ARIEL

THE MODERN MOTOR CYCLE

GEARBOX

BURMAN

TYPE 'GB'

OWNER'S GUIDE

PUBLISHED BY

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THE BURMAN GEARBOX
TYPE "GB"

DESCRIPTION:

Commencing January 1952, a new standard Gearbox was introduced and fitted to all models in the Ariel range and described as the Burman type "GB." The gearbox incorporates positive footchange mechanism and four speeds and operation of gear change and kickstarter assemblies are very similar to those of the previous Burman "BA" and "CP" types.

Location of the gearbox main case in the Motor Cycle frame is by the same method as adopted on previous models, i.e., being held between the right and left hand rear engine plates. The top fixing lug of the gearbox case is slotted and allows the box to be moved on the lower swivel lug to provide driving chain adjustment.

The clutch is identical to that previously fitted to the "BA" and "CP" gearboxes since 1936, but the operating arm or lever is located within the enclosed kickstarter end of the gearbox and adjustment provided by the inclusion of a simple sleeve nut arrangement located in a small cover plate on the outer face of the end cover.

Clutch cable adjustment is by way of a common adjuster and cable stop on top of the end cover for single and twin cylinder models, and for four cylinder models an adjuster is situated on the actual cable control at the handlebar end.

The exploded view of the complete gearbox and clutch in this booklet clearly indicates the general arrangement of the internal gear, kickstarter and footchange assemblies. Reference to the given part numbers in the list will provide a full description of each separate component part.

LUBRICATION:

Ordinary engine oil is recommended for lubrication of the complete box and a filler cap and an oil level plug are provided on the kickstarter end casing.

Oil code number or grade S.A.E. 50 to 60 of any reputable brand is suitable.

The oil level should be checked every 1,000 miles and "topped up" as necessary.

CLUTCH ADJUSTMENT:

Adjustment to the clutch plates and springs is rarely necessary and the spring plate tension is correct when the ends of the springs are just visible when viewed across the face of the spring plate. This setting provides ample pressure to ensure efficient clutch grip. If the clutch adjustment screws are tightened more it makes clutch withdrawal unnecessarily heavy. After adjustment see that the spring plate lifts equally, if not, the adjusting screws should be eased off on the low side or tightened on the high side until the plate is equally lifted.

The clutch operating lever within the kickstarter cover should be set to give up to $\frac{3}{16}$" clearance or free movement which can be felt for testing after removing the oil filler plug and exposing the lever.

To set the operating lever, loosen the small cover plate held by two screws on the face of the end cover and adjust the sleeve nut which can be turned complete with the plate, until the correct position is found to give the necessary clearance. Finally, take up all unnecessary slack in the control cable by means of the external adjuster but take care not to interfere with the free movement or clearance already given to the internal operating lever. Reference to the fully descriptive exploded view of the gearbox will readily assist operators to identify and adjust the clutch withdrawal assembly.

DISMANTLING THE CLUTCH ASSEMBLY.

CLUTCH PLATES:

Remove the clutch dome cover held by four screws and then undo the five spring retaining nuts projecting through the end spring plate. A slotted screwdriver is supplied in the tool kit for this purpose. The complete set of clutch plates can now be withdrawn from the housing. If clutch slip has taken place, carefully examine the condition of the cork or fabric inserts and replace with factory exchange plates if necessary. Care should be taken when reassembling to fit the plates in the correct order. The first plate to put in is a plain one then alternately a cork or fabric insert plate and a plain plate, finishing with a plain one. See also "clutch adjustment."

CLUTCH BODY AND SPROCKET:

After removing the clutch plates, undo the securing nut on the end of the mainshaft and pull off the clutch centre which is splined on the mainshaft sleeve. This leaves the clutch sprocket and outer clutch housing (carried on a needle roller bearing) in position on the shaft. To remove these parts, turn back the edges of the ring tab washer locking the six set bolts in the centre of the housing and take out the bolts; the outer housing is now free. To remove the sprocket, take off the outer half of the oilbath case when the sprocket, bearing cage and needle rollers can be slipped off the shaft. Note that the rollers are not held in the cage and can therefore drop out when the cage and sprocket are pulled off the shaft. When refitting these parts secure the needle rollers in the cage with a little grease. A plain washer fits **behind** the roller race and a tongued washer **outside** the race next to the clutch sprocket.

When reassembling be absolutely sure that the six set bolts are screwed right home and that they are locked in position by the circular tab washer. Also ensure that the mainshaft nut securing the clutch centre is tightened fully and the special lock washer is placed behind the nut.

DISMANTLING THE KICKSTARTER CASE END COVER.

Removing the K.S. case end cover enables examination to be made of the internal clutch operating lever and plunger and also exposes the complete K.S. and footchange mechanism as well as the speedometer spiral gear drive.

Before removing the end cover take out the oil drain plug and allow all oil to drain off.

Release the clutch cable adjuster sufficiently to allow the inner wire and nipple to be detached from the inner operating lever.

Next take off the nut securing the gear indicator cap and small coil spring enclosed on the end of the footchange cam barrel spindle. Then unscrew the six cheese headed screws which secure the outer K.S. cover to the inner K.S. case, noting carefully the position of the three different lengths of screws used.

Next draw the cover forward approximately $\frac{1}{2}$" taking care to hold securely the K.S. crank and pedal in the vertical position.

Tie the K.S. crank to the footchange lever in order to prevent the K.S. spring from unwinding.

The K.S. end cover can now be fully removed complete with K.S. quadrant and spring and also part of the footchange operating assembly.

Note the position of the main RETURN SPRING for the footchange control quadrant. This is the large "U" shaped flat steel spring working together with the cam cylinder.

After fitting any necessary replacement parts and cleansing, the end cover can be replaced by reversing the procedure, taking care to replace the paper joint washer and tightening all screws before refilling the case with oil. Be sure to replace correctly the small coil spring and gear indicator cap and nut.

DISMANTLING THE KICKSTARTER CASE OR BACK PLATE.

After removing the K.S. outer end cover, take off the mainshaft end nut, K.S. driving ratchet and pinion and the small coil spring and sleeve for pinion.

Next dismantle the gear selector spindle split pins and take out the footchange cam cylinder together with the spring plunger which it will be noticed makes contact with the various indentations on the face of the cylinder. Take out the clutch operating plunger and rod, noting the method of engagement between the plunger and the operating lever which will still be attached to the K.S. case outer cover. Also note the position of the small steel ball between clutch rod and plunger.

Remove the four cheese headed screws securing the inner K.S. case to the main gearbox shell, noting the position of the two different lengths of screws, and withdraw the case, leaving the internal gear assembly, etc., in position in the main housing or shell.

It is possible to remove the K.S. rear half case complete with the internal gear assembly, selector forks, etc., all left in position, by taking off the complete clutch as previously described but also removing the splined driving sleeve fitted to the clutch end of the mainshaft.

Without dismantling the K.S. ratchet pinion assembly the four securing screws are taken out and the rear half case can be pulled away with gear assembly attached. This method is the most satisfactory way of making a close up examination of the gear assembly.

Reference to the exploded view should be made when dismantling and reassembling and the correct order of gear assembly, part numbers and titles, carefully noted. When refitting the footchange cam assembly, place in position the ball ended plunger and small coil spring so that the ball end engages with any one of the indentations on the rear face of the cam cylinder. Make

quite certain that the paper joint washer is replaced between the K.S. case and the main shell and that the four securing screws are well tightened.

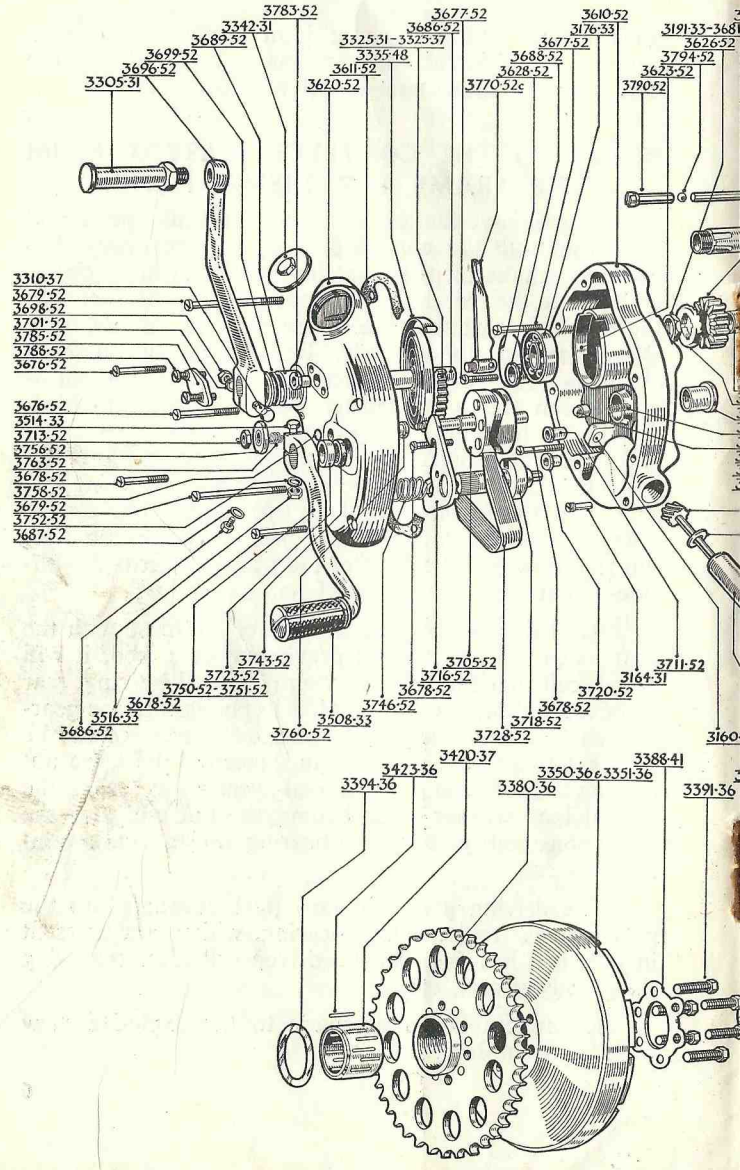
REMOVING THE COMPLETE GEARBOX FROM THE FRAME FOR DISMANTLING.

First remove the left-hand footrest, brake pedal and rod, dismantle the complete clutch as previously described and take off the front half of the primary chaincase. Note the small round paper joint washer between the two halves of the case at the footrest circular boss. Disconnect the clutch cable. Remove the top gearbox clamp bolt—$\frac{1}{2}$" dia.—towards the offside—righthand—and loosen the box adjuster bolt and locknut. Next release the tie bolts through the rear engine plates and seat tube frame lugs and also through the engine plates and crankcase lugs to give the gearbox clamping lug some play or clearance between the plates. Remove the lower gearbox pivot or swivel bolt and the complete box can now be taken out of the frame towards the offside—righthand—of the machine.

After dismantling the K.S. cover and case with the gear assembly attached as previously described, it will be noticed that the main driving gear ball bearing, rear sprocket and oil seal, will be left in position in the gearbox shell or main case. To remove these, secure the sprocket to prevent rotation and unscrew the large nut locking the sprocket to the driving gear sleeve. Note the special lock washer fitted behind the nut and also the order of assembly of the ball bearing, oil seal and retaining washers.

The driving gear will now push through into the gearbox case and the ball bearing, which is a press fit in the shell housing, can be driven out after removing the gland oil seal, etc.

Reference should be made to the exploded view when reassembling.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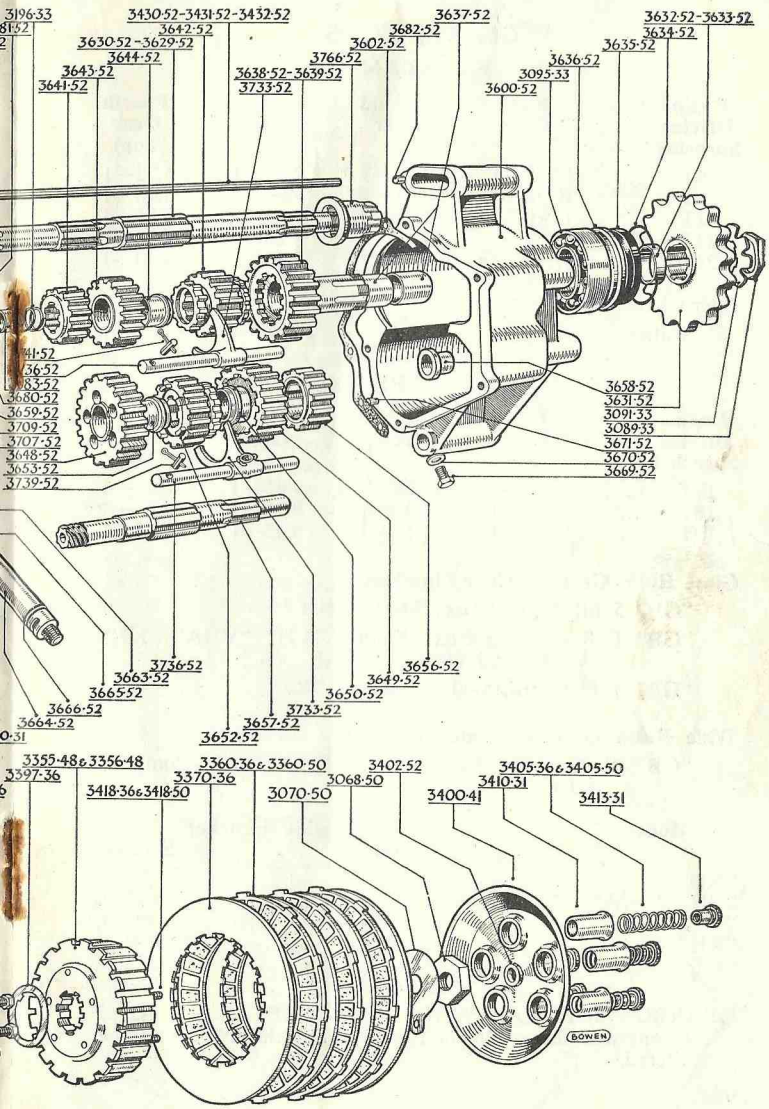
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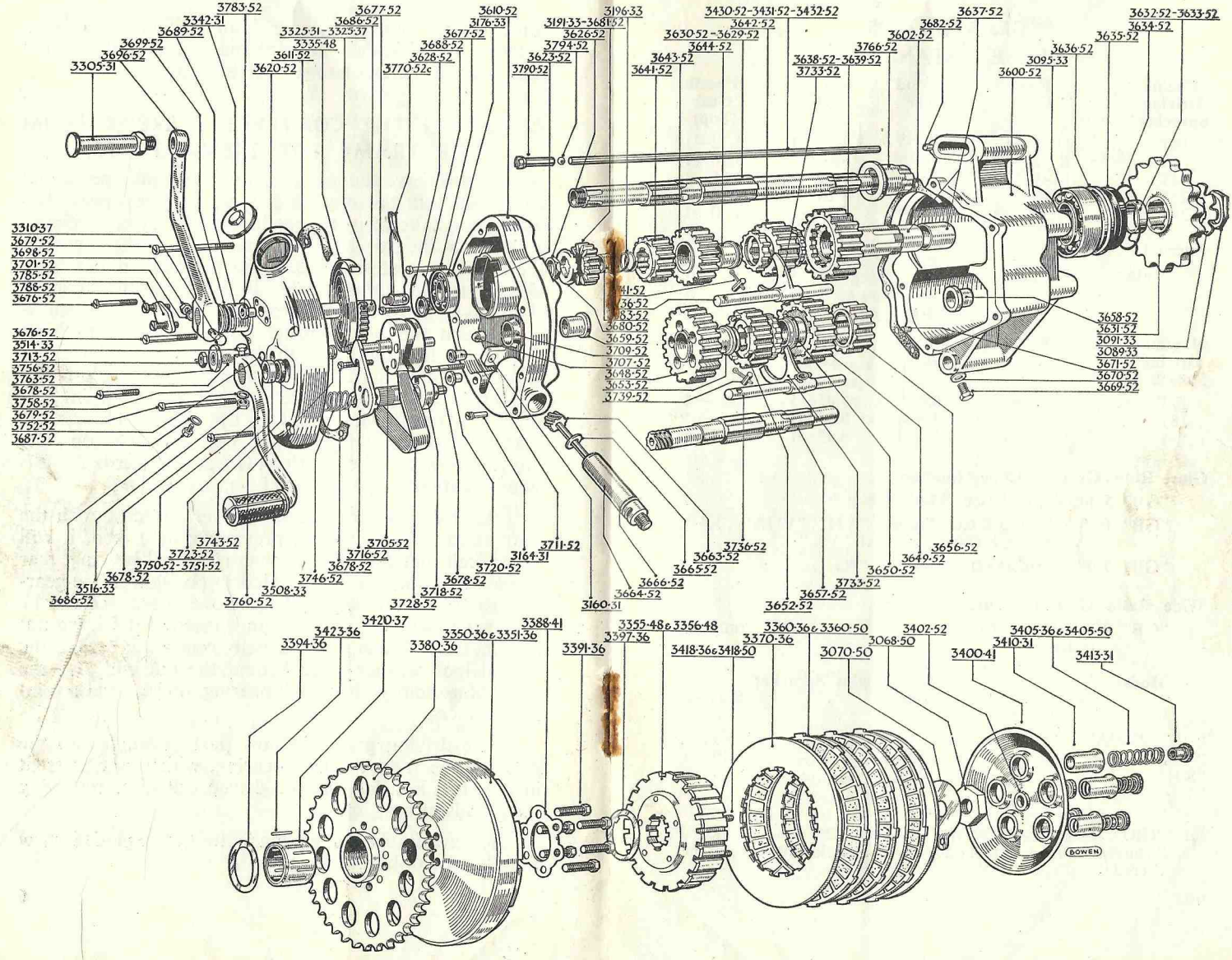
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BOWEN

GEAR RATIOS

CLOSE — STANDARD

Engine Driving Sprocket	First Gear	Second Gear	Third Gear	Fourth Gear (Top)
19T ...	15.15—1	9.72—1	7.50—1	5.72—1
21T ...	13.72—1	8.81—1	6.77—1	5.18—1
22T ...	13.10—1	8.42—1	6.47—1	4.95—1
23T ...	12.55—1	8.05—1	6.20—1	4.74—1
24T ...	11.92—1	7.65—1	5.88—1	4.50—1
Internal Gearbox Ratios	2.65—1	1.70—1	1.308—1	1—1

WIDE — SPECIAL

Engine Driving Sprocket	First Gear	Second Gear	Third Gear	Fourth Gear (Top)
17T ...	20.0 —1	13.05—1	9.45—1	6.5 —1
18T ...	18.7 —1	12.3 —1	8.95—1	6.0 —1
19T ...	17.9 —1	11.5 —1	8.45—1	5.75—1

Close Ratio Gearbox Code Numbers:

"GB" 5 fitted to 350 c.c. Model "NH."

"GB" 6 fitted to 500 c.c. Models "VH" "VHA" "KH" "VCH" and 600 c.c. Model "VB."

"GB" 7 fitted to 1,000 c.c. Model "4G."

Wide Ratio Gearbox Code Number:

"GB" 10 fitted to Competition Model "VCH" only to order.

Model	Engine Sprocket Solo	Sidecar
"NH"	19T ...	—
"VH" "VHA"	23T ...	19T
"VB"	22T ...	19T
"KH"	21T ...	19T
"4G"	24T ...	22T
"VCH"	As ordered ...	—

GEARBOX and REAR WHEEL SPROCKETS are standard throughout the complete range of models and cannot be altered.

Description of Part.

Makers of Gearbox:
Messrs. Burman & Sons Ltd.,
Wychall Lane,
Kings Norton,
Birmingham, 30.

1952 Gearbox parts, type G.B.—

G.B.5. gearbox fitted 2 plate clutch assembly **350 c.c. model.**

G.B.6. gearbox fitted 3 plate clutch assembly **500 c.c. models.**

*G.B.7. gearbox fitted 3 plate clutch assembly **1,000 c.c. "4G" model.**

G.B.10. gearbox (wide ratio) 2 or 3 plate clutch assembly fitted **"V.C.H." model** only.

Where parts are exclusive to the G.B.10 gearbox only these parts are listed on Page No. 13, other parts are as fitted to the G.B.5 and G.B.6 gearbox.

*Where parts differ from those fitted to 350 c.c. and 500 c.c. models these are listed on Page No. 13.

Part Nos.		No. Per Set
3600-52	Gearbox shell only	1
3602-52	Gearbox joint washer	1
3610-52	Kickstarter case	1
3611-52	Kickstarter case joint washer	1
3620-52	Kickstarter case cover	1
3623-52	Kickstarter case cover locating piece ...	1
3626-52	Mainshaft nut (k/s end)	1
3176-33	Mainshaft bearing	1
3628-52	Bearing retaining ring for mainshaft bearing	1
3630-52	Mainshaft	1
3631-52	Driving sprocket, $\frac{5}{8}'' \times \frac{1}{8}''$, 19.T	1
3632-52	Sprocket spacing collar	1
3095-33	Driving gear bearing	1
3634-52	Bearing retaining ring (Split)	1
3635-52	Driving gear oil seal	1
3636-52	Driving gear oil seal housing	1
3089-33	Driving gear nut	1
3091-33	Driving gear nut lock washer	1
3637-52	Driving gear bush ... ... set of	2
3638-52	Driving gear with bush, 28.T	1
3641-52	First gear mainshaft, 17.T	1
3642-52	Second gear mainshaft, 22.T	1
3643-52	Third gear mainshaft, 25.T	1

Part Nos.		No. Per Set
3644-52	Third gear mainshaft bush	1
3648-52	First gear layshaft, 29.T	1
3649-52	Second gear layshaft, 24.T	1
3650-52	Second gear layshaft bush	1
3652-52	Third gear layshaft, 21.T	1
3653-52	First gear layshaft bush	1
3656-52	Layshaft pinion, 18.T	1
3657-52	Layshaft	1
3658-52	Layshaft bush (clutch end)	1
3659-52	Layshaft bush (k/s end)	1
3660-52	Layshaft bush dowel	2
3661-52	Layshaft cover washer	1
3663-52	Speedometer spindle	11
3664-52	Speedometer spindle bush	1
3665-52	Speedometer thrust washer	1
3160-31	Speedometer location button	1
3666-52	Speedometer spindle bush oil seal	1
3164-31	Speedometer spindle bush grub screw ...	1
3342-31	Gearbox filler plug	1
3670-52	Gearbox drain plug washer	1
3669-52	Gearbox drain plug	1
3671-52	Gearbox and k/s case dowel	1
3676-52	Screw, k/s cover to k/s case	2
3677-52	Screw, k/s case to gearbox	2
3678-52	Screw, k/s case to gearbox and k/s cover to k/s case	4
3679-52	Screw, k/s cover to gearbox	2
3682-52	Gearbox adjuster pivot pin	1
3686-52	Oil level plug	1
3687-52	Oil level plug washer	1
3068-50	Mainshaft nut (clutch end)	1
3070-50	Mainshaft nut lockwasher (clutch end) ...	1
3675-52	Dowel, k/s case cover locating piece ...	2
3680-52	Driving ratchet	1
3191-33	Ratchet pinion	1
3196-33	Ratchet pinion spring	1
3683-52	Ratchet pinion bush	1
3325-31	Kickstarter quadrant	1
3686-52	Kickstarter quadrant spindle	1
3688-52	Kickstarter spindle bush (inner)	1
3689-52	Kickstarter spindle bush (outer)	1
3335-48	Kickstarter spring	1
3690-52	Kickstarter spring pin	1
3696-52	Kickstarter lever	1
3305-31	Kickstarter lever pedal	1
3310-37	Kickstarter lever pinch bolt	1
3698-52	Kickstarter lever pinch bolt nut	1

Part Nos.		No. Per Set
3699-52	Kickstarter spindle oil seal	1
3701-52	Kickstarter lever bolt washer	1
3705-52	Cam assembly	1
3707-52	Cam plunger	1
3709-52	Cam plunger spring	1
3711-52	Cam spindle bush (inner)	1
3713-52	Cam spindle nut, retaining indicator ...	1
3716-52	Quadrant and drive peg for control spindle	1
3718-52	Quadrant spindle	1
3720-52	Quadrant spindle bush (inner)	1
3723-52	Quadrant spindle bush (outer)	1
3725-52	Quadrant spindle cover washer	1
3728-52	Main return spring for control quadrant ...	1
3733-52	Selector fork	2
3736-52	Selector fork spindle	2
3738-52	Selector spindle cover washer	2
3739-52	Selector spindle peg	4
3741-52	Selector spindle cotter pin	4
3743-52	Selector spindle oil seal	1
3746-52	Return spring (secondary) (coil)	1
3750-52	Footchange lever	1
3514-33	Footchange lever bolt	1
3516-33	Footchange lever bolt nut	1
3752-52	Footchange lever bolt nut washer	1
3508-33	Footchange lever rubber	1
3754-52	Footchange lever rubber fixing pin ...	1
3756-52	Footchange indicator	1
3758-52	Footchange indicator oil seal	1
3760-52	Cam spindle bush (outer)	1
3763-52	Indicator oil seal spring	1
3766-52	Mainshaft sleeve	1
3770-52C	Clutch operating lever	1
3783-52	Clutch operating lever adjusting sleeve ...	1
3785-52	Adjusting sleeve cap	1
3788-52	Adjusting sleeve cap screw	2
3790-52	Clutch operating plunger	1
3794-52	Clutch operating plunger ball, $\frac{5}{16}$" ...	1
	Clutch parts.	
3350-36	Clutch case "VH" "VB" "VHA" "KH" and "4G" (three plate)	1
3355-48	Clutch centre "VH" "VB" "VHA" "KH" and "4G" (three plate)	1
3351-36	Clutch case "VCH" "NH" (two plate) ...	1
3356-48	Clutch centre "VCH" "NH" (two plate) ...	1
3360-36	Clutch cork plate fitted cork inserts "NH" "VH" "VB" "VHA" "4G" and "KH"	2 or 3
3365-36	Clutch corks	

Part Nos.		No. Per Set
3370-36	Clutch plain plate "VCH" "NH" models ...	3
	"KH" "VH" "VB" "VHA" and "4G" ...	4
3380-36	Chainwheel ($\frac{1}{2}$" × .305 × 44T)	1
3388-41	Chainwheel set pin lock washer	1
3391-36	Chainwheel set pin	6
3394-36	Thrust washer (inner)	1
3397-36	Thrust washer (outer)	1
3400-41	Clutch spring plate	1
3402-52	Clutch spring plate thrust cup	1
3405-36	Clutch spring	5
3410-31	Clutch spring cup	5
3413-31	Clutch spring adjusting nut	5
3417-36	Clutch spring stud (3 plate)	5
3418-50	Clutch spring stud (2 plate)	5
3420-37	Roller cage	1
3423-36	Needle rollers ... ... set of	12
3430-52	Clutch operating rod "VB" "VH" "VHA"	1
3431-52	Clutch operating rod "NH" "VCH" ...	1
	*Note.—Parts listed below are fitted to G.B.7 gearbox, model "4G" only. Other G.B.7 parts are as fitted to the G.B.5 and G.B.6 gearbox.	
3629-52	Mainshaft	1
3633-52	Sprocket spacing collar	1
3639-52	Driving gear with bush, 28T	1
3681-52	Ratchet pinion	1
3325-37	Kickstarter quadrant	1
3751-52	Footchange lever	1
3432-52	Clutch operating rod	1
	Note.—The parts listed below are fitted to model "VCH" G.B.10 wide ratio gearbox only, other parts are as those fitted to the G.B.5 and G.B.6 gearbox.	
3645-52	Second gear mainshaft, 21T	1
3647-52	First gear layshaft, 30T	1
3655-52	Layshaft small gear, 17T	1
3639-52	Driving gear, 30T	1
3360-50	Clutch plate, fitted Neoprene inserts ...	2
3365-50	Neoprene inserts	
3405-50	Clutch spring	5
3300-52	Kickstarter lever, folding type	1
3305-52	Kickstarter lever pedal	1
3309-52	Kickstarter lever spring washer	1
3312-52	Kickstarter lever pedal nut	1
3315-52	Kickstarter lever pedal washer (plain) ...	1

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Missing