

# Capstan Winch for Series II Ila, and III Land Rovers

Supplied and Manufactured by:

**AEROPARTS ENGINEERING CO. LTD., (R.T.Z.-Pillar Group)**

COMMERCIAL ROAD : HEREFORD : ENGLAND : Telephone Hereford 3068/9

## HISTORY

This unit basically conforms to the original designs by The Rover Co. Ltd., and manufactured by Aeroparts since the introduction of the Land Rover range. It is fitted to vehicles operating all over the world, in all climates, and has proved itself to be reliable under the most difficult conditions.

## DESCRIPTION

The winch is mechanically driven from the engine crankshaft, and is mounted on a support plate between the front bumper and the radiator grille. It is designed for a maximum pull of 3000 lbs. (1360 kgs) and overload protection is supplied by a Shear Pin in the main function of the winch is self-recovery, or straight hauling or pulling. The main function of the winch is self-recovery, or straight hauling or pulling. The specification limits, and should be used with a 1 1/4" (31.5 mm) diameter manilla Wire Ropes are not recommended for constant use as this will cause excessive wear. A Bollard, which has a specially designed shape for gripping. If necessary the engine can be started through the winch, which has a starter dog fitted, accessible through the bumper bar, but if this is done, it is recommended that the shear pin is temporarily removed and replaced by a 5/16 dia Bolt. For Petrol-Engine Vehicles it is necessary to throttle back for maintaining an engine speed of 600 r.p.m.

## OPERATION

Pass the rope twice round the bollard, leaving one end free for holding by the operator on one side of the winch. Pass the other end under the guide roller and fasten it to the vehicle being pulled (or to a rigid stationary point for self-recovery) with engine running. When the winch is pulling, maintain a steady pull of the free end of the rope, paying off as it winds in.

## TECHNICAL INFORMATION

Direction of Pull	..	..	..	..	..	..	Front
Drive	..	..	..	..	..	..	From Engine Crankshaft
Max. Pull	..	..	..	..	..	..	3000 lbs. (1360 kgs)
Overload Protection	..	..	..	..	..	..	Shear Pin (3000 lbs)
Reduction Ratio	..	..	..	..	..	..	Worm and Wheel 75:1
Rope	..	..	..	..	..	..	20 mm Viking Nylon
							1 1/4" dia (31.5 mm)
							53 lbs. (24 kgs)
Weight of Winch	..	..	..	..	..	..	With 1000 r.p.m. Engine
Winch Speed	..	..	..	..	..	..	16ft. (4.87 m) per min
Lubrication	..	..	..	..	..	..	EP90, SAE 90 Gear Oil

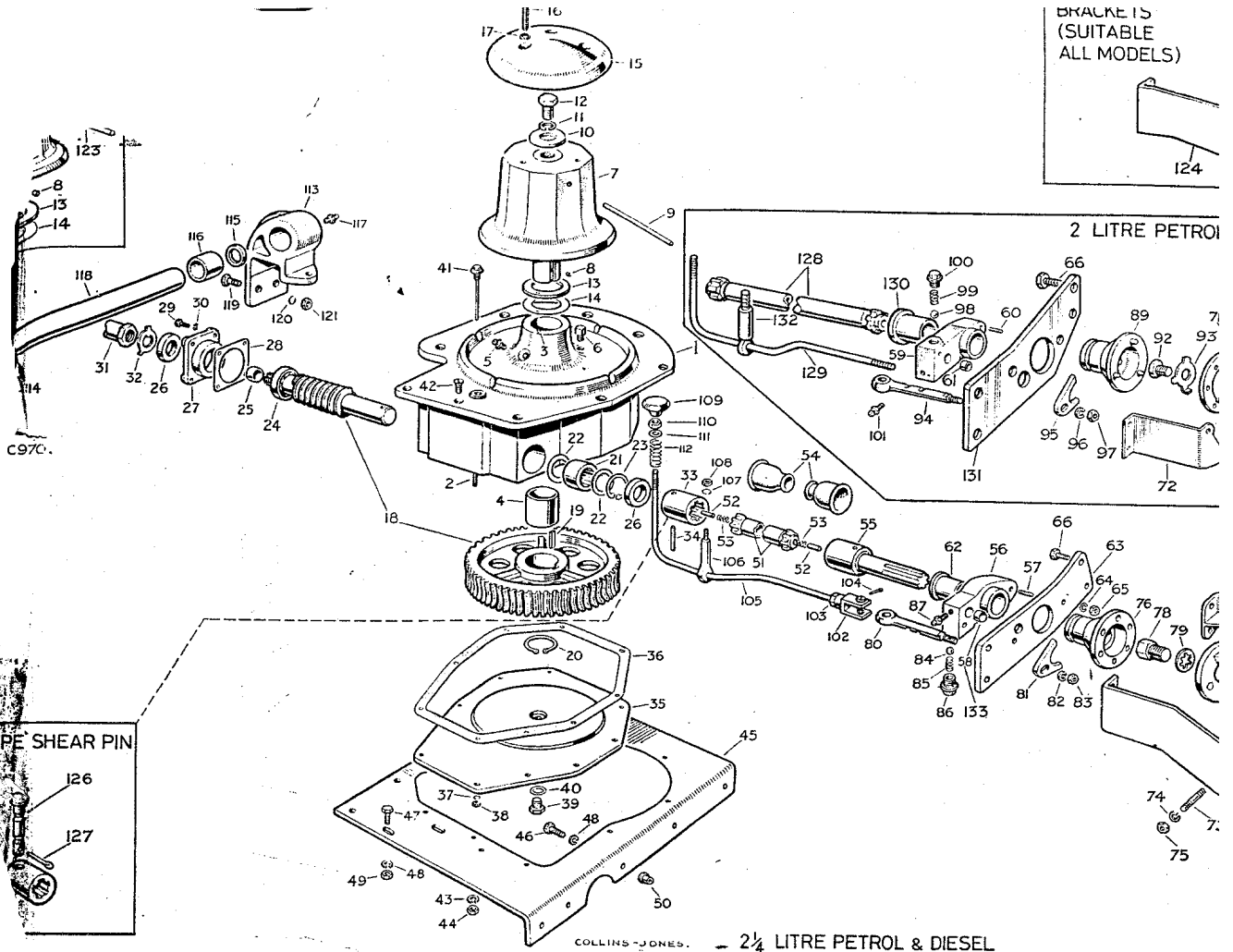
## OVERHAULING

- 1 Remove the control knob and locknut, plain washer and spring from the control rod; remove the rear dust cover and spring washer securing the control rod eyebolt to the support plate and drop the dust cover. Slide back the dust cover from the front universal joint on the winch propeller shaft.
- 2 Remove the nuts, spring and plain washers securing the support plate to the chassis and the bolts, plain washers and self-locking nuts securing the front bumper to the chassis. Remove the bumper, support plate, rope guide and winch complete, at the same time disengaging the propeller shaft from the universal joint sleeve on the winch. The spring and plunger in the propeller shaft should be freed at this stage and care should be taken that these are not lost.
- 3 Remove the winch from the support plate.
- 4 Slide the rear dust cover along the propeller shaft and withdraw the propeller shaft from the driving shaft, care being taken that the second spring and plunger are not lost.
- 5 Extract the driving shaft from the shaft housing and remove the driving flange from the driving shaft with the selector fork.
- 6 Disconnect the control rod clevis from the control shaft and remove the drive shaft from the shaft housing and control shaft complete from the brackets.
- 7 Remove the selector fork from the control shaft; remove the plug, spring and ball from the control shaft housing and withdraw the control shaft; remove the shaft housing from the plate.
- 8 Remove the radiator and grille panel assembly.

BRACKET IS  
(SUITABLE  
ALL MODELS)

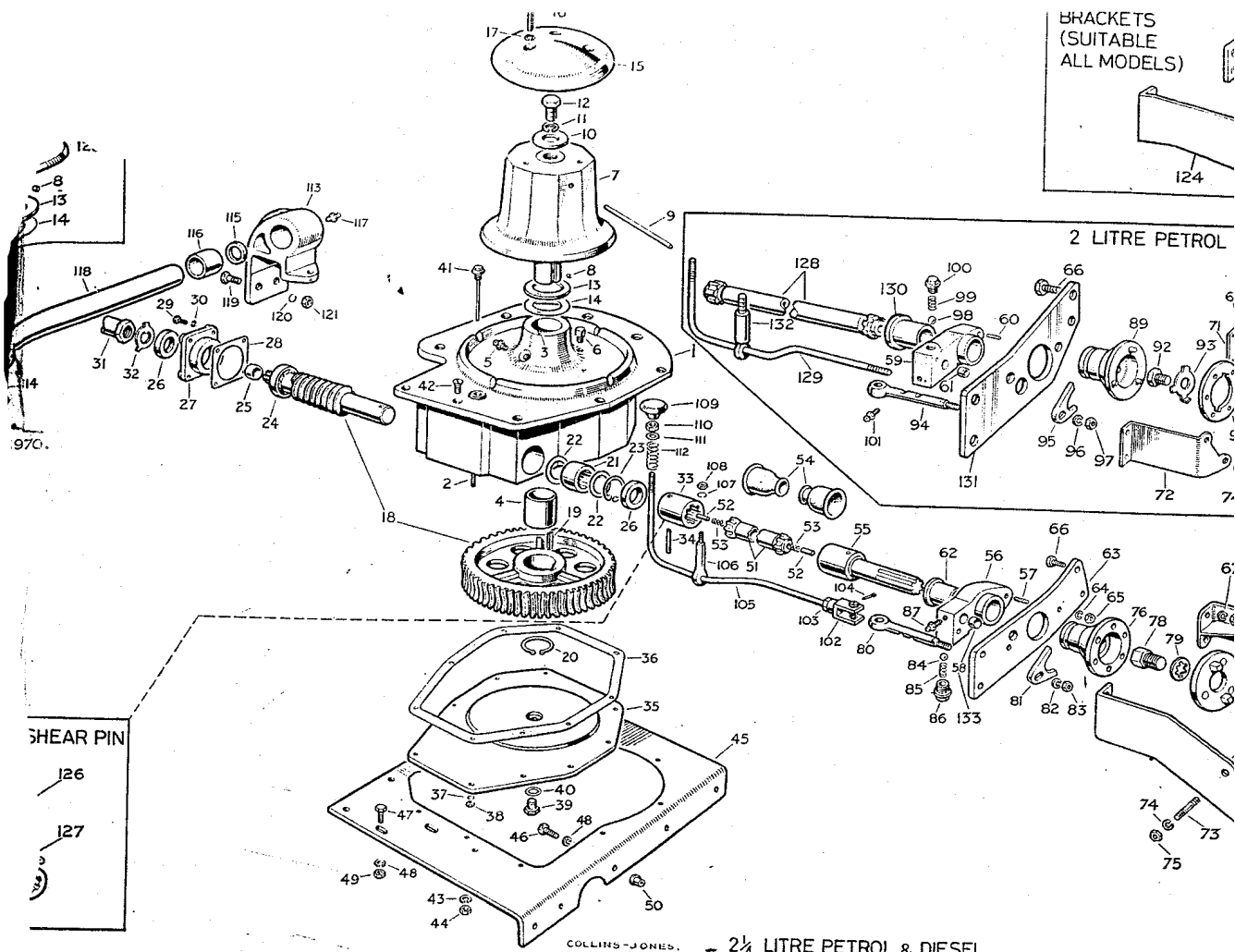
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2 LITRE PETROL



PART No.	DESCRIPTION	No. off			REMARKS
		2 Litre	2 1/2 Litre	Series III	
268698	Casing Assy. for Front Winch	1	1	1	
212104	Stud for Bottom Cover	10	10	10	
09561	Dowel for Thrust Washer	2	2	2	Sub-Assembly Supplied Complete for Spares
219161	Bush for Bollard Shaft				
219696	Grease Nipple for Shaft				
543688	Breather Cup for Housing				
234370	Bollard and Shaft Assembly			NR	Alternatives, Check Diameter Before Ordering
09561	Dowel Pin for Shaft			NR	
506287	Safety Pin for Bollard 0.328 Dia.			NR	
237006	Safety Pin for Bollard 0.265 Dia.				
8060	Plain Washer				Fixing Bollard Shaft
3078	Spring Washer				
215767	Set Bolt (3/8" B.S.F.)				For Bollard
219089	Thrust Washer				
233324	Shim	As Req'd	As Req'd	As Req'd	
219115	Bollard Cap	1	1	NR	For Fixing Bollard Cap
219742	Set Bolt	3	3	NR	
3076	Spring Washer	3	3	NR	
234807	Worm and Wheel Assembly	1	1	1	
219125	Key For Worm Wheel	1	1	1	
219691	Circlip Fixing Worm Wheel	1	1	1	
235646	Roller Bearing for Worm	1	1	1	
235648	Washer for the above	2	2	2	
235647	Circlip for Worm Shaft	1	1	1	
19088	Bearing for Worm Shaft	1	1	1	
9113	Distance Piece for Worm Shaft	1	1	1	
9624	Oil Seal for Worm Shaft	2	2	2	
9062	Oil Seal Retainer	1	1	1	
119	Joint Washer for Retainer	1	1	1	
001	Set Bolts 2BA: Fixing Retainer	4	4	4	
073	Spring Washer for above	4	4	4	
87	Starter Dog	1	1	1	
18	Lock Washer for Dog	1	1	1	
83	U. J. Sleeve	1	1	1	
2	Mills Pins	1	1	1	
	Bottom Cover	1	1	1	
	Joint Washer for Cover	1	1	1	
	Spring Washer for Cover	10	10	10	
	Nut Washer for Cover	10	10	10	
	Drain Plug	1	1	1	
	Joint Washer for Plug	1	1	1	
	Dip Stick Assembly	1	1	1	
	Special Bolt	9	9	9	Fixing Front Winch to support plate
	Spring Washer	9	9	9	
	Nut 1/8"	9	9	9	

See Plate Ref. Nos. 126 & 127 & Note



COLLINS-JONES. - 2 1/2 LITRE PETROL & DIESEL

PART No.	DESCRIPTION	No. off			REMARKS
		2 Litre	2 1/2 Litre	Series III	
268698	Casing Assy. for Front Winch				
212104	Stud for Bottom Cover	10	10	10	
09561	Dowel for Thrust Washer				Sub-Assembly Supplied Complete for Spares
219161	Bush for Bollard Shaft	2	2	2	
219696	Grease Nipple for Shaft				
543688	Breather Cup for Housing				
234370	Bollard and Shaft Assembly				
09561	Dowel Pin for Shaft			NR	Alternatives. Check Diameter Before Ordering
506287	Safety Pin for Bollard 0.328 Dia.			NR	
237006	Safety Pin for Bollard 0.265 Dia.			NR	
8060	Plain Washer				} Fixing Bollard Shaft For Bollard
3078	Spring Washer				
215767	Set Bolt (1/2" B.S.F.)				
219089	Thrust Washer				
233324	Shim	As Req'd	As Req'd	As Req'd	
219115	Bollard Cap				} For Fixing Bollard Cap
219742	Set Bolt	3	3	NR	
3076	Spring Washer	3	3	NR	
234807	Worm and Wheel Assembly			NR	
219125	Key For Worm Wheel				
219691	Circlip Fixing Worm Wheel				
235646	Roller Bearing for Worm				
235648	Washer for the above	2	2	2	
235647	Circlip for Worm Shaft				
219088	Bearing for Worm Shaft				
9113	Distance Piece for Worm Shaft				
19624	Oil Seal for Worm Shaft	2	2	2	
9062	Oil Seal Retainer				
9119	Joint Washer for Retainer				
5001	Set Bolts 2BA: Fixing Retainer	4	4	4	
3073	Spring Washer for above	4	4	4	
29087	Starter Dog				
29118	Lock Washer for Dog				
29083	U. J. Sleeve				
29362	Mills Pins				
21117	Bottom Cover				
21116	Joint Washer for Cover				
2974	Spring Washer for Cover	10	10	10	
223	Nut Washer for Cover	10	10	10	
53677	Drain Plug				
230107	Joint Washer for Plug				
219119	Dip Stick Assembly				
252110	Special Bolt	9	9	9	
3015	Spring Washer	9	9	9	
25481	Nut 1/2"	9	9	9	

See Plate Ref. Nos. 126 & 127 & Note A

47	255226	Bolt $\frac{3}{16}$ "	}	plate to cross	5	5	5	
48	3075	Spring Washer		members & front	10	10	10	
49	254811	Hut		Bumper	5	5	5	
50	263703	Riv-Nuts			5	5	5	
51	278056	Prop Shaft			1	1	1	
52	219093	Plunger for Shaft		2	2	2		
53	55742	Plunger Spring		2	2	2		
54	219080	Dust Cover		2	2	2		
55	269162	Driving Shaft		1	1	1		
56	504248	Winch Shaft Housing-Assembly	}	NR	1	1	Supplied as Sub-Assembly	
57	212104	Stud for above		NR	2	2	For Spares (2½ Litre	
58	219103	Bush for above		NR	1	1	and Series III only)	
59	217793	Shaft Housing-Assembly		1	HR	NR	Supplied as Sub-Assembly	
60	212104	Stud for Housing		2	HR	NR	For Spares, (for	
61	219103	Bush for Housing	2	HR	NR	2 Litre only)		
62	504250	Bush for Shaft Housing		NR	1	1		
63	268910	Support Plate		NR	1	1		
64	3074	Spring Washer		NR	2	2		
65	2823	Nut		NR	2	2		
66	255227	Bolts	}	Fixing	4	4	4	
67	3075	Spring Washer		support plate	4	4	4	
68	254811	Nut $\frac{3}{16}$ "		to bracket on	4	4	4	
69	279068	Shim		front cover	NR	1	1	
70	268907	Bracket R.H.			NR	1	1	Replaced by 543170 plate re
71	268905	Bracket L.H.		NR	1	1	Replaced by 550771 plate re	
72	219074	Bracket R.H.		1	NR	NR	Replaced by 543170 plate re	
73	236510	Bracket L.H.		1	NR	NR	Replaced by 550771 plate re	
74	252511	Stud	}	NR	4	4		
75	3075	Spring Washer		Fixing Brackets	4	4	4	
76	254811	Nut $\frac{3}{16}$ "			4	4	4	
77	268903	Winch Driving Flange			NR	1	1	
78	268900	Winch Driving Plate			NR	1	1	
79	269461	Special Bolt	}	Fixing Driving	NR	1	1	
80	78193	Shake Proof Washer		Plate	NR	1	1	
81	504253	Control Shaft			NR	1	1	
82	219562	Selector Fork for Shaft			NR	1	1	
83	3074	Spring Washer		Fixing Fork	NR	1	1	
84	2823	Nut $\frac{1}{4}$ "	to Shaft	NR	1	1		
85	3050	Steel Ball	For	NR	1	1		
86	211382	Spring	Control	NR	1	1		
87	219101	Plug	Shaft	NR	1	1		
88	219696	Grease Nipple: for Control Shaft		NR	1	1		
89	250530	Bolt $\frac{3}{16}$ " 65F x 2" Fixing Bracket		4	NR	NR		
90	263356	Driving Flange		1	NR	NR		
91	218653	Driving Flange for Fan Pulley		1	NR	NR		
92	218549	Winch Driving Plate		1	NR	NR		
93	218584	Special Plug	}	Fixing Driving	1	NR	NR	
94	218605	Lock Washer		Plate & Flange	1	NR	NR	
95	219561	Control Shaft			1	NR	NR	
96	219562	Selector Fork		Fixing	1	NR	NR	
97	3074	Spring Washer		Fork to	1	NR	NR	
98	2823	Nut	Shaft	1	NR	NR		
99	3050	Steel Ball	For	1	NR	NP		
100	211382	Spring	Control	1	NR	NR		
101	219101	Plug	Shaft	1	NR	NR		
102	219696	Grease Nipple		1	NR	NR		
103	215809	Clevis Assembly	}	For	1	1		
104	2828	Lock Nut $\frac{3}{16}$ "		Control	1	1	1	
105	2392	Split Pin		Rod	1	1	1	
106	278054	Control Rod			NR	1	1	
107	269197	Eye Bolt for Control Rod			NR	1	1	
108	3074	Spring Washer		1	1	1		
109	2823	Nut $\frac{1}{4}$ "		1	1	1		
110	219558	Knob for Control Rod		1	1	1		
111	2827	Lock Nut for Control Rod		1	1	1		
112	2251	Plain Washer for Control Rod		2	2	2		
113	212943	Spring for Control Rod		1	1	1		
114	219577	Rope Guide Bracket R.H. Assembly	}	1	1	1	Either Hand Supplied	
115	219576	Rope Guide Bracket L.H. Assembly			1	1	1	as Sub-Assembly for
116	219241	Thrust Washer			2	2	2	Spares: Modified
117	219237	Bush for Guide Bar			2	2	2	Type Pending
118	219696	Grease Nipple for Bush			2	2	2	Late 1973
119	219214	Rope Guide Bar		1	1	1		
120	255248	Bolt $\frac{3}{8}$ " UNF x $1\frac{1}{8}$ "	}	Fixing Rope Guide	4	4	4	
121	255247	Bolt $\frac{3}{8}$ " UNF x 1"		to Support Plate	2	2	2	
122	3076	Spring Washer		& Front Bumper	6	6	6	
123	254812	Nut $\frac{3}{8}$ " UNF			6	6	6	
124	234402	Starting Handle			1	1	1	Not Illustrated
125	237255	Wrench for Bollard		1	1	1	Not Illustrated	
126	582221	Bollard & Shaft Assembly		NR	NR	1		
127	582222	Safety Pin		NR	NR	1		
128	550771	Bracket L.H.		1	1	1		
129	543170	Bracket R.H.		1	1	1		
130	581937	Shear Pin Brass		1	1	1	Replacing Mills Pins Item 34	
131	2394	Split Pin $\frac{1}{8}$ "		1	1	1		
132	278061	Prob Shaft		1	NR	NR		
133	278059	Control Rod		1	NR	NR		
134	219104	Bush for Control Shaft Housing		1	NR	NR		
135	236511	Support Plate		1	NR	NR		
136	219559	Eye-Bolt		1	NR	NR		
137	504252	Bush for Housing		NR	1	1		

NR - Not Required

NOTES:

- A From November 1971 Mills Pin 250362 (Plate Ref. No. 34) will be replaced by Shear Pin 581937 (Plate Ref. No. 126) designed to shear at 3000 lbs. Pull, before Bollard Safety Pin.

# Fitting Instructions for Capstan Winches

SERIES 2, 2A and 3 L/R 88 inch and 109 inch (FOR PETROL ENGINES FIT HAND THROTTLE).

## PROCEDURE:

1. Remove the grille, grille panel, radiator block and cowl (shown detailed in Section 'L' of the Workshop Manual if available). Remove the fan by removing four set bolts and spring washers. Remove front apron panel.
  2. Mark off a point on the front face of chassis second cross member  $3\text{-}9/32''$  (83 mm) from the top face and mid-way between the side-members. Use a pilot drill first, then drill the front face only of the cross member to  $27/64''$  (10.7 mm) diameter.
  3. Fit a nut and plain washer to a  $5/16''$  BSF set bolt having a threaded length not less than  $1\frac{1}{2}''$  38 mm. Drill or file the thread of a  $3/8''$  BSF nut clear, and slide it onto the set bolt, then screw on a Riv-nut, (details section 'T' Workshop Manual). Adjust so that  $1/8''$  (3 mm) of the set bolt extends beyond the Riv-nut and then lock the assembly. Insert the Riv-nut into the hole in second cross member and then, keeping the set bolt and distance nut stationary, turn the  $5/16''$  BSF nut—clockwise  $2\frac{1}{4}$  turns.
  4. Assemble the winch support plate temporarily to the cross member, securing with a set bolt and spring washer. Using the support plate as a template, mark off the other four holes in the cross member, and the five  $5/16''$  (8 mm) clearance holes in the front bumper. Remove the plate and the front bumper by removing eight bolts, plain washers and nuts. Fix the other four new nuts to second cross member.
  5. Prise up the tabs on the starting dog lock washers and remove the dog and washer. Fit new driving plate with special plug and shakeproof washer.
  6. Secure the two shaft plate brackets, R.H. and L.H., to the engine front cover, with four studs, spring washers and nuts.
  7. Secure the shaft housing to the shaft support plate by means of two spring washers and nuts. Grease the driving shaft and insert it in the housing, sliding the driving flange on to its spline. Insert the control shaft in the housing and secure the selector fork to the control shaft and in the groove of the flange by means of a spring washer and nut. Push the steel ball into the hole, holding it in position by the spring and the plug. Fit the grease nipple in the shaft housing.
  8. Bolt the housing and support plate to the brackets, using four bolts ( $5/16'' \times 1\frac{1}{2}''$  10MS), spring washers and nuts.
  9. Slide two rubber dust covers on to the propeller shaft and fit a spring and plunger into each end of the shaft; insert one end of the shaft into the driving shaft held in the shaft housing, and slide the dust cover over the joint.
  10. Secure the winch support plate to the front bumper, using five bolts ( $5/16''$  UNF x  $1\frac{1}{4}''$  long), spring washers and nuts. Fit the winch to the support plate, using nine special bolts, spring washers and nuts. Offer the winch, support plate and bumper into position; engage the propeller shaft with the universal joint sleeve on the winch, then secure support plate to second cross member, using five set bolts ( $5/16''$  BSF x  $7/8''$  long) and spring washers.  
ALT. The universal joint (item 33) may be pinned to winch shaft with new type brass shear pin (item 6/127).
  11. Slide the eyebolt on to the control rod and fit locknut ( $5/16''$  BSF) and clevis to the end of the rod. Pass the rod through the hole in the cross member, and secure it to the support plate with a spring washer and nut ( $1/4''$  BSF) on the eyebolt. Fit spring between two plain washers on the other end of the control rod and secure with locknut ( $3/8''$  BSF) and a knob. Fit the clevis to the control shaft in the shaft housing, and adjust the clevis so that the driving flange is engaged correctly when the rod is moved in its slot.
  12. Mount the rope guide brackets, R.H. and L.H., with the guide bar inserted in each bearing on the support plate, using two bolts ( $3/8''$  UNF x  $1''$  long), spring washers and nuts. Making sure the bar turns freely, drill four holes  $3/8''$  (9.5 mm) through the brackets into the bumper, and secure the brackets by means of four bolts ( $3/8''$  UNF x  $1\frac{1}{8}''$  long), spring washers and nuts.
  13. Fill the winch to the mark on the dipstick with an S.A.E. 90 oil; grease all moving parts and use a grease gun at the nipples on the rope guide brackets, on the shaft housing, and on the winch casing, which can be found by turning the bollard.
  14. Replace the fan blade and the radiator in accordance with the Workshop Manual, Section 'L'.  
When refitting the radiator and grille panel assembly to chassis frame cross member mountings, it may be found necessary to use extra rubber buffers, Part No. 306465 (obtainable from The Rover Co. Ltd.) to ensure clearance between the bottom of radiator block and winch propeller shaft.
- NOTE: 1. The starting dog on the winch may be found to be loose, this must be tightened and locked by the lock washer. The Engine may be started through the winch (using the starting handle supplied) provided that the brass shear pin is temporarily replaced with a  $5/16''$  dia. steel bolt (not supplied).  
2. If winch is fitted with brass shear pin the starting handle should not be used without first removing the safety pin, which can temporarily be replaced by a  $5/16''$  standard bolt. Do not forget to re-fit the shear pin before again operating the winch.

## OPERATING INSTRUCTIONS

The winch must only be engaged or disengaged when the engine is stationary and the winch must be operated at 600 r.p.m., i.e. a fast idling speed.

- 9 2 LITRE PETROL MODELS; Remove the driving plate from the crankshaft vibration damper; remove the vibration damper (Section A).
- 10 Remove the two support plate brackets.
- 11 2½ LITRE PETROL, DIESEL MODELS; Remove the driving plate from the fan driving pulley or vibration damper.
- 12 If necessary, remove the two rope guide brackets and rope guide from the front bumper and support plate.  
If necessary, remove the bushes from the brackets.
- 13 Remove the drain plug and filler plug and drain off the oil
- 14 Drive out the Mills pin securing the universal joint sleeve to the rear of the worm shaft and remove the sleeve.
- 15 Unscrew the dog from the front of the worm shaft; slide off the lock washer.
- 16 Remove the oil seal retainer, oil seal and joint washer from the casing. If necessary, remove the oil seal from the retainer.
- 17 Turning the shaft to disengage the worm from the worm wheel, drive the worm shaft, ball bearing and distance piece from the casing. Drift the bearing and distance piece from the shaft.
- 18 Remove the bottom cover and joint washer from the casing.
- 19 Withdraw the three Allen screws and spring washers and lift off the bollard cap.
- 20 Remove the set bolt, spring washer and plain washer from the end of the bollard shaft; drift out the safety pin securing the bollard to the shaft and remove the bollard.
- 21 Remove the thrust washers and shims, which should be preserved and withdraw the worm wheel and shaft from the casing.
- 22 Remove the circlip securing the worm wheel and press the shaft from the wheel; if necessary, remove the peg and key from the shaft.
- 23 If necessary, press the two bollard shaft bushes from the casing; remove the worm shaft oil seal from the casing; remove the roller retaining circlip, a distance washer, the roller bearing, and a further washer; remove the grease nipple, the breather cup and the thrust washer peg, leaving the bare casing.
- 24 Wash all the component parts thoroughly and lay them out for inspection.
- 25 Check all the bearings for wear and damage and renew them as necessary.
- 26 Check the gears for damage marks and rectify or renew them as necessary; the gears must only be renewed as a pair.
- 27 Examine the casing for signs of damage or cracks and renew as necessary. The casing may also be scrap as a result of excessive wear in a bearing bore; such wear will be obvious during the course of assembly.
- 28 The bollard and shaft are only supplied as an assembly.
- 29 Assemble the unit by reversing the stripping procedure, paying particular attention to the following points:-
- 30 The roller bearing must be a PUSH FIT in the casing and on the work shaft. The ball bearing must be a LIGHT PRESS FIT in the casing and on the worm shaft.  
Renew the bearings, casing or shaft as necessary.
- 31 If necessary, renew the bollard shaft bushes, which must be a PRESS FIT in the casing and a SLIDING FIT on the bollard shaft. They must be reamed to 1.312 in. (33.4 mm).  
The upper bearing must stand ¼ in. (3 mm) proud of the top face of the casing.
- 32 The bollard shaft must be well greased on assembly.
- 33 The worm shaft oil seals must be replaced with their knife edges inwards.
- 34 The worm shaft must be able to turn quite freely, but no end-float must be present.
- 35 The shims between the bollard thrust washer and the casing, available .005 in. thick, are provided for adjustment of the bollard shaft end-float, which must be set on assembly to .003 in. to .005 in. (0.07 to 0.12 mm).
- 36 If necessary, renew the bushes in the rope guide brackets.  
The old bushes may be removed by screwing a suitable size tap into the bearing and then extract; a thrust washer is fitted behind each bush.  
The new bushes must be a LIGHT PRESS FIT in the brackets. The guide bar must be able to rotate freely in the bushes, which must be reamed in position to 1.390 in. (35.3 mm).
- 37 If necessary, renew the drive shaft bush in the shaft housing. The bush must be a PRESS FIT in the housing. After fitting, ream the bush to .750 in. (19 mm) and drill the lubrication hole through the nipple side of the bush. The drive shaft must be a SLIDING FIT in the bush.
- 38 If necessary, renew the two control shaft bushes in the housing, the bush on the studded side of the housing should stand 3/32 in. (2 mm) proud of the housing face.
- 39 Complete the assembly and installation. Fill the winch with oil. 3½ pints (2.0 litres). Apply grease at the nipples on the rope guide, bollard shaft and drive shaft housing. Smear all moving parts liberally with grease.