

S.E. 4

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AMENDMENT NO. 164 JULY 1983

COMPONENTS	WORK TO BE CARRIED OUT	REMARKS
<u>GEARBOX</u>	<u>Stripping and Cleaning</u>  Rough clean. Completely strip gearbox.  Sub-components to receive additional cleaning following stripping.	Note: Clutch plates to be kept in sets and in correct order, for possible re-use.
<u>OUTER CASING</u>	Examine visually and crack detect suspect areas by dye penetrant method.  Repair by welding or "Metallock" method, except at mounting brackets areas, or renew as necessary.	When crack detecting, special attention must be given to areas surrounding mount bracket locations and at point between bottom of front cover flange face and bottom cover.
<u>MOUNTING BRACKET STUDS AND DOWELS</u>	Examine oil filler plug hole threads and recondition as necessary.  Examine studs visually for damage and by light hammer tap for security.  All damage and/or insecure studs shall be removed and scrapped. Examine the threaded hole for damage and check it dimensionally using a plug thread gauge. If damaged, or the NO GO section of the gauge enters the hole, the thread shall be restored using a 'Helicoil insert' secured with Loctite 270.  Where a previously 'Helicoiled' thread is unacceptable, the case is to be considered for scrapping. When this is not possible, the hole shall be filled with weld, drilled, tapped and a 'Helicoil insert' fitted.  Fit new studs using loctite 270 and check that the dowels are free from damage and secure.	See Data Section Item 1.

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COMPONENT	WORK TO BE CARRIED OUT	REMARKS
Filler Plug and Breather Assembly	Examine, renew plug as necessary.	Ensure breather holes are clear.
Inspection Cover	Check for level, straighten or renew as necessary.	
Mounting Brackets	Check suspension bolt holes, weld and machine as necessary. (Fit new joint to combined cover and bracket type).	See Data Section Item 2.
Adaptor Dipstick	Examine and ensure security to cover; renew as necessary.	
Dipstick Assembly	Examine, renew as necessary.	Blue anneal from tip to 2 in (approx.) above full mark.

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COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>FILLER PLUG AND BREATHER ASSEMBLY</u>	Examine, renew plug as necessary.	Ensure breather holes are clear.
<u>INSPECTION COVER</u>	Check for level, straighten or renew as necessary.	
<u>MOUNTING BRACKETS</u>	Check suspension bolt holes, weld and machine as necessary.  For combined cover and bracket only - apply a 3-4 mm diameter bead of Silicone sealant to the gearbox casing, sealing face.  Assemble the cover/bracket to the gearbox casing within 10 mins and DO NOT fit a cork gasket.	See Data Section Item 2.  Approved Silicone sealants are: LOCTITE silicone Sealant Cat No 7/60344 and HERMATITE Silicone RTV Cat No 7/60188
<u>ADAPTOR DIPSTICK</u>	Examine and ensure security in cover; renew as necessary.	
<u>DIPSTICK ASSEMBLY</u>	Examine, renew as necessary.	Blue anneal from tip to 2 in (approx) above full mark.

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COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>OUTER CASING</u> (Continued)		
Tail Pins (Automatic Adjusters)	Examine and ensure security in casing; renew as necessary.	See Data Section Item 3.
Eyebolts (Lifting)	Examine for security in casing; repair or renew as necessary.	
Blanking Plate	Examine for Security.	
<u>BASE PLATE</u>		
	Examine visually and crack detect suspect areas by dyepenetrant method; recondition or renew as necessary. Examine lubricating oil drain plug hole threads; recondition as necessary. Renew joint washer.	
Centraliser Stops	Examine, and check security in base plate; repair or renew as necessary.	
<u>LINKAGE (INTERNAL AND EXTERNAL BRAKE BANDS)</u>		
Bracket for External Band Hooks and Centraliser	Examine for wear, renew as necessary.	See Data Section Item 4.
Bracket for Internal Band Links and Centraliser	Examine for wear, renew as necessary.	See Data Section Item 5.
External Brake Hook Complete, 1st and 3rd Speeds - Front and Rear	Examine pin holes for wear and plates for security. Re-rivet plates or renew hook as necessary.	See Data Section Item 6.
External Brake Hook Complete, 2nd Speed - Rear	Examine pin holes for wear and plate for security. Re-rivet plate or renew hook as necessary.	See Data Section Item 6.
Centraliser Springs	Check spring length, renew as necessary.	See Data Section Item 7.

COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>LINKAGE (INTERNAL AND EXTERNAL BRAKE BANDS) (Continued)</u>		
Eyebolt and Centraliser Pins, Left and Right Hand	Examine for wear, renew as necessary.	See Data Section Items 8 and 9.
Centralisers	Examine for wear, renew as necessary.	See Data Section Item 10.
Internal Band Links and Pins	Examine link pin holes and pins for wear, renew items as necessary.	See Data Section Item 11.
<u>CYLINDER BLOCK ASSEMBLY</u>		
Cylinder Block	Examine cylinder bores and bolt hole threads; repair or renew block as necessary. Renew joint (Cylinder Block to Baseplate).	See Data Section Item 12.
Pistons - 1st, 2nd and 3rd Speeds	Examine, renew as necessary.	
Seals (Piston)	Renew.	
Retaining Rings	Renew.	
Springs - 1st, 2nd and 3rd Speeds	Check spring length, renew as necessary.	See Data Section Item 13. Ensure pistons are fitted with correct springs.
Base (Bottom Cover)	Check for level, straighten or renew as necessary. Renew joints.	
Abutment (Air Restrictor Valve - 1st, 2nd and 3rd Speeds)	Examine items, renew assembly as necessary.	Ensure all air holes are clear. Re-wire all bolt heads.

COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>CYLINDER BLOCK ASSEMBLY (Continued)</u>		
Operating Strut and Pin	Examine pin, pin holes and spherical seat for wear. Renew as necessary.	See Data Section Item 14.
Spring Retainer Plate	Examine, renew as necessary.  Test assembly by applying 100 lb/in <sup>2</sup> air pressure to 1st, 2nd and 3rd speed pistons in turn and checking for air leakage. No leakage is permissible.	
<u>BRAKE BANDS AND LININGS - 1st, 2nd AND 3rd SPEEDS</u>		
Steel Band (Internal)	Examine and check for permanent set by measuring the 'Free Gap' Crack detect by magnetic particle method - Renew any found cracked.	See Data Section 15.  Special attention to be given to the area of the anchor lugs.
	Check size and conditions of rivet holes	See Data Section 15
Steel Band (External)	Examine and check for permanent set by measuring the 'Free Gap'  Check side plates for wear and rivets for security; re-rivet plates or renew items as necessary check size and condition of lining attachment rivet holes	See Data Section 15.  See Data Section 15
Linings (Internal and External)	Renew.	See Data Section Item 16. When riveting, ensure close fit of lining to steel band is maintained.
Automatic Adjuster Screw and Locknut	Examine, renew items as necessary.	See Data Section Item 17.
<u>BRAKE BAND ADJUSTING LINKAGE</u>		
Pull Rods, Pins and Adjuster Nuts (Automatic)	Examine, renew items as necessary.	See Data Section Item 18. Ensure adjuster nuts run easily on the pull rods throughout full length of thread.
Adjuster Table and Thrust Pad (Automatic)	Examine, and check security of spring locating pin; renew items as necessary.	



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COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>BRAKE BAND ADJUSTING LINKAGE (Continued)</u>		
Adjuster Ring (Automatic) Striking Plate)	Examine, renew as necessary.	Special attention to be given to striking edge for wear and security of spring locating pin.
Adjuster Spring (Automatic)	Renew.	Ensure 'interference push' fit exists between spring bore and exterior of adjuster nut.
Cam Plates (Operating Levers)	Examine pinholes and inner faces for wear. Weld and machine, or renew, as necessary.	See Data Section. Item 19. Special attention must be given to condition of inner faces.
Bush	Examine bore for wear, renew as necessary.	See Data Section Item 20.
Cams (Needle Roller Assembly)	Examine, renew assemblies as necessary.	
<u>REAR COVER ASSEMBLY (OUTPUT)</u>		
Rear Cover	Examine for damage, renew as necessary. Remove wear on the abutment face by machining and fit shims to give the correct clearance.	See data section item 23A.
Bearing Sleeve	Examine, renew as necessary.	See Data Section Item 22. Ensure that the bearing is a good fit in the sleeve.
Bearings	Examine, renew as necessary.	
Oil Seal and Housing	Examine housing and repair or renew as necessary. Renew oil seal.	See Data Section Item 23. Pack grease between seal lips on assembly.

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COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>FRONT COVER ASSEMBLY (INPUT)</u>		
Front Cover	Examine visually and crack detect suspect areas by dye penetrant method. Weld and machine, or renew, as necessary. Check condition of oil pump gear housing and studs, repair or renew as necessary.	See Data Section Item 24.
Cylinder Liner, 4th Speed	Examine for fractures and wear, renew as necessary.	See Data Section Item 25.
Pistons, Clutch, 4th Speed	Examine, renew as necessary.	See Data Section Item 26.
Springs (for Clutch Piston)	Examine and check spring length; renew as necessary.	See Data Section Item 27.
Seals (Piston)	Renew.	
Seal Retaining Rings, 4th Speed	Renew.	
Air Cylinder Cover Plates, 4th Speed	Examine joint face and bolt hole threads. Renew plates as necessary, renew joint.	Ensure air holes are clear.
Bearing Liner (for Front Cover)	Examine stud holes for condition and flange face for truth. Renew as necessary.	See Data Section Item 28. Ensure the bearing is a good fit in the sleeve. Note: During assembly, the flat on the flange to be positioned adjacent to oil pump housing.
Bearing (Input)	Examine, renew as necessary.	
Oil Seal and Housing	Examine housing and renew as necessary. Renew oil seal.	See Data Section Item 29. Note: During assembly, the flat on the housing is to be positioned adjacent to the oil pump housing. Pack grease between seal lips on assembly.
Oil Pump Cover with Plug	Examine flange faces and adaptor hole threads. Renew as necessary.	Following assembly, wire lock the securing bolts.

COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>FRONT COVER ASSEMBLY (INPUT) (Continued)</u>		
Adaptor (Oil Pump Cover and Bonded Seal)	Examine, renew as necessary. Renew seal joint.	Ensure oil hole is clear.
Banjo Bolt and Union (Lubricating Oil)	Examine threads and joint faces. Renew items as necessary. Renew joint washers.	Ensure oil feed holes are clear.
Pump Gear (Driven) and Shaft	Examine gear teeth, bore of gear and shaft. Renew items as necessary.	See Data Section Item 30
Pump Gear and Driving Shaft	Examine gear teeth, shaft, thread, key and keyway. Renew circlip, renew other items as necessary.	See Data Section Item 31
Pump Gear (Intermediate)	Examine gear teeth, bore and keyway. Renew as necessary.	See Data Section Item 32
Pipes, Air Feed, and flanges	Examine and check security of elbow flanges to pipes. Recondition or renew as necessary.	Ensure all air feed holes are clear.
<u>CLUTCH ASSEMBLY 4TH SPEED</u>		
Clutch Actuation Member (Sliding Panel)	Examine and renew as necessary. Check condition and security of the front plate, re-rivet or renew plate as necessary. Remove wear on the bearing abutment face by machining and fit shims to give the correct clearance.	See Data Section Item 33 Ensure the bearing is a good fit on the sliding panel. See Data Section Item 33A
Bearing (Sliding Panel)	Examine and renew as necessary.	
Clutch Thrust Ring	Examine piston stem locating holes for wear and ensure that the bearing is an 'interference push' fit within the thrust ring. Renew as necessary.	See Data Section Item 34
Clutch Return Spring	Examine, and check for length; renew as necessary.	See Data Section Item 35

COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>CLUTCH ASSEMBLY, 4th SPEED (Continued)</u>		
Clutch Plates (Driven)	Examine gear teeth and surfaces for wear, check plates for distortion. Renew as necessary, using plates BR Cat. No. 15/9055 (complete set).	See Data Section Item 36.
Clutch Plates (Driver)	Examine gear teeth and surfaces for wear, check plates for distortion. Renew as necessary, using plate BR Cat. No. 15/9055 (complete set).	See Data Section Item 36.
Abutment Washer	Examine, renew as necessary.	
Oil Pump Driving Gear	Examine gear teeth, keyway and oil muff location. Renew as necessary.	See Data Section Item 37.
Oil Muff	Check bore for wear. Renew as necessary.	See Data Section Item 38. Ensure oil hole is clear.
Bracket for Oil Muff	Examine, and check security on front cover. Renew as necessary.	Ensure oil hole is clear.
<u>INPUT SHAFT ASSEMBLY</u>		
Input Shaft	Check alignment of shaft between centres. Examine splines, flange, keyway and end thread (Coupling Retaining) for condition; size journal and check condition of surfaces. Recondition or renew shaft as necessary. Reclaim the sealing area if grooved as in Appendix D.	See Data Section Item 39. Ensure all oilways are clear.
Input Coupling	Examine location for oil seal, flange face and holes, internal splines and pulley grooves. Reclaim or renew as necessary. When reassembling old type coupling, thoroughly clean and degrease the shaft and coupling splines. Apply Loctite type LT270 (BR Cat. No. 7/60352) to the splines. Then continue with assembly, tightening input shaft nut to 350-400 lbs. f. ft.	See Data Section Item 40.  Input shaft (15/9046, 15/9047) and coupling (15/95069) do not require Loctite when reassembling
Washer (Special)	Examine, renew as necessary.	
'0' Ring	Renew.	
Nut (Special)	Examine, renew as necessary.	

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COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>CLUTCH ASSEMBLY, 4th SPEED (Continued)</u>		
Input Coupling	Examine location for oil seal, flange face and holes, internal splines and pulley grooves. Reclaim or renew as necessary. When reassembling old type coupling, thoroughly clean and degrease the shaft and coupling splines. Apply Loctite type LT270 (BR Cat No. 7/60352) to the splines. Then continue with assembly, tightening input shaft nut to 350-400 lbs f ft.	See Data Section Item 40.  Input shaft (15/9046, 15/9047) and coupling (15/95069) do not require Loctite when reassembling
Washer (Special)	Examine, renew as necessary.	
'O' Ring	Renew.	
Nut (Special)	Examine, renew as necessary.	

COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>OUTPUT SHAFT ASSEMBLY</u>		
Brake Drum, 1st Speed	Examine gear teeth and ribbing; crack detect by magnetic method. Renew as necessary.	See Data Section Item 41. Ensure the ribbed portion has not 'closed in'.
Output Shaft	Examine keyways, coupling taper, end thread and flange face. Recondition or renew shaft as necessary. Reclaim the sealing area if grooved as in Appendix D.	See Data Section Item 42.
Output Coupling	Examine oil seal surface, keyway, flange face, internal taper, bolt holes and pulley grooves. Renew or reclaim coupling as necessary; lap coupling to output shaft as necessary.	See Data Section Item 43. See Appendix 'C' for the fitting of output coupling to shaft
Nut (Special) (Driven Shaft)	Examine, renew as necessary.	
Washer (Special) (Driven Shaft)	Examine, renew as necessary.	
Locknut (Special)	Examine, renew as necessary.	
Locking Washer	Renew.	
Oil Thrower (Output)	Examine, renew as necessary.	
Washer (Oil Pump) (Outer)	Examine, renew as necessary.	
Oil Pump Eccentric (Rear)	Examine key and external surface for wear. Renew as necessary.	See Data Section Item 44. Ensure security of eccentric on output shaft, and that oilway is clear.
Lubricating Oil Non Return Valve (Output)	Examine ball valve, valve body and washer; renew items as necessary.	

COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>OUTPUT SHAFT ASSEMBLY</u> (Continued)		
Oil Pump Oscillating Cylinder (Rear)	Examine externally and internally for wear. Renew as necessary.	See Data Section Item 45. Ensure oilways are clear.
Oil Pump Plunger	Examine internal bore (relative to eccentric housing) and external diameter of plunger. Renew as necessary.	See Data Section Item 46. Ensure oilways are clear and that the oil holes line up.
<u>LUBRICATING OIL FILTER</u>		
Outer Casing	Strip and clean. Examine for damage, renew as necessary. Renew bottom seal (under bolt head).	
Top Cover (Filter Head)	Examine visually for fractures, renew as necessary. Renew seal.	
Element	Renew	
Relief Valve (Retaining Body)	Remove from cover and examine seat, ball and spring. Renew items as necessary.	
Centre Bolt	Examine thread and circlip. Renew items as necessary.	
Gasket (Seal, Upper)	Renew.	
Spring (Element)	Check length, renew as necessary.	See Data Section Item 47.
Adaptors	Examine thread condition and renew adaptors as necessary. Renew joint washers.	Ensure oil hole is clear.

COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>LUBRICATING OIL PIPES</u>		
Oil Pipe (Non Flexible)	Examine for cone wear and security, check condition of union nut threads. Renew as necessary.	
Flexible Hoses	Examine for chafing, cone wear and security of end fittings; check condition of union nut threads. Renew as necessary.	
Banjo Bolt and Union	Examine threads and joint faces. Renew items as necessary. Renew joint washers.	
<u>1st SPEED GEAR TRAIN</u>		
Planet Pinions and Rivets	Examine gear teeth for wear, check pinions for lift and rivets for security; if necessary, strip assembly and renew defective items.	See Data Section Item 48.
Planet Inner Races	Examine external diameter for wear. Renew as necessary.	See Data Section Item 49.
Rollers (Planet) 3/8" x 3/8" long	Examine, renew as necessary.	Renew rollers in sets.
Distance Washers	Examine, renew as necessary.	See Data Section Item 50.
Planet Carrier	Examine planet mating face for wear. Renew as necessary.	See Data Section Item 51.
Bush, Driven Shaft (Input to Output Shaft)	Examine internally and externally for wear. Renew as necessary.	See Data Section Item 52.
Bush, 1st Speed Annulus	Examine internally and externally for wear. Renew as necessary.	See Data Section Item 53. Ensure oil feed holes are clear.



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COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>2nd SPEED GEAR TRAIN</u>		
Planet Pinions and Rivets	Examine gear teeth for wear, check pinions for lift and rivets for security; if necessary, strip assembly and renew defective items.	See Data Section Item 54
Planet Inner Races	Examine external diameter for wear. Renew as necessary.	See Data Section Item 55
Rollers (Planet) 3/8" x 3/8" long	Examine, renew as necessary.	Renew rollers in sets.
Distance Washers	Examine, renew as necessary.	See Data Section Item 56
2nd Speed Planet Carrier	Examine gear teeth for wear and check rivet security to 3rd speed annulus. Renew as necessary.	See Data Section Item 57
3rd Speed Annulus	Examine gear teeth for wear. Crack detect by magnetic method. Renew as necessary.	See Data Section Item 58
Bush	Examine, renew as necessary.	See Data Section Item 59
<u>3rd SPEED GEAR TRAIN</u>		
Planet Pinions	Examine gear teeth for wear and check pinions for lift, if necessary, strip assembly and renew defective items.	See Data Section Item 60
Planet Pinion Rivets	Renew	
Planet Inner Races (Special)	Examine external diameter for wear. Renew as necessary.	See Data Section Item 61
Rollers (Planet) 1/4" x 1/4" long	Examine, renew as necessary.	Renew rollers in sets.

COMPONENT	WORK TO BE CARRIED OUT	REMARKS
<u>3rd SPEED GEAR TRAIN (Continued)</u>		
3rd Speed Planet Carrier	Examine gear teeth for wear and check rivet security to 2nd speed brake drum. Renew as necessary.	See Data Section Item 62.
Bush (Plain)	Examine, renew as necessary.	See Data Section Item 63.
2nd Speed Brake Drum	Examine gear teeth and ribbing for condition. Crack detect by magnetic method. Renew as necessary.	See Data Section Item 64. Ensure the ribbed portion has not 'closed in'.
Bush (Flanged)	Examine, renew as necessary.	See Data Section Item 65.
<u>3rd SPEED SUNWHEEL AND BRAKE DRUM ASSEMBLY</u>		
3rd Speed Sunwheel	Examine gear teeth for wear and check security of welding to 3rd speed brake drum. Repair or renew items as necessary.	See Data Section Item 66.
3rd Speed Brake Drum	Examine internal gear teeth and external ribbing for condition. Crack detect by magnetic method. Renew as necessary.	See Data Section Item 67. Ensure the ribbed portion has not 'closed in'.
Clutch Pressure Plate	Examine, and check security to 3rd speed brake drum. Renew items as necessary.	
Bush(Flanged)	Examine, renew as necessary.	See Data Section Item 68. See Page 31, Fig.26, of S.E.4 Gearbox Service Manual for determining thickness of flange.
Clutch Driving Member	Examine gear teeth and check security to input shaft. Renew as necessary.	See Data Section Item 69. Ensure bolts are fitted correctly, i.e. chamfer on bolt head to shaft.
1st and 2nd Speed Sunwheel	Examine gear teeth and bore for wear. Renew as necessary.	See Data Section Item 70.

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## TEST SCHEDULE

1. Mount gearbox on stand, fill with specified gearbox lubricant (See Appendix B) and couple driving motor (6 h.p.) to input shaft, gear changing effected by a relay air valve.
2. Couple to air supply (65 lb/in<sup>2</sup>) to check operation of brake bands.
3. Fit transparent cover in place of normal cover plate.
4. Carry out running tests as under:-

Gear Engaged	Period of Test Run in each Gear (In Minutes)			Total Running Period (In Minutes)
	875 rev/min	1200 rev/min	1600 Rev/min	
3rd	15	15	15	45
2nd	15	15	15	45
1st	15	15	15	45
4th	-	15	15	30
	45	60	60	165

5. Record the relevant data on Test Form (See Appendix 'A').
6. Check for oil leaks.
7. Check outside details.
8. Check for air leakage past 4th speed actuating pistons by using the approved test rig and applying 100 lb/in<sup>2</sup> air pressure for 5 minutes. No leakage must occur.



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Sheet 16

Amendment No. 23 July 1972.

APPENDIX 'B'

LUBRICATION SCHEDULE

<u>COMPONENT</u>	<u>Lubricant</u>	<u>B.R. Cat. No.</u>
Gearbox	D.M.U. Gearbox Oil.	27/20765

APPENDIX 'C'FITTING OF OUTPUT COUPLING TO SHAFTDetails of work

1. In all cases it is essential that the output coupling and shaft be 'blued' and hand lapped to ensure correct mating. This operation must be carried out with the key omitted and the blueing area must not be less than 75%.
2. When fitting the key a clearance of .010" to .015" must be obtained between the top of the key and the keyway in the coupling hub.
3. The key must be a 'drive' fit in the output shaft keyway and a 'push' fit in the coupling hub.
4. The aforementioned conditions must also apply should it be found necessary to fit an oversize key, but the maximum key width must not exceed 11/16". On no account should a stepped key be used.
5. To ensure that the coupling is tight on the shaft the coupling hub face must project beyond the end of the tapered shaft by 3/32" minimum on assembly.
6. Ensure that the coupling hub securing nut is a free fit throughout the length of the thread on the output shaft.
7. A washer must always be fitted between the hub face and the castellated nut. When fitting the nut it must be tightened down a torque loading of 900 lbs. ft. and on no account must the nut be slackened back in order to insert the split pin. Should adjustment be necessary the nut must be faced accordingly.
8. Each output coupling and shaft must be stamped with the serial number of the gearbox in order that these components can be kept as assemblies and if removed for any purpose, they will not be fitted to another tapered shaft or output coupling.

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INPUT AND OUTPUT SHAFTSRECLAMATION OF SEALING AREA

Input and output couplings which have been grooved in service by the cutting action of the shaft seal may be reclaimed by grinding out the groove. The surface finish after grinding shall not be courser than roughness number N5 and the minimum diameter of the coupling at seal area shall be in accordance with the following.

<u>Coupling</u>	<u>Nominal Dia. Dia. D. Fig. 1</u>	<u>Minimum Dia. Dia. D. Fig. 1</u>
<u>R14 Gearbox</u>		
input shaft	3.500 ins.	3.485 ins.
output shaft	4.250 ins.	4.235 ins.
<u>SE4 Gearbox</u>		
input shaft	2.250 ins.	2.235 ins.
	2.750 ins.	2.735 ins.
output shaft	2.750 ins.	2.735 ins.

At each reclamation the minimum amount of metal shall be removed to give the specified sealing area surface finish.

After removal of 0.015" and when the seal area is worn, it shall be reduced by a further 0.005" + 0.003", making a total of 0.017" to 0.023" and a speedi-sleeve fitted in accordance with the following instructions and sizes:-

/Continued....

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INPUT AND OUTPUT SHAFTS (Cont'd.)

B.R. Cat. No.	Vulcascot Speedi-Sleeve No.	Shaft Diameter	Width (Not including flange)
15/9062	92230	2.230" $\pm$ .003"	.750"
15/9061	99268	2.730" $\pm$ .003"	.750"
15/9060	99340	3.480" $\pm$ .003"	.875"
15/9059	99366	3.730" $\pm$ .003"	.875"
15/9058	99423	4.230" $\pm$ .003"	.750"

Ensure that the seal area is free from dirt, lubricant or metal burrs, locate the speedi-sleeve squarely onto the shaft, flanged end first, fit the installation tool over the sleeve, place a block of hardwood across the face of the tool and, using a hammer, gently drive the sleeve onto the shaft until correctly positioned over the centre of the seal contact area.

When worn, the sleeve may be removed by splitting with a small, sharp chisel before fitting a new sleeve in accordance with the above.



DATA

AMENDMENT NO. 165 JULY 1983

ITEM NO.	COMPONENT	MINIMUM	MAXIMUM	REMARKS
<u>OUTER CASING</u>				
1	Studs, Mounting Bracket - Torque Load	70 lbf ft	75 lbf ft	
2	Mounting Bracket - Suspension Bolt Hole Diameter - Rear	1.258"	1.260"	
	- Front	1.508"	1.510"	
	- Side	1.258"	1.260"	
3	Tail Pins (Automatic Adjusters) - Diameter	0.365"	0.375"	Turn through 180° when worn to minimum size. Renew when again worn to 0.365".
<u>LINKAGE (INTERNAL AND EXTERNAL BRAKE BANDS)</u>				
4	Bracket for External Band Hooks and Centraliser - Pin Hole Diameter (Large)	0.752"	0.757"	Renew at maximum size.
	- Pin Hole Diameter (Small)	0.314"	0.319"	Renew at maximum size.
5	Bracket for Internal Band Link and Centraliser - Pin Hole Diameter (Large)	0.752"	0.757"	Renew at maximum size.
	- Pin Hole Diameter (Small)	0.314"	0.319"	Renew at maximum size.
6	External Brake Hook Complete, 1st and 3rd Speeds (Front and Rear) and 2nd Speed (Rear) - Band Hook Pin Hole Diameter	0.752"	0.757"	Renew at maximum size.
7	Centraliser Springs - Length	0.950"	0.975"	Renew at minimum size.
8	External Band Eyebolt Pin - Diameter	0.745"	0.750"	Renew at minimum size.
9	Centraliser Pins (Left and Right Hand) - Diameter	0.307"	0.312"	Renew at minimum size.

ITEM NO	COMPONENT	MINIMUM	MAXIMUM	REMARKS	ITEM NO
<u>LINKAGE (INTERNAL AND EXTERNAL BRAKE BANDS) (Continued)</u>					
10	Centralisers (Left and Right Hand) - Pin Hole Diameter	0.314"	0.319"	Renew at maximum size.	10
	- Spring Hole Diameter	0.455"	0.465"	Renew at maximum size.	
11	Internal Band Links and Pins - Link Pin Hole Diameter	0.752"	0.757"	Renew at maximum size.	11
	- Pin (For Internal Band Link) Diameter	0.745"	0.750"	Renew at maximum size.	
	- Internal Band Pin Diameter	0.745"	0.750"	Renew at minimum size.	
<u>CYLINDER BLOCK ASSEMBLY</u>					
12	Cylinder Block - Bore - 1st Speed	3.250"	3.255"	Renew at maximum size.	12
	- 2nd Speed	2.750"	2.755"	Renew at maximum size.	
	- 3rd Speed	2.250"	2.255"	Renew at maximum size.	
13	Springs - Length - 1st Speed	7.875"	8.250"	Renew at minimum size.	13
	- 2nd Speed	7.500"	7.875"	Renew at minimum size.	
	- 3rd Speed	7.375"	7.750"	Renew at minimum size.	
14	Operating Strut and Pin - Pin Hole Diameter	0.752"	0.757"	Renew at maximum size.	14
	- Pin Diameter	0.745"	-		
	- Length of Strut (Spherical Seat to Centre of Pin Hole)	8.100"	8.125"	Renew when length is less than minimum.	
<u>BRAKE BANDS AND LININGS - 1st 2nd AND 3rd SPEEDS</u>					
15	Steel Bands (Internal and External) - "Free Gap" Dimension	2.000"	-		15
	Rivet hole diameter	-	0.170"	Renew band when rivet hole is in excess of the maximum size.	
16	Linings (Internal and External) - Rivet Diameter	0.148"	0.151"	See Data Section Appendix A for rivet details	16

ITEM NO.	COMPONENT	MINIMUM	MAXIMUM	REMARKS
<u>BRAKE BANDS AND LININGS - 1st, 2nd AND 3rd SPEEDS (Continued)</u>				
17	Automatic Adjuster Screw and Locknut			
	- Brake Setting Dimensions			
	- 1st Speed		1.875"	
	- 2nd Speed		2.125"	
	- 3rd Speed		2.125"	
<u>BRAKE BAND ADJUSTING LINKAGE</u>				
18	Pull Rods, Pins and Adjuster Nuts (Automatic)			
	- Pull Rod Hole Diameter	-	0.755"	
	- Pull Rod Pin Diameter	0.745"	-	
	- Adjuster Nut Thread Size		7/8" B.S.F.	
19	Cam Plates (Operating Levers)			
	- Pin Hole Diameter	0.477"	0.482"	Renew at maximum size.
	- Inner Face Wear		0.005"	If depth of wear exceeds this figure, faces machined to take 0.03125" brass washer each side of needle roller bearing. These washers to be renewed at each scheduled overhaul.
20	Bush			
	- Inside Diameter	-	0.755"	
21	Cams (Needle Roller Assembly)			
	- Outside Diameter of Bearing	1.290"	1.300"	Renew at minimum size.
<u>REAR COVER ASSEMBLY</u>				
22	Bearing Sleeve			
	- Inside Diameter	5.500"	5.502"	Renew at maximum size.
23	Oil Seal and Housing			
	- Inside Diameter of Housing	5.250"	5.252"	Renew at maximum size.
23A	Bearing abutment face clearance	-0.004"	+0.004"	Shim as necessary.

ITEM NO.	COMPONENTS	MINIMUM	MAXIMUM	REMARKS	ITEM NO.
	<u>FRONT COVER ASSEMBLY (INPUT)</u>				
24	Front Cover - Oil Pump Gear Housing Wear	-	0.005"	Surface grind if wear exceeds this figure.	24
25	Cylinder Liner 4th Speed - Bore	4.125"	4.130"	Renew at maximum size.	25
26	Pistons, Clutch, 4th Speed - Stem Diameter	0.737"	0.747"	Renew at minimum size.	26
27	Springs (for Clutch Piston) - Length	2.375"	2.500"	Renew at minimum size.	27
28	Bearing Liner (for Front Cover) - Inside Diameter of Sleeve - Type 7027	4.332"	4.334"	Renew at maximum size.	28
	- Type 6924	4.250"	4.252"	Renew at maximum size.	
29	Oil Seal and Housing - Inside Diameter of Housing -Type 7027	3.750"	3.752"	Renew at maximum size.	29
	-Type 6924	3.375"	3.377"	Renew at maximum size.	
30	Pump Gear (Driven) and Shaft - Backlash between Gears		0.030"	Renew when backlash exceeds this figure.	30
	- Bore of Gear	0.501"	0.503"	Renew at maximum size.	
	- Shaft Diameter	0.497"	0.499"	Renew at minimum size.	
31	Pump Gear and Driving Shaft - Backlash between Gears		0.030"	Renew when backlash exceeds this figure.	31
	- Shaft Diameter - Type 7027	0.558"	0.560"	Renew at minimum size.	
	- Type 6924	0.4995"	0.500"	Renew at minimum size.	
32	Pump Gear (Intermediate) - Backlash between Gears		0.015"	Renew when backlash exceeds this figure.	32
	- Bore of Gear	0.500"	0.5005"	Renew at maximum size.	

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ITEM NO.	COMPONENT	MINIMUM	MAXIMUM	REMARKS	ITEM NO.
<u>CLUTCH ASSEMBLY, 4TH SPEED</u>					
33	Clutch Actuation Member - Outside Diameter (Sliding Panel)	3.998"	4.00"	Renew or recondition at minimum size.	33
33A	Bearing abutment face clearance	-0.004"	+0.004"	Shim as necessary	
34	Clutch Thrust Ring - Inside Diameter	8.500"	8.502"	Renew or recondition at maximum size.	34
35	Clutch Return Spring - Length	4.000"	4.250"	Renew at minimum size	35
36	Clutch Plates (Driven & Driver) - Distortion	-	0.005"		36
	- Tooth Wear	-	0.005"		
	- Face Wear	-	0.005"		
	- Nominal Thickness of Plates	0.124"	0.126"		
37	Oil Pump Driving Gear - Backlash between Gears	-	0.015"	Renew when backlash exceeds this figure	37
	- Keyway Width	0.1875"	0.1925"	Renew at maximum size.	
	- Oil Muff Location - Outside Diameter	3.246"	3.248"	Recondition or renew at minimum size.	
38	Oil Muff - Inside Diameter	3.250"	3.262"	Recondition or renew at maximum size.	38
<u>INPUT SHAFT ASSEMBLY</u>					
39	Input Shaft - Shaft Misalignment		0.002"		39
	- Journal Sizes	1.846"	1.848"		
		1.246"	1.248"		

ITEM NO.	COMPONENT	MINIMUM	MAXIMUM	REMARKS	ITEM NO.
	<u>INPUT SHAFT ASSEMBLY</u> (Continued)				
39 (Cont)	Input Shaft (Continued) - <u>Splines (Coupling/Shaft)</u>				39 (Cont)
	Male Spline Width (Coupled End)	0.435"	-		
	Female Spline Width (in Coupling)	-	0.441"		
	Bottom Diameter of Splines (on Shaft)	1.484"	-		
	Spline Inside Diameter of Coupling	-	1.487"		
	Backlash - Coupling to Shaft	-	0.002"	Minimum backlash to be obtained by selection.	
	- <u>Splines (1st and 2nd Speed Sunwheel/Shaft)</u>				
	Male Spline Width (on Shaft)	0.433"	-		
	Female Spline Width (in Sunwheel)	-	0.441"		
	Bottom Diameter of Splines (on Shaft)	1.484"	-		
	Splines Inside Diameter of Sunwheel	-	1.487"		
	Backlash - Sunwheel to Shaft	-	0.004"	Minimum backlash to be obtained by selection	
40	Input Coupling				40
	- Flange Face Distortion	-	0.005"		
	- Bent Hole Elongation Diameter	-	0.390"		
	- Pulley Grooves	-	-	Remachine grooves at total stepping of 0.020". Renew pulley after removal of 0.125".	
	- Seal Surface Diameter	2.220"	2.255"		
	- Sealing Area Surface Finish	2.720"	2.755"		
			N5		

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ITEM NO.	COMPONENT		MINIMUM	MAXIMUM	REMARKS	ITEM NO.
	<u>OUTPUT SHAFT ASSEMBLY</u>					
41	Brake Drum, 1st Speed	- Annulus Teeth Indentation	-	0.002"		41
		- Serration Wear	-	0.020"		
42	Output Shaft	- Taper on Shaft		75% Bed.		
43	Output Coupling	- Flange Face Distortion	-	0.005"		43
		- Bolt Hole Elongation Diameter	-	0.390"		
		- Pulley Grooves	-	-	Remachine grooves at total stepping of 0.020". Renew pulley after removal of 0.125".	
		- Seal Surface Diameter	3.720	3.755		
		- Sealing Area Surface Finish		N5		
44	Oil Pump Eccentric (Rear)	- Outside Diameter	3.495"	3.497"	Renew at minimum size.	44
		- Keyway Width	0.1875"	0.1925"	Renew at maximum size.	
45	Oil Pump Oscillating Cylinder (Rear)	- Outside Diameter	3.495"	3.497"	Renew at minimum size.	45
		- Plunger Bore	0.552"	0.554"	Renew at maximum size.	
46	Oil Pump Plunger	- Inside Diameter	3.500"	3.502"	Renew at maximum size.	46
		- Outside Diameter	0.547"	0.549"	Renew at minimum size.	
	<u>LUBRICATING OIL FILTER</u>					
47	Spring	- Length	1.125"	1.375"	Renew at minimum size.	47



ITEM NO.	COMPONENT		MINIMUM	MAXIMUM	REMARKS	ITEM NO.
	<u>1st SPEED GEAR TRAIN</u>					
48	Planet Pinions	- Gear Teeth Indentation	-	0.002"		48
		- Lift	-	0.002"		
49	Planet Inner Races	- Outside Diameter	1.318"	1.319"	Renew at minimum size.	49
50	Distance Washers	- Thickness	0.157"	0.160"	Renew at minimum size.	50
51	Planet Carrier	- Thickness	0-230"	0.250"		51
52	Bush, Driven Shaft (Input to Output Shaft)	- Outside Diameter	1.493"	-	Renew at minimum size.	52
		- Inside Diameter	-	1.253"	Renew at maximum size.	
		- Flange Thickness	0.120"	-	Renew at minimum size.	
53	Bush, 1st Speed Annulus	- Outside Diameter	3.115"	-	Renew at minimum size.	53
		- Inside Diameter	-	2.882"	Renew at maximum size.	
	<u>2nd SPEED GEAR TRAIN</u>					
54	Planet Pinions	- Gear Teeth Indentation	-	0.002"		54
		- Lift	-	0.002"		
55	Planet Inner Races	- Outside Diameter	1.318"	1.319"	Renew at minimum size.	55
56	Distance Washers	- Thickness	0.157"	0.160"	Renew at minimum size.	56
57	2nd Speed Planet Carrier	- Thickness	0 -0230"	0-250"		57
		- Gear Teeth Wear	-	0.005"		
58	3rd Speed Annulus	- Face Wear	-	0.005"		58
		- Gear Teeth Wear	-	0.005"		

ITEM NO.	COMPONENT	MINIMUM	MAXIMUM	REMARKS	ITEM NO.
<u>2nd SPEED GEAR TRAIN (Continued)</u>					
<u>3rd Speed Annulus (Continued)</u>					
59	Bush				
	- Outside Diameter	3.586"	3.591"	Renew at minimum size.	59
	- Inside Diameter	2.501"	2.506"	Renew at maximum size.	
	- Flange Thickness	0.0525"	0.0625"	Renew at minimum size.	
<u>3rd SPEED GEAR TRAIN</u>					
60	Planet Pinions				
	- Gear Teeth Indentation	-	0.002"		60
	- Lift	-	0.002"		
61	Planet Inner Races (Special)				
	- Outside Diameter	0.899"	0.900"	Renew at minimum size.	61
62	Planet Carrier				
	- Thickness	0 - 230"	0.250"		62
63	Bush (Plain)				
	- Outside Diameter	2.0575"	2.0625"	Renew at minimum size.	63
	- Inside Diameter	1.849"	1.854"	Renew at maximum size.	
64	2nd Speed Brake Drum				
	- Gear Teeth Indentation	-	0.002"		64
	- Serration Wear	-	0.020"		
65	Bush (Flanged)				
	- Outside Diameter	3.994"	3.999"	Renew at minimum size.	65
	- Inside Diameter	3.751"	3.756"	Renew at maximum size.	
	- Flange Thickness	0.095"	0.100"	Renew at minimum size.	
<u>3rd SPEED SUNWHEEL AND BRAKE DRUM ASSEMBLY</u>					
66	3rd Speed Sunwheel				
	- Gear Teeth Wear	-	0.002"		66
67	3rd Speed Brake Drum				
	- Gear Teeth Indentation	-	0.005"		67
	- Serration Wear	-	0.020"		

ITEM NO.	COMPONENT	MINIMUM	MAXIMUM	REMARKS	ITEM NO.
	<u>3rd SPEED SUNWHEEL AND BRAKE DRUM ASSEMBLY (Continued)</u>				
68	Bush (Flanged)				68
	- Outside Diameter	2.055"	2.060"	Renew at minimum size.	
	- Inside Diameter	1.849"	1.854"	Renew at maximum size.	
	- Flange Thickness	-	0.125"		
69	Clutch Driving Member				69
	- Gear Teeth Indentation	-	0.005"		
70	1st and 2nd Speed Sunwheel				70
	- Male Spline Width	0.433"	-		
	- Female Spline Width	-	0.441"		
	- Spline Bottom Diameter	-	1.484"		
	- Spline Diameter	-	1.487"		
71	Planet Wheels.				71
	- Planet wheel rivets - Protrusion.	-	0.032"		

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APPENDIX C

Gear band rivet sizes and quantities per Brake Band

SE4 Gearbox Brake Band

Stubs 9 BWG (.148" to .151" dia)

<u>BR Cat No</u>	<u>Length (ins)</u>	<u>Qty/brake band</u>	<u>SCG Part No.</u>
30/1414	3/8"	16	42842
30/1416	1/2"	1	41394
30/1418	9/16"	7	41387
30/1420	21/32"	6	42841
30/1422	7/8"	3	41399

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APPENDIX C

Gear sizes and quantities per Brake Band

SEK Gearbox Brake Band

Table B (148" to 151" dia)

BR Cat No	Length (ins)	Qty/brake band	SCB Part No
30/1474	1 1/8"	2	41398
30/1475	1 1/2"	1	41397
30/1476	2 1/8"	1	41394
30/1477	2 1/2"	1	41393
30/1478	1 1/8"	2	41392

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