

HEWLAND

L. G. 500 (4-SPEED)

and

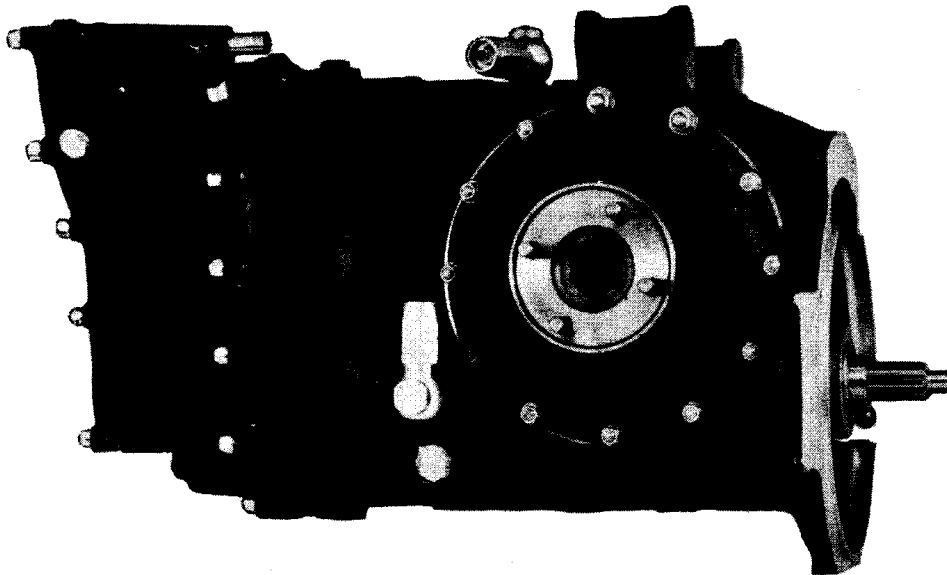
L. G. 600 (5-SPEED)

TRANSAXLE GEARBOX

Maintenance and Overhaul Manual

HEWLAND ENGINEERING LIMITED • MAIDENHEAD • BERKSHIRE • ENGLAND





THE **L. G.** SERIES TRANSAXLE GEARBOX UNITS

These units are designed for use with 300 to 450 cu. inch competition engines, and are manufactured as two, four and five speed models. The present manual deals with the four speed unit (LG 500) and the five-speed unit (LG 600).

Only one final drive ratio is used (3.3 : 1). Since the drive is indirect at all times, any change in ratio can be made through the gearbox. The drive is taken from the clutch shaft to the hypoid final drive via straight **cut** gears. Gear change is effected by non-synchronised face dogs. Ratios can be changed without removing the unit from the chassis, and all requirements can be met from **OUT** extensive range of gears. All ratios except bottom are inter-changeable, and may be arranged in any order.

The differential and crown wheel assembly is mounted on two taper roller bearings, located in the side plates and adjustable to correct **pre**-load by shims. **Output** shafts are also mounted in the side plates, and lip oil seals are fitted. The pinion is supported by a double angular contact bearing clamped to the case directly behind the gears. This bearing accepts the major radial and thrust loads, while a roller bearing supports the tail. Thus pinion mesh can never be affected by case expansion.

The gears run directly on caged needle roller bearings, and each gear and bearing revolves as an assembly. Heat treated nickle-chrome steel

is used for all gears and shafts. Selector forks are cast in aluminium bronze, and casings in magnesium alloy.

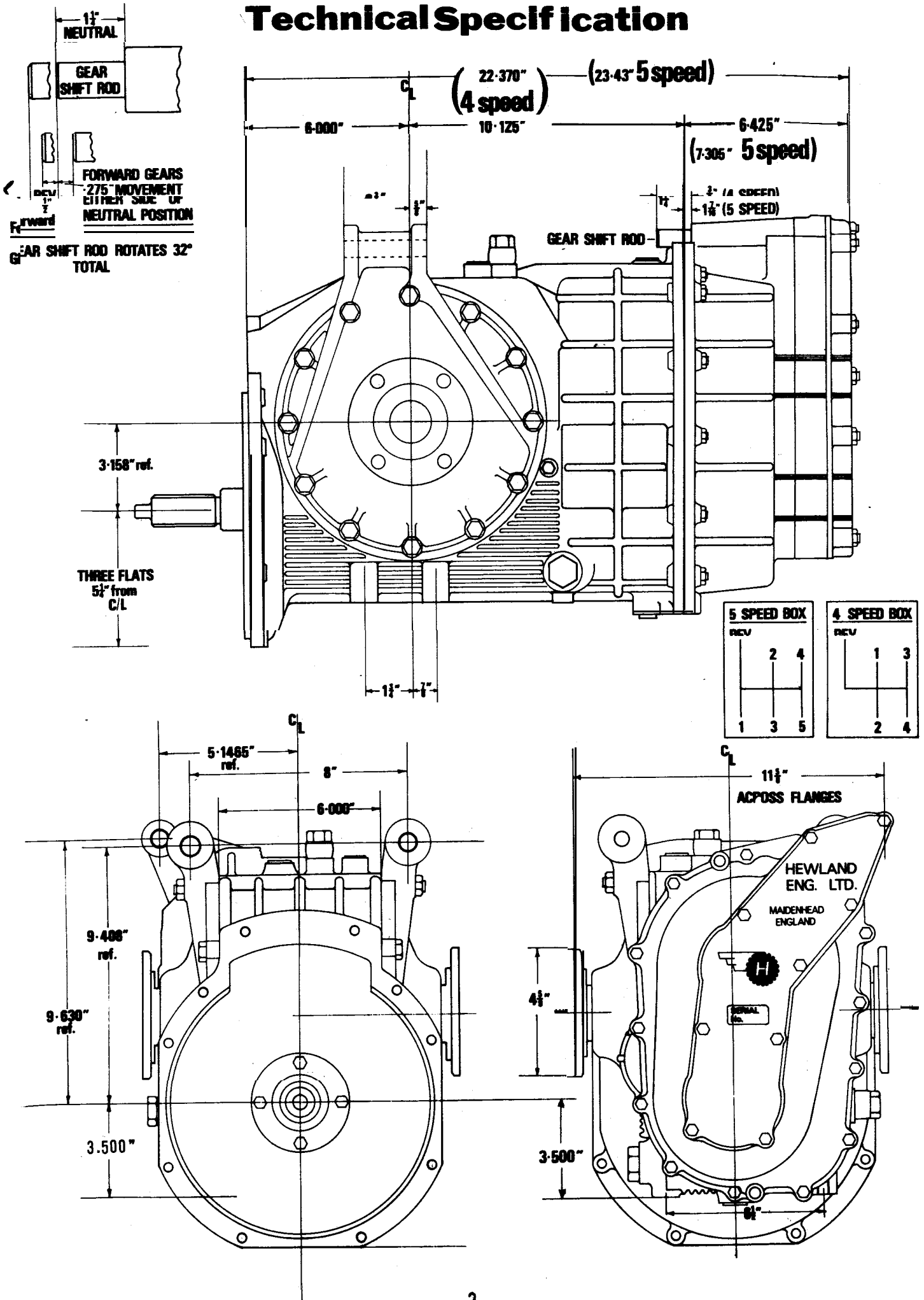
The differential is of Limited Slip design, and two types are manufactured. The unit normally supplied **is** the cam and **pawl** type. The other is the '**Powr-Lok**' type, operated by flat clutch plates. Both units are illustrated.

The gearbox unit is lubricated **by** oil splash, and the final drive **by** pump. The pump is located in the main case, and is fed via a filter which can be withdrawn from the **outside** of the case. The oil is piped **out** of the main case on the **right**-hand side and returns via external piping, thus providing for the fitting of an oil cooler. The latter is strongly recommended to ensure that oil temperature does not exceed its maximum of 110°C (250°F).

The gear-change rod is mounted high on the right-hand side of the unit to facilitate the installation of the gear line linkage. The clutch **is** operated by steel fork and push-rod • accepted as the simplest and most reliable system, especially with monocoque chassis. The push-rod is actuated from a slave cylinder mounted on the side of the main case.

The general configuration of the LG Series provides the maximum utilisation of power allied to minimum weight for the power required to **be** transmitted.

Technical Specification



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General notes on maintenance and overhaul

Only genuine **Hewland** spares should be used as replacements. These are manufactured in our own workshops to the fine tolerances necessary, and rigorously inspected and tested.

New nuts and gaskets should always be used on re-assembly.

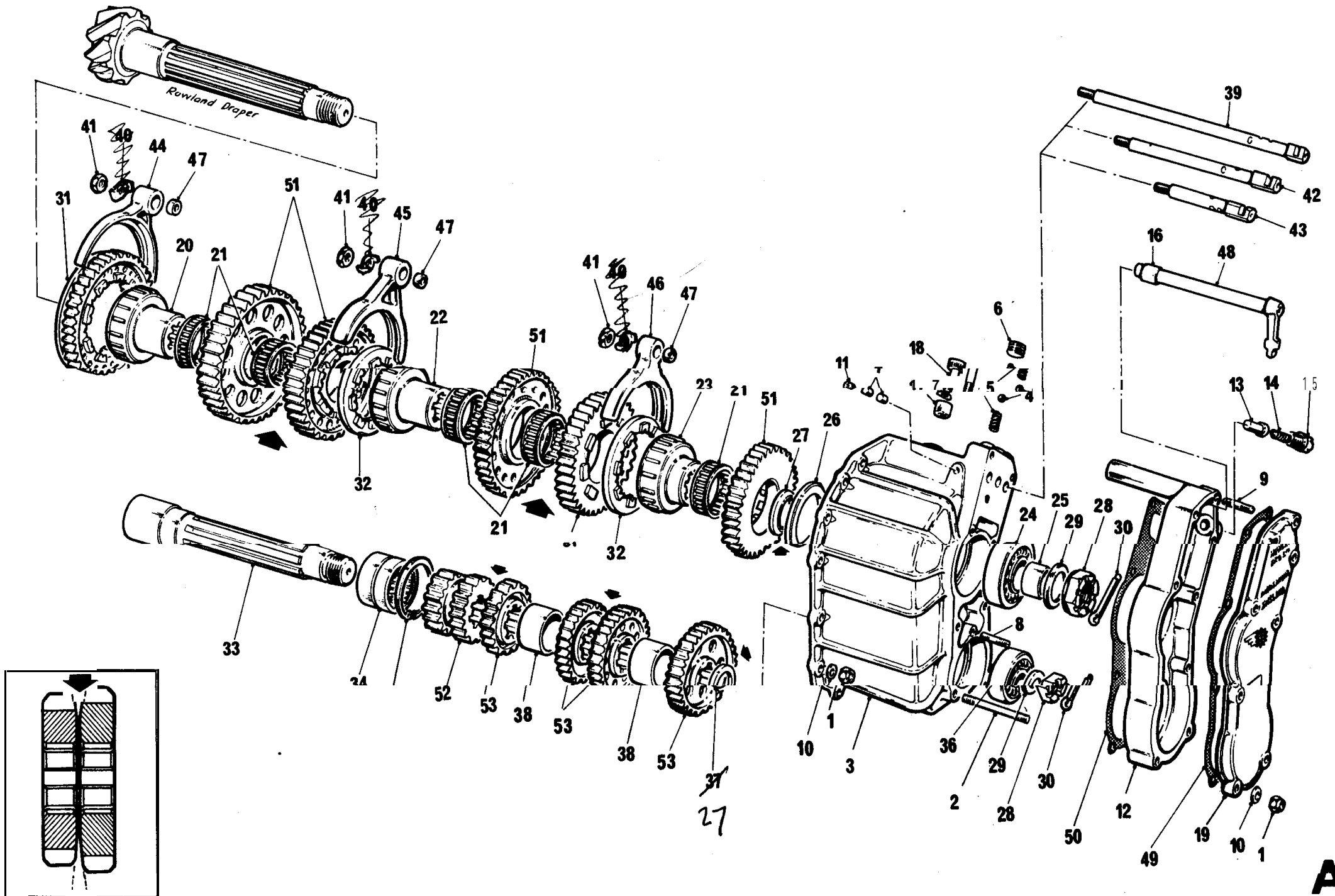
When warming the outside of the case, keep the **blow-lamp** moving. Do not overheat. Test with a spot of moisture, which will bounce off when the case is hot enough.

When refilling with oil, put half the quantity into each filler hole. Never put all the oil in one oil sump.

	LG 500 (4 - speed)	LG 600 (5 - speed)
Weight	136 lbs	145 lbs
Oil Capacity	5 pts	6 pts
Type of Oil	Hypoid SAE 90/140	

Spares List A

ILLUS. NO.	DESCRIPTION	PART NUMBER	QTY	QTY	REMARKS	ILLUS. NO.	DESCRIPTION	PART NUMBER	QTY	QTY	REMARKS
			5 Speed	4 Speed					5 Speed	4 Speed	
✓A1	5/16" Nyloc Nuts	FT 2013	43	43		✓A27	Thrust Washer	LG 2295	1	1	
✓A2	Stud 5/16" x 3 1/2" FT 202-6/	LG 2025	8	8		✓A28	Pinion & Layshaft Nut	LG 230	2	2	
✓A3	Bearing Carrier	LG 5 202	1	1	5 Speed	✓A29	Washer	LG 2301	2	2	
✓A3	Bearing Carrier	LG 4 202	1	1	4 Speed	✓A30	Split Pin 236-2 ?	LG 2302	2	2	
✓A4	Steel Ball Selector Rod	FT 2021	6	6		✓A31	Reverse & First Sliding Gear	LG5 231	1	1	5 Speed
✓A5	Spring Selector Rod	FT 2022	6	6		✓A31	Reverse Sliding Gear	LG4 231	1	1	4 Speed
✓A6	Retaining Screw	FT 2023	3	3		✓A32	Clutch Ring	LG 232'	2	2	
✓A7	Plungers	F T 2024	2	2		✓A33	Layshaft 5 Speed	LG5 234	1	1	5 Speed
✓A8	Stud FT 201-2	LG 2026	2	2		✓A33	Layshaft 4 Speed	LG4 234	1	1	4 Speed
* ✓A9	Stud	LG 2026	1	1		✓A33	Layshaft 5 Speed Rear Start	LG5 234 Rs	1	1	Rear Start 5 Speed
✓A10	Washer 5/16"	FT 2027	43	43		✓A33	Layshaft 4 Speed Rear Start	LG4 234 Rs	1	1	Rear Start 4 Speed
✓A11	Blanking Plug	FT 2028	1	1		✓A34	Bearing Layshaft Front	LG 234 1	1	1	
✓A12	Selector Finger Housing	LG 203	1	1		✓A35	Circlip	LG 2342	1	1	
✓A13	Plunger	H C 2032-0	1	1		✓A36	Bearing Layshaft Rear	LG 2343	1	1	?
✓A14	Spring	FT 2032	1	1		✓A37	Thrust Washer Layshaft	LG 2345	1	1	
✓A15	Plug	FT 2035	1	1		✓A38	Sycer Layshaft	LG 2346	2	1	
✓A16	5/8" Bush	FT 2036	2	2		✓A39	Selector Rod First & Reverse	LG5 246	1	1	5 Speed
✓A17	Alloy Spacer	LG 20310	1	1		✓A39	Selector Rod Reverse	LG4 246	1	1	4 Speed
* ✓A18	Screw	FT 20311	1	1		✓A40	Tab Washer Not Used	FT 2461	3	3	
✓A19	End Cover	LG 204	1	1		✓A41	Nut	FT 2462	3	3	
*	END Cover Rear Start	LG 204 R	1	1	Not Illustrated	✓A42	Selector Rod LG 521	LG 247	1	1	
*	Oil Seal End Cover	LG 2041	1	1	Not Illustrated	✓A43	Selector Rod 4th/5th LG 598	LG5 248	1	1	5 Speed
*	Cover Starter Spline	LG4 2042	1	1	Not Illustrated	✓A43	Selector Rod 3rd/4th	LG4 248	1	1	4 Speed
*	Allen Cap Screws	LG4 2043	4	4	Not Illustrated	✓A44	Selector Fork 1st/Reverse LG 60	LG5 249	1	1	5 Speed
*	Nyloc Nut 1/4" UNF	LG4 2046	4	4	Not Illustrated	✓A44	Selector Fork Reverse	LG4 249	1	1	4 Speed
*	Monza Filler Cap	LG 2044	1	1	Not Illustrated	✓A45	Selector Fork 2nd/3rd LG 612	LG5 250	1	1	5 Speed
*	Dowels	LG 2045	2	2	Not Illustrated	✓A45	Selector Fork 1st/2nd	LG4 250	1	1	4 Speed
*	Sleeve Oil Seal	LG 20416	1	1	Not Illustrated	✓A46	Selector Fork 4th/5th LG 611	LG5 251	1	1	5 Speed
*	Starter Sleeve Splined	LG 20417	1	1	Not Illustrated	✓A46	Selector Fork 3rd/4th	-	1	1	4 Speed
✓A20	Hub First Second & Reverse	LGS 226	1	1	5 Speed	✓A47	Adjusting Spacer	FT 246-3	3	3	Mode on Assemble
✓A20	Hub First & Reverse	LG4 226	1	1	4 Speed	✓A48	Selector Finger	LG 252	1	1	
✓A21	Needle Bearing	LG 2261	5	4		✓A49	Gasket End Cover	LG 260	1	1	
✓A22	Hub Centre	LG 227	1	1		✓A50	Gasket Selector Finger Housing	LG 261	1	1	
✓A23	Hub Rear	LG 228	1	1		✓A51	Pinion Gears All Ratios	LG 511-A	5	4	
✓A24	Bearing Pinion Tail	LG 2291	1	1		✓A52	Layshaft Gear 1st/Reverse	LG 606	1	1	5 Speed
✓A25	Bush	LG 2292	1	1		✓A52	Layshaft Gear 1st	-	1	1	4 Speed
✓A26	Thrust Washer	LG 2294	1	1		✓A53	Loyshaft Gears Other Ratios	LG 512-A	4	3	



GEARBOX UNIT, SPARES LIST AND DIAGRAM

A

The Gearbox **unit**

REMOVING THE UNIT

END COVER

1. Remove the **nine** $\frac{5}{16}$ " UNF Nyloc nuts and washers from the end cover. Take off cover and gasket.
2. Remove the split pins from the castellated pinion and **layshaft** nuts.
3. Push the heads of the two outside selector rods, thus engaging the gears.
4. Remove the pinion nut and washer and slacken off the **layshaft** nut.
5. Now withdraw the two outside selector rods, to disengage the gears.

BEARING CARRIER

1. Remove the **twelve** $\frac{5}{16}$ " UNF nuts and washers, and the $\frac{5}{16}$ " UNC **allen** cap screw.
2. Using a plastic mallet, tap the bearing carrier and remove it from the main case, **complete** with lay-shaft assembly and gear train. Support the gears, hubs and clutch rings with the hand, as they come off the pinion.

Replace in reverse order to above.

CHANGING GEAR RATIOS

When changing a gear ratio, take off the slackened nut and remove the **layshaft** from the bearing carrier. Gears are exchanged in pairs • one from the **layshaft** and one from the pinion shaft. Each gear is

etched with two numbers. The first is the number of its own teeth. The second is the number of teeth on its mating gear.

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

STRIPPING THE GEAR TRAIN

1. Remove hubs, clutch rings and gears. Wash and inspect for wear and cracks, giving particular attention to the clutch rings.
2. Examine forks for heavy or uneven wear, and test for excessive play between forks and clutch rings.
3. If forks are not to be stripped, check that nuts are tight and properly tabbed. To continue **stripping:-**
4. Knock back the tab and unscrew the nut from the **1st/Reverse** fork, (44). Remove the fork.
5. Remove bung, spring and plunger (13, 14, 15) from the selector finger housing.
6. Remove ~~the selector finger~~ by sliding it into the **1st/Reverse** selector head, and pushing the rod **until** the head is clear of the others.

(On the 4-speed gearbox, to remove selector finger it is necessary to undo reverse selector fork and push rod down until head is clear of the others).

7. Take off the Selector Finger Housing by undoing the **allen** cap screw and two UNF nuts. Then remove the two remaining forks.

8. Undo the three **allen** cap screws (6) and take out the top Selector Rod Springs and balls. Then take out the three Selector Rods, followed by the bottom balls and springs.
9. Undo the UNC **allen** cap screw (11) -and push out the locking slugs.
10. Inspect pinion **and layshaft** tail bearings and renew if necessary. To remove, warm up surrounding area.

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

11. When replacing bottom balls and springs, set up to correct height. About one-third of the ball should be exposed. Continue by inserting locking slugs and selector rods, then top balls and springs.
12. Any hub renewed should be identical in length with the original. If replacing all hubs, or main bearing carrier, check that overall length of pinion assembly has not been altered. Clearance is essential to avoid overheating and seizure, but too much clearance will cause excessive wear.

Setting up the selector forks • **overleaf**

THE GEARBOX UNIT (continued)

SETTING UP THE SELECTOR FORKS

Extreme accuracy in setting up is imperative to ensure that gears engage freely, and to avoid uneven or excessive wear. The use of a Bewland **Fork-setting** Jig is strongly recommended. Designed specifically for **LG500** and 600 gearboxes, it will save costly setting-up time and vastly reduce the possibility of error. (Fig. 1).

*Note that when two **layshaft** gears run together, their chamfered sides must face each other. (See diagram A).*

1. Warm the case and drop in the **pinion tail** bearing as described above.
2. Place the jig in a vice. Slide the hubs, with top gear and thrust washer, on to the dummy pinion.
3. Attach the bearing carrier to the jig, using temporary nuts.
4. Tighten the pinion **nut**. Then check for correct clearance on top gear. (**.008"** to **.010"**).
5. Remove from jig. Fit selector forks to rods, with nuts and washers.
6. Build up the hubs, gears and clutch rings, and slide them back on to the setting jig.

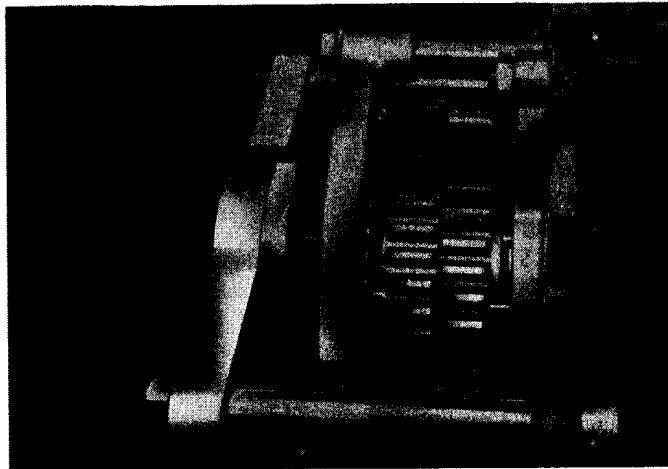


Fig. 1. The **Hewland** fork-setting jig in **use**

7. Adjust the forks individually. Correct positioning requires that:-
 - (a) The clutch ring should be centered on its hub, between the two gears.
 - (b) The clutch ring should engage fully with either gear.
 - (c) When fully engaged with either gear there should still be clearance between the gear and clutch-ring faces.

When satisfied with the set-up, continue as follows:-

8. Tighten up **2nd/3rd** and **4th/5th** selector rods.
9. Put in the **layshaft** bearing, having warmed up the surrounding area.
10. Slide back the **1st/Reverse** selector rod. This will enable you to replace the selector finger. Now replace the selector finger housing, using a new gasket.
11. Tighten up M/Reverse selector rod nuts. (Use new nuts and tabs for all selector rods). At the same time, make sure that the selector rod heads are correctly aligned, and there is correct clearance between them.
12. Build up the complete **layshaft** assembly with **gears**, spacers and thrust washer. Replace in bearing carrier.
13. Put the complete set-up back into the jig. Re-check all clearances. Test all movements. When satisfied, take it down and bolt it into the gear box, using a jointing compound.
14. As a final check, run on two or three nuts and go through the gears. Then replace the **Nyloc** nuts and tighten up. Replace spacers and nuts on pinion and layshaft, using a torque spanner.
*Put in split pins and replace end cover, using a new gasket.

**Correct torque is 115 lbs/ft. for pinion nut, and 80 lbs/ft. for layshaft nut.*

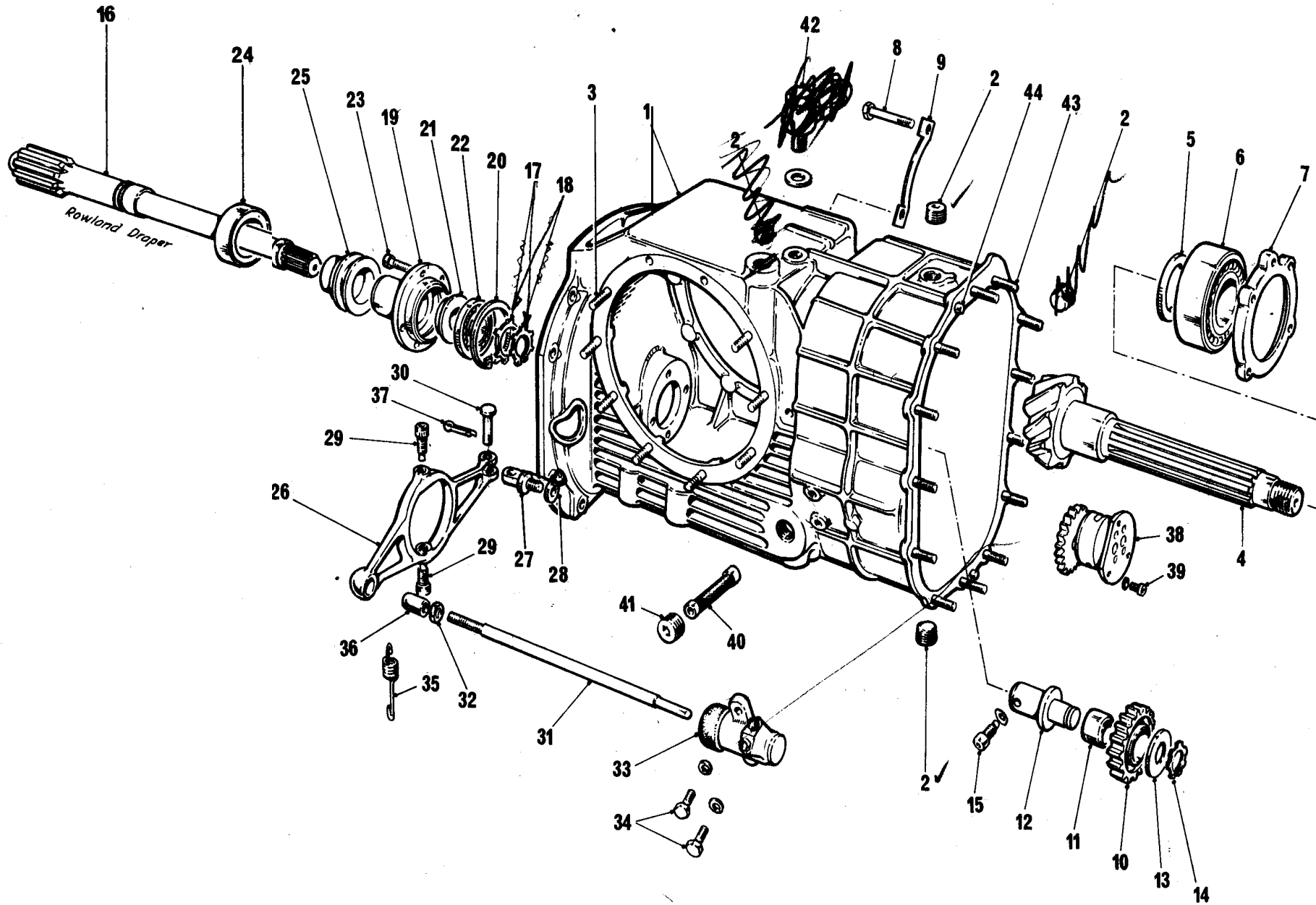
Spares List B

ILLUS. NO.	DESCRIPTION	PART NUMBER	QTY 5 Speed	QTY 4 Speed	REMARKS	ILLUS. NO.	DESCRIPTION	PART NUMBER	QTY 5 Speed	QTY 4 Speed	REMARKS
B1	Main Case	LG 201	1	1		B19		LG 2445			
B2	Oil Filler Plugs (8100)	FT 2011	4	4		B19		LG 2446			
B3	Stud Side Plote	FT 2012	20	20		B20	Circlip Spigot	LG 24410	1	1	
B4	Crown Wheel & Pinion	LG 221B	1		5 Speed	✓B21	Oil Seal	LG 24411	1	1	
B4	Crown Wheel & Pinion				4 Speed	✓B22	Bearing	LG 24412		1	
B5	Spacer Pinion Head	LG 2222	1	1		✓B23	Screws	L-G 24413	4	4	
B6	Pinion Bearing	LG 2221	1	1		✓B24	Thrust Bearing	LG 24513	1	1	LG 245-A
B7	Clomp Plate (MK2) LG 597	LG 223	1	1		B25	Bearing Carrier (CLUTCH THROST)	LG 245	1	1	
B8	Bolt; LG 582	LG 2251	5	5		B25		LG 2451			
B9	Tob Washers	LG 2252	2	2		B25		LG 2452			
✓B10	Reverse Idler Gear LG 514	LG 2371	1	1		B25	LG 587	LG 2453			
✓B11	Bearing HC 234-1	LG 2372	1	1		✓B26		LG 2454			
✓B12	Reverse Idler Spigot LG 515	LG 2373	1	1		B26		L G 2455			
✓B13	Reverse Idler Washer LG 572	LG 2374	1	1		✓B26	Clutch Fork	DG 254	1	1	
✓B14	Circlip 22 mm LG	LG 2375	1	1		✓B27	Fulcrum	DG 255	1	1	
✓B15	Reverse Idler Retaining Screw ^s	LG 2376	1	1		✓B28	Washer	DG 2551	1	1	
B16	Clutch Shoft Chevrolet	LG 239				✓B29	Swivel Bolt	FT 256	2	2	
B16	Clutch Shoft Ford J and B	LG 2391				✓B30	Clevis Pin	D G 257	1	1	
B16	Clutch Shoft Galaxie	LG 2392				✓B31	Rod	LG 258	1	1	
B16	Clutch Shoft Oldsmobile	LG 2393				✓B32	Nut Adjusting	FT 2581	1	1	
B16	Clutch Shaft Blonk	LG 2394			Half Machined	✓B33	Slave Cylinder	DG 2582	1	1	
B16	Clutch Shaft Indy Ford	LG 2395				✓B34	Bolts	DG 2583	2	2	
B16	Clutch Shoft Repco	LG 2396				✓B35	Spring	DG 2584	1	1	
B16	Clutch Shaft					✓B36	Dome	DG 259	1	1	
✓B17	Citclip Clutch Shaft	LG 2390	1	1		✓B37	Split Pin	DG 2571	1	1	
✓B18	Circlip Clutch Shaft	LG 2390A	1	1		✓B38	Oil Pump.	LG 265	1	1	
✓B19	Spigot Clutch Shaft	LG 244	1	1	Stondord	✓B39	Screws Pump Mounting	L G 26510	4	4	
B19		LG 2441				✓B40	Oil Filter	LG 266	1	1	
B19		LG 2442				✓B41	Plug	LG 2661	1	1	
B19		LG 2443				B42	Banjo Union Complete	LG 2662	2	2	
B19		LG 2444				43	STUD	FT 201-4	12		

44

DOWEL

FT 201-5 2



MAIN CASE AND DIFFERENTIAL COMPARTMENT, SPARES LIST AND DIAGRAM

The Main Case and Differential Compartment

Removal and replacement of units and assemblies

DIFFERENTIAL AND DRIVE

1. Take off slave cylinder (33) complete with clutch push-rod, by removing the two bolts and washers.
 2. Take off the left-hand side plate, having removed the nuts **and** washers of plate and tie-bars. Loosen with light blows from a plastic mallet.
 3. Support the complete differential assembly on a hammer shaft, and lift it out of the main case.
 4. Remove the right-hand side-plate.
- Replace in reverse order to above.

CLUTCH SHAFT

1. Unhook the spring (35) from the clutch fork clevis pin, enabling the fork to swing free.
 2. Slacken off the top and bottom swivel pins (29) and slide the thrust bearing and bearing carrier off the end of the clutch shaft.
 3. Remove the clutch fork, after taking out the split pin and clevis pin.
 4. Remove the four $\frac{1}{4}$ " allen cap countersunk set screws. Slide out complete clutch shaft assembly.
 5. Remove small circlip and oil pump driver gear. Remove second circlip and press clutch shaft out of spigot housing.
 6. Remove the large circlip (20), then the bearing and the oil seal (22 and 21).
- Re-assemble in reverse order to above, and **also:-**
7. Fit a new oil seal. Replace any worn parts, giving particular attention to the bearing.

8. Check that the bearing carrier rotates **freely** after tightening down the two swivel pins (9).
9. When bolting the spigot to its housing, put a smear of locking fluid on the four **allen** cap screws.

PINION

The pinion is withdrawn through one of the **side-plate** 'apertures' by pulling it well forward into the empty diff. compartment and tilting it. To do this, it is first necessary to remove the bearing behind the pinion head. Proceed as **follows:-**

1. Remove the clamp plate, having first unscrewed the five UNC bolts.

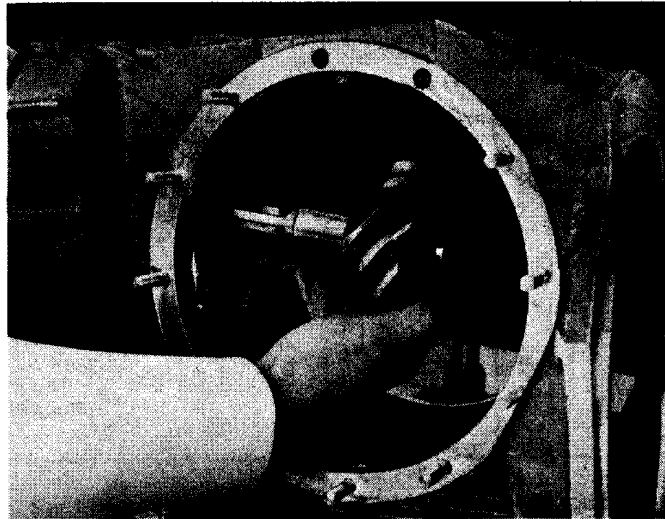


Fig. 2. Easing the pinion through the side plate aperture

2. Put a nut on the end of the pinion shaft for protection. Then strike with a plastic mallet and ease the pinion forward in the empty diff. compartment. **Turn** the main case upright, with its bolts supported on blocks.
3. Warm the outside of the case around the bearing, which will now drop out provided the case is **vertical**. Keep the flame moving and do not over-heat.
4. Tilt pinion and withdraw it through the aperture (Fig. 2). Remove thrust washer.

Replace, in reverse order to above. To fit a new crown wheel and pinion, see page 14.

REVERSE IDLER GEAR

Remove the circlip and lift off the gear.

OIL PUMP

Remove the circlip that retains the driven gear. Undo the three **allen** cap screws and slide out pump unit. You will now be able to lift off the gear and woodruff key. To dismantle pump, see page 12.

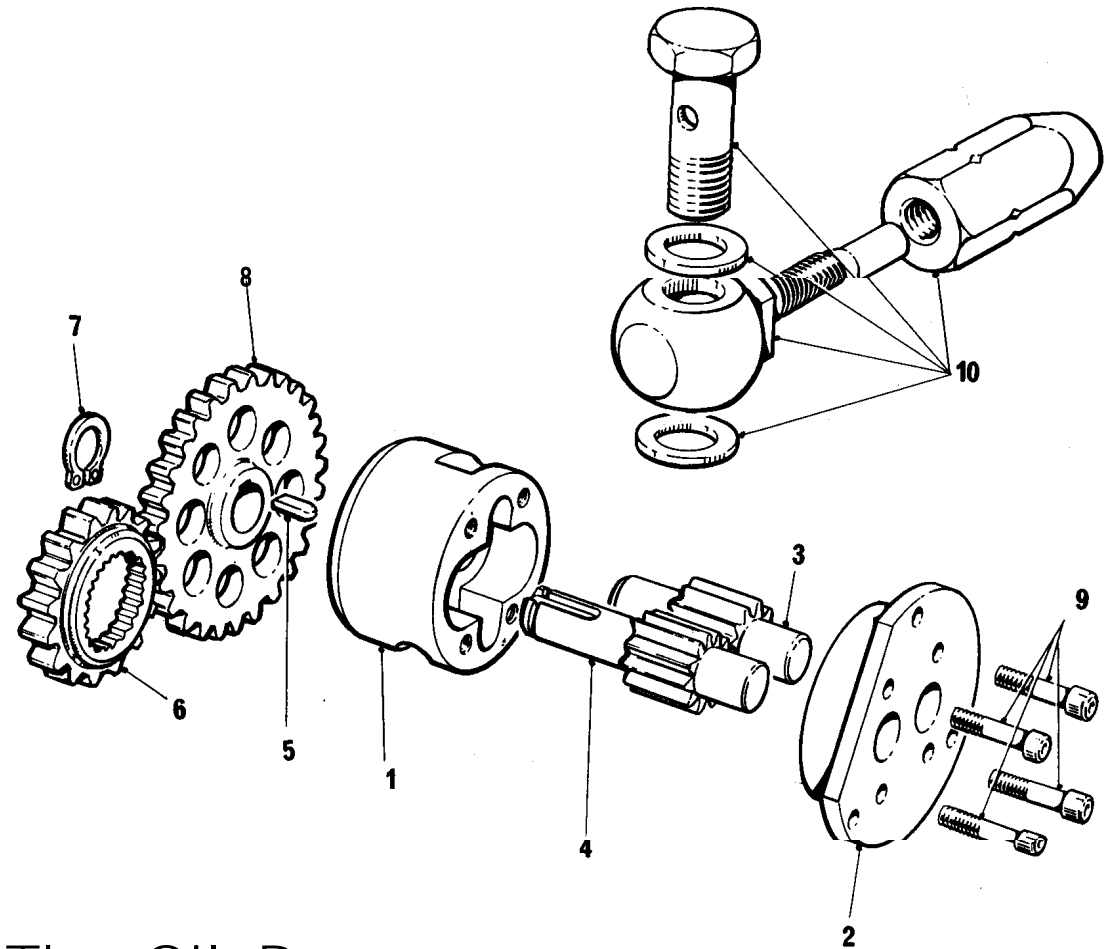
LAYSHAFT BEARING

The **layshaft** bearing is removed by warming the outside of the case, having first taken out the **cir-clip**. This bearing will be damaged by removal, and should not be disturbed unless it has to be renewed.

Wash and inspect all parts. Wash out main case to remove sludge. Ensure that no small metallic objects or particles have been left in the case.

Spares List E

ILLUS. NO.	DESCRIPTION	PART NUMBER	QTY	QTY	REMARKS
			5 Speed	4 Speed	
E1	Pump Body	LG 2652	1	1	
E2	Pump Cover	LG 2653	1	1	
E3	Gear	LG 2654	1	1	
E4	Gear	LG 2655	1	1	
E5	Woodruff Key	LG 2656	1	1	
E7	Gear	LG 2657	1	1	
E8	Circlip	LG 2658	1	1	
	Geor Clutch Shaft	LG 2659	1	1	
E9	Allen Cap Screws	LG 26510	4	4	
E10	Banjo Union Complete	LG 2662	2	2	
*	Adaptor J Block	LG 2071			Not Illustrated
*	Adaptor B Block	LG 2072			Not Illustrated
*	Adaptor Galaxie	LG 2073			Not Illustrated
*	Adaptor Oldsmobile	LG 2074			Not Illustrated
*	Adaptor Chevrolet	LG 2075			Not Illustrated
*	Adaptor Indy Ford	LG 2076			Not Illustrated
*	Adaptor Chevrolet (MAG)	LG 2077			Not Illustrated
*	Adaptor Chevrolet Schiefer	LG 2078			Not Illustrated



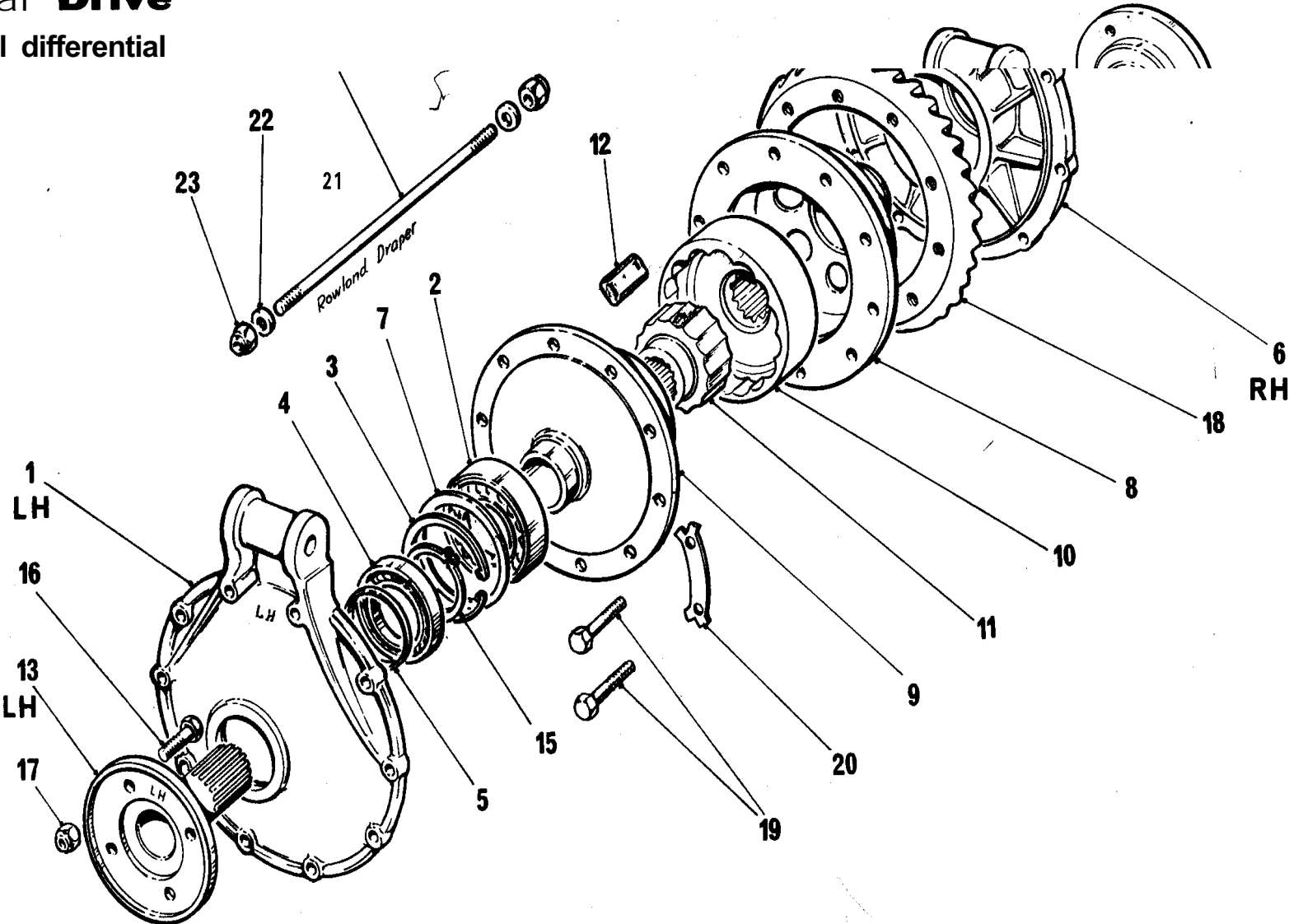
The Oil Pump

Spares List C

ILLUS. NO.	DESCRIPTION	PART NUMBER	QTY 5 Speed	QTY 4 Speed	REMARKS
✓C1	Side Plate (L.H.)	LG 205	1	1	Std
✓C2	Side Plate (L.H.)	205A	1	1	Lola Cars
✓C3	Bearing Diff Inner	DG G 202052	2	2	
✓C4	Circlip	LG 2053	2	2	
✓C5	Bearing Outer	LG 2054	2	2	
✓C6	Oil Seal	LG 2054	2	2	
✓C7	Side Plots (R.H.)	LG 206	1	1	Std
✓C8	Side Plate (R.H.)	LG 206A	1	1	Lola Cars
✓C9	Shims 3 to 25 Thou.	DG 2061	1	1	
✓C10	Outer Housing	LG 213	1	1	
✓C11	Plunger Carrier	LG 214	1	1	
✓C12	Outer Cam	LG 215	1	1	
✓C13	Inner Cam Track	LG 216	1	1	
✓C14	Plungers	LG 217	2	18	
✓C15	Drive Shaft 4.450 Detroit	218 RH	1	1	
✓C16	Circlip	LG 218A RH	1	1	
✓C17	Drive Shaft Bolt	LG 2193	2	2	
✓C18	Nyloc Nut 3/8"	FT 2196	a	a	
✓C19	Crown Wheel	See Sheet B			
✓C20	Crown Washers (Optional)	2211	10	10	
✓C21	Tie	FT 2212	5	5	
✓C22	Washer	262	2	2	
✓C23	Nyloc Nut	LG 2621	2	2	
		2196	2	2	

For Alternative Drive with 'Power-lok' Differential - See page 15

Standard Final **Drive**
with cam-and-pawl differential



Stripping the **Sub-assemblies**

DIFFERENTIAL

The following instructions apply to the Cam-and Pawl type Differential in standard LG500 and 600 Gearboxes. The alternative final drive with Powr-Lok differential is illustrated overleaf, and clearly shows the sequence of dismantling.

1. Bend back the tabs, remove the bolts and take off the crown wheel.
2. Remove in turn the outer housing, outer cam track and inner Cam' track.
3. Remove the eight plungers (**pawls**) from the **plunger** carrier.
4. Wash and examine for wear or damage, giving particular attention to plungers, and profiles of the cam tracks. Make certain **that:-**
5. The splines of the inner cam track are towards the drive shaft (11, diagram C).
6. New bolts and tabs are used for the crown wheel Tighten with a torque spanner to **75 lbs/ft.**

Re-assemble in reverse order to above.

FINAL DRIVE

Left-hand Side Plate

1. **Remove** the drive shaft circlip and knock out the shaft.

2. Support the plate on fire bricks and warm it, having first covered the oil seals with a block of metal for **protection.** The outer track of the differential bearing and the shims should now drop out.
3. Remove the large circlip which retains the side plate bearing and oil seal, so that both can be withdrawn.

Right-hand Side Plate

Follow the same procedure as above.

Re-assemble in reverse order **to** above fitting new oil seals if necessary.

OIL PUMP

This unit is extremely sturdy and simple in design. It operates at far below its maximum rating and is unlikely to suffer serious wear. To clean it and inspect gears and body for possible scoring, remove the four **allen** cap screws and take off the pump cap.

When te-assembling, make sure that the driving shaft is nearest the flat side of the cap. (Diagram E).

OIL FILTER

Snip the wire'. Unscrew the bung with an **allen** key. Withdraw the filter, wash and replace.

NOTES ON RE-ASSEMBLY TO THE MAIN CASE

Replace the units and sub-assemblies in the reverse order to which they were dismantled, with special attention to the **following:-**

1. Slide the oil pump half way home, then push the splined end of the shaft through the driven gear. Take care to replace the woodruff key and circlip. Slide the pump home and secure it from the back with the three **allen** cap screws, using a smear of locking fluid.
2. When replacing the filter bung, do not over-tighten or **you may** collapse the filter. It should be just possible to turn the filter, using slight hand pressure.
3. To replace the pinion, stand the casing on its end with bell housing on the bench. Drop the adjusting spacer onto the pinion head and slide in the pinion. Now warm up the case and drop the bearing over the pinion and into its housing. Replace the clamp plate, using new bolts and tab washers with a smear of locking fluid.

IMPORTANT: The bearing must be inserted with its filler slots upwards. Clamp bolts must not be proud of **the** clamp plate.

*C/W BOLT TORQUE - (WIRE LOCKED) 85 lb.ft.
" " " (TABS + LOCTITE) 75 lb.ft.*

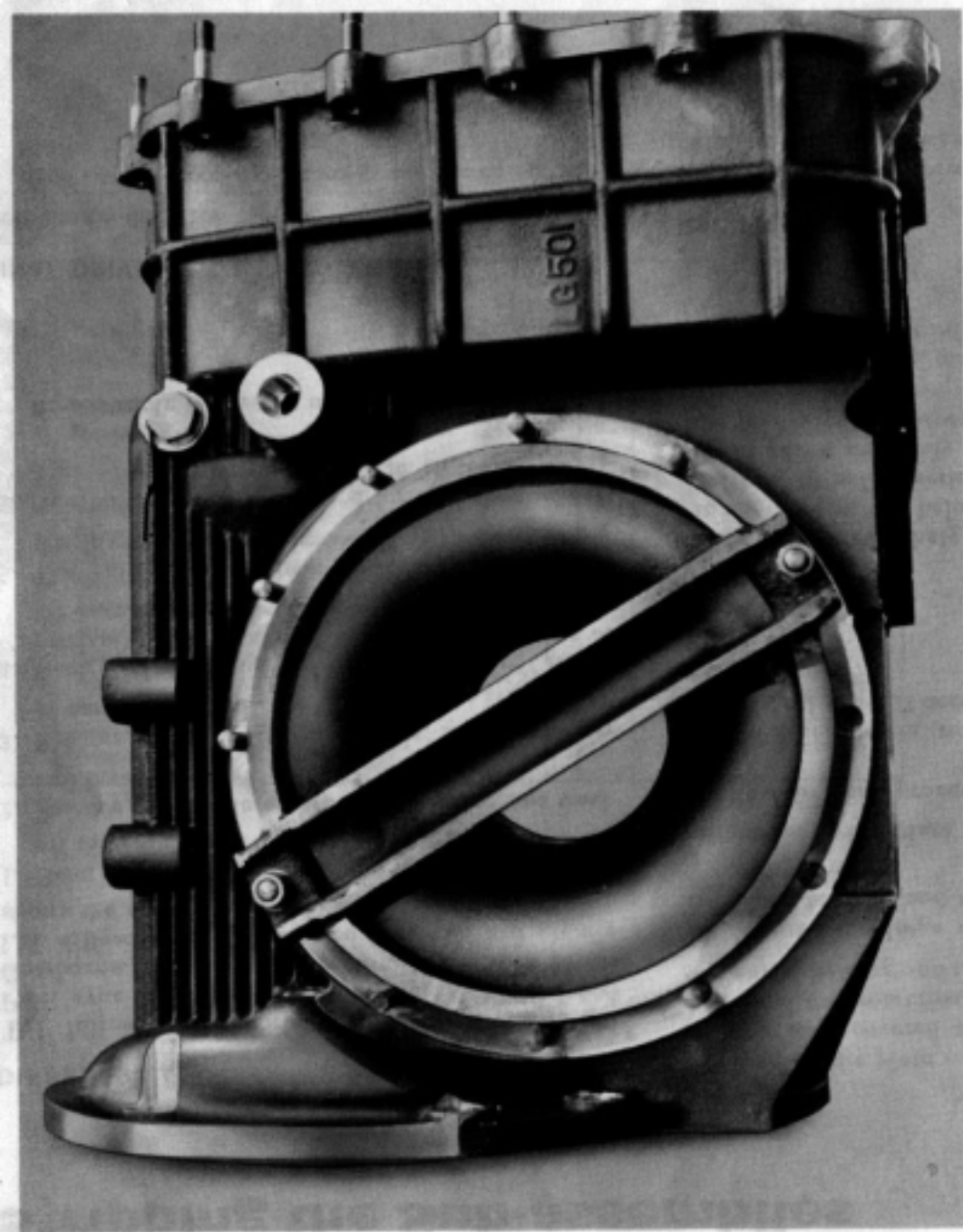


Fig. 3. The Hewland setting gauge in position

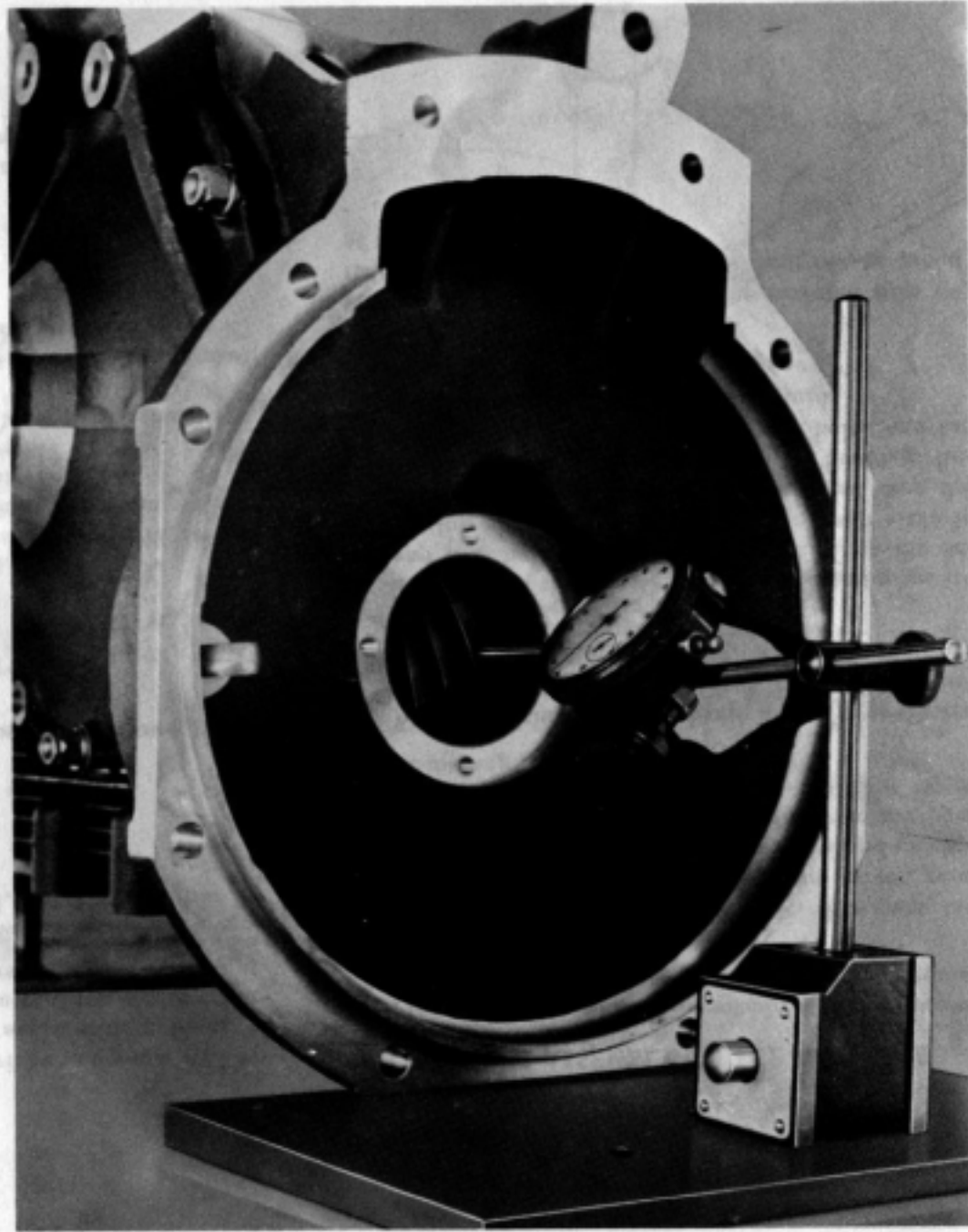


Fig. 4 How the dial recording micrometer is used to measure backlash

Fitting a new Crown Wheel and pinion

The crown wheel and pinion are supplied as a pair, precision matched and-lapped. Each-pair is individually tested and passed as perfect before leaving the factory, and neither part should ever be replaced without the other.

Setting up can be done in the usual way, using engineer's blue. A faster and more positive method, however, is to use the new **Hewland Setting Gauge**. Procedure is as follows:-

SETTING UP, USING THE HEWLAND SETTING GAUGE

This operation is carried out with the hubs and spacer on the pinion, and it is important that they should be pulled up tight with the pinion nut.

1. Assemble setting gauge to main case. (Fig. 3)
2. Place a $\frac{1}{2}$ " parallel bar across the pinion, as illustrated. Hold it flat and square with the pinion face. Measure the clearance between the bar and the setting gauge (Fig. 5). **Correct** clearance is etched on the pinion.
3. **Adjust** if necessary by substituting a thicker or thinner spacer. When satisfied, remove setting gauge. Renew clamp plate bolts and tab washers.

TO ADJUST THE PRE-LOAD

1. Assemble differential unit, using the new crown wheel and **solid dummy bearings** in place of the two inner differential bearings (2). The thickness of the shims is critical. If they have to be renewed, make sure they are replaced with shims of same thickness as the originals.
2. Assemble the differential unit and side plates to the main case. Bolt up, including tie bars, to normal tension.



Fig. 5 With pinion in the setting gauge, a feeler gauge is used to measure clearance.

3. **Now** turn the pinion by hand to test the pre-load. Adjust by means of shims until satisfactory.

NOTE: Turn the pinion with hubs removed. Using reasonable effort it should be possible to turn it by gripping the splines, but more effort will be needed with dummy bearings than with real ones. Make sure there is some evidence of backlash. Absence of backlash will give a false impression of pre-load.

TO ADJUST THE BACKLASH

For this operation you will require a post-mounted dial indicator with an extended probe (Fig. 4).

1. Remove the solid dummy bearings from the differential unit and replace them with dummy roller bearings. (Real bearings with increased tolerances for easy substitution).
2. Insert probe of, dial **indicator** through spigot housing until it touches one of the teeth of the crown wheel (Fig. 4). Note the reading on the dial indicator. Turn pinion by hand to rotate crown wheel, and take at least 12 readings. (14 readings are standard practice in our own workshops). Minimum reading should be **.004"**.
3. To increase or decrease backlash, change shims from one side of the differential to the other. **But** remember that, once the pre-load has been set, you can use only the shims that are already there. Continue to test until satisfactory.
4. Remove the side plates. Replace the dummy bearings with real bearings.

RE-ASSEMBLE AS FOLLOWS:

5. Press inner bearings onto differential assembly.
6. Warm up one side plate. Insert oil seal, **side-plate** bearing and circlip.
7. Press the drive shaft into the side plate and retain with circlip.
8. Insert shim or shims, and outer bearing track. Place a heavy weight on bearing to flatten out shims.
9. Repeat for the other side plate. After cooling, assemble one side plate to the main case. Complete the assembly of the differential and drive unit as described above.

ILLUS. NO.	DESCRIPTION	PART NUMBER	QTY	QTY	REMARKS
			5	4	
			per	speed	
D1	Diff Housing Salisbury Type	SLG 2131	1	1	
D2	cross Shaft	SLG 2132	2	2	
D3	Spacers	SLG 2133	2	2	
D4	Roll Pin	SLG 2134	1	1	
D5	Pinion Gear	SLG 2135	4	4	
D6	Side Gears	SLG 2136	2	2	
D7	Rings Side Gears	SLG 2137	2	2	
D8	Discs	SLG 2138	6	6	
D9	Clutch Plate Bevelled	SLG 2139	2	2	
D10	Clutch Plate	SLG 21310	6	6	
D11	Tab Washer	SLG 21311	4	4	
D12	Bolt	SLG 21312	8	8	
D13	Drive Shaft Metalastic LH	LG 219 LH	1	1	
D14	Drive Shaft Metalastic	LG 219 RH	1	1	

Spares List D

