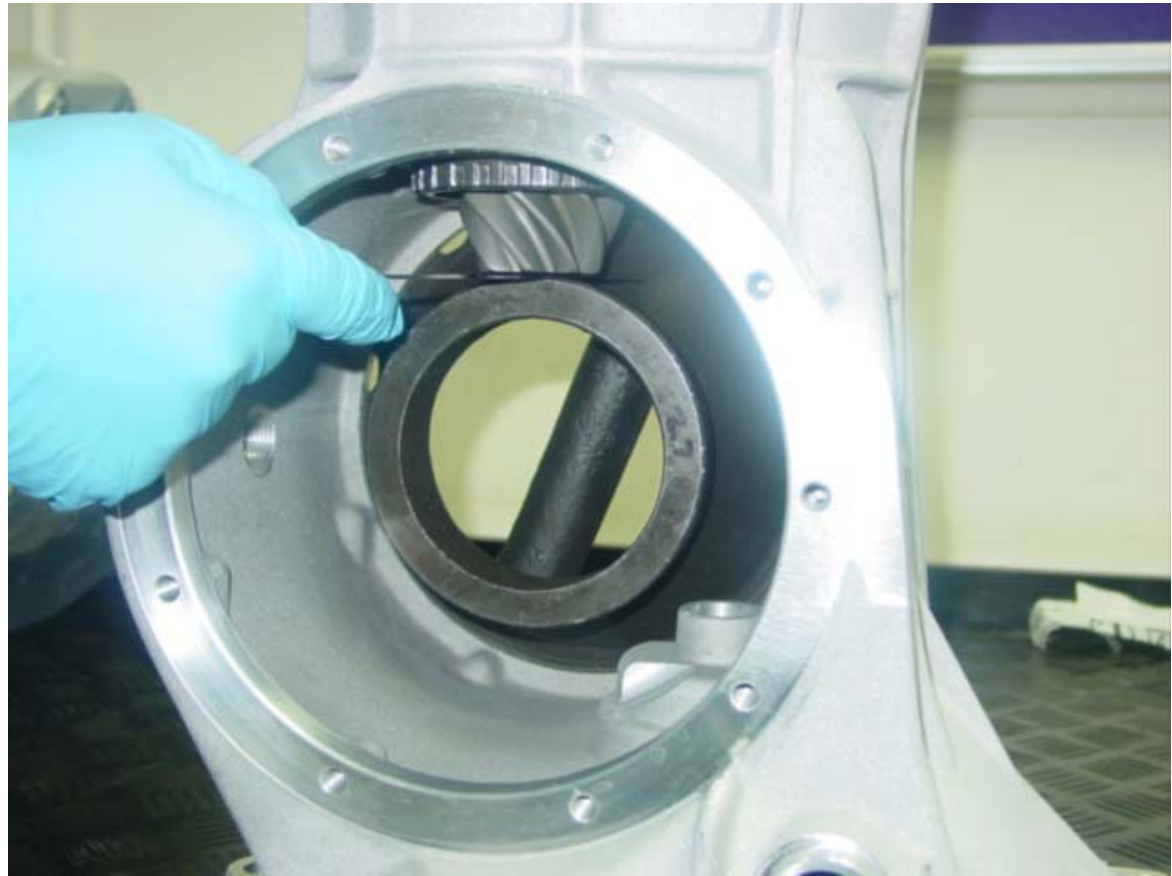


FIGURE 2

NB. It is not correct practice to replace a pinion shaft without checking the setting distance, even if the old and new shafts have the same recorded setting distance.

It is also good practice to renew the pinion head bearing if the pinion shaft is being replaced.

DIFFERENTIAL BEARING PRELOAD

Requires special tool No. SK-119-MK8

Assemble the differential unit (C18) with the crownwheel (C20) and two inner differential bearings (C14). The thickness of the shims (C13) is critical. If they are to be renewed make sure they are of the same thickness as those removed.

Warm up both side plates (C1, C2). Insert oil seal (C9), side plate bearing (C10).

Assemble the differential unit (C18) and side plates (C1, C2) along with side plate spacers (C12,C17) a selection of shims (C13) and dummy differential bearing outer tracks into the maincase (D1). Ensuring that the crownwheel (C20) and pinion (D17) have some backlash, bolt up to normal tension

Now turn the pinion (D17) by hand to test the preload. Adjust by means of shims until satisfactory.

NOTE: Using reasonable effort it should be possible to turn the pinion by gripping the splines. Make sure there is some evidence of backlash. Absence of backlash will give a false impression of preload.

If there is too much preload then remove some shims (C13), if there is too little then add shims (C13). Repeat the test until the correct amount of shims has been added.

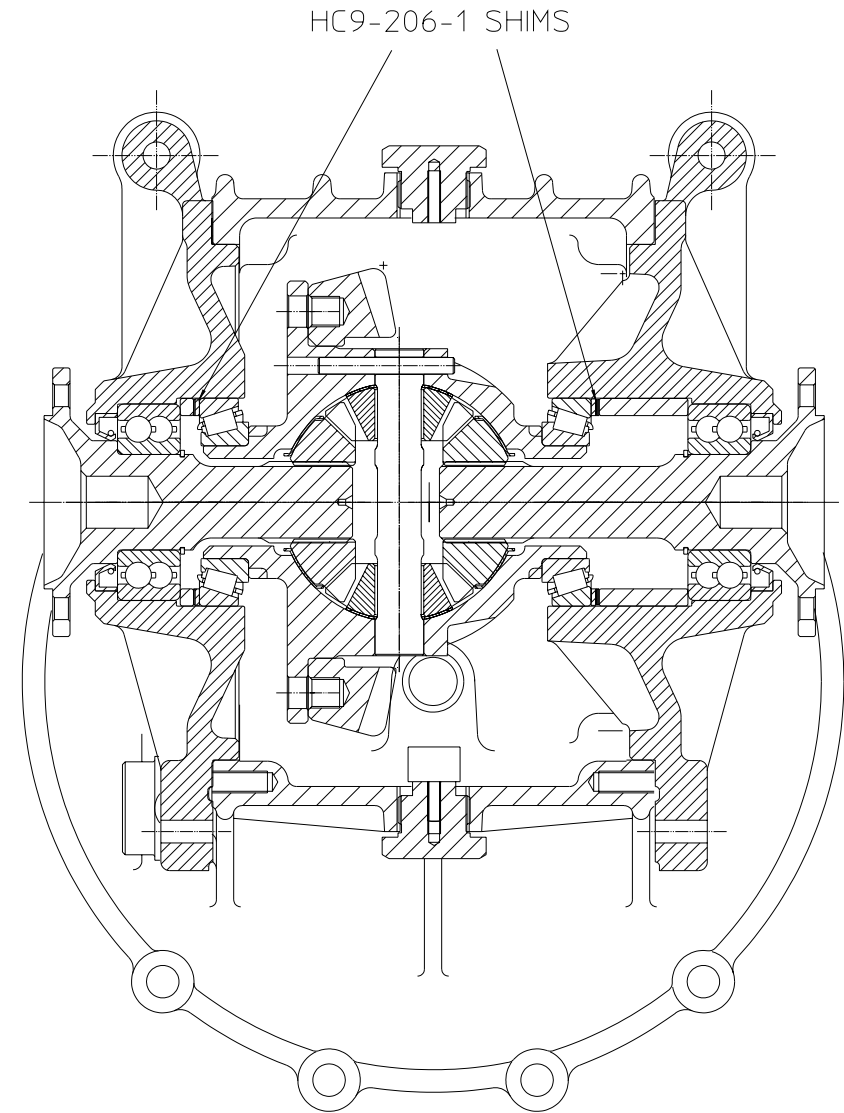


FIGURE 4

CROWNWHEEL & PINION BACKLASH SETTING

For this you will need a post mounted dial indicator with extended probe. See figure 5 right.

Insert a 3/16 bolt into the split pin hole in the tail of the pinionshaft (D17) or put the castellated nut (A34) on the tail of the pinionshaft (D17).

Place the point of the probe against the bolt, or side of the nut, and measure the backlash on the dial indicator. Turn the pinion by hand to rotate the crownwheel (C20) and take at least 14 readings in different positions. Minimum reading should be 0.005". Refer to the Crownwheel and pinion setting label.

To increase or decrease the backlash, change shims (C13) from one side to the other of the differential, but remember that the overall thickness of the shims must stay the same, meaning the preload will not change.

Flatten out shims (C13) if necessary.

Remove sideplates (C1,C2) and swap shim or shims (C13) placement as required. Repeat until the backlash setting is correct.

Once correct, add the difference in thickness of a dummy bearing to taper roller bearing, to each side of the shim stack. Press inner bearings (C14) onto differential assembly. Warm up sideplates (C1,C2) and insert shims and spacers and bearing outer tracks (C14) into sideplates (C1,C2).

After cooling, reassemble and re-check preload and backlash. If there is any change from settings with dummy tracks then re-heat and adjust shims as necessary.

Press in drive shaft (C22, C23) and replace circlip (C11). Support differential bearing outer track (C14) so as not to displace sideplate bearing outer track (C10).

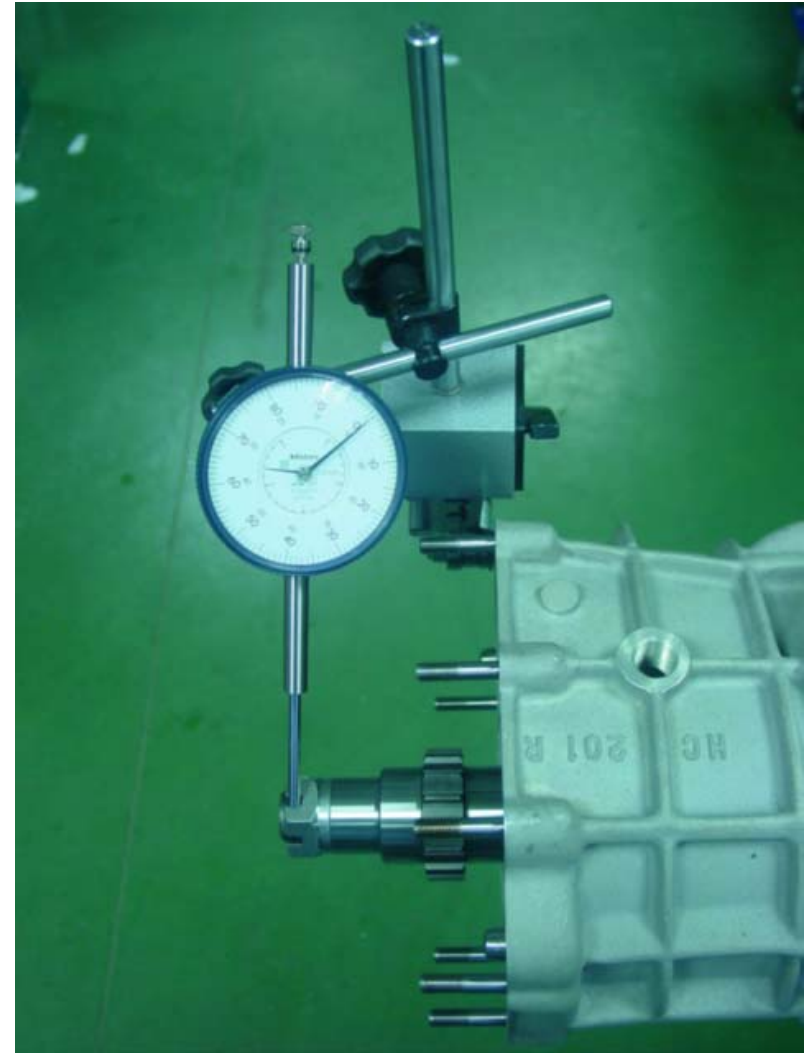


FIGURE 5

Complete the assembly of the differential and drive unit in reverse order of gearbox disassembly described later in the manual.

FORK SETTING

Requires special tool No. SK-15

Extreme accuracy in setting up is imperative to ensure that gears engage freely and to avoid uneven or excessive wear. The use of a Hewland fork setting jig is recommended. Designed specifically for this gearbox, it will save costly setting up time and vastly reduce the possibility of error.

It is imperative that all sharp edges are removed from detent grooves on selector rods (A21, A22, A23).

Setting Top Clearance on the Gearbox

Use grease to secure the thrust washer (A57) in the recess of the bearing carrier (A7). Stack the hubs (A42, A48, A54), inner track (A40) and final gear (A56) and needle cage (A55) in place on the pinion (D17) in the maincase (D1). Slide the bearing carrier assembly, less selector forks, fully on to the maincase (D1) and tighten up the pinion nut (A34). With a finger through the layshaft bearing (A35) check that the gear is free to turn, if so, run three or four temporary M8 nuts (A18) and assess the clearance. The distance between the top gear (A56) and the thrust washer (A57) should be 0.008-0.010. If necessary, grind the pinion bearing end of the first/reverse hub (A42) to achieve this or fit shims (HC-225-4).

Setting Top Gear Clearance on the Jig

Repeat as above. Do not grind front hub (A42) once set to gearbox. The jig should only require the use of shims to set the correct clearance.

Remove from the jig. Fit selector forks (A25, A27, A28) to rods (A21, A22, A23), with nuts (A30) and washers (A31). Build up the hubs (A42, A48, A54) gears and clutch rings (A47, A53) and slide them back onto the setting jig.

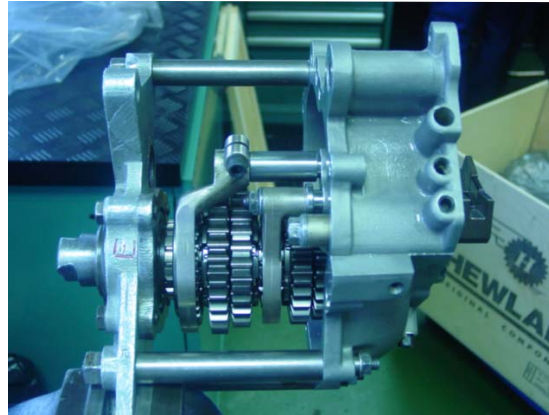


FIGURE 6
shims (A29).

Adjust the forks individually. Correct positioning requires that:-

- The clutch ring should be centred in its hub, between the two gears.
- The clutch ring should fully engage either gear
- When fully engaged with either gear there should still be clearance between the gear and clutch ring faces.

Adjust the forks by replacing or grinding the spacers (A31) or adding or removing

When satisfied with the setup, continue as follows:

Replace nuts (A30), tighten up selector rods (A21, A22, A23), and position selector rod heads correctly. Build up the complete layshaft assembly with gears, spacers (A60, A64) and thrust washer (A66). Replace in bearing carrier (A7). Put the complete set up back into the jig. Re-check all the clearances, test all movements. When satisfied, remove the bearing carrier (A7) assembly from jig and replace it in the maincase (D1).

Replace draw bolt (A38). Run on pinion (A34) and layshaft nuts (A37). Run on two or three 8mm nuts and go through the gears to make sure that the selector mechanism is working correctly.

When satisfied, remove the bearing carrier unit, apply jointing compound, reassemble and bolt up to the maincase using new M8 Nyloc nuts (A18). Replace the draw bolt (A38), by tightening and then backing it off 1/4 -1/2 a turn to align with the split pin hole. Make sure the clutch shaft (D24) is held in place, so as to ensure the sleeve (D27) does not come off.

GEARBOX DISASSEMBLY

It is assumed that all bearings, oil seals, studs and dowels are already fitted into their casings.

Drain the Oil

Remove the seven 1/4" UNF nuts (A6) and washers (A5), and take off the end cover (A1). Remove the selector finger (A20). Remove the split pins (A39) from the pinion (D17) and layshaft (A58/B27). Unscrew and remove the draw bolt (A38) from the end of the layshaft (A58/B27). Lock the gear train by engaging reverse and top gears (that is, by pushing in the two outside selector heads). Remove the castellated nut (A34) from the pinion shaft. Note that that nut has a left hand thread. Slacken off the layshaft nut (A37) but do not remove it.

Bearing Carrier

Remove nine 8mm 'Nyloc' nuts (A18) and washers (A17), and remove bearing carrier (A7). Withdraw it complete with layshaft assembly, and with hubs and gears from the pinion. Place one hand under hubs (A42, A48, A54) and gears to support them as they slide off the pinion (D17). (Replace in reverse order to above)

Changing Gear Ratios

When changing a gear ratio, take off the slackened nut (A37) and remove the layshaft (A58/B27) from the bearing carrier (A7). Gears are exchanged in pairs, one from the layshaft and one from the pinionshaft. Each gear is etched with its number of teeth and the number of teeth of its mating gear.

It is essential that gears should be correctly paired according to these numbers.

Stripping the Gear Train

Remove the layshaft (A58/B27) from the bearing carrier (A7) as above. Slide off gears, spacer (A64) and thrust washer (A66). Wash and inspect for wear or damage. Wash and inspect the hubs (A42, A48, A54), clutch rings (A47, A53) and gears taken from the pinion (D17). Check the condition of the forks (A25, A27, A28) by testing. That is, by slipping the clutch rings (A47, A53) into the forks (A25, A27, A28) . If there is excessive wear, dismantle forks (A25, A27, A28) as described below, remembering that they will have to be re set on assembly. If there is not excessive wear, do not dismantle, but check that the nuts (A30) are tight.

Refer to page 15 onwards for part references.

GEARBOX DISASSEMBLY

To continue stripping:-

4-SPEED GEARBOX: Remove nuts (A30) from 1st/2nd and 3rd/4th gear selector forks. Remove 5/16" BSF pinch bolt (A26) from reverse gear selector fork (A25). Remove all three forks (A25, A27, A28).

5-SPEED GEARBOX: Remove nuts (A30) from 2nd/3rd and 4th/5th gear selector forks. Remove 5/16" BSF pinch bolt (A26) from 1st/reverse gear selector fork. Remove all three forks (A25, A27, A28).

Check selector rods (A21, A22, A23) for smooth movement, Inspect for wear or damage. To remove rods:

1. Undo the three Allen set screws (A16) and take out the top selector rod springs (A14) and balls (A15). Then take out the three selector rods (A21, A22, A23) , followed by the bottom balls (A15) and springs (A14).
2. Undo the two 3/8" UNC Allen set screws (A10, A11) and push out the locking slugs (A24).

Inspect the layshaft and pinion tail bearings (A35,A32) for wear. If it is necessary to renew the bearings then proceed as follows:

1. In the case of the pinion (needle roller) bearing (A32) remove the 5/16" UNC locating bolt (A8) and warm up the surrounding area.
2. In the case of the layshaft flanged bearing (A35), simply warm up.

Re assemble in reverse order to the above, subject to the following:

When replacing the bottom balls (A15) and springs (A14), set up to correct height; about one-third of the ball should be exposed. Continue by inserting locking slugs (A24) and selector rods (A21, A22, A23), then top balls (A15) and springs (A14). Remove all sharp edges on springs (A14) and edges for detent balls (A15) on selector rods (A21, A22, A23).

Any hub (A48, A42, A54) renewed should be identical in length with the original. If replacing all hubs (A48, A42, A54), or main bearing carrier (A7), check the overall length of the pinion assembly has not been altered. Clearance is essential to avoid overheating and seizure, but too much clearance will cause excessive wear.

When fitting the reverse idler:

Heat up the casing (D1) and insert the reverse idler assembly into the casing. Rotate the assembly around until the reverse gears of the pinion shaft (A41) and the idler (D11) have a backlash of 0.017 inches. Measure this with feeler gauge. Allow the casing to cool and measure the backlash again, it should be approximately 0.012-0.015 inches. Rotate the pinionshaft (D17) to feel that the reverse idler (D11) is rotating smoothly with the pinionshaft (D17). If it is not repeat the process until it runs smoothly.

Dismantling the Maincase

Differential and Drive

Remove the nuts (C7) and washers (C8) from the left hand side plate (C1). Remove plate, loosening if necessary with light blows from a plastic mallet. Never use a screwdriver or pry bar as this may damage the sealing face. Lift the differential assembly (C18) out of the maincase (D1) and remove the right hand side plate (C2).

Removing the Clutch Shaft

Slide off the clutch release bearing. Ease the clutch shaft (D24) forward, so that the sleeve (D27) can be removed. Then remove circlip (D26), withdraw clutch shaft (D24) and remove oil seal (D25).

Stripping the Differentials

Free Diff (HC8)

Dismantle by tapping out the 'Seloc' roll pin and removing the cross shaft. Inspect side bevels and planet bevels for wear or damage and renew as necessary. Wash all parts and reassemble.

Cam and Pawl type (FT)

Remove crownwheel bolts (C21) and take off the crownwheel (C20). Remove in turn the Diff case, the outer cam track and the inner cam track. Remove the eight plungers (pawls) from the plunger carrier. Wash and examine for wear or damage, giving particular attention to plungers, and profiles of the cam tracks.

Powerflow Differential (LD-212)

Remove the 8 cap head screws holding on the diff cap. Remove the plate stack, ramps, bevel and planet gears. Examine all parts for wear and replace as required.

Sideplates

Remove the driveshaft circlip (C11) and knock out the drive flange (C22/C23). Support the plate on fire bricks and warm it, having first covered the oil seal (C9) with a block of metal for protection. The outer track of the differential bearing (C14, C13) and shims should now drop out, with the side plate bearing (C10) and oil seal (C9).

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 splined to the diff casing, and 6 splined to the side bevel gears). 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

- 1) The side bevel gears 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 side ring gear ramp angles 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 of the ring gear, 45 degrees transmits less sideways force than 30 degrees. Likewise on the coast side of the ring gear, 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. The side rings gear are available with many different drive/coast ramp angle combinations.
- 3) The second adjustable factor is how tightly the plate stack is compressed on assembly (known as static preload). The preload torque is measured between the side bevel gears, by holding one side bevel gear stationary, and measuring the torque required to turn the other. It is created by grinding the internal spacer to the required size for the required preload.
- 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.

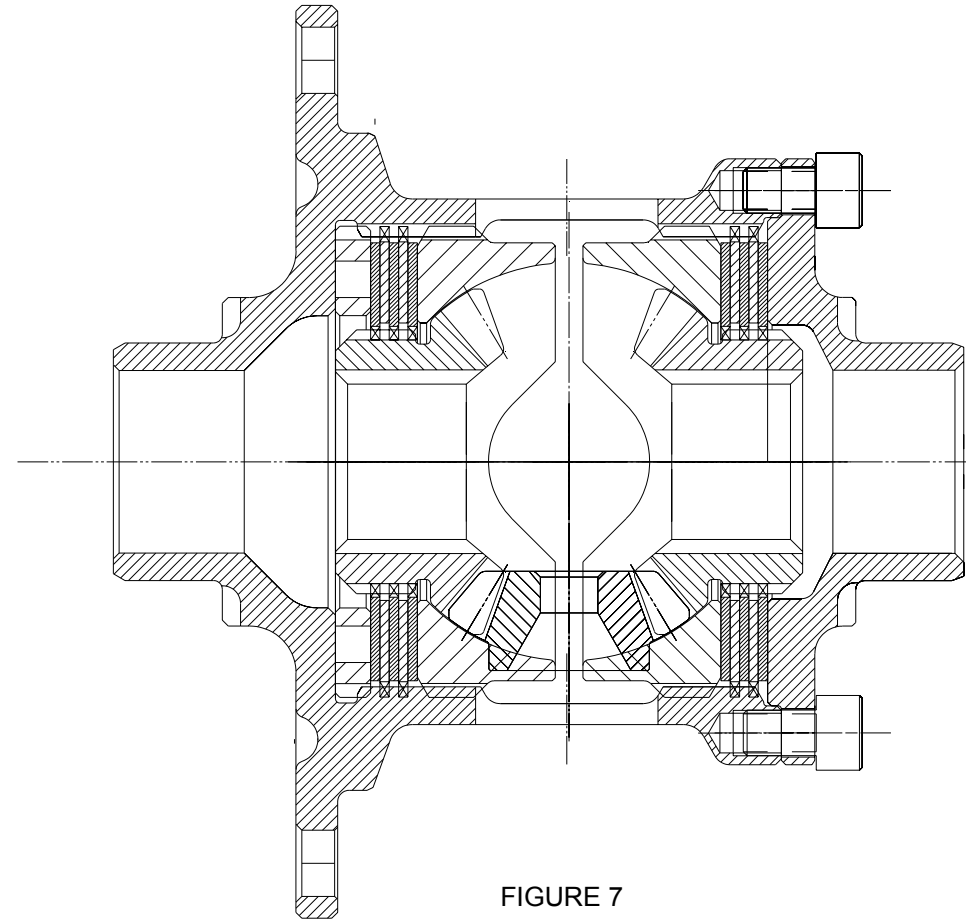


FIGURE 7



ILLUSTRATED PARTS LIST

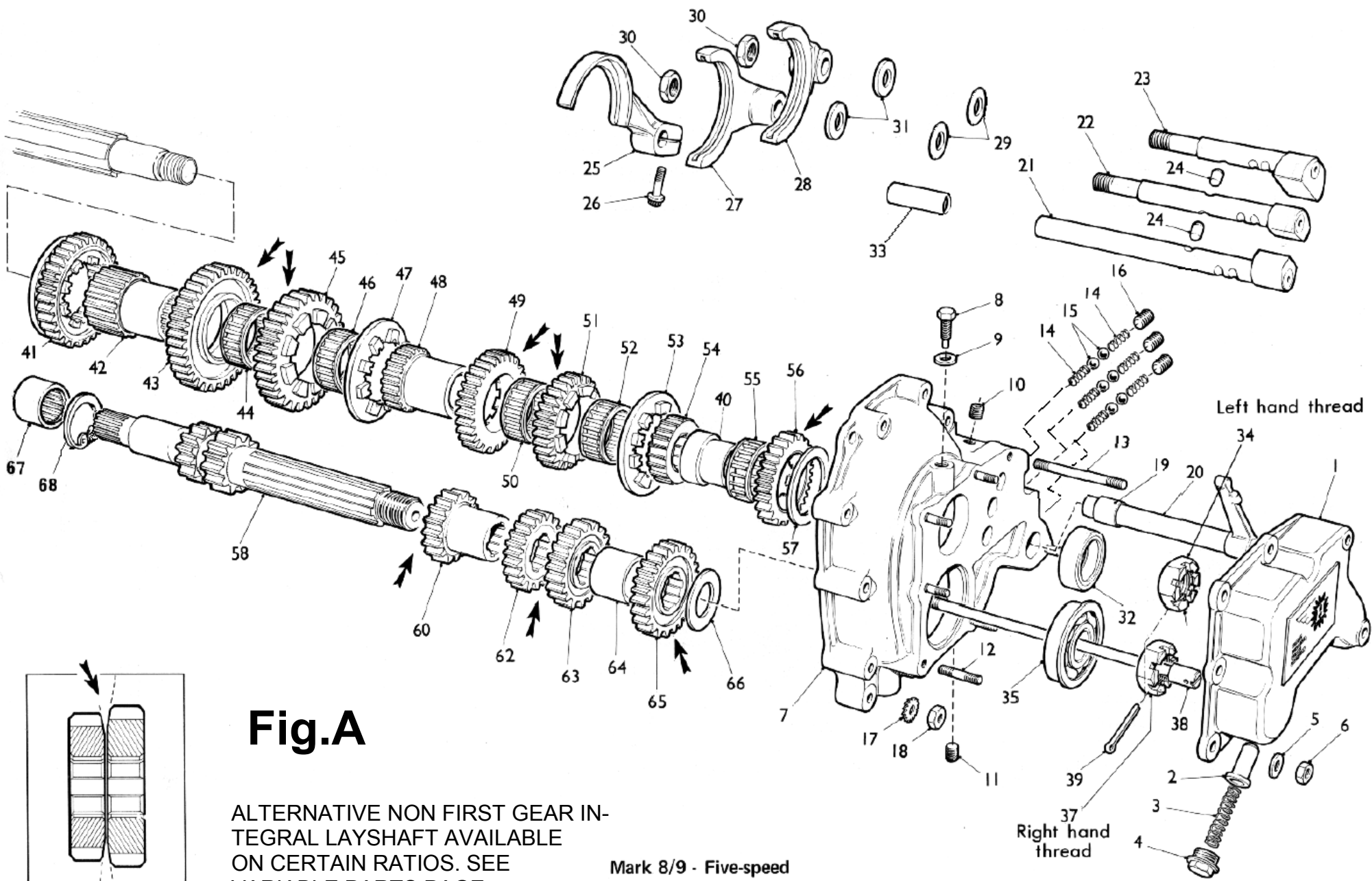


Fig.A

ALTERNATIVE NON FIRST GEAR IN-
TEGRAL LAYSHAFT AVAILABLE
ON CERTAIN RATIOS. SEE
VARIABLE PARTS PAGE

Mark 8/9 - Five-speed

MK9 SHAFTS AND SELECTION			
Position	Quantity	Stock code	Description
A1	1	HC-204	END COVER
A2	1	HC-203-0	PLUNGER 1ST & REVERSE
A3	1	FT-203-2	COMPRESSION SPRING
A4	1	FT-203-5	PLUG
A5	7	HC-202-9	WASHER
A6	7	HC-202-10	NUT
A7	1	HC-202	BEARING CARRIER
A8	1	HC-229-3	SOCKET CAP SCREW
A9	1	F3D-236-1	WASHER
A10	1	FT-202-8	SOCKET SET SCREW
A11	1	FT-202-8	SOCKET SET SCREW
A12	5	HC-202-5	STUD
A13	2	HC-202-6	STUD
A14	6	FT-202-2	COMPRESSION SPRING
A15	6	FT-202-1	BALL BEARING
A16	3	FT-202-3	SOCKET SET SCREW
A17	9	F3D-236-1	WASHER
A19	2	FT-203-6	BUSH
A18	9	HC-201-3A	NUT
A20	1	FT-252	SELECTOR FINGER
A21	1	HC-246	REVERSE SELECTOR ROD
A22	1	HC-247	CENTRE SELECTOR ROD
A23	1	HC-248	TOP GEAR SELECTOR ROD
A24	2	HC-202-4	INTERLOCK
A25	1	HC-249	1ST & REVERSE SELECTOR FORK
A26	1	HC-249-1	SOCKET CAP SCREW
A27	1	HC-250	CENTRE SELECTOR FORK
A28	1	HC-251	TOP GEAR SELECTOR FORK

MK9 SHAFTS AND SELECTION			
Position	Quantity	Stock code	Description
A29	2	FT-248-4#	SHIM (VARIOUS SIZES)
A30	2	FT-246-2	NUT
A31	2	HC-246-3	SPACER
A32	1	HC8-229-1	NEEDLE ROLLER BEARING
A33	1	HC9-246-4	REVERSE ROD STOP
A34	1	FT-230	PINION NUT (L.H)
A35	1	HC-234-3	BALL BRG FLANGED (SEE BEA-082)
A37	1	FT-236	LAYSHAFT NUT (R.H.)
A38	1	HC-236-3	DRAWBOLT
A39	2	FT-230-1	SPLIT PIN (REPLACES FT-236-2)
A40	1	HC8-229	INNER TRACK
A41	1	HC85-231-HB	REVERSE SLIDING GEAR
A42	1	HC85-226-HB	FRONT HUB
A44	1	FT-226-1	NEEDLE CAGE
A46	1	FT-226-1	NEEDLE CAGE
A47	1	HC-232	CLUTCH RING
A48	1	HC8-227	CENTRE HUB
A50	1	FT-226-1	NEEDLE CAGE
A52	1	FT-226-1	NEEDLE CAGE
A53	1	HC-232	CLUTCH RING
A54	1	HC8-228	REAR HUB
A55	1	FT-226-1	NEEDLE CAGE
A57	1	HC-229-4	THRUST WASHER
A64	1	HC-234-6 (*)	SPACER
A66	1	HC-234-5	THRUST WASHER
A67	1	HC9-234-1	BEARING
A68	1	HC9-234-2	CIRCLIP
*	MARK 5 GEARS REQUIRE SPACER HC5-234-6		

MK9 SHAFTS AND SELECTION - RATIOS			
Position	Quantity	Stock code	Description
A58/A43	1	MK85/MK5-RATIO-INT	LAYSHAFT & INT 1ST (5 SPEED)
A60/A45	1	MK8/MK5-RATIO-2ND	2ND GEAR RATIO
A62/A49	1	MK8/MK5-RATIO-STD	3RD GEAR RATIO
A63/A51	1	MK8/MK5-RATIO-STD	4TH GEAR RATIO
A65/A56	1	MK8/MK5-RATIO-STD	5TH GEAR RATIO

4-SPEED GEAR TRAIN AND LAYSHAFT ASSEMBLY

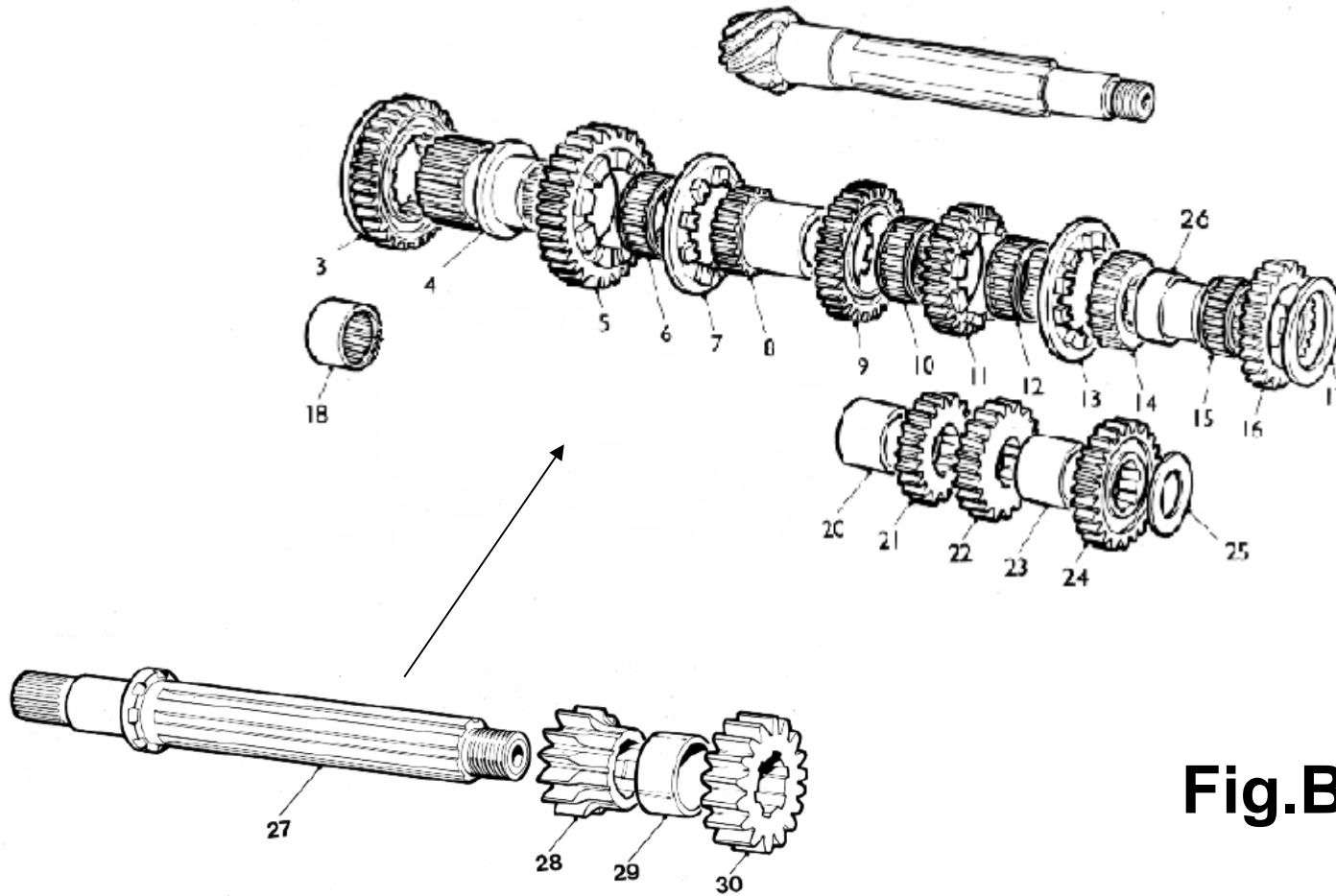


Fig.B

ALTERNATIVE FIRST GEAR INTEGRAL
LAYSHAFT AVAILABLE
ON CERTAIN RATIOS. SEE VARIABLE
PARTS PAGE

MK9 SHAFTS AND SELECTION			
Position	Quantity	Stock code	Description
B3	1	HC84-231-HB	REVERSE SLIDING GEAR
B4	1	HC84-226-HB	FRONT HUB
B6	1	FT-226-1	NEEDLE CAGE
B7	1	HC-232	CLUTCH RING
B8	1	HC8-227	CENTRE HUB
B10	1	FT-226-1	NEEDLE CAGE
B12	1	FT-226-1	NEEDLE CAGE
B13	1	HC-232	CLUTCH RING
B14	1	HC8-228	REAR HUB
B15	1	FT-226-1	NEEDLE CAGE
B17	1	HC-229-4	THRUST WASHER
B18	1	HC9-234-1	BEARING
B20	1	HC-234-6	SPACER
B23	1	HC-234-6	SPACER
B25	1	HC-234-5	THRUST WASHER
B26	1	HC8-229	INNER TRACK
B27	1	HC9-234	LAYSHAFT (4 SPEED)
B28	1	HC9-238	REVERSE INPUT GEAR
B29	1	HC9-238-1	SPACER

MK9 SHAFTS AND SELECTION - RATIOS			
Position	Quantity	Stock code	Description
B30/B5	1	MK8-RATIO-STD	1ST GEAR RATIO
B21/B9	1	MK8-RATIO-STD	2ND GEAR RATIO
B22/B11	1	MK8-RATIO-STD	3RD GEAR RATIO
B24/16	1	MK8-RATIO-STD	4TH GEAR RATIO

MK5 GEARS CANNOT BE RUN IN A 4 SPEED CONFIGURATION,
NO SUITABLE LAYSHAFT HAS EVER BEEN MADE

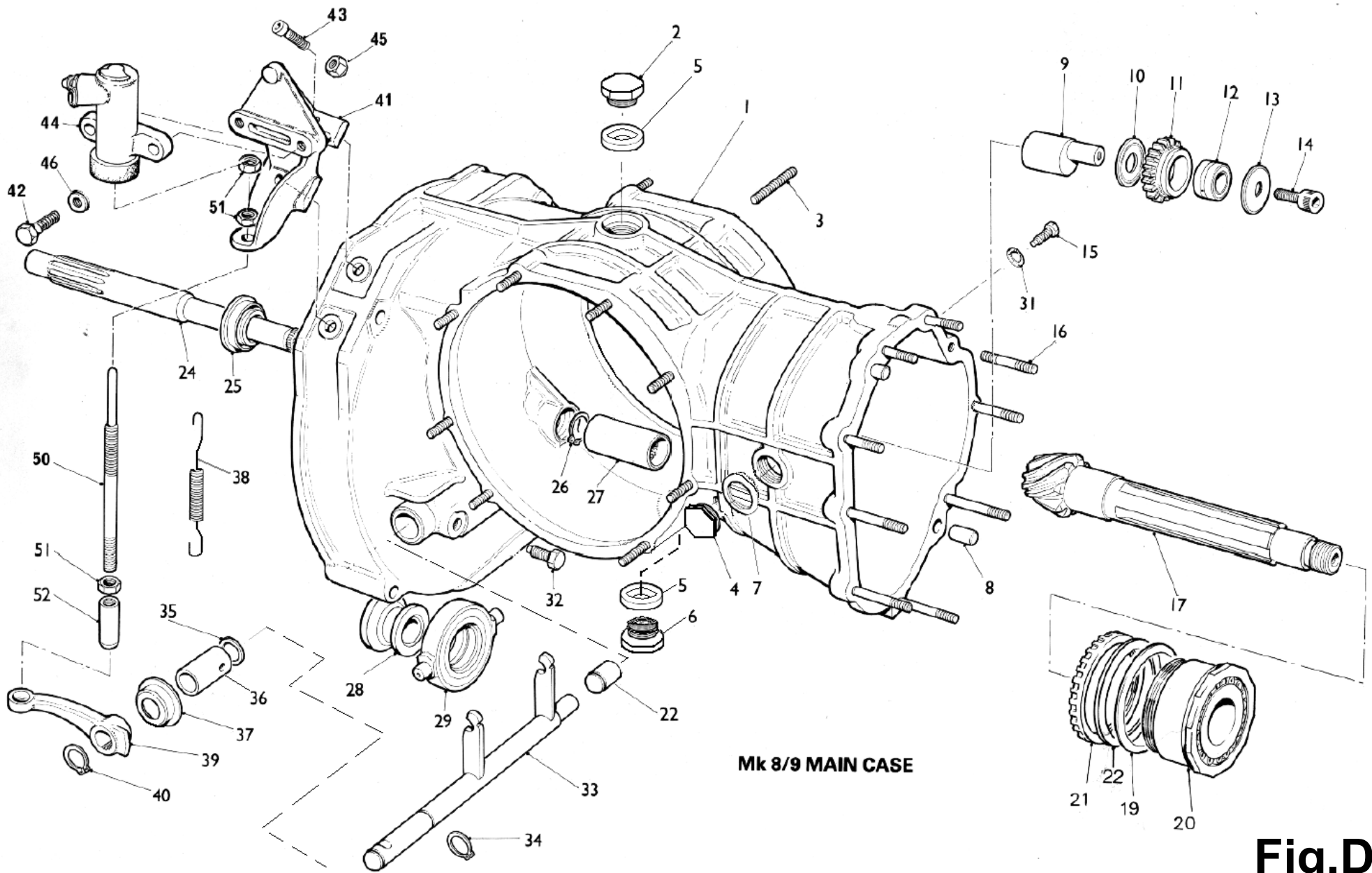


Fig.D

MK9 SHAFTS AND SELECTION			
Position	Quantity	Stock code	Description
D1	1	HC-201-R	MAINCASE
D2	1	TL-201-1	PLUG
D3	16	HC-201-2	STUD
D4	2	FT-203-5	PLUG
D5	2	FGB-201-8	DOWTY WASHER
D6	1	VG-201-1	MAGNETIC PLUG
D7	2	LD-203-7	DOWTY WASHER
D8	2	HC-201-5	DOWEL
D9	1	HC-237-3	SPIGOT
D10	1	HC-237-4	THRUST WASHER
D11	1	HC-237-1	REVERSE IDLER GEAR
D12	1	HC-237-2	NEEDLE ROLLER BEARING
D13	1	HC-237-4B	WASHER
D14	1	HC-237-7	SOCKET CAP SCREW
D15	1	SCR-015	SOCKET CAP SCREW
D16	9	HC-201-4	STUD
D17	1	HC8-221-RATIO	CROWN WHEEL AND PINION
D19	VARIOUS	HC8-222-2	SHIM REDIFINED HC8-222-2-SIZE
D20	1	HC8-222-1HB	PINION HEAD BEARING
D21	1	FGA-222-1A	NUT
D22	1	HC-201-13	BUSH
D23	1	HC8-222-2A	WASHER
D24	1	HC-239-17	CLUTCH SHAFT
D25	1	HC-244-11	LIP SEAL
D26	1	HC-239-0	CIRCLIP
D27	1	HC-236-4	SLEEVE
D31	1	F3D-236-1	WASHER

MK9 SHAFTS AND SELECTION			
Position	Quantity	Stock code	Description
D28	1	HC-245	BOBBIN - 1.31"
D29	1	HC-245-B	BEARING
D32	1	HC9-254-2	SCREW
D33	1	HC9-254A	CROSS SHAFT
D34	1	HC9-254-6	CIRCLIP
D35	1	HC9-254-3	WASHER
D36	1	HC9-254-1	BUSH
D37	1	HC9-254-4	SPRING CAP
D38	1	HC9-254-5	SPRING
D39	1	HC9-254-7	LEVER
D40	1	HC9-254-6	CIRCLIP
D41	1	HC8-258-7	SLAVE CYL BKT CASTING MACHINED
D42	2	FT-258-3	SCREW
D43	2	HC-258-3	SKT CAP SCREW
D44	1	FT-258-2	SLAVE CYLINDER
D45	2	FT-201-3	NUT
D46	2	FT-258-5	WASHER
D50	1	HC8-258	PUSH ROD
D51	3	HC-258-1	NUT
D52	1	HC-259	NOSE PIECE PUSH ROD

Please note, these parts are not supplied with the standard mk9 gearbox. They are part of a separate assembly HC9-258-200

VARIABLE PARTS

ALTERNATIVE NON FIRST GEAR INTEGRAL LAYSHAFT AVAILABLE ON CERTAIN MK8 RATIOS FOR 5 SPEED

MK9 SHAFTS AND SELECTION			
Position	Quantity	Stock code	Description
B27	1	HC9-234	LAYSHAFT
B28	1	HC9-238	REVERSE INPUT GEAR
B29	1	HC9-238-1	SPACER
B30/B5	1	MK8-RATIO-STD	1ST GEAR RATIO
B21/B9	1	MK8-RATIO-STD	2ND GEAR RATIO
A58/A43	-1	MK8-RATIO-INT	LAYSHAFT & INT 1ST
A60/A45	-1	MK8-RATIO-2ND	2ND GEAR RATIO

ALTERNATIVE FIRST GEAR INTEGRAL LAYSHAFT AVAILABLE ON CERTAIN MK8 RATIOS FOR 4 SPEED

MK9 SHAFTS AND SELECTION			
Position	Quantity	Stock code	Description
A58/A43	1	MK8-RATIO-INT	LAYSHAFT & INT 1ST
B27	-1	HC9-234	LAYSHAFT
B28	-1	HC9-238	REVERSE INPUT GEAR
B29	-1	HC9-238-1	SPACER
B30/B5	-1	MK8-RATIO-STD	1ST GEAR RATIO



ILLUSTRATED PARTS LIST: DIFFERENTIALS

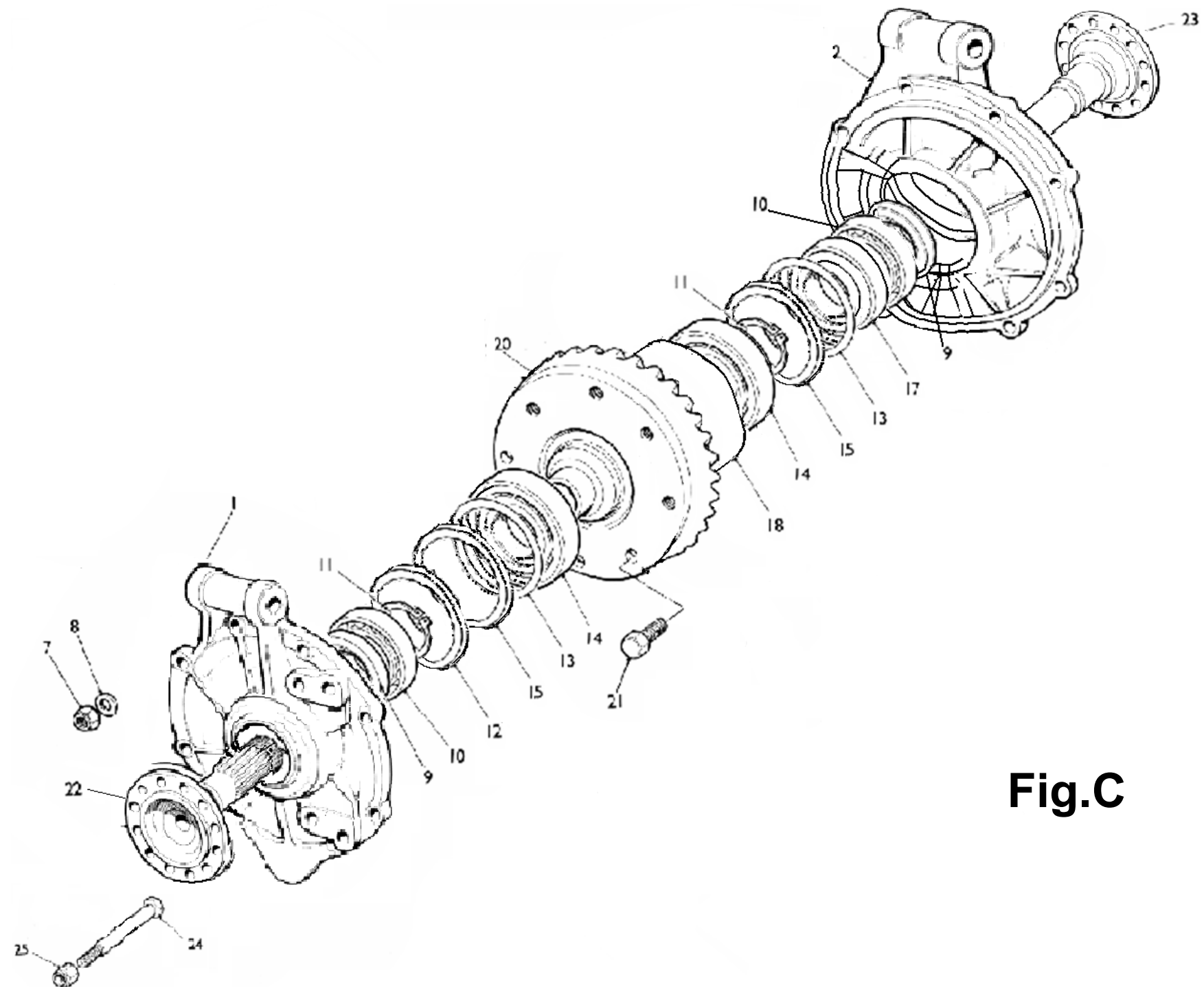


Fig.C

MK9 DIFFERENTIAL			
Position	Quantity	Stock code	Description
C1	1	HC9-205-C	LEFT HAND SIDEPLATE
C7	16	HC-201-3A	NUT
C8	16	F3D-236-1	WASHER
C9	2	HC9-205-4	OIL SEAL
C10	2	HC9-205-3	DOUBLE ROW ANGULAR BALL BEARING
C11	2	FT-219-1A	CIRCLIP
C13	VARIOUS	HC9-206-1	SEE VARIOUS SIZES LISTED
C14	2	HC9-205-1	TAPER ROLLER BEARING
C18	1	DIFF ASSY	DIFFERENTIAL ASSEMBLY
C20	1	HC8-221-RATIO	CROWNWHEEL & PINION
C21	8	VG-221-1	CROWNWHEEL BOLT .810
C22	1	HC9-218-LH	12 HOLE DRIVE SHAFT
C23	1	HC9-218-RH	12 HOLE DRIVE SHAFT
C24	12	HC9-219-4	FLANGE BOLT
C25	12	FT-201-3	NUT

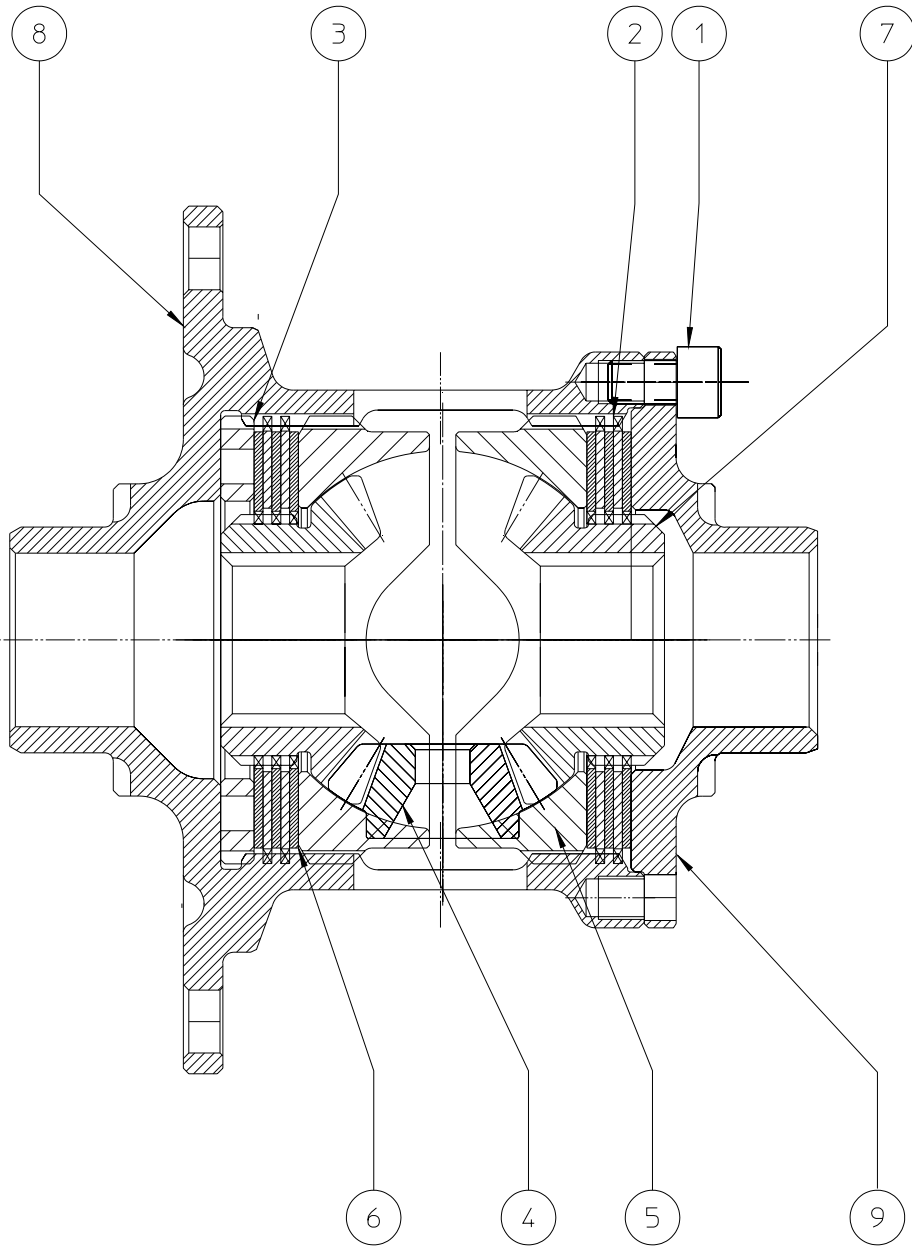
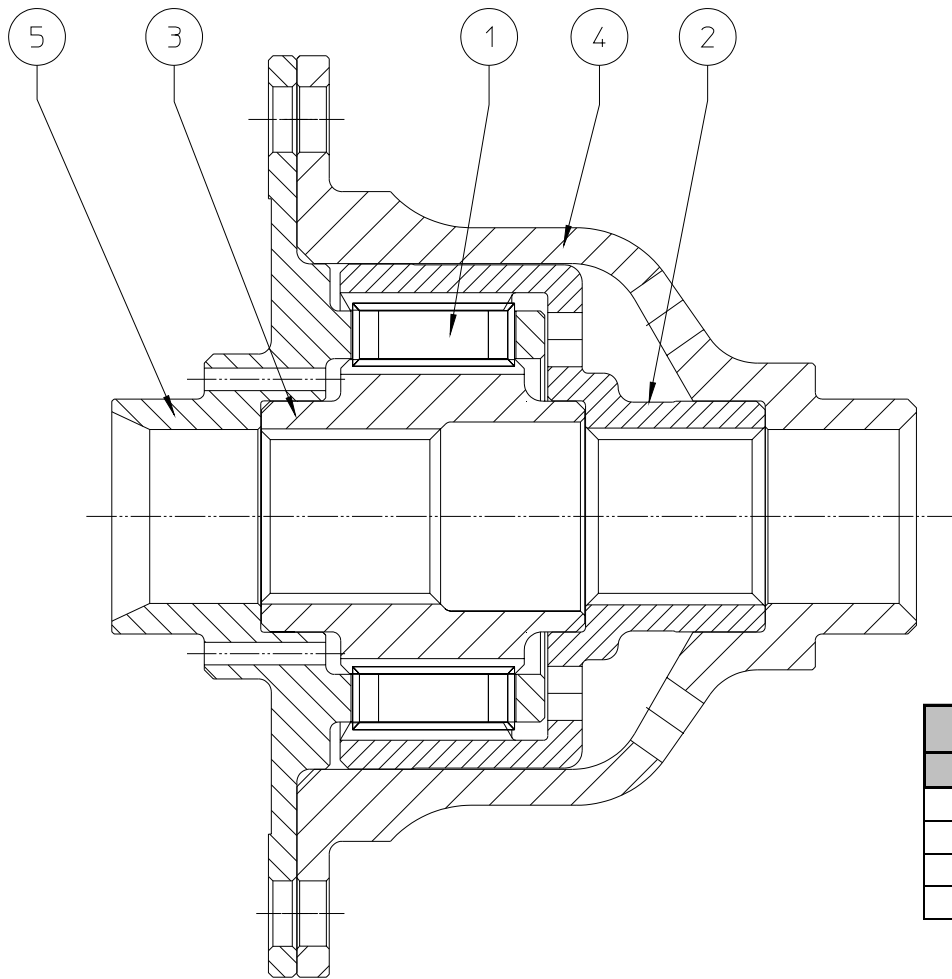


FIGURE 8

Position	Qty	PartNo	PartName
1	8	F3A-213-12	SCREW
2	4	FTC-213-10	CLUTCH PLATE
3	1	FTC-213-3	SPACER-PRELOAD SETTING
4	3	FTC-213-5AH	PLANET BEVEL GEAR
5	1	FTC-213-7	SIDE GEAR RINGS
6	6	FTC-213-8	CORE PLATE
7	2	HCC-213-6AH	SIDE BEVEL GEAR
8	1	LD-213	DIFFERENTIAL CASING
9	1	LD-214	END PLATE

MK9 DIFF SPACERS (POWERFLOW)			
Position	Quantity	Stock code	Description
C2	1	HCC-206-C	RIGHT HAND SIDEPLATE
C12	1	HCC-205-2	LEFT HAND SPACER
C15	0		NO SPACER
C17	1	HCC-206-2	RIGHT HAND SPACER

REF TO PAGE 24



Bill of Material			
Position	Qty	PartNo	PartName
		LD-212-CP	CAM&PAWL DIFFERENTIAL
1	8	FT-217	PLUNGER
2	1	HC8-215	OUTER CAM TRACK
3	1	HC8-216	INNER CAM TRACK
4	1	LD-213-CP	DIFF CASE C & P
5	1	LD-214-CP	PLUNGER CARRIER

MK9 DIFF SPACERS (CAM & PAWL)			
Position	Quantity	Stock code	Description
C2	1	HC9-206-C	RIGHT HAND SIDEPLATE
C12	1	HC9-205-2A	LEFT HAND SPACER
C15	2	HC9-205-2B	SPACER
C17	1	HC9-206-2A	RIGHT HAND SPACER

MK9 DIFF SPACERS AFTER BULLETIN MK9-003			
Position	Quantity	Stock code	Description
C2	1	HC9-206-C	RIGHT HAND SIDEPLATE
C12	1	HC9-205-2C	LEFT HAND SPACER
C15	0		N/A
C17	1	HC9-206-2C	RIGHT HAND SPACER

REF TO PAGE 24

FIGURE 9

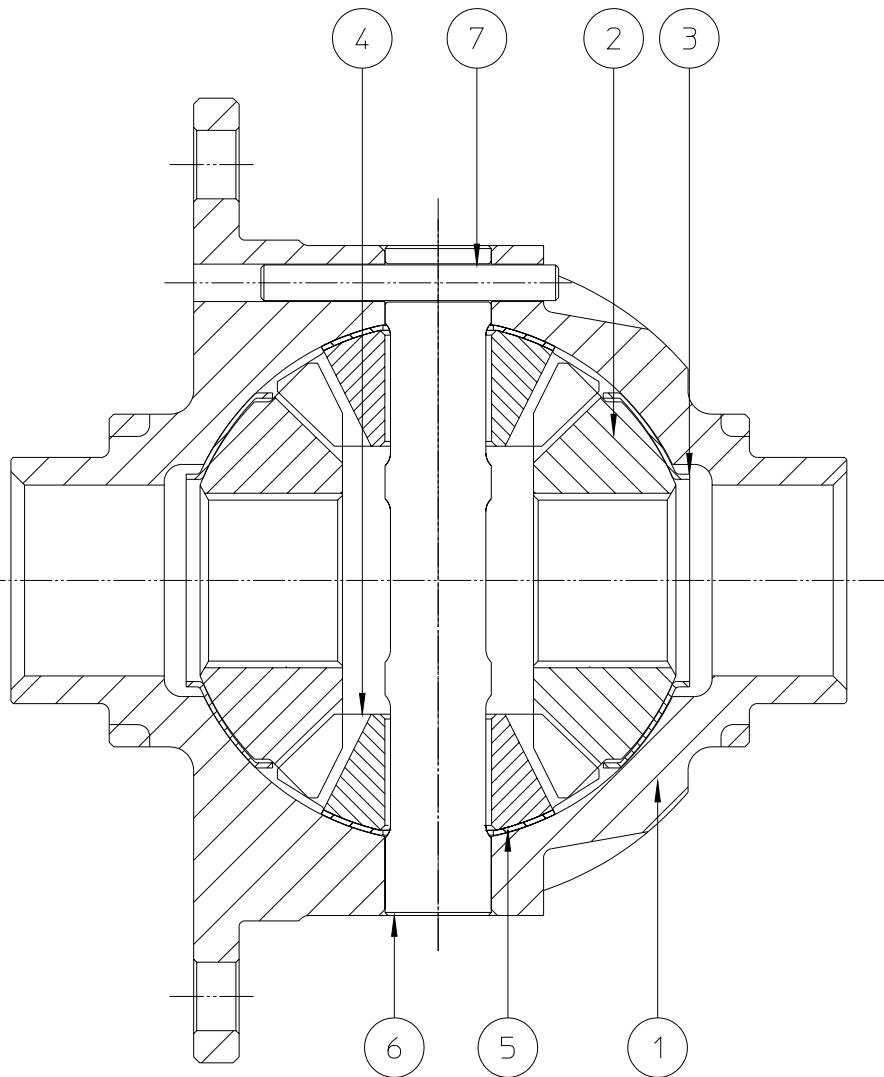


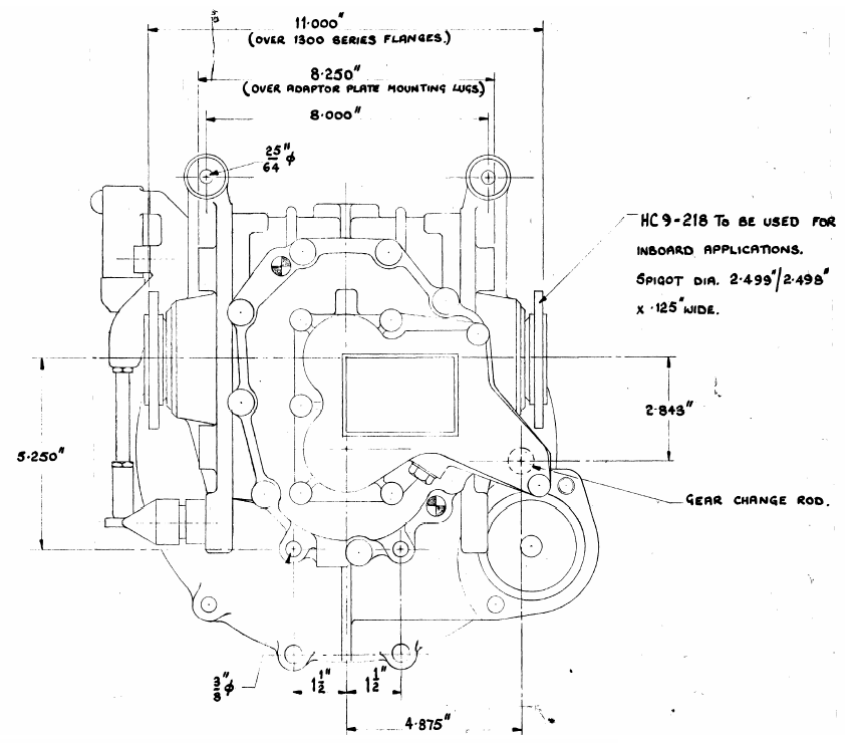
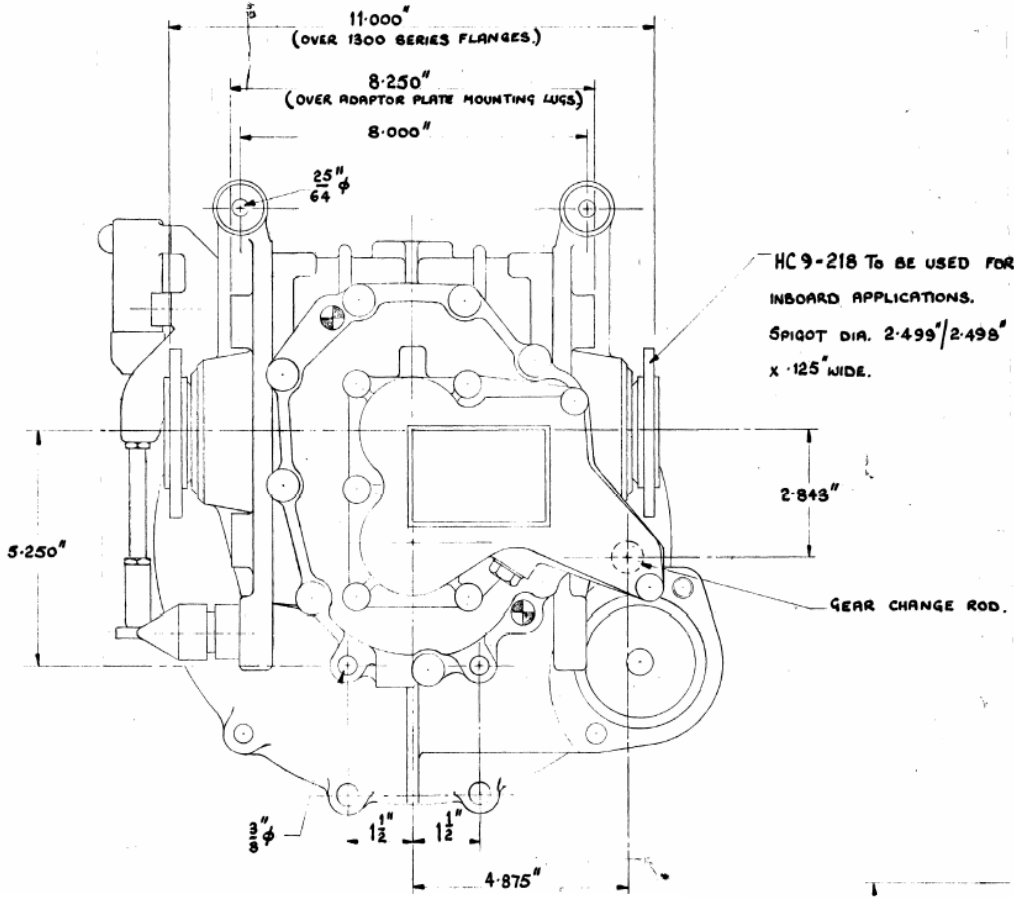
FIGURE 10

Bill of Material			
Position	Qty	PartNo	PartName
		HC8-214-0R	FREE DIFF. ASSY.
1	1	LD-213-F	DIFF CASE
2	2	HC8-214-4R	SIDE BEVEL
3	2	HC8-214-5R	SIDE BEVEL WASHER
4	2	HC8-214-3R	PLANET BEVEL
5	2	HC8-214-6R	PLANET BEVEL WASHER
6	1	HC8-214-2R	CROSS SHAFT
7	1	HC8-214-7R	ROLL PIN

MK9 DIFF SPACERS (FREE)			
Position	Quantity	Stock code	Description
C2	1	HC9-206-C	RIGHT HAND SIDEPLATE
C12	1	HC9-205-2A	LEFT HAND SPACER
C15	2	HC9-205-2B	SPACER
C17	1	HC9-206-2A	RIGHT HAND SPACER

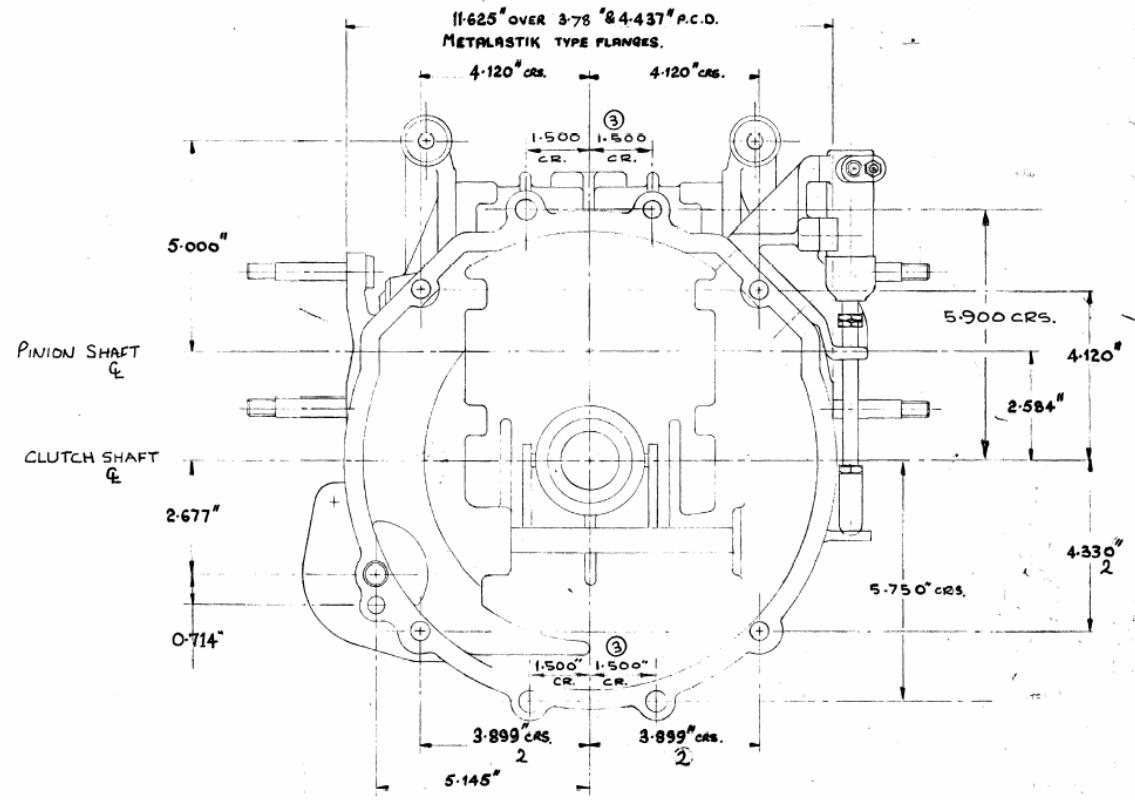
MK9 DIFF SPACERS AFTER BULLETIN MK9-003			
Position	Quantity	Stock code	Description
C2	1	HC9-206-C	RIGHT HAND SIDEPLATE
C12	1	HC9-205-2C	LEFT HAND SPACER
C15	0		N/A
C17	1	HC9-206-2C	RIGHT HAND SPACER

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INSTALLATION DRAWING

FIGURE 11





TECHNICAL BULLETINS

Technical Bulletin MK9 Gearbox.

Issued: 19th April, 1996.

Bulletin: MK9/001

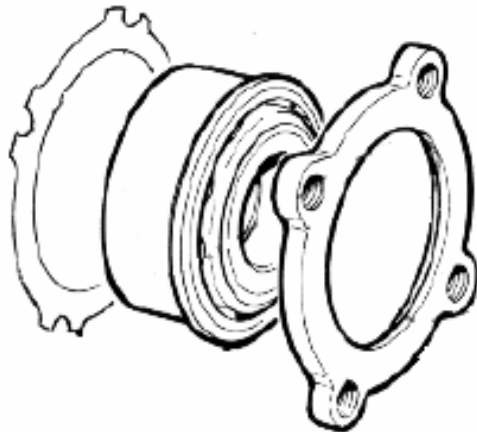
Re: Pinion Head Bearing FT-222-1

Author: Charles Ingram

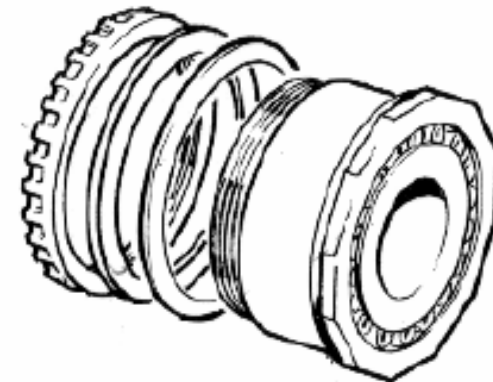
Due to FAG ceasing production of FT-222-1 (FAG No. 511515), Hewland Engineering Limited has decided that all HC gearboxes will be fitted with HC8-222-1 (FAG No. 521676C) pinion head bearing.

This is a retrofitable bearing that does not require the modification of any other parts

FT bearing arrangement



HC bearing arrangement





Technical Bulletin MK9 Gearbox.

Issued: 15th January, 1997.

Bulletin: MK9/002

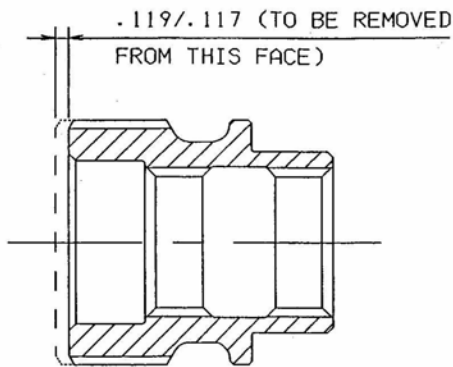
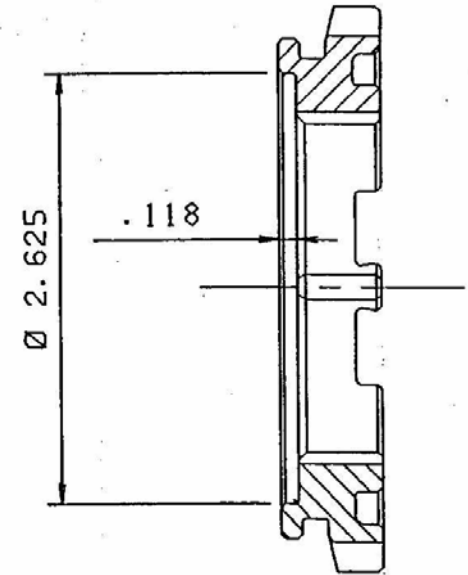
Re: Pinion Head Bearing HC8-222-1

Author: Charles Ingram

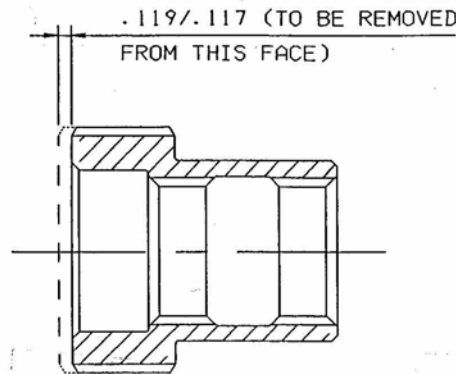
Due to FAG ceasing production of HC8-222-1 (FAG No. 521676C), Hewland Engineering Limited has sourced a replacement bearing part no. HC8-222-1HB.

In order to install this bearing a new front hub HC85-226-HB (five speed) HC84-226-HB (four speed) and reverse sliding gear HC85-231-HB (five speed), HC84-226-HB (four speed) are required.

Alternatively, existing front hub and reverse sliding gear may be modified as shown.



HC8-4-226HB



HC8-5-226HB

HC8-5-231HB
&
HC8-4-231HB

Technical Bulletin MK9 Gearbox.

Issued: 11th February 2009

Bulletin: MK9-003

Re: Differential Sideplate Spacers

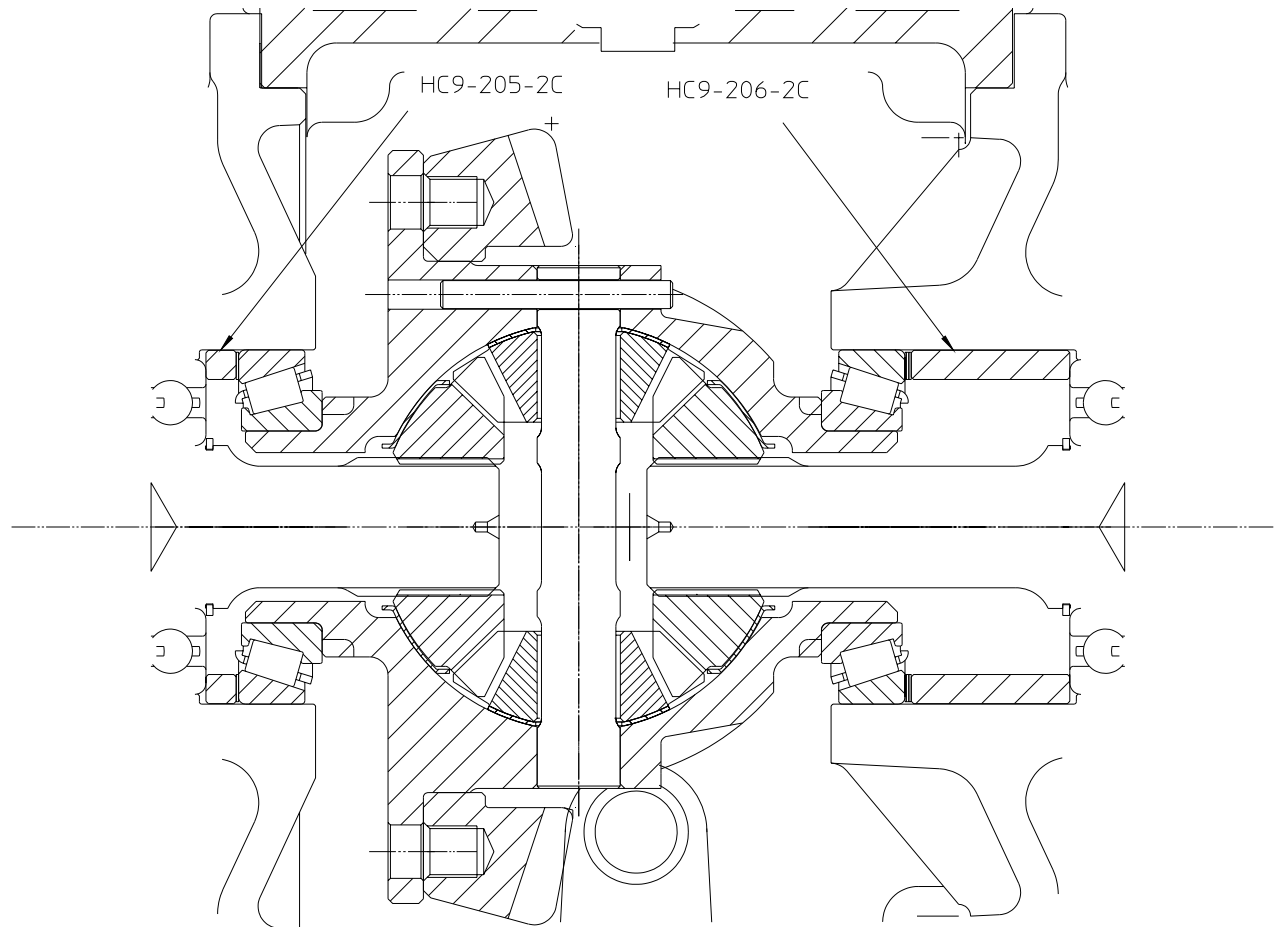
Author: Charles Ingram

Hewland Engineering is ceasing the manufacture of the differential spacers HC9-205-2A, HC9-205-2B and HC9-206-2A and replacing them with two new spacers; HC9-205-2C and HC9-206-2C.

HC9-205-2C replaces spacers HC9-205-2A and HC9-205-2B, used in the right hand side plate for the Cam and Pawl, and Free Differential setups.

HC9-206-2C replaces spacers HC9-206-2A and HC9-205-2B used in the right hand side plate for the Cam and Pawl differential and, Free Differential setups.

Although not recommended, if it is required then HC9-206-2A can be made from HC9-206-2C and HC9-205-2A can be made from HC9-205-2C.



Manual Revision Details

Date of Revision	Details
29/01/2009	First edition of new manual
11/02/2009	Technical Bulletin MK9-003 added
26/02/2009	Installation Drawing added, variable layshaft options added, various corrections
09/03/2009	Studs and bushes added
07/05/2009	MK5 gears removed from 4 speed assembly drawing
15/12/2009	MK5 gears in 4 speed clarification note added
27/01/2010	FT-248 corrected to FT-248-4, layshaft part number corrected