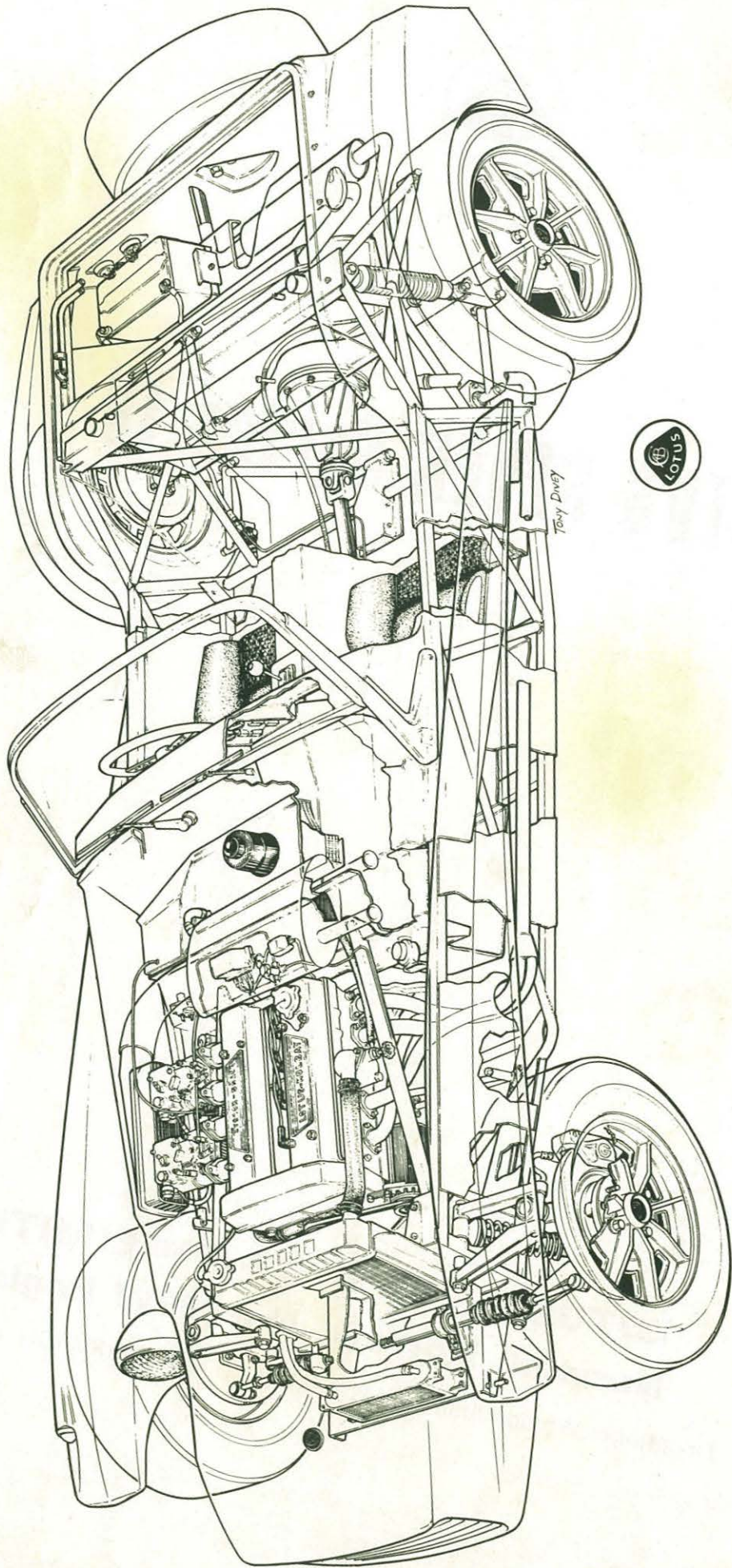




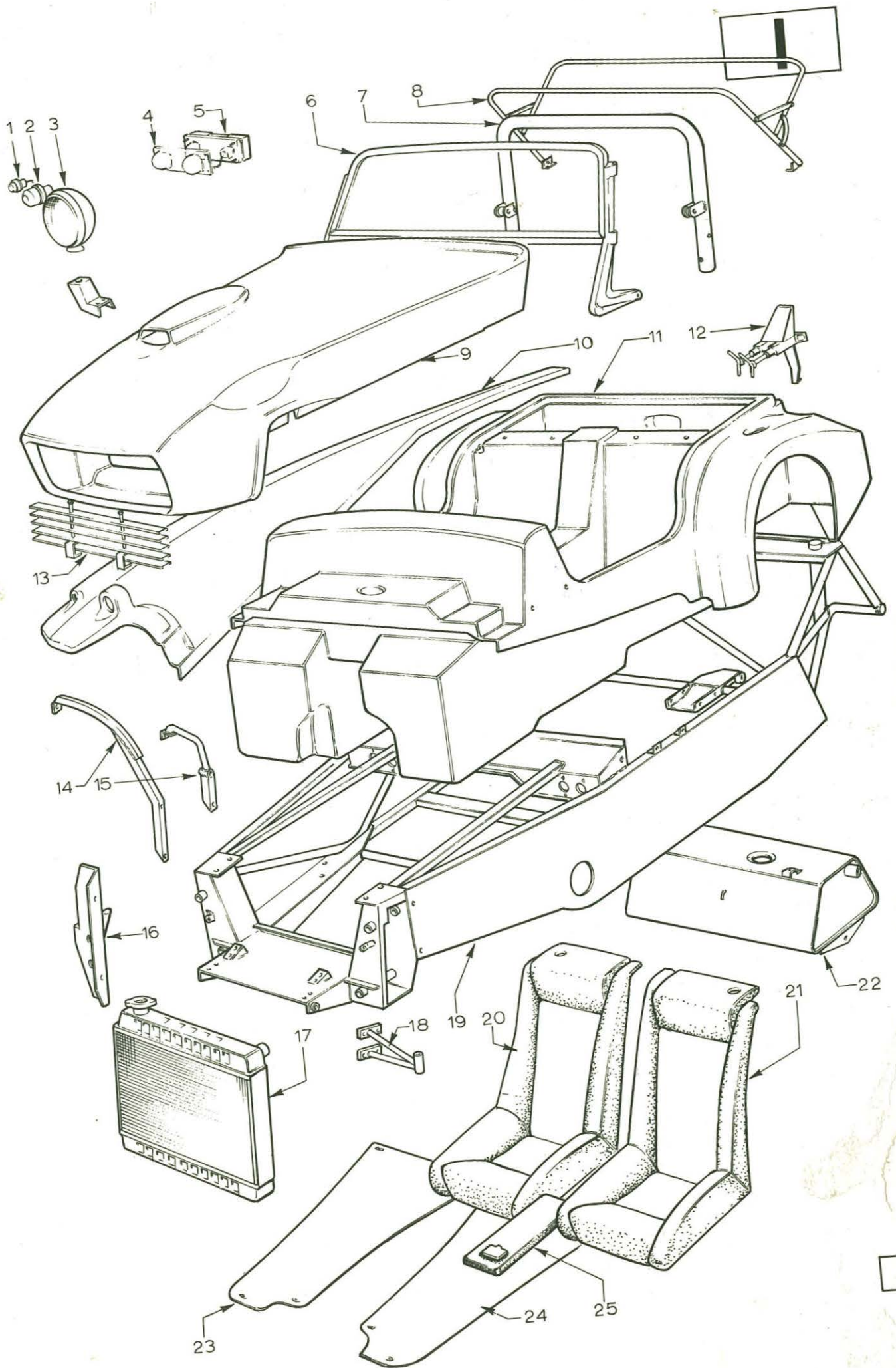
# LOTUS SEVEN Series IV

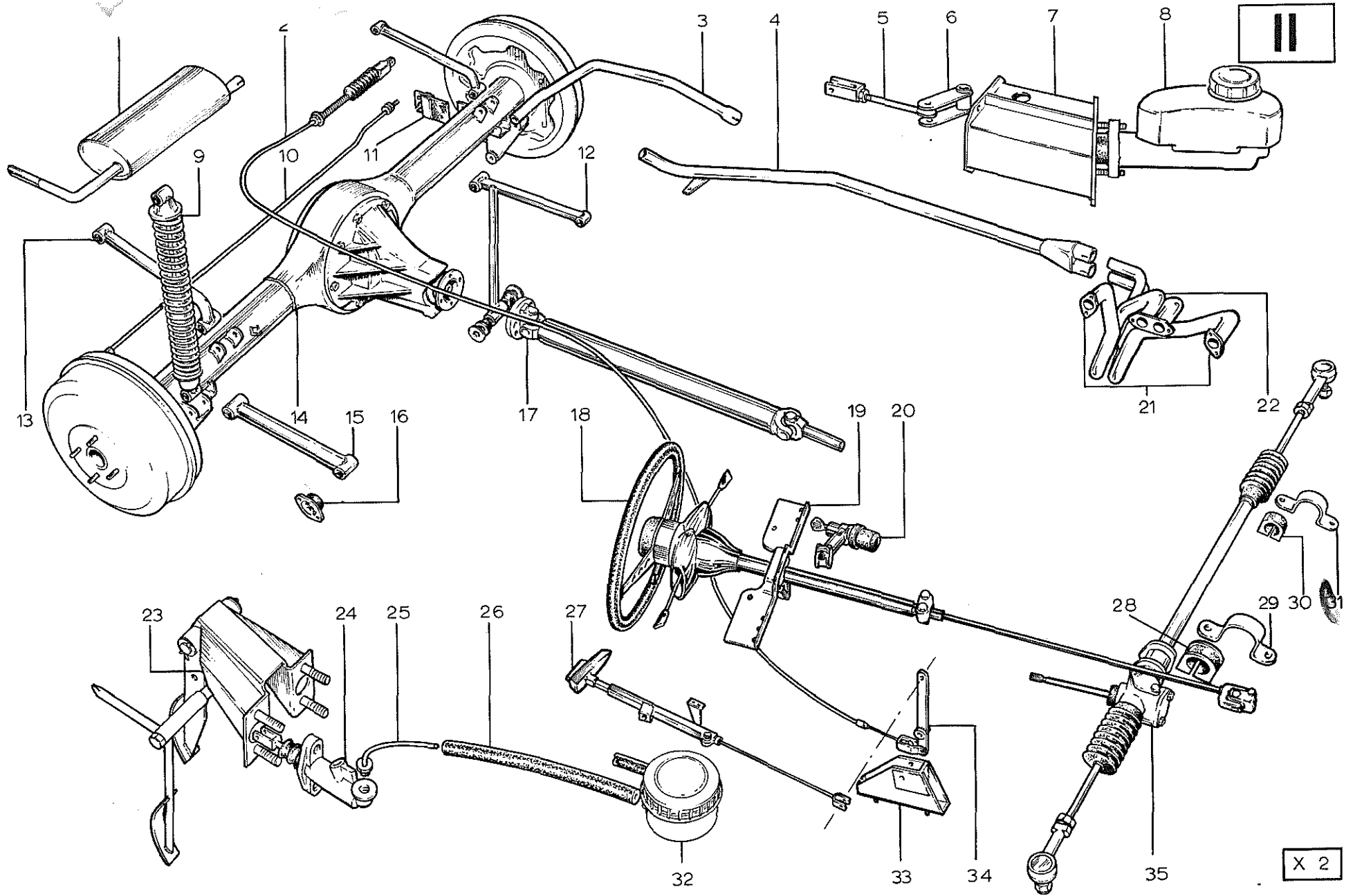
**LOTUS CARS (SERVICE DIVISION) LIMITED**  
**Norwich Norfolk, Nor. 92W England**

Telephone: Wymondham 3411. Cables: LOTUS, NORWICH Telex: 97401



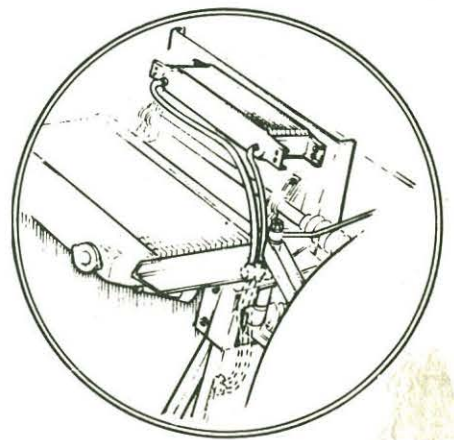
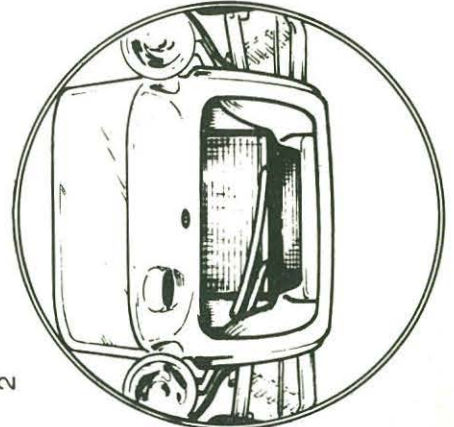
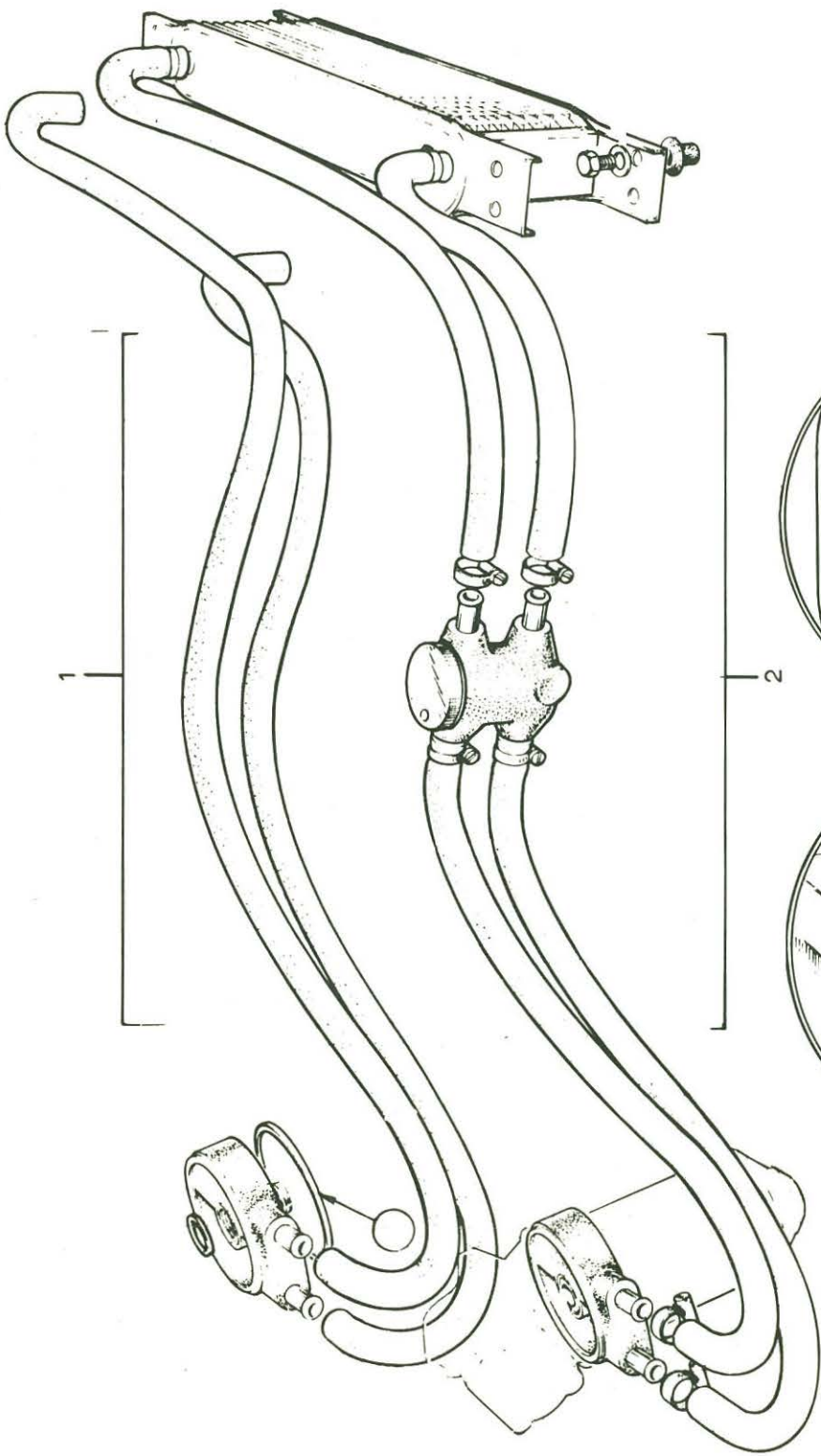


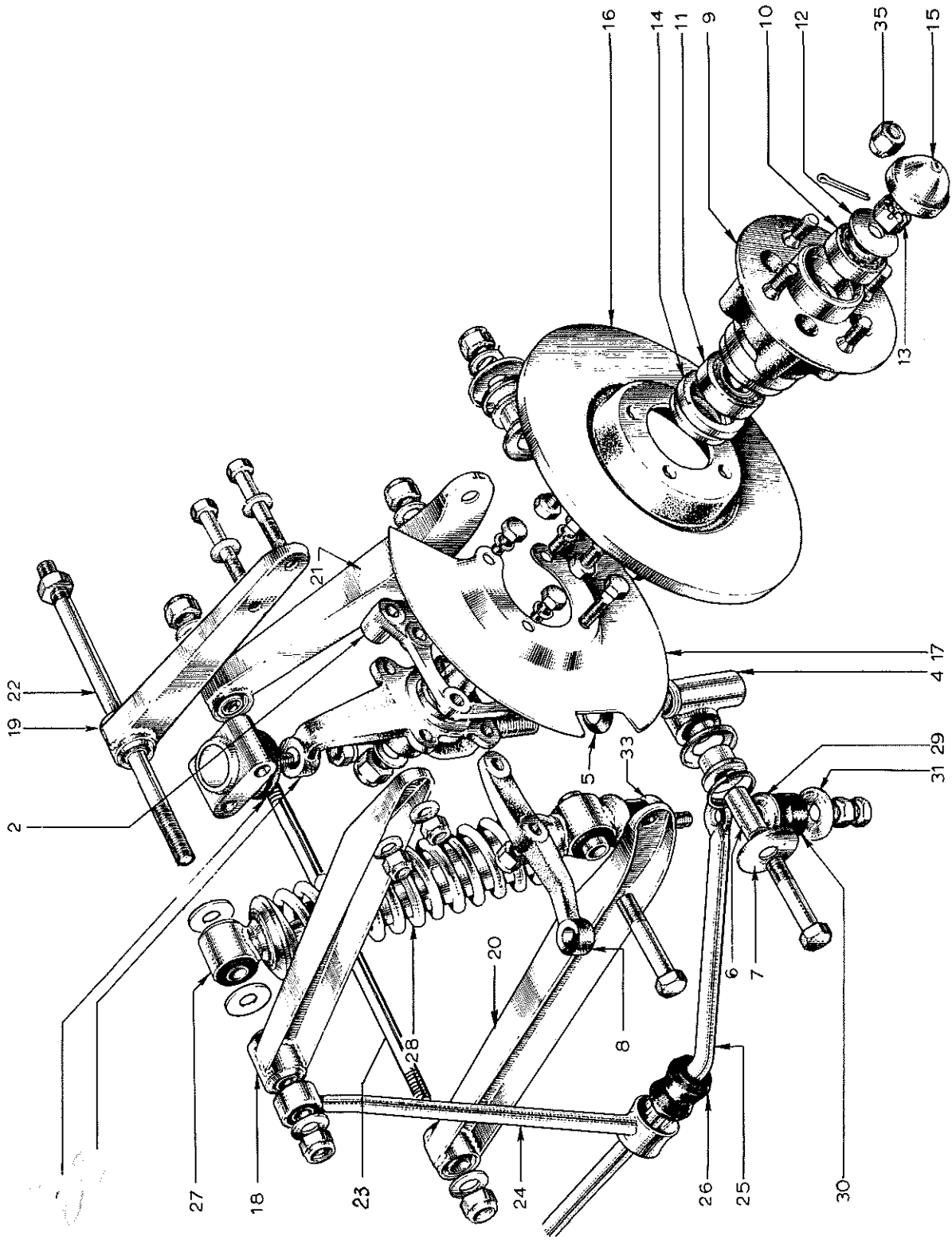




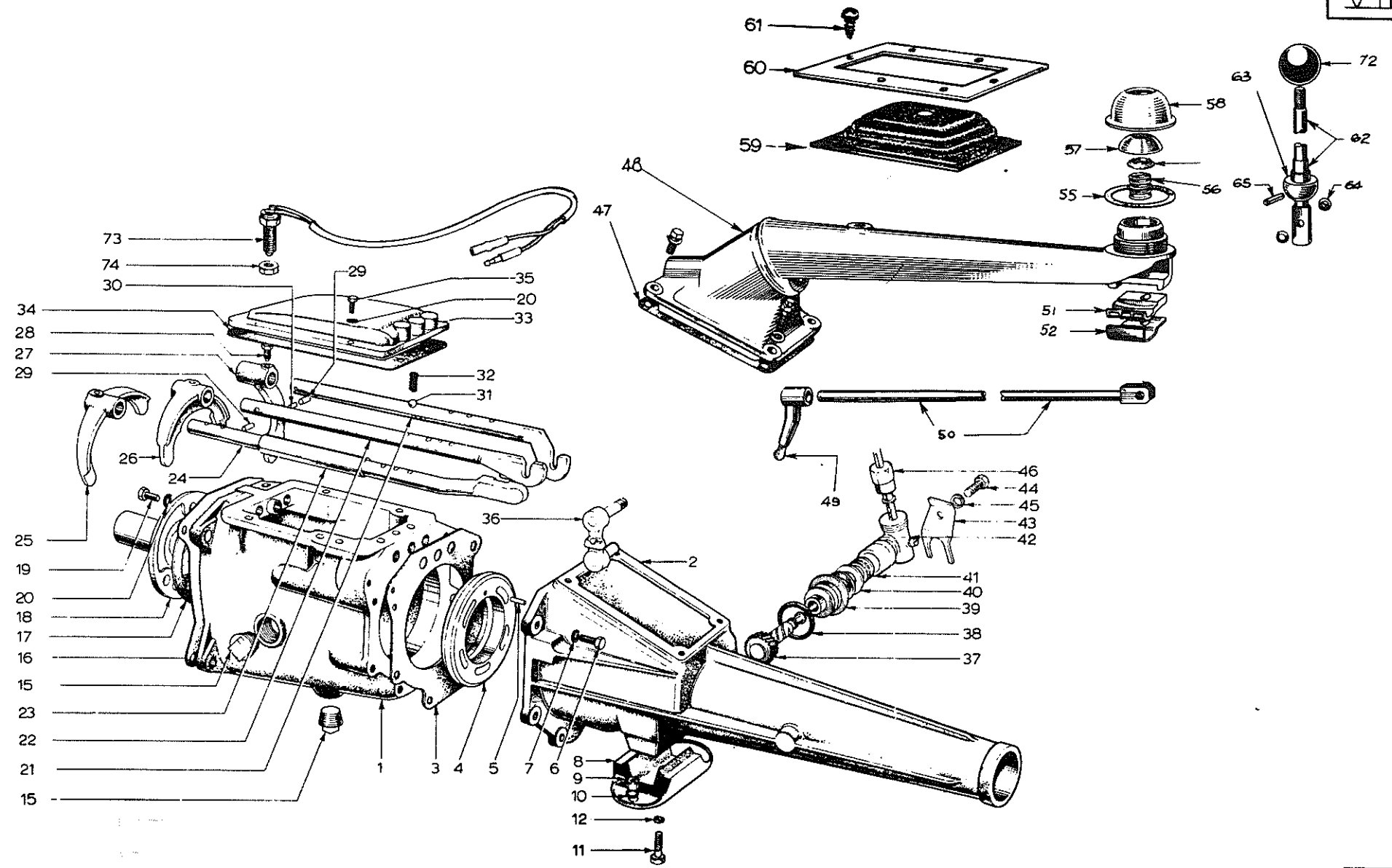
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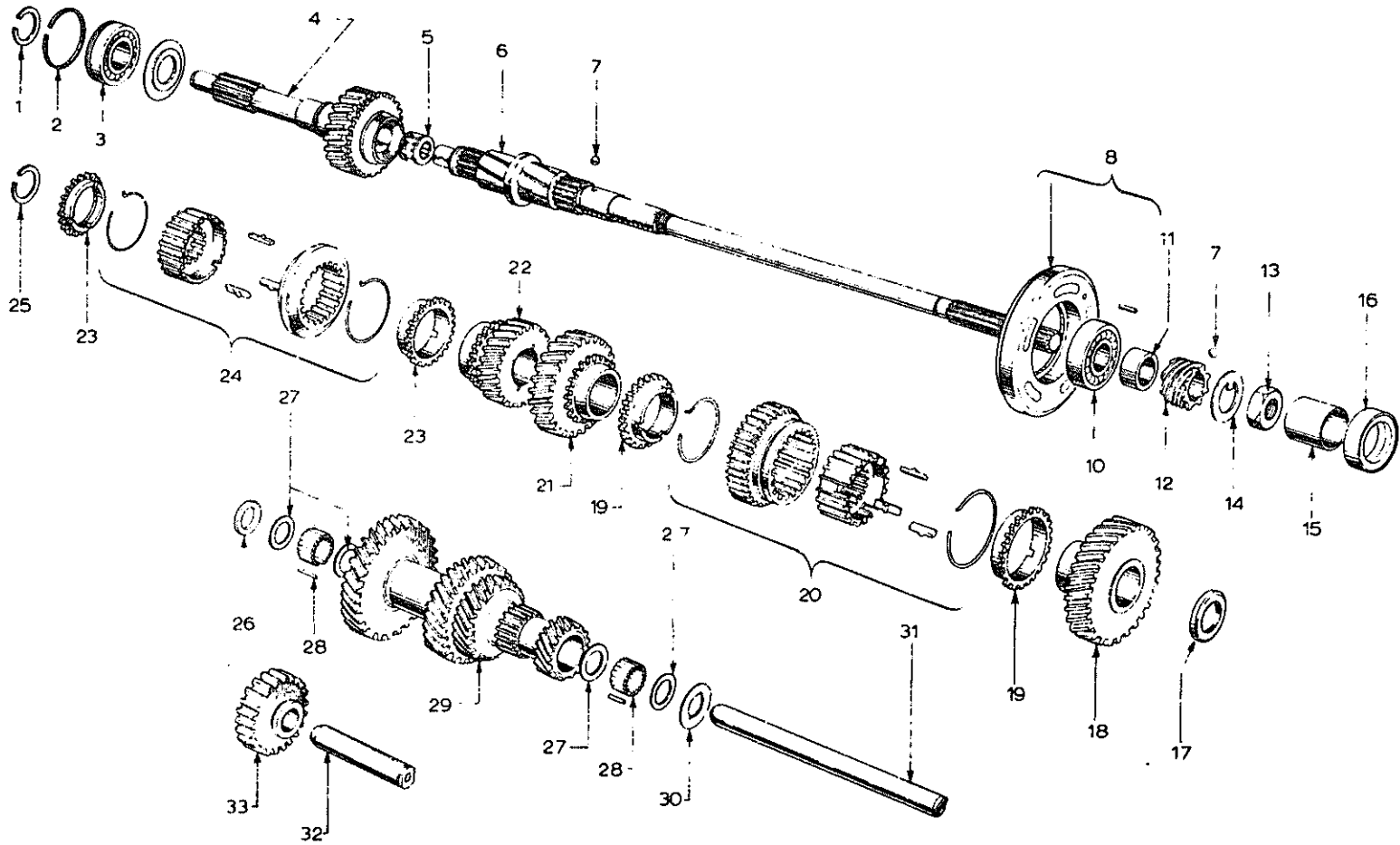
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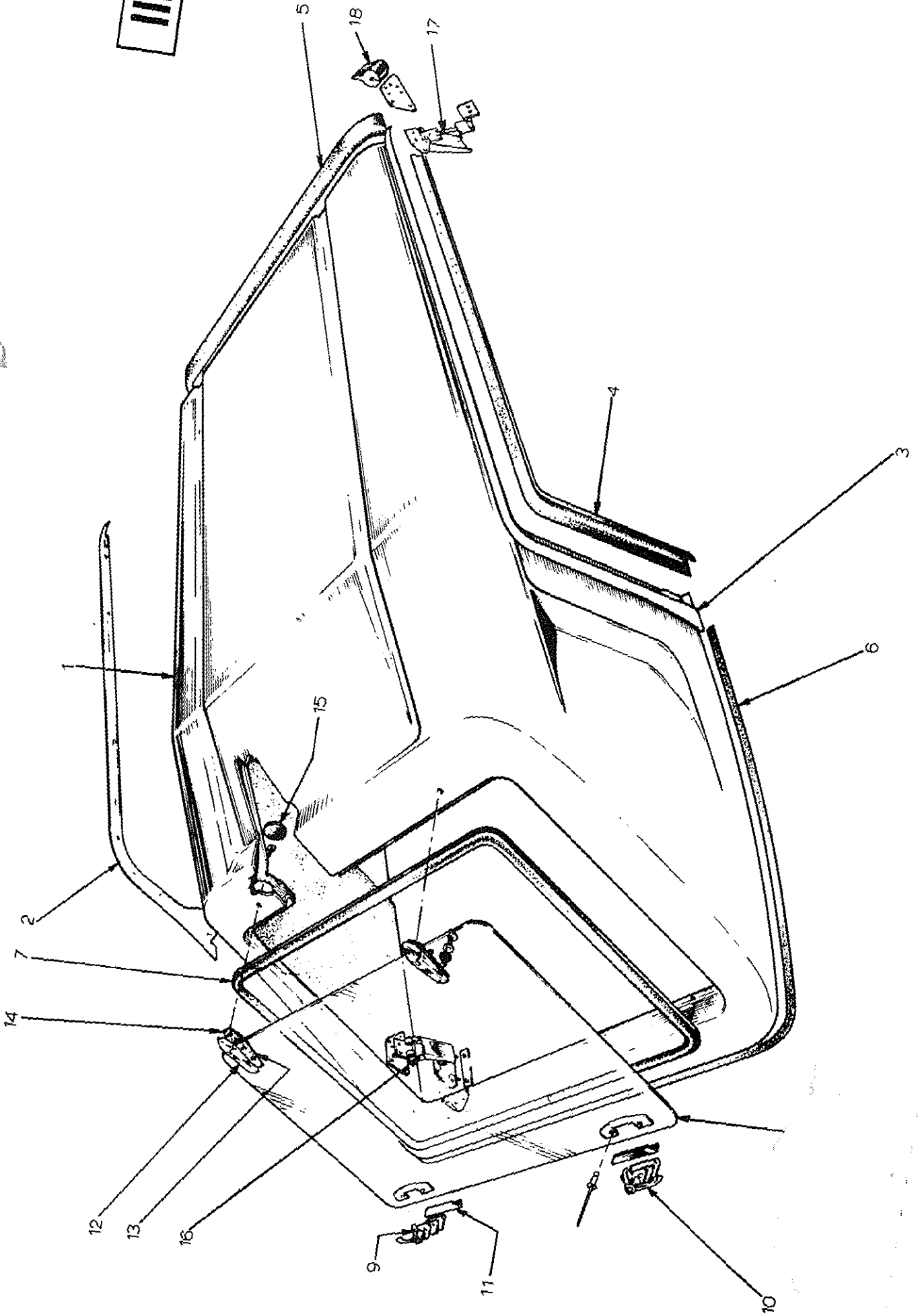






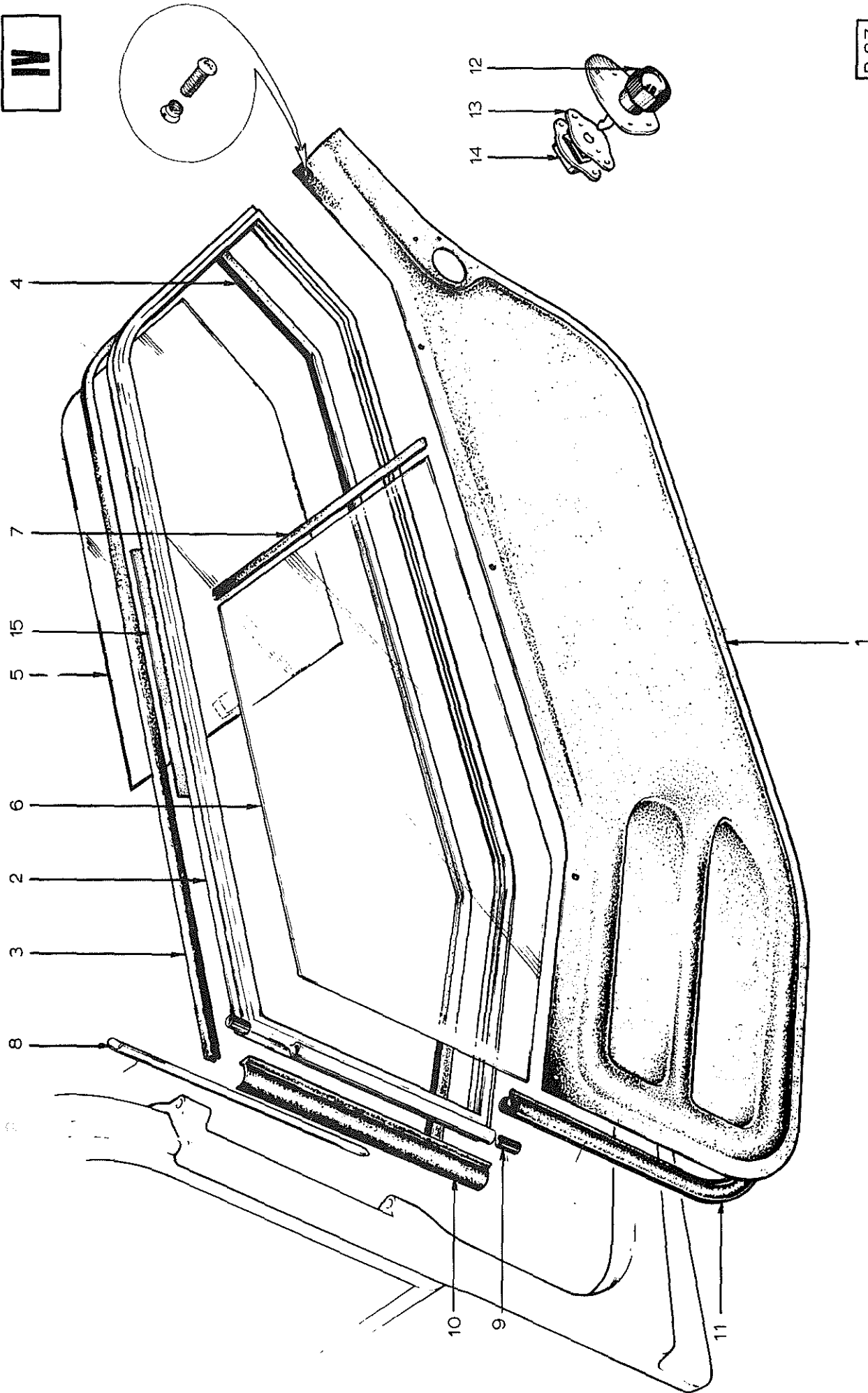


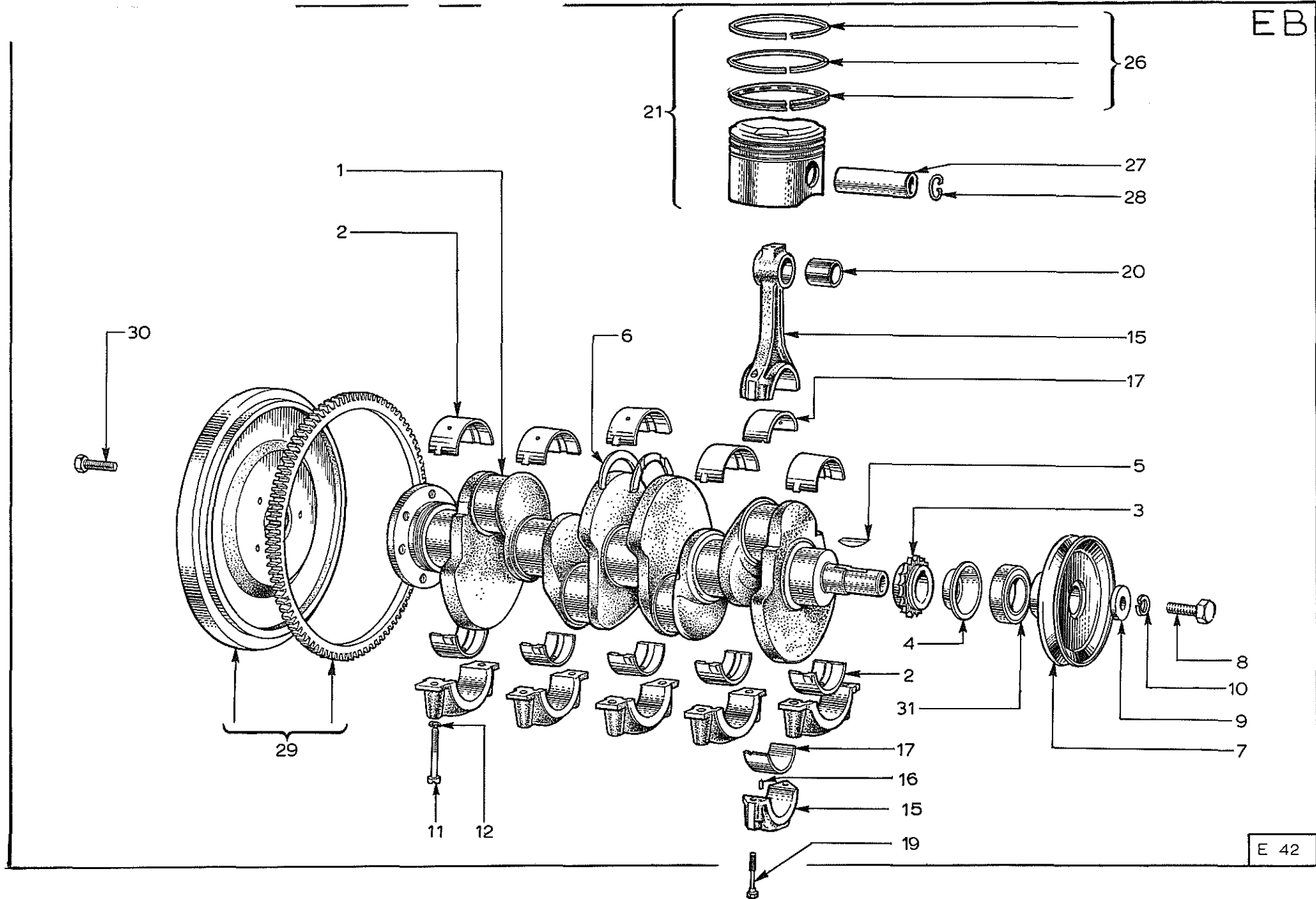
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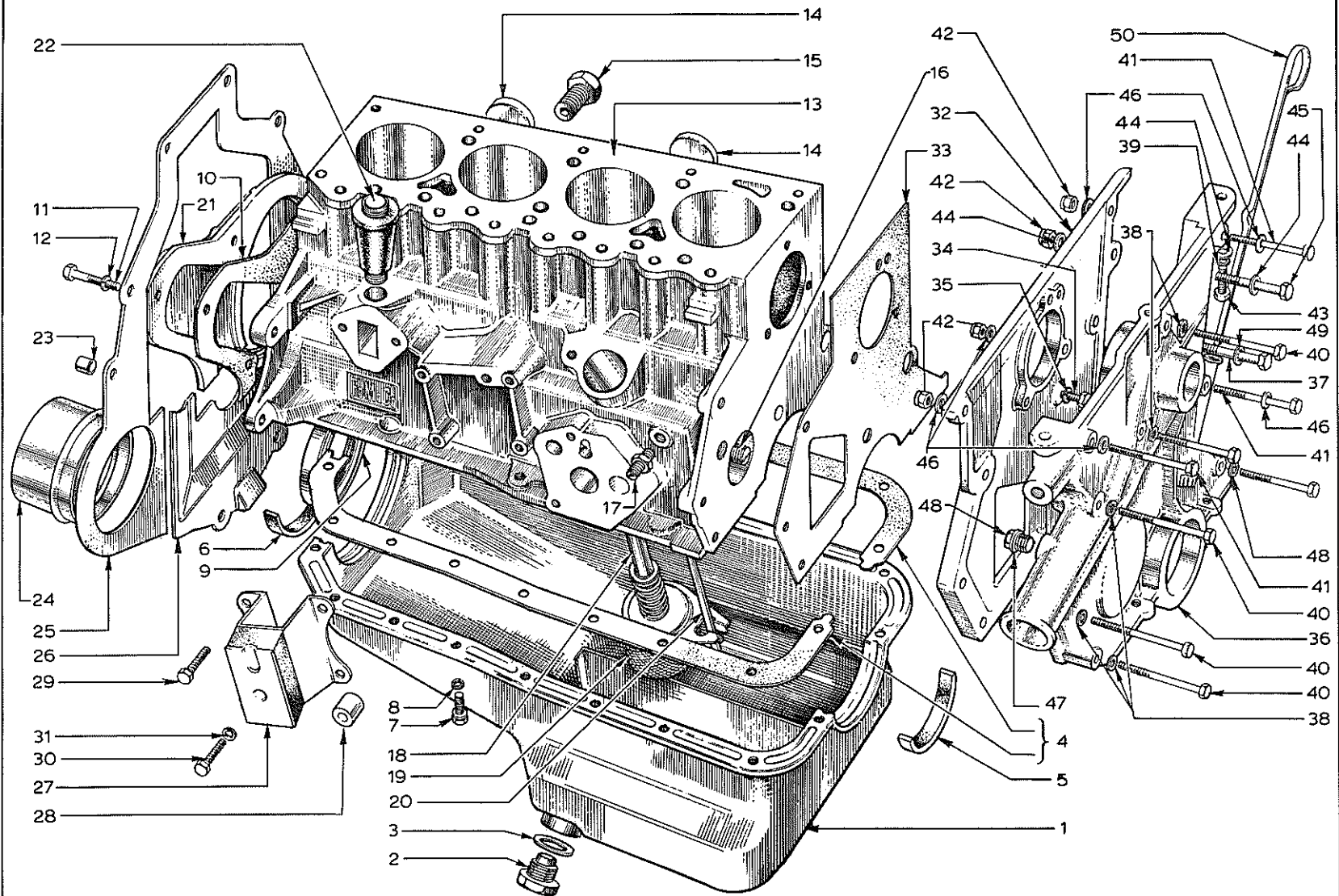
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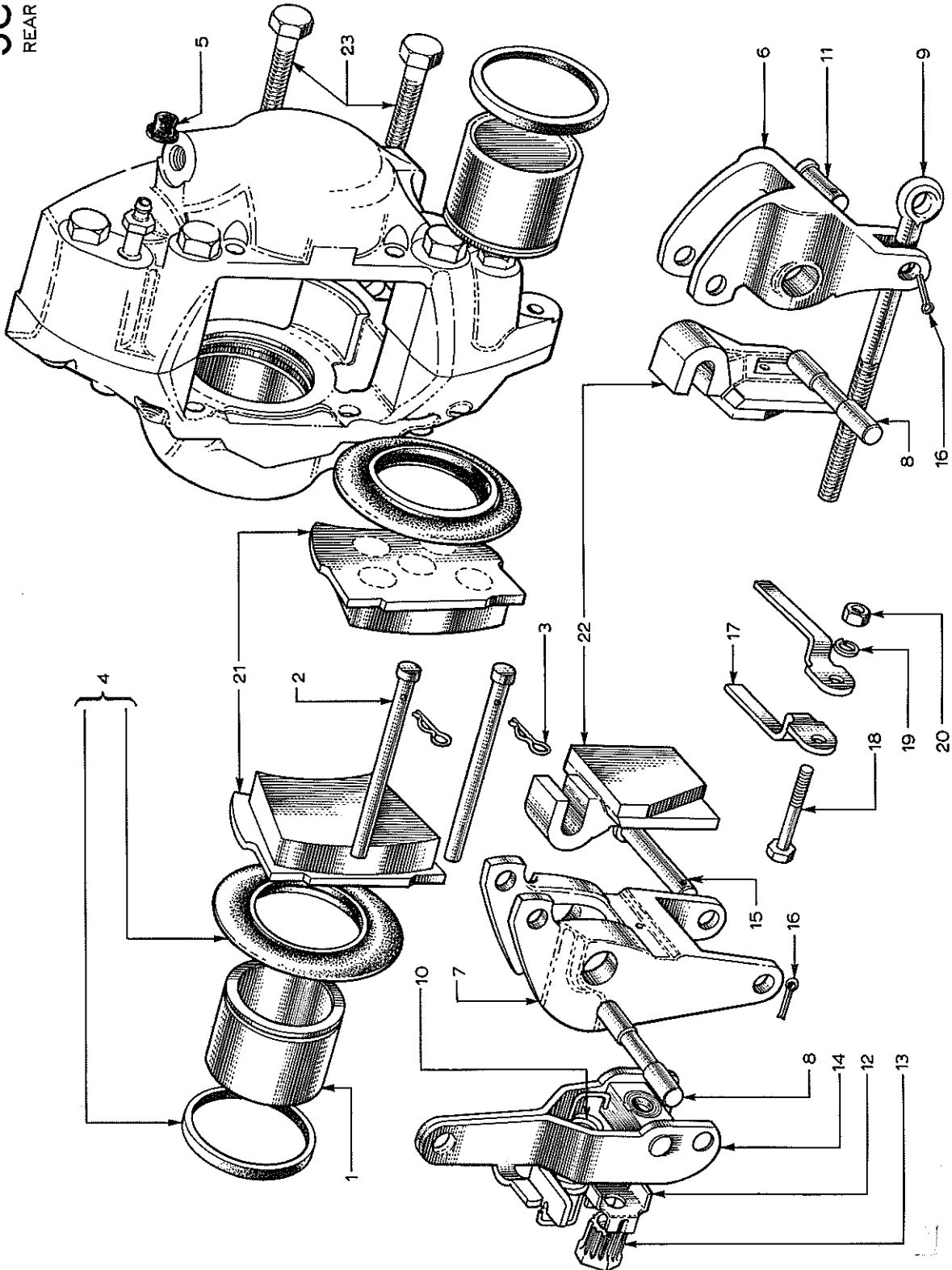


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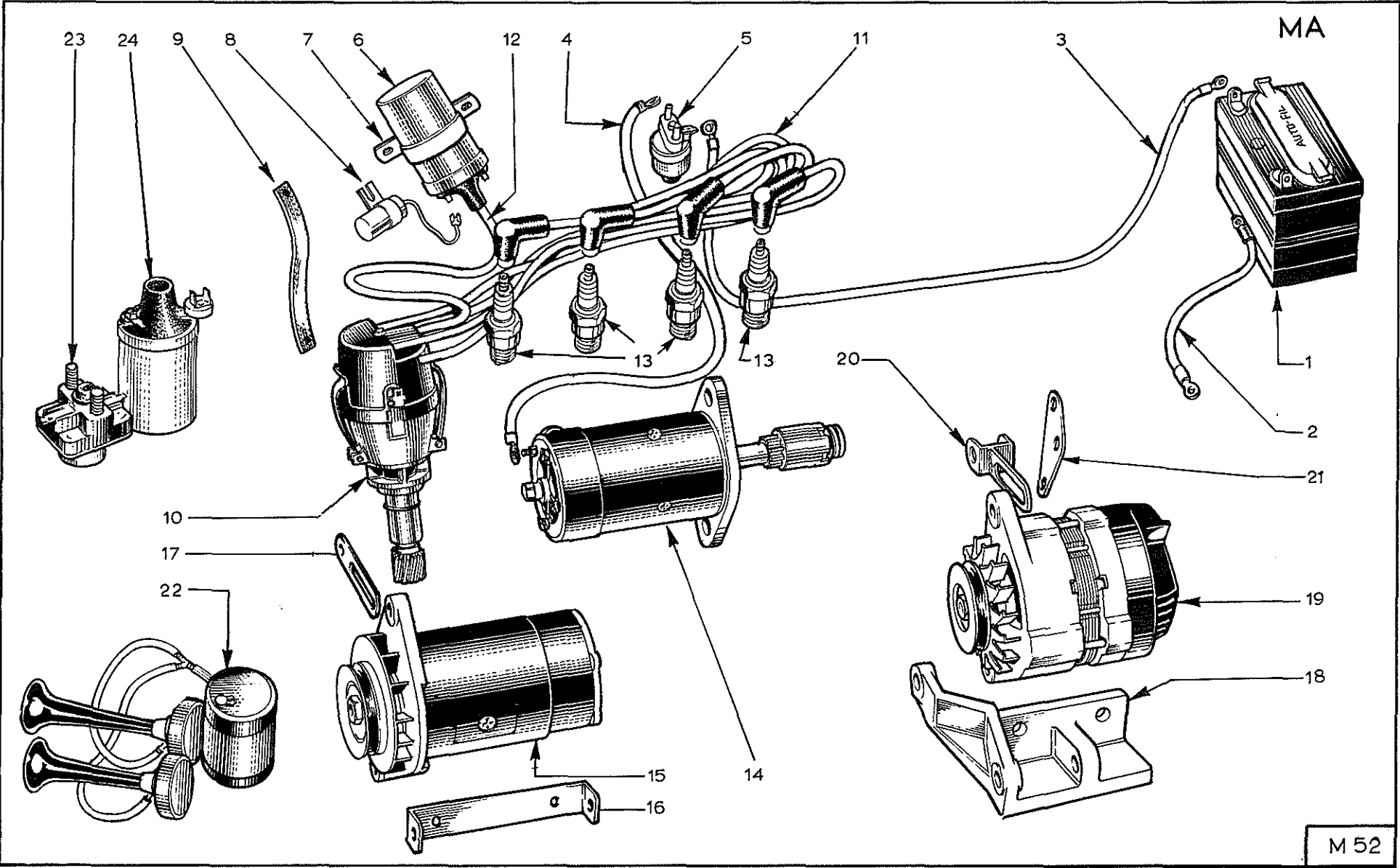


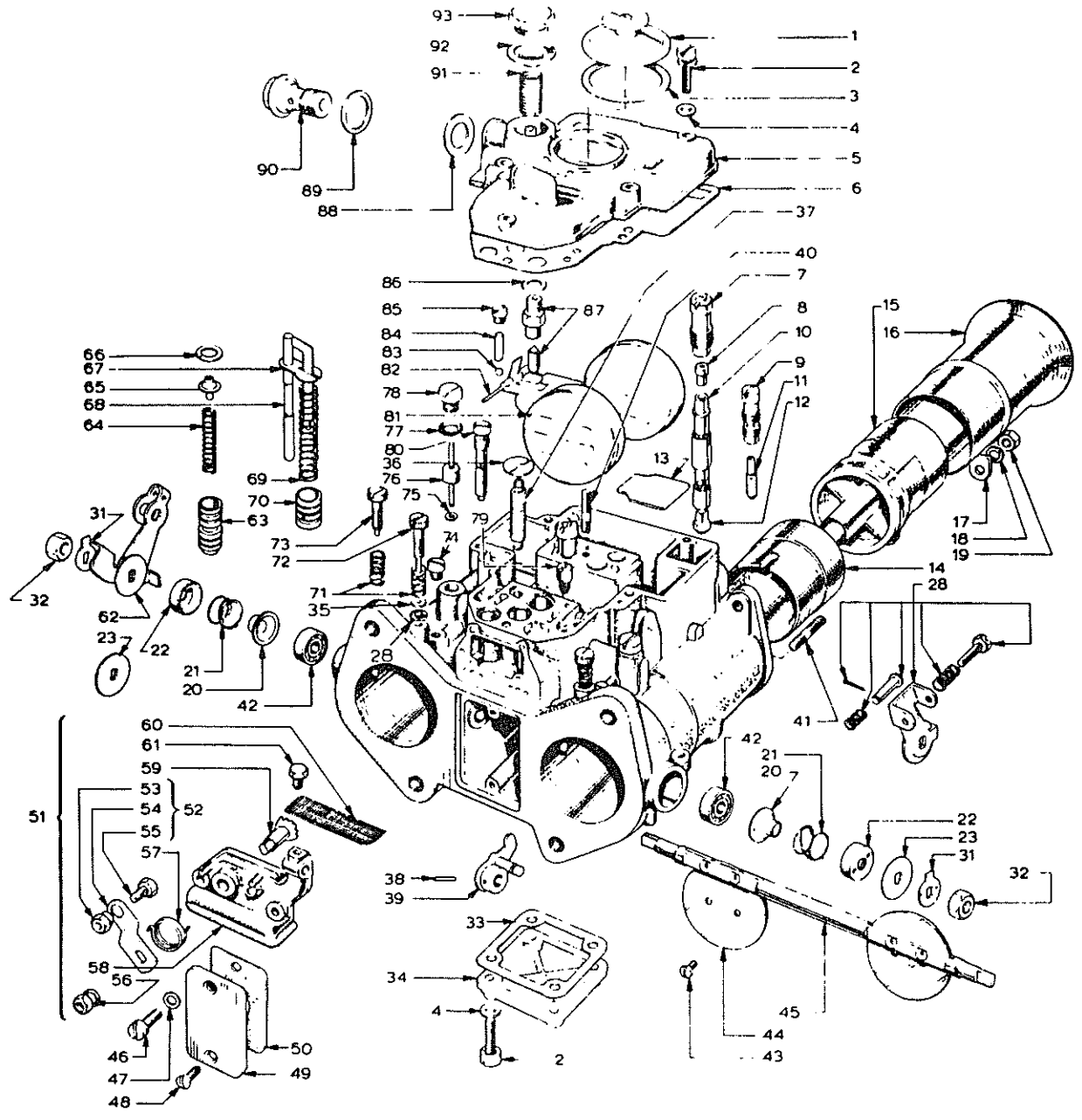


JC  
REAR

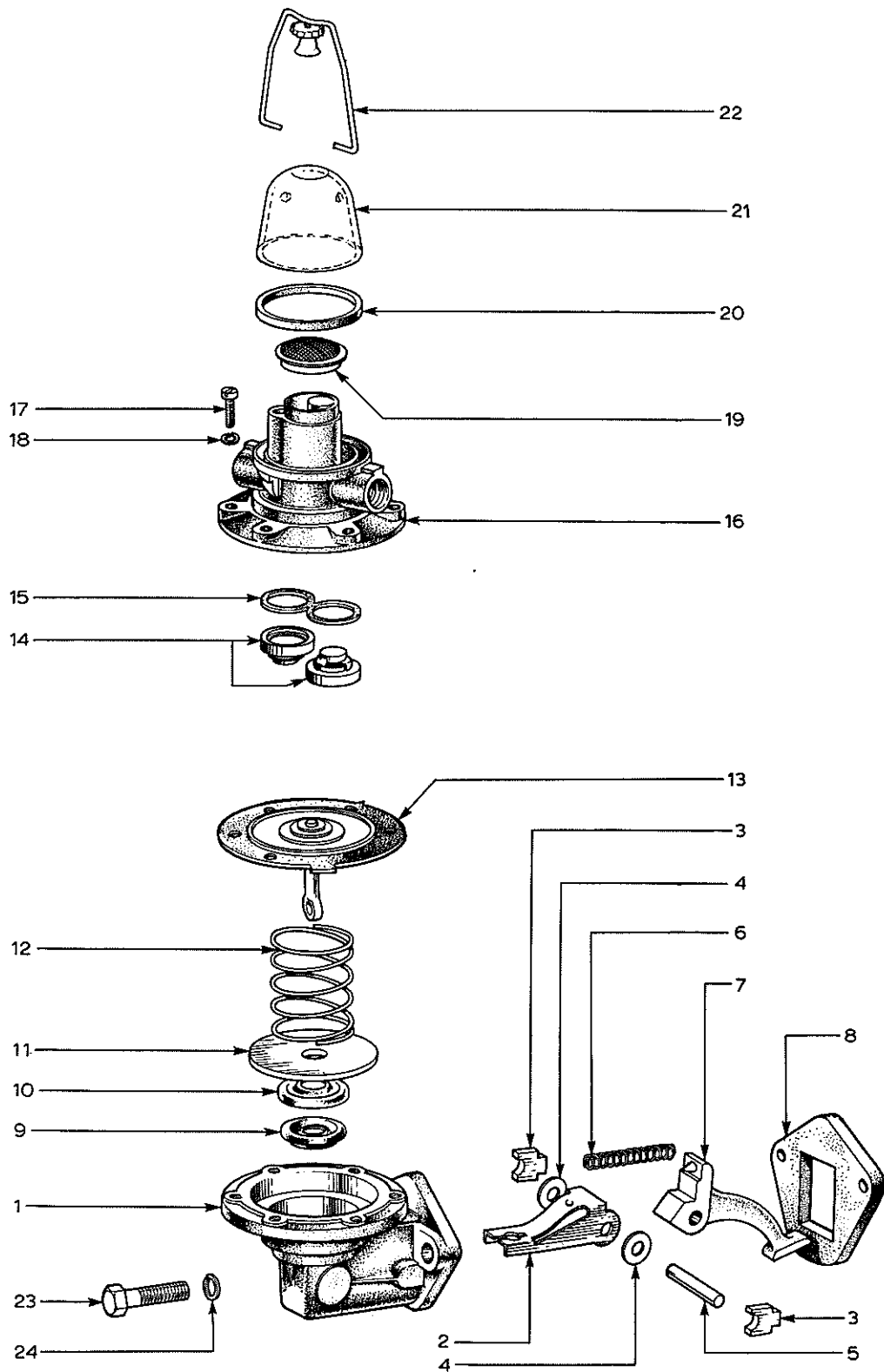


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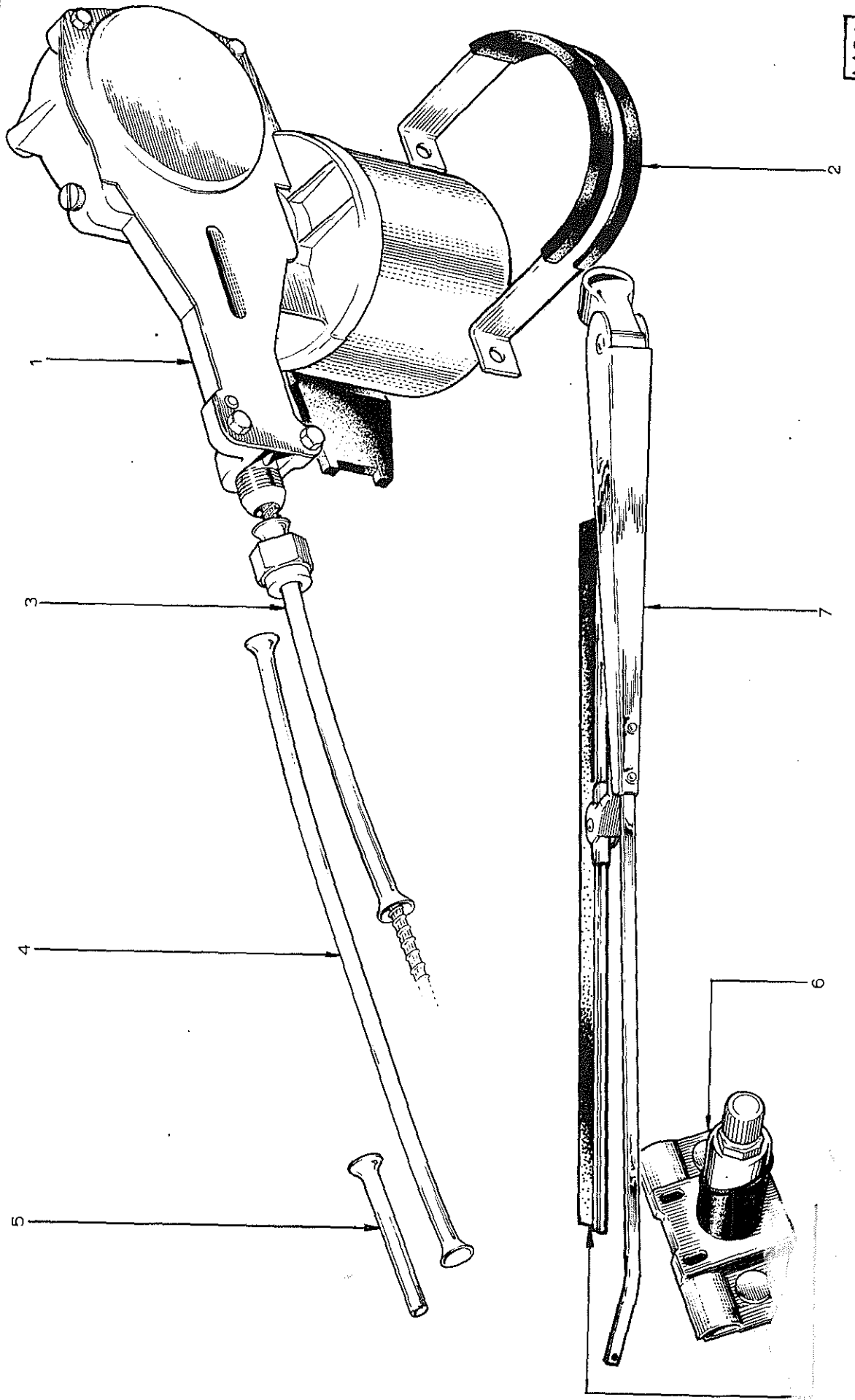
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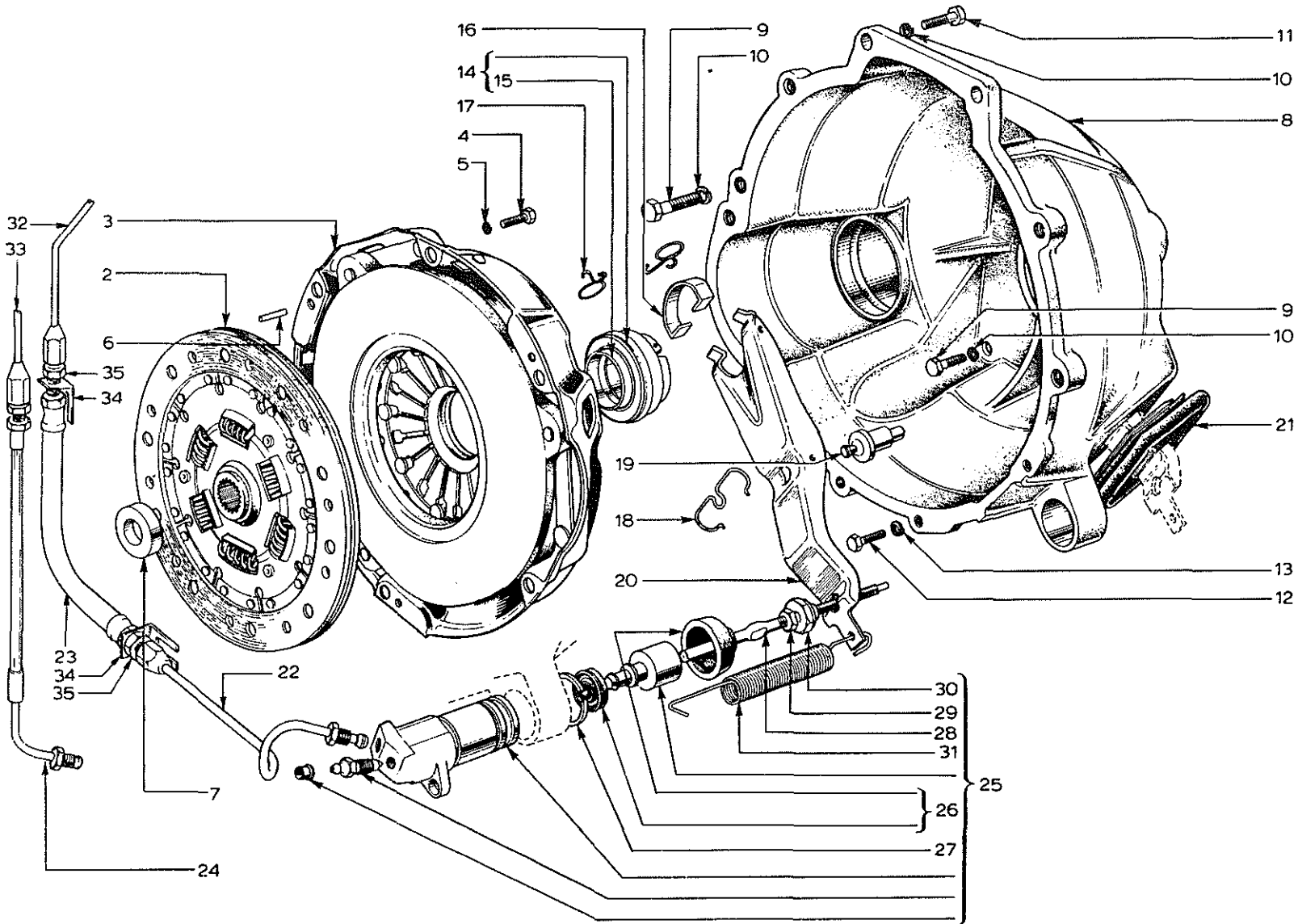


VIII

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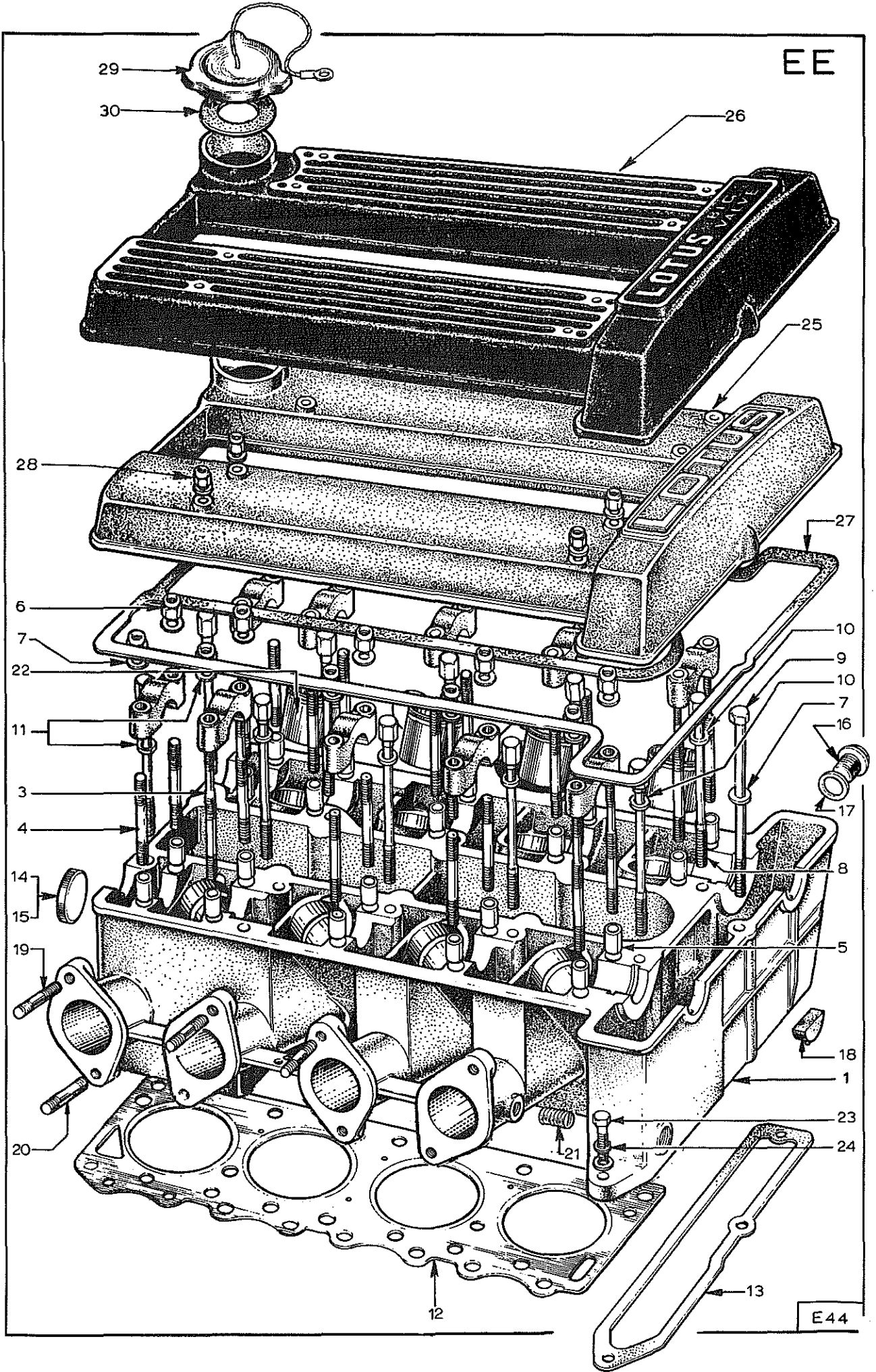


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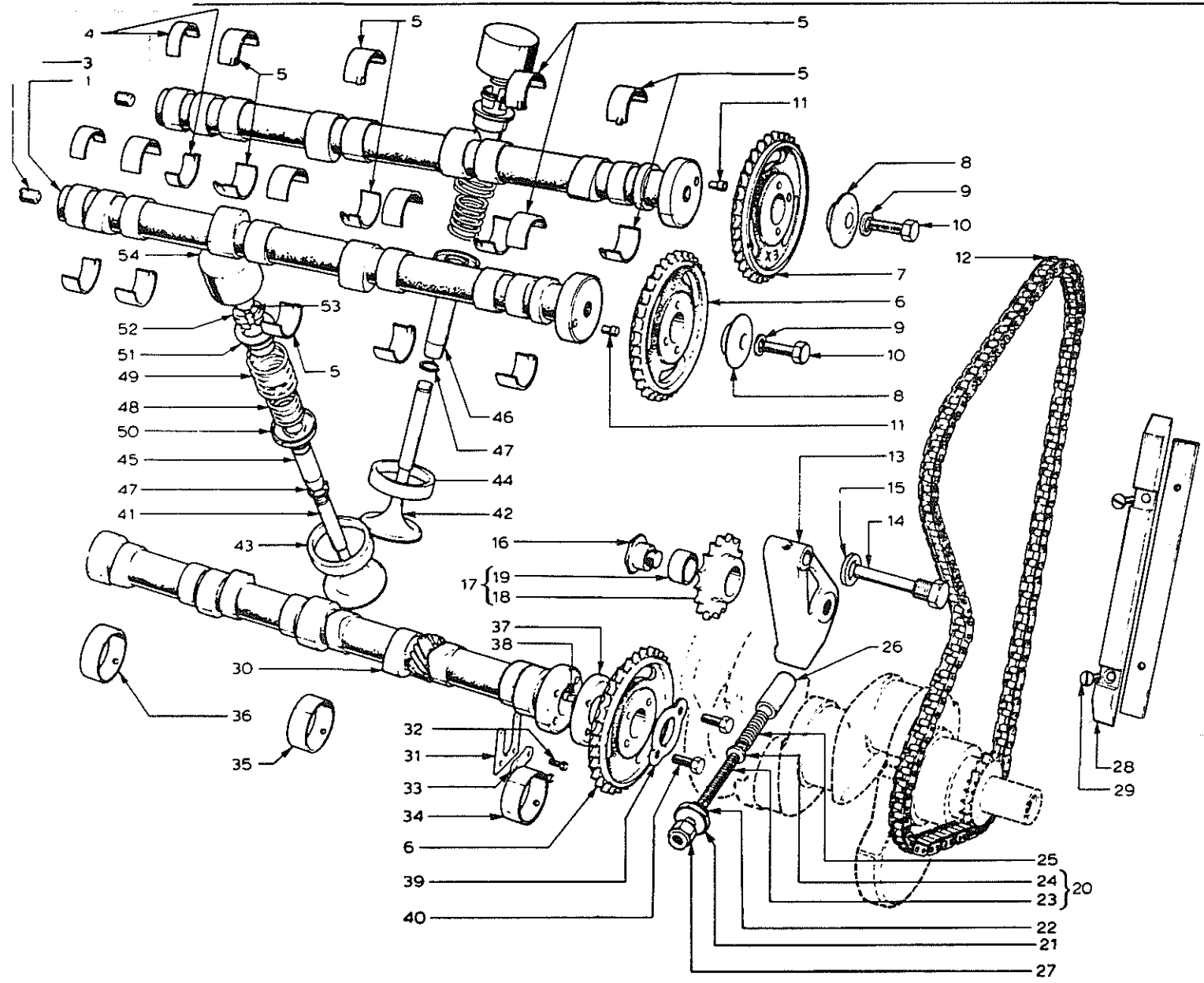


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EE



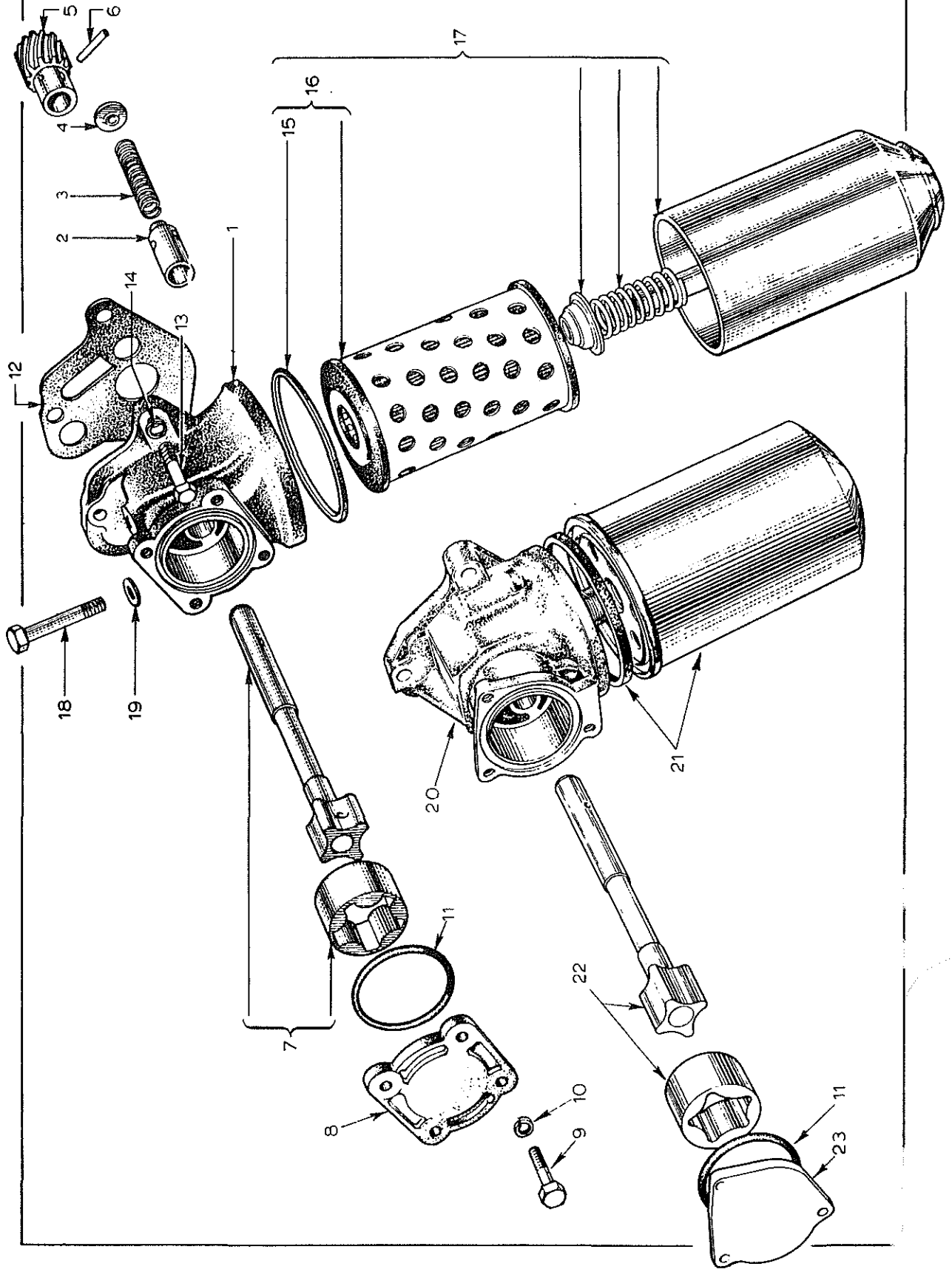
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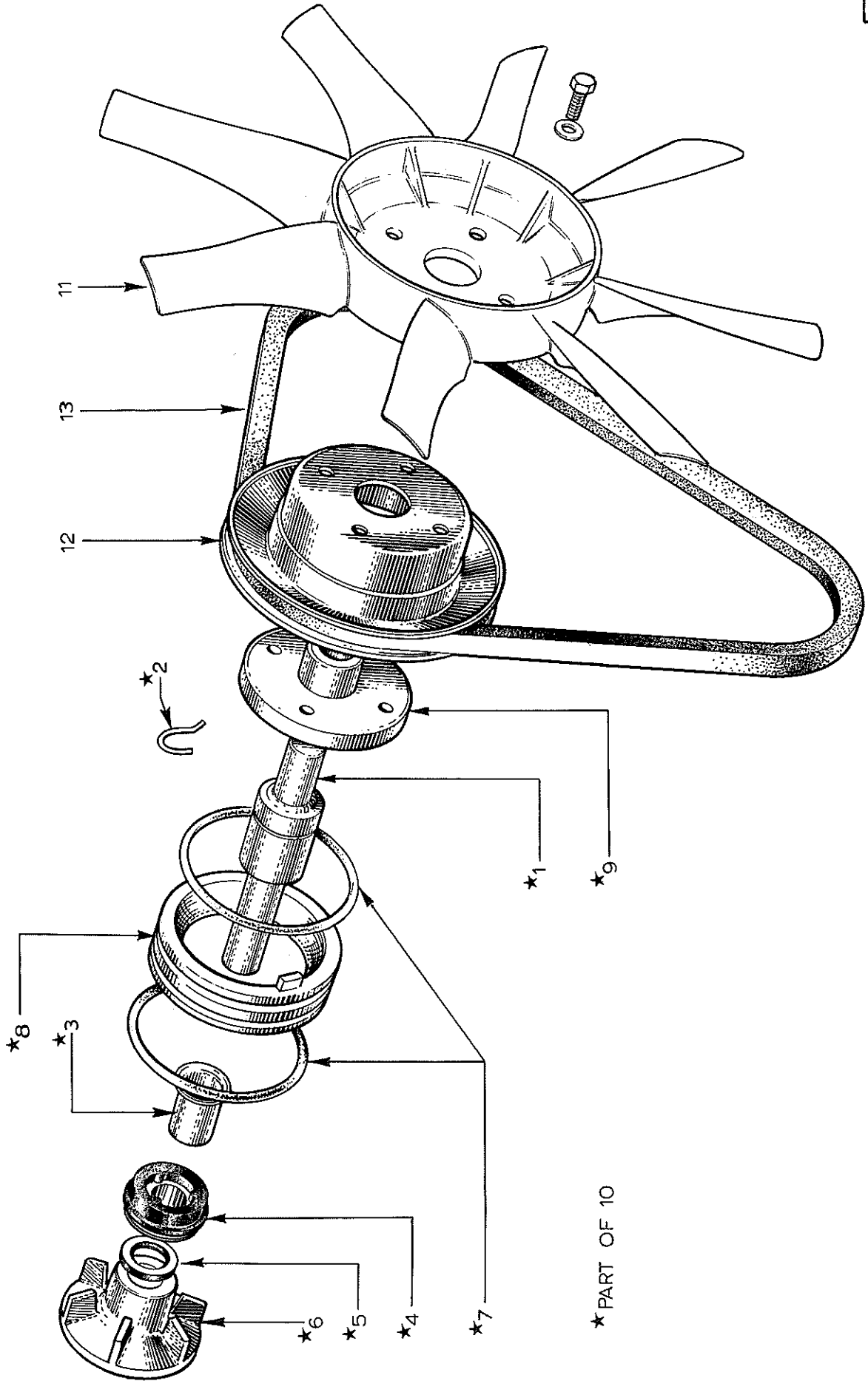




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\* PART OF 10

## INTRODUCTION

This publication is a combined Service Parts List/Service Notes. It is NOT intended as a Workshop Manual but as an Owner's guide to the removal and replacement of the main units.

Three engine types are used in production, these being:-

Lotus Twin-Cam

Holbay Clubman

Ford Cortina GT

Only the Lotus Twin-Cam engine with its associated parts will be fully described (See also Section 'E' of the Parts List). For details of the other engines apply to their manufacturers.

The gearbox is common to all models and is fully described.

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PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
			<u>CHASSIS</u>		
I	19	A007 A 4000	Chassis Assembly	1	
VI	23	046 A 0012	Pin - Lower Wishbone	2	
		A007 A 2001	Mounting Plate - Control Box	1	
		A007 A 2002	Mounting Bracket - Fuse Box	1	
		A007 A 4100	Handbrake Pulley	1	
		A007 A 4015	Mounting Bracket - L.H. Brake Hose	1	
		A007 A 4026	Mounting Bracket - R.H. Brake Hose	1	
			<u>BODY</u>		
I	9	A007 B 4005	Bonnet (Hood)	1	
		A050 B 2000	Bush - Bonnet Hinge	2	
		A036 B 1925	abrasive Washer	8	
		128 CA	washer - Thin	4	
		128 D	Washer - Thick	8	
		22 A	Nut - $\frac{3}{4}$ " UNF	2	
		A007 B 4133	Buffer	2	
		A007 B 4025	Hinge Pin - Bonnet	2	
		122	Washer	2	
		215	Nut	2	
			Blanking Mould - Air Intake	1	German Only
			Pop Rivet	3	
		026 B 0269	Nose Badge	1	)
		102	Nut	2	) Badge to Bonnet
		205 AA	Washer	2	)
I	13	A007 B 4031	Radiator Grille	1	)
		A007 B 4129	Grommet	2	Grille To Body
I	26	A007 B 4015	Headlamp Mounting Bracket	2	
		8	Bolt	6	
		114	Washer	6	
		118	Washer	6	
		116	Washer	2	
		A007 B 4032	Bonnet Stay	1	
		A007 B 4035	Bracket - Stay	1	
		026 B 6009	Pop Rivet	5	
			Grommet	2	
		036 B 6155	Clip	1	
		A007 B 4024	Mounting Plate - Bonnet Striker	1	
		050 B 1508	Striker Pin	1	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		216	Nut	1	
		050 B 6126	Spring - Bonnet Release	1	
		050 B 6128	Cup - Spring Retaining	1	
		2A	Bolt	2	
		110	Washer	2	
		106	Washer	2	
		A007 B 4141	Mounting Plate - Bonnet Catch	1	
		050 B 1509	Slide - Bonnet Catch	1	
		050 B 1502	Plate - Slide Retaining	1	
		XUFS 0408	Bolt	2	)
		106	Washer	2	) Retainer to Mounting Plate
		050 B 1874	Spacer	2	)
		A007 B 4138	Release Lever - Bonnet	1	
		A007 B 4174	Bush - Release Lever	1	
		XUFB 0432	Bolt	1	
		208	Nut	1	
		110	Washer	1	
			Mushroom Buffer - Rear Bonnet	2	
		A007 B 4199	Front Wing - L.H.	1	)
		A007 B 4200	Front Wing R.H.	1	) Early Cars No Indicators
		A007 B 4143	Front Wing - L.H.	1	
I	10	A007 B 4144	Front Wing - R.H.	1	
		XL 3/81	Beading - Wing to Body	2	
I	14	A007 B 4029	Wing Stay	2	
			Trim Seal 1" x 1/8" x 14"	2	
		A007 B 4027	Wing Stay - L.H.	1	
I	15	A007 B 4028	Wing Stay - R.H.	1	
		323 A	Screw	4	)
		131	Washer		)
			Rubber washer - 3/16 1/D	4	) Wing to Stays
			Rubber Washer - 1/2 1/D	AR	)
		283	Nut	4	)
		6BL	Bolt	4	)
		1	Bolt	4	)
		110	Washer	8	)
		108	Washer	8	)
I	11	A007 B 4192	Body Assembly	1	
		32B	Bolt	2	)
		128	Washer	4	)
		37A	Bolt	1	)
		XUFB 0864	Bolt	1	)
		219	Nut	2	)
		129	Washer	9	)
		A007 B 4201	Spacer	1	)
		XUFB 0728	Bolt	1	)
		XUFB 0720	Bolt	1	)
					) Body to Chassis and Upper Radius Arms

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		129	Washer	2	)
		A007 A 4032	Spacer	1	) Body to Lower Seat Member
		13C	Bolt	2	)
		209 A	Nut	2	)
		211 A	Washer	4	) Body to Gearbox Member
		118	Washer	AR	)
		XUFB 0432	Bolt	2	)
		110	Washer	2	)
		113	Washer	2	) Body to Footwell
		208	Nut	2	)
		A007 B 4136	Tape - Sealing	AR	)
I	(	A007 B 4006	Windscreen	1	
	6 (	A007 B 4017	Side Pillar Casting - L.H.	1	
	(	A007 B 0018	Side Pillar Casting - R.H.	1	
			Screw	6	Pillars to Windscreen
		34S	Screw	4	)
		122	Washer	5	)
		423A	Nut	4	) Pillars to Body and Chassis
			Screw	2	)
		113	Washer	2	)
		208	Nut	2	)
		A007 B 4189	Sidescreen L.H. Complete	1	
IV		A007 B 4188	Sidescreen R.H. Complete	1	
		A007 B 4202	Sidescreen Frame L.H.	1	
IV	2	A007 B 4203	Sidescreen Frame R.H.	1	
IV	9	A007 B 4061	Bush	4	
IV	8	A007 B 4083	Hinge Pin	2	
IV	6	A007 B 4194	Glass - Front	2	
		A007 B 4195	Glass - Rear L.H.	1	
IV	5	A007 B 4196	Glass - Rear R.H.	1	
IV	3 & 4	A007 B 4197	Felt Channel	4	
IV	7	BV10	Seal	2	
		A007 B 4081	Side Curtain L.H.	1	
IV	1	A007 B 4082	Side Curtain R.H.	1	
IV	11	A007 B 4222	Seal	2	
IV	12, 13, 14	A007 B 4184	Catch - Complete	2	
		A007 B 4182	Gaiter	2	
		A007 B 4154	Side Curtain L.H.	1	)
		A007 B 4155	Side Curtain R.H.	1	) Early Type
		A007 B 4175	Turn Button Plate	2	
		A007 B 4156	Turn Button Plate	2	
		337A	Screw	4	
I	8	A007 B 4157	Hood (Top) Frame	1	
		A007 B 4153	Hood (Top)	1	
		406	Fastener	18	
		400	Cup washer	18	



PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		335A	Screw	4	Hood Frame to Body
		A007 B 4158	Boot Cover	1	
		312	Screw	6	
		400	Cup Washer	6	
I	24	A007 B 4150	Mat - L.H.	1	
I	23	A007 B 4151	Mat - R.H.	1	
		317A	Screw	8	)
		422	Nut	8	)
		406A	Carpet Ring	8	) Mats to Floor
		105	Washer	8	)
		446	Socket	8	)
		447	Ring	8	)
I	20	A007 B 4148	Seat - R.H.	1	
I	21	A007 B 4149	Seat - L.H.	1	
		A007 B 4198	Seat - adjustable	2	
		XUFS 0416	Bolt	4	)
		110	Washer	4	) Runners to Seat
		A007 B 4186	Seat Runner (Latch)	1	
		A007 B 4185	Seat Runner (Plain)	1	
		A007 B 4086	Seat Brace - Front	1	
		A007 B 4087	Seat Brace - Rear	1	
		XUFS 0616	Bolt	4	)
		216	Nut	4	) Runners to Floor
		122	Washer	4	)
		A007 B 4205	Trim	1	
		A007 B 4044	Bracket - Choke	1	
		326	Screw	2	)
		205AA	Nut	2	) Bracket to Body
		102	Washer	2	)
		A007 B 4041	Choke Cable - T/C	1	
		A007 S 4114	Choke Cable - GT	1	
I	25	A007 B 4049	Armrest - Complete	1	
		A007 B 4170	Asstray	1	
I	7	A007 B 4055	Roll Over Bar	1	
		A007 B 4019	Bolt	2	
		A08 W 000	Washer	2	
I	12	A007 B 4058	Rear Number Plate Carrier	1	
		A007 B 4011	Bush	2	
		A007 B 4054	Clamp Bolt	2	Spare Wheel and Number Plate Mounting
		A007 B 4132	Tension Pin	2	
		128	Washer	2	
		A007 B 4136	Buffer	1	
		A007 B 4171	Mirror	1	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		A007 M 4008	Battery Carrier	1	)
		A007 M 4010	Battery Clamp - Outer	1	)
		A007 M 4011	Battery Clamp - Inner	1	)
		XUFC 0428	Bolt	2	)
		110	Washer	2	)
		106	Washer	2	)
		A007 M 4012	Battery Clamp	1	
		A007 M 4014	Stud - Outer	1	
			Wingnut	1	
		110	Washer	2	
		A007 M 4013	Stud - Inner	1	
		A007 M 4015	Bracket - Battery HSG		
		SG 225	DZUS Spring	1	
			Rivet $\frac{1}{8}$ " diameter x $\frac{3}{8}$ "	4	
		A007 B 4033	Cover - Battery HSG	1	
		EMF 6	Stud	1	
		100	Washer	2	
		A007 B 4101	Seat Belt	2	)
		A007 B 4102	Seat Belt - Fixing Kit	2	) Lap and Diagonal Static
		A007 B 4103	Seat Belt	2	)
		A007 B 4219	Seat Belt - Fixing Kit	2	) Full Harness Static
		A007 B 4104	Seat Belt	2	)
		A007 B 4220	Seat Belt - Fixing Kit	2	) Lap and Diagonal Inertia Reel
		A007 B 4105	Seat Belt	2	)
		A007 B 4221	Seat Belt - Fixing Kit	2	) Full Harness Inertia Reel
		A007 B 4183	Ashtray - Facia	1	Optional Extra
III		A007 B 4206	Hard Top - Complete	1	
III	1	A007 B 4207	Hard Top - Shell	1	
III	2	A007 B 4208	Drip Rail L.H.	1	
III	3	A007 B 4209	Drip Rail R.H.	1	
III	4	A007 B 4212	Trim	2	
III	5	A007 B 4213	Seal	1	
III	18	A007 B 4212	Seal	2	
III	6	A007 B 4215	Seal	1	)
		A007 B 4076	Plate	2	) Hard Top to Windscreen Frame
III	17	A007 B 4216	Catch	2	)
		A007 B 4217	Hook	2	
		306	Screw	4	Hook to Frame
III	16	A007 B 4218	Catch	2	)
		A007 B 4077	Plate	2	)
		A007 B 4074	Hook	2	) Hard Top to Body
		A007 B 4075	Tapping Plate	2	)
		323A	Screw	4	)
		105A	Washer	4	)
III	7	A007 B 4222	Seal	1	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
III	11	A007 B 4072	Seal Plate	2	
III	9	A007 B 4223	Catch L.H.	1	
		A007 B 4078	Packing Plate	2	
		325	Screw	4	
III	8	A007 B 4225	Glass	1	
	(	A007 B 4066	Hinge (Screen Half)	2	
III	12 (	A007 B 4067	Hinge (Body Half)	2	
	(	A007 B 4068	Hinge Pin	2	
III	13	A007 B 4226	Gasket	2	
III	14	A007 B 4227	Gasket	2	
		322E	Screw	4	)
		131	Washer	4	) Hinge to Screen
			Rubber washer	4	)
		335A	Screw	2	)
		110	Washer	2	) Hinge to Top
III	15		Grommet	2	
		A007 B 4080	Windscreen Washer Assembly	1	
		A007 B 4063	Exterior Mirror - Complete Assembly	1	
		007 B 4060	Tonneau Cover	1	
		550	Dot Fastener	6	
		312	Screw	6	
		A007 B 4069	Footrest (Clutch)	1	Optional
			Pop Rivet	4	
		A007 B 4059	Passenger Footrest	1	Optional
			Pop Rivet	4	
			<u>FRONT SUSPENSION</u>		
		A007 C 4100	Vertical Link Assembly	1	L/H Side
		A007 C 4101	Vertical Link Assembly	1	R/H Side
		036 C 6005	Vertical Link	1	R/H Side
VI	1	036 C 6006	Vertical Link	1	L/H Side
		036 C 6035	Plug, Link	2	
		036 C 6008	Stub Axle	2	
		1.9	Washer	2	)
		219B	Nut	2	) Stub Axle to Vertical Link
		036 C 6021	Caliper Mounting Plate	1	R/H
VI	2	036 C 6022	Caliper Mounting Plate	1	L/H
		10	Bolt	4	
		116	Washer	4	
		036 H 6000	Steering Arm	1	R/H side
VI	8	036 H 6091	Steering Arm	1	L/H side
		036 C 6019	Dust Cover - Brake Disc	1	R/H side

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
VI	17	036 C 6020	Dust cover - Brake Disc	1	L/H Side
		24	Bolt	2	)
		XUFB 0634	Bolt	2	) Disc Dust Cover and Steering
		036 J 6010	Washer	4	) Arm to Vertical Link.
		215	Nut	2	)
VI	3	036 C 6007	Ball Joint Assembly	2	
		128	Washer Ball Joint	2	
		218A	Nut - Ball Joint	2	
VI	18	A046 C 0093	Wishbone, Upper	1	L/H Side Leading
		A046 C 0094	Wishbone, Upper	1	R/H Side Leading
		A036 C 6055	Bush, Wishbone	4	
VI	19	A046 C 0095	Wishbone, Upper	1	L/H Side, trailing
		A046 C 0096	Wishbone, Upper	1	R/H Side, trailing
VI	22	046 C 0092	Stud	2	
		128	Washer	2	
		219	Nut	2	
		18	Bolt	4	
		208A	Nut	4	
		118	Washer	4	
		036 C 6025	Trunnion Assembly	1	R/H Side
VI	4	036 C 6026	Trunnion Assembly	1	L/H Side
VI	5	036 C 6028	Seal, trunnion	2	
VI	6	036 C 6031	Sleeve, Trunnion	2	
		036 C 6030	Seal, Trunnion	4	
VI	7	036 C 6032	Washer, Trunnion	4	
		036 C 6029	washer, Trunnion	4	
		34	Bolt - Trunnion to Wishbone	2	
		218	Nut- Trunnion to Wishbone	2	
		128	Washer - Trunnion to Wishbone	2	
VI	20	A007 C 4103	Wishbone, Lower	2	
VI	21	A007 C 4104	Wishbone, Lower	2	
		A036 C 6055	Bush, wishbone	4	Inner Bush
		219	Nut; Wishbone	4	
		129	washer- Wishbone	4	
		A007 C 6001	Damper/Spring Assembly	2	
VI	27	A007 C 4102	Damper Unit	2	
VI	28	A007 C 4008	Spring	2	
		37B	Bolt - Damper to Wishbone	2	
		219B	Nut - Damper to Wishbone	2	
		129	Washer - Damper to Wishbone	2	
VI	25	A007 C 4007	Anti-roll Bar	1	
VI	24	054 C 0005	Link, Roll Bar	2	
VI	26	050C 6032	Bush, Link	2	
VI	9	A007 C 2000	Front Hub	2	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
VI	10	036 C 6016	Bearing, Outer	2	
VI	11	036 C 6017	Bearing, Inner	2	
VI	12	036 C 6009	'D' Washer	2	)
VI	13	036 C 6010	Nut	2	) Front Hub to Stub Axle
		415	Split Pin	2	)
VI	14	036 C 6018	Oil Seal Assembly		
VI	15	036 C 6013	Cap, Grease		
VI	16	036 J 6008	Brake Disc	2	
		036 J 6009	Bolt - Disc to Hub	8	
		121	Washer - Disc to Hub	8	
VI	29	036 C 6000	Plate )	2	
VI	30	046 C 6000	Rubber )	4	
VI	31	036 C 6003	Retainer ) Damper to Anti	2	
VI	33	036 C 6001	Retainer ) Roll Bar	2	
		AUPN 060F	Nut )	2	
		AUPN 060H	Nut )	2	
		A007 C 4118	Wheel Stud	8	
			<u>REAR SUSPENSION</u>		
		A007 D 4000	Rear Suspension Assembly	1	
		A007 D 4001	Rear Axle Assembly	1	
		A007 D 4004	Axle Locating Link	1	Early Cars
II	15	A007 D 4011	Lower Radius Arm (R.H.S.)	1	Replacing 007 D 4004
		A007 D 4005	Lower Radius Arm (L.H.S.)	1	Early Cars
II	12	A007 D 4012	Axle Locating Link	1	Replacing 007 D 4005
		A007 D 4009	Bush	2	)
		A007 D 4101	Half Bush	6	) Link and Lower Radius Arm
		56	Bolt	3	)
		219	Nut	3	) Link and Lower Radius Arm to Axle
		129	Washer	6	)
		57	Bolt	2	)
		218A	Nut	2	) Link and Lower Radius Arm to
		128B	Washer	4	) Chassis
		58	Bolt	1	)
		219B	Nut	1	) Link to Chassis Centre
		129	Washer	2	)
II	13	A007 D 4006	Upper Radius Arm	2	
		A007 D 4101	Half Bush	4	)
		A007 D 4102	Bush	2	) Upper Radius Arm
		37B	Bolt	2	)
		219	Nut	2	) Upper Radius Arm to Axle
		129	Washer	4	)



PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
II	16	046 D 6000	Bush		Link and Lower Radius Arm to Chassis
		10	Bolt	4	)
		211	Nut	4	) Bush to Chassis
		118	washer	4	)
II	9	A007 D 4100	Rear Damper Assembly	2	
		A007 D 4008	Road Spring	2	
		37	Bolt	2	)
		219	Nut	2	) Damper to Axle
		L08 W 0000	Washer	2	)
		378	Bolt	2	Damper to Chassis
			<u>ENGINE ASSEMBLY</u>		
			Engine Assembly	1	1600 cc Ford 'GT'
			For individual parts within the engine assembly, apply to your nearest Ford Dealer.		
			Engine Assembly	1	Holbay Clubman
			For individual parts within the engine assembly, apply to Holbay Racing Engines, Woodbridge, Suffolk, England.		
		A007 W 6004	Cil Cooler Kit	1	
		A007 E 4104	Air Filter	1	Ford 'GT'
			Screw, Filter Securing	4	
		A007 E 4102	Air Cleaner Assembly	1	Twin-Cam and Holbay Clubman
		A007 E 4002	Bracket	2	
		XUPB 0408	Bolt	2	
		A04 W 0905	Washer	2	
		L04 W 000	Washer	2	
		A007 E 4103	Strap	1	
		A007 E 4106	Element	1	
		A050 S 0122	Trunking	1	
		A036 S 6006	Clip, Trunking	2	
		050 S 0022	Airbox	1	
		XUPB 0424	Bolt	1	
		XUPB 0436	Bolt	1	
		A04 W 1810	Washer	2	
		L04 W 0000	Washer	2	
I	18	A007 E 4001	Engine Mounting	2	
		XUCB 0512	Bolt	8	)
		L05 W 0000	Washer	8	) Engine Mounting to Cylinder Block
		A007 E 4100	Mounting Rubber	2	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		XSPB 0836	Bolt	2	)
		LOB W 0000	Washer	2	) Mounting Rubber to Engine Mounting
		XUPB 0528	Bolt	4	)
		211	Nut	4	) Mounting Rubber to Chassis
		118	Washer	4	)
		A007 E 4004	Breather Tube	1	Holbay Clubman
		D026 E 0701	Engine Assembly	1	S/E Twin Cam
		N026 E 0701	Engine Assembly	1	Big Valve Twin Cam
			<u>CYLINDER BLOCK</u>		
		A026 E 0700	Short Cylinder Block Assy.	1	
EA.	1	A026 E 6083 (2731 E 6675)	Oil Pan	1	
EA.	2	2731 E 6730	Drain Plug	1	
EA.	3	2731 E 6734	Washer - Drain Plug	1	
EA.	4	3027 E 6781	Gasket - Oil Pan	2	
		A026 E 6085 (2730 E 6710A)	Gasket - Oil Pan, L/H	1	
		A026 E 6084 (2730 E 6711A)	Gasket - Oil Pan R/H	1	
EA.	5	A026 E 6082 (2733 E 6722A)	Packing - Oil Pan, Front	1	
EA.	6	A026 E 6086 (2730 E 6723A)	Packing - Oil Pan, Rear	1	
EA.	7	A026 E 6064 (20308 S8)	Screw )	18	
EA.	8	A026 E 6117	Washer ) Oil Pan to Block	18	
EA.	9	2724 E 6701A	Seal - Crankshaft Rear	1	
EA.	10	2730 E 6344A	Gasket - Oil Seal Housing	1	
EA.	11	A026 E 6047 (20366 S2)	Bolt )	4	
EA.	12	A026 E 6091 (34806 S2)	Oil Seal Housing to Cylinder Block Washer )		
EA.	13	C026 E 0708	Cylinder Block Assembly	1	
EA.	14	A026 E 6090 (35300S)	Plug - Water Jacket	3	
EA.	15	A026 E 6032 (87786ES)	Plug - Water Drain	1	
EA.	16	A026 E 6031 (87837 ES2)	Plug - Oil Gallery	3	
		A026 E 6017	Plug - Transverse Oil Gallery	1	
EA.	17	9D295	Connector - Oil Pressure Gauge	1	
		A026 E 6034 (357966S)	Plug - Oil Gallery Drain	1	
EA.	18	A026 E 6089 (2730 E 6615A)	Pipe - Oil Intake	1	



PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
EA.	19	A026 E 6088 (2730 E 6623A)	Screen Assembly - Oil Pump	1	
EA.	20	2730 E 6K656	Pipe - Return	1	
EA.	21	X026 E 0384 (2730 E 6K301)	Housing - Rear Oil Seal Retaining	1	
EA.	22	026 E 0034	Breather Connection	1	
		A026 E 0322	Grommer - Breather Connection	1	
		B026 E 0033	Tube - Breather Connection	1	
EA.	23	A026 E 6106 (105 E 6397)	Dowel Pin - Clutch Housing to Cylinder Block	2	
EA.	24	A026 E 6125	Cover - Starter Motor Nose	1	
EA.	25	A026 E 6108 (2730 E 7007)	Intermediate Plate - Upper	1	
EA.	26	2735 E 6382A	Intermediate Plate - Lower	1	
EA.	32	026 E 0004	Timing Case Backplate	1	
EA.	33	026 E 0005	Gasket - Timing Case Backplate	1	
EA	34	A026 E 6045 (20344 S2)	Set Screw	1	
EA.	35	34505	washer	1	
		A026 E 0705	Timing Case Cover Assembly	1	
EA.	36	A026 E 0361	Timing Case Cover	1	
		026 E 0734	Timing Case Cover with Oil Tube	1	
		A026 E 6030 (105 E 6754)	Oil Tube	1	
EA.	37	A026 E 6051 (45512 S2)	Bolt	1	)
EA.	38	A026 E 6054 (34805 S2)	Washer	6	) Timing Case to Cylinder Block
EA.	39	X036 M 6246 (34806 S2)	washer	3	)
EA.	40	A026 E 6057 (45510 S2)	Bolt )	4	)
EA.	41	A026 E 6056 (45511 S2)	Bolt )	5	)
EA.	42	PT/D086/11/2	Nut )	3	)
EA.	43	A026 E 6095 (20386 ES)	Bolt )	1	)
EA.	44	A036 E 6243 (34746 ES)	washer.)	2	Timing Case to Cylinder Block
EA.	45	20513S	Bolt )	1	)
EA.	46	A026 E 6050 (44715 S7)	washer )	6	)
EA.	47	026 E 0049	washer )	1	)
EA.	48	026 E 0047	Plug )	1	)
EA.	49	34802	Washer )	1	)
EA.	50	A007 E 4109	Dip Stick	1	All Engines

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
			<u>CRANKSHAFT</u>		
EB.	1	B026 E 0330	Crankshaft	1	
EB.	2	026 E 0336	Crankshaft Liner - Main Bearing Standard	10	
		A026 E 0336	Crankshaft Liner - Main Bearing .010 in. U/S	10	
		B026 E 0336	Crankshaft Liner - Main Bearing .020 in. U/S	10	
EB	3	026 E 0015	Crankshaft Sprocket	1	
EB.	4	026 E 0326A	Oil Slinger	1	
EB.	5	A026 E 6033 (115004 ES)	Key - Crankshaft Sprocket	1	
EB.	6	A026 E 6035 (105 E 6308A)	Thrust Washer - Main Bearing	AR	
		105 E 6308B	Thrust Washer - Main Bearing	AR	
EB.	7	026 E 0331	Pulley - Crankshaft	1	
EB.	8	A026 E 6044 (20411 S2)	Bolt - Pulley to Crankshaft	1	
EB.	9	100 E 6378	Washer - Pulley to Crankshaft	1	
EB.	10	A026 E 6055 (34808 S2)	Lock Washer - Pulley to Crankshaft	1	
EB.	11	E0TA 6345B	Bolt - Main Bearing Cap	10	
EB.	12	34848 S2	Lockwasher - Main Bearing Cap	10	
EB.	15	C026 E 0340	Connecting Rod	4	
EB.	16	11336 Es2	Dowel Pin	8	
EB.	17	A026 E 6029	Bearing - Connecting Rod	8	
		026 E 0715	Kit - Big End Bearing - Standard	1	
EB.	19	125 E 6215	Bolt - Connecting Rod	8	
EB.	20	105 E 6207A	Bush - Connecting Rod	4	
		026 E 0735	Kit - Big End Bearing .010 U/S	AR	
		026 E 0736	Kit - Big End Bearing .020 U/S	AR	
EB	21	C026 E 0712A	Piston Assembly - Standard - Grade I 82,474 mm. 3.2470 in. 82,466 mm. 3.2467 in.	4	) ) ) )
		C026 E 0712A	Piston Assembly-Standard-Grade II 82,481 mm. 3.2473 in. 82,474 mm. 3.2470 in.	4	) ) ) Optional
		C026 E 0712A	Piston Assembly-Standard-Grade III 82,489 mm. 3.2476 in. 82,481 mm. 3.2473 in.	4	) ) )
		C026 E 0712A	Piston Assembly-Standard-Grade IV 82,497 mm. 3.2479 in. 82,489 mm. 3.2476 in.	4	) ) )
		C026 E 0732	Piston Assembly-.015 in.O/S-Grade I 82,855 mm. 3.2620 in. 82,847 mm. 3.2617 in.	4	) ) )
		C026 E 0732	Piston Assembly-.015 in.O/S-Grade II 82,862 mm. 3.2623 in. 82,855 mm. 3.2620 in.	4	) ) )
		C026 E 0732	Piston Assembly -.015 in.O/S Grade III 82,870 mm. 3.2626 in. 82,862 mm. 3.2623 in.	III 4	) ) )
		C026 E 0732	Piston Assembly-.015in.O/S-Grade IV 82,878 mm. 3.2629 in. 82,870 mm. 3.2626 in.	4	) ) )

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
EB.	26	026 E 0733	Piston Ring Set - Standard	4	
		A026 E 0733	Piston Ring Set .015 in. O/S	4	
		026 E 6003	Oil Control Set - Standard	AR	
		026 E 6004	Oil Control Ring Set .015 in. O/S	AR	
EB	27	026 E 0405	Piston Pin	4	
EB	28	105 E 6140	Piston Pin Retainer	8	
EB	29	A026 E 0717	Flywheel Assembly	1	
EB	30	A026 E 6062	Bolt - Flywheel to Crankshaft	6	
		A026 E 6104	Dowel Pin	1	
EB	31	A026 E 6022 (105 E 6362C)	Seal - Crankshaft Front Bearing	1	
			<u>OIL PUMP</u>		
		A026 E 6001	Oil Pump Assembly	1	Up to
EC	1	105 E 6600	Oil Pump Body Pressure Relief Valve	1	
EC	2	105 E 6663D	Plunger - Pressure Relief Valve	1	
EC	3	105 E 6654	Spring - Pressure Relief Valve	1	
EC	4	105 E 6653B	Retainer - Pressure Relief Valve	1	
EC	5	105 E 6551	Gear	1	
EC	6	105 E 724325	Pin	1	
EC	7	105 E 6608A	Rotor and Shaft Assembly	1	
EC	8	105 E 6616A	Cover	1	
EC	9	20344S	Bolt ) Cover to Body	4	
EC	10	34825S	Washer )	4	
EC	11	87066ES	Seal Ring	1	
EC	12	A026 E 602B (105 E 6659)	Gasket )	1	
EC	13	A026 E 6042 (20386S2)	Bolt ) Body to Cylinder Block (both Types)	3	
EC	14	X036 M 6246 (34806S2)	Washer )	3	
EC	15	A026 E 6073 (E1ADKN18688B)	Gasket	1	
EC	16	036 E 6005	Element - Oil	1	
EC	17	036 E 6004	Oil Filter Assembly	1	
EC	18	A026 E 6074 (115827ES)	Bolt - Filter Bowl to Body	1	
EC	19	A026 E 6118	Washer - Filter Bowl to Body	1	
		A036 E 6029	Oil Pump Assembly	1	From
EC	20	2735E 6600	Oil Pump Body & Pressure Relief Valve	1	
EC	21	2735E 6714B	Oil Filter Assembly	1	
EC	22	2735E 6608A	Rotor and Shaft Assembly	1	
EC	11	87066ES	Seal Ring	1	
0871					

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
EC.	23	2735E 6616A	Cover	1	
EC.	9	20344S	Bolt )	3	
EC.	10	34825S	Washer ) Cover to Body	3	
<u>WATER PUMP</u>					
		026 E 6000	Water Pump Assembly (and repair kit)	1	
ED.	1	A026 E 6049 (105 E 8530)	Shaft	1	
		A026 E 6038 (105 E 8576B)	Retainer (replaced by 691F8K537A)	1	
ED.	2	691F8K537A	Retainer	1	
ED.	3	A026 E 6020 (105 E 8550)	Slinger	1	
ED.	4	105 E 8564	Seal	1	
		A026 E 6048 (105 E 8512)	Impellor Assembly (replaced by A026 E 6126 & A026 E 6127)	1	
ED.	5	A026 E 6127	Disc	1	
ED.	6	A026 E 6126	Impellor	1	
ED.	7	116648 ES	'O' Ring	2	
ED.	8	026 E 0362	Insert	1	
		A026 E 6021 (105 E 8567C)	Hub (replaced by 691 E 8553)	1	
ED.	9	691 E 8553	Hub	1	
		036 E 6000	Blade Fan, Inner (metal)	1	
		A026 E 6006	Bolt )	4	
		E830034 S71	Washer ) (Metal Fan)	4	
ED.	11	A007 E 4109	Fan	1	
		026 E 6009	Bolt	4	
		026 E 6010	Washer	4	
ED.	12	691 E 8509AA	Pulley (replaced by 691E8509AA)	1	
ED.	13	026 E 0353	Belt Fan	1	
<u>CYLINDER HEAD</u>					
EE	1	A026 E 0703	Cylinder Head	1	Bare
		E026 E 0703	Cylinder Head	1	Bare -"Big Valve"
		A026 E 0729	Cylinder Head	1	W/out Camshafts, etc.
		E026 E 0729	Cylinder Head	1	W/out Camshafts etc. ("Big Valve")
EE.	3	A026 E 0318	Stud - Bearing Cap (long)	8	)
EE.	4	A026 E 0319	Stud - Bearing Cap (Short)	12	) From October 1970
0971					

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
EE	5	026 E 0320	Dowel Pin )	20	
EE	6	114547 ES8	Nut ) Bearing Cap to Head	20	
EE	7	A05W 1206	Washer )	20	
		026 E 0367	Union - Vacuum Pipe on Manifold	1	
EE	8	026 E 0027A	Bolt - Cylinder Head	10	
EE	9	026 E 0029	Bolt - Cylinder Head	1	
		036 M 6243	Washer - Bolt	1	
EE	10	026 E 0028	Washer - Bolt	8	
EE	11	026 E 0031	Washer - Bolt	2	
EE	12	026 E 0026	Gasket - Cylinder Head	1	
EE	13	026 E 0032	Gasket - Cylinder Head (Timing Case)	1	
EE	14	358063 ES	Expansion Plug (1/2 in.)	4	
EE	15	A026 E 6122	Expansion Plug (1 in.)	1	
EE	16	026 E 0046	Plug - Oil Gallery	2	
EE	17	026 E 0048	Crush Washer - Plug	2	
EE	18	026 E 0002	Plug - Camshaft Bore	4	
EE	19	A026 E 6027 (102/10)	Stud - Short	6	) Carburettor to Cylinder Head
EE	20	026 S 0098	Stud - Long	2	
EE	21	A026 E 6061 (353052 ES)	Plug	1	
EE	22	026 E 0324	Sleeve - Cam Follower	8	
EE	23	XUCB 0516	Bolt	2	) Cylinder Head to Block front
EE	24	L05W 0000	Washer	2	
EE	25	026 E 0702E	Camshaft Cover Assembly	1	
EE	26	C026 E 0702	Camshaft Cover Assembly	1	"Big Valve" engines
EE	27	A026 E 0001	Gasket - Camshaft Cover	1	
		A026 E 6050	Washer )	7	) Camshaft Cover
EE	28	YUFH 040F	Nut )	8	
EE	29	A026 E 0415	Oil Filler Cap	1	
EE	30	026 E 0325	Gasket - Cap	1	
		A026 E 6027	Stud	6	) )
		026 S 0098	Stud	2	
		A05W 1206	Washer	8	) Carburettor Mounting
		W 0110	Washer	8	
		026 S 0042	Nut	8	)
			<u>CAMSHAFTS</u>		
EF	1	C026 E 0351	Camshaft	2	S/E engines
		D026 E 0351	Camshaft	2	"Big Valve" Engines
EF	3	A026 E 6016 (353052ES)	Plug	1	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
EF	4	026 E 0303	Bearing - Rear	4	
EF	5	026 E 0003	Bearing	16	
EF	6	A026 E 6024 (105 E 6256B)	Sprocket - Inlet	1	
EF	7	026 E 0305	Sprocket - Exhaust	1	
EF	8	026 E 0016	Washer - Sprocket to Camshaft	2	
EF	9	A026 E 6094 (34828)	Washer - Sprocket to Camshaft	2	
EF	10	026 E 0304	Bolt - Sprocket to Camshaft	2	
EF	11	A026 E 6023 (E93A6253)	Dowel - Sprocket to Camshaft	2	
EF	12	026 E 0007	Timing Chain	1	
EF	13	026 E 0012	Bracket - Chain Tensioner	1	
EF	14	026 E 0011	Pivot Pin - Chain Tensioner	1	
EF	15	026 E 0048 (AGS1136B)	Washer	1	
EF	16	026 E 0013	Pin	1	
EF	17	026 E 0707	Sprocket Assembly	1	
EF	18	026 E 0381	Sprocket	1	
EF	19	026 E 0382	Bush	1	
EF	20	026 E 0706	Adjuster Screw Sub-assembly	1	
EF	23	026 E 0008	Bolt - Tensioner Adjustment	1	
EF	24	A026 E 6098 (AGS1138C)	Washer - Tensioner Adjustment	1	
EF	21	026 E 0391	Adjusting Nut	1	
EF	22	026 E 0392	Washer - Adjusting Nut	1	
EF	25	026 E 0009	Spring - Tensioner Adjustment	1	
EF	26	026 E 0010	Plunger - Tensioner Adjustment	1	
EF	27	IT/D106/11/2	Nut - Tensioner Adjustment	1	
EF	28	A026 E 0014	Chain Guide	1	
EF	29	A026 E 6059	Screw - Chain Guide	2	
EF	30	026 E 0352	Jackshaft	1	
EF	31	A026 E 6036 (105E6269E)	Thrust Plate	1	
EF	32	A026 E 6026 (2032437)	Bolt - Adaptor to Jackshaft	2	
EF	33	A026 E 6037 (105E6255)	Bolt Retainer	1	
EF	34	105 E 6261E	Liner - Front	1	
EF	35	105 E 6262E	Liner - Centre	1	
EF	36	105 E 6263E	Liner - Rear	1	
EF	37	026 E 0017	Adaptor	1	
EF	38	026 E 0018	Dowel	1	
EF	39	A026 E 6025 (105 E 6256B)	Retainer	1	
EF	40	A026 E 6041 (2036602)	Bolt	2	
EF	41	A026 E 0019	Valve - Inlet	4	S/E Engines



PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		B026 E 0019	Valve - Inlet	4	"Big Valve" Engines
EF	42	B026 E 0020	Valve - Exhaust		
EF	43	A026 E 0312	Valve Seat Insert - Inlet	4	Std.
		A026 E 0124	Valve Seat Insert - Inlet	4	Std. - Big Valve Engines
		A026 E 0312A	Valve Seat Insert - Inlet	4	0.005 ins. Oversize S/E Engines
		A026 E 0125	Valve Seat Insert - Inlet	4	0.005 ins. Oversize - Big Valve Engine
		A026 E 0312B	Valve Seat Insert - Inlet	4	0.010 ins. Oversize - S/E Engines
		A026 E 0126	Valve Seat Insert - Inlet	4	0.010 ins. Oversize-Big Valve Engines
		A026 E 0312C	Valve Seat Insert - Inlet	4	0.015 ins. Oversize - S/E Engines
		A026 E 0127	Valve Seat Insert - Inlet	4	0.015 ins. Oversize-Big Valve Engines
EF	44	A026 E 0313	Valve Seat Insert - Exhaust	4	Std.
		A026 E 0313A	Valve Seat Insert - Exhaust	4	0.005 ins. Oversize
		A026 E 0313B	Valve Seat Insert - Exhaust	4	0.010 ins. Oversize
		A026 E 0313C	Valve Seat Insert - Exhaust	4	0.015 ins. Oversize
EF	45	A026 E 0314	Valve Guide - Inlet	4	Std.
		A026 E 0314A	Valve Guide - Inlet	4	0.001 ins. Oversize
		A026 E 0314B	Valve Guide - Inlet	4	0.005 ins. Oversize
		A026 E 0314C	Valve Guide - Inlet	4	0.006 ins. Oversize
EF	46	A026 E 0315	Valve Guide - Exhaust	4	Std.
		A026 E 0315A	Valve Guide - Exhaust	4	0.001 ins. Oversize
		A026 E 0315B	Valve Guide - Exhaust	4	0.005 ins. Oversize
		A026 E 0315C	Valve Guide - Exhaust	4	0.006 ins. Oversize
EF	47	A026 E 6018 (111946ES)	Circlip - Valve Guide	8	
EF	48	B026 E 0023	Valve Spring - Inner	8	
EF	49	B026 E 0022	Valve Spring - Outer	8	
EF	50	A026 E 0316	Valve Spring Seat	8	
EF	51	A026 E 0021	Retainer - Valve Spring	8	
EF	52	026 E 0045	Split Cone	16	
EF	53	A026 E 0025(65)	Shim 0.065 ins. thick	AR	
		A026 E 0025(66)	Shim 0.066 ins. thick	AR	
		A026 E 0025(67)	Shim 0.067 ins. thick	AR	
		A026 E 0025(68)	Shim 0.068 ins. thick	AR	
		A026 E 0025(69)	Shim 0.069 ins. thick	AR	
		A026 E 0025(70)	Shim 0.070 ins. thick	AR	
		A026 E 0025(71)	Shim 0.071 ins. thick	AR	
		A026 E 0025(72)	Shim 0.072 ins. thick	AR	
		A026 E 0025(73)	Shim 0.073 ins. thick	AR	
		A026 E 0025(74)	Shim 0.074 ins. thick	AR	
		A026 E 0025(75)	Shim 0.075 ins. thick	AR	
		A026 E 0025(76)	Shim 0.076 ins. thick	AR	
		A026 E 0025(77)	Shim 0.077 ins. thick	AR	
		A026 E 0025(78)	Shim 0.078 ins. thick	AR	
		A026 E 0025(79)	Shim 0.079 ins. thick	AR	
		A026 E 0025(80)	Shim 0.080 ins. thick	AR	
		A026 E 0025(81)	Shim 0.081 ins. thick	AR	
		A026 E 0025(82)	Shim 0.082 ins. thick	AR	



PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		A026 E 0025 (83)	Shim 0.083 ins. thick	AR	
		A026 E 0025(84)	Shim 0.084 ins. thick	AR	
		A026 E 0025(85)	Shim 0.085 ins. thick	AR	
		A026 E 0025(86)	Shim 0.086 ins. thick	AR	
		A026 E 0025(87)	Shim 0.087 ins. thick	AR	
		A026 E 0025(88)	Shim 0.088 ins. thick	AR	
		A026 E 0025(89)	Shim 0.089 ins. thick	AR	
		A026 E 0025(90)	Shim 0.090 ins. thick	AR	
EF	54	026 E 0024	Cam Follower	8	
<u>CARBURETERS</u>					
		D026 S 0710	Carburetter, Front	1	) S/E Engines
		D026 S 0711	Carburetter, Rear	1	
		L026 S 0710	Carburetter, Front	1	) Big Valve Engines
		L026 S 0711	Carburetter, Rear	1	
EG	1	026 S 6001	Cover - Jet Inspection	2	
EG	2	026 S 6002	Screw	18	
EG	3	026 S 6003	Gasket - Jet Inspection Cover	2	
EG	4	026 S 6004	Washer	18	
EG	5	026 S 6005	Cover - Upper Body	2	
EG	6	026 S 6006	Gasket - Upper Body Cover	2	
EG	7	026 S 6007	Holder - Emulsion Tube	4	
EG	8	026 S 6008	Jet - Air Correction (150 mm.)	4	S/E engines
		A026 S 6008	Jet - Air Correction (155 mm.)	4	Big Valve Engines
EG	9	026 S 6009	Holder - Idling Jet	4	
EG	10	026 S 6010	Emulsion Tube	4	
EG	11	026 S 6011	Jet - Idling	4	
EG	12	026 S 6012			
		A026 S 6012	Jet - Main (115 mm.)	4	S/E engines
		A026 S 6186	Jet - Main (120 mm.)	4	Big Valve engines
EG	13	026 S 6013	Plate	2	
EG	14	A026 S 6014	Choke (32 mm.)	4	S/E engines
		A026 S 6184	Choke (33 mm.)	4	Big Valve engines
EG	15	026 S 6015	Venturi	4	
EG	16	A028 S 0034	Trumpet	4	
EG	17	026 S 6096	Fixing Plate	4	
EG	18	026 S 6095	Washer	4	
EG	19	026 S 6094	Nut	4	
EG	20	026 S 6016	Dust Cover	4	
EG	21	026 S 6017	Spring	4	
EG	22	026 S 6018	Lid	4	
EG	23	026 S 6019	Washer - Distance	4	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
EG	28	026 S 6020	Lever Assembly	2	
		026 S 6021	Split Pin	2	)
		026 S 6022	Spring	2	)
		026 S 6023	Pin	2	) Not serviced separately
		026 S 6025	Spring	4	)
		026 S 6026	Screw	4	)
EG	31	026 S 6027	Lockwasher	4	)
EG	32	026 S 6028	Nut	4	
EG	33	026 S 6029	Gasket )	2	Bottom Bowl
EG	34	026 S 6030	Cover )		
EG	36	026 S 6032	Plate	2	
EG	37	026 S 6033	Spring	2	
EG	38	026 S 6034	Pin	2	
EG	39	026 S 6035	Lever - Pump Control	2	
EG	40	026 S 6036	Stud - Jet Inspection Cover	2	
EG	41	026 S 6037	Stud - Trumpet to Body	8	
EG	42	026 S 6038	Bearing	4	
EG	43	026 S 6039	Screw	8	
EG	44	026 S 6040	Throttle Plate	4	
EG	45	026 S 6041	Shaft	2	
EG	46	026 S 6042	Screw	4	
EG	47	026 S 6043	Washer	4	
EG	48	026 S 6044	Screw	4	
EG	49	026 S 6045	Cover	2	
EG	50	026 S 6046	Gasket	2	
EG	51	026 S 6047	Control Assembly	2	
EG	52	026 S 6048	Lever Assembly	2	
EG	53	026 S 6049	Nut	2	
EG	54	026 S 6050	Lever	2	
EG	55	026 S 6051	Screw	2	
EG	56	026 S 6052	Nut	2	
EG	57	026 S 6053	Spring - Lever Return	2	
EG	58	026 S 6054	Cover	2	
EG	59	026 S 6055	Shaft	2	
EG	60	026 S 6056	Strainer	2	
EG	61	026 S 6057	Screw	2	
EG	62	026 S 0027	Lever, Throttle	1	
EG	63	026 S 6059	Valve, Starter	4	
EG	64	026 S 6060	Spring )	4	Starter Valve
EG	65	026 S 6061	Guide )	4	
EG	66	026 S 6062	Cirelip )	4	
EG	67	026 S 6063	Plate	2	
EG	68	026 S 6064	Rod - Pump Control	2	
EG	69	026 S 6065	Spring	2	
EG	70	026 S 6066	Plunger	2	
EG	71	026 S 6025	Spring	5	(per engine)

PLATE	REF: NO.	PART NO.	DESCRIPTION	QTY	REMARKS
EG	72	026 S 6068	Screw - Idle Mixture Adjustment	2	(carburetter)
EG	28	A026 S 6196	Seal	1	
EG	35	A026 S 6195	Washer	1	
EG	73	026 S 6069	Screw - Throttle Adjustment	1	(per engine)
EG	74	026 S 6070	Screw - Progression Holes Inspection	4	
EG	75	026 S 6071	Gasket - Pump Jet	4	
EG	76	026 S 6072	Jet - Pump	4	
EG	77	026 S 6073	Gasket - Plug	4	
EG	78	026 S 6074	Plug	4	
EG	79	026 S 6075	Inlet Valve	2	
EG	80	026 S 6076	Jet - Starting	4	
EG	81	026 S 6077	Float	2	
EG	82	026 S 6078	Float Shaft	2	
EG	83	026 S 6079	Ball - Fuel Inlet Valve	4	
EG	84	026 S 6080	Stuffing - Fuel Inlet Valve Ball	4	
EG	85	026 S 6081	Screw	4	
EG	86	026 S 6082	Gasket - Needle Valve Seat	2	
EG	87	026 S 6083	Needle Valve	2	
EG	88	026 S 6084	Gasket - Fuel Pipe to Carburetter	2	
EG	89	026 S 6086	Gasket - Fuel Pipe to Carburetter	2	
EG	90	026 S 6087	Banjo Bolt	2	
EG	91	026 S 6088	Filter	2	
EG	92	026 S 6089	Gasket )	2	) Filter Inspection
EG	93	026 S 6090	Plug )		
			<u>FUEL PUMP</u>		
		026 E 0370	Fuel Pump Assembly	1	
EH	1	109 E 9375	Body, Lower	1	
EH	2	E93 A 9381B	Link Assembly	1	
EH	3	EIADKN9379B	Retainer, Pin	2	
EH	4	78 D 9289	Washer	2	
EH	5	EIADKN9378	Pin	1	
EH	6	BE 9380	Spring	1	
EH	7	109 E 9376B	Arm	1	
EH	8	105 E 9374	Gasket, Pump to Cylinder Block	1	
EH	9	EOTA 99399B	Seal	1	
EH	10	EOTA 99401	Retainer, Seal	1	
EH	11	E93A9414	Washer	1	
EH	12	856940	Spring	1	
EH	13	109 E 9398	Diaphragm and Pull Rod Assembly	1	
EH	14	105 E 9352	Valve	2	
EH	15	EIADDN 9367	Gasket, Valves to Body	2	
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PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
EH	16	105 E 9351	Body, Upper	1	
EH	17	31628 S2	Screw, Upper to Lower Body	6	
EH	18	34804 S7	Lockwasher	6	
EH	19	109 E 9365	Screen Assembly	1	
EH	20	EIADKN9364A	Gasket, Filter Bowl	1	
EH	21	EIADKN9355	Bowl	1	
EH	22	EIADKN9387B	Ball Assembly	1	
EH	23	20406 S2	Bolt	2	
EH	24	34806 S2	Lockwasher	2	
			<u>GEARBOX - EXTERIOR</u>		
		B026 F 0700	Gearbox Assembly	1	
FA	1	2821 E 7006F	Gearbox Casing	1	
FA	2	2821 E 7A039A	Housing, Extension Assembly	1	
FA	3	2821 E 7086A	Gasket - Extension Assembly	1	
FA	4	E 436-GA-1	Housing - Bearing	1	
FA	5	306305 S	Pin - Housing Retaining	1	
FA	6	304684 S8	Bolt	5	
FA	7	34847 ES	Washer	5	
FA	8	118 E 6068B	Insulator - Gearbox Mounting	1	
FA	9	YUFN 050F	Nut	2	) Insulator to Mounting Bracket
FA	10	A06W 0000	Washer	2	
FA	11	XUFS 0516	Bolt	2	) Mounting Bracket to Insulator
FA	12	A05W 1007	Washer	2	
FA	15	35305 ES	Plug	2	
FA	16	105 E 7A619	Gasket	1	
FA	17	113 E 7051	Gasket	1	
FA	18	2821 E 7050C	Retainer	1	
		69 BB 7052AA	Seal - Main Drive	1	
FA	19	20346 S2	Bolt	3	
FA	20	34806 S2	Washer	7	
FA	21	2821 E 7242G	Rail - Reverse Shift	1	
FA	22	2821 E 7240D	Rail - 1st and 2nd shift	1	
FA	23	2821 E 7A072B	Sleeve - 3rd and 4th shift rail	1	
FA	24	2821 E 7C113D	Rail - 3rd and 4th shift	1	
FA	25	113 E 7230	Fork - 3rd and 4th speed	1	
FA	26	113 E 7231C	Fork - 1st and 2nd speed	1	
FA	27	2821 E 7231C	Fork - Reverse Gear Shift	1	
FA	28	105 E 7245	Screw - Fork to Shift-rail	3	
FA	29	105 E 7233	Plunger - Gearshift	2	
FA	30	105 E 7235	Pin	1	
FA	31	353081 S	Ball, 5/16" dia.	3	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
FA	32	105 E 7234	Spring - Gearshift Ball	3	
FA	33	105 E 7222B	Cover	1	
FA	34	2821 E 7223A	Gasket	1	
FA	35	20346 S2	Bolt	4	
FA	36	113 E 7K001A	Lever - Reverse Gear	1	
FA	37	109 E 17322B	Gear - Speedo Drive	1	
FA	38	87052 S91	'O' Ring	1	
FA	39	105 E 17269	Bearing	1	
FA	40	E 316 NE 1	Gasket	1	
FA	41	026 F 0100	Adaptor	1	
FA	42	026 F 6000	Gearbox - Right angled	1	
FA	43	105 E 17264	Clip	1	
FA	44	203245	Bolt	1	
FA	45	34805 S	Washer	1	
FA	46	A007 N 4109	Speedometer Cable	1	
FA	47	E 359 GA 1	Gasket	1	
		A007 F 4100	Remote Control Assembly	1	
FA	48	118 E 7K006B	Housing, Remote Control	1	
FA	49	118 E 7346A	Arm Selector	1	
		115459 ES	Plug	1	
FA	50	118 E 7325 D	Remote Rod	1	
FA	51	116 E 7K003B	Stop, Reverse	1	
FA	52	120 E 7K067	Stop Plate	1	
FA	55	105 E 7207	Gasket, Retaining Cap	1	
FA	56	105 E 7227B	Spring, Gear Lever	1	
FA	57	116 E 7A138	Seat, Lever Spring	1	
FA	58	116 E 7220B	Cap, Lever Retaining	1	
FA	59	050 F 6000	Gaiter, Gear Lever	1	
FA	60	050 F 0137	Bezel, Gaiter	1	
FA	61		Screw, Bezel Retaining	6	
FA	62	120 E 7202B	Lever, Gearchange	1	
		3050535	Pin, Selector Arm	1	
		120 E 7202B	Gear Lever	1	
FA	64	120 E 7K022A	Bush, Gearchange Lever	2	
		116 E 7K023	Insulator, Gear Lever	1	
		116 E 7K001A	Lever, Reverse Selector	1	
FA	65	305071ES	Pin, Reverse Selector Arm	1	
		20386 ES2	Bolt, Reverse Stop	1	
		34806 S	Washer	1	
		44723 S	Washer	1	
		112974 ES	Bolt, Remote Rod	1	
FA	72	109 E 7213	Gear Lever Knob	1	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
			<u>GEARBOX - INTERIOR</u>		
FB	1	105 E 7160	Snap Ring	1	
FB	2	105 E 7026	Snap Ring	1	
FB	3	69GG 7025	Bearing	1	
FB	4	2821 E 7017D	Main Drive Gear	1	
FB	5	113 E 7120A	Bearing - input shaft	1	
FB	6	2821 E 7061C	Main Shaft	1	
FB	7	353080 S	Ball 3/16" dia.	2	
FB	8	E436 GA 1	Housing - Bearing	1	
FB	9	306305 S	Pin - Bearing Housing	1	
FB	10	113 E 7065	Bearing	1	
FB	11	113 E 17288B	Spacer	1	
FB	12	2821 E 17285	Speedometer Gear	1	
FB	13	111100 ES	Tab Washer	1	
FB	14	114470 ES	Nut	1	
FB	15	105 E 7041 D	Bearing - Extension Housing	1	
FB	16	69 AG 7A292AA	Seal - Extension Housing	1	
FB	17	2821 E 7071B	Washer	1	
FB	18	2821 E 7100A	Gear - 1st speed	1	
FB	19	2824 E 7107B	Synchroniser Ring	2	1st and 2nd Gear
FB	20	69 BG 7124AA	Synchroniser Assembly	1	1st and 2nd Gear
		2821 E 7K080B	Snap Ring	1	
		2824 E 7116A	Insert	3	
		211 E 7109A	Spring	2	
FB	21	2821 E 7102A	Gear - 2nd speed	1	
FB	22	2821 E 7B340B	Gear - 3rd speed	1	
FB	23	2824 E 7107B	Synchroniser Ring	2	3rd and 4th Gear
FB	24	69 BG 7B280AA	Synchroniser Assembly	1	3rd and 4th Gear
		2824 E 7116B	Insert	3	
		2820 E 7109A	Spring	2	
FB	25	105 E 7059B	Snap Ring	1	
FB	26	11968ES18	Spacer	1	
FB	27	105 E 7129B	Washer	4	
FB	28	E0A 7121	Roller - Needle Bearing	40	
FB	29	2824 E 7113B	Gear - Counter Shaft	1	
FB	30	105 E 7128 B	Washer - Counter Shaft	1	
FB	31	2820 E 7111 A	Shaft - Counter Shaft	1	
FB	32	211 E 7140B	Shaft - Reverse Gear	1	
FB	33	2824 E 7142	Gear - Reverse Idler	1	
		113 E 7143	Bush - Reverse Idler Gear	1	

			<u>STEERING</u>		
II	18	A007 H 4107	Steering Wheel	1	
		A007 H 0732	Steering Column Assembly	1	RHD
		A007 H 0733	Steering Column Assembly	1	LHD
		046 H 6005	Inner Column - Upper	1	
		A007 H 4000	Steering Column - Lower	1	
		14 B	Bolt	1	)
		212	Nut	1	) Lower Column U/J to Rack
		118	Washer	1	)
		036 H 6038	Impact Clamp	1	Inner to Lower Column
		036 H 6033	Escutcheon	2	
		036 M 6000	Switch	1	Indicators
		046 M 6183	Switch	1	Headlamp Selection
II	35	A007 H 4101	Steering Unit	1	RHD
		A007 H 4102	Steering Unit	1	LHD
		A007 H 4100	Ball Joint - Track Arm	2	
		A007 H 4110	Lock Nut - Track Arm	2	
II	28	A007 H 4103	Insulator	1	)
II	29	A007 H 4104	Clamp	1	)
II	31	A007 H 4105	Clamp	1	)
II	30	A007 H 4106	Insulator	1	)
		13 D	Bolt	2	) Steering Unit to Chassis
		8 B	Bolt	2	)
		118	Washer	4	)
		114	Washer	4	)
		A007 H 4109	Seal - Column to Body	1	Early Cars
		036 M 6289	Grommet	1	Replacing 007 H 4109
II	20	036 H 6065	Lock - Steering Column	1	
		A036 H 0063	Blanking Clip	1	Steering Column Lock Aperture
II	19	A007 B 4012	Bracket	1	)
		326	Screw	2	)
		205 AA	Nut	2	) Steering Column Mounting
		102	Washer	2	)
			<u>WHEELS</u>		
		A007 G 4103	Steel Wheel	5	
		A007 G 4101	Nave Plate	4	
VI	35	036 D 6000	Wheel Nut	16	
		A007 G 4105	Alloy Wheel	5	
		A007 G 4106	Wheel Nut	16	
		A007 G 4107	Wheel Nut Washer	16	
		A007 G 4108	Wheel (Badge) Centre	5	



PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
			<u>BRAKING SYSTEM</u>		
II	23	A007 J 4001	Mounting Bracket	1	Pedals
		A007 J 4002	Pedal	2	Brake & Clutch
		A007 J 4115	Tape - Self Adhesive	2	Anti Slip Pedals Switzerland
		A007 J 4101	Bush - Oilite	2	Self Lubricating
		A007 J 4100	Circlip	2	Pedal to Mounting Bracket
		13 D	Bolt	1	)
		118 A	Washer	1	) Mounting Bracket to Cross Member
		114	Washer	1	)
		A007 J 4117	Clevis Pin	2	Pedal to Clevis
		A007 J 4118	Split Pin	2	
		036 Q 6035	Master Cylinder	2	Early Cars Brake and Clutch
II	24	A007 J 4127	Master Cylinder	2	Replacing 036 Q 6035
		211	Nut	4	)
		118	Washer	4	) Master Cylinder to Pedal Box
		A007 J 6020	Push Rod - Master Cylinder	2	Brake & Clutch
		A007 J 6016	Clevis	2	)
		A007 J 4128	Nut - Clevis Locking	2	) Brake and Clutch
II	26	A007 J 4134	Hose	2	Reservoir to Bundy RHD
II	25	A007 J 4131	Bundy Pipe	2	Master Cylinder to Hose
II	26	A007 J 4130	Hose	2	Reservoir to Bundy LHD
II	32	A007 J 4125	Reservoir Extension	1	Used with 036 Q 6035
		A007 J 4126	Reservoir - Remote	1	Brake and Clutch
		A007 J 4009	Bracket - Reservoir Mounting	1	
		3	Bolt	2	Bracket to Body
		40	Bolt	1	)
		203	Nut	1	) Bracket to Clamp
		131	Washer	1	)
		A007 J 4132	Hydraulic Fluid	1	Can
		A007 J 4122	Bundy Pipe	1	Master Cylinder to 5 way RHD
		026 J 6007	Bundy Pipe	1	Master Cylinder to 5 way LHD
		036 J 6015	5 way Union	1	
		4 AA	Bolt	1	)
		208 A	Nut	1	) 5 Way to Chassis
		046 J 6025	Switch - Stop Light	1	
		125 AA	Crush Washer	1	Switch to 5 way
		A007 J 4121	Bundy Pipe	2	5 way to RHS and LHS Front
		A007 J 4159	Sleeving - F.V.C.	5	
		046 J 6016	Flexible Pipe	2	Chassis to Bracket
		216 A	Nut	4	)
		121	Washer - Shakeproof	4	) Hose to Chassis and Bracket
		122	Washer	8	)
		046 J 2000	Bracket	1	Flexible Hose to Caliper LHS
		046 J 2001	Bracket	1	Flexible Hose to Caliper RHS

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
			<u>FRONT BRAKES</u>		
JC	1	A007 C 4135	Caliper Assembly	1	LHS
		A007 C 4136	Caliper Assembly	1	RHS
JC	2	A007 C 4137	Brake Pads (Car Set)	4	Pads
JC	3	036 J 6011	Pin - Pad Retaining	4	
JC	4	036 J 6012	Clip - Pad Retaining	4	
JC	5	036 J 6003	Repair Kit	AR	
JC	6	036 J 6004	Bleed Screw	2	
JC	7	036 J 6005	Dust Cover ; Bleed Screw	2	
JC	8	026 J 6041	Piston		
		A007 J 4123	Bundy Pipe	1	5 Way to Rear Chassis
		050 J 6004	Flexible Pipe	1	Chassis to Axle
		216 A	Nut	2	)
		121	Washer - Shakeproof	2	) Flexible Hose to Chassis and
		122	Washer	4	)
		026 J 6018	Bundy	1	Flexible Hose to Rear Brake RHS
		A007 J 4137	Bundy Pipe	1	RH Rear Brake to LH Rear Brake
II	27	A007 J 4007	Handbrake Lever	1	Early Cars
		A026 J 0704	Handbrake Lever	1	Replacing 007 J 4007
		A007 J 5008	Bracket - Handbrake	1	Early Cars
		329 A	Screw	2	)
		203	Nut	2	) Bracket to Body
		131	Washer	2	)
		A007 J 4004	Primary Cable	1	Early Cars Handbrake
		A007 J 4012	Primary Cable	1	Replacing 007 J 4004
		A007 J 4112	Clevis Pin	1	Cable to Lever
		413	Split Pin - Clevis		
		118	Washer		
II	34	A007 J 4005	Multiplying Lever	1	Handbrake
		XUPB 0832	Bolt		)
		219	Nut		) Pivot - Multiplying Lever
		129	Washer		)
II	33	A007 J 4006	Bracket Multiplying Lever	1	)
		208	Nut	2	) Bracket to Chassis
		110	Washer	2	)
II	2	A007 J 4003	Secondary Cable	1	Handbrake
		A007 J 6017	Clevis	2	Secondary Cable
		A007 J 6018	Clevis Pin - Clevis	2	
		A007 J 4108	Clip - Clevis Pin	2	
II	11	A 07 J 4103	Flexible Strap	1	Handbrake Compensator
II	11	A007 J 4106	Plate - Flexible Strap	1	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		3	Bolt	2	)
		206	Nut	2	) Flexible Strap to Axle
		106	Washer - Spring	2	)
II	10	A007 J 4104	Rod - Handbrake	1	
		A007 J 4105	Grommet - Rod Guide	1	
		A007 J 6018	Clevis Pin	1	Rod Clevis to Brake Lever RHS
		A007 J 4108	Clip - Clevis Pin	1	
			<u>DUAL BRAKING SYSTEM</u>		
					NOTE: The following parts are peculiar to the Dual Braking System and comply to Swiss, German and U.S.A. market requirements.
		A007 J 6016	Clevis	1	
		A007 J 4128	Locknut	1	
II	5	A007 J 4014	Push Rod - Pedal	1	
		A007 J 6019	Clevis Pin	1	)
		118	Washer	2	) Pedal Push to Master Cylinder Push Rod through Pivot Arm Assembly.
		413	Split Pin	1	)
II	6	A007 J 4015	Pivot Arm Assembly	1	
		046 P 6163	Bush - Nylon	2	)
		WO 019	Spacer Tube	1	) Pivot Arm
		XUFB 0432	Bolt	1	)
		110	Washer	1	) Pivot Arm Assembly to Mounting Box
II	7	A007 J 4013	Mounting Box	1	
		210 A	Nut	2	)
		118	Washer	2	) Mounting Box to Chassis
		114	Washer - Spring	2	)
		7	Setscrew	1	)
		118	washer	1	) Mounting Box to Bracket on Chassis
		114	Washer - Spring	1	)
II	8	054 J 6008	Master Cylinder - Dual	1	
		211	Nut	1	)
		118	Washer	1	) Master Cylinder to Mounting Box
		A007 J 4017	Heat Shield	1	Master Cylinder
		A007 J 6012	Bundy Pipe	1	) Master Cylinder to Pressure
		A007 J 6014	Bundy Pipe	1	) Differential Warning Assembly
		050 J 6053	Pressure Differential warning Assy	1	
		A007 J 4134	Spacer	1	)
		6 BA	Bolt	1	)
		208	Nut	1	) P.D.W.A. to Chassis
		110	Washer	1	)

A007 J 6013	Bundy Pipe	1	P.D.W.A. to 4 Way
A007 J 6015	4 Way Junction	1	
A007 J 4123	Bundy Pipe	1	P.D.W.A. to Rear Brake
A007 M 4106	Test Switch	1	Brake Fail Warning Light
A007 M 6030	Bulb	1	

REPAIR KITS

036 Q 6024	Repair Kit - Master Cylinder	AR	
050 J 6041	Repair Kit - Tandem Cylinder	AR	Dual Braking System

COOLING SYSTEM

I	17	A007 K 4000	Radiator	1	
		036 K 6001	Raidotor Cap	1	
		A007 K 4100	Elug	1	
		A007 K 4001	Brakcet L.H.	1	
I	16	A007 K 4002	Bracket R.H.	1	
		1 B	Bolt	4	)
		106	Washer	4	) Radiator to Bracket
		112	Washer	4	)
		3AA	Bolt	6	)
		450	Rawlnut	6	) Bracket to Chassis
		112	Washer	6	)
		A007 K 4105	Top Hose - G.T.	1	
		026 K 0003	Top Hose - T/C	1	
		A007 K 4004	Water Pipe - T/C	1	
		2A	Hose Clip	1	
		1X	Hose Clip	3	

FUEL SYSTEM

A007 L 4003	Fuel Filler Assembly	1	
A007 L 4113	Drain Tube	1	
A007 L 4112	Breather Tube	1	
000	Hose Clip	4	
A007 L 4111	Filler Cap	1	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		A007 L 4006	Hose	1	)
		3	Hose Clip	3	) Filler to Tank
I	22	A007 L 4001	Fuel Tank	1	
		A007 L 4106	Sender Unit	1	
		A007 L 4107	Locking Ring	1	
		A007 L 4108	Sealing Ring	1	
		A007 L 4104	Olive	1	
		A007 L 4105	Nut	1	
		A007 L 4102	Fuel Pipe	1	
		A007 L 4103	Elbow Union	1	
			<u>ELECTRICAL EQUIPMENT</u>		
MA	1	036 M 6004	Battery	1	
MA	2	A007 M 4009/3	Cable	1	Battery to Earth
		036 L 6004	Grommet	1	
MA	3	A007 M 4009/1	Cable	1	Battery to Solenoid
MA	4	A007 M 4009/2	Cable	1	Solenoid to Starter
MA	5	036 M 6299	Solenoid	1	Early Twin Cam
		A007 M 4143	Solenoid	1	Replacing 036 M 6299
		322 E	Screw	2	)
		131	Washer	2	) Solenoid to Chassis
		105 A	Washer - Spring	2	)
MA	6	A007 M 4142	Coil	1	
MA	7	036 M 6248	Bracket Coil	1	
		3	Bolt	2	)
		208	Nut	2	) Coil to Body
		110	Washer	2	)
MA	9	026 M 0039	Earth Strap	1	Engine to Chassis
MA	10	P026 M 0009	Distributor	1	
		028 M 0073	Cap - Distributor	1	)
		036 M 6057	Brush and Spring	1	)
		028 M 0070	Rotor Arm	1	)
		A036 M 6062	Contact Set (Quick Fit)	1	) Twin Cam
		036 M 6060	Condensor	1	)
MA	11	026 M 0706	Ignition Lead Set	1	
		026 E 0450A	Lead (21 $\frac{1}{2}$ in.)	1	
		026 E 0450 B	Lead (22 $\frac{1}{4}$ in.)	1	
		026 E 0450C	Lead (29 $\frac{1}{2}$ in.)	1	
		026 E 0450D	Lead (30 $\frac{1}{4}$ in.)	1	
MA	12	026 E 0451	Coil Lead (13 $\frac{1}{2}$ in.)	1	
MA	13	A026 M 6001	Sparkin Plug	4	



PLATE	REF. NO.	PART NO.	DESCRIPTION	QTY	REMARKS
MA	14	A036 M 6338	Starter Motor	1	
		25	Bolt	2	
		120	Washer	2	
		036 M 6180	Brush Set	1	
MA	15	A036 M 6306	Generator	1	
		036 M 6179	Brush Set	1	
		036 M 6236	Pulley	1	
		036 M 6232	Washer	1	)
		036 M 6233	Nut	1	) Pulley to Generator
MA	16	036 M 6237	Bracket - Generator Mounting	1	
		036 M 6238	Bolt	2	)
		036 M 6239	Washer	2	) Bracket to Block
		036 M 6240	Bolt	2	)
		036 M 6241	Washer	2	) Generator to Bracket
MA	17	026 E 0030	Adjusting Link	1	
		036 M 6242	Bolt	1	)
		036 M 6243	Washer	1	) Generator to Link
		036 M 6244	Nut	1	)
		036 M 6245	Bolt	1	)
		036 M 6246	Washer	1	) Link to Block
MA	18	A007 M 4122	Horn	1	
		1	Bolt	2	)
		106	Washer	2	) Horn Mounting
MA	19	050 M 6056	Air Horn Kit	1	Optional Extra
		A050 M 6160	Capacitor	1	
		A036 M 6321	Voltage Regulator	1	
			<u>WIPER MOTOR ASSEMBLY</u>		
VIII	1	A007 M 4112	Wiper Motor Assembly	1	
		050 B 6136	Pad	1	)
VIII	2	046 M 6155	Strap	1	)
		3	Bolt	2	)
		113	Washer	2	) Motor to Body
		208	Nut	2	)
		A007 M 4006	Bundy - Assembly of	1	RHD
		A007 M 4007	Bundy - Assembly of	1	LHD
VIII	3	A007 M 4107	Bundy	1	Wiper Motor to Wheelbox RHD
		A007 M 4110	Bundy	1	Wiper Motor to Wheelbox LHD
VIII	4	A007 M 4108	Bundy	1	Wheelbox to Wheelbox
VIII	5	A007 M 4109	Bundy - 2 1/4 in. overrun	1	
		A007 M 4111	Bundy - 8 in. overrun	1	
VIII	6	A007 M 4113	Wheelbox - Wiper	2	
VIII	7	A007 M 4114	Wiper Arm	2	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS	
VIII	8	A007 M 4115	Wiper Blade	2		
		A007 M 4101	Switch - Wipers	1		
		<u>INSTRUMENTS AND SWITCHES</u>				
		054 N 6002	Speedometer, MPH	1		
		A007 N 4101	Speedometer, KPH	1		
		054 N 6001	Tachometer	1		
		054 N 6006	Oil Pressure Gauge	1		
		046 E 6378	Transmitter, oil pressure gauge	1		
		A007 K 2007	Adaptor, transmitter	1		
		054 N 6005	Water Temperature Gauge	1		
		046 E 6379	Transmitter, water temperature gauge	1		
		054 N 6007	Fuel Gauge	1		
		054 M 6062	Ammeter	1		
		A007 M 4123	Flasher Unit, Hazard	1		
		A007 M 4169	Switch, Flasher	1		
		036 M 6300	Flasher Unit, Indicators	1		
		036 M 6301	Clip, Securing Flasher Unit	1		
		A007 M 4012	Switch, Headlamp and Sidelamps	1		
		036 B 6015	Switch, Ignition	1	First cars	
		A007 M 4146	Switch, Ignition	1	Later cars	
		036 M 6018	Fuse Unit	1		
		XUPS 1008	Screw	1		
		A007 M 4147	Blanking Plate	AR	Switch Aperture	
		A007 M 4144	Ballast Register	1		
		7	Bolt )			
		116	washer ) Resistor to Chassis	1		
		118	washer )	1		
		046 B 6000	Label, Negative Earth	2		
<u>LIGHTING EQUIPMENT</u>						
I	3	A007 M 4116	Headlamp Assembly	2	U.K. Only	
		A007 M 4117	Headlamp Assembly	2	European Only	
		A007 M 4118	Headlamp Assembly	2	North America Only	
		046 M 6183	Light Unit	2	U. K. Only	
		046 M 6185	Light Unit	2	European Only	
		036 M 6083	Light Unit	2	North America Only	



PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		A036 M 6361 (411)	Bulb	1	France Only
		A036 M 6360 (410)	Bulb	1	All European except France
I	1	A007 M 4134	Sidelamp Assembly	2	
		CUPS 0410	Screw )	4	
		131	Washer ) Sidelamp fixings	4	
		224	Nut )	4	
		A007 M 4127	Warning Lamp, Main Beam	1	North America and Germany
		A007 M 4126	Warning Lamp, Direction Indicator	1	
		036 M 6251	Flasher Lamp, Front	2	except N. America, Swit & Italy
		036 M 6283	Flasher Lamp, Front	2	N. America Only
		036 M 6263	Flasher Lamp Front	2	Switzerland & Italy only
		A007 B 4045	Bracket, L/H ) Flasher Lamp	1	)
		A007 B 4046	Bracket, R/H ) to Bonnet	1	) First Cars
		40	Bolt	4	
		203	Nut	4	
		105	Washer	4	
		046 M 6165	Repeater Flasher Lamp	2	Optional
		036 M 6282	Side Marker Lamp	2	Front, amber
		036 M 6281	Side Marker Lamp	2	Rear, red
		050 B 1852	Insert	2	Rear Marker Lamp
		A050 B 1854	Bracket, Mounting	2	Front of Insert
		A050 B 1853	Bracket, Mounting	2	Rear of Insert
		A007 M 4170	Map Lamp	1	Optional
		A007 M 4131	Rear Lamp Assembly, L/H	1	U.K. Specification
I	5	A007 M 4130	Rear Lamp Assembly, R/H	1	U.K. Specification
		A007 M 4164	Rear Lamp Assembly, L/H	1	North America Specification
I	5	A007 M 4164	Rear Lamp Assembly R/H	1	North America Specification
I	4	A007 M 4132	Cover, Rear Lamps	2	
		203	Nut	12	)
		105 A	Washer	12	)
		105	Washer	8	) Lamps and cover to body
		131	Washer	4	)
		A007 M 4119	Rear Number Plate Lamp	1	First Cars
		A007 M 4165	Rear Number Plate Lamp	1	Double Bulb
		A007 M 4168	Rear Number Plate Lamp	1	Double Bulb, Opaque Lens
		A007 M 4149	Socket	1	)
		A007 M 4150	Plug	1	)
		A007 M 4166	Pin, Male	2	) Number Plate Lamp Connector
		A007 M 4152	Pin, Female	2	)
		A007 M 4001	Rear Loom	1	
		A050 M 6167	Fuse	1	
		036 M 0127	Fuse - in line	1	Germany
		A007 M 4000	Main Loom	1	

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		412 B	'P' Clip	3	)
		341	Screw	2	)
		224	Nut	2	) Battery Cable to Tunnel
		131	Washer	2	)
		X.14	'P' Clip	1	)
		401	Screw	1	) Cable to Cross Member
		131	Washer	1	)
		A007 M 4002	Instrument Loom	1	
		A007 M 4141	Bulb	6	)
		036 M 6289	Grommet	1	) Loom
		050 M 6096	Voltage Stabiliser	1	
			<u>HEATER</u>		Optional Extra All Markets
		A007 P 4100	Heater Kit - Standard	1	
		A007 P 4101	Heater Unit - Standard	1	
		MUFS 1012	Screw	4	)
		105	Washer	4	) Heater to Body
		026 P 0004	Seal	1	)
		050 K 6006	Connector	2	Elbow to Hose
		050 P 6002	Clip	8	
		A007 P 4104	Switch - Standard Heater	1	
		A007 P 4102	Demister Kit	1	U.S.A. Markets and optional other markets
		A007 P 4001	Plate - Demister Take Off	2	Standard Heater
		A007 P 4002	Air Hose (18 in.)	1	
		A007 P 4003	Air Hose (2 in.)	1	Steering Column Side
		A007 P 4000	Demister Vent Pipe	2	
		A007 B 4190	Demister Cowl	1	RHS
		A007 B 4191	Demister Cowl	1	LHS
		A007 P 4103	Heater Kit - 2 Speed	1	U.S.A. markets and optional other markets
		A007 M 4105	Switch - 2 Speed	1	
		A007 P 4104	Heater Unit - 2 Speed	1	
		MUFS 1012	Screw	4	)
		105	Washer	4	) Heater to Body
		026 P 0004	Seal	1	)
		050 K 6006	Connector	2	Elbow to Hose
		050 P 6002	Clip	8	
		036 P 6003	Water Valve - Remote Control	1	
		A007 B 4043	Cable - Heater Control		
		A007 B 4044	Bracket - Cable Mounting		
		40	Screw		
		205 AA	Nut		
		102	Washer		

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		A007 P 4105	Face Level Vent Assembly	1	Optional Extra
		036 B 6063	Face Level Vent	2	
		A007 P 4002	Hose - Air	2	
		036 P 0031	Elbow	2	
			<u>CLUTCH</u>		
II	24	036 Q 6035	Master Cylinder	1	Early Cars and Dual Braking Systems
		A007 J 4127	Master Cylinder	1	Replacing 007 J 4127
		211	Nut	2	)
		118	Washer	2	) Master Cylinder to Pedal Box
		A007 J 6020	Push Rod - Master Cylinder	1	
		A007 J 6016	Clevis	1	
		A007 J 4128	Nut - Clevis Locking	1	
II	25	A007 J 4131	Bundy Pipe	1	Master Cylinder to Hose
		A007 J 4130	Hose	1	Bundy Pipe to Reservoir LHD
II	26	A007 J 4134	Hose	1	Bundy Pipe to Reservoir RHD
II	32	A007 J 4126	Reservoir - Remote	1	Clutch and Brakes
QA	2	050 Q 6015	Clutch Centre Plate	1	
QA	3	050 Q 6014	Pressure Plate Assembly	1	
QA	4	XUPB 0514	Bolt	6	)
QA	5	115	Washer	6	) Clutch Assembly to Flywheel
QA	6	036 Q 6004	Dowel Pin	3	)
QA	7	036 E 6006	Spigot Bearing	1	
QA	8	A026 E 6114 (105 E 7500 B)	Bell Housing	1	
QA	9	27	Bolt	4	)
QA	10	L 06 W 0000 (34837 ES2)	Washer	6	)
QA	11	25	Bolt	2	)
QA	12	XUCB 0408	Bolt	3	) Bell Housing to Engine
QA	13	L 04 W 0000	Washer	3	)
QA	14	A036 Q6040	Release Bearing	1	
QA	15	A026 Q 6007 (125 E 7571)	Hub - Release Bearing	1	
QA	16	A026 Q 6004 (E308 OD 7)	Link	1	Release Bearing to Fork
QA	17	A026 Q 6012 (109 E 7605B)	Clip	2	Release Bearing to Fork
QA	18	A026 Q 6011 (109 E 7562)	Spring - Release Fork	1	
QA	19	A026 Q 6009 (109 E 7522)	Pin - Release Fork	1	
QA	20	A026 Q 6008 (109 E 7511)	Fork - Clutch Release	1	

PLATE	REF: NO.	PART NO.	DESCRIPTION	QTY	REMARKS
QA	21	A026 Q 6003 (E335 GD 7)	Gaiter - Clutch Release Fork	1	
QA	24	A007 Q 4118	Hose - Nylon	1	RHD )
QA	24	050 Q 6005	Hose - Nylon	1	LHD ) Master Cylinder to Slave Cylinder
QA	25	036 Q 6025	Slave Cylinder - Clutch	1	
QA	26	036 Q 6026	Repair Kit	AR	
QA	27	A026 Q 6006 (E0A 7059B)	Circlip	1	
QA	28	A026 Q 6005 (E310 GD 7)	Push Rod	1	
QA	29	33923S	Nut	1	) Slave Cylinder Push Rod to
QA	30	E311 GD 7	Nut	1	) Operating Arm
QA	31	A026 Q 6010 (109 E 7525)	Return Spring	1	
		A007 Q 6024	Repair Kit - Master Cylinder	AR	
			<u>REAR AXLE</u>		
II	17	A007 R 4000	Prop Shaft	1	
		A007 R 6001	Flange - Rear Axle	1	
		A007 R 6002	Rear Axle	1	
			<u>EXHAUST SYSTEM</u>		
		A007 S 4100	Manifold Gasket	1	) 1600 GT & Clubman
		A007 S 4101	Manifold Gasket	2	)
		026 S 0004	Manifold Gasket	4	Twin Cam
II	21	A007 S 4102	Downpipe 1 & 4	1	)
II	22	A007 S 4103	Downpipe 2 & 3	1	) 1600 GT & Clubman
		A007 S 4104	Downpipe 1 & 4	1	
		A007 S 4105	Downpipe 2 & 3	1	
		050 S 6004	Clip	2	Downpipe to Front Intermediate Pipe
II	4	A007 S 4106	Intermediate Pipe - Front	1	Front to Rear Intermediate Pipe & Rear to Silencer
		A007 S 4109	Clip	2	
		050 S 0156	Flexible Mounting	1	
		210 A	Nut	2	)
		118	Washer	2	) Flexible Mounting Front Intermediate Pipe
		114	Washer, Spring	2	)
II	3	A007 S 4107	Intermediate Pipe - Rear	1	
		B050 S 0094	Strap - Mounting	1	Rear Pipe to Bundy

PLATE	REF:NO.	PART NO.	DESCRIPTION	QTY	REMARKS
		13	Bolt	2	)
		211	Nut	2	) Strap to Body and Pipe
		118 A	Washer	2	)
II	1	A007 S 4108	Silencer and Tailpipe	1	
		050 S 6006	Clip - Mounting	1	Strap to Silencer
			Strap - Mounting	1	
		4 AA	Bolt	1	)
		208 A.	Nut	1	) Strap to Chassis
		113 A	Washer	1	)
II	23	A007 S 4001	Throttle Pedal	1	
		A007 S 4115	Bush - Pedal Pivot	1	
		14 C	Bolt	1	)
		118	Washer	1	) Pedal Retaining
		114	Washer - Spring	1	)
		A007 S 4004	Throttle Cable	1	1600 GT LHD
		A007 S 4005	Throttle Cable	1	1600 GT RHD
		A007 S 4007	Plate - Throttle Cable Abutment	1	Early Cars
		A007 S 4009	Plate - Throttle Cable Abutment	1	)
		A007 S 4116	Throttle Lever	1	) 1600 GT
		B026 S 0028	Throttle Return Spring	1	
		A007 S 4002	Throttle Cable - LHD	1	)
		A007 S 4003	Throttle Cable - RHD	1	)
		B026 S 0028	Throttle Return Spring	1	) Twin Cam and Clutman
		036 S 6167	Barrel - Throttle Cable	1	)
			<u>TOOL KIT</u>		
		026 T 0001	Assembly of Tool Kit	1	
		A026 T 0002	Jack	1	
		A026 T 0003	Handle - Jack	1	
		A007 T 4109	Wheel Brace	1	
		036 T 6014	Bag - Jack and Handle	1	
		050 T 0322	Key Ring and Fob	1	
		A007 T 4117	Tonneau Cover	1	



## TECHNICAL DATA

### DIMENSIONS

#### Overall:

Length	146.3in.	(371.6cm)
Width	60.5in.	(153.7cm)
Height - Top of hood	44in.	(111.7cm)
- Top of screen	41.5in.	(105.4cm)
Ground Clearance (Under chassis)	6.5in.	( 16.5cm)

### CAPACITIES

Engine Sump (including filter)	7½ pints (4 litres; 9 U.S. pints)
Gearbox	1¾ pints (.99 litres; 2.1 U.S. pints)
Rear Axle	2 pints (1.2 litres; 2.4 U.S. pints)

### ENGINE

#### General

Number of cylinders	4
Capacity	95.06 cu. in. (1558 cc.)
Stroke	2.864 in. (72.746 mm.)
Bore - Grade 1	3.2500/3.2503 in. (82.550/82.558 mm.)
- Grade 2	3.2503/3.2506 in. (82.558/82.565 mm.)
- Grade 3	3.2506/3.2509 in. (82.565/82.573 mm.)
- Grade 4	3.2509/3.2512 in. (82.573/82.580 mm.)
Compression - Ratio	9.5:1 except Sprint; 10.3:1 Sprint
- Pressure (at sea level)	in excess of 160 lbs.sq.in. (11.248 kg.sq.cm.) Each cylinder within 20lbs.sq.in. (1.406 kg.sq.cm.) of each other.

## Performance

Max BHP (net) @ r.p.m.

90 @ 5,500 STD; 93 @ 6,000 S/E;  
126 @ 6,500 Sprint.

Max Torque @ r.p.m. - except Sprint  
- Sprint

108 lbs.ft. (14.931 kg.m.) @ 4,000  
113 lbs.ft. (15.622 kg.m.) @ 5,500

## Cylinder Head

Material

Aluminium

Gasket

Copper/Asbestos

Valve timing - Inlet opens

22° B.T.D.C.      26° B.T.C.D.

- Inlet closes

62° A.B.D.C. STD; 66° A.B.D.C. S/E & Sprint

- Exhaust opens

62° B.B.D.C.      66° B.B.D.C.

- Exhaust closes

22° A.T.D.C.      26° A.T.D.C.

Angle of valve seats and faces

45°

Valves:

Head diameter - Inlet (except Sprint)

1.526/1.530 in. (38.760/38.862 mm.)

- Inlet (Sprint)

1.560/1.566 in. (39.624/39.776 mm.)

- Exhaust

1.321/1.325 in. (33.553/33.655 mm.)

Stem diameter - Inlet

.310/.311 in. (7.874/7.899 mm.)

- Exhaust

.0003/.0023 in. (.007/.058 mm.)

Stem clearance in guide - Inlet

.0003/.0023 in. (.007/.058 mm.)

- Exhaust

.0025/0030 in. (.063/.076 mm.)

Clearance (cold) - Inlet

.005/.007 in. (.127/.177 mm.)

Valve springs:

Type

Dual

Free Length - Inner

1.130 in. (28.70 mm.)

- Outer

1.450 in. (36.83 mm.)

Rate - Inner @ .92 in. (23.4 mm.)

12.4 lbs. (5.6 kg.)

- Inner @ .58 in. (14.7 mm.)

33.5 lbs. (15.2 kg.)

- Outer @ 1.17 in. (29.7 mm.)

45 lbs. (20.4 kg.)

- Outer @ .83 in. (21.1 mm.)

109 lbs. (49.4 kg.)



### Valve guides:

Bore in head	.499/.4995 in. (12.674/12.687 mm.)
Internal dia. (to ream after fitting)	.3113/.3123 in. (7.907/7.932 mm.)
Length - Inlet	1.520 in. (38.608 mm.)
- Exhaust	1.480 in. (37.592 mm.)
Fitted height above head	.320 in. (8.128 mm.)

### Camshafts:

Journal diameter	1.000/1.0005 in. (25.4/25.413 mm.)
End float	.003/.010 in. (.076/.254 mm.)
Bearings - Number	5
- Type	Steel backed white metal
- Running clearance	.0005/.002 in. (.013/.050 mm.)

### Cam followers:

Bore in head	1.375/1.3756 in. (34.925/34.940 mm.)
Outside diameter	1.3742/1.3745 in. (34.904/34.912 mm.)
Follower to head clearance	.0005/.0014 in. (.013/.036 mm.)

### Jackshaft

Bearings - Number	3
- Type	Steel backed white metal
- Length - Front	.75 in. (19.05 mm.)
- Centre	.64 in. (16.26 mm.)
- Rear	.75 in. (19.05 mm.)
- Running clearance	.001/.002 in. (.025/.050 mm.)
Journal diameter	1.560/1.5605 in. (39.624/39.637 mm.)
End float	.0025/.0075 in. (.063/.190 mm.)

### Crankshaft

Balance	Within .2oz.in. (14.42 gr.cm.)
Diameter - Main journals	2.1255/2.1260 in. (53.987/54.000 mm.)
- Crankpin	1.9370/1.9375 in. (49.199/49.211 mm.)
End float - Dimension	.003/.008 in. (.076/.203 mm.)
- Controlled by	Thrust washers on centre main bearing.

Bearings - Number	5
- Type	Steel backed, lead bronze with lead overlay
- Running clearance	.0015/.0030 in. (.038/.076 mm.)
Maximum undersize for regrind	.03 in. (.762 mm.)

### Flywheel

Maximum run-out (lateral)	.004 in. (.101 mm.)
Starter ring gear - Run-out - Lateral	.016 in. (.406 mm.)
- Radial	.006 in. (.152 mm.)

### Connecting Rod

Type	'H' Section
Material	Steel forging
Distance between centres	4.799/4.801 in. (12.19/12.24 cm.)
Bearings - Type	Steel backed, lead bronze, with lead overlay
- Running clearance	.0005/.0022 in. (.013/.513 mm.)
- End float on crankpin	.004/.010 in. (.101/.254 mm.)
Small end bore (bushed):	
Grade 'A' (silver)	.8124/.8125 in. (20.635/20.637 mm.)
Grade 'B' (green)	.8125/.8127 in. (20.637/20.642 mm.)

### Gudgeon (Piston) Pin

Type	Floating
Location	Circlips
Diameter - Grade 'A'	.8121/.8122 in. (20.627/20.628 mm.)
- Grade 'B'	.8122/.8123 in. (20.628/20.632 mm.)
Class of fit	Finger push fit

### Piston

Type	Solid skirt
Material	Tin-plated aluminium alloy
Length	2.687 in. (68.250 mm.)
Compression height	1.536/1.538 in. (39.014/39.065 mm.)

Maximum permissible weight variation per set	4 grammes
Rings - Compression	2
- Oil control	1
Diameter - Grade 1	3.2467/3.2470 in. (82.466/82.474 mm.)
- Grade 2	3.2470/3.2473 in. (82.474/82.481 mm.)
- Grade 3	3.2473/3.2476 in. (82.481/82.489 mm.)
- Grade 4	3.2476/3.2479 in. (82.489/82.497 mm.)
Piston clearance in cylinder bore	.0030/.0036 in. (.076/.091 mm.)
Gudgeon pin bore offset	.04 in. (1.016 mm.) towards thrust face
Ring gap (fitted) - Compression	.009/.014 in. (.229/.356 mm.)
- Oil control	.010/.020 in. (.254/.508 mm.)
Piston ring to groove clearance:	
- Compression	.0016/.0036 in. (.041/.091 mm.)
- Oil control	.0018/.0038 in. (.046/.097 mm.)

### Lubrication System

Pump:

Type

Eccentric lobe

Drive

Gear on jackshaft

Inner and outer rotor clearance

.006 in. (.15 mm.) Maximum

Inner and outer rotor float

.005 in. (.13 mm.) Maximum

Outer rotor to housing clearance

.010 in. (.25 mm.) Maximum

Normal pressure (hot)

35/40 lbs.in.sq. (2.4/2.8 kg.cm.sq.)

Filter

Full Flow (renewable element or 'throw-away canister).

### FUEL SYSTEM

Pump - Operation

Lever by eccentric on jackshaft

    - Pressure

1.25/2.5 lbs. in. sq. (.087/.176 kg.cm.sq.)

Air cleaner type

Paper element (dry)

Carburetter - Type and number

Weber 40 DCOE 31 Two

    - Slow running speed

800/900 r.p.m.

Settings:

40 DCOE 31

	30 mm .	32 mm .	33 mm .
Choke	115	115	120
Main Jet	200	150	155
Air corrector jet	50 F.8	50 F.8	50 F.8
Slow running jet	40	40	35
Accelerator pump jet	10 mm .	10 mm .	10 mm .
Accelerator pump stroke	100	100	100
Starter air jet	F.5/100	F.5/100	F.5/100
Starter petrol jet	F.11	F.11	F.11
Emulsion tube	1.75	1.75	1.75
Needle valve	1.5 in. (3.8 cm)	1.5 in. (3.8 cm)	1.5 in. (3.8 cm)

IGNITION SYSTEM

Type	Coil and distributor
Firing order	1,3,4,2.
No 1. cylinder	Nearest to radiator
Ignition advance control	Fully automatic
Ignition timing (static):	
Weber Carburettors (except Sprint)	10° B.T.D.C.* (40953) & (41189)
Weber Carburettors (Sprint)	12° B.T.D.C.* (41189)
Coil	Lucas LA.12
Sparking Plugs - Type	Champion N7Y
- Gap	.020/.023 in. (.508/.584 mm.)

\* The above ignition settings may need SLIGHT alteration to meet local fuel requirements.

Distributor

Type	23 D. 4
Direction of rotation (from above)	Anti-clockwise
Drive	Gear on jackshaft
Contact breaker gap	.014/.016 in. (.35/.40 mm.)
Contact lever spring tension	18/24 oz. (.51/.68 kg).
Firing angles	0°, 90°, 180°, 270° ± 1°
Cam dwell angle	60° ± 3°

Despatch No. - Weber carburetters 40953, STD; 41189A, S/E and Sprint  
 Centrifugal advance - Distributor despatch No. 40953

<u>crankshaft r.p.m.</u>	<u>crankshaft degrees B.T.D.C. (Add static settings)</u>
Below 500	No advance
1,000	5.6
1,500	10.5
2,000	16.0
2,500	16.8
3,000	17.8
3,500	18.6
4,000	19.5
4,500	20.5
5,000	21.0
5,500	22.5
6,000	23.0
6,500	24.0

Centrifugal advance - Distributor Despatch No. 41189A

<u>crankshaft r.p.m.</u>	<u>crankshaft degrees B.T.D.C. (Add static settings)</u>
Below 1,000	No advance
1,250	2.5
1,500	4.5
1,750	7.0
2,000	9.3
2,250	11.5
2,500	14.0 Maximum advance

### COOLING SYSTEM

Type	Centrifugal pump and fan
Radiator cap relief valve pressure	10lbs. in. sq. (.70 kg. cm. sq.)
Thermostat nominal opening temperature	78°C.
Fan belt tension (at longest run)	½ in. (12.7 mm.) total up-and-down movement.

### CLUTCH

Make and Type	Borg & Beck, diaphragm spring
Operation	Hydraulic
Driven plate - Diameter	8 in. (20.3 cm.)
- Number of springs	6

## GEARBOX

Type	4 forward speeds, all synchromesh, & reverse
Bearings - Mainshaft	Ball
- Countershaft	Rollers
Adjustment - 1st. gear end float	.005/.010 in. (.127/.254 mm.)
- 2nd. gear end float	.005/.010 in. (.127/.254 mm.)
- 3rd. gear end float	.005/.016 in. (.127/.406 mm.)
- Countershaft	.008/.020 in. (.203/.508 mm.)
- Mainshaft end float	.030 in. MAX (.76 mm. MAX)
<u>Ratios</u> - Top	1.000:1
- 3rd.	1.396:1
- 2nd.	2.009:1
- 1st.	2.972:1
- Reverse	3.324:1

## REAR AXLE (See Ford Escort W.S.M.)

Final drive ratio	3.777:1
Overall ratios:	
With 3.77:1 final drive	
- Top	3.777:1
- 3rd.	5.272:1
- 2nd.	7.587:1
- 1st.	11.225:1
- Reverse	12.554:1

## STEERING

Type	Rack & Pinion
Steering angles:	
Camber	Zero - nominal
Castor	5° <sup>+</sup> -30'
Swivel pin (kpi)	9° <sup>+</sup> -30'
Toe-in	.0625 in. (1.6mm.)

## WHEELS AND TYRES

Wheel - Type	Pressed steel
- Size	5½ J
Tyres - Type	Dunlop SP. Sport with tubes
Tyres - Size	165 x 13
- Pressure * (cold) - Front	16 lbs. in. sq. (1.12 kg.cm.sq.)
- Rear	22 lbs. in. sq. (1.55 kg.cm.sq.)

\* For sustained fast touring, or full load increase pressures to

- Front	18 lbs. in. sq. (1.26 kg.cm.sq.)
- Rear	26 lbs. in. sq. (1.83 kg.cm.sq.)

NOTE: It is not necessary to increase the tyre pressures for any reason other than those given.

## TORQUE LOADING FIGURES

### ENGINE

Cylinder head (tighten cold)	60 - 65	8.29 - 8.98
Cylinder head to front cover	10 - 15	1.38 - 2.07
Sparking plugs	24 - 28	3.31 - 3.87
Camshafts - Bearing caps	9	1.24
- Sprockets	25 - 30	3.45 - 4.14
Crankshaft - Main bearing caps	55 - 60	7.60 - 8.29
- Connecting rod (big-end) caps	44 - 46	6.08 - 6.36
- Pulley	24 - 28	3.31 - 3.87
Flywheel	45 - 50	6.22 - 6.91
Front (timing) cover - ¼ in. (UNF & UNC)	5 - 7	.69 - .96
- 5/16 in. (UNF & UNC)	10 - 15	1.38 - 2.07
- Back plate to cylinder block	6 - 8	.83 - 1.10
Timing chain tensioner - Sprocket pin	40 - 45	5.53 - 6.22
- Retaining bolt	45 - 50	6.22 - 6.91
- Pivot pin	40 - 45	5.53 - 6.22



	<u>lbs. ft</u>	<u>kg. m.</u>
Jackshaft - Sprocket	12 - 15	1.65 - 2.07
- Thrust plate	5 - 7	.69 - .96
Oil filter centre bolt	12 - 15	1.65 - 2.07
Oil pump to cylinder block	12 - 15	1.65 - 2.07
Oil sump to cylinder block	6 - 8	.83 - 1.10
Oil sump drain plug	20 - 25	2.76 - 3.45
Fuel pump to cylinder block	12 - 15	1.65 - 2.07
Exhaust manifolds to cylinder head	12 - 15	1.65 - 2.07
Rear oil seal carrier (crankshaft) to cylinderblock	12 - 15	1.65 - 2.07
Generator to mounting bracket	15 - 18	2.07 - 2.48
Carburettor trumpet nuts	8	1.10

### CLUTCH

Clutch housing to gearbox	40 - 45	5.53 - 6.22
Clutch assembly to flywheel	12 - 15	1.65 - 2.07
Fluid pipe nuts	5 - 7	.69 - .96

### GEARBOX

Rear extension to gearbox main casing	20 - 25	2.76 - 3.45
Mainshaft nut	20 - 25	2.76 - 3.45
Plugs - Drain	25 - 30	3.45 - 4.14
- Filler/level	25 - 30	3.45 - 4.14

### FRONT SUSPENSION AND STEERING

Stub axle retaining nut	65 - 75	8.98 - 10.36
Ball joint - to vertical link	38 - 42	5.25 - 5.80
- to upper wishbone	12 - 15	1.65 - 2.07
Lower wishbone - to trunnion*	35	4.83
- to damper*	50 - 60	6.91 - 8.29
Inner wishbone retaining nut*	50 - 60	6.91 - 8.29
Caliper mounting plate to hub	22 - 27	3.04 - 3.73
Steering arm to vertical link	22 - 27	3.04 - 3.73
Steering tie-rod ball joint	26 - 28	3.59 - 3.87

\*Tighten with suspension in static ride condition

## HUBS

Brake disc to hub	22 - 27	3.04 - 3.73
Front hub spindle nut*	5 - 6	.69 - .83

\*Tighten nuts to this torque loading while rotating hub to ensure bedding of taper rollers. Slacken nut one 'flat', then insert split pin.

## BRAKE AND CLUTCH HYDRAULIC SYSTEM CONNECTIONS

3/8 in. UNF female (bundy and hose connections)	8 - 10	1.10 - 1.38
3/8 in. UNF male (bundy to master cylinder multi-ways etc)	5 - 7	.69 - .96
7/16 in. UNF male (pressure differential warning valve)	7 - 10.5	.96 - 1.45
3/8 in. bore servo bundy (5/8 in. UNF male)	14 - 21	1.93 - 2.90
Brake hose to banjo	12 - 15	1.65 - 2.07
Stop lamp switch	12 - 15	1.65 - 2.07

Torque wrenches in daily use should be checked at intervals, not exceeding 3 months, to ensure that accuracy is maintained.

## GENERAL - NUTS AND BOLTS

1/4 in. UNF and UNC	5 - 7	.69 - .96
5/16 in. UNF and UNC	12 - 15	1.65 - 2.07
3/8 in. UNC	17 - 22	2.35 - 3.04
3/8 in UNF	22 - 27	3.04 - 3.73
7/16 in. UNC	30 - 35	4.14 - 4.85
7/16 in. UNF	40 - 45	5.53 - 6.22
1/2 in UNC	45 - 50	6.22 - 6.91
1/2 in. UNF	50 - 60	6.91 - 8.29
9/16 in. UNC	60 - 70	8.29 - 9.68
9/16 in UNF	65 - 70	8.98 - 10.36
5/8 in. UNC	75 - 85	10.36 - 11.75
5/8 in. UNF	100 - 110	13.82 - 15.20

## BODY

### ACCIDENT REPAIRS

#### Assessing Accident Damage

All damage must be classed as structural. However, inside this broad classification the damaged area can be further defined as either:-

(a) High stressed, (b) Moderate stressed, or (c) Low stressed, and on that definition depends the original construction and therefore the repair method to be employed.

As a general rule there should be a bond wherever two panels touch, or wherever they close on important points. It is usually possible to check these bonds both visually and physically for fractures or breaks. Ascertain the cause of damage and the direction of impact and examine all panels or bonds which may have been affected. A front end impact for example may easily cause the bonds at the bulkhead to split without the defect being normally visible and so on.

If necessary the metal on other components should be removed to facilitate examination as to the extent of damage sustained.

Before the assessment can be completed, it is essential to decide on the repair method to be followed, the sizes of replacement panels to be ordered, etc. as the detailed instructions should be carefully followed.

The extent of the damage (and size of replacement panels) should take into account surface crazing.

Fire damage is the most difficult to assess but generally only the obvious burnt or charred sections will need to be replaced or reinforced.

The pedal mounting areas are heavily loaded and since failure of these in service could be fatal, they should be carefully examined if they have been close to the fire source.

#### Basic Binds and Joints

a. The old laminates should be tapered off for 3 to 4 in. (7.6 to 10.2 cm.) on either side of the fracture line, a reinforcing layup comprising alternative layers of chopped strand mat and fine woven cloth is applied on both sides of the panel providing a symmetrical repair of great strength.

In most cases it is advisable to make the reinforcing layup on the reverse side of the panel considerably stronger than that on the outside.

- b. When it is difficult to taper both sides of the laminate an almost equally effective joint can be obtained in which the reinforcing layer is done on the reverse side of the panel.
- c. In this method the reinforcing layer is added on the reverse side, but with no tapering of the old panels and with the crack of the old panel merely filled in. If this latter method is used, it is advisable to laminate a box or channel section over the joint at suitable intervals.

### Pedal Mountings

In cases of damage at the panel area on which the pedals assembly is mounted, it is essential to position the vertical face of the mountings accurately relative to the bulkhead and cross-shaft mounting bracket. Both the thickness and smoothness of the internal vertical face is critical.

A maximum thickness of .25 in. (6.35 mm.) and a minimum thickness of .1875 in. (4.76 mm.) must be achieved for the surfaces where the pedal mounting bracket seats on the rough side of the panel.

Where a fracture has occurred on the face, this can be remedied by making a mounting plate for the brake and clutch master cylinders mounting bolts, securing this preferably on the inside of the panel and adjusting the thickness to that given above. The plate could then be either laminated or bolted into position.

### SUPERFICIAL DEFECT REPAIRS

#### Pin Holes or Air Voids

These are unfortunately quite inseparable from the hand layup system but since all body components are 'heated' to the maximum known service temperature of 180°F.(82°C.) in order to show up any voids before painting they should never in theory give any difficulty. If they do then the only solution is to dig them out and fill the holes with a polyester stopper or filler. The two commonly used methods of filling these small holes are,

- (a) drilling or routing out so as to leave a larger hole with near vertical walls, or
- (b) where the hole is enlarged by gouging or 'picking out'.

A common problem of repaired pin holes is the sinking of the paint surface some time after the repair has been completed. This may result from the use of a cellulose paint stopper which has a higher rate of shrinkage or in the case of a polyester stopper is usually caused by painting too soon after effecting the repair, before the filler is properly cured.

The filled areas should on no account be rubbed down until the filler has fully cured, or sinking will obviously result.

#### Surface Crazing

There are various causes of surface crazing, but practically all are caused by sharp impacts or accidental damage. During an accident some panels may flex sufficiently to cause the surface to craze without causing immediate apparent damage to the surface.

The crazing may not work its way through the surface for some weeks so that it is necessary when assessing accident damage to carefully examine all panels, particularly near cracks or split bonds and in cases of doubt it may be possible to promote the appearance of the crazing by applying gentle heat.

Crazing itself generally stops at the first layer of glass fibre and is consequently not in itself structurally serious, but the extensive crazing near damaged areas should be taken as an indication of over-stressing and the panel should be reinforced or replaced. It is not possible to remedy crazing by simply re-surfacing with a further layer of resin.

#### Wrinkling or Distortion

This phenomenon is usually caused by exposure to severe heat. This can cause the resin to soften slightly and in doing so give way to any inbuilt or associated stresses. In all such cases, technical advice should be sought from Lotus Cars Ltd.

#### Split Bonds

Small splits of bonds such as those around the door can occur, being caused mainly by excessive flexing of the panels or by vibration and they should be arrested before they can extend and become serious. The split should be peeled open slightly further, the inside flange surfaces should be roughened up with a hacksaw blade and the appropriate type of bonding resin should be inserted before clamping up. Clamping pressure should always be applied evenly, using a small slip of wood or metal if dimpling of the panel surface is to be avoided. Where possible, all splits should be laminated from the inside.

## Metal Inserts

The only metal inserts used are bobbins.

## Bobbins

Considerable use is made of die-cast metal inserts, which are oval in configuration and commonly known as 'bobbins'.

These are designed to carry high loads in most directions and also offer the advantage of being accurately located in the mountings.

Three basic forms are employed as follows:-

Large (structural) bobbins - with  $\frac{3}{8}$  in. or  $\frac{7}{16}$  in holes (plain or threaded).

Small (semi-structural) bobbins - with  $\frac{1}{4}$  in. or  $\frac{5}{16}$  in. holes (plain or threaded).

The following advise is given when dealing with bobbin failures.

## Bobbins Pulling Out

This could easily be caused by overloading e.g. accidental damage. Where the bobbin and its surrounding area is accessible from the rough side of the laminates either naturally or by cutting non-weakening access holes, the remedy is to improvise a local mould in wood or glass fibre of the body surrounding the finished side of the bobbin.

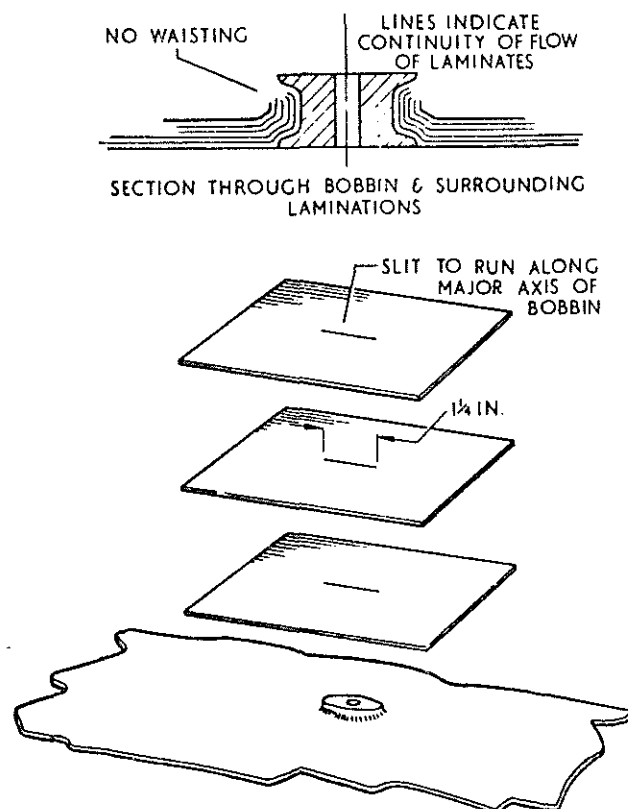


Fig 1. METHOD OF BONDING IN BOBBINS

Difficulty may be experienced in re-locating the bobbin and its surrounding laminate in its original position. A local mould of the smooth side of the surrounding area (for example 6 in. (15 cm.) beyond in all directions) should eliminate this trouble. Re-registering can be achieved by drilling holes through mould and body and through the bobbin before removing the repair mould.

Additional 4.00 in. (10.2 cm.) square patches to make up to:-  $\frac{1}{4}$  in. and  $\frac{5}{16}$  in. bobbins: the equivalent of  $5 \times 1\frac{1}{2}$  oz. layers.

$\frac{3}{8}$  in. and  $\frac{7}{16}$  in bobbins: the equivalent of  $7 \times 1\frac{1}{2}$  oz. layers.

NOTE:- Number of patches to be determined from the above.

The bobbin can then be directly laminated on the old mounting by using the techniques described and overlapping the new laminate on to the old by several inches (centimetres) whenever possible.

The larger bobbins are used only where the loadings are known to be high, e.g. body mountings, seat attachments, etc. Smaller bobbins are used as a locatory point or a blind attachment point.

#### Stripped Threads

Whilst their oval section will prevent these bobbins from turning, in normal use they may loosen if too much tightening pressure is applied, or when an attempt is made to tap them out to a large diameter. If a thread is damaged or stripped an attempt should be made to drill the thread clear and use a bolt and lock nut or drill oversize and fit helicoil insert.

When fitting an initial check should be made with each bolt before tightening. Where the bolts are particularly tight this may be due to resin within the threaded portion of the bobbin which can be remedied by tapping out.

Only the current length of the bolt should be used, i.e. those whose thread engages with the full depth of the bobbin. No attempt should be made to pull items up under heavy load with a small engagement of thread. To avoid tightening up onto the plain shank of the bolt it is recommended that only setscrews be used, i.e. those threaded all the way up to the head.



### Laminating in a New Bobbin

Firstly the laminates from the basic mounting surface must overlap and interleave with the laminates around the bobbins. Secondly the laminate must be well built up under the bobbin to prevent the bobbin from pulling out in a downward direction. This surrounding laminate should in itself comprise a tight ring around the bobbin to prevent it from bursting out under diagonal loads but if in doubt one or two layers of tape or cloth should be wound round the waist of the bobbin. Finally plasticine or similar plugs should be used during laminating to keep the resin out of the bobbin threads.

When properly laid the visible rough sidewall will be nearly vertical in line with the bobbin top profile. In effect a strong reinforcing ring of laminate surrounds the bobbin and this ring must be properly connected to the basic laminate.

### Layup around Bobbins

- a. It is important that build-up around bobbins is as previously described as bobbins by nature of their application are subjected to high loads, and will break out of the surrounding fibre glass if not bonded in correctly.
- b. Bobbins must be bolted to mould after 'mould release agent' has been applied and prior to Gel-coat application. Care must be taken to ensure that it sits well down on to the mould, and that the bobbin is positioned correctly in accordance with the specification concerned. Do NOT apply Gel-coat to the bobbin surfaces or sides. It is essential to keep the Gel-coat to a minimum thickness to prevent 'crazing' and desirable that the general layup thickness tapers gradually away from the bobbins. Remember that tensile applications are the most demanding and require continuity of layup, that the above instructions be strictly adhered to, that the safety of the vehicle may be dependant upon the correctness of the application of these operations.

### Body Mounting Points

When mounting body to chassis unit, a clearance between the rearmost mounting brackets and body behind the differential unit may be observed. Should this condition occur it is essential not to tighten the body down onto the brackets as consequential stressing of the body shell rearwards of the door apertures may open the door apertures and result in jamming and misfitting of the door. Spacing washers of 16 swg must be inserted, packing out until tightening can be effected without straining.

## B.5 - BODY CARE

When washing the body, use plenty of cold water; never attempt to remove dust or mud from the paintwork when dry, as this will damage the high gloss finish.

Special preparations are marketed for adding to the washing water, the use of these mild 'detergents', as directed by the manufacturers, will expedite washing. Only use preparations of a reputable manufacture. When dust and mud have been removed with sponge and water, finally dry with a chamois leather.

If the car is kept clean by frequent washing, it will be found that polishing is almost unnecessary. If a polish is used, do not allow it to contaminate the windscreen.

During the months of winter, many countries use salt to assist in the clearance of ice and snow. Thoroughly wash the coachwork, the underside of the body and wings, and the chassis, either weekly or more frequently, depending on local conditions, to remove any salt deposit and prevent its corrosive action. The glass-fibre coachwork will not of course be affected by any corrosive action but the metal parts attached could be.

### Bright Metal

The attractive appearance of bright metal can be preserved if it is cleaned regularly. Each week wash with a soap and water solution, rinse thoroughly with clean water and dry off. Staining or tarnish can be removed with a good quality chromium cleaner.

### Windscreen Cleaning

The windscreen wipers are hinged so that they may be lifted clear of the glass, when cleaning the windscreen. Never push the blades across the windscreen as this will damage the mechanism.

### Upholstry and Roof Lining

Normal cleaning consists of an occasional light wipe over with a cloth dampened in a mild soap and water solution; it is important that the cloth is only damp, not soaked.

## Covers

If it is desired to protect the vehicle with a portable cover, only use a lined and ventilated one. Unlined, or unventilated covers could cause 'sweating' of the paint finish.

Ensure body is dry before using the cover.

## BONNET (HOOD)

### To Remove

1. Fully open the bonnet AFTER ensuring that it will not foul any object at the front of the car.
2. From the lower front corners of the bonnet, remove the pivot bolts securing the bonnet to the chassis.

### To Replace

1. Replacement is a reversal of the removal procedure.

## BONNET LOCK

It is essential that the bonnet lock and release cable are checked for correct adjustment at intervals of every 3,000 miles (5,000 km.)

1. The cable must be well lubricated (use Shell Retinax 'A'), free from 'kinking' or tight bends and not chafing.
2. The catch must be free working.

## FRONT SUSPENSION AND STEERING

The front suspension is of the fully independent type with unequal length upper and lower wishbones, incorporating coil springs and damper units.

A stub axle carrying the hub assembly is bolted into the vertical link, which in its turn carries the outer ends of the wishbones, the steering arms and the brake calipers. The vertical link, lower trunnion into which it is fitted, steering arm and front hub are all handed, therefore care must be taken when fitting replacements.

An anti-roll bar is attached to the chassis by rubber insulated links and is connected at both ends to the lower ends of the dampers.

The steering gear is of the direct acting rack-and-pinion type, there being no separate steering linkage. On the ends of the steering unit rack are adjustable tie-rods to which are attached the ball-joints, these in their turn being directly attached to the steering arms. The steering arms are bolted to the vertical link.

## Maintenance

Lubrication of the lower steering swivels (trunnions) is most important to maintain accurate steering. The steering unit should be lubricated as indicated under 'Recommended Lubricants'.

### To Remove

When dismantling any part of the front suspension or steering gear, it is recommended that the bonnet be first removed (see 'Body'), thus giving easier access to all components.

### STEERING MOUNTING POINTS

The steering unit is secured to the chassis by two 'U' clamps using shock absorbing rubber between the unit and the clamps.

NOTE: Tie-rod ends of the steering unit should be free moving and show no signs of 'necking'. In order to maintain correct steering geometry, the track rods should be of equal length, with the front wheels correctly tracked (see 'Technical Data').

Where shims are used beneath the steering unit mountings they should also be used on replacement, these being necessary to achieve correct steering geometry.

### LOWER STEERING SWIVELS (TRUNNIONS)

The steering swivels are lubricated by removing the blanking screw located in the vertical link, then screwing in a grease nipple. Apply the grease gun filled with one of the recommended oils (see 'Lubrication') remove grease nipple and replace blanking screw.

### FRONT HUBS

The front hubs use two taper roller bearings. Correct adjustment is achieved by tightening the securing nut until no free play can be felt at the bearings, this being indicated by increased bearing drag, then 'backing' off the nut by one 'flat' to align the split pin holes.

It should be remembered that the hub bearings are designed to run with a .002/.004 in. (.05/.10 mm.) end float, therefore overtightening will destroy the bearings.

After adjustment, the hub bearings should be packed about half full with one of the greases recommended under 'Lubrication'.

## REAR SUSPENSION

The rear suspension has a live axle located by leading and trailing links. Lateral location is by wishbones and spring/damper units control the ride.

### SPRING/DAMPER ASSEMBLY

#### To Remove

1. Jack up car and remove road wheel.
2. Release bolts from top and bottom damper fixing and remove damper and spring as a complete assembly. Further dismantling, as required, can be carried out on the bench.

#### To Replace

1. Reverse the above instructions.

### AXLE LOCATING LINK AND/OR RADIUS ARMS

#### To Remove

1. Jack up car and remove road wheel.
2. Using an axle stand, support the rear axle adjacent to the lower fixing of the spring/damper unit.
3. Release bolts as required to remove axle locating link and radius arms.

#### To Replace

1. Reverse the above instructions.

## ENGINE

All running clearances, fitting tolerances and dimensions are given in 'Technical Data'.

### E.1 - GENERAL DESCRIPTION

The engine is a four cylinder, four stroke, twin overhead camshaft unit having a cast aluminium cylinder head which has fully machined hemispherical combustion chambers and separate parts for each valve. The valves, of which the inlets are longer than the exhaust, have replaceable guides and seat inserts and are at an angle of 27° to the vertical. They are operated by the camshafts acting directly on piston type cam followers (tappets).

A spring tensioned single row chain drives the camshafts at half engine speed. The camshaft end float and location depends on a shoulder at the front of each shaft bearing in the head. The timing chain also drives the jackshaft which is situated in the right-hand wall of the cast iron cylinder block and which drives the oil pump, distributor and fuel pump. The jackshaft is located by a thrust plate bolted to the cylinder block front face and runs in three steel-backed white metal bearings, while the camshafts each run in five bearings of this type. The oil pump, distributor and fuel pump are mounted on the right-hand side of the engine, the oil pump and distributor being driven by a single skew gear on the jackshaft and the fuel pump by a cam also on the same shaft.

The crankshaft, of cast-iron construction and dynamically balanced, runs in five steel-backed lead bronze lined bearings, end float being controlled by split thrust washers located in the cylinder block on either side of the centre main bearing.

The connecting rods of 'H' section forgings have steel-backed bronze little end bushes and steel-backed copper lead big end liners, the big end bearing caps being located by two dowels and retained by two bolts. Solid skirt aluminium alloy pistons with two compression and one oil control ring situated above the gudgeon pin are used. The gudgeon pins are retained in position by circlips installed in grooves at each end of the gudgeon pin bore.

A cast-iron flywheel incorporating a steel ring gear drive for the starter, is located on the crankshaft flange and retained by six bolts fitted without lockwashers.

## E.2 - LUBRICATION

### General

The lubrication system is of the forced feed type, the oil being circulated by a mechanically driven oil pump bolted to the right-hand side of the cylinder block. The pump is driven by a skew gear on the jackshaft, and is of the eccentric bi-rotor type which incorporates a non-adjustable plunger type relief valve.

Oil is drawn from the sump up an inlet pipe attached to the cylinder block and into the pump. When the relief valve opens, oil is passed back into the sump, returning via the base of the sump to prevent aeration. From the pump the pressurised oil flows through the integral full flow filter to a short oil gallery on the right-hand side of the engine. At the forward end of the gallery is a tapped take-off for the oil pressure transmitter. A cross drilling at the rear of this gallery takes the oil to the other side of the engine where the main oil gallery is situated from which all the main bearings are fed.

A notch cut in the centre main bearing liner feeds oil to the crankshaft rear thrust washer. Oil is fed to the big end bearings through drillings in the camshaft front, centre and rear journals. Lubrication of the little end bushes, the gudgeon pins and the non-thrust sides of the cylinders is by oil mist and an oil jet forced through a small drilling in each connecting rod web, every revolution of the crankshaft.

The jackshaft bearings are fed from the front, centre and rear main bearings via drillings in the block and a metered jet of oil from a front drilling lubricates the chain and sprockets. Oil fed to the overhead camshafts is controlled by flats machined on the jackshaft front journal, and each camshaft bearing is then fed by a central drilling, blocked at the rear end by a tapered Allen screw. Surplus oil from these bearings then drains back into the sump by way of passages in the head.

### Oil Level

The correct level is to the 'FULL' mark on the dipstick, which is located to the left-hand side of the timing cover. When checking the oil level the car must be standing on a level surface and the dipstick withdrawn, wiped replaced and finally withdrawn and read, the depth of the oil on the end of the dipstick indicating the level of the oil in the sump. If oil needs to be added, remove the oil filler cap on the camshafts cover and pour in clean engine oil of the correct grade (see 'Lubrication') until the dipstick indicates that the sump is full. Do NOT overfill. Replace the oil filler cap securely (double notch) otherwise an oil loss could occur with the resultant failure of the engine lubrication system. From new the oil should be changed after 500 miles (800 km.) and then after every 3,000 miles (5,000 km.). If the oil appears to be excessively dirty before this distance, it should be changed and a new filter element fitted.

The sump capacity is given in 'Technical Data'. Where possible it is better to drain the oil when the engine is warm, (after having just completed a run) and has a lower viscosity to carry away any sediment.

### Oil filter

A full flow filter is bolted to the pump body to make an integral unit. The oil flows through the filter and passes to the galleries. To remove the filter unscrew the central retaining bolt and withdraw the filter body and element. The element should be replaced at intervals of every 6,000 miles (10,000 km.) or more frequently if there are signs of excessive fouling.

E.57

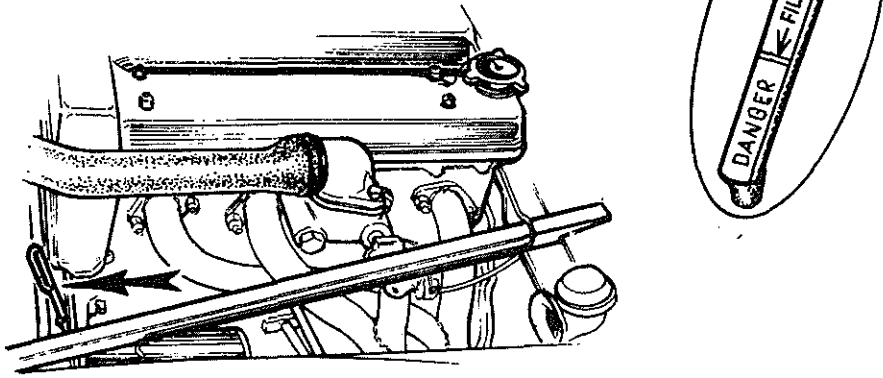


Fig. 1 DIPSTICK

Total Movement  
to be .5 in (13mm)

E.58

Timing Marks  
on Sprockets

Timing Chain  
Tension Adjuster

Timing Marks  
Cast on Cover

Timing Notch  
in Pulley

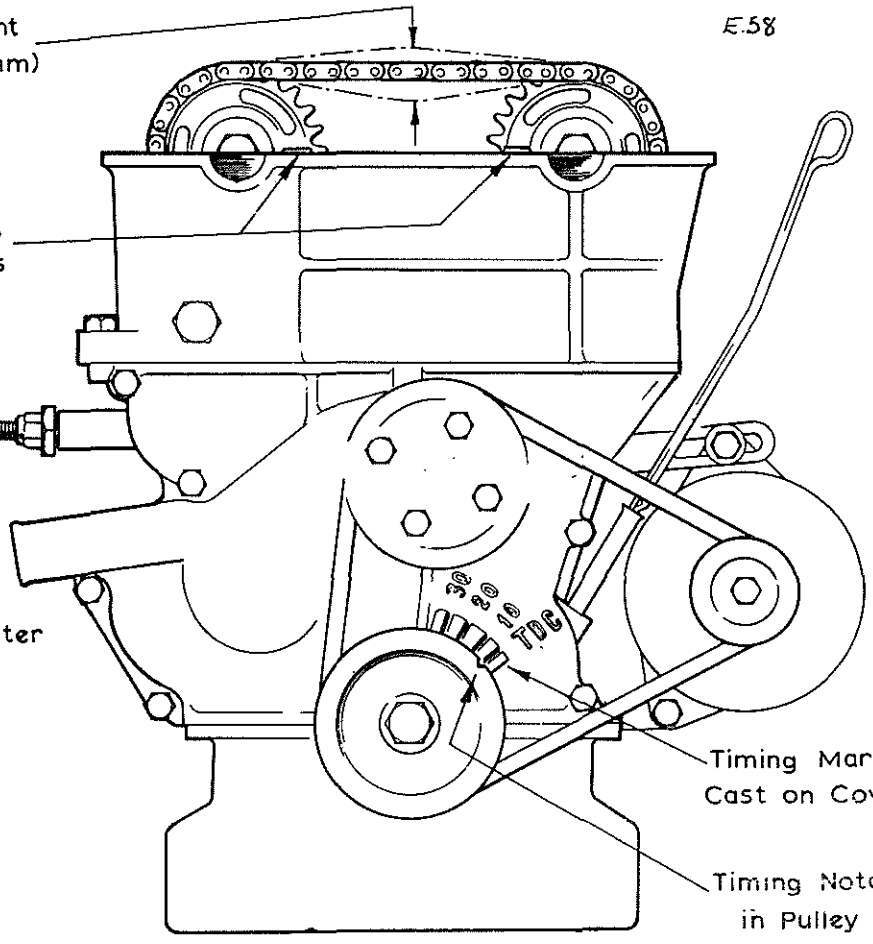


Fig. 2 TIMING MARKS & CHAIN TENSION



Extract the sealing ring and fit the replacement ring supplied with the new element. Clean out the filter body and refit the new filter assembly to the pump body. On some models a 'throw-away' canister type of filter is used. It is removed by turning in an anti-clockwise (counter-clockwise) direction. Before fitting a new filter, clean the mating face on the oil pump body, then screw on filter by HAND sufficient to make a seal, usually 2/3 to 3/4 turn to ensure an oil tight joint.

### Oil Sump

The sump is pressed steel construction bolted to the block with 18 bolts and spring washers.

### E.3 - ENGINE TUNE

1. Pull off the sparking plug leads and remove the plugs. Clean the plugs and reset the gaps to the dimensions given in 'Technical Data', or if the electrodes are badly burned, fit new plugs, and reconnect the plug leads.
2. Remove the distributor cap and examine the contact-breaker points. Replace the points if badly burned or excessive metal transfer is evident. Adjust the points gap to the dimension given in 'Technical Data' and refit the distributor cap.
3. Remove the fuel pump sediment bowl and filter screen. Wash both in clean petrol, ensure the gasket is in good condition and refit screen and sediment bowl to the fuel pump.
4. Remove the air cleaner element and clean by shaking through. If very clogged with dust or dirt, replace. Clean filter body of all accumulated dirt, reassemble and refit air cleaner assembly to car.
5. Disconnect the fuel feed pipes at the carburetters.
6. Weber Carburetters Remove float chamber cover. Withdraw the float arm pivot and remove float and gasket. Unscrew all the jets and blow them clear with an air gun. Do NOT use wire as this will enlarge the jet orifice. Remove the needle valve and the needle valve body, and blow it clean with an air line. Clean the float, float chamber and filter gauze using clean petrol. Replace all the jets, needle valve body and needle valve. Place the gasket on the carburetter cover and fit float assembly. Check float setting (see 'Fuel System'). Refit float chamber cover.

7. Zenith Stromberg Carburettors - Disconnect air trunking from air box and remove air box. Remove carburetters from engine (see 'Fuel System') to a clean work bench. Release centre plug from the base of each carburetter. Remove float chambers by releasing the retaining screws and withdrawing in a vertical motion to avoid damaging the float mechanism. Remove float chamber gasket. Take out floats. Remove needle valve from float chamber cover. Remove 'O' ring from centre plug. Thoroughly clean all removed parts in clean petrol. Refit needle valve into float chamber cover using a new washer. Replace float assembly and check (see 'Fuel System') Refit float chambers with new gasket. Fit new 'O' ring to centre plug and replace securely. Refit carburetters to engine using new gaskets. Top up damper reservoirs with oil (see 'Lubrication')
8. Reconnect the fuel feed pipes at the carburetters.
9. Adjust the valve clearances (see Section E.7.)
10. Connect the leads of a timing light in accordance with the manufacturers instructions. Check that the mark on the crankshaft pulley is visible; if not, mark with paint.
11. Start the engine and point the timing light at the crankshaft pulley, adjacent to the timing scale. Progressively increase the engine speed to 2,500 r.p.m. observing the timing mark, with the aid of the timing light to check that the distributor advances the ignition timing.
12. At 2,500 rev./min. adjust the ignition timing if necessary (see 'Technical Data') by slackening the distributor clamp and turning the distributor body as required. After making an adjustment tighten the clamp only sufficiently to hold the distributor in position - DO NOT OVERTIGHTEN. Remove the timing light.
13. Adjust the slow running speed of the engine (see 'Fuel System')

#### E.4 - COMPRESSION CHECK

1. Warm up the engine to its normal operating temperature then remove all sparking plugs. Set throttles to fully open position.

2. Place the gauge in a convenient position and insert the conical-ended rubber tube into No.1 sparking plug orifice. The normal compression pressure with an engine that has been run in correctly is given in 'Technical Data'. At altitudes above sea-level, proportionally lower pressures will be obtained. Compression is checked with starter turning engine at 200 r.p.m. Battery and starter should be in good condition.
3. Test the remaining cylinders in a similar manner, replace sparking plugs and connect the plug leads.

#### E.5 - CAMSHAFT COVER

##### To Remove

1. Remove the eight nuts and washers retaining the camshaft cover.
2. Remove the cover together with its gasket.

##### To Replace

When refitting the camshaft cover, it is advisable to use a new gasket.

#### E.6 - TIMING CHAIN TENSION

1. The timing chain tensioner is located at the right-hand side of the engine immediately below the cylinder head flange. Release the locknut and screw in (or out) the tensioner until a maximum noise level is achieved, approximately  $\frac{1}{2}$ in. (12.5 mm.) total movement of the chain between the two camshaft sprockets.

#### E.7 - VALVE CLEARANCES

##### To Remove

1. Remove the camshafts cover (Section 'E.5').
2. Turn the camshaft until the heel of the cam is on the cam follower (tappet) then, using feeler gauges, determine the distance between the cam follower and the cam heel. This clearance is given in 'Technical Data'.
3. Check all valve clearances, noting any which require adjustment.
4. Remove the camshaft (Section 'E.9').
5. Remove the cam followers with the aid of a valvegrinding tool, keeping them in their respective order.
6. Remove each adjustment shim now exposed, where the clearance requires adjustment, and substitute shims (one only to each valve) giving the correct clearance.

A thinner shim will be required to increase the valve clearance, and a thicker one to reduce the clearance.

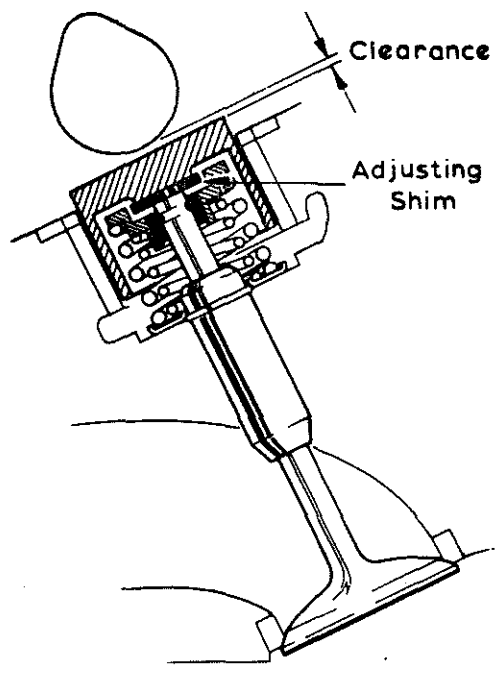
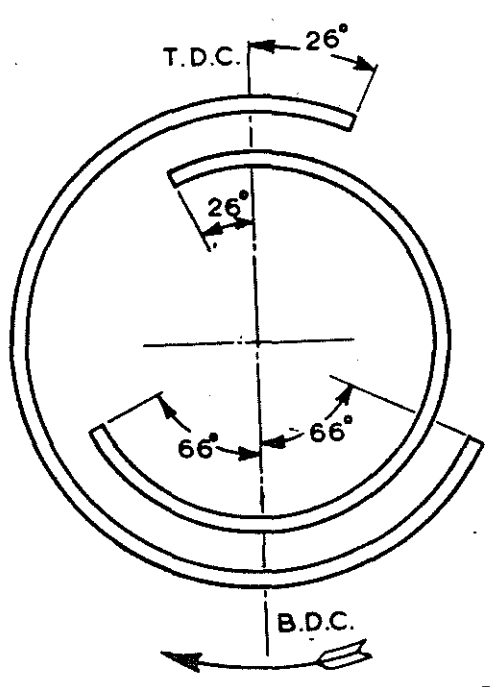


Fig. 3 VALVE ADJUSTMENT

TD 50-4E



TD 50-5E

Fig. 4 VALVE TIMING

1D-50-EB

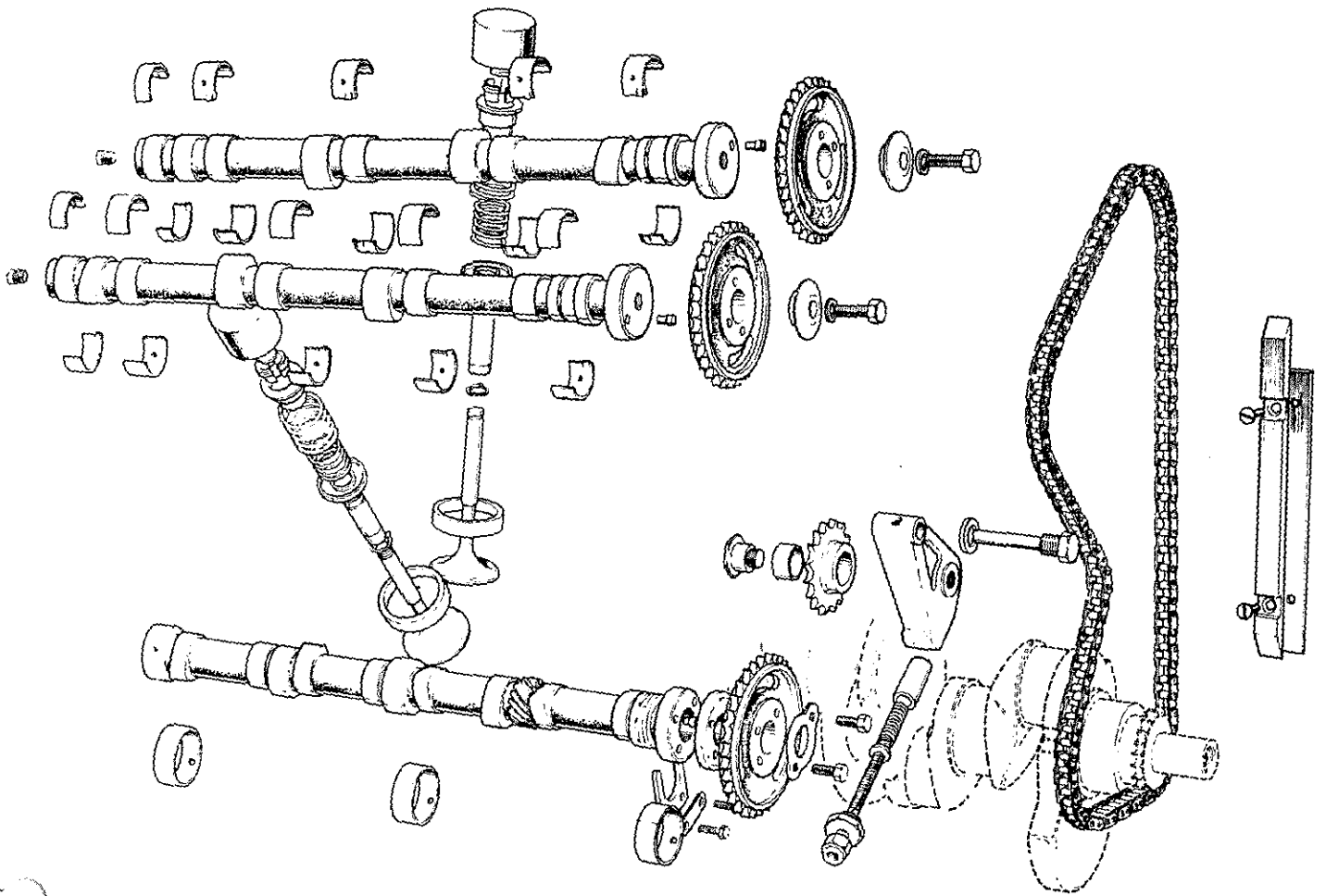


Fig. 5 VALVE GEAR COMPONENTS

Select a shim to give the correct size from the following formula:-

$$\text{Shim thickness required} = \text{A.C.} + \text{E.S.} - \text{C.C.}$$

Where A.C. is actual valve clearance

E.S. is existing shim thickness

C.C. is correct valve clearance

Measure the thickness of the shim accurately with a micrometer, even though the shim's thickness is etched around the periphery or on the underside of the shim. Any roughness caused by the etching should be removed with fine emery cloth.

#### To Replace

1. Refit the cam followers in their respective bores.
2. Fit the camshafts and recheck the valve clearances, re-adjusting if necessary.
3. Refit the camshaft cover.

### E.8. - CAMSHAFTS SPROCKETS AND TIMING CHAIN

#### To Remove

1. Remove the camshaft cover (Section 'E.5').
2. Set the engine in the timing position by aligning the timing mark on the crankshaft pulley with the lower mark (T.D.C.) on the front cover, and the timing marks on the camshafts sprockets adjacent to each other and level with the camshafts cover mounting face.
3. Remove the timing chain tensioner (Section 'E.6').
4. Remove the sprockets by releasing their central retaining bolts, and disconnect the timing chain. To remove the timing chain the front cover (Section 'E. 22'). must first be removed.

#### To Replace

1. Fit the camshafts sprockets and timing chain aligning the timing marks, as set during dismantling. Tighten the retaining bolts to the torque loading given in 'Technical Data'. Ensure correct sprocket replacement. (Ex.sprocket on exhaust camshaft).
2. Refit and adjust timing chain tension (Section 'E.6').
3. Refit the camshafts cover (Section 'E.5').

## E.9. - CAMSHAFTS AND BEARINGS

### To Remove

1. Remove the camshafts cover (Section 'E.5.').
2. Set the engine timing position (Section 'E.8.').
3. Remove the timing chain tensioner (Section 'E.6').
4. Remove the camshafts sprockets (Section 'E.8').
5. Remove the bolts securing the camshafts bearing caps, and remove the caps marking them (if not already marked) to ensure replacement in their original position. Extract the bearing liners.

### To Replace

1. Fit new bearing liners, noting that the location tags are correctly positioned in their locations in both cylinder head and bearing caps.
2. Fit the camshafts and their bearing caps, tightening the cap bolts progressively from the centre working outwards, to the torque loading given in 'Technical Data'.
3. Fit the camshafts sprockets and adjust the timing chain tension (Section 'E.8'). Check and adjust the valve clearances (Section 'E.7'). Finally fit the camshafts cover (Section 'E.5'.)

## E.10 - CYLINDER HEAD

### To Remove

1. Drain the cooling system.
2. Remove the carburetters air box (see 'Fuel System').
3. Remove the radiator top hose and the heater hose from their connections at the cylinder head.
4. Disconnect the water temperature gauge sender unit.
5. Disconnect the throttles and choke cables, fuel pipes from carburetters (see 'Fuel System') and exhaust manifold.
6. Remove the camshafts cover (Section 'E.5.')
7. Remove the camshafts sprockets (Section 'E.8.').
8. Pull the leads from the sparking plugs
9. Release the cylinder head bolts evenly and progressively working diagonally from the centre, not forgetting the bolts in the timing cover, and remove the cylinder head together with its gasket.



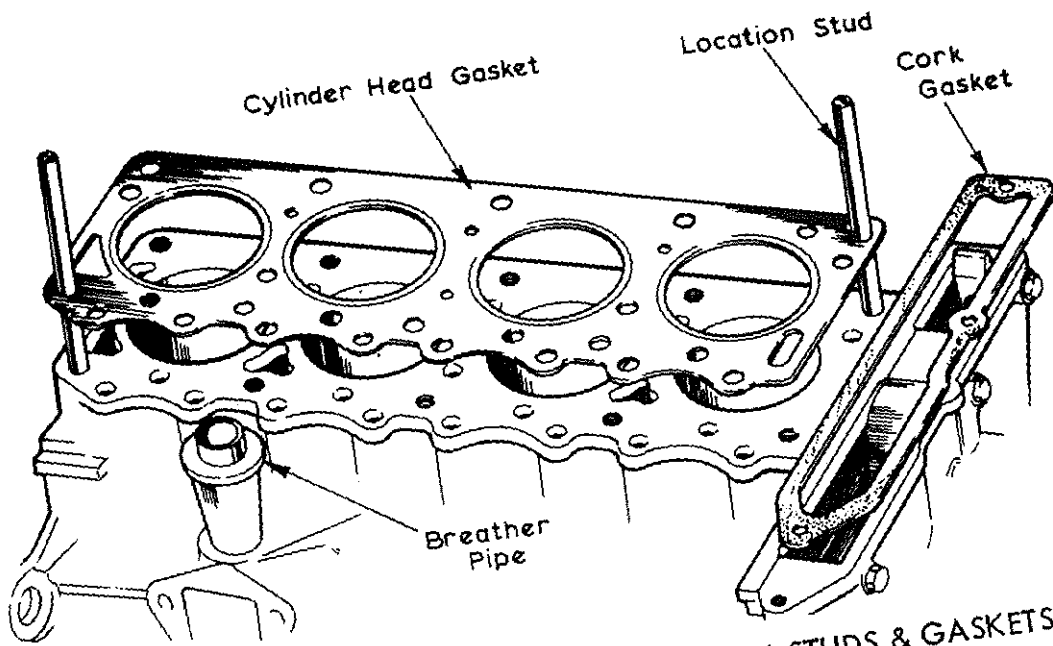


Fig. 6 CYLINDER HEAD LOCATION STUDS & GASKETS

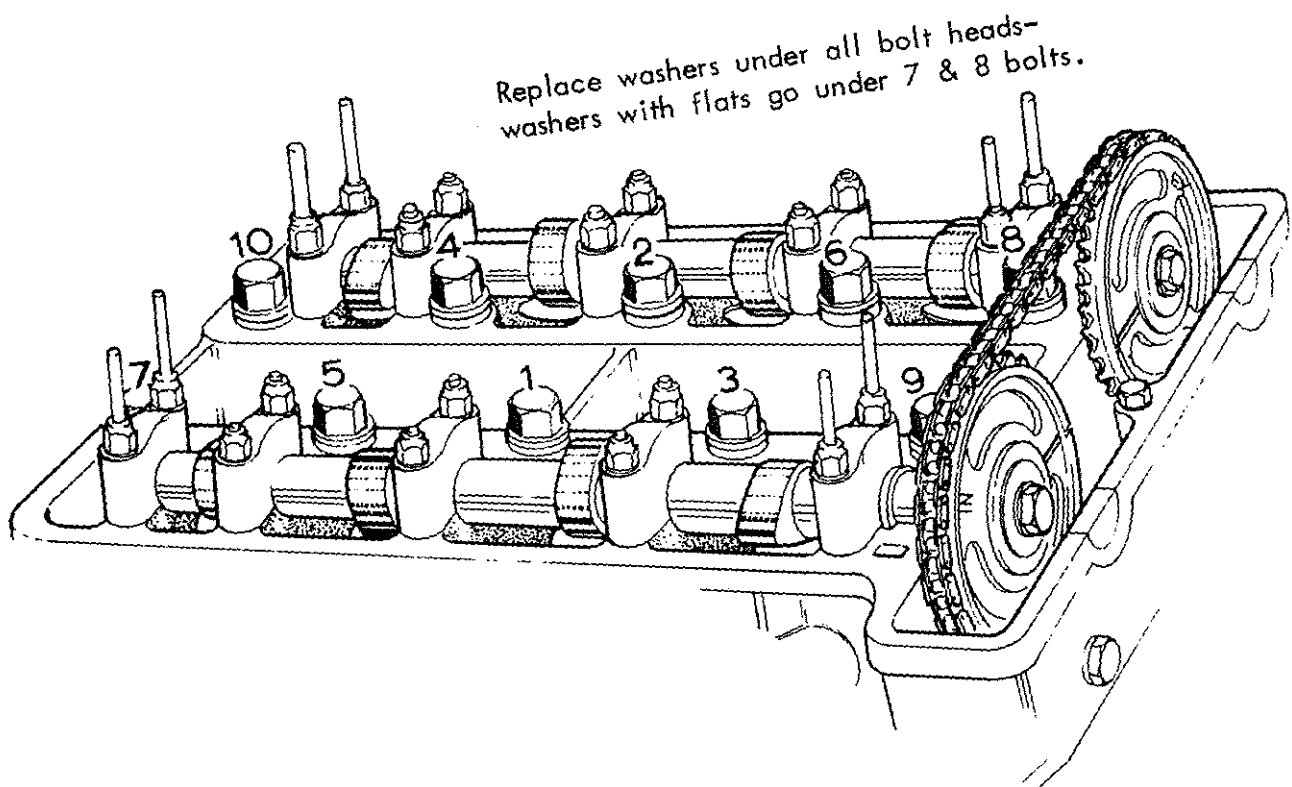


Fig. 7 ORDER OF TIGHTENING HEAD BOLTS

TD-50-E9

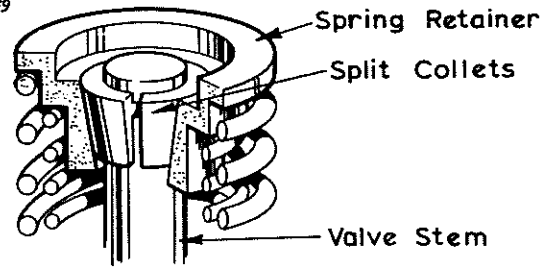


Fig. 8 VALVE SPRING RETAINER

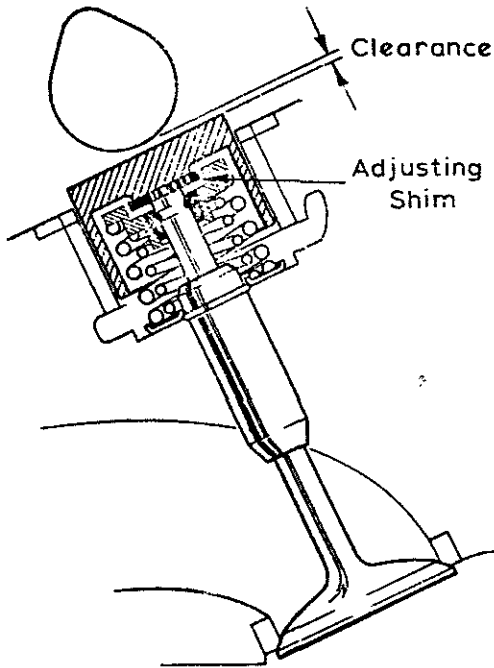


Fig. 9 VALVE ADJUSTMENT

TD-50-4E

TD-50-E11

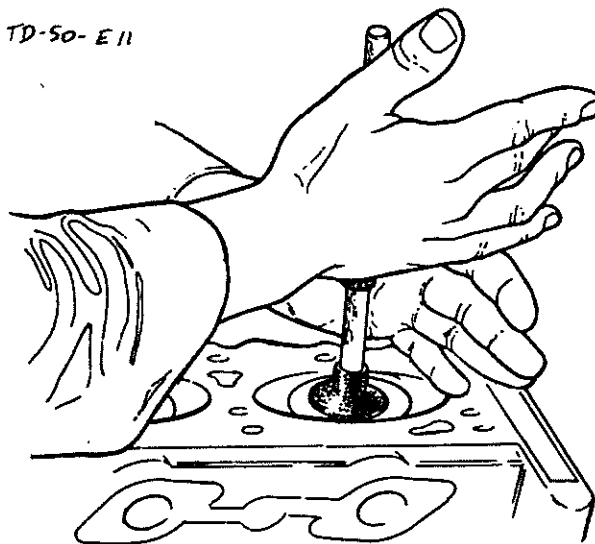


Fig. 10 GRINDING IN VALVES

Do NOT lay the cylinder head flat on its face while the camshafts are fitted as this will cause damage to the valves.

### To Replace

1. Screw into diagonally opposite holes (front left, rear right,) in the cylinder block face, two spare cylinder head bolts from which the heads have been removed and screwdriver slots cut. These studs locate the gasket whilst the cylinder head is being fitted. Use a new cylinder head gasket and a new cork gasket on top of the front cover. This cork gasket should have '3M's EC776 applied to its face which is in contact with the front cover, and 'Hylomar' applied to the face which will be in contact with the cylinder head.
2. Fit the cylinder head assembly, ensuring that the breather pipe is engaged in its bore. Loosely replace the cylinder head bolts. Extract the two gasket-locating studs and fit the last two bolts. Tighten all bolts to the torque loading given in 'Technical Data' working progressively diagonally outwards from the centre. New cylinder head bolts (Part No. 26 E 027A) have recently been introduced, these having an improved material specification. There is no change to the tightening torque. Old and new bolts are interchangeable, but it is inadvisable to mix old and new bolts on the same cylinder head, as the thread lengths may differ slightly.
3. Fit the camshafts sprockets (Section 'E.8') and camshafts covers (Section 'E.5')
4. Reconnect exhaust manifold, throttle and choke cables, and fuel pipes to carburetters. Refit the brake servo vacuum hose, radiator top hose, water temperature gauge sender unit and the heater hose. Refit the carburetters air box.
5. Finally, refill the cooling system.

### E.11 - VALVES

#### To Remove

1. Remove the cylinder head (Section 'E10') and the camshafts (Section 'E.9')
2. Remove the cam followers and the adjusting shims (Section 'E.7').

3. Using a valve spring compressor, compress the valve springs and extract the split collets, valve spring retainer, valve springs and spring seat from each valve.
4. Remove the valve.

#### To Replace

1. Lightly lubricate the stem of the valve and insert into its guide.
2. Fit spring seat, valve springs, valve spring retainer. Place the valve spring compressor in position and compress the valve springs sufficiently to fit the split collets. Remove the valve spring compressor.
3. Replace the cylinder head (Section 'E.10') followed by the camshafts (Section 'E.9').
4. Fit the camshafts sprockets (Section 'E.8'), check the valve clearances (Section 'E.7') and finally fit the camshafts cover (Section 'E.5.')

#### E.12 - DECARBONISE CYLINDER HEAD AND PISTONS

1. Remove carburetters.
2. Remove cylinder head (Section 'E.10').
3. Remove the valves (Section 'E.11')
4. Using a suitable implement (such as a blunt scraper), remove all carbon deposits from cylinder head faces, inlet and exhaust parts, piston crowns and valve heads. A ring of carbon should be left around the periphery of each piston crown. The top of the cylinder bores should NOT be touched. It is important to note that loosened carbon is not left where it can contaminate any parts of the engine.
5. Clean each valve thoroughly and carefully examining for pitting. Valves in a pitted condition should be refaced with a suitable grinder or new valves should be fitted. Stamp any new valves with the number of the port to which it is fitted. If the valve seats show any sign of pitting or unevenness they should be trued by the use of service cutting tools. When using a cutting tool take care to remove only as much metal as is necessary to ensure a true surface. The removal of too much metal could cause the spring retainer to foul the cam follower, and/or difficulty in achieving the required valve clearance.

6. When grinding a valve onto its seating the valve should be smeared lightly with fine or medium carborundum paste and then lapped in with a suction grinder. Avoid the use of excessive quantities of grinding paste and see that it remains in the region of the valve seating only. A light coil spring placed under the valve head will assist considerably in the process of grinding. The valve should be ground to its seat with a semi-rotary action and occasionally allowed to rise by the pressure of the light coil spring. This assists in spreading the paste evenly over the valve face and seat. It is necessary to carry out the grinding operation until a dull, even matt surface, free from blemishes is produced on the valve seat and valve face. On completion, the valve seats and ports should be cleaned with a rag soaked in paraffin, dried, and then thoroughly cleansed by compressed air. The valves should be washed in paraffin and all traces of grinding paste removed. Check that no grinding paste has entered the valve guides.
7. Re-assemble the valves to the cylinder head (Section 'E.11')
8. Refit cylinder head (Section 'E.10') and carburettors.

### E.13 - VALVE SEAT INSERTS

#### To Remove

1. Remove the cylinder head (Section 'E.10') and dismantle as for decarbonising (Section 'E.12').
2. Remove valve seat inserts by inserting a suitable sharp chisel through the port and carefully locating its cutting edge between the base of the insert and the alloy material of the head. The chisel may then be tapped deftly with a hammer. Further similar attempts to dislodge the insert should be made round the periphery of the insert where access is possible. Ensure that the recesses in the cylinder head are ENTIRELY FREE of foreign matter, otherwise the new insert will NOT seat fully in its recess.

#### To Replace

Valve seat inserts are available in standard and up to .015 in. (.381 mm.) oversize.

1. Heat the whole cylinder head to a temperature NOT EXCEEDING 200°C. (392°F.) and freeze the insert with 'dry ice' to a temperature NOT LESS THAN -80°C. (-112°F.)
2. Press the insert into place using a suitable replacer tool, ensuring that the seat face is towards the combustion chamber. Allow the cylinder head to cool naturally in the air.
3. Rebuild(Section 'E.12') and refit the cylinder head (Section 'E.10')

#### E.14 - VALVE GUIDES

##### To Remove

1. Remove the cylinder head (Section 'E.10') and dismantle (Section 'E.10')
2. Remove the valve guide with a suitable drift, knocking upwards into the cam follower bore after heating the cylinder head to 100/150°C (212/303°F.)

##### To Replace

Valve guides are available in standard and up to .006 in. (.152 mm.) oversize (See Service Parts List).

1. Heat the cylinder head to 100/150°C. (212/303°F.), locate a new circlip on the new guide and press the guide into its bore until the circlip seats completely in its recess. Care must be taken that the guides are NOT driven beyond this point (see 'Technical Data').
2. Ream the guide AFTER fitting, to the dimension given in 'Technical Data'. Recut the valve seat to ensure that it is concentric with the valve stem bore.
3. Rebuild (Section 'E.12') and refit the cylinder head (Section 'E.10')

#### E.16 - OIL SUMP

##### To Remove

1. Using a suitable receptacle release the drain plug and allow the oil to drain.
2. Release the setscrews from around the periphery of the sump. Remove the sump.
3. Thoroughly remove any accumulated sludge from the sump before refitting.

##### To Replace

1. When refitting use a suitable jointing compound on each gasket face before bringing into contact with the sump.

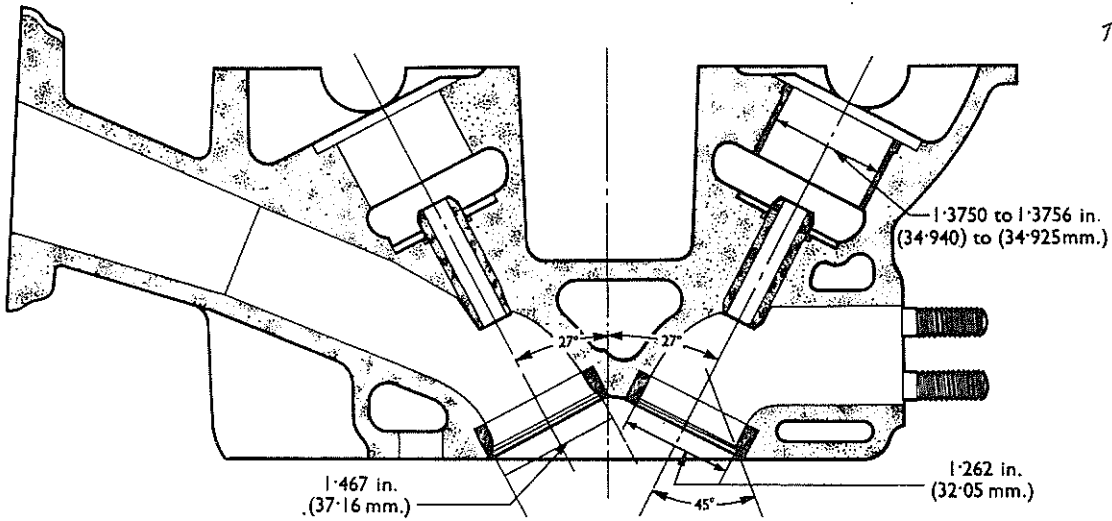


Fig. 11 VALVE SEAT INSERTS, VALVE GUIDES & VALVE FOLLOWER SLEEVE

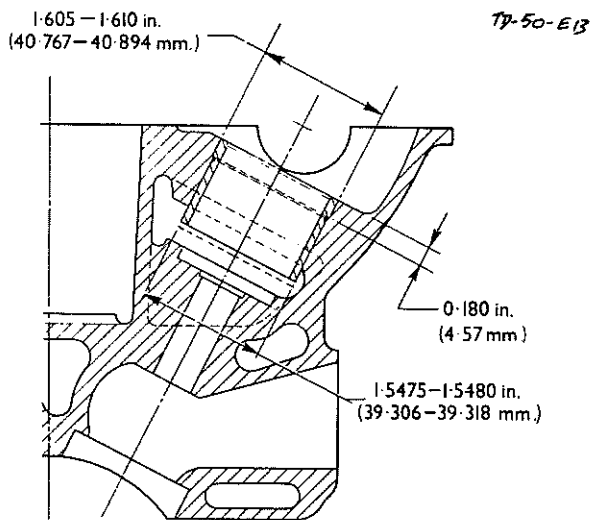


Fig. 12 DIMENSIONS FOR SLEEVE

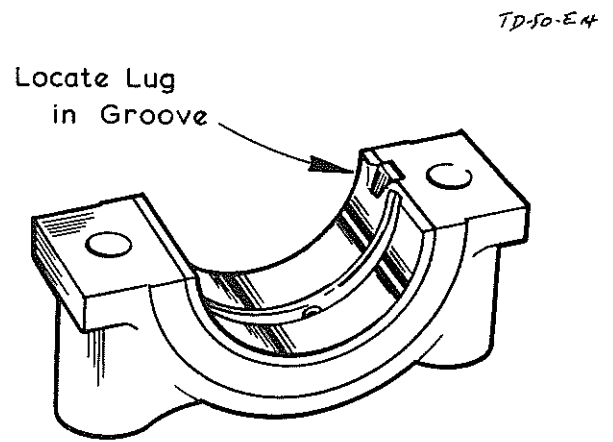


Fig. 13 MAIN BEARING SHELL AND CAP

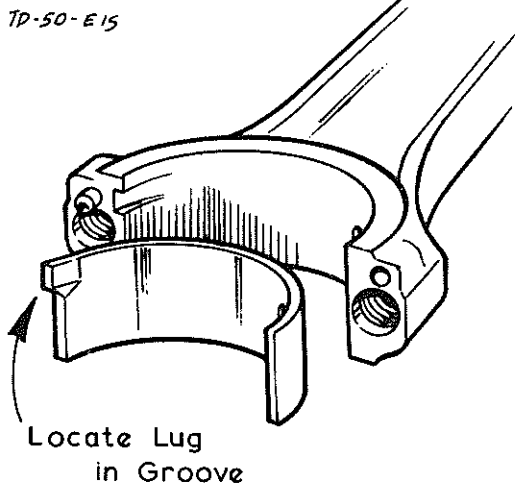


Fig. 14 CONNECTING ROD AND SHELL



## E.17 - MAIN BEARINGS

### To Remove

1. Remove the oil sump (Section 'E.16')
2. Mark each main bearing cap (if not already marked) with a similar mark on the cylinder block adjacent to the crankshaft, so that each cap when refitted will be in its original position.
3. Remove No.1 (from radiator end) main bearing cap, and release the upper shell bearing from the cylinder block by pushing out, revolving the crankshaft at the same time. Release the lower shell bearing from the cap by lifting out.

### To Replace

1. Fit new bearings by reversing the dismantling procedure and refit No.1 bearing cap. Tighten the retaining bolts to the torque loading given in 'Technical Data'.
2. Renew remaining main bearing liners in sequence, tightening each bearing cap to its correct torque loading BEFORE releasing the next one in sequence.

## E.18 - CONNECTING ROD BEARINGS

### To Remove

1. Remove the oil sump (Section 'E.16').
2. Commencing with No.1 (from radiator end) connecting rod, turn the crankshaft to facilitate removal of cap and mark cap and rod.
3. Release the big-end bolts by two or three turns, and tap them to release the cap. Fully unscrew the bolts and remove the cap.
4. Remove the upper and lower big-end bearing liner from the connecting rod and the lower bearing liner from the connecting rod cap.

### To Replace

1. Replace upper and lower big-end bearing liners in their appropriate locations.
2. Fit the cap to the connecting rod and tighten the bolts to the torque loading given in 'Technical Data'.
3. Renew the big-end bearing liners by repeating the above operation.

## E.19 - PISTONS, PISTON RINGS AND CONNECTING RODS

### To Remove

1. Remove the cylinder head (Section 'E.10') and the oil sump (Section 'E.16').
2. Release the big-end bolts by two or three turns, and tap them to release the cap. Fully unscrew the bolts and remove the cap. Push the piston out of the bore and remove the assembly to a bench.
3. Remove the piston rings. Extract the gudgeon pin circlips and push the pin out of the piston. Separate the piston and the connecting rod.

### To Replace

1. Select the new piston of the appropriate grade required (see 'Technical Data')
2. Fit the piston rings, oil control first, followed by the lower then the upper compression rings. Ensure that the rings are fitted the correct way up.
3. Assemble the piston to the connecting rod, ensuring that the 'front' marking on both parts are on the same side. Heat the piston in water to enable the gudgeon pin to be fitted. Retain the pin with new circlips.
4. Position the oil control ring gap to the rear and the two compression ring gaps to 120° on either side of this. Compress the rings using a suitable piston ring compressing tool and push the piston assembly into its bore with the 'front' mark on the piston towards the front of the engine.  
Turn the crankshaft as necessary to fit the connecting rod big-end to the crank pin. Tighten all bolts to the torque loading figures given in 'Technical Data'.
5. Refit the oil sump (Section E.16') and the cylinder head (Section 'E.10')

### Oil Control Rings

Oil control rings are recommended where oil consumption is excessive (more than 1 pint in 250 miles; 1 litre in 700 kilometers). The rings are available under:

Part No. 26 E 6003    Standard Bore

Part No. 26 E 6004    .015 in. Oversize Bore.

The procedure for fitting the ring is as follows:-

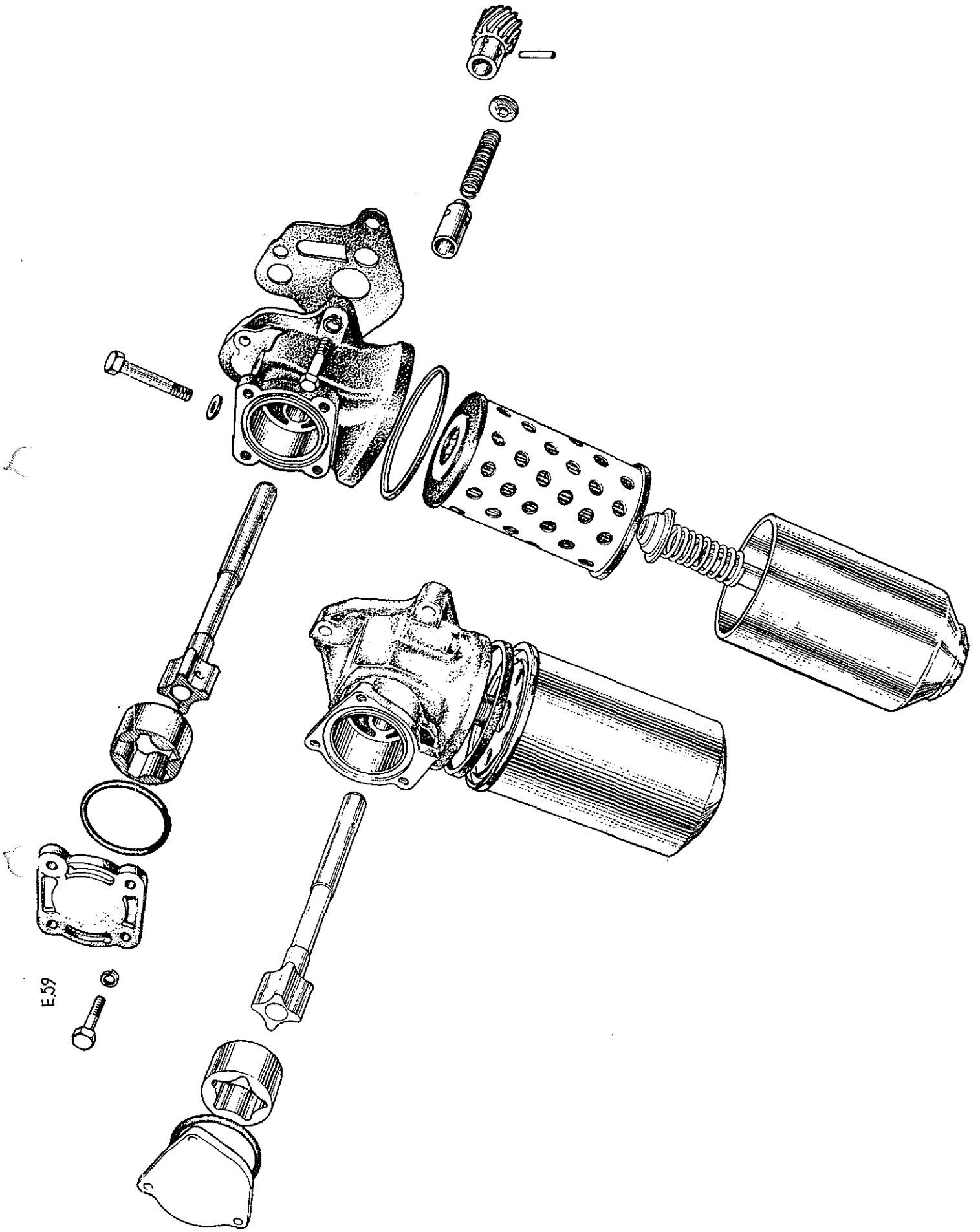


Fig. 15. LUBRICATING OIL PUMP AND FILTER COMPONENTS

1. Remove the pistons and measure the cylinder bores for wear. If more than .003 in. (.0762 mm.) wear has taken place, the cylinder block MUST be bored to .015 in (.381 mm.) oversize and new pistons fitted. If the engine is already bored .015 in (.381 mm.) oversize and MORE than .003 in (.0762 mm.) wear is evident, a new cylinder block is required.
2. The new type of oil control rings consist of an expander ring and two steel rails which are fitted above and below the expander ring. They MUST always be fitted BEFORE the compression rings are replaced, working from the piston crown downwards. They CANNOT be fitted with a ring compressing tool.
3. Fit the expander ring on the piston, ensuring that the coloured ends are butting.
4. Fit one end of a steel rail into the groove below the expander ring holding the rail end with a thumb, whilst easing the rail over the piston and into its location.
5. Repeat '4' to fit the other steel rail above the expander ring.
6. Position the lower steel rail gap 1 in. (25 mm.) to the LEFT of the expander ring gap and the upper steel rail gap 1 in. (25 mm.) to the RIGHT of the expander ring gap. The gaps to piston relationship is immaterial.

Running in: If oil control rings only have been fitted, a running-in distance of 100 miles (160 km.) is sufficient. If the bores have been honed because new compression rings were fitted in conjunction with oil control rings, then the running-in distance MUST be extended to 500 miles (800 km.) Where reboring and fitting of new pistons was required, the running-in period must extend progressively during the FIRST 1,000 miles (1,600 km.) NOT EXCEEDING 3,000 r.p.m. in any gear during this period.

## E.20 - CRANKSHAFT PULLEY

### To Remove

1. Slacken the generator mounting bolts, push the generator towards the engine and remove the fan belt.
2. Release the central retaining bolt and, using a suitable puller, remove the crankshaft pulley.

### To Replace

1. Replace the pulley aligning its slot with the crankshaft key. Tighten the retaining bolt to the torque loading given in 'Technical Data'.
2. Replace the fan belt and adjust to the specified tension.

### E.21 - OIL PUMP AND OIL FILTER

1. Release the three securing setscrews and remove the pump and filter as an assembly.

### To Dismantle

(All clearances are given in 'Technical Data').

1. Remove the filter body and element and extract the sealing ring from the groove.
2. Remove the end plate and withdraw the 'O' ring from the groove in the pump body.
3. Check the clearance between the lobes of the inner and outer rotors. The rotors are supplied as a matched pair only, so that if clearance is excessive a new rotor pair must be fitted.
4. Check the clearance between the outer rotor and the housing. If clearance between the outer rotor and pump body is excessive a new rotor assembly and/or pump body should be fitted.
5. Place a straight edge across the face of the pump body and check the clearance between the face of the rotors and the straight edge. If clearance is excessive the face of the pump body can be carefully lapped on a flat surface.
6. If it is necessary to renew the rotor or drive shaft, remove the outer rotor then drive out the retaining pin securing the skew gear to the drive shaft and pull off the gear. Withdraw the inner rotor and drive shaft.

### To Reassemble

1. If the pump has been completely dismantled, fit the inner rotor and drive shaft assembly to the pump body. Press the skew gear (if undamaged) onto the drive shaft end supporting the shaft, at the rotor end, on a suitable spacer, replace the gear retaining pin and peen over the ends securely.

2. Install the outer rotor with its chamfered face inwards, towards the pump body.
3. Place the 'O' ring in the groove in the pump body and fit the end plate with the machined face towards the rotors.
4. Locate a new filter body sealing ring in the groove and fit the filter assembly to the oil pump. Fit a new aluminium washer to the centre bolt and tighten to the torque loading given in 'Technical Data'.

#### To Replace

1. Place new gasket on the pump mounting flange, and fit pump filter as an assembly. Tighten the three securing bolts to the torque loadings given in 'Technical Data'.

### E.22 - FRONT (TIMING) COVER OIL SEAL

#### To Remove

1. Drain the cooling system, disconnect the radiator hoses and remove radiator.
2. Remove the camshaft cover (Section 'E.5.')
3. Remove the fanbelt, followed by the fan and water pump pulley.
4. Remove the crankshaft pulley (Section 'E.20'), the sump (Section 'E.16') and the timing chain tension adjuster (Section 'E.6').
5. Remove the front cover by extracting all forward facing bolts, of which there are eleven, and the three bolts which secure the front cover to the cylinder head.
6. Remove the crankshaft oil slinger.
7. Disconnect the timing chain taking care not to rotate the camshafts, or the crankshaft, thus alter the valve timing.
8. Remove the jackshaft sprockets.
9. Remove the front cover backplate with its gaskets by extracting the single retaining setscrew immediately below the water pump aperture.

#### To Replace

(All bolts should be tightened to the torque loading figures given in 'Technical Data').

1. Locate a new gasket on the cylinder head to timing cover joint (Section 'E.10'). If a new oil tube has been fitted it is important that the vertical height, measured from the sump mounting flange to the top of the tube is 4.10 in. (10.47 cm.) if the correct level is to be maintained.

2. The backplate is fitted with a dry paper gasket to the cylinder block and retained by the single clamp screw. Before tightening, assemble timing cover to cylinder block, locating both the water pump insert in the timing cover and the oil seal on the crankshaft. Move timing cover assembly, backplate and gasket to ensure maximum step between oil sump face on timing cover and cylinder block oil sump face, and also between top faces of timing cover and backplate. This step should not exceed .010 in. (.254 mm.); measure with feeler gauge.
3. Remove timing cover assembly taking care not to move backplate and tighten clamp screw to the torque loading given in 'Technical Data'.
4. Refit timing chain and crankshaft oil slinger.
5. Apply a suitable jointing compound to the front cover joint faces and fit the cover. It is important to align the cover and to replace the bolts in their correct locations, tightening to their torque loadings (see 'Technical Data').
6. Refit the timing chain tensioner, tightening its bolt correctly. Refit the sump.
7. Refit the crankshaft pulley. Replace the water pump and fan, together with the fanbelt, adjusting to its correct tension. Adjust the timing chain tension. Refit the camshaft cover. Replace the radiator, refit top and bottom hoses and refill the cooling system.

### E.23 - WATER PUMP

#### To Remove

1. Remove the front cover (Section 'E.22') from the engine.
2. With the front cover on a bench, withdraw the water pump bearing retainer clip from the slot in the housing.
3. Remove the pump puller hub from the shaft.
4. Press the impeller, seal, slinger, shaft and bearing assembly out of the housing using a suitable press. Press the impeller off the end of the shaft.
5. Remove the pump seal from the shaft.
6. Carefully split the slinger bush with a chisel to detach it from the shaft.
7. Remove the insert from the front cover.

Check Clearance Where  
Shown by Arrows

TD-50-E17

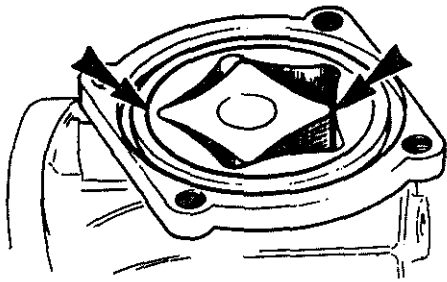


Fig 16 CHECKING ROTOR SIDE CLEARANCE

TD-50-E10

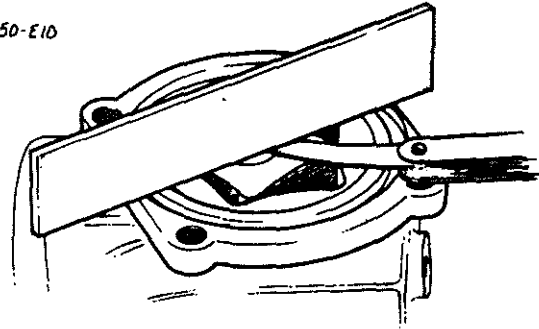
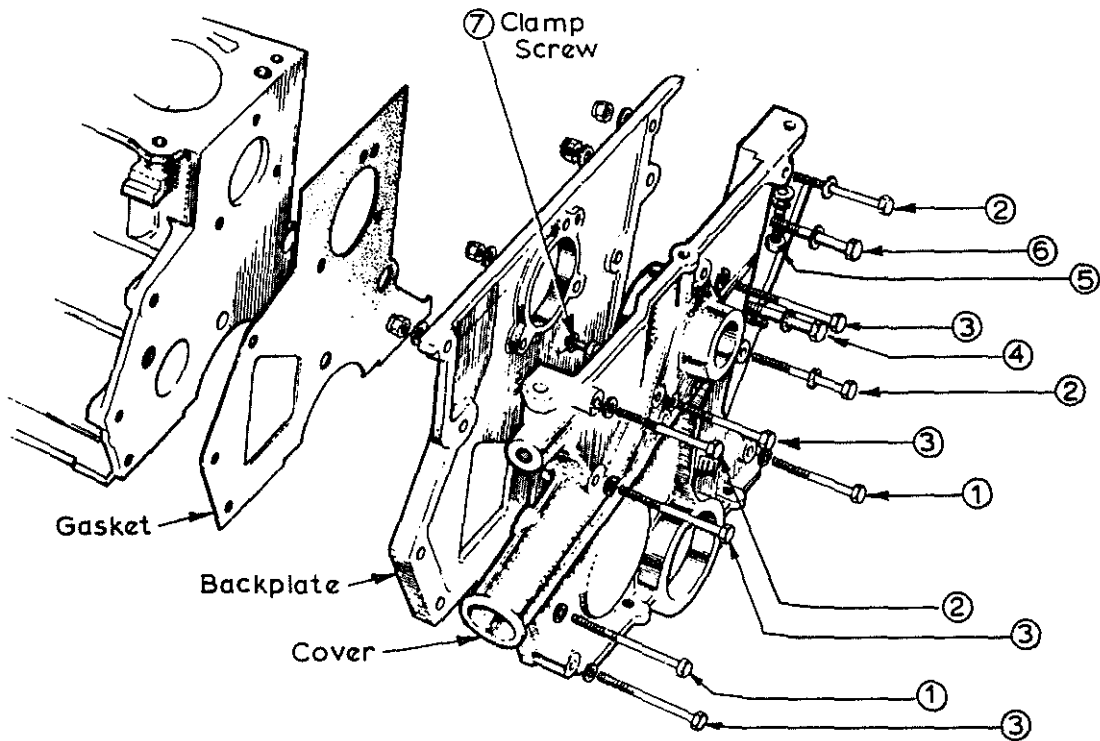


Fig. 17 CHECKING ROTOR FACE CLEARANCE



1. Dowel Bolts  $\frac{1}{8}$  in. U.N.C.  $\times$   $2\frac{1}{2}$  in. long
2. Bolt  $\frac{1}{4}$  in. U.N.F.  $\times$   $2\frac{1}{2}$  in. long and nut
3. Bolt  $\frac{1}{4}$  in. U.N.C.  $\times$   $2\frac{1}{2}$  in. long
4. Bolt  $\frac{1}{8}$  in. U.N.C.  $\times$   $2\frac{1}{2}$  in. long
5. Bolt  $\frac{1}{8}$  in. U.N.C.  $\times$  1 in. long
6. Bolt  $\frac{1}{4}$  in. U.N.C.  $\times$   $3\frac{1}{2}$  in. long
7. Bolt  $\frac{1}{8}$  in. U.N.C.  $\times$   $1\frac{1}{2}$  in. long
8. Bolt  $\frac{1}{8}$  in. U.N.F.  $\times$   $1\frac{1}{2}$  in. long and nut

Fig. 18 TIMING CHEST BOLTS.



### To Replace

1. Press the shaft bearing assembly into the housing until the groove in the shaft is in line with the groove inside the housing. Fit new bearing retainer clip in the groove of the bearing and housing.
2. Press the pump pulley hub on to the front end of the shaft until the end of the shaft is flush with the end of the hub. Fit new slinger bush (flanged end first) on the rear end of the shaft. Fit new pump seal on the slinger bush with the carbon thrust face towards the impeller, and press into housing.
3. Fit new 'O' rings to insert, fit insert to front cover.
4. Press impeller onto the shaft ensuring that the vanes are not damaged.
5. Refit the front cover to the engine.

### E.24 - TIMING CHAIN TENSIONER SPROCKET

#### To Remove

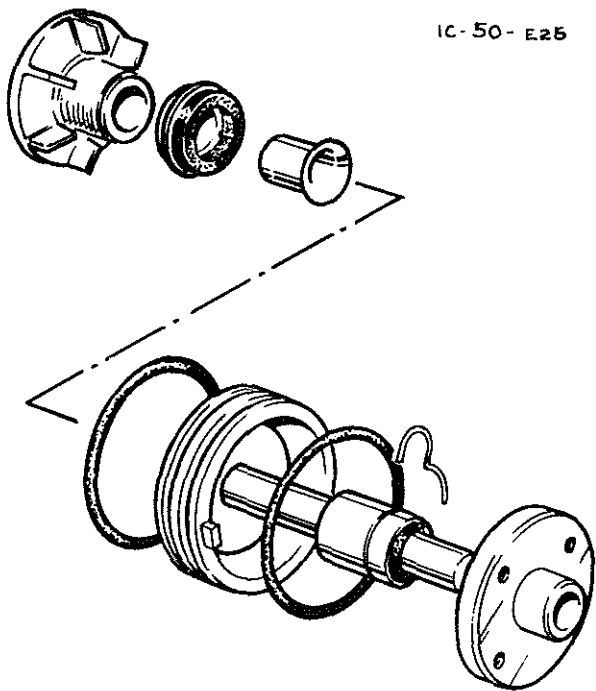
1. Remove the camshafts cover (Section 'E.5.')
2. Set the engine to T.D.C. (Section 'E.8')
3. Remove timing chain tensioner by fully unscrewing.
4. Remove the INLET camshaft sprocket (Section 'E.8.')
5. Using a suitable piece of wire with a hooked end, insert the hook into the sprocket bracket, then release the pivot pin. Remove bracket and sprocket assembly by passing up between the two camshafts.
6. Unscrew the sprocket pin and remove sprocket.

#### To Replace

1. Reverse the removal procedure, not forgetting to tighten the bolts, where necessary, to the torque loadings given in 'Technical Data'.

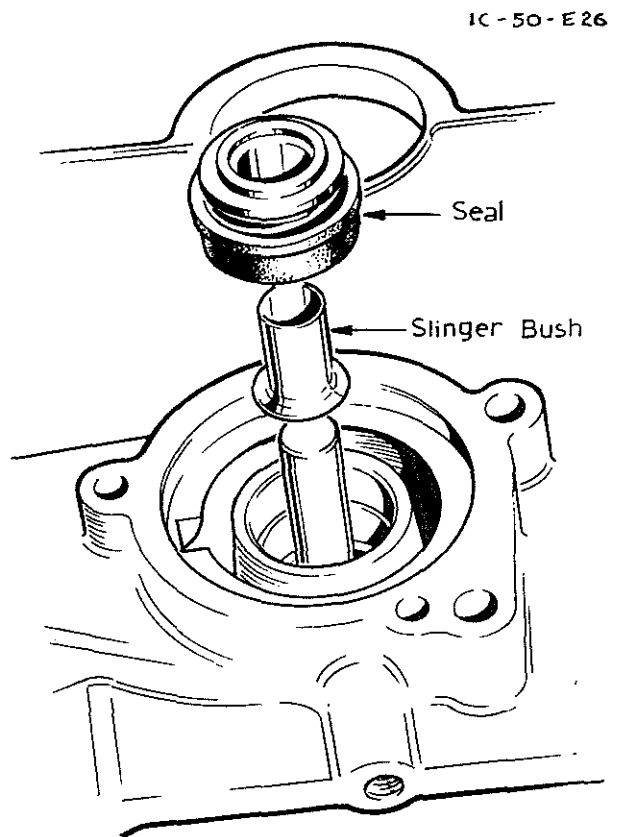
### E.25 - ENGINE MOUNTINGS

1. Apply the handbrake, jack-up front of the car and support with chassis stands.
2. Support the engine with a jack.
3. Remove the right-hand engine mounting and replace with a new mounting.
4. Repeat the operation (3) for the left-hand mounting not forgetting to replace the earthing strap (if fitted).
5. Remove the jack from under the engine, jack up front of car, remove chassis stands and lower car to ground.



1C-50-E25

Fig 19 WATER PUMP INTERNAL COMPONENTS

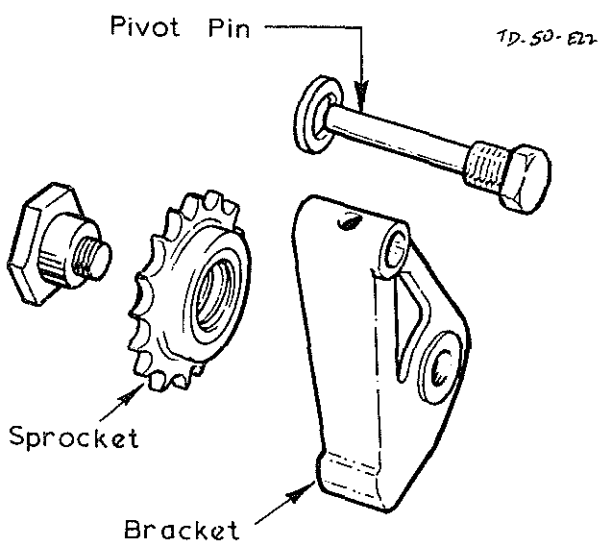


1C-50-E26

Seal

Slinger Bush

Fig. 20 FITTING WATER PUMP SEAL



Pivot Pin

1D-50-E27

Sprocket

Bracket

Fig 21 CHAIN TENSIONER COMPONENTS

## E.26 - ENGINE ASSEMBLY

### To Remove

1. Remove bonnet.
2. Disconnect the battery.
3. Drain the cooling system, disconnect the radiator hoses and remove radiator.  
Drain the engine sump.
4. Disconnect the following connections from their attachments on the engine:-
  - a. Water temperature capillary
  - b. Oil pressure pipe
  - c. Generator cables
  - d. Heater hoses at cylinder head timing cover
  - e. Distributor and HT coil cables
  - f. Starter motor cable.
5. Remove the choke and throttle cable. Remove carburetters air box and air trunking. On cars with cast-iron manifolds, release the screws or nuts holding the down pipe to the exhaust manifold, release the lower fixing, and remove pipe.
6. Release the clip securing the clutch slave cylinder and pull cylinder away from its location with the fluid pipe still attached. Remove starter motor. Remove fuel feed pipe from fuel pump.
7. Fit a sling and support the engine on suitable tackle.
8. Unscrew the lower clutch housing bolts and remove the cover. Unscrew the clutch housing to the engine bolts. Disconnect the engine mountings (Section 'E.25'). Suitably support the gearbox.
9. Pull the engine unit forward off the mainshaft of the gearbox and lift up and out from the engine compartment.

### To Replace

1. Position the engine unit in the engine compartment, and engage the unit on the mainshaft of the gearbox. Ensure that the upper part of the clutch housing is located on the dowels. Reconnect the engine mountings.

2. Fit the engine to clutch housing securing bolts. Fit the lower clutch housing cover. Remove the sling and lifting tackle and the support beneath the gearbox.
3. Fit the carburetter air box, air trunking, choke and throttle cables. Refit the starter motor and attach its cables. Refit the clutch slave cylinder.
4. Refit the exhaust down pipe to the intermediate pipe at its lower end, and to the exhaust manifold at its upper end. The gasket at this joint should be discarded (if fitted) and Holt's 'Firegum' used as a jointing compound.
5. Re-attach the distributor and coil cables, the cables to the generator, and the oil pressure pipe and water temperature capillary.
6. Refit the radiator, reconnect all hoses, close drain taps (or plugs) in engine cylinder block and in radiator, and refill cooling system.
7. Fill the engine sump with recommended oil, reconnect the battery, start engine and check for leaks. Check and re-adjust the ignition, and the carburetter slow running.
8. Refit the bonnet.

#### E.27 - FLYWHEEL AND RING GEAR

##### To Remove

1. Remove the engine from the car (Section 'E.26') and mount the engine on a suitable stand.
2. Unscrew the bolts around the periphery of the clutch assembly and remove clutch from flywheel.
3. Release the bolts and remove the flywheel.
4. Cut between two adjacent teeth on the ring gear with a hacksaw and split the gear with a chisel.

NOTE Under no circumstances must pressure be applied in attempting to remove the gear for re-positioning on the flywheel.

##### To Replace

1. Heat the new ring gear evenly, to a temperature NOT EXCEEDING 600°F. (316°C.) Do not heat beyond this point otherwise the wear resistance properties of the gear will be destroyed. Fit the gear to the flywheel with the chambers on the leading faces of the teeth relative to the normal direction of rotation. Allow the ring gear to cool naturally in the air. DO NOT QUENCH.

TD-50-E21

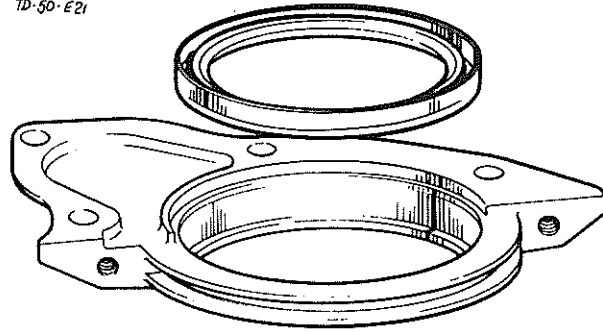
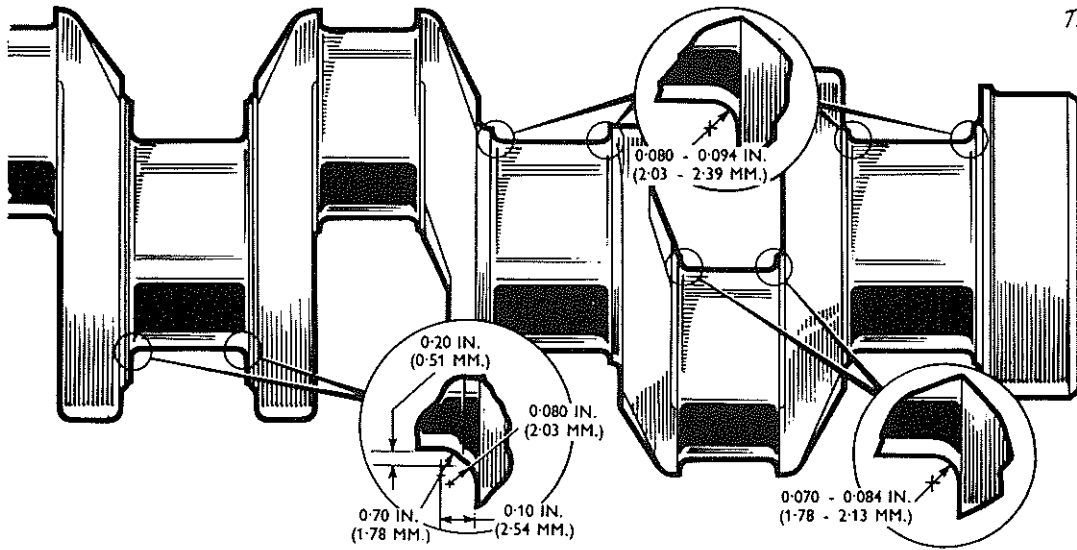


Fig 22 REAR OIL SEAL & HOUSING  
(From engine No. LP 7799).



TD-50-E22

Fig. 23 CRANKSHAFT FILLET RADII - REGRINDING

2. Locate the flywheel squarely upon the crankshaft flange, insert the securing bolts and tighten to the torque loading given in 'Technical Data'.
3. Check the flywheel run-out using a proprietary dial gauge. The total run-out should NOT EXCEED the dimension given in 'Technical Data'.
4. Refit the clutch assembly, centralising the driven plate with a dummy gearbox mainshaft. Tighten the bolts to the torque loading given in 'Technical Data'.
5. Remove the engine from the stand and replace into car. (Section 'E.26').

#### E28 - CRANKSHAFT SPROCKET

##### To Remove

1. Remove the engine from the car (Section 'E.26') and mount the engine on a suitable stand.
2. Remove the front cover (Section 'E.22')
3. Using a suitable extractor, pull off the crankshaft sprocket.

##### To Replace

1. Using a new key, press the sprocket on to the crankshaft ensuring that the slot is lined up with the key, and that the long boss is towards the main bearing journal.
2. Refit the front cover.
3. Refit the engine into the car.

#### E.29 - CRANKSHAFT REAR OIL SEAL

##### To Remove

1. Remove the engine from the car (Section 'E.26') and mount on a suitable stand.
2. Remove the flywheel (Section 'E.27') and the oil sump (Section E.16')
3. Extract the retaining bolts and remove the rear oil seal carrier from its location on the cylinder block.
4. Using an extractor, remove the oil seal from its carrier.

##### To Replace

1. Fit a new oil seal to the oil seal carrier. (From engine No. LP 7799 new one-piece seals have been used).

2. Locate a new gasket on the rear oil seal carrier using a suitable jointing compound, insert the retaining bolts, and locate carrier squarely on the cylinder block before tightening to the torque loading given in 'Technical Data'.
3. Refit the flywheel and the oil sump.
4. Refit the engine into the car.

### E.30 - CRANKSHAFT

#### To Remove

1. Remove the engine from the car (Section 'E.26') and mount on a suitable stand.
2. Remove the camshafts cover (Section 'E.5').
3. Set the valve timing marks in the timed position (Section 'E.8') then remove the crankshaft pulley (Section 'E.20').
4. Remove the front cover (Section 'E.22'), crankshaft sprocket (Section 'E.28') flywheel (Section 'E.27'), oil sump (Section 'E.16'), release the timing chain tensioner (Section 'E.6.') disconnect the timing chain (Section 'E.8') and remove the rear oil seal carrier (Section 'E.29').
5. Unscrew the connecting rod bearing cap bolts (the big ends) two or three turns, and tap them to release the caps. Completely remove the bolts and release the caps. Push the pistons up into the cylinder bores.
6. Remove the main bearing cap bolts evenly and lift off each cap. Lift out the crankshaft and remove the bearing liners and thrust washers.
7. If a reground crankshaft is being fitted, it is important that the existing fillet radius between journals and webs MUST be maintained. These measurements are:-

Crankpin Journals                      .070/.084 in. (1.77/2.13 mm.)

Main bearing Journals                .080/.094 in. (2.03/2.38 mm.)

Centre main bearing Journal   - See Fig. 22

#### To Replace

1. Fit the appropriate clutch spigot bearing into the crankshaft (See also Section 'E.34').
2. Using a new key, fit the crankshaft sprocket.

3. Fit new main bearing liners and replace crankshaft. Fit new crankshaft thrust washers with the oil grooves towards the crankshaft flange. Refit the main bearing caps (Section 'E.17'). Check the crankshaft end float between the crankshaft and the thrust washers. This should be given in 'Technical Data'.
4. Using new bearing liners, refit the connecting rods to the crankshaft (Section 'E.19').
5. Refit the rear oil seal carrier, reconnect the timing chain and re-adjust the tension, refit the oil slinger, flywheel, front cover, crankshaft pulley, and oil sump.
6. Recheck the valve timing and fit camshafts cover.
7. Refit the engine into the car.

### E.31 - JACKSHAFT AND BEARINGS

#### To Remove

1. Remove the engine from the car (Section 'E.26') and mount on a suitable stand.
2. Remove the camshafts cover (Section 'E.5').
3. Set the valve timing marks (Section 'E.8'), release the timing chain tension (Section 'E.6'), remove the crankshaft pulley (Section 'E.20') disconnect the timing chain (Section 'E.8') remove oil pump and filter assembly (Section 'E.21'), the ignition distributor and the fuel pump.
4. Remove the jackshaft sprocket and spacer by releasing its securing setscrews, after turning down the locking plate tabs.
5. Remove the jackshafts thrust plate by turning down the locking tabs, then releasing the two setscrews. Withdraw the jackshaft.
6. If it is desired to renew the jackshaft bearing bushes, then use of a special tool for their removal and replacement is essential (Section 'E.35'). Remove the bushes using tool no. P.6031 with adaptors tool no. P 6031-3

#### To Replace

1. Check all oilways in the cylinder block to see that they are clear. Apply a sealing compound to the oil gallery plugs prior to refitting.



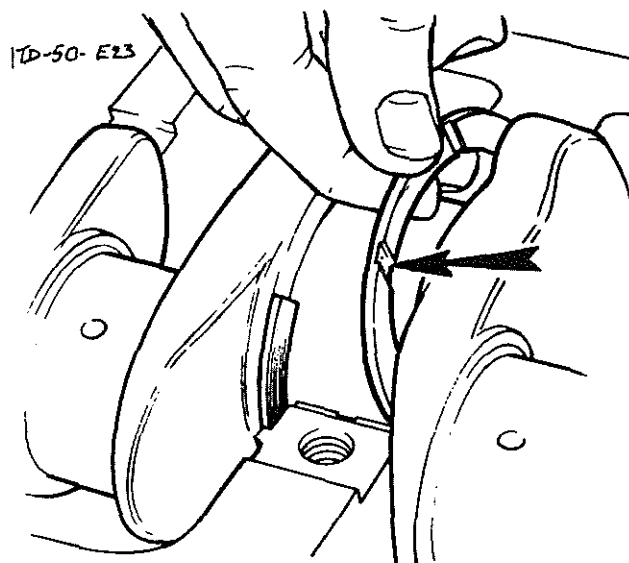


Fig. 24 FITTING THRUST WASHERS

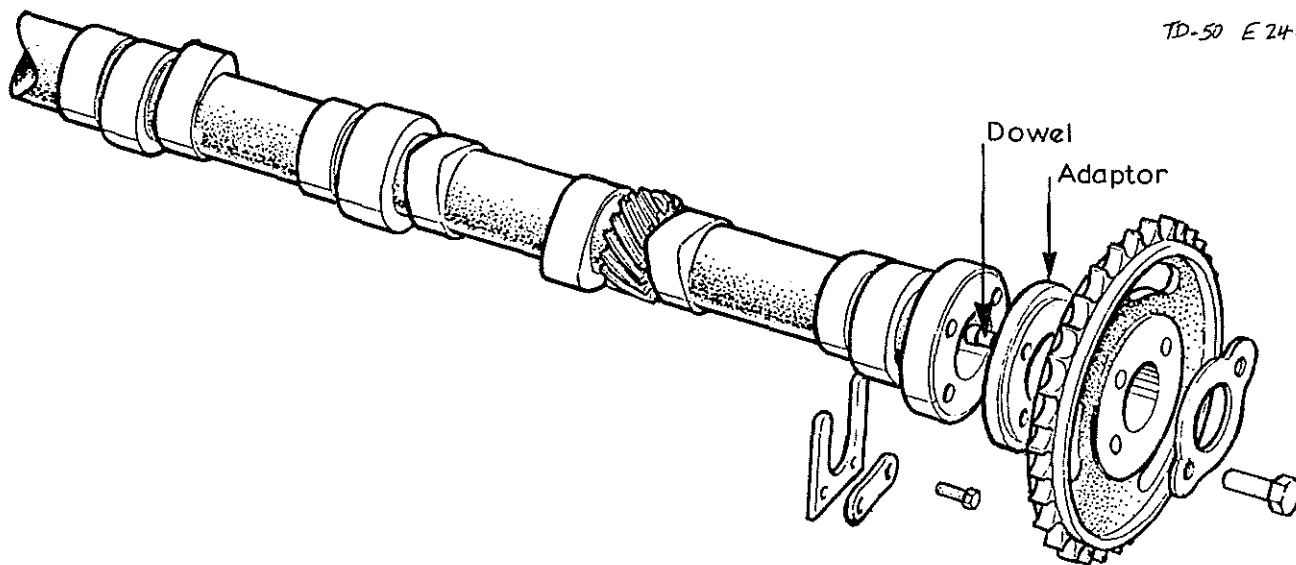


Fig. 25 JACKSHAFT COMPONENTS

2. Fit new jackshaft bushes using Tool No. P6031 and P6031/3. Ensure that the oil holes in the bushes and cylinder block are aligned. The splits in the bushes should be upwards and outwards at 45° to the vertical.
3. Fit a new dowel to the new jackshaft, and slide the shaft into position. Using a new locking plate under the heads of the setscrews, fit the thrust plate in its groove on the jackshaft. Tighten bolts to the torque loading given in 'Technical Data'. Check the shaft end float with feeler blades between the thrust plate and the shaft flange. (See 'Technical Data').
4. Replace the jackshaft sprocket and spacer using a new locking plate beneath the heads of the setscrews, tightening to the torque loading given in 'Technical Data'.
5. Replace the fuel pump, ignition distributor, oil pump and filter assembly, reconnect timing chain, replace front cover and crankshaft pulley, re-adjust timing chain tension.
6. Recheck the ignition timing and replace camshafts cover.
7. Refit the engine into the car.

### E.32 - CYLINDER BLOCK

#### To Remove

1. Remove the engine from the car (Section 'E.26') and mount on a suitable stand.
2. Completely strip all components from the engine following the procedure given in the previous chapters.
3. Remove the oil pump filter gauze, oil pump inlet tube and oil return pipe.
4. Remove the cylinder block from the stand.

#### To Replace

1. Mount the new cylinder block on the stand.
2. Fit the oil pump inlet tube and oil return pipe. Press this pipe fully home to the full depth of the counter-bored hole. Measured along the length of the pipe to the flange of the cylinder block this should read 6.5 in. (16.5 cm) Fit the filter gauze to the oil inlet tube. (Note that this instruction only applies to engines from LP 7464).
3. Rebuild the remainder of the engine by referring to the previous chapters.
4. Refit the engine into the car.

### E.33 - REBORING

When reboring the cylinder block to suit oversize pistons, each bore is machined to the actual diameter of the piston to be fitted, plus the specified clearance in the bore. Maximum recommended oversize bore is +.015 in. (.381 mm).

#### To Remove

1. Remove engine from car (Section 'E.26'), mount on a suitable stand and completely strip off all components by following procedures given in previous chapters.

#### To Rebore

1. Rebore cylinder block using proprietary boring equipment and adhering to the manufacturers instructions.

#### To Replace

1. Rebuild engine and refit into the car by referring to the previous chapters.

### E.34 - CLUTCH SPIGOT BEARING

Commencing at engine no. 18500, a needle roller spigot bearing (36 E 6019) has been fitted in current production to all engines. To accommodate this change, the bore in the crankshaft has been increased from:

.8252/.8264 in. (20.960/20.990 mm.)

to

.8260/.8279 in. (20.980/21.005 mm.)

The crankshaft part number is unchanged (B26 E 330) and there is no immediate identification mark; the crankshaft can only be distinguished by measuring the spigot bearing bore.

If desired, the new bearing can be fitted into existing crankshafts. The diameter of the gearbox mainshaft is unchanged.

The following special tools are required for fitting and removing the bearing (see also Section 'E.36'):-

- |           |   |
|-----------|---|
| P. 7137   | Insertion tool (Clutch plate centralizer) |
| CP.7600/7 | Extraction tool                           |

**NOTE** The needle roller bearing is pre-packed with grease and requires no further lubrication.

### E.35 - WATER PUMP IMPELLER

A new water pump impeller (Part No. A026 6126) has been introduced as a running change (therefore no engine change points are available) into current Production.

With the new impeller, a new rubber-backed seal facing the disc (Part No. A026 E 6127) is also fitted. As the new seal is rubber back, it does not need to be attached to the impeller as it will stay in position on its own.

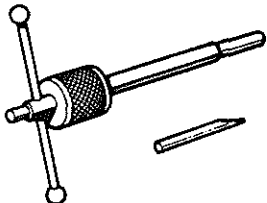


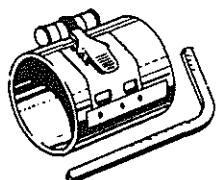
The new impeller is .030 in. (.762 mm.) larger on its outside diameter, but this will not affect any other component within the engine and is therefore, completely interchangeable with the original type of impeller.

### E.36 - SPECIAL TOOLS

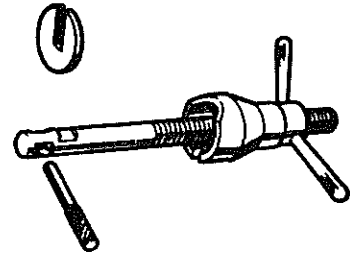
The foregoing sections have all been written without the mention of Special Tools, except in the case of jackshaft bearing bushes, where the need for Special Tools is essential for their correct removal and replacement.

If much engine repair work is to be undertaken, it will be found more expedient to use some, of not all, the Special Tools from the following list. These tools have been developed in conjunction with Ford Motor Company Limited and V. I. Churchill Limited from whom they are available. Their address is:-

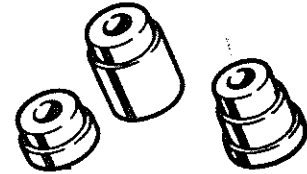
V. I. Churchill & Co. Ltd.,  
 London Road,  
 DAVENTRY,  
 Northamptonshire,  
 England.

200A or B	Engine stand	Not illustrated
316X	Valve seat cutter holder	
316-10	Valve seat cutter pilot	
317-25	Valve seat cutter	
38/U.3	Piston ring compressor	

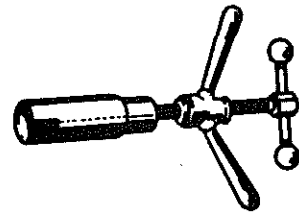
P.6031 Camshaft bearing bush remover/  
replacer



P.6031-3 Camshaft bearing remover/replacer  
adaptors



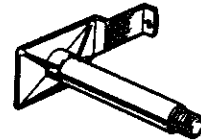
P.6032 Crankshaft sprocket replacer



P.6054 Valve guide remover/replacer

Not illustrated

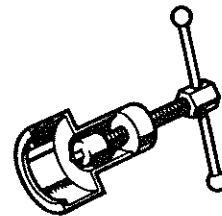
P.6107 Adaptor for engine stand



P.6110 Main bearing liner remover/  
replacer



P.6116 Crankshaft sprocket remover



P.6150 Crankshaft front cover oil seal  
aligner



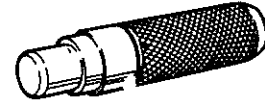
P.6161 Crankshaft front cover oil seal  
remover/replacer



P.6165 Crankshaft rear oil seal remover/replacer



P.7137 Clutch plate centraliser

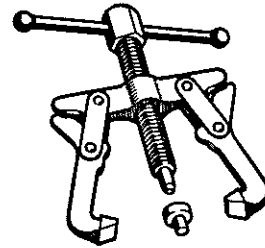


P.8000-4B Water pump overhaul kit Not illustrated

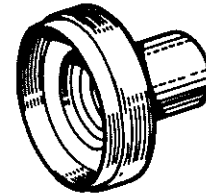
P.80008A Slave ring (use with P.8000-4B) Not illustrated

PT.4063A Cylinder head gasket locating studs Not illustrated

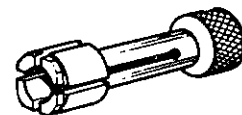
CP.6041 Crankshaft pulley remover



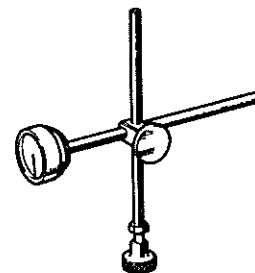
CP6147 Crankshaft rear oil seal aligner



CP.7600/7 Needle roller spigot bearing (clutch) remover



P.4008 Dial gauge



## GEARBOX

### F.1 - GENERAL DESCRIPTION

The gearbox fitted is equipped with four forward speeds which are all of the constant mesh type and provided with synchromesh engagement. A reverse gear of the normal spur type is also fitted in the box whilst all the forward constant mesh gears are of the helical type, to ensure quiet operation. The gears are selected manually by a floor mounted gear lever.

There are three selector shafts and a selector fork is attached to each shaft by a setscrew. The forks on the left-hand and centre shafts engage in a groove machined in the periphery of the third and top gear and the first and second gear synchroniser sleeves respectively. A fork attached to the right-hand shaft engages with a groove in the reverse idler gear hub.

The selector shafts are free to slide in the gearbox case but an interlocking plunger device situated in the front of the gearbox case prevents more than one shaft being moved at a time, thus preventing the engagement of two gears simultaneously. Index notches corresponding to the neutral and gear positions are machined in the respective shafts and are engaged by spring-loaded locking balls in the gearbox top face and cover to positively locate the gear.

The rear ends of the forged selector shafts protrude into the gearbox extension housing. The first and second gear and the reverse gear selector shafts both being hooked. The third and top gear selector shaft is slotted on the inner face of the forged end and is bent so that the slot is adjacent to the hook in the first and second gear selector shaft. A relay lever engages with the reverse selector shaft hook and forms a gear selector gate with the forward gear selector shaft ends, by means of a slotted lug adjacent to the first and second selector shaft hook.

#### Description

The gearbox and clutch housing are bolted to the engine. The drive from the engine is through the clutch to the gearbox by a splined shaft integral with the main drive gear, the clutch disc being free to slide on these splines. The main drive gear runs in a ball race in the gearbox case and the shaft is supported at the forward end by a spigot located in a bearing fitted in the end of the engine crankshaft.

The main drive gear bearing is retained on the shaft by a circlip, the main drive gear and bearing assembly being retained in the gearbox by another circlip located in a groove in the bearing outer race and a retainer bolted to the gearbox case front face. An oil seal in the bearing retainer prevents oil leaking out onto the clutch disc. The main drive gear is in mesh with the countershaft cluster gear which runs on needle roller bearings divided equally between each end of the countershaft.

The mainshaft is supported in the main drive gear by a spigot located in needle roller bearings and runs in a ball race mounted in a carrier sandwiched between the gearbox and the extension housing. The mainshaft extension is supported at the rear end by the driveshaft sliding joint, which runs in a bearing bush fitted in the rear end of the extension housing. An oil seal is also fitted at this location.

The first second and third gears are in constant mesh with the countershaft cluster gear and are free to rotate on the mainshaft, the first gear on a steel bush, which is positively located by a steel ball, and the other two directly on the shaft itself. The forward gears are engaged by blocker type synchroniser assemblies splined to the mainshaft, between the first and second gears and between the third and main drive gears. The mainshaft bearing, first gear and bush, first and second gear synchroniser and the second gear, together with the speedometer drive gear and spacer are retained by a nut locked with a tab washer, on the mainshaft extension, the speedometer drive gear being positively located by a steel ball. The third gear and the third and top gear synchroniser are retained at the forward end of the mainshaft by a circlip.

The reverse spur gear is machined on the outside of the first and second gear synchroniser sleeve and a reverse idler spur gear is mounted parallel to the mainshaft and countershaft.

### Lubrication and Maintenance

The gears are lubricated by an extreme pressure gear oil, which partially fills the gearbox case; a combined filler and level plug and a drain plug being provided to facilitate service. The countershaft cluster gear, which is almost completely submerged, picks up oil as it revolves to lubricate the mainshaft and main drive gears and bearings and also the selector shafts and forks. Oil passing through the main drive gear bearing is returned to the gearbox case by a slot in the bearing retainer and an oil drain hole in the gearbox case front face. An oil seal in the bearing retainer prevents the oil from leaking out along the main gear shaft and onto the clutch disc.



Oil thrown up by the gears is collected in a channel in the left-hand side of the gearbox case and runs back onto the extension housing to lubricate the speedometer gears and the mainshaft extension bush. An oil seal in the end of the extension housing prevents the oil from leaking out around the driveshaft sliding joint. Oil trapped by the seal returns to the extension housing through a slot under the bush. A packet of oil is retained in the extension housing by the front face which is recessed to locate the mainshaft bearing carrier plate. An oil hole, in the front face, drains surplus oil back into the gearbox case via annular grooves and a slot in the mainshaft bearing carrier plate.

The gearbox is ventilated by a breather incorporated in the rear left-hand bolt retaining the remote control housing to the extension housing. Ventilation slots in the extension housing front face and the mainshaft bearing carrier plate being provided for air to flow between the gearbox case and the extension housing.

### The Synchronisers

The synchronisers are of the 'blocker ring' type and consist of a hub, which is splined to the mainshaft and an outer sleeve splined to the hub. The hub has three inserts or blocker bars supported by two light circular springs, which hold the blocker bars against the synchroniser sleeve and, in the neutral position, in engagement with notches machined in the internal splines of the sleeve. The blocker bar springs, which are positioned on either side of the hub, have tags at one end located in a common insert, the other end being free. The springs are fitted so that the free ends run in opposite directions. A bronze blocker ring is interposed between the synchroniser and each forward gear, having a tapered face to mate with the corresponding face on the gear.

The blocker rings have dog teeth die-cast on their external diameter and are cut away at three equal points to locate on the blocker bars. Radial clearance, to give approximately half a pitch of the dog teeth on the blocker ring and gear, exists between the slots and blocker bars.

When engaging a forward gear, the respective synchroniser is moved towards the required gear. The blocker bars, which are in engagement with the sleeve, also move and push the blocker ring into contact with the tapered face of the gear, which revolves at a different speed to the mainshaft synchroniser. The frictional drag which exists between the tapered face of the blocker ring and gear will keep one side of the slots against the blocker bars, so that the dog teeth will be out of line with teeth on the sleeve.

This prevents gear engagement as long as there is any difference in the speeds between the mating cones.

As the speeds equalise, however, the blocker ring centralises itself, allowing the sleeve to move fully to engage the dog teeth of the gear.

### The Power Flow

#### Neutral

In neutral, with the engine running, the main drive gear and countershaft gear revolve and the first, second and third gears revolve on the mainshaft. The mainshaft reverse idler gear and first and second gear synchroniser are, of course, stationary.

#### First

To engage first gear, the first and second gear synchroniser (which is also the reverse mainshaft gear) is moved rearwards so that the internal teeth engage the dog teeth on the gear, so locking the first gear to the mainshaft. Power is transmitted from the main drive gear to the front countershaft gear, to the first gear, then to the first and second gear synchroniser and mainshaft.

#### Second

Second gear is engaged by moving the first and second gear synchroniser forward, to lock the second gear to the mainshaft. Power is then transmitted from the main drive gear, to the front countershaft gear, to the second gear, then to the first and second gear synchroniser and mainshaft.

#### Third

Third gear is engaged by sliding the sleeve of the third and top gear synchroniser rearwards to engage with the dog teeth on the third gear, so locking it to the mainshaft. The power train is then from the main drive gear to the countershaft gear, to the third gear and then to the third and top gear synchroniser and mainshaft.

#### Top

Top gear is direct drive, the main drive gear being locked to the mainshaft by the action of the third and top gear synchroniser, which has been moved forward so that the internal teeth on the sleeve engage the dog teeth on the main drive gear.

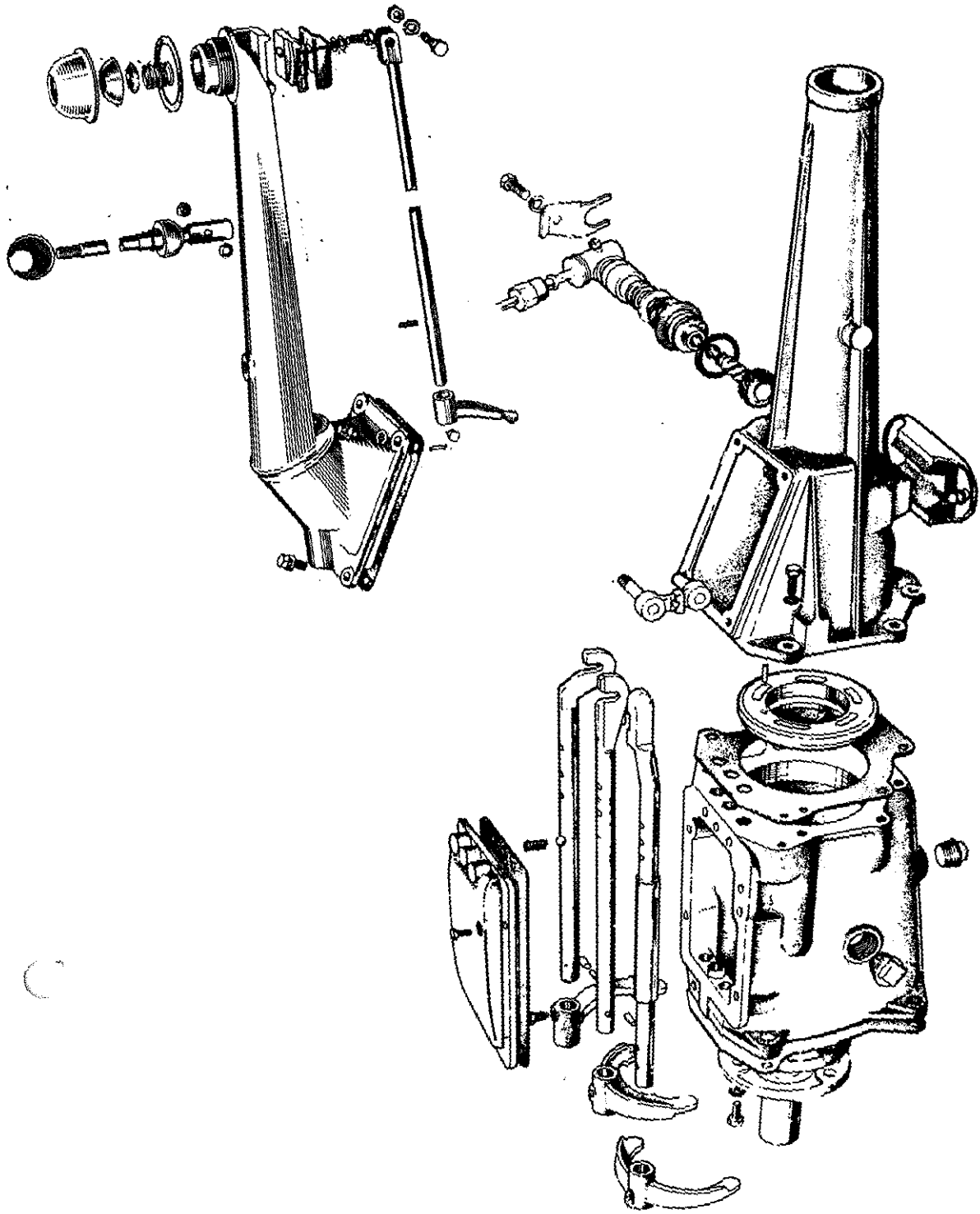


FIG. 1

FIG. 1. GEARBOX EXTERNAL COMPONENTS



Fig. 2 GEARBOX INTERNAL COMPONENTS

## Reverse

Reverse is engaged by moving the reverse idler gear forward so that it meshes with a spur gear on the countershaft (located between the first and second gear) and also with the spur gear machined on the outer diameter of the first and second gear synchroniser. Power is transmitted from the main drive gear to the front countershaft gear, up to the reverse idler gear and then the reverse mainshaft gear on the first and second gear synchroniser and mainshaft.

## F.2 - GEARCHANGE ASSEMBLY

### To Remove

1. From inside the car, remove the change lever grommet.
2. Unscrew the nylon gearchange lever cap. Lift out the assembly.

### To Replace

1. Use a new gasket between the gearchange cover and the lever cap.
2. Replace the gearchange lever assembly. Ensure the cap is tight by tapping with a suitable drift.
3. Refit the gearchange lever grommet.

## F.3 - GEARBOX ASSEMBLY

### To Remove

1. Remove bonnet
2. Disconnect the battery
3. Remove the radiator
4. Remove the engine together with the gearbox, after first removing the gearbox mounting bracket.
5. Remove gearbox from engine.

### To Replace

1. Fit gearbox to engine.
2. Replace engine into car.
3. Refit radiator.
4. Reconnect battery.
5. Refit bonnet.

## F.4 - GEARBOX ASSEMBLY - OVERHAUL

1. Remove the gearbox (Section 'F.3').
2. Drain the oil into a suitable receptacle.

3. Before commencing dismantling, ensure that gears are in the neutral position.
4. Remove the clutch release bearing mechanism.
5. Remove the clutch housing by unscrewing and removing the four bolts and lockwashers securing the housing to the gearbox case. If required, drive out the clutch release arm fulcrum pin.
6. Remove the gearbox top cover plate, by unscrewing four bolts and lockwashers securing the cover plate to the gearbox and carefully lift off the cover plate as the selector shaft locking springs are located in the cover plate and can be lost when the cover is removed.
7. Withdraw the selector shaft locking springs and balls from the locations.
8. Ensure that the gearbox is in the neutral position and remove the locking wire from the bolt heads. Unscrew the square-headed taper bolts securing the selector forks to the selector shafts.
9. Withdraw the third and top selector shaft to the rear, supporting the sleeve fitted to the third and top selector shaft. Lift out the sleeve.
10. Withdraw the first and second gear selector shaft and remove the floating pin from the cross drilling at the forward end of the shaft. Rotate the shaft through  $90^{\circ}$  and remove it from the gearbox casing.
11. Withdraw the reverse selector shaft to the rear rotating it  $90^{\circ}$  clockwise to prevent it fouling the extension housing.
12. Lift the selector forks from the locating grooves on their respective gears.
13. If required, remove the interlock plungers from their location in the gearbox casing.
14. Remove the extension housing and mainshaft assembly by unscrewing the bolts and spring washers securing the housing to the gearbox casing.
15. Remove the speedometer driven gear and the gear bearing from the extension housing.
16. Withdraw the extension housing.
17. From the front face of the gearbox case, using a brass drift, drive the countershaft towards the rear a limited amount until it is free from the front of the gearbox case. Using a dummy countershaft, push the countershaft completely out of the gearbox. The countershaft gear will now lie at the bottom of the gearbox case permitting the mainshaft to be withdrawn.

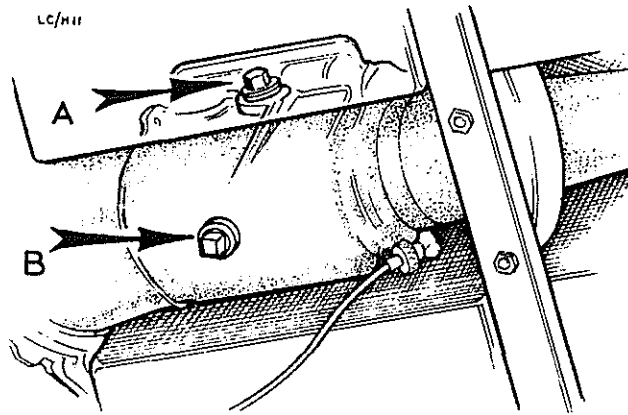


Fig. 3 OIL FILLER & DRAIN PLUGS.  
 A - Gearbox filler/level plug  
 B - Gearbox drain plug

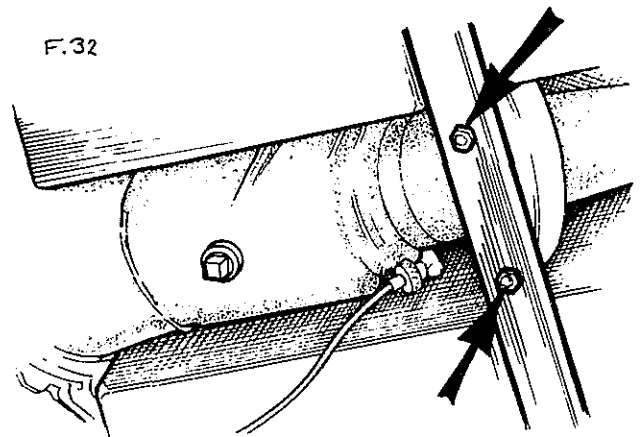


Fig. 4. GEARBOX MOUNTING

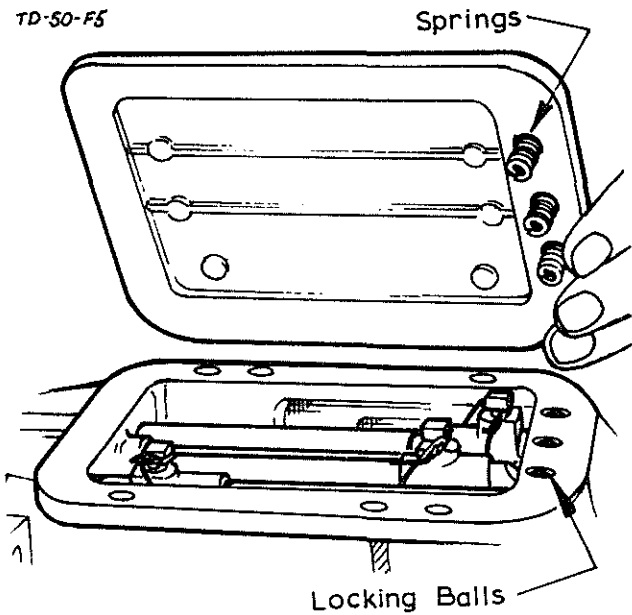


Fig. 5. REMOVING COVER PLATE

18. Withdraw the complete mainshaft assembly to the rear.
19. Remove the main drive gear bearing retainer by unscrewing the three bolts and spring washers securing the retainer to the gearbox case. Withdraw the retainer, large circlip and the paper gasket. Carefully tap out the main drive gear.
20. Withdraw the countershaft gear and the two thrust washers from the gearbox. The countershaft or cluster gear is mounted on forty needle rollers (twenty at each end). A small washer is located on either side of each set of rollers to retain them in position. Push out the dummy countershaft, remove the retaining washers and needle rollers.
21. Withdraw the reverse idler shaft using Tool No. 'P.7043'. Should this tool not be available, locate a nut, a flat washer and a sleeve on a 5/16 in. 25 UNF - 2 threaded bolt, screw bolt into the reverse idler shaft and tighten the nut to withdraw the shaft.
22. Dismantle the mainshaft by bending back the tab on the lockwasher, and unscrewing the nut securing the speedometer drive gear. Remove the nut, lockwasher, speedometer gear. Extract the locating ball and remove the spacer.
23. Remove the third gear and third and top gear synchroniser assembly. Remove the small diameter circlip at the forward end of the mainshaft. Press the mainshaft out of the third and top gear synchroniser, and third gear whilst supporting the mainshaft from beneath to prevent it dropping.
24. Press off the mainshaft together with the sandwich plate mainshaft bearing and the first gear bush. Remove the first gear bush locating ball.
25. Press off the second gear and the first and second synchroniser assembly from the mainshaft.

**NOTE:** The synchroniser hubs and sleeves and also the mainshaft are mated together. Mating marks are etched on the corresponding splines of the hub and sleeve, and near the hub and mainshaft splines. The synchroniser and hub assembly are serviced as a unit consisting of the synchroniser sleeve, three blocker bars, two circular springs and the synchroniser hub.

The first gear rotates on a hardened steel bush that is lubricated via three holes in the first gear adjacent to the dog teeth. Always ensure that these holes are kept clear.



26. Dismantle the main drive gear by removing the circlip securing the main drive gear bearing, support the bearing and press the main drive gear out of the bearing.
27. Extract the oil seal from the rear of the extension housing, examine the extension housing rear bearing bush, and remove it, if necessary, by driving it into the housing.
28. Locate a new bearing and enter it into the rear of the housing with the split in the bush uppermost, i.e. opposite the groove in the extension housing bore. Drive the bearing squarely into position until the rear end of the bearing is flush with the deeper recessed face of the extension housing.
29. Locate a new mainshaft oil seal so that the lip on the seal faces into the extension housing and drive the seal into position in the housing.
30. To overhaul the main drive gear bearing retainer, remove the oil seal from the bearing retainer.
31. Place a new oil seal so that the annular driving face is located in the channel between the sealing lip and the metal case. Drive the seal into position.

#### To Re-assemble the Gearbox

1. Inspect all parts for wear. Any that are considered unserviceable should be replaced.  
In the following sequence it is assumed that all precautions regarding cleanliness are taken and that all gaskets, oil seals and lockwashers are renewed.
2. Scribe a mark in line with the centre of the key-way on the outer edge of the bush flange on the mainshaft and another one along the centre line of the speedometer hole as far as the boss of the first and second gear synchroniser hub splines.
3. Assemble the second gear to the mainshaft so that the dog teeth are towards the rear.
4. Locate a blocker ring on the cone face of the second gear.
5. Assemble the first and second gear synchroniser unit. If a new unit is to be installed, slide the synchroniser sleeve (reverse mainshaft gear) off its hub. Clean preservative from the hub, sleeve, blocker bars and springs. Lightly oil.

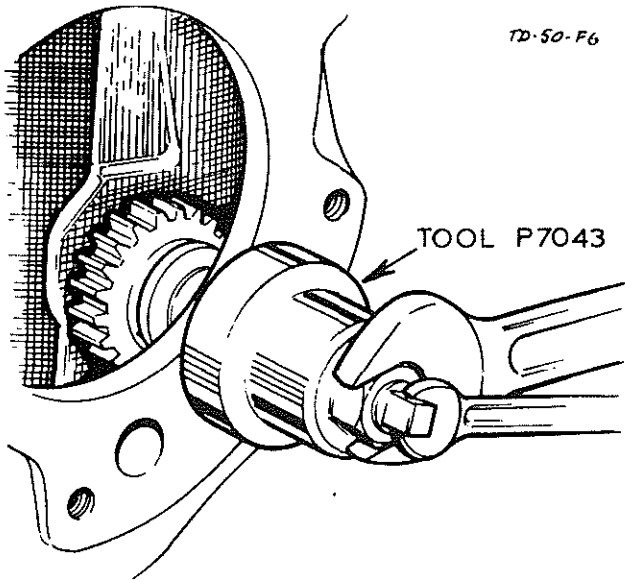


Fig. 6. REMOVING REVERSE IDLER GEAR

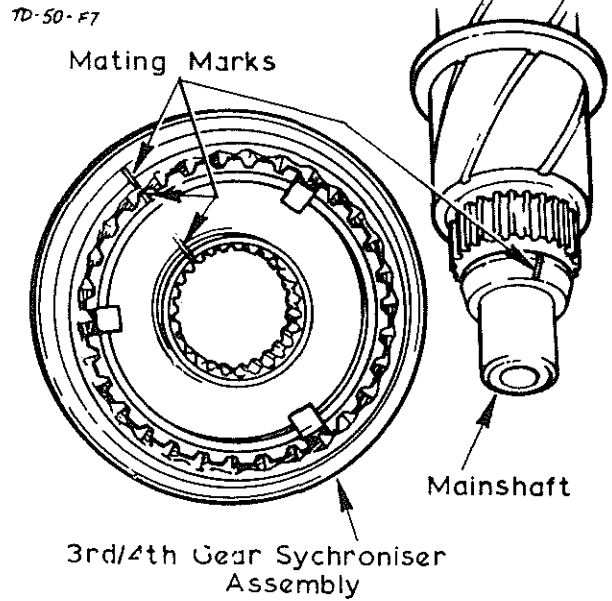


Fig. 7. MATING MARKS BETWEEN MAINSHAFT AND SYNCHRONISER

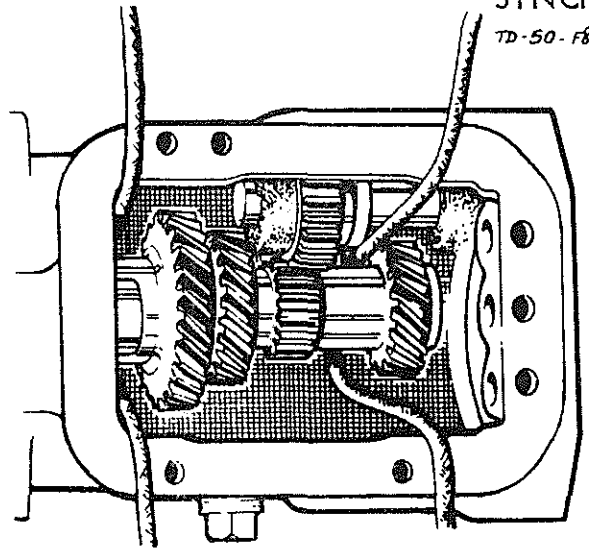


Fig. 8. FITTING COUNTERSHAFT

6. Fit the synchroniser sleeve over the hub with the mating marks aligned. Locate a blocker bar in each of the three slots cut in the hub.
7. Install a blocker bar spring in one blocker bar. Note the direction of rotation of the spring. Fit the other spring to the opposite face of the synchroniser unit, ensuring that the spring tag locates in the same blocker bar as the spring previously fitted but, with this spring running in the opposite direction. Leave the other end of each spring free.
8. Locate the first and second gear synchroniser on the mainshaft (selector fork groove to the rear) taking care that the mating splines on the hub and shaft correspond.
9. Fit a blocker ring in the first and second gear synchroniser so that the cut-outs in the blocker ring fit over the blocker bars and hold the components in their place on the shaft.
10. Place the first gear bush locating ball in the mainshaft.
11. Locate the hardened steel bush in the first gear with the shoulder on the bush away from the first gear dog teeth. Fit this assembly on the mainshaft so that the dog teeth are located adjacent to blocker ring and first and second gear synchroniser and, with the help of the marks on the shaft and bush, ensure that the ball fits in the bush key-way.
12. Position the sandwich plate on the mainshaft with dowel hole to the rear. Fit the mainshaft bearing. Slightly withdraw the sandwich plate to the rear to fit over the bearing.
13. Ensure that the cut outs in the second gear blocker ring (the first one fitted) are aligned with the blocker bars in the first and second gear synchroniser, and also that the mainshaft and hub mating marks are still aligned and press the bearing onto the shaft. Check that the first and second gears are free to rotate. Remove the assembly from the press.
14. Slide the third gear onto the shaft with the dog teeth away from the thrust collar on the shaft and locate the blocker ring on the taper face of the gear.
15. Locate the third and top gear synchroniser hub on the mainshaft with its long boss towards the front of the shaft. Ensure that the mating marks on the hub and shaft correspond.

16. Support the third and top gear synchroniser hub on the adaptor. Locate the shaft so that the mating marks on hub and the shaft are in line. Where the synchroniser hub is sliding fit, ensure that it does not rock on the splines. Fit the circlip in its locating groove to retain the assembly in position.
17. Fit the synchroniser sleeve on its hub with the mating marks in line. Locate a blocker bar in each of the three slots cut in the hub. Install a blocker bar spring (at the rear of the hub) so that the tag end locates in a blocker bar, the other end being left free. Note the direction of rotation of the spring. Fit the other spring at the front face of the synchroniser ensuring that the tag on this spring locates in the same blocker bar as the spring previously fitted but with this spring running in the opposite direction. Leave the other end of this spring free also.
18. Slide the spacer onto the mainshaft, install the locating ball for the speedometer drive gear in its seating and fit the gear with shoulder to the rear. Fit the lockwasher over the shaft and locate the tab on the inner diameter into the groove on the inside of the speedometer drive gear. Screw on the nut and tighten to the torque loading given in 'Technical Data'. Bend over a section of the outer edge of the lockwasher so that it securely locks the nut.
19. Position the main gear bearing on the gear, with the external circlip groove on the bearing away from the gear, support the assembly with the main drive gear and press the bearing right home on the gear. Fit the smaller diameter circlip in the groove provided in the shaft of the main drive gear.
20. Re-assemble the countershaft. Fit a retaining washer to abut the machined shoulder inside the gear, one at either end. Oil the needle rollers and locate twenty in the recess in the countershaft gear. Fit a retaining washer then insert the dummy countershaft to retain the rollers in position. Repeat this procedure at the other end of the countershaft. Locate the thrust washers in position in the gearbox. Ensure that the tongues on each washer are located in the machined recesses in the gearbox.
21. Position the countershaft gear in the bottom of the gearbox casing, taking care not to displace the thrust washers. A piece of string fitted under either end of the countershaft gear at this stage will facilitate assembly later. See Fig. 8.

22. Fit the large diameter circlip in its locating groove on the main drive gear bearing and fit the main drive gear in the gearbox.
23. The internal diameter of the seal is smaller than the external diameter of the main drive gear splines, which on assembly, should be covered with masking tape to protect the seal. Place a new gasket on the gearbox front face and fit the retainer, ensuring that the oil slot in the retainer is in line with the drain hole in the gearbox casing. Coat the three retaining bolts with a jointing compound, fit a spring washer on each bolt, then tighten the bolts securely. Remove the masking tape from the main drive gear splines.
24. Position the reverse idler gear with the groove for the selector fork towards the rear of the gearbox. Fit the shaft in the case and through the gear so that the flats will line up with the locking recess in the extension housing.
25. Install the needle roller bearing in the bore of the main drive gear, and fit a new gasket over the rear face of the gearbox.
26. Position a blocker ring over the taper face of the top gear and a cork gasket over the rear face of the gearbox case.
27. Pass the mainshaft assembly through the rear of the gearbox, locating the mainshaft spigot in the roller bearing in the bore of the main drive gear. As the mainshaft is tapped in, the mainshaft bearing carrier plate will fit into the recess provided in the gearbox. Align the dowel pin with the central selector shaft hole ready for the assembly of extension housing.
28. Carefully, with the aid of the pieces of string (see operation 21), lift the gear into mesh with the mainshaft and main drive gear, taking care that the thrust washers are not displaced, carefully refit the countershaft from the rear, keeping it in contact with the dummy shaft. Tap the countershaft in, so that the front face just protrudes from the front face of the gearbox case, ensure that the locking face at the rear of the countershaft is positioned so that it will mate with the locking recess cast in the extension housing. Remove the string.

29. Fit the extension housing. Ensure that the cork gasket is correctly located. Pass the extension housing over the mainshaft whilst ensuring that the dowel in the main bearing carrier plate locates in the drilling provided in the drilling provided in the housing. Secure the extension housing to the gearbox case with the bolts (suitably covered with jointing compound) and spring washers.
30. Refit the clutch housing and secure in place with its bolts and lockwashers. Fit the fulcrum pin if it has been removed.
31. Check that all gears can be obtained, then place all gears in the neutral position.
32. Assemble the clutch release mechanism.
33. Re-assemble the selector mechanism by ensuring that the interlock plungers are correctly located in the front face of the box. If the interlock plungers have been removed it will be necessary to withdraw the expansion plug from the right-hand side of the gearbox casing to correctly locate the plungers. Push the plunger into the casing until it is located in the first cross drilling. Locate the other plunger in a similar manner. Fit a new expansion plug.
34. Locate the selector forks on the gears, ensure that the gearbox is neutral and install the reverse gear selector shaft turning it through  $90^{\circ}$ .
35. Align the hole in the shaft with the bolt hole in the selector fork and fit the square headed bolt, tighten it securely and lock with soft iron wire.
36. Install the first and second gear selector shaft, turning this shaft through  $90^{\circ}$  to prevent it fouling the extension housing. Before the shaft is pushed fully home, check that the floating pin is located in the shaft and then set the shaft in the neutral position. Align the hole in the shaft with the bolt in the selector fork and fit the square headed taper bolt, tighten it securely and lock with a soft iron wire.
37. Install the third and top gear selector shaft. Locate the floating sleeve on the third and top gear selector shaft before pushing this through the fork and into the gearbox case. Align the hole in the shaft with the bolt hole in the selector fork and fit the square headed taper bolt, tighten it securely and lock with soft iron wire. Ensure that all selector fork locking bolts are tightened and locked with soft iron wire.

38. Check that all gears can be selected and then leave them in the neutral position. Position a new gasket on the top face of the gearbox and install the selector shaft locking balls and springs. Fit the gearbox cover plate, ensuring that the springs are correctly located in the drillings and secure it with four bolts and lockwashers.
39. Refit the gearbox (see Section 'F.3') and refill with oil.

#### F.5 - JUMPING OUT OF GEAR

Where the above problem is experienced, the following procedure is recommended.

1. Remove the gearbox cover and invert it.
2. Place the three selectorsprings in their recesses in the cover and measure how far they protrude above the face of the cover with the gasket in position. The dimension must be within .335/.375 in. (8.5/9.5 mm.) If necessary the dimension can be achieved by the addition of steel shims .25in. (6.35 mm.) diameter x .048 in. (1.219 mm.) thickness, inserted below the springs in their recesses in the cover.
3. Check that no radical clearance can be felt in the reverse idler gear, and that there is no casting 'flash' adjacent to reverse gear which could impede the selection of 'reverse'. Replace the top cover.
4. Check that movement of the gear lever is not impeded by the lip at the top of the nylon gearchange lever cap (see Fig. 9), thus preventing full engagement of the gears. If necessary, trim this lip with a knife to obtain sufficient clearance.

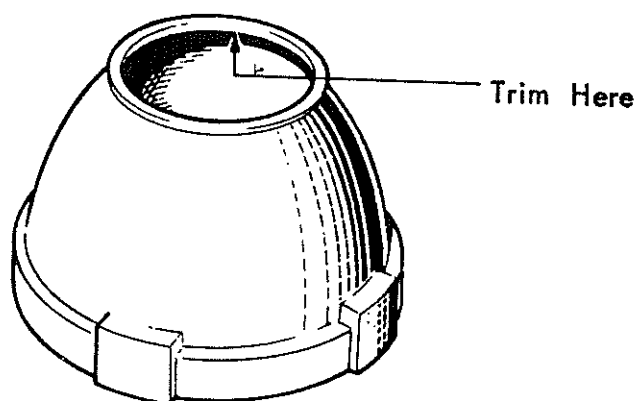


Fig. 9 GEARCHANGE LEVER CAP

5. Check that the reverse lamp switch does not impede forward movement of the reverse gear selector rod. If necessary slacken the locknut and adjust the height of the switch body.

## BRAKING SYSTEM

### GENERAL DESCRIPTION

The brakes of the disc type at the front, drum type at the rear are hydraulically operated. Pressure on the brake pedal forces fluid from the master cylinder into cylinders at the wheels, exerting pressure in pistons which actuate the brake pads. A vacuum operated servo is incorporated in the system to ensure light pedal application.

The handbrake is mechanically operated, through a cable linkage and operates on the rear brakes. It is quite independent of the hydraulic system in operation.

On vehicles designed for markets requiring dual braking systems and to comply with the laws existing in those markets, the braking system is split into two separate hydraulic units with its own master cylinder, two brakes (either front or rear). The object of the dual systems being that, in the unlikely event of a leak developing or a brake pipe splitting, at either front or rear of the car, the driver is not in a position of having no brakes and is thus able to stop in the event of a failure.

### Maintenance

The combined master cylinder brake fluid reservoir is located at the rear end of the engine compartment, it being mounted on the pedal box assembly.

Check fluid level at intervals of every 3,000 miles (5,000 km.) topping-up if necessary to within  $\frac{1}{2}$  in. (12 mm.) of the top, using only the specified fluid. (See Section 'O').

### Brake Adjustments

When properly adjusted there should be a  $\frac{1}{4}$  in. (6 mm.) free movement of the brake pedal before the piston in the brake master cylinder begins to move. When checking this setting take care that the carpets are not fouling the pedal.

No manual adjustment to compensate for brake pad wear is provided, or indeed necessary, since the correct pad-to-disc relationship is maintained hydrostatically as the brakes are operated.

### Brake Pads

Pads should be examined at regular intervals. Always use genuine pads on replacement.



It should be understood that a metallic hiss is apparent with disc brakes. This is normal and should not be considered as a fault. If a metallic squeal is heard, this is a general indication of brake pads OVERDUE for replacement. Under no circumstances allow the pads to wear below 1/16 in. (1.6 mm.) thickness.

#### Hydraulic Pipes and Connections

It is of vital importance that there are no leaks in the hydraulic system, therefore it is essential that these should be checked periodically when the brakes are receiving normal maintenance inspection.

All bundy pipes should be inspected throughout their entire length at intervals NOT EXCEEDING 6 months, i.e. before and after winter months. This is particularly important where salt and grit (which are both corrosive), are used in the clearance of snow and ice.

#### Brake seals, Hoses and Fluid

The brake manufacturers recommend that at intervals NOT EXCEEDING 40,000 miles (65,000 km.) or 3 years, whichever is reached first, that the braking system be completely overhauled and all washers, seals and hoses renewed. Hydraulic servo units should be stripped, all old seals discarded, component parts cleaned and examined and, if in good condition, the unit rebuilt with the appropriate service kit. All fluid should be drained, the system flushed with a correct cleaning fluid, then refilled with new fluid at intervals of every 18 months.

### COOLING SYSTEM

#### K.1. - GENERAL DESCRIPTION

Coolant is drawn from the radiator through a rubber hose connection situated at the rear right-hand base of the radiator, by the pump, driven by a belt from the crankshaft. After entering the front of the cylinder block from the rear of the pump, the coolant circulates round the cylinders and passes to the cylinder head. It is returned through the outler elbow situated at the top left-hand side of the cylinder head which also contains the thermostat, to the radiator header tank via the top water hose. Air is drawn through the radiator core by a fan attached to the belt driven pump pulley.

The cooling system when hot is under pressure and it must be emphasised that the filler cap be removed very carefully. The filler spout of the radiator is provided with a specially shaped cam to facilitate the operation.

Unscrew the cap slowly until the retaining tongues are felt to engage the small lobes on the end of the filler spout cam and wait until the pressure in the radiator is fully released before finally removing the cap. It is advisable to protect the hand against escaping steam if removing the cap when the system is hot.

### K.2. - COLD WEATHER PRECAUTIONS

When cold weather is anticipated, it is recommended that a suitable anti-freeze solution be added to the cooling system, as frost damage will not be prevented by draining the system because some water will still be left in the car heater (if fitted).

Before putting anti-freeze into the cooling system ensure that the cylinder head nuts are tightened to the correct torque loadings (see 'Technical Data'), as any leakage of anti-freeze into the engine sump may cause serious damage. Impact hoses, hose connections and all cooling system joints and tighten or renew where necessary.

### K.3. - COOLING SYSTEM

#### To Top-Up

1. With the engine cold, remove the radiator filler cap and check the coolant level; this should be up to the bottom of the filler neck.
2. Remove the overflow bottle (where fitted), rinse out and fill with clean coolant to a capacity of at least 1 pint (1.2 U.S. pints; .57 litres).
3. With the bottle refitted, the overflow tube must be an airtight fit on both the bottle and radiator. The tube must also reach to the bottom of the bottle but must be cut off at an angle of  $45^{\circ}$  to allow free passage of the coolant.

#### To Drain

1. Remove the radiator filler cap.
2. Set heater temperature control to HOT (when heater is fitted).
3. Open drain tap or plug in bottom of radiator.
4. Open drain tap or plug on left-hand side of cylinder block.

**CAUTION** If the cooling system is being drained while the engine is hot, take the necessary precautions when removing the filler cap (see Section 'K.1.').

### To Refill

1. Before starting to refill the system the car should be on level ground. Ideally a 'nose up' attitude is better to ensure a minimum amount of air being drawn into the system along with the coolant.
2. Close radiator and cylinder block drain taps.
3. Set heater temperature control to HOT (when heater is fitted).
4. Using either clean soft water, or a pre-mixed anti-freeze solution with water, refill the cooling system pinching the radiator top hose between fingers and thumb to expel air while filling.
5. After filling, run engine for a short time and check externally for leaks.

### K.4. - FAN BELT ADJUSTMENT

The adjustment of the fan belt tension is effected by slackening slightly the two generator mounting bolts and the adjustment locking bolt. Move the generator towards or away from the engine as necessary until the correct belt tension is obtained.

Tighten bolts after adjustment.

### K.5. - FAN

#### To Remove

1. Release the bolts securing the fan to the hub and pull off.

#### To Replace

Replacing the fan is a direct reversal of the removal procedure.

### K.6. - THERMOSTAT

#### To Remove

1. The thermostat is housed in the outlet on the left-hand side of the cylinder head, and is removed by first draining the cylinder block to below the thermostat level.
2. Release the clip attaching the top water hose to the water outlet, then remove bolts with their washers securing outlet to cylinder head.
3. Lift out thermostat

#### To Test

1. Inspect the thermostat for visual signs of deterioration and discard it if the valve is worn, distorted or corroded.

2. If there are no obvious signs of deterioration, check the operation of the thermostat by immersing it in a vessel containing water which is being gradually heated. With a thermometer read off the temperature at which the valve begins to open. It should start to open within 30°C. of the temperature given in 'Technical Data' and continue to rise to the fully open position.
3. If the thermostat fails to pass these simple tests, it should be replaced with a new unit.
4. Alternatively to item '2', equipment for testing the thermostat can be obtained from:-

A. C. Delco Ltd.,  
Dunstable, Bedfordshire,  
England.

#### To Replace

1. Replacing the thermostat is a direct reversal of the removal procedure.

#### K.7. - RADIATOR

##### To Remove

1. Remove the bonnet.
2. Drain the cooling system (Section 'K.3.') retaining the coolant if an anti-freeze solution is being used.
3. Release the clips from the forward ends of top and bottom water hoses. Pull off hoses from their locations on the radiator. Pull off the overflow hose between radiator and expansion bottle (where fitted).
4. From each side flange of the radiator, remove two bolts with their nuts and washers securing the radiator to its mounting brackets. Lift out radiator from its location.

##### To Replace

1. Place radiator in position and secure to its mounting brackets.
2. Re-attach top and bottom water hoses and secure with their clips. Replace the overflow hose.
3. Close both the radiator and cylinder block drain taps and refill cooling system (Section 'K.3.')
4. Replace the bonnet.

## Radiator Filler Cap

Correct pressurising of the cooling system is of great importance, this depending on the radiator cap being in good condition. If the rubber sealing gasket (on spring assembly) is damaged, the complete cap should be replaced. Test also that the spring assembly is functioning correctly, or is not fatigued.

Equipment for testing the radiator cap can be obtained from AC - Delco Limited. The radiator cap rubber/asbestos seal (Part No. 36K 6002) should also be replaced if faulty or missing.

## FUEL SYSTEM (TWIN-CAM ENGINES)

### L.1 - GENERAL DESCRIPTION

The fuel system has a tank located at the rear of the luggage compartment. The filler cap is located on the rear right-hand panel, the filler pipe being connected to the tank by a short length of hose retained with clips. The fuel tank gauge unit is located in the rear face of the tank. The fuel gauge on the instrument panel registers the quantity of fuel in the tank with the ignition switched on.

A fuel pipe connects the fuel tank to a diaphragm type mechanical fuel pump mounted on the right-hand side of the engine and operated by the jackshaft. The fuel pump incorporates a gauze screen and an inverted sediment bowl. From the fuel pump a branched pipe delivers fuel to the carburetters.

Two side draught Weber carburetters are used (see respective sections dealing with carburetters and also 'Technical Data').

The air cleaner is of the replaceable paper element type. A flexible hose connects the air cleaner to an airbox mounted on the carburetters.

### L.2 - FUEL SYSTEM

#### To Clean

1. Remove the air cleaner and clean.
2. Disconnect the fuel supply pipe at both the carburetters and fuel pump locations.
3. Unscrew the wing nuts and lift off the two main and idling jet covers. Remove the screws securing the carburetter covers and remove the two covers.
4. Remove the jets and blow them clean with an air line.

5. Clean the floats and float chambers with petrol and blow clean with an air line.
6. Refit the carburettor covers ensuring that the floats are free to move in their bodies. Replace the two main jet covers and secure with their wing nuts. Check float level.
7. Using an air line, blow through the previously disconnected fuel supply pipes between carburettors and fuel pump. Replace the pipe.
8. Disconnect the pipe between the fuel tank and the fuel pump, and blow through using an air line. Replace the pipe.
9. Remove the fuel pump sediment bowl and filter, wash in clean petrol, and refit.
10. Replace the air cleaner.

### L.3. - FUEL GAUGE

#### To Remove

1. From behind the fuel gauge, release the nut securing the gauge strap, pull off strap and pull gauge out of fascia panel from front.
2. Note position of wiring cables and remove from gauge.

#### To Replace

1. Reconnect the cables to the fuel gauge. push gauge into location in fascia panel.
2. From behind fascia panel, replace the securing strap with its nut.

### L.4 - FUEL PUMP

Fuel is drawn from the fuel tank by the pump which is secured to the engine block and is driven by an eccentric on the jackshaft. The pump consists of two main bodies which clamp a diaphragm between their outer flanges.

The lower body assembly comprises a rocker arm and link, both of which pivot on a pin located in the body; attached to the link is the pull rod incorporated in the diaphragm assembly. To protect the diaphragm from crankshaft oil splash, an oil seal is located at the point in the lower body where the push-rod passes through. A return spring is interposed between the undersides of the diaphragm and the lower body, the spring determining the pump output pressure, (see 'Technical Data'). A further spring is fitted between the rocker arm and the body for the purpose of ensuring that the rocker arm is in constant contact with the eccentric on the jackshaft.

Assembled in the upper body are two valve assemblies; one being opened by suction, the other by pressure. Both valves are held in position by a recess in the upper body which is then staked.

Both inlet and outlet valve assemblies are identical in construction and are renewable and interchangeable.

Also incorporated in the upper body is a filter gauze which is held in position with a dome glass top cover and gasket, this in turn being held by a centre screw clamping the cover to the upper body.

#### To Remove Fuel Pump

1. Disconnect the pipes from the inlet and outlet bosses of the fuel pump .  
Seal off the ends of the pipes to prevent the ingress of foreign matter .
2. Remove two fuel pump retaining bolts and lockwashers, and withdraw fuel pump and gasket from cylinder block .

#### To Dismantle

1. Before commencing to dismantle, clean exterior of pump and scribe a line across the lower and upper body flanges of the pump for location purposes during re-assembly .
2. Remove domed glass top cover of pump also gasket and filter gauze .
3. Remove the screws and spring washers securing the lower and upper bodies together and separate the two bodies .
4. The valve assemblies are 'staked' in position and it is necessary to relieve this 'staking' in order to remove valves .
5. From the lower body remove the diaphragm and pull rod assembly, first turning the assembly through an angle of  $90^{\circ}$  in order to free the rod from the link in the rocker arm assembly .

NOTE: The diaphragm and pull rod are a permanent assembly and no attempt should be made to separate the two parts .

6. Lift out the diaphragm return spring and, where fitted, remove oil seal retaining washer and oil seal .
7. Providing that the rocker arm pin is held firmly in the lower body it should not be necessary to remove the rocker arm pin or associated parts unless undue wear is in evidence .

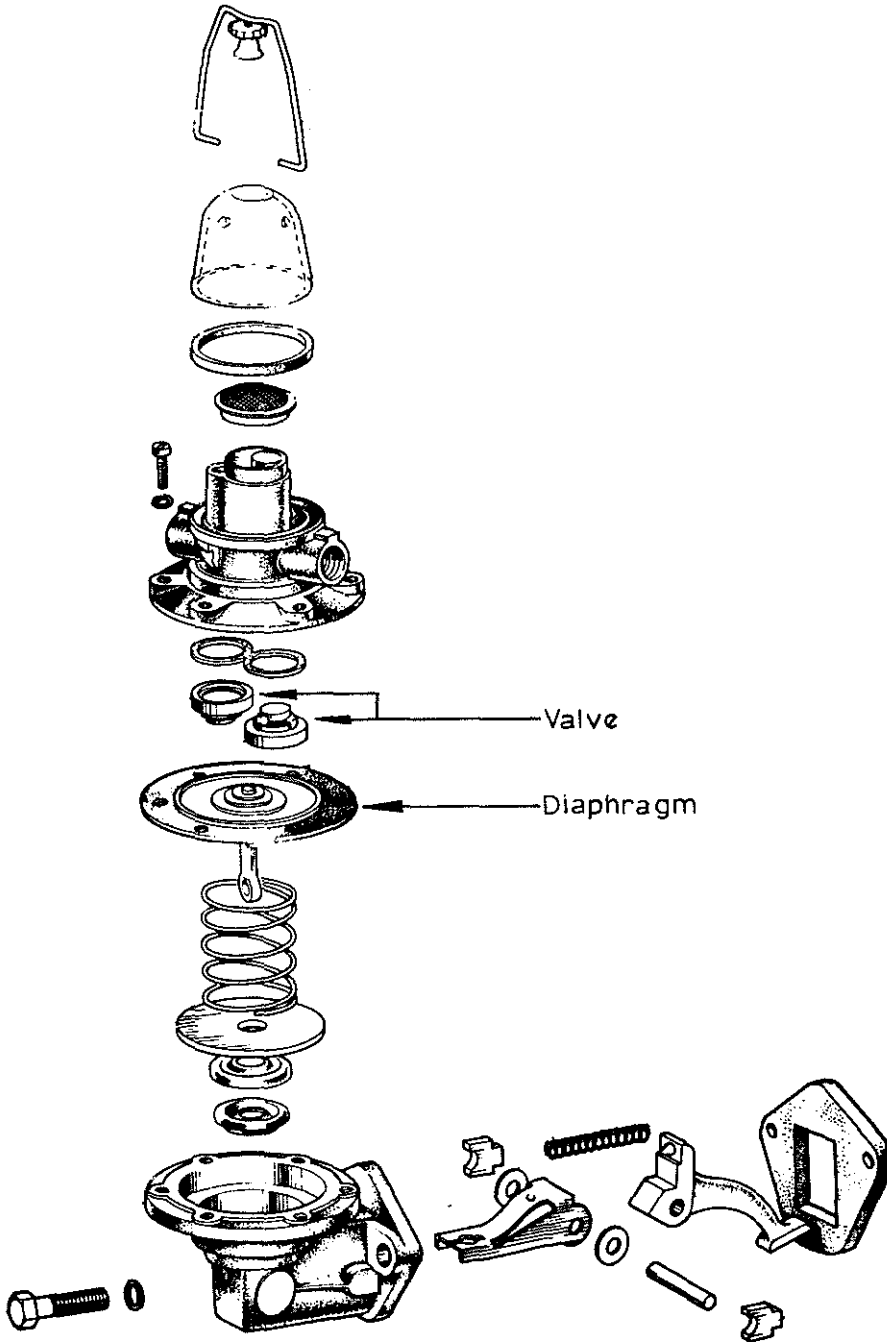


Fig. 1. FUEL PUMP COMPONENTS



Should it be necessary to remove the rocker arm from body, the following procedure should be adopted:-

The rocker arm and associate parts are located by two retainers, which are fitted into slots at engine face of castings, the retainers in turn being held by punch indentations at each end of retaining pins.

To remove the rocker arm assembly, hold rocker arm firmly in suitable vice and with two flat bars approximately 12 in. long (30.5 cm.) insert one each side in the gap between the casting and vice, lever the body away from the rocker arm and pin.

NOTE: Care should be taken that the type of removing bars used are flat to ensure that the body machined face is not damaged.

### Inspection and Overhaul

1. Thoroughly wash all parts in clean paraffin, ensuring the valves are cleaned separately if being used again.
2. Check diaphragm for hardening or cracking and examine the lower extremity of the pull rod, where it connects with the rocker arm link for wear. Renew the diaphragm assembly if any of these signs are in evidence.
3. Check the diaphragm return spring, if corroded or damaged, it should be replaced.
4. Visually check valve assemblies, if any doubt exists, replacement valves should be fitted. The two valves are identical and can be used for either application by inverting their positions.
5. Examine the rocker arm face pad for wear. Slight wear is permissible but should not exceed depth of .010 in. (.254 mm.) Check rocker arm pin and link holes for wear, also the underside of link where diaphragm pull rod engages for wear. Badly worn or damaged parts should be renewed. Check rocker arm return spring.
6. Discard old oil seal and gaskets.
7. Examine upper and lower bodies for cracks or damage. If either the diaphragm or engine mounting flanges are distorted, these should be lapped to restore their flatness. Renew if either distortion is excessive.

## To Re-assemble

Re-assembly of the rocker arm into the body is as follows:-

Assemble rocker arm, link and spacing washers onto rocker arm pin, place rocker arm return spring into body and insert rocker arm assembly into body of pump. Ensure that the rocker arm return spring is properly engaged between locating 'pips' on casting and rocker arm. Tap two new pin retainers into slots in the body and, while holding the retainers hard against the rocker arm, pin punch over the end of the slots with a 1/8 in. (3.17 mm.) pin punch to prevent retainers working loose.

NOTE: When re-fitting rocker arm pins, always use new service replacement retainers, (Coloured copper for identification). These are slightly shorter than the original type to allow for new staking.

Fit new oil seal washer and steel retaining washer into the lower body.

Place the diaphragm return spring in position over oil seal retaining washer.

Place the diaphragm assembly over the spring, with the pull rod downwards and with the locating tab on the diaphragm at the twelve o'clock position.

Press down on the diaphragm at the same time turning the assembly to the left in such a manner that the slot on the pull rod will engage the fork in the link, ultimately turning the assembly a complete quarter of a turn to the left, which will place the pull rod in its correct working position in the link.

This will also permit the matching up of the holes in the diaphragm with those on the pump body flange and the tab will now be at the nine o'clock position.

Place the new valve gasket in the upper body around the valve ports. Place valve assembly in inlet port with the spring facing outwards. Fit other valve in the outlet port position with the spring inside the port.

When re-fitting re-stake valve in four positions by using a suitable punch.

Refit filter gauze in top of upper body, also glass domed cover with new cover gasket. Fit central clamping screw.

The upper and lower bodies can now be fitted together as follows:-

Push the rocker arm towards the pump body until the diaphragm is level with the body flange.

Place the upper half of the pump body into its correct position by aligning the scribed lines made on the two flanges prior to dismantling.

Replace the securing screws and spring washers and tighten only until the heads of the screws engage the washers.

Push the rocker arm away from the pump so as to hold the diaphragm at the top of the stroke and while so held, tighten the body screws diagonally and securely.

**IMPORTANT:** After assembling in the manner described above, the edges of the diaphragm should be flush with its two clamping flanges.

Any appreciable protrusion of the diaphragm indicates incorrect fitting, in which case special care should be taken in maintaining downwards pressure in the rocker arm while the diaphragm screws are finally tightened.

#### To Replace

1. Clean the mounting face on the cylinder block, removing any trace of gasket which may be adhering to the face. Fit a new gasket to the cylinder block flange, holding it in place with a smear of grease.
2. Insert the rocker arm through the hole in the cylinder block so that the arm lies on the camshaft eccentric.
3. Secure the fuel pump to the cylinder block with two spring washers and bolts, tightening the bolts evenly to the torque loading given in 'Technical Data'.
4. Ensure that the pipe joints are clean and refit the fuel pipes.
5. Run the engine and check for leaks at the joints.

#### L.5. - WEBER CARBURETTERS

##### General Description

These carburetters are of the dual barrel side-draught type, each consisting of two single barrel carburetters with two venturis in each barrel. A small auxiliary venturi is located in each barrel and they discharge fuel, except under certain conditions, into the narrowest portions of the large venturis. By using two venturis in each barrel a greater depression is created than when a single venturi is employed. Also, the velocity of an airstream is higher at the centre, and the velocity of this central core is used by the auxiliary venturis, which discharge into the centre of the main venturis at the narrowest section.

The throttle plates in each carburetter are on a common spindle and the synchronising linkage between the carburetters ensures that the throttle plates in each carburetter open an identical amount. It should be remembered that one barrel supplies one cylinder only, since the inlet tracks are not interconnected. Apart from the throttle linkage, the carburetters are identical and each carburetter is, in effect, two carburetters with duplicated main jets, idling jets, etc.

However, while each barrel has an accelerator pump jet, there is only one piston type accelerator pump per carburetter and this feeds both jets. To facilitate cold starting a progressive starting device is fitted, discharging the mixture into both barrels on the engine side of the throttle plates. The idling jets, main and air correction jets, together with their emulsion tubes, are accessible after removing the small circular cover retained by a wing nut on top of the carburetter cover.

A common float chamber is incorporated with twin floats, to reduce the effects of fuel surge actuating a single needle valve which incorporates a damping device to prevent the needle from chattering on its seat. The floats straddle the centrally located jets, their position reducing the effects of fuel surge which occurs when cornering, braking and accelerating. A gauze filter is fitted between the fuel entry point in the carburetter cover and the end float chamber.

The following operating details apply, for simplification purposes, to one barrel of a carburetter. The supply to the other barrel is the same.

### Cold Starting

The progressive starting device on one side of the carburetter is actuated by the choke control on the instrument panel. It consists of two spring loaded pistons, operated by a single lever connected to the choke control, which opens or closes a duct to each throttle barrel, and two petrol starting and air corrector jets, supplied with petrol from the float chamber and air from the float chamber respectively.

With the engine being cranked by the starter motor and the pistons raised from their seats by the action of pulling out the choke control on the facia panel, petrol passes from the float chamber through the starting jet and is emulsified by air from the calibrated bush in the carburetter body. This mixture is then ducted to the piston chamber at a point below the piston where it meets further air passing through two holes, uncovered by the piston, which are open to atmosphere. The mixture is then ducted to an orifice on the engine side of the throttle plate.

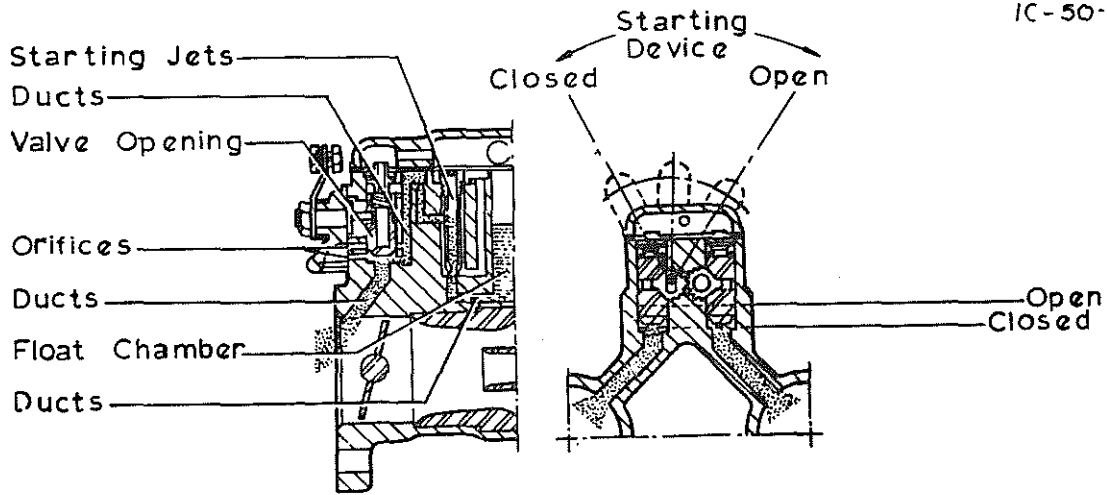


Fig. 2 STARTING DEVICE (WEBER)

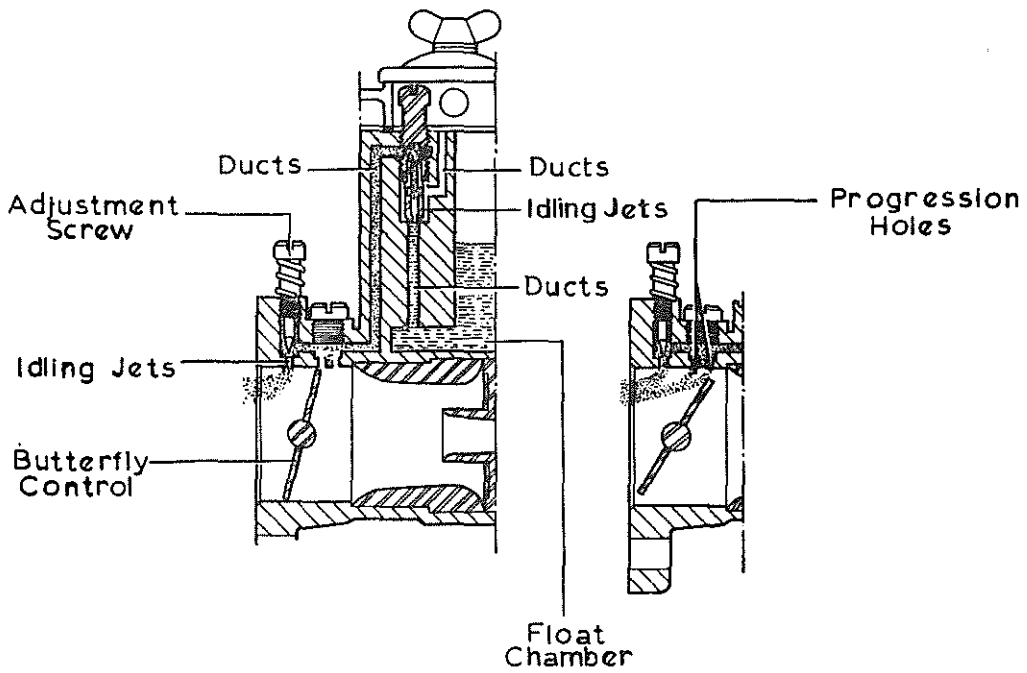


Fig. 3. IDLING & PROGRESSION SUPPLY (WEBER)

When the engine starts and the choke control is pushed progressively home as the engine warms up, the piston will move closer to its seat and the orifice at the top of the piston chamber will be uncovered thus allowing a greater quantity of air to enter through the starting device piston spring guide/retainer. At the same time, the orifice below the piston which supplies the mixture from the starting jet is partially blocked and so are the holes open to atmosphere, thus reducing and weakening the quantity of mixture delivered.

With the choke control pushed fully home the piston will be returned to its seat and close the duct to the barrel.

### Idling and Progression Supply

Petrol passes from the float chamber to the idling jet and is emulsified with air from the float chamber. The orifice in the tapered end meters the petrol and the hole in the side of the idling jet calibrates the air. The mixture passes through the holes in the idling jet holder and via passages is ducted to the idling discharge orifice on the engine side of the throttle plate. The quantity of mixture passing through the discharge hole is regulated by a needle type volume control screw.

Three progression holes by the throttle plate edge are connected to the passage supplying the idling mixture. These progression holes ensure a smooth and progressive supply of mixture as the throttle plate is gradually opened.

### Main System

The emulsion tube is a push fit in its holder. In one end of the emulsion tube is the air corrector jet and in the other end the petrol jet.

When the throttles are opened further, depression is imposed on the auxiliary venturis. Petrol passes from the float chamber through the main jet into the emulsion tube where it mixes with air which has passed through the air corrector jet.

The mixture is then channeled to the 'beak' in the auxiliary venturi which in turn discharges into the main venturi.

### Accelerator Pump System

The accelerator pump ensures smooth acceleration and reduces any hesitation when the throttle is suddenly opened.

The single accelerator pump in each carburetter supplies two pump jets, one per barrel. Only one inlet valve is fitted but there are two delivery valves.

With the throttle plate closed the accelerator pump control rod is raised by the arm pinned to the throttle plate spindle. The control rod, which is 'U' shaped and the piston are spring-loaded so that if the throttle spindle arm is lowered the pump piston will descend under the action of its own spring.

When the piston ascends petrol is drawn from the float chamber past a ball in the inlet valve located in the bottom of the float chamber. This inlet valve has a lateral calibrated orifice which passes any excess fuel into the float chamber when the piston descends.

When the throttles are opened, the spindle rotates the arm which allows the pump control rod and piston to descend under the action of their spring. The inlet ball valve closes, preventing fuel from returning to the fuel chamber, except by calibrated orifice. Petrol is then forced to a pump delivery valve, lifts the weighted ball from its seat in the carburettor body and then passes to the appropriate pump jet, mounted between the edge of the main venturi and throttle plate.

When the accelerator pedal is released, the vacuum caused when the pump piston rises closes the delivery valve ball to prevent the entry of air through the pump jet. The pump cylinder is, therefore, refilled by fuel flowing past the inlet ball valve and lateral calibrated orifice.

#### High Speed Device

To slightly enrich the mixture at high engine speeds, the accelerator pump delivery valve performs as a power jet. When the vacuum at the pump jet reaches a certain value, according to the delivery valve ball weight, the ball is drawn from its seat and, via the accelerator pump housing and inlet valve, fuel is drawn from the float chamber.

It will be appreciated that the pump jet controls the amount of additional fuel and the delivery valves weight the point of opening.

#### Carburettor Flexible Mountings

Studs are screwed into the flanges of the inlet tracts, and these studs pass through the spacer, the carburettor mounting flanges, double coil spring washers and the nuts. "O" rings are sandwiched between the carburettors, spacer, and the inlet tracts.

1C-50-L5

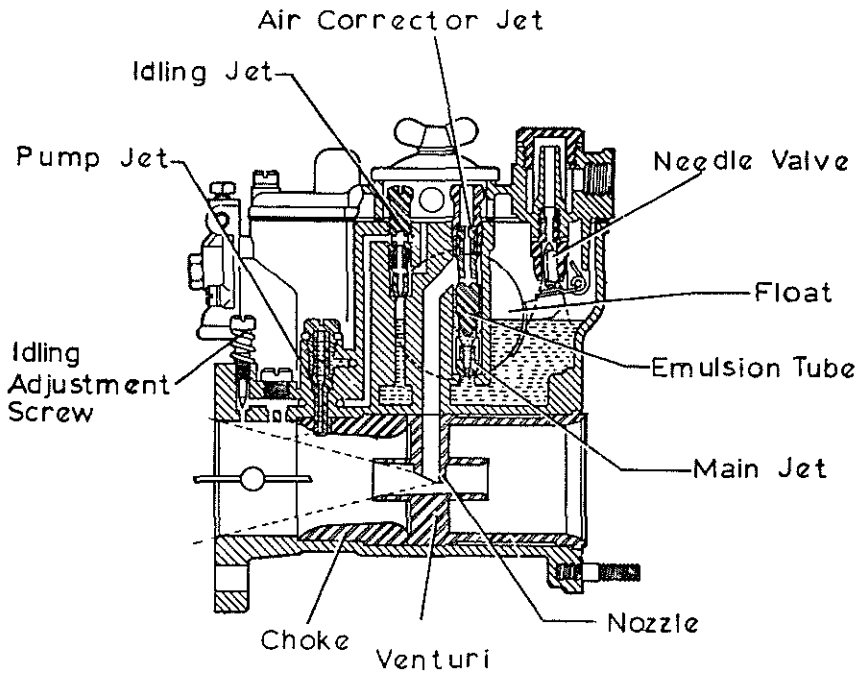


Fig. 4. MAIN SYSTEM (WEBER)

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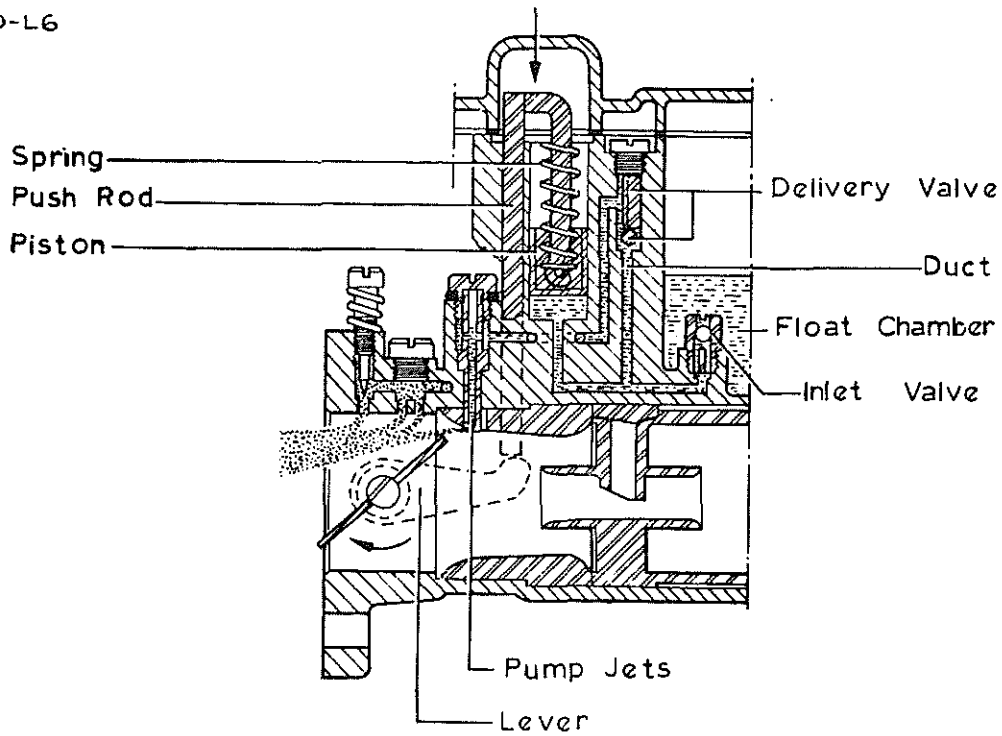


Fig. 5. ACCELERATOR PUMP SYSTEM (WEBER)



The "O" rings act as a seal to prevent the ingress of air, and together with the double coil, spring washers, also act as an insulator to absorb vibration and prevent frothing in the float chambers.

At intervals of every 3,000 miles (5,000 km.) check the clearance with feeler blades between the coils of the eight spring washers. The clearance should be .04 in. (1.01 mm.) and it must be remembered to check also the four washers which are below the carburetters. If only the top four washers are set and those underneath loose, the carburetters will tilt with the possibility of air leaks and the "O" ring being pulled from its mounting plate and barrel.

To obtain the correct clearance, slacken or tighten the carburetter retaining nuts. Be careful not to overtighten the nuts, otherwise the mounting plate may permanently be distorted and the "O" ring can then become detached. Also, the coil spring washer may fracture if over-tightened.

#### L.6. - WEBER CARBURETTERS

##### To Remove

1. Release the clip and disconnect the air cleaner trunking from the air box. Remove the central bolt visible in the air box, and pull off the outer half of the box.
2. Unhook the throttle return spring and remove the throttle cable from Carburetters. Disconnect the fuel supply pipes at the carburetters. Remove the choke cable.
3. Progressively release the carburetters securing nuts, (four are visible from above, the other four being below). Remove nuts and washers.
4. Carefully remove the two carburetters as an assembly, ensuring that the synchronising linkage between the two is not disturbed. Remove the spacers with their "O" rings from the mounting studs.

##### To Replace

1. Carefully examine to check that each carburetter metal spacer is not damaged, and that the "O" rings in the faces of the plate are in position. Fit the spacer assemblies.

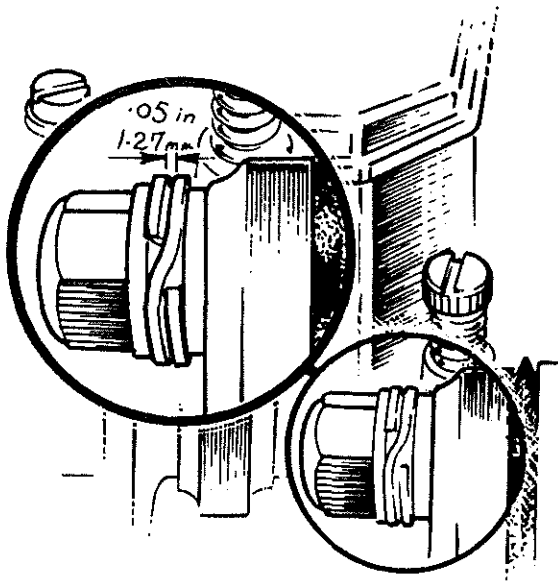


Fig. 6. DOUBLE COIL SPRING WASHER CLEARANCE (WEBER)

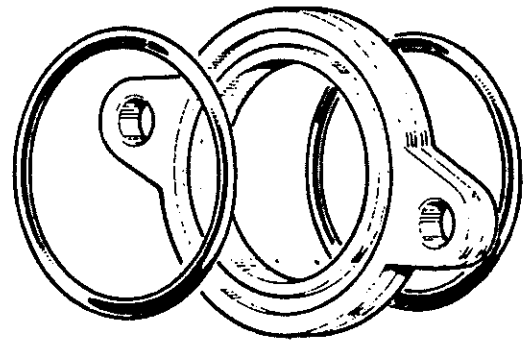


Fig. 7. CARBURETTER FLEXIBLE MOUNTING (WEBER)

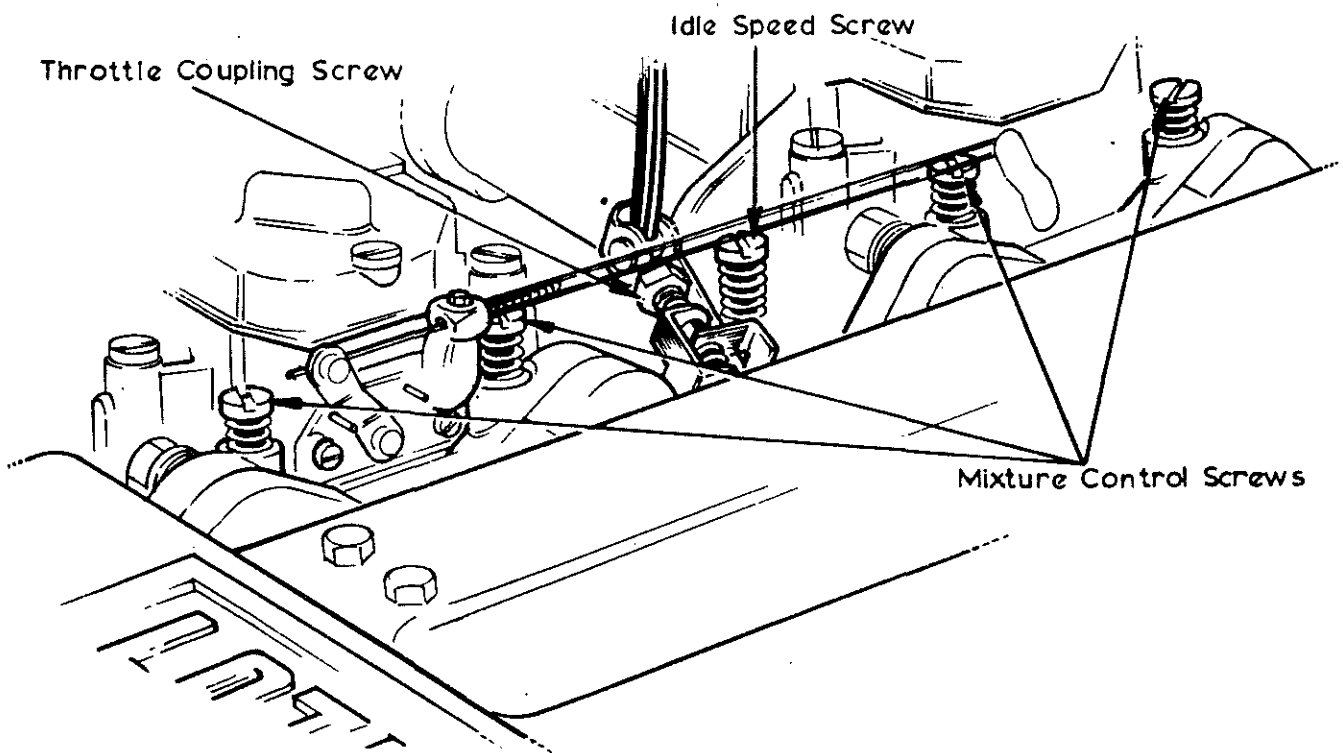


Fig. 8. CARBURETTER ADJUSTING SCREWS (WEBER)

2. Fit the carburetters, ensuring that the synchronising linkage is correctly positioned so the the lug on the rear carburetter throttle linkage is between the spring-loaded plunger and adjusting screw on the front carburetter. To each stud fit a double coil spring washer, a flat washer and nut. Tighten the eight nuts progressively until a .040 in. (1.01 mm.) clearance exists between the coils of the double coil spring washers. This clearance should be checked with feeler blades. Do not overtighten the nuts otherwise the "O" rings will be flattened into the recesses of the plate.
3. Refit the fuel supply pipes to the carburetters. Reconnect the choke control by securing the cables casing in the case arm of each starting device cover with the clamp screw. Ensure that the choke control on the facia panel is pushed fully home and that the starting device operating levers are in the 'off' position.
4. Reconnect the throttle cable and throttle return spring. If not already fitted, a new spring (Part No. B26 S 028) having a double coil, should be used.
5. Ensure the gasket is in good condition between the two halves of the air box, then refit outer half. Reconnect the air trunking to the air box.

#### L.7. - WEBER CARBURETTERS

##### To Adjust

The only adjustments required are synchronisation, mixture strength and idling speed. These adjustments being effected by the idle speed adjustment screw (or throttle screw) the interconnecting throttle arm screw (or coupling screw) and the four idling mixture volume adjustment screws (or mixture screws).

The carburetters should be 'set-up' after initial installation or subsequent overhaul as follows:-

1. Ensure that the engine has reached its normal running temperature and check that the starting control (choke) levers, are fully forward. The warmer the engine the easier the adjustment will be.
2. Check that there are no air leaks at the "O" ring gaskets.
3. Set all four mixture screws approximately three-quarters turn open.
4. Adjust the rear carburetter throttle screw to give approximately 1,000 r.p.m.

L.20

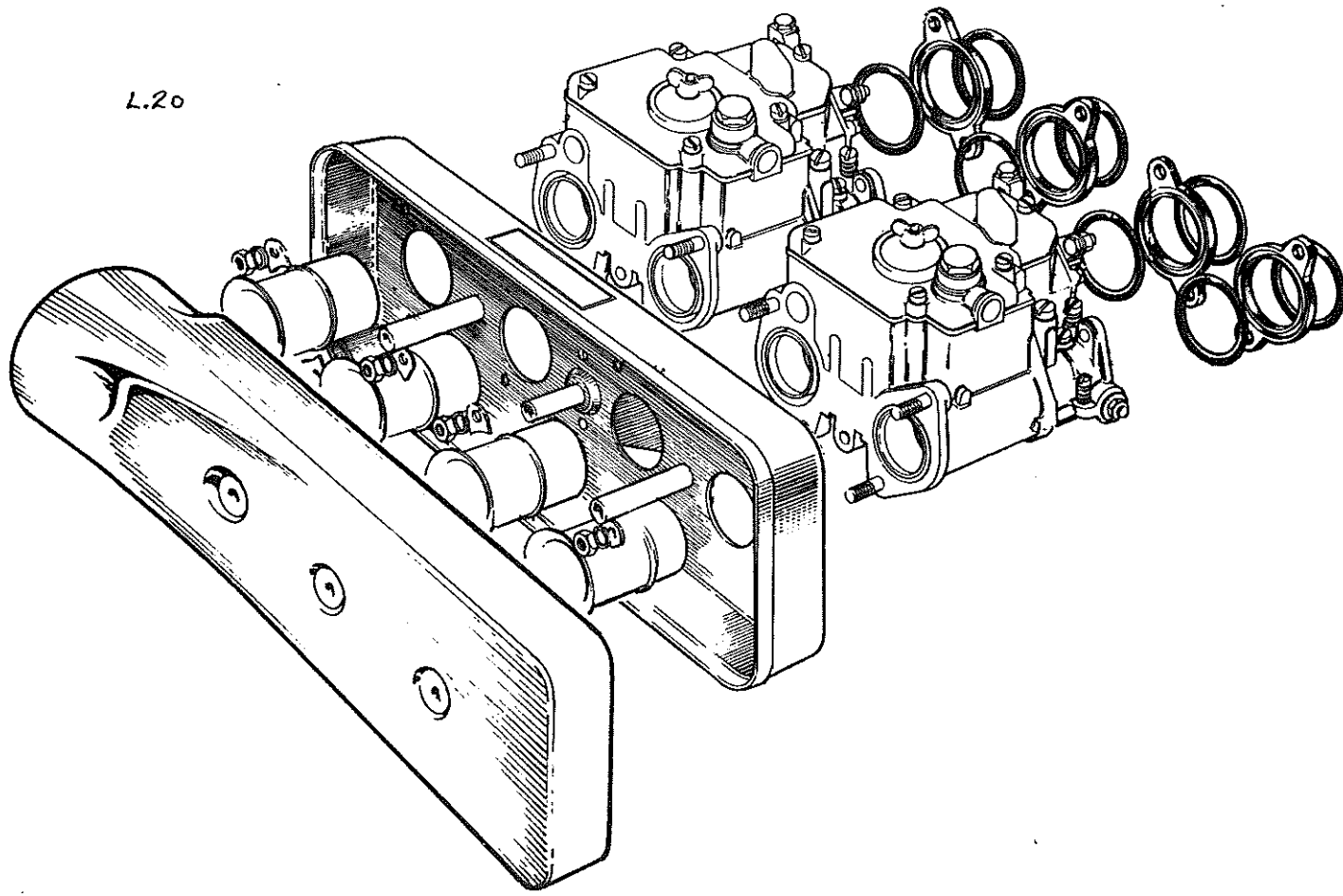


Fig. 9. AIR BOX & CARBURETTER ASSEMBLY

5. Synchronise the carburetters. This is done as follows:-
- a. Using a proprietary carburetter balancing tool (such as the Crypton Synchro-Test) adjust the coupling screw until the air flow through each carburetter is the same. Alternatively, a piece of rubber or plastic tube can be used; one end being held to the ear and the other at the mouth of the carburetter trumpet. The coupling screw is then adjusted to produce the same loudness of 'hiss' at each carburetter.
  - b. Short out or remove each plug lead in turn and adjust the coupling screw until the shorting out of each pair of plugs produces approximately the same drop in engine revs.

NOTE: for method 'a' it is necessary to remove the airbox cover, but this will have negligible effect on the carburation at idling speeds.

6. Adjust each mixture screw in turn. One at a time, screw each one right in and unscrew a small amount at a time (not more than 1/8 turn, waiting approximately 5 seconds at each setting). A point will be found which will cause a rise in engine revolutions and continued unscrewing beyond that point will cause the revolutions to drop back again. Each screw must be adjusted to give the maximum rise in revolutions. The rise in revolutions may be so small (possibly 50 r.p.m. or so) as to be undetectable by ear, and it is recommended that a mirror should be hung on the steering wheel so that the tachometer may be seen.

NOTE: During the course of items 5 and 6 it will be necessary to re-adjust the throttle screw from time to time to maintain the engine revolutions at around 1,000 r.p.m.

7. Repeat 4, 5 and 6 (possibly several times) until no further improvements can be obtained.
8. Adjust the throttle screw to give an idle of 800 to 900 r.p.m.

NOTE: In all cases where there may be unbalance of air flows through throttles in the SAME carburetter, this can be corrected by placing a spanner on each end of the throttle spindle, and twisting slightly in the required direction.

## L.8. - WEBER CARBURETTERS

### To Clean

1. Disconnect the fuel supply pipes at the carburetters. Unscrew the wing nuts and lift off the two main and idling jet covers. Progressively, release the screws securing the top covers, remove the screws with their washers and remove covers.
2. Remove the accelerator pump inlet valve from the base of the float chamber.
3. Remove the idling jet holders (two per carburetter) and pull the jets from the holders.
4. Unscrew the emulsion tube holders (two per carburetter). Pull each emulsion tube from its holder and then the main jet from one end of the emulsion tube and the air corrector jet from the other.
5. Remove the accelerator pump delivery valve retaining screws (two per carburetter).
6. Unscrew the pump jet retaining screws, (two per carburetter) and examine the rubber seal around each screw. Extract each pump jet from the body.
7. Remove the starting jets (two per carburetter).
8. Remove the accelerator pump from the carburetter body. Pull out the inverted 'U' shaped control rod which will withdraw the split retainer, spring and piston.
9. Blow the accelerator pump, the jets and their housings clean using a low pressure air line. Wash the floats and the float chamber in clean petrol and blow clean.
10. Fit the starting jets.
11. Replace the accelerator pump jets, noting that the smaller diameter enters first and the flat on the large diameter is to the engine side of the carburetter. Check the condition of the retaining screw rubber seals and refit together with these screws.
12. Refit the accelerator pump delivery valves by fitting a ball first, then a weight, concave face to the ball, and finally the retaining screws.

13. Fit the emulsion tube holders. Push a hexagonal head main jet into the large diameter end of an emulsion tube and a circular-headed air corrector jet in the other end. Fit the emulsion tube holder over the air-corrector end, and screw the assembly into position.
14. Replace the idling jets in their holders and fit them in the carburetter.
15. Check that the accelerator pump inlet valve ball moves freely and screw the valve into the base of the float chamber.
16. Re-assemble and fit the accelerator pump. Slide the split retainer on the accelerator pump control rod, with the dishing toward the hook end of the control rod. Pass the spring over the hooked end of the control rod, compress the spring and then locate the piston on the control rod. Position the assembly in the carburetter and press the split retainer in position.
17. Refit the carburetter cover, ensuring that the floats are free to move in the bodies. Secure with the screws and washer, tightening evenly. Refit the small circular main and idling jet covers retained by two wing nuts. Reconnect the fuel supply pipes to the carburetters.

#### L.9. - WEBER CARBURETTERS

##### Overhaul

1. Remove the carburetters from the engine, then with the instruments on a clean bench, remove the nuts, spring washers and clamps which secure the trumpets and the air box back plate to the carburetters.

##### To Dismantle

1. Remove the auxiliary venturi followed by the main venturi from each barrel.
2. To remove the fuel filter, unscrew the hexagon-headed retainer from the carburetter cover, noting that there is a sealing washer beneath the retainer head. Withdraw the gauze filter from the cover, taking care not to mislay the brass seat in the top of the filter.
3. The carburetter cover can be withdrawn after removing the small circular main and idling jet cover retained by a wing nut and then the screws (slacken evenly) with their washers.

4. Remove the floats and needle valve from the cover. Gently push out the flat fulcrum pin from the cover, after which the needle valve may be removed from its seat. Withdraw the cover gasket and unscrew the needle valve seat from the cover, a sealing washer being fitted between the needle valve seat and cover.
5. Remove the accelerator pump from the carburetter body. Pull out the inverted 'U' shaped control rod which will withdraw the split retainer, spring and piston. To dismantle the assembly, first compress the spring, slightly rotate the piston and withdraw from the hooked end of the control rod, followed by the spring and split retainer.
6. Unscrew the accelerator pump inlet valve from the base of the float chamber. Shake the inlet valve to ensure that the ball inside the valve body slides freely.
7. Remove the idling jet holders (two per carburetter) and pull the idling jets from the holders.
8. Unscrew the emulsion tube holders (two per carburetter). Pull each emulsion tube from its holder and then the main jet from one end of the emulsion tube and the air corrector jet from the other.
9. Remove each accelerator pump delivery valve retaining screws (two per carburetter) and invert the carburetter to extract the balls and weights.
10. Unscrew the pump jet retaining screws (two per carburetter) and examine the rubber seal around each screw. Extract each pump jet from the body.
11. Remove the starting jets (two per carburetter).
12. Unscrew the volume control screws and throttle stop screw (if fitted). Examine the springs.
13. The starting device cover on the side of the carburetter may be removed after unscrewing the two retaining screws which have spring and flat washers beneath their heads.
14. Carefully prise out the combined starting device piston guide/retainer circlips (two per carburetter). Withdraw the guides and springs and invert the carburetter to extract the starting device pistons.



15. Remove the throttle plates, one from each barrel, by unscrewing the two screws securing each plate in its shaft.
16. Remove the throttle spindle; a new carburetter body is supplied with the throttle spindle, pump operating arm, bearings etc. They can be dismantled if required as follows:-

Remove the nuts, after bending back the tab washers, each end of the throttle spindle. Remove the flat washer from one end and the throttle linkage from the other. Withdraw the plate and gasket, secured by two screws, from the engine side of the carburetter to gain access to the accelerator pump control arm. Tap out the pin retaining this arm to the spindle. Ensuring that the threads are not damaged, knock out the spindle which will also remove from one end of the spring retainer, the spring, dust cover and bearing. After carefully prising out the spring retainer from the other end, the spring and dust cover can be extracted.

#### Cleaning and Inspection

After dismantling and prior to re-assembling, the carburetter, filter and the jets should be checked for size and cleaned. The seating of the idling jets, starter pistons, starter jets and main jets in the carburetter body should also be examined, together with the seating faces of the jets and tubes themselves.

It is physically impossible to interchange air correction jets with main jets, starting jets with idling jets etc., and similarly their positions in the carburetter.

Inspect the various gaskets, also the sealing rings fitted to the accelerator pump jet screws, needle valve seat and filter retainer. Clean the filter and ensure that the gauze is undamaged.

Shake the accelerator pump inlet valve to check that the ball is free to slide.

#### To Re-assemble

1. If removed, refit the throttle spindle across the barrels, ensuring that the accelerator pump operating arm is fitted on the shaft so that the shouldered end is by a barrel and the curved end of the arm is uppermost. Retain the arm spindle with a tension pin. Fit a dust cover, spring and spring retainer at each end of the shaft and, depending on the end of the shaft, fit a flat washer on the throttle linkage.

Secure with new tab washers and nuts, operating the throttle spindle whilst tightening the nuts to ensure ease of movement. It may be necessary to lightly tap either end of the shaft to obtain this condition. Refit the accelerator arm access plate and gasket, securing with two screws.

2. Fit the throttle plates, noting that the edges of the plates are chamfered, the plates being fitted so that they can completely close the barrels. If a new throttle plate is being fitted check that the angle stamped on the plate is  $79^{\circ} 30'$ . If a throttle plate with a different angle is fitted, then the carburetters low speed progression will be affected since the distance between the throttle plate's edge and adjacent progression hole will be altered with the result that vacuum at the progression hole will either be too strong or too weak with consequential irregular running. Retain the plates in the shaft with new screws, the shaft holes being countersunk for the heads; do not tighten these screws at this time. Close the throttle shaft to centralise the plates with the barrels, tighten the screws and peen the threaded ends to retain.
3. Using a .002 in. (5.08 mm.) thick feeler gauge in the gap between the throttle body and the throttle plate (on the centre line of the throttle plate and at right-angles to the throttle spindles) at the progression hole side of the throttle barrel, hold the throttle control lever firmly against the stop screw and adjust the screw until a light pull is required to withdraw the feeler blade. Next, trap the feeler blade on the opposite side of the throttle plate and if the concentricity is correct, then the same effort will be required to withdraw the blade with the stop screw in the same position. If the concentricity is incorrect, the clamping screws must be backed off and plate moved as required. Repeat the above procedure on the second throttle plate until concentricity is obtained on this also. Peen the threaded ends of the screws to retain these.
4. Having checked (and set if necessary) the concentricity of the two throttle plates, they should now be checked for synchronisation. Using a .002 in. (5.08 mm.) feeler blade positioned between the throttle body and the plate on the progression hole side of the barrel and holding the throttle control lever hard against the stop screw, adjust the screw until a light pull is required to withdraw the feeler. Without disturbing the stop screw, the same effort should be required to withdraw the feeler from between the second plate and throttle barrel.

In cases where the concentricity of the two throttle plates has been set but synchronisation is incorrect, check first that the throttle plates are all identical in respect to the degree number stamped on them (i.e. 79° 30'.) If these are correct, this normally indicates a twisted throttle spindle and this is corrected by holding one end of the spindle and turning the other end in the required direction.

5. Fit the starting device pistons in the carburetter body tapered ends first, followed by the coil springs and combined spring guide/retainers, the latter being held in position by circlips.
6. Secure the starting device cover to the carburetter, dowels being provided on the cover for locating purposes, and retain with two screws, flat washers and spring washers, tightening them evenly to avoid distorting the cover; by looking through the spring guide/retainers and operating the lever a check can be made to ensure that the pistons are raised by the operating lever and lowered by the springs when the lever is released.
7. Fit the progression hole inspection plugs, one in each barrel.
8. Fit the starting jets, two per carburetter.
9. Replace the accelerator pump jets, (two per carburetter), noting that the smaller diameter enters first and the flat on the large diameter is to the engine side of the carburetter. Check the condition of the retaining screw rubber seals, and the alloy seating washers, and fit these items with the retaining screws.
10. Refit the accelerator pump delivery valves (two per carburetter) by fitting a ball first, then a weight, concave face to the ball, and finally the retaining screws.
11. Fit the emulsion tube holders. Push a hexagonal head main jet into the large diameter end of an emulsion tube and a circular-headed air corrector jet in the other end. Fit the emulsion tube holder over the air-corrector end, and screw the assembly into position.
12. Replace the idling jets (two per carburetter) in their holders and fit them in the carburetter.
13. Check that the accelerator pump inlet valve ball moves freely and screw the valve into the base of the float chamber.

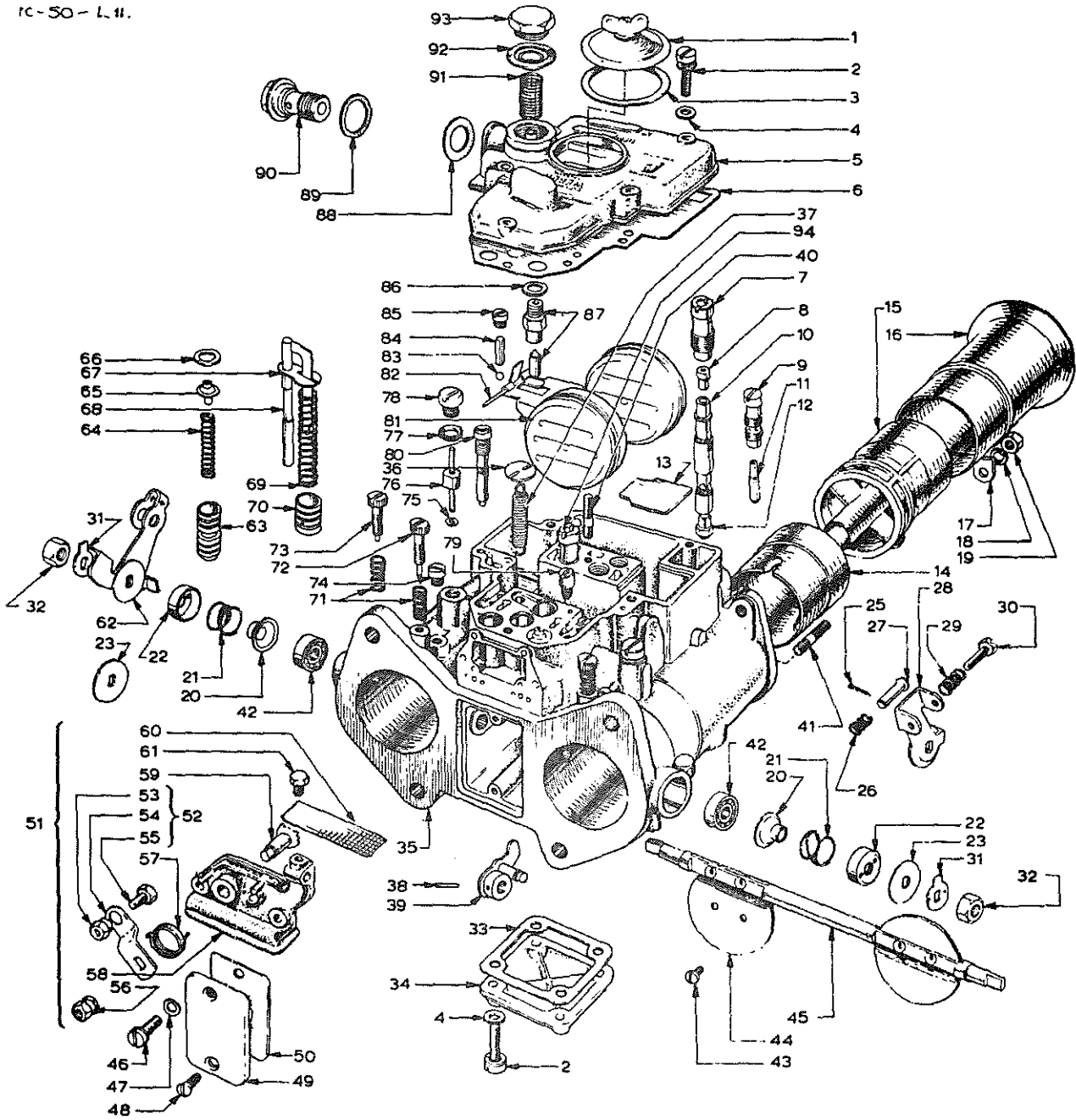


Fig. 10. WEBER CARBURETTER COMPONENTS

### Key to Fig. 10

- |                              |                            |                             |
|------------------------------|----------------------------|-----------------------------|
| 1. Cover, jets inspection.   | 32. Nut.                   | 63. Valve.                  |
| 2. Screw.                    | 33. Gasket, bowl.          | 64. Spring.                 |
| 3. Gasket, cover.            | 34. Cover, bowl.           | 65. Guide.                  |
| 4. Washer.                   | 35. Body, carburetter.     | 66. Circlip                 |
| 5. Cover, upper body.        | 36. Plate.                 | 67. Plate, spring retainer. |
| 6. Gasket, cover.            | 37. Spring.                | 68. Rod, pump control.      |
| 7. Holder, emulsion tube.    | 38. Pin.                   | 69. Spring.                 |
| 8. Jet, air corrector.       | 39. Lever, pump control.   | 70. Plunger.                |
| 9. Holder, idling jet.       | 40. Stud, upper body.      | 71. Spring.                 |
| 10. Tube, emulsion.          | 41. Stud, trumpet to body. | 72. Spring.                 |
| 11. Jet, idling.             | 42. Bearing.               | 73. Screw, throttle adjust. |
| 12. Jet, main.               | 43. Screw, throttle plate. | 74. Screw.                  |
| 13. Plate.                   | 44. Throttle plate.        | 75. Gasket.                 |
| 14. Choke.                   | 45. Shaft.                 | 76. Jet, pump.              |
| 15. Venturi.                 | 46. Screw.                 | 77. Gasket.                 |
| 16. Trumpet.                 | 47. Washer.                | 78. Plug.                   |
| 17. Plate, fixing.           | 48. Screw.                 | 79. Valve, inlet.           |
| 18. Washer, spring.          | 49. Plate.                 | 80. Jet, starting.          |
| 19. Nut.                     | 50. Gasket.                | 81. Float.                  |
| 20. Cover, dust.             | 51. Control assembly.      | 82. Shaft.                  |
| 21. Spring.                  | 52. Lever.                 | 83. Ball.                   |
| 22. Lid.                     | 53. Nut.                   | 84. Ball.                   |
| 23. Washer, distance.        | 54. Lever.                 | 85. Screw.                  |
| 24. -                        | 55. Screw.                 | 86. Gasket.                 |
| 25. Pin, split.              | 56. Nut.                   | 87. Seat, needle valve.     |
| 26. Spring throttle control. | 57. Spring, lever return.  | 88. Gasket.                 |
| 27. Pin, control lever.      | 58. Cover.                 | 89. Gasket.                 |
| 28. Lever.                   | 59. Shaft, starting.       | 90. Banjo bolt.             |
| 29. Spring, control lever.   | 60. Strainer.              | 91. Filter, upper casing.   |
| 30. Screw, control lever.    | 61. Screw.                 | 92. Gasket.                 |
| 31. Lockwasher.              | 62. Lever, rear carb.      | 93. Plug.                   |

14. Assemble and fit the accelerator pump. Slide the split retainer on the accelerator pump control rod, with the dishing towards the hook end of the control rod, compress the spring and then locate the piston on the control rod. Position the assembly in the carburetter and press the split retainer into position. Check the operation of the pump by actuating the throttles.
15. Screw the needle valve seat into the cover, after ensuring that the seat sealing washer fitted between the seat and cover is in good condition. This sealing washer also affects the float level.
16. Refit the needle valve and floats. Check the needle valve damping ball for free operation and then place the needle valve in its seat. Place a new gasket on the cover and then push the float fulcrum pin through the cover 'legs' and float hinge.
17. Check the float level. Hold the carburetter cover in the vertical position with the floats hanging down and with the tab which abuts the needle valve in light contact with the ball and perpendicular. The distance between both floats and cover, including gasket, should be 8.5 mm. If necessary, bend the needle valve tab to obtain this measurement.  
After levelling the floats check that the stroke is 6.5 mm i.e. 15 mm. from the cover. If necessary adjust the position of the other tab, which abuts the needle valve seat, to obtain this measurement. Check also that, where the support arms are soldered to the floats, a small tag has NOT BEEN LEFT ON. If evident, this tag must be removed by careful filing, taking care not to puncture the floats or bend the support arms. If the tag is not removed, it could impede high fuel flows at the needle valve thus causing fuel starvation. The float level and stroke should be checked whenever the floats, needle valve, needle valve seat or sealing washer are renewed.
18. Refit the carburetter cover, ensuring that the floats are free to move in the body. Secure with five screws, flat washers and spring washers tightening them evenly. Refit the small circular main and idling jet cover retained by a wing nut.
19. Place the gauze fuel filter in the top cover, then the brass seat in the gauze filter and finally screw the retainer, with a sealing washer beneath its head, into the cover.

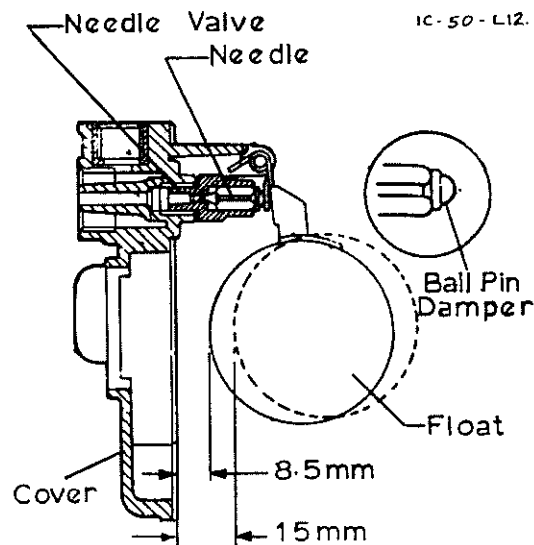


Fig. 11 LEVELLING THE FLOAT (WEBER)

20. Carefully screw the volume control screws (two per carburetter) into position until each just contacts its seat and then unscrew one turn.
21. Fit the throttle stop screw, if fitted, until it just contacts the throttle stop lever and then screw in a further half turn.
22. Fit the main venturis, smaller external diameter first, so that the brass pin in the larger external diameter slides in the barrel's channel.
23. Replace the auxiliary venturis, larger external diameter first, engaging the venturi spring tongue in the barrel channel.

#### To Replace

1. Assemble the two carburetters by placing the air box backplate on its studs. Prime the securing nuts with Locquic Primer 'N'.
2. Place air trumpets in position, then their clamps, spring washers and finally the nuts which should be fitted with Loctite 'AV'. Tighten the nuts to the torque loadings given in 'Technical Data'.

## ELECTRICAL EQUIPMENT

### GENERAL DESCRIPTION

The electrical system is a 12-volt earth return type, employing NEGATIVE earth polarity. The system incorporates the charging, lighting, starter, ignition and auxiliary circuits. The charging circuit employs a D.C. Generator.

## Polarity

Extreme care must be exercised when fitting service replacements to ensure that they suit the vehicle's earth polarity.

Certain units are interchangeable or adaptable for use with either earth polarity, but others fitted with electronic devices would become irreparably damaged if connected to an opposite polarity. The effects of polarity on the unit are summarised as follows:-

### Batteries, Ignition Coils, Ammeters:

These are suitable for both positive and negative earth systems provided they are connected to suit the vehicle's earth polarity.

### Control Boxes:

These are suitable for both positive and negative earth systems, and if connected into a system with an opposite polarity, will automatically repolarize themselves, provided that the cables to the 'D' and 'F' positions are correctly connected.

### D.C. Generators (Dynamos):

These are suitable for both positive and negative earth systems, provided they are repolarised after fitting.

### Radios:

These are designed for one or other polarity and reversed connections will destroy the transistors. However, it is possible for a competent radio engineer to alter the internal connections to suit an opposite polarity.

### Electric Clocks, Tachometers and Alternators:

These are designed for one or other polarity and cannot be adapted to suit an opposite polarity. Incorrect connections will render the instrument useless.

## Servicing Equipment

It is important to note that the servicing of the system cannot be carried out satisfactorily unless special equipment is available. Further, special equipment is needed for dismantling and re-assembling some units of the system, and should this equipment not be available, dismantling must not be attempted.



We recommend the Avometer 'Model 12' testing equipment (obtainable from Avo Ltd., 92 - 96 Vauxhall Bridge Road, London S.W.1 England), or the Wilkinson 'WIL/25 Mk.1' two meter set (obtainable from J. Wilkes & Son (Electrical) Ltd., Bredon, Tewkesbury, Gloucester, England), both of which have been specially designed for automotive use and enables a wide range of checking operations to be carried out.

An instrument for testing the car instruments 'in situ' is available under Part No. 36 M 6183.

#### DISTRIBUTOR - (TWIN-CAM)

##### Contact Breaker Assembly

At the first 500 miles (800 km.) then subsequently every 3,000 miles (5,000 km.) the contact-breaker assembly should be checked as follows:-

1. Turn the engine until the contact-breaker points are fully opened and check the gap with a suitable gauge. If the gap is correct the gauge should be a sliding fit. Do not alter the setting unless the gap varies considerably from the gauge thickness. (See 'Technical Data').  
To adjust the setting keep the engine in position which gives the maximum opening of the contacts and then slacken the two screws securing the fixed contact plate. Adjust the position of the plate until the gap is set to the thickness of the gauge and then tighten the two locking screws.  
Remember that the cam only keeps the contact points fully open over a very small angle and that care must be taken to ensure that the points are in the fully open position.
2. If the contacts are dirty or pitted they must be cleaned by polishing them with fine carborundum stone and afterwards wiping them with a petrol-moistened cloth. The moving contact can be removed from its mounting in order to assist cleaning. Check and adjust the contact breaker setting after cleaning the contacts.
3. Check that the moving arm moves freely on its pivot. If it is sluggish, remove the moving arm and polish the pivot arm with a fine emery cloth. Afterwards, clean off all trace of emery dust and apply a spot of clean engine oil to the top of the pivot. The contact-breaker spring tension is given in 'Technical Data'.

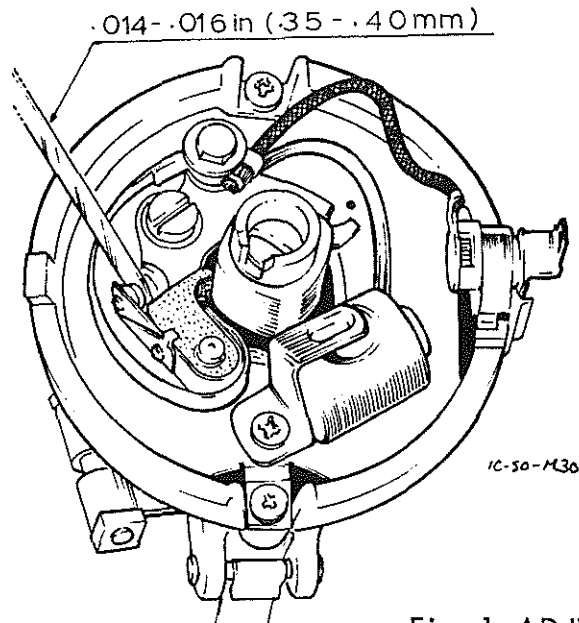


Fig. 1 ADJUSTING CONTACT BREAKER POINT GAP

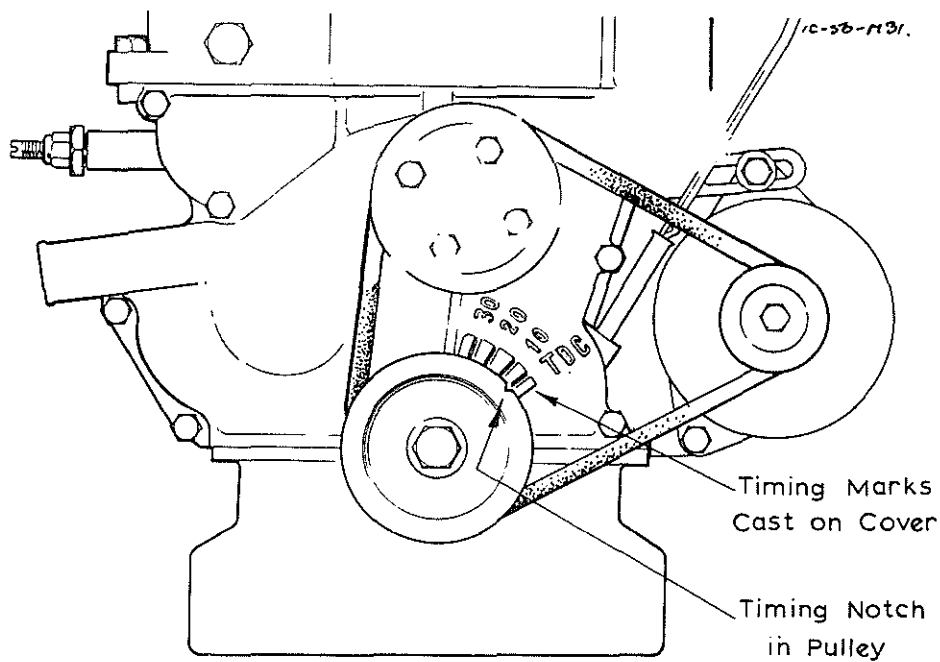


Fig. 2 TIMING MARKS

To Remove Contact-Breaker

1. Remove the distributor cap.
2. Remove the rotor arm.
3. Remove the breaker arm.
4. Remove the adjustable contact.

To Replace the Contact-Breaker

1. Locate a new adjustable contact on the pivot pin and loosely fit the retaining screw.

2. Locate fibre washers on the terminal post and the pivot pin and fit the breaker arm. Thread the insulating bush into the low tension and condenser lead eyelets before locating it on the terminal post with the end inside the spring eye.
3. Adjust the point gap to .014 in. to .016 in. (.36 mm. to .40 mm.) Use a screwdriver to adjust the gap. Re-check the adjustment after tightening the retaining screw.
4. Fit the rotor arm and the distributor cap.

#### Ignition Timing

Two distinct types of distributor are in current use, both of Lucas manufacture. The static ignition timing is given in 'Technical Data'.

#### To Remove Distributor

1. Remove the distributor cap.
2. Disconnect the low tension lead.
3. Unscrew the bolt retaining the distributor clamp on the engine and carefully withdraw the distributor.

#### To Replace Distributor and Time Ignition

1. Turn the engine crankshaft until the timing mark on the crankshaft pulley is in its alignment on the front cover timing scale as No. 1 piston comes up on the compression stroke (see 'Technical Data').
2. Fit the distributor with the low tension terminal adjacent to the cylinder block. Position the rotor, with the electrode towards the distributor cap rear clip, prior to inserting the distributor into the cylinder block. As the gears mesh, the rotor will rotate clockwise into alignment with No. 1 H.T. electrode in the distributor cap.
3. Slacken the bolt and twist the clamp so that the hole is in line with the one in the cylinder block. Fit the retaining bolt and tighten.
4. Rotate the distributor body as necessary, until the contact breaker points are just opening when the rotor is adjacent to No. 1 H.T. electrode in the distributor cap. Take up the backlash in the distributor drive while completing this operation by holding the rotor in a clockwise direction. Tighten the clamp sufficiently to hold the distributor in this position. **DO NOT OVER-TIGHTEN.**

5. Fit the distributor cap.
6. Connect the leads of the timing light, using the circlips provided, in accordance with the manufacturers instructions.
7. Check that the mark on the crankshaft pulley is visible and mark with chalk or paint if necessary.
8. Start the engine and point the timing light at the crankshaft pulley adjacent to the timing scale.
9. Progressively increase the engine speed to 2,500 rev./min. observing the timing mark with the aid of the timing light, to check that the distributor advances the ignition timing.
10. At 2,500 revs./min. adjust the ignition timing to the figure given in 'Technical Data', if necessary, by slackening the distributor clamp and turning the distributor body as required.
11. After making an adjustment, tighten the clamp sufficiently to hold the distributor in position. DO NOT OVER-TIGHTEN.
12. Remove the timing light.

## LUBRICATION

### MAINTENANCE

In order to maintain this vehicle in an efficient, safe and economical condition, regular lubrication at the intervals shown on the Lubrication Diagram is essential. These are:-

- A - 3,000 miles (5,000 km.)
- B - 6,000 miles (10,000 km.)
- C - 12,000 miles (20,000 km.)

LC 47

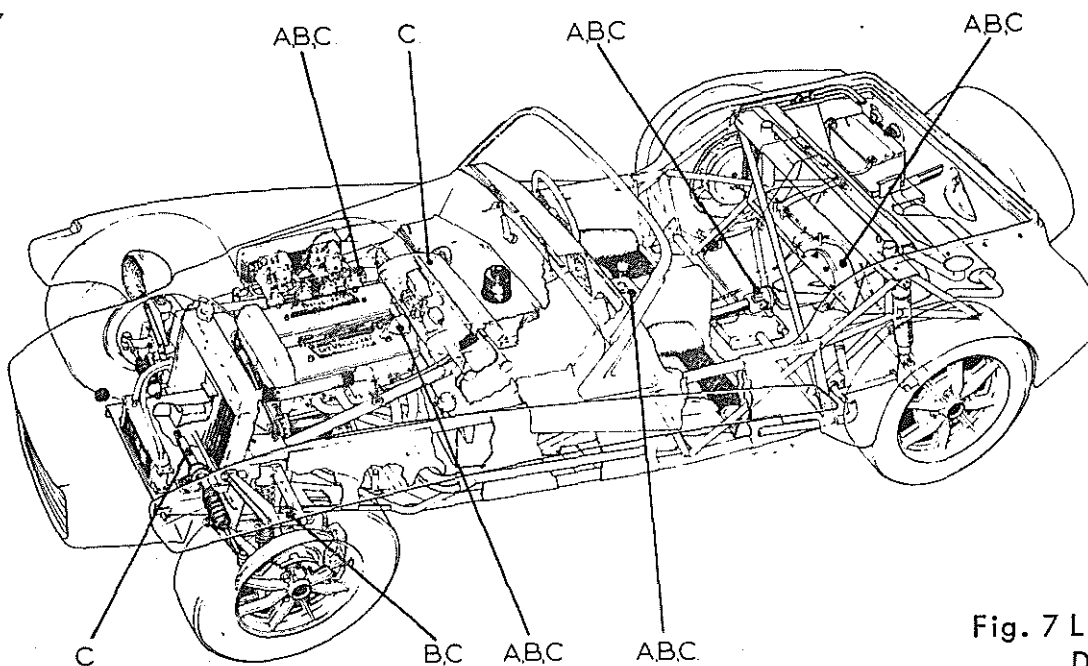


Fig. 7 LUBRICATION  
DIAGRAM

## RECOMMENDED LUBRICANTS

(The products shown are not listed in order of preference) .

	Shell	Esso	B.P.	Castrol	Mobil
<u>Engine (above 0°C)</u>	Shell Super 100	Esso Uniflo	Super Viscostatic 20W/50	Castrol GTX	Mobiloil Super
<u>Engine (below 0°C)</u>	Shell Super 10W/30	Esso Uniflo	Super Viscostatic	Castrolite	Mobiloil Special 10W/30
<u>Gearbox</u>	Shell Sprimax 80EP	Esso Gear Oil GX 80	B.P. Gear Oil 80 EP	Castrol Hypoy Light	Mobilube GX 80
<u>Differential Unit</u>	Shell S.6909	Esso A.L. 1763	B.P. X. 5116	-	-
<u>Steering Unit</u>	Shell Retinax 'A'	Esso Multi- Purpose Grease	B.P. Energrease L. 2	Castrol- Grease LM	Mobil- Grease MP
<u>Lower Steering Swivels</u>	Shell Spirax 90 EP	Esso Gear Oil GP 90/140	B.P. Gear Oil 90 EP	Castrol Hypoy	Mobilube GX 90
<u>Front Hubs</u>	Shell Retinax 'A'	Esso Multi- Purpose Grease	B.P. Energrease L. 2.	Castrol - Grease LM	Mobil- Grease MP
<u>Carburetter Dampers</u>		Engine Oil			
<u>Generator Rear Bearing</u>		Engine Oil			

Pivots & Linkages

Engine Oil

Body

Hinges, locks, catches

Engine Oil or Silicone Grease

Distributor

Shaft and cam bearing )

Contact breaker pivot ) .....

Engine Oil

Timing (spark) control )

Cam profile

Light Grease

Battery Terminals

Silicone Grease

Brake and Clutch Fluid

Castrol Girling Brake & Clutch Fluid  
Crimson to specification SAE . 70 R.3

\*Differential Unit

Any SAE oil can be used which has an addition of 10% 'Anglamol 99' by weight.

IMPORTANT

There is no need to use additives with any of the specified lubricants as those constituents considered necessary have already been included during blending. It should be specially noted that, under no circumstances, should additives of any kind be used in the differential unit.

APPROVED ANTI-FREEZE SOLUTIONS

Lotus Cars Limited approve anti-freeze solutions for use in the engine cooling system, based on inhibited ethylene glycol provided it conforms to British Standards Specification 'BS. 3151'.

<u>Solution Strength</u>	<u>Against Frost Damage</u>	<u>Safe Pump Circulation</u>
25%	-15°F. (-26°C.)	10°F. (-12°C.)
30%	-28°F. (-33°C.)	3°F. (-16°C.)
35%	-38°F. (-39°C.)	-4°F. (-20°C.)
40%	-42°F. (-41°C.)	-10°F. (-23°C.)
50%	-53°F. (-47°C.)	-32°F. (-36°C.)

LC/H8

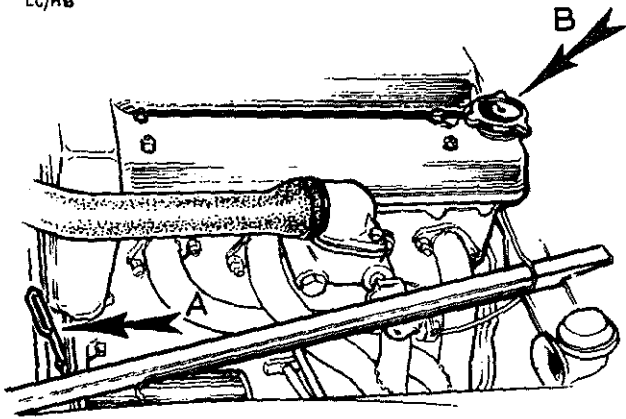
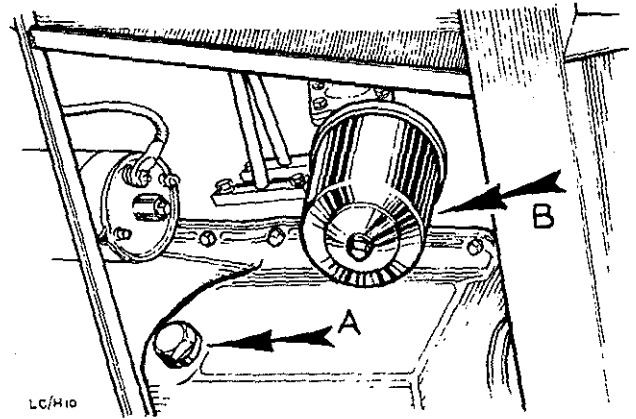


Fig. 2 TWIN-CAM ENGINE  
A - Engine Sump Dipstick  
B - Engine Oil Filler Cap



LC/H10

Fig. 3 A - Engine Sump Drain Plug  
B - Engine Oil Filter

LC/H11

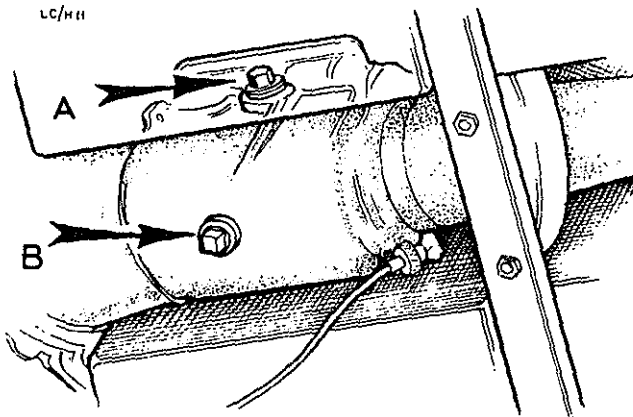


Fig. 4 A - Gearbox Filler Level Plug  
B - Gearbox Drain Plug

## ENGINE

The correct level is to the 'FULL' mark on the dipstick, which is located to the left-hand side of the timing cover. The oil filler cap is at the rear of the left-hand side of the camshaft cover. Inspect the oil level daily, topping up if necessary to the correct level. DO NOT overfill. Replace the oil filler cap securely (double notch), otherwise an oil loss will occur and could result in a complete failure of the engine lubrication system.

### Draining the Sump

Draining the sump will be greatly facilitated if carried out when the car has just completed a run and the oil is warm, thus flowing more readily. Allow to drain thoroughly, clean the drain plug and replace. The drain plug is located at the right-hand rear of the sump.

NOTE: If the engine oil is renewed at the recommended intervals there is no necessity to use a flushing oil. The use of a flushing oil is NOT recommended because of the difficulty in draining it completely.

### Oil Filter

It is recommended that the oil filter element be renewed at intervals of every 6,000 miles (10,000 km.)

To renew the filter element, release the central bolt retaining the filter body to the oil pump body, on the right-hand side of the engine. Thoroughly clean the inside of the filter body, fit new sealing rings and element, and refit to engine. Torque load the central retaining bolt to the loading given in 'Technical Data'. It is pointed out that it is false economy to fit a new oil filter alone; always refill the engine with new oil after draining the sump.

## GEARBOX

A combined filler and level plug is fitted on the left-hand side of the gearbox, the drain plug being situated below the gearbox. The oil level should reach the bottom of the fillerplug orifice and Extreme Pressure oil of the correct grade added if necessary. Gearbox lubricant should be drained at 6,000 mile (10,000 km.) intervals, preferably when the oil is warm after a run. Ensure that the drain plug is cleaned thoroughly before being replaced and tightened.



## REAR AXLE

The used lubricant must be withdrawn with the aid of a syringe at 500 miles (800 km.) Refill the axle with the specified lubricant.

The combined filler/level plug is located in the rear face of the axle casing.

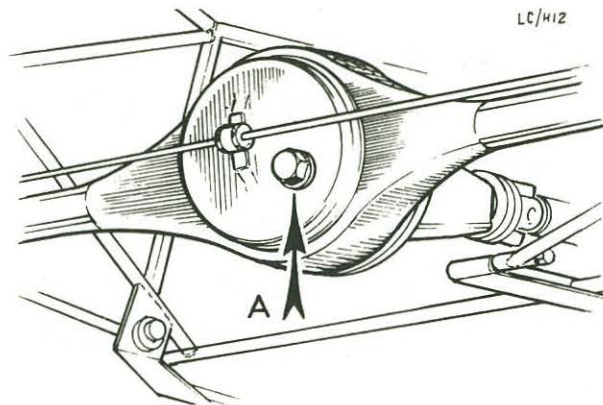


Fig. 5. A - REAR AXLE OIL FILLER/LEVEL PLUG

## STEERING UNIT

At intervals of every 12,000 miles (20,000 km.), remove the plug from the top of the unit and fit a screwed grease nipple. Apply the grease gun filled with one of the recommended greases (see Section 'O.8') and give FIVE STROKES ONLY; over-greasing can cause damage to the bellows. Remove the nipple and refit the plug.

## LOWER STEERING SWIVELS

At intervals of every 6,000 miles (10,000 km.) remove the plugs and fit screwed grease nipples. Apply a grease gun filled with one of the recommended lubricants and pump the gun until oil exudes from the swivels. Remove the nipples and refit the plugs.

## BRAKE AND CLUTCH FLUID RESERVOIRS

The brake and clutch fluid reservoirs are located at the rear end of the engine compartment, just forward of the main bulkhead, on the driving side.

Check fluid levels in the reservoirs at intervals of every 3,000 miles (5,000 km.) **topping-up** if necessary to within  $\frac{1}{2}$  in. (12 mm.) of the top. Use only the specified fluid for topping-up.

## PROPELLER SHAFT

Where grease nipples are fitted at each end of the propeller shaft (not fitted on all models), they should be lubricated at intervals of every 3,000 miles (5,000 km.) using one of the recommended lubricants.

## CLUTCH

### GENERAL DESCRIPTION

The clutch assembly comprises a diaphragm spring type pressure plate with a single dry driven plate. To ensure a smooth take up of the drive, the linings of the clutch driven plate are flexibly mounted and the hub is spring cushioned.

The clutch driven plate is free to slide along the splines of the gearbox mainshaft, the forward end of which forms a spigot, to fit into the clutch pilot bearing in the centre of the crankshaft. The clutch cover, diaphragm spring and pressure plate are serviced as an assembly.

The clutch release mechanism is hydraulically actuated by a pendant pedal connected by a push rod to the master cylinder.

A flexible pipeline connects the clutch master cylinder with the clutch slave cylinder mounted on the clutch housing.

This method of clutch operation ensures smooth clutch engagement as relative movement between the engine and the clutch pedal is not transferred to the operating mechanism.

Pressure in the clutch slave cylinder operates an adjustable push rod, which in turn, acts on the release arm end.

The diaphragm spring is pivoted on three shouldered pins and retained to these pins by two fulcrum rings. When the diaphragm's centre is moved towards the flywheel by the release bearing, the diaphragm's outer edge deflects towards the clutch housing causing the clutch to disengage.

The release bearing is retained to the clutch release arm fork by means of two single coil springs and a semi-circular link.

The maintenance required by the clutch system is confined to topping-up the master cylinder and checking the clutch adjustment.

## Clutch Adjustment

The clutch should be adjusted until the clearance between the slave cylinder push rod adjusting nut and the release arm is .08 in. (2.03 mm.), after the pedal has returned the full length of its travel.

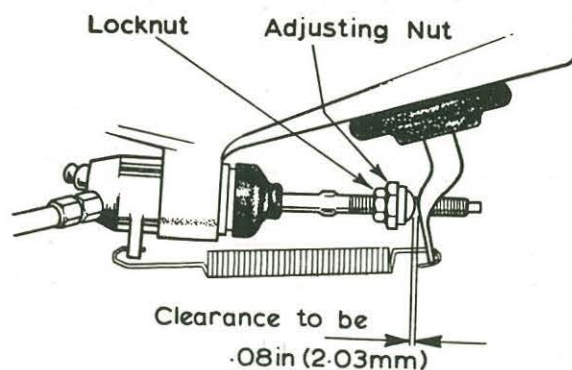
To carry out this adjustment, disconnect the retracting spring, release the locknut and, holding the push rod by the flats provided, turn the adjusting nut until the correct clearance is obtained between the end of the release arm and the nut.

Tighten the locknut securely, re-check the adjustment and reconnect the retracting spring.

## Master Cylinder Topping-up

The clutch master cylinder is located at the rear end of the engine compartment on the driving side.

Check fluid level in the reservoir at intervals of every 3,000 miles (5,000 km.), topping-up if necessary to within  $\frac{1}{2}$  in. (12 mm.) of the top. Use only the specified fluid (see Section 'O') for topping-up.



TD 50 Q3

Fig. 1. CLUTCH ADJUSTMENT

## REAR AXLE

The rear axle assembly is a Ford Escort component and only the removal from the car will be described here.



### To Remove

1. Support the car and remove the road wheels.
2. Mark the rear flange of the propeller shaft to the rear axle flange, then release the bolts and remove the shaft by pulling rearwards from the gearbox spigot.
3. Disconnect the handbrake cable from the brake backplates.
4. Disconnect the brake pipe (bundy to hose) and insert a suitable plug in the ends of the pipes to prevent the ingress of foreign matter.
5. Support the axle casing.
6. Release the top end of the spring/damper assembly.
7. Remove the front end of the 'A' bracket from the chassis.
8. Remove the front end of the rear radius arm from the axle location.
9. Remove the axle as a complete assembly with the 'A' bracket and the damper/spring assemblies still attached.

### To Replace

Reverse the above instructions, not forgetting that the braking system will have to be 'bled' after reconnecting the pipes.