Heater Brush 54300325 Lucas No

TRIUMPH

HERALD 1200, 12/50, VITESSE
AND
SPITFIRE

WORKSHOP MANUAL

PART NUMBER 511243

Issued by the

SERVICE DIVISION

STANDARD-TRIUMPH SALES LIMITED

A member of the Leyland Motor Corporation

COVENTRY ENGLAND

TRIUMPH
Herald 1200, 12/50, Vitesse
and
Spitfire Models

INTRODUCTION

This Workshop Manual, which is in loose-leaf form, has been compiled to assist Standard-Triumph Distributors and Dealers throughout the world in the efficient repair and maintenance of Herald 1200, 12/50 Vitesse and Spitfire models.

The information most frequently required is given in the preliminary pages and includes:—the Introduction, General Specification, Unit reference numbers, Vehicle dimensions, Nut tightening torques, Special tools, Recommended lubricants and Lubrication summary, Jacking system and a short glossary of part names and alternatives.

Whilst retaining the same grouping system used for Service Information Sheets and previous Workshop Manuals, this book introduces an additional group having the designation "0". This section gives recommendations for "running-in", together with instructions for carrying out the "Customer Preparation Service", detailed periodical lubrication and regular maintenance operations listed on the back of vouchers contained in the Maintenance Voucher Booklet accompanying each new vehicle. A lubrication chart is provided at the end of the section.

Dismantling, assembly and adjustment procedures for the complete vehicle are divided into six groups numbered one to six. Each deals with one major unit and associated parts, except group six, which deals exclusively with the electrical system. Each group is preceded by a detailed specification and dimensions.

Special Tools

The use of special tools mentioned in the text, contributes to an efficient and profitable repair. Some operations are, in fact, impracticable without their use, particularly those, for example, which deal with the assembly of the differential unit. Distributors are therefore urged to check their tools against the list provided and order those necessary.

Numbering Pages and Section

The running headline, at the top of the page, names each section within a group. For example, group one contains four sections, namely: Engine, Cooling, Fuel and Exhaust Systems, these being numbered 1 to 4 respectively.

The group number is shown at the top outer edge of each page and is followed by a decimal point.

Each section number is placed after the decimal point following the group number.

Two numerals placed after the section number are used to identify the pages which comprise a particular section, thus page 5 of the cooling section would appear 1·205.

Service Information and Amendment Procedure

NOTE: Service Information and amendment sheets are issued to the motor trade only and are not for general publication.

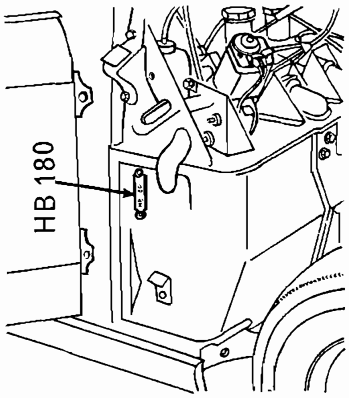
Design modifications, changes in procedure and notice of amendment subsequent to the preparation of this manual are given in Service Information Sheets which are issued regularly to all authorised dealers. Should existing instructions be affected or additional information be warranted, new pages will be included with each consecutively numbered notice of amendment. This will also give details of the pages and groups affected. See page 31.

To ensure that this manual is kept up to date, Distributors and Dealers are advised to write the amendment number, the page number and the group number in the space provided on the page preceding Group "0" as the amended pages of text are inserted. Any gaps in the sequence of amendment numbers will then be readily apparent and immediate action can be taken to obtain the missing sheets.

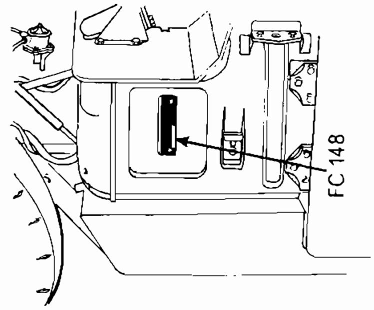
Schedule of Repair Operations

The operations listed in the "Schedule of Repair Operation Times" refer to those described in this manual. The time set against each operation in the schedule is evolved by performing the actual operations on a standard vehicle using special tools where stated. The "Schedule of Repair Operation Times", for use with this manual, is issued as a separate publication and may be obtained from the Spares Division under Part Number 511225.

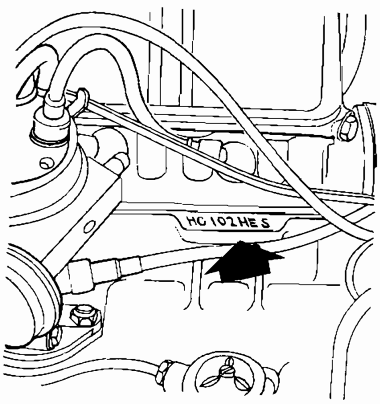
LOCATION OF COMMISSION
and
UNIT NUMBERS



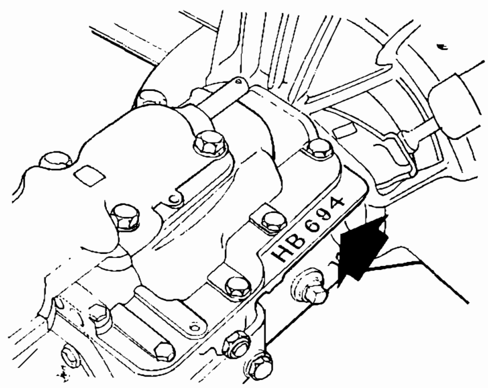
The Body Number is on the right-hand side of the scuttle and the Commission Number (Chassis Number) on the left-hand side of the scuttle.



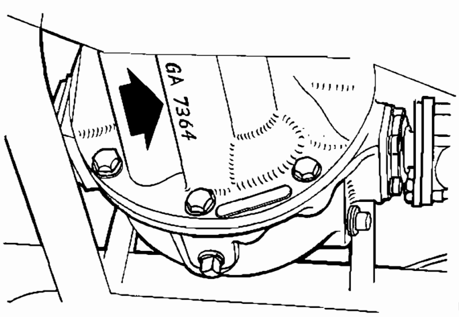
The Body Number and the Commission Number (Chassis Number) are on the right-hand side of the scuttle (Spitfire).



The Engine Number is stamped on the left-hand side of the cylinder block.



The Gearbox Number is stamped on the top face of the casting at the right-hand side.



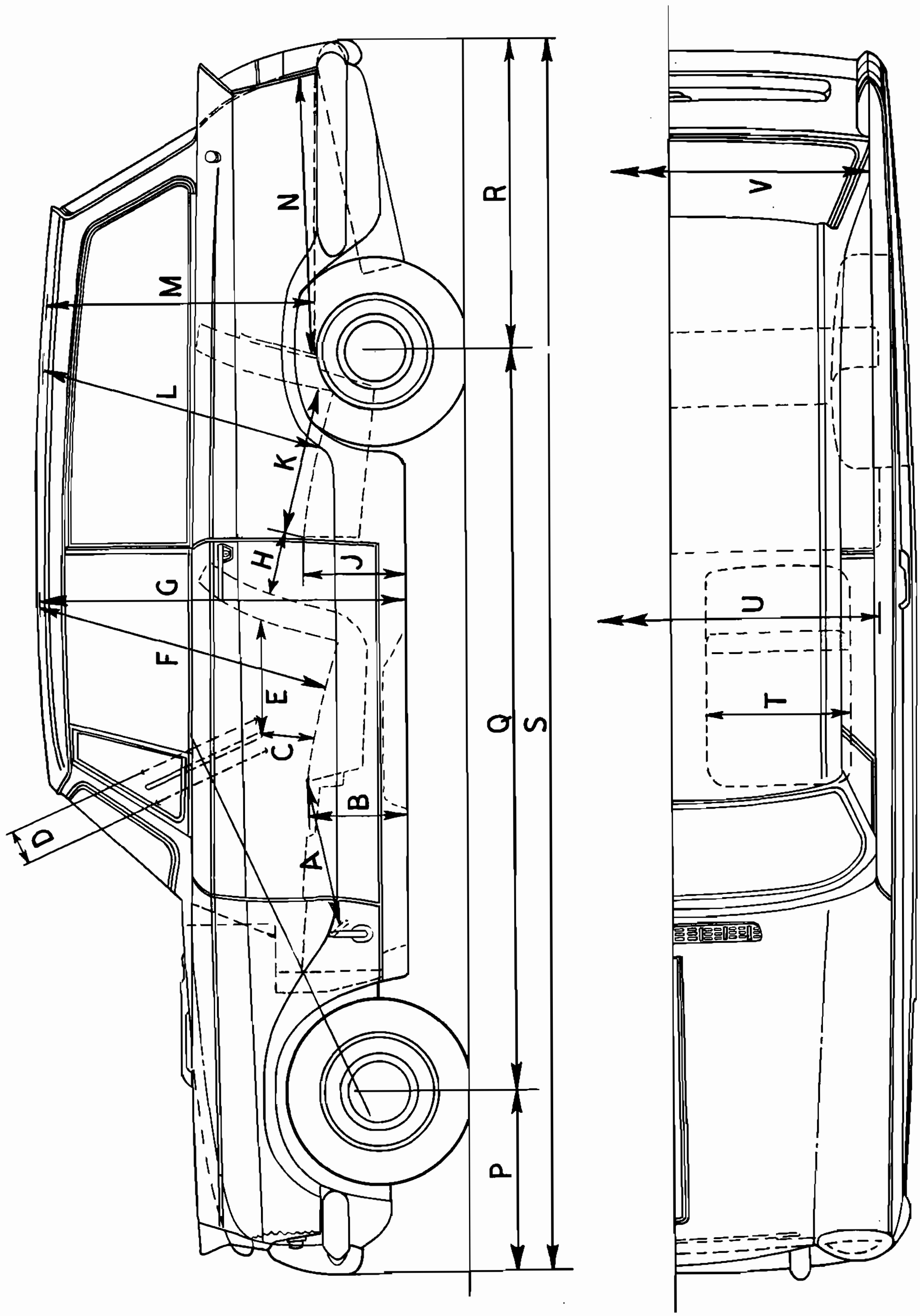
D252

The Rear Axle Number is stamped on the underside of the hypoid housing.

IMPORTANT

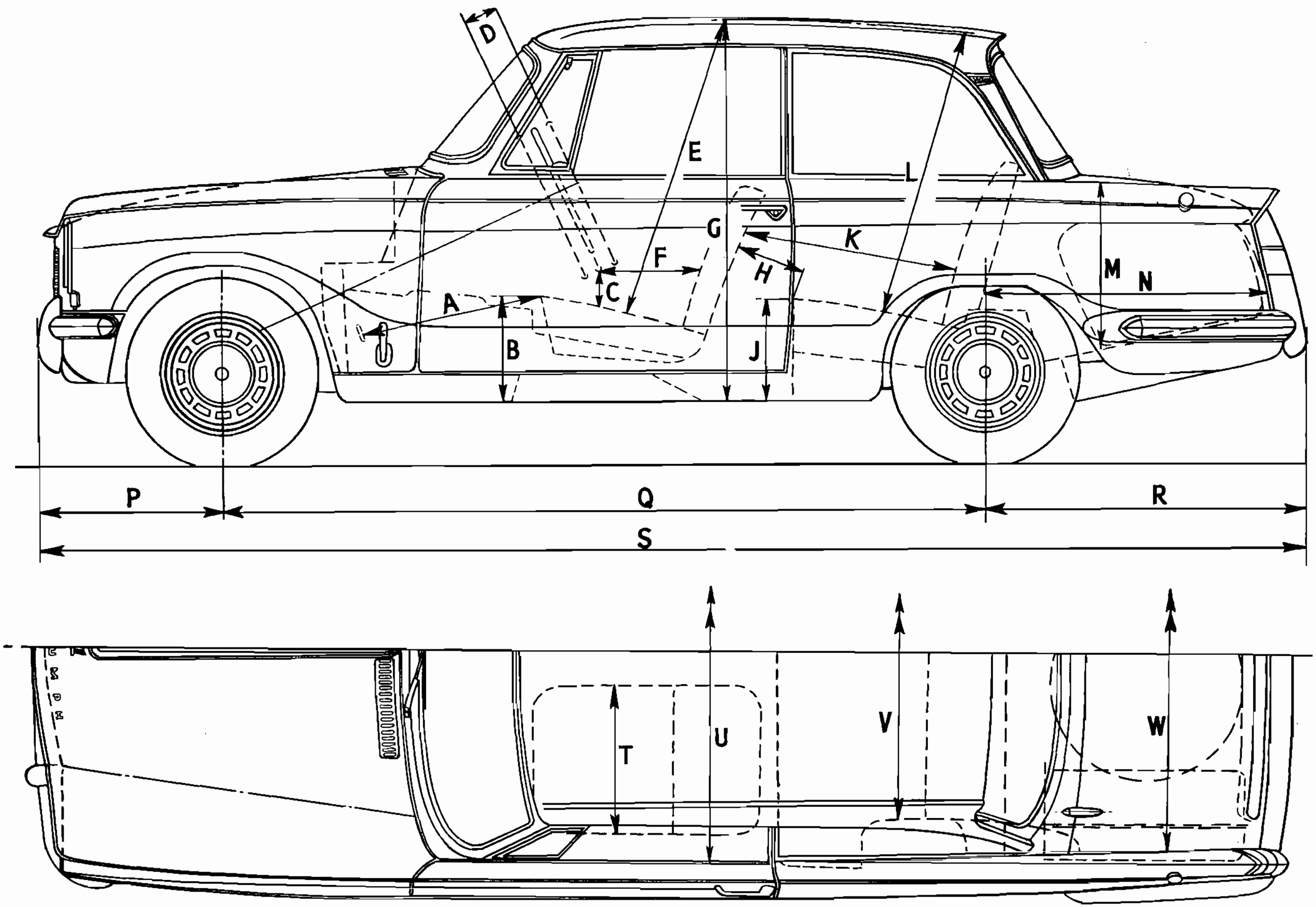
In all communications relating to Service or Spares, please quote the Commission Number (Chassis Number).

VEHICLE DIMENSIONS



Triumph Herald Estate Car and Courier

VEHICLE DIMENSIONS



Triumph Herald 1200, 12/50 and Vitesse Saloon

GENERAL SPECIFICATION

	HERALD 1200, 12/50	SPITFIRE	VITESSE
Engine			
Number of cylinders	4	4	6
Bore of cylinders	2·728″ (69·3 mm)	2·728″ (69·3 mm)	2·628″ (66·75 mm.)
Stroke of crankshaft	2·992″ (76 mm.)	2·992″ (76 mm.)	2·992″ (76 mm.)
Piston area	23·45 sq. in. (151 sq. cm.)	23·45 sq. in. (151 sq. cm.)	32·55 sq. in. (210 sq. cm.)
Cubic capacity	1147 c.c. (70 cu.in.)	1147 c.c. (70 cu, in.)	1596 c.c. (97·39 cu.in.)
Compression ratio	8·0 or 7 : 1	9·0 or 7·5 : 1	8·75 or 7 : 1
Valve clearances (cold)	0·010″ (0·254 mm.)	0·010″ (0·254 mm.)	0·010″ (0·254 mm.)
Valve timing with clearances set at 0·0165″ (0·42 mm)	Inlet and exhaust valves to be equally open at T.D.C.	Inlet and exhaust valves to be equally open at T.D.C.	Inlet and exhaust valves to be equally open at T.D.C.
Performance Data (Nett)	Compression Ratio 8·0 : 1 (1200 only)	Compression Ratio 9·0 : 1	Compression Ratio 8·75 : 1
Brake horse power	39 B.H.P. at 4500 r.p.m.	63 B.H.P. at 5750 r.p.m.	70 B.H.P. at 5000 r.p.m.
Torque	730 lbs. in. at 2250 r.p.m.	804 lbs. in. at 3500 r.p.m.	1110 lbs. in. at 2800 r.p.m.
B.M.E.P.	131 lbs. sq. in.	144 lbs. sq. in.	143 lbs. sq. in.
Performance Data (Nett)	Compression ratio 8·5 : 1 (12/50 only)		
Brake horse power	51 B.H.P. at 5200 r.p.m.		
Torque	756 lbs. in. at 2600 r.p.m.		
B.M.E.P.	136 lbs. sq. in.		
Lubrication (Engine)			
Pump type	Eccentric rotor	Eccentric rotor	Eccentric rotor
Oil filter	A.C. Delco, Purolator or Tecalemit full flow external replaceable unit.	A.C. Delco, Purolator or Tecalemit full flow external replaceable unit.	A.C. Delco, Purolator or Tecalemit full flow external replaceable unit.
Oil pressure at 2,000 r.p.m.	40-60 lbs.sq.in. (2·8-4·2 kgs.sq.cm.)	60 lbs.sq.in. minimum (4·2 kgs.sq.cm.)	45 lbs.sq.in. (2·8-4·2 kgs.sq.cm.)
Ignition System			
Contact breaker gap	0·015″ (0·4 mm.)	0·015″ (0·4 mm.)	0·015″ (0·4 mm.)
Spark plugs—Type	Lodge CNY ½″ reach × 14 mm.	Lodge CNY ½″ reach × 14 mm.	Lodge HLNY ¾″ reach × 14 mm.
—Gap	0·025″ (0·64 mm.) High comp. 0·030″ (0·77 mm.) Low comp.	0·025″ (0·64 mm.)	0·025″ (0·64 mm.)
Firing order	1 : 3 : 4 : 2	1 : 3 : 4 : 2	1 : 5 : 3 : 6 : 2 : 4
Ignition timing (Static)	15° B.T.D.C.	13° B.T.D.C.	10° B.T.D.C.
Cooling System			
Circulation	Impeller type pump incorporating by-pass. Four-bladed, 12½″ dia. fan	Impeller type pump incorporating by-pass. Two-bladed, 12½″ dia. fan	Impeller type pump incorporating by-pass. Six-bladed, 10⅝″ dia. fan.
Temperature control (See page 1·202)	Thermostat Opening temperature 70°C. Fully open at 85°C.	Thermostat Opening temperature 70°C. Fully open at 85°C.	Thermostat Opening temperature 70°C. Fully open at 85°C.

GENERAL SPECIFICATION—continued

	HERALD 1200, 12/50	SPITFIRE	VITESSE
Radiator	Pressurised — finned vertical flat tubes — integral header tank.	Pressurised — finned vertical flat tubes — separate header tank.	Pressurised — finned vertical flat tubes — separate header tank.
Filler Cap—Type	A.C.	A.C.	A.C.
—Pressure	7 lbs sq. in. (0·49 kgs. sq. cm.)	7 lbs. sq. in. (0·49 kgs. sq. cm.)	7 lbs. sq. in. (0·49 kgs. sq. cm.)
Fuel System			
Fuel tank	Non pressure type mounted in L.H. side of luggage compartment. Courier and Estate Car location under the floor.	Non pressure type mounted forward of luggage compartment.	Non pressure type mounted in L.H. side of luggage compartment.
Carburettor	Single Solex B30 *PSE1* down-draught.	Twin *SU HS2 Horizontal.*	Twin Solex 32 PIH *semi* down-draught.
Settings	Choke tube 21·5 Main jet 112·5 Air correction 175 Pilot jet 45 Pilot air bleed 85 Econostat:— Fuel jet 100 Air bleed 1·2 Pump rod—outer slot	Needles A.N.	Choke Tube 18 Main jet 105 Air correction 160 Pilot jet 35 Emulsion tube 69 Pilot air bleed 100·0 Starter jet 90·0 Needle valve 1·3 Econostat:— Fuel jet 130 Air bleed 280
Air cleaners	A.C. Paper element.	A.C. Wire gauze.	A.C. Paper element.
Fuel pump—Type	A.C. mechanical type Y.	A.C. mechanical type Y.	A.C. mechanical type F.G.
—Operating pressure	1½ to 2½ lbs. sq. in. (0·105 to 0·176 kg. sq. cm.)	1½ to 2½ lbs. sq. in. (0·105 to 0·176 kg. sq. cm.)	1½ to 2½ lbs. sq. in. (0·105 to 0·176 kg. sq. cm.)
Clutch			
Type	Borg & Beck 6¼″ dia. single dry plate.	Borg & Beck 6¼″ dia. single dry plate.	Borg & Beck 8″ dia. single dry plate.
Operation	Hydraulic.	Hydraulic.	Hydraulic.
Gearbox			
Type	Four forward speeds and reverse. Synchromesh on 2nd, 3rd and top gears.	Four forward speeds and reverse. Synchromesh on 2nd, 3rd and top gears.	Four forward speeds and reverse. Synchromesh on 2nd, 3rd and top gears.
Control	Centre floor mounted remote control.	Centre floor mounted remote control.	Centre floor mounted remote control.

GENERAL SPECIFICATION—continued

	HERALD 1200, 12/50	SPITFIRE	VITESSE
Gear Ratios	Top 3rd 2nd 1st & Rev.	Top 3rd 2nd 1st & Rev.	Top 3rd 2nd 1st & Rev.
	1·0 1·394 2·158 3·746	1·0 1·394 2·158 3·746	1·0 1·25 1·78 2·93
Overall ratios	4·11 5·74 8·88 15·42	4·11 5·74 8·88 15·42	4·11 5·16 7·31 12·06
Rear Axle			
Type	Hypoid bevel gears. Tapered roller bearings.	Hypoid bevel gears. Tapered roller bearings.	Hypoid bevel gears. Tapered roller bearings.
Ratio	4·11 : 1	4·11 : 1	4·11 : 1
Brakes			
System	Girling hydraulic	Girling hydraulic	Girling hydraulic
Type—Front	$1\frac{1}{4}'' \times 8''$ (3·175 × 20·32 cms.) diameter drum.	9″ (22·86 cms.) diameter disc.	9″ (22·86 cms.) diameter disc.
—Rear	$1\frac{1}{4}'' \times 7''$ (3·175 × 17·78 cms.) diameter drum.	$1\frac{1}{4}'' \times 7''$ (3·175 × 17·78 cms.) diameter drum.	$1\frac{1}{4}'' \times 8''$ (3·175 × 20·32 cms.) diameter drum.
Suspension			
Front	Low periodicity independent suspension with wishbones top and bottom. Coil springs controlled by telescopic dampers and anti-roll bar (not fitted on Courier). Patented bottom bush. Tapered roller hub bearings.	Low periodicity independent suspension with wishbones top and bottom. Coil springs controlled by telescopic dampers and anti-roll bar. Patented bottom bush. Tapered roller hub bearings.	Low periodicity independent suspension with wishbones top and bottom. Coil springs controlled by telescopic dampers and anti-roll bar. Patented bottom bush. Tapered roller hub bearings.
Rear	Swing axle type independent suspension, radius rods and transverse leaf spring controlled by telescopic dampers. Ball and needle roller hub bearings.	Swing axle type independent suspension, radius rods and transverse leaf spring controlled by telescopic dampers. Ball and needle roller hub bearings.	Swing axle type independent suspension, radius rods and transverse leaf spring controlled by telescopic dampers. Ball and needle roller hub bearings.
Steering			
Type	Rack and pinion unit. Telescopic steering column.	Rack and pinion unit. Telescopic steering column.	Rack and pinion unit. Telescopic Steering column.
Castor angle	4° positive.	4° positive.	4° positive.
Camber Angle	2° positive.	2° positive.	2° positive.
King Pin Inclination	$6\frac{3}{4}$°	$6\frac{3}{4}$°	$6\frac{3}{4}$°
Front wheel alignment	Parallel to $\frac{1}{16}''$ (1·6 mm.) toe in.	Parallel to $\frac{1}{16}''$ (1·6 mm.) toe in.	Parallel to $\frac{1}{16}''$ (1·6 mm.) toe in.
Rear wheel alignment	Parallel to $\frac{1}{16}''$ (1·6 mm.) toe in.	Parallel to $\frac{1}{16}''$ (1·6 mm.) toe in.	Parallel to $\frac{1}{16}''$ (1·6 mm.) toe in.
Turning circle	25 ft. (7·62 metres).	24 ft. (7·32 metres).	25 ft. (7·62 metres).

GENERAL SPECIFICATION—continued

	HERALD 1200, 12/50	SPITFIRE	VITESSE
Chassis Data			
Wheelbase	7 ft. 7½ in. (2325 mm.).	6 ft. 11 in. (2110 mm.).	7 ft. 7½ in. (2325 mm.).
Track—Front	4 ft. 0 in. (1220 mm.).	4 ft. 1 in. (1245 mm.).	4 ft. 1 in. (1245 mm.).
—Rear	4 ft. 0 in. (1220 mm.).	4 ft. 0 in. (1220 mm.).	4 ft. 0 in. (1220 mm.).
Ground clearance	6¾ in. (170 mm.).	5 in. (125 mm.).	6¾ in. (170 mm.).
Exterior Dimensions			
Overall length	12 ft. 9 in. (3885 mm.).	12 ft. 1 in. (3685 mm.).	12 ft. 9 in. (3885 mm.).
Width	5 ft. 0 in. (1525 mm.).	4 ft. 9 in. (1450 mm.).	5 ft. 0 in. (1525 mm.).
Height	4 ft. 4 in. (1320 mm.).		4 ft. 4 in. (1320 mm.).
(Hood up)	4 ft. 4½ in. (1335 mm.).	3 ft. 11½ in. (1205 mm.).	4 ft. 4½ in. (1335 mm.).
(Hood down)	4 ft. 1½ in. (1245 mm.).	3 ft. 8¼ in. (1125 mm.).	4 ft. 1½ in. (1245 mm.).
Weight			
Dry			
Saloon	15¼ cwt. (770 kgs.).		17 cwt. (876 kgs.).
Coupé	14⅞ cwt. (725·5 kgs.).		
Convertible	14⅞ cwt. (725·5 kgs.).	13¼ cwt. (675 kgs.).	17¼ cwt. (888 kgs.).
Estate car	16⅛ cwt. (820 kgs.).		
Courier	15⅝ cwt. (794 kgs.).		
Complete (including fuel, oil, water and tools)			
Saloon	16 cwt. (810 kgs.).		18 cwt. (914 kgs.).
Coupé	15½ cwt. (787 kgs.).		
Convertible	15⅝ cwt. (794 kgs.).	14 cwt. (710 kgs.).	18¼ cwt. (927 kgs.).
Estate car	16⅞ cwt. (860 kgs.).		
Courier	16¼ cwt. (825 kgs.).		

Capacities	HERALD 1200, 12/50 IMPERIAL	U.S.	METRIC	SPITFIRE IMPERIAL	U.S.	METRIC	VITESSE IMPERIAL	U.S.	METRIC
Engine (from dry)	8 pts.	9·6 pts.	4·6 litres	8 pts.	9·6 pts.	4·6 litres	8 pts.	9·6 pts.	4·6 litres
Drain and refill	7 pts.	8·4 pts.	4 litres	7 pts.	8·4 pts.	4 litres	7 pts.	8·4 pts.	4 litres
Gearbox	1·5 pts.	1·8 pts.	·85 litres	1·5 pts.	1·8 pts.	·85 litres	1·5 pts.	1·8 pts.	·85 litres
With overdrive							2·4 pts.	2·9 pts.	1·64 litres
Rear axle	1 pt.	1·2 pts.	·57 litres	1 pt.	1·2 pts.	·57 litres	1 pt.	1·2 pts.	·57 litres
Cooling system with heater	8·5 pts.	10·2 pts.	4·8 litres	9·5 pts.	11·4 pts.	5·4 litres	14 pts.	15·6 pts.	7·4 litres
Fuel tank	6·25 gals.	7·3 gals.	32 litres	9 gals.	10·8 gals.	41 litres	8·75 gals.	10·5 gals.	40 litres
(Estate car & Courier van only)	9 gals.	10·8 gals.	41 litres						

Electrical System	HERALD 1200, 12/50	SPITFIRE	VITESSE
Battery	12 volt 38 amp. hours.	12 volt 38 amp. hours.	12 volt 38 amp. hours.
Control box	RB 106/2	RB 340 (22 amps.)	RB 340 (25 amps.)
Generator	C 40-1.	C 40-1	C 40-L
(Maximum output)	22 amps.	22 amps.	25 amps.

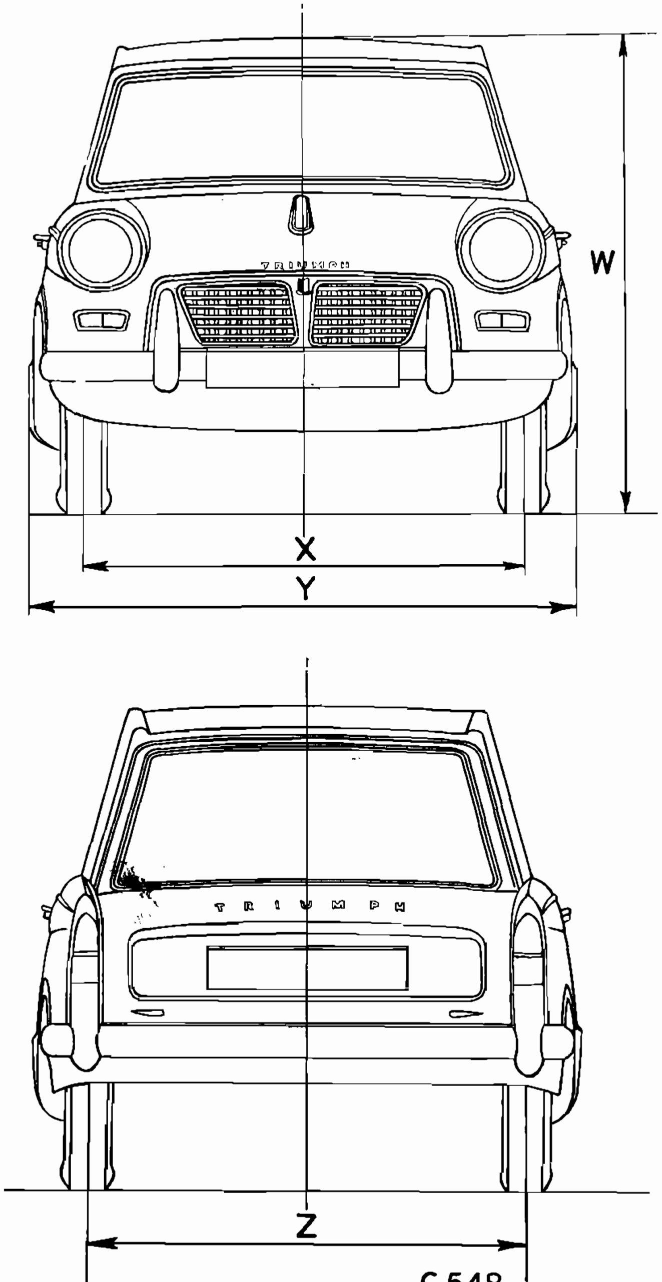
GENERAL SPECIFICATION—continued

	HERALD 1200, 12/50	SPITFIRE	VITESSE
Tyres Size	Tubeless. Saloon, Coupé and Convertible: 5·20 × 13 Estate Car and Courier Van: 5·60 × 13	Tubeless. 5·20 × 13 (4 ply rating)	Tubeless. 5·60 × 13 (4 ply rated Nylon)

Pressures	HERALD 1200, 12/50	HERALD 1200 Estate Car	(4 ply tyres) COURIER VAN		SPITFIRE	VITESSE
	Lbs. per sq. in.	Lbs. per sq. in.	Lbs. per sq. in.		Lbs. per sq. in.	Lbs. per sq. in.
2 UP—Front	19	19	15		18	22
—Rear	24	25	25		24	24
4 UP—Front	19	19	—		—	22
—Rear	28	30	—		—	26
Semi Laden—Front	—	—	15		—	—
—Rear	—	—	25		—	—
Fully Laden				(6 ply tyres)		
—Front	—	—	15	15	—	—
—Rear	—	—	32	36	—	—

NOTE. All models. The maintenance of the pressure differential between front and rear tyres is essential for correct steering behaviour.

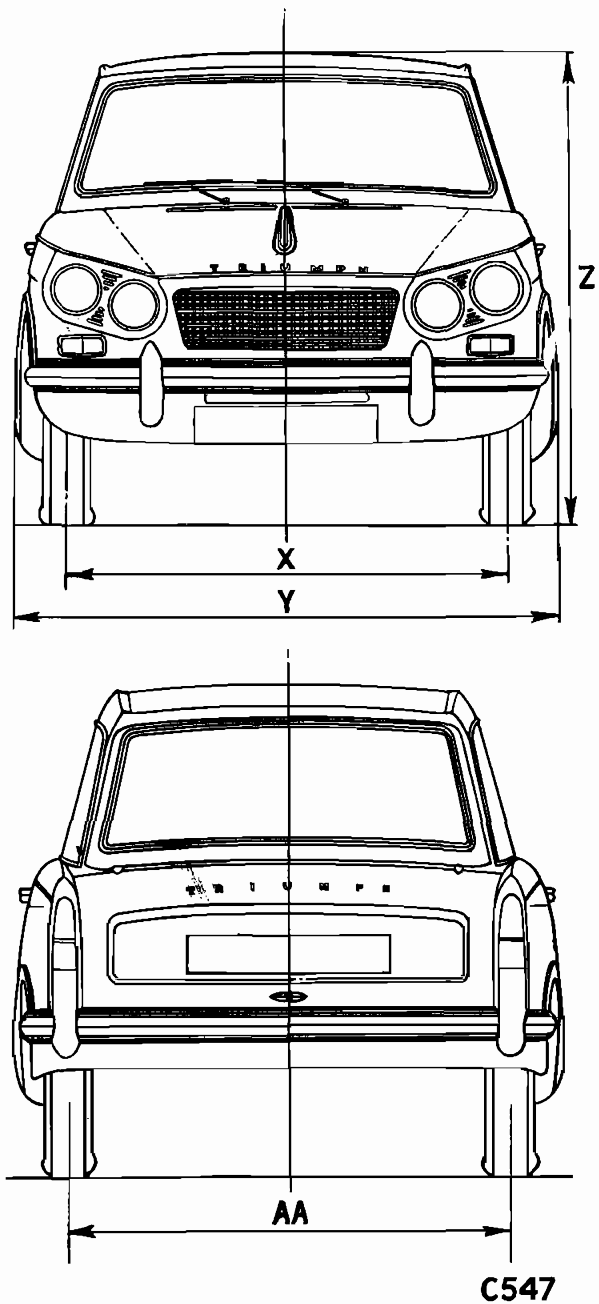
Payload Capacity	*Area*	*Weight*	*Volume*
Estate Car—with 4 up	10½ sq. ft.	1 cwt.	19 cu. ft.
—with 2 up, rear seat folded flat	20 sq. ft. (1·85 sq. m.)	5 cwt. (254 kg.)	45 cu. ft. (1·275 cu. m.)
Courier	19·0 sq. ft. (1·765 sq. m.)	5 cwt. (254 kg.)	45 cu. ft. (1·275 cu. m.)



VEHICLE DIMENSIONS

A	Max.	1′ 9¾″	55·29 cm.
	Min.	1′ 4″	40·64 cm.
B		1′ 0″	30·48 cm.
C		5½″	13·17 cm.
D		4″	10·16 cm.
E	Max.	1′ 4¼″	41·27 cm.
	Min.	10¼″	26·04 cm.
F		3′ 0½″	92·71 cm.
G		3′ 9½″	1·156 m.
H	Max.	11¾″	29·84 cm.
	Min.	5¾″	14·60 cm.
J		1′ 1″	33·02 cm.
K		1′ 6″	45·72 cm.
L		2′ 10″	86·36 cm.
M		2′ 9″	83·82 cm.
N		2′ 10″	86·36 cm.
P		1′ 11″	58·42 cm.
Q		7′ 7½″	2·324 m.
R		3′ 2½″	97·79 cm.
S		12′ 9″	3·886 m.
T		1′ 6″	45·72 cm.
U		4′ 1″	1·245 m.
V		4′ 0″	1·219 m.
W		4′ 4″	1·320 m.
X		4′ 0″	1·219 m.
Y		5′ 0″	1·524 m.
Z		4′ 0″	1·219 m.

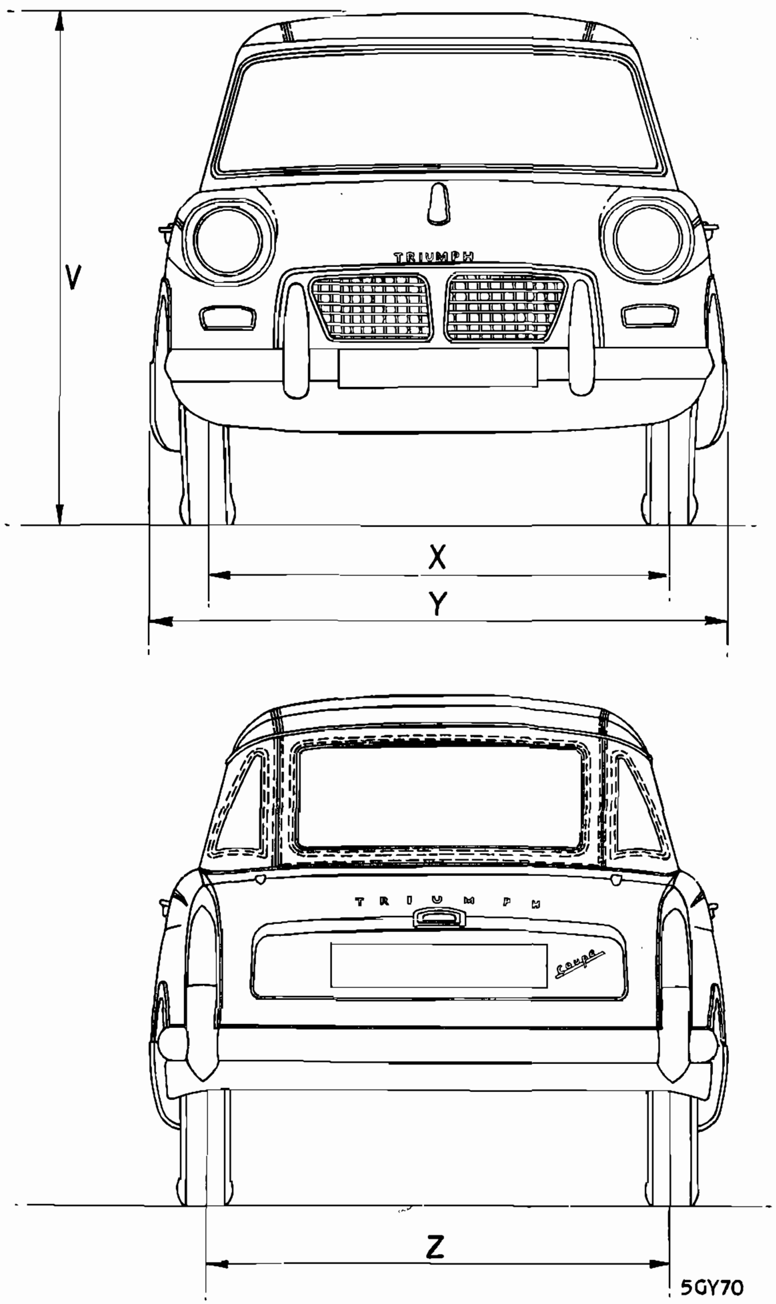
Triumph Herald Estate Car and Courier—Overall Dimensions



VEHICLE DIMENSIONS

A	Max.	1′ 9¾″	55·25 cm.
	Min.	1′ 4″	40·64 cm.
B		1′ 0″	35·48 cm.
C		5½″	13·97 cm.
D		4″	10·16 cm.
E		3′ 0½″	92·71 cm.
F	Max.	1′ 4¼″	41·27 cm.
	Min.	10¼″	26·04 cm.
G		3′ 9½″	1·156 m.
H	Max.	11¾″	29·84 cm.
	Min.	5¾″	14·60 cm.
J		1′ 0″	30·48 cm.
K	Max.	2′ 3″	68·58 cm.
	Min.	1′ 9″	53·34 cm.
L		2′ 10″	86·36 cm.
M		1′ 9″	53·53 cm.
N		3′ 0″	91·44 cm.
P		1′ 11″	58·42 cm.
Q		7′ 7½″	2·324 m.
R		3′ 2½″	97·79 cm.
S		12′ 9″	3·886 m.
T		1′ 6″	45·72 cm.
U		4′ 1″	1·245 m.
V		3′ 3″	99·06 cm.
W		3′ 10″	1·168 m.
X		4′ 1″	1·245 m.
Y		5′ 0″	1·524 m.
Z		4′ 4½″	1·333 m.
AA		4′ 0″	1·219 m.

Triumph Herald 1200, 12/50 and Vitesse Saloon—Overall Dimensions



VEHICLE DIMENSIONS

A	Max.	1′ 9$\frac{3}{4}$″	55·30 cm.
	Min.	1′ 4″	40·64 cm.
B		1′ 0″	30·50 cm.
C		5$\frac{1}{2}$″	14·00 cm.
D	Max.	1′ 4″	41·30 cm.
	Min.	10$\frac{1}{4}$″	26·00 cm.
E		2′ 11″	88·90 cm.
F		10″	25·40 cm.
G	Max.	11$\frac{1}{4}$″	29·80 cm.
	Min.	5$\frac{1}{4}$″	14·60 cm.
H	Max.	2′ 3″	68·60 cm.
	Min.	1′ 9″	53·30 cm.
J		2′ 0″	61·00 cm.
K		1′ 9″	53·30 cm.
L		3′ 0″	91·40 cm.
M		1′ 10$\frac{3}{8}$″	56·80 cm.
N		7′ 7$\frac{1}{2}$″	2·320 m.
P		3′ 2″	97·80 cm.
Q		12′ 8$\frac{3}{4}$″	3·870 m.
R		4″	10·20 cm.
S		1′ 6″	45·70 cm.
T		4′ 1″	1·240 m.
U		3′ 10″	1·170 m.
V		4′ 4″	1·320 m.
W		4′ 0″	1·220 m.
X		4′ 11$\frac{11}{16}$″	1·520 m.
Y		4′ 0″	1·220 m.

Triumph Herald 1200 and Vitesse Convertible—Overall Dimensions

RECOMMENDED LUBRICANTS AND ANTI-FREEZE SOLUTIONS

The grades listed are not in order of preference

BRITISH ISLES (ALL SEASONS)

COMPONENT	ESSO	SHELL	B.P.	CASTROL	MOBIL	DUCKHAM'S	REGENT	PETROFINA
ENGINE	Esso Extra Motor Oil	Shell Super Motor Oil or Shell X-100 20W	Visco-Static or Energol Motor Oil 20W or Visco-Static Long-Life	Castrolite	Mobiloil Special	Duckham's Q20/50 or Duckham's Nol Twenty	Havoline 20/20W or Havoline Special 10W/30	Fina Motor Oil 20-30 or Fina Multigrade Motor Oil SAE 10W/30
CARBURETTOR DASHPOTS	Esso Motor Oil 20W/30	Shell X-100 20W	Energol Motor Oil 20	Castrolite	Mobiloil Arctic	Duckham's Nol Twenty	Havoline 20/20W	Fina Motor Oil 20-30
KING PIN LOWER SWIVEL, GEARBOX, REAR AXLE	Esso Gear Oil GP 90/140	Shell Spirax 90 EP	Energol SAE 90 EP	Castrol Hypoy	Mobilube GX 90	Duckham's Hypoid 90	Multigear Lubricant EP 90	Fina Pontonic MP SAE 90
OIL CAN	Esso Engine Oil	Shell X-100 20W	Energol SAE 20W	Everyman Oil	Mobil Handy Oil	Duckham's General Purpose Oil	Havoline 20/20W	Engine Oil
FRONT AND REAR HUBS, STEERING UNIT, ENGINE WATER PUMP	Esso Multi-Purpose Grease H	Shell Retinax A	Energrease L2	Castrolease LM	Mobilgrease MP	Duckham's LB 10	Marfak All Purpose	Fina Marson HTL2

CLUTCH AND BRAKE RESERVOIRS	CASTROL GIRLING CRIMSON CLUTCH AND BRAKE FLUID, TO SAE 70 R3 SPECIFICATION.	WHERE THIS PROPRIETARY BRAND IS NOT AVAILABLE, OTHER FLUIDS WHICH MEET THE SAE 70 R3 SPECIFICATION MAY BE USED.

APPROVED ANTI-FREEZE SOLUTIONS: Smiths Bluecol — Esso Anti-Freeze — Shell Anti-Freeze — B.P. Anti-Freeze — Castrol Anti-Freeze — Mobil Permazone — Duckham's Anti-Freeze — Regent P.T. Anti-Freeze — Fina Thermidor

WHERE THESE PROPRIETARY SOLUTIONS ARE NOT AVAILABLE, OTHERS WHICH MEET BSI 3151 OR 3152 SPECIFICATION MAY BE USED.

RECOMMENDED LUBRICANTS AND ANTI-FREEZE SOLUTIONS

The grades listed are not in order of preference

OVERSEAS COUNTRIES

COMPONENT	AIR TEMP. °C.	AIR TEMP. °F.	S.A.E. & A.P.I. DESIGNATION	ESSO	SHELL	B.P.	CASTROL	MOBIL	DUCKHAM'S	TEXACO CALTEX	PETROFINA
ENGINE	Over 30	Over 80	S.A.E. 30 M.M.	Esso Motor Oil 30 Esso Extra Motor Oil 20W/40	SHELL SUPER MOTOR OIL Shell X-100 30	VISCO-STATIC LONG LIFE Energol S.A.E. 30	Castrol 30 (HD) CASTROL XL 20W/40	Mobil Special	Duckham's Nol Thirty Q20/50	Havoline 30 Havoline Special 20W/40	Fina MS Motor Oil S.A.E. 30 FINA MULTIGRADE Motor Oil S.A.E. 20W/40
	0 to 30	30 to 80	S.A.E. 20 M.M.	Esso Motor Oil 20 Esso Extra Motor Oil 10W/30	Shell X-100 20W	VISCO-STATIC Energol S.A.E. 20W	Castrol 20 (HD) CASTROLITE 10W/30		Duckham's Nol Twenty Q5500	Havoline 20/20W Havoline Special 10W/30	Fina MS Motor oil S.A.E. 20W FINA MULTIGRADE Motor Oil S.A.E. 10W/30
	Below 0	Below 30	S.A.E. 10 M.M.	Esso Motor Oil 10W	Shell X-100 10W	Energol S.A.E. 10W	Castrol 10 (HD)		Duckham's Nol Ten	Havoline 10W	Fina MS Motor Oil S.A.E. 10W
CARBURETTORS DASHPOTS			USE APPROPRIATE CURRENT SINGLE-GRADE ENGINE OIL								
KING PIN LOWER SWIVEL, GEARBOX, AND REAR AXLE	Over 30	Over 80	G.L.4 Hypoid 90	Esso Gear Oil GP 90	Shell Spirax 90 EP	Energol S.A.E. 90 EP	Castrol Hypoy	Mobilube GX 90	Duckham's Hypoid 90	Multigear Lubricant EP 90	Fina Pontonic MP S.A.E. 90
	Below 30	Below 80	GL 4 Hypoid 80	Esso Gear Oil GP 80	Shell Spirax 80 EP	Energol S.A.E. 80 EP	Castrol Hypoy Light	Mobilube GX 80	Duckham's Hypoid 80	Multigear Lubricant EP 80	Fina Pontonic MP S.A.E. 80
FRONT AND REAR HUBS, STEERING UNIT, ENGINE WATER PUMP				Esso Multi-Purpose Grease H	Shell Retinax A	Energrease L2	Castrolease LM	Mobilgrease MP	Duckham's LB 10	Marfak All-Purpose	Fina Marson HTL 2
OIL CAN				Engine Oil	Shell X-100 20W	Energol S.A.E. 20W	Everyman Oil	Mobil Handy Oil	Duckham's General Purpose Oil	Home Lubricant	Fina MS Motor Oil S.A.E. 20W/20
CLUTCH AND BRAKE RESERVOIR			CASTROL GIRLING CRIMSON CLUTCH AND BRAKE FLUID TO SAE 70 R3 SPECIFICATION.				WHERE THIS PROPRIETARY BRAND IS NOT AVAILABLE, OTHER FLUID WHICH MEETS THE SAE 70 R3 SPECIFICATION MAY BE USED.				

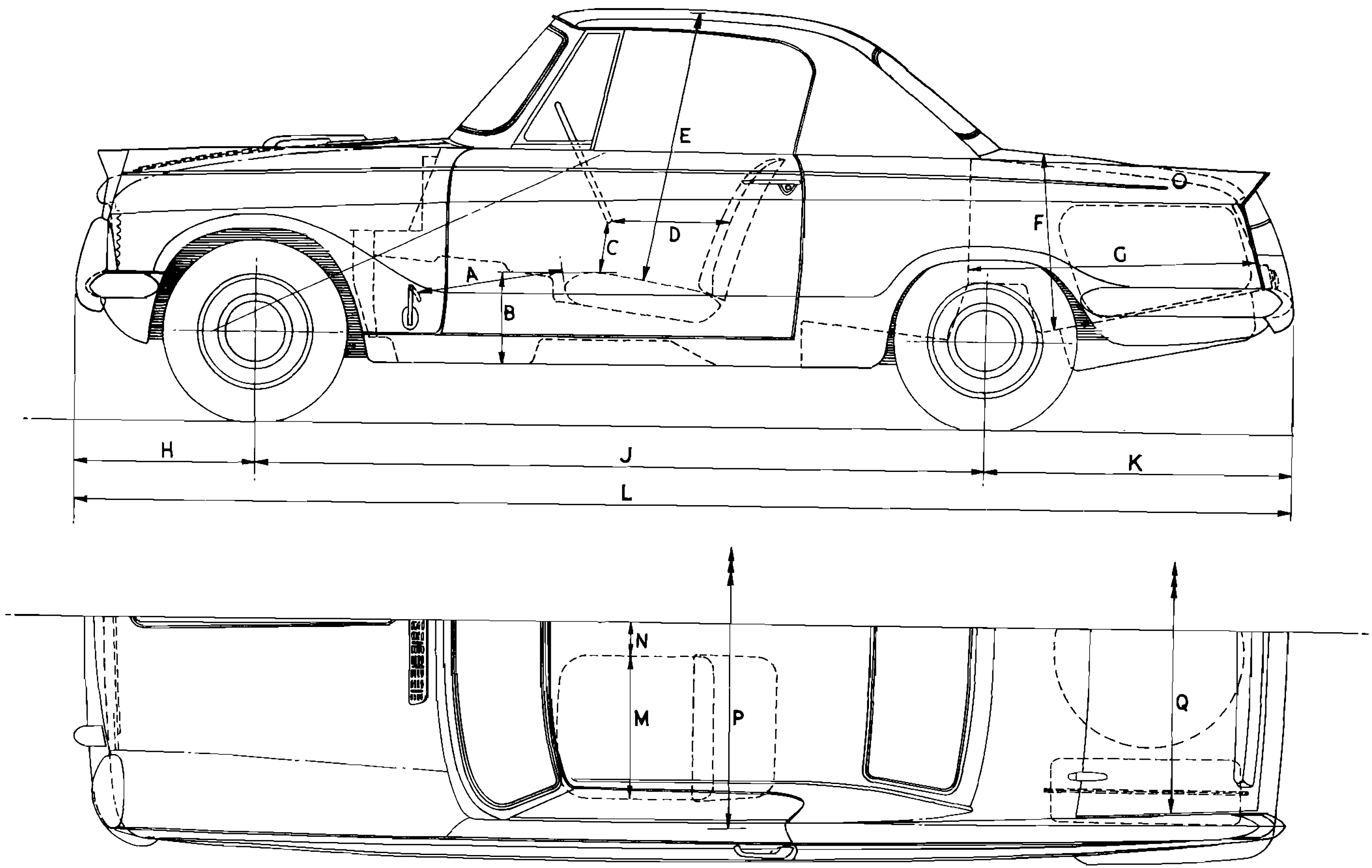
APPROVED ANTI-FREEZE SOLUTIONS: Smiths Bluecol — Esso Anti-Freeze — Shell Anti-Freeze — B.P. Anti-Freeze — Castrol Anti-Freeze — Mobil Permazone — Duckham's Anti-Freeze — Regent P.T. Anti-Freeze — Fina Thermidor

WHERE THESE PROPRIETARY SOLUTIONS ARE NOT AVAILABLE, OTHERS WHICH MEET BSI 3151 OR 3152 SPECIFICATION MAY BE USED

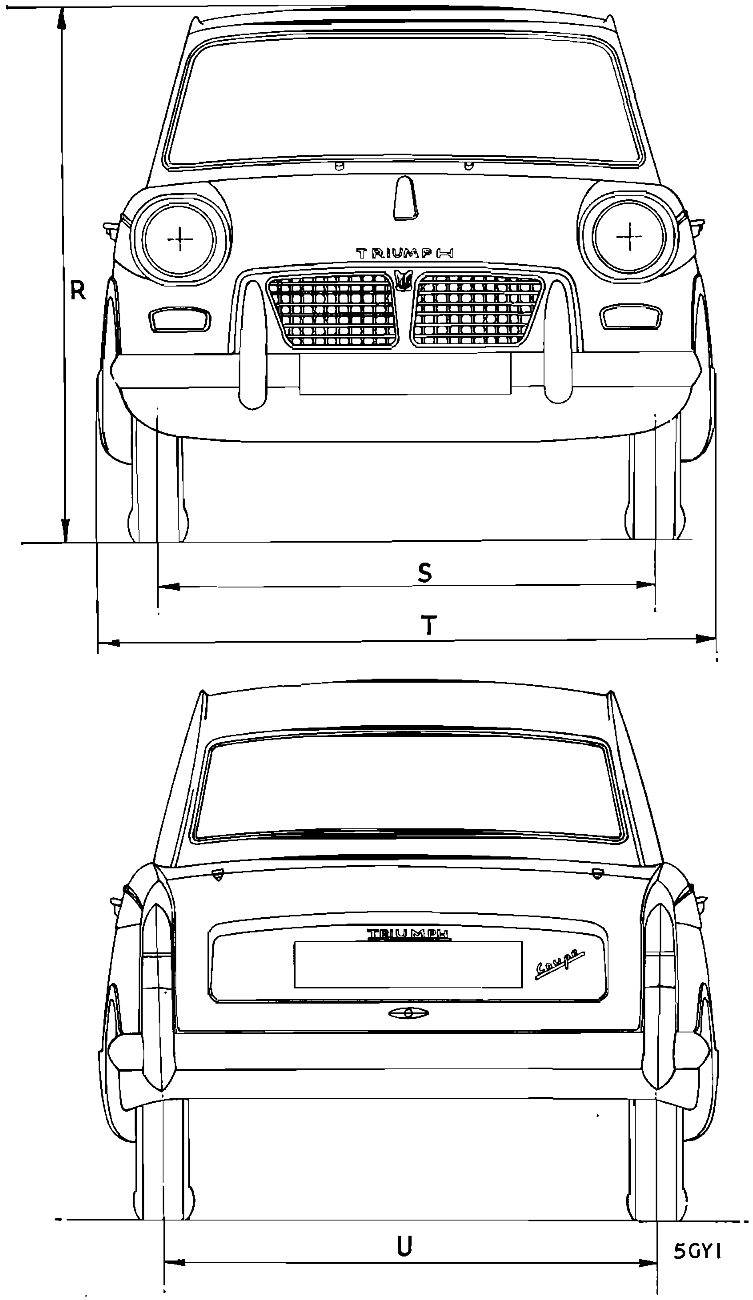
LUBRICATION SUMMARY

Chart Ref.	*Items*	*Details*	*Page Ref.*	*Mileage Intervals*
A	**Front wheel hubs**	Dismantle and repack	4·116	As required
B	**Gearbox**	Top up oil level	0·208	6,000 (10,000 km.)
D	**Rear axle**	Top up oil level	0·208	12,000 (20,000 km.)
E	**Rear hubs**	Grease as recommended only	0·209	12,000 (20,000 km.)
F	**Handbrake cable guides**	Apply grease to guide and compensator sector	0·209	12,000 (20,000 km.)
G	**Oil filter**	Renew	0·210	12,000 (20,000 km.)
H	**Distributor**	Oil as recommended	0·206	6,000 (10,000 km.)
J	**Generator rear bearing**	Inject a few drops of engine oil	0·210	12,000 (20,000 km.)
K	**Lower steering swivels**	Lubricate as recommended	0·204	6,000 (10,000 km.)
L	**Water pump**	Grease as recommended — 5 strokes	0·209	12,000 (20,000 km.)
M	**Engine sump**	Top up oil level	0·202	Weekly
		Drain and refill with new oil	0·204	6,000 (10,000 km.)
	Oil filler cap	Clean	0·207	6,000 (10,000 km.)
N	**Steering box**	Grease as recommended — 5 strokes	0·209	12,000 (20,000 km.)
	Clutch and brake master cylinders	Top up fluid level	0·202	Monthly
	Air cleaner element	Clean	0·205	6,000 (10,000 km.)
		Replace	0·210	12,000 (20,000 km.)
	Carburettor dashpots	Top up	0·205	6,000 (10,000 km.)
	Tyre pressures	Adjust	0·202	Monthly
	Radiator	Top up with clean soft water	0·202	Weekly
	Battery	Top up with distilled water	0·202	Monthly
	Bonnet catches, hinges, locks, handbrake and control cables	Lubricate	0·207	6,000 (10,000 km.)

VEHICLE DIMENSIONS



Triumph Herald Coupé

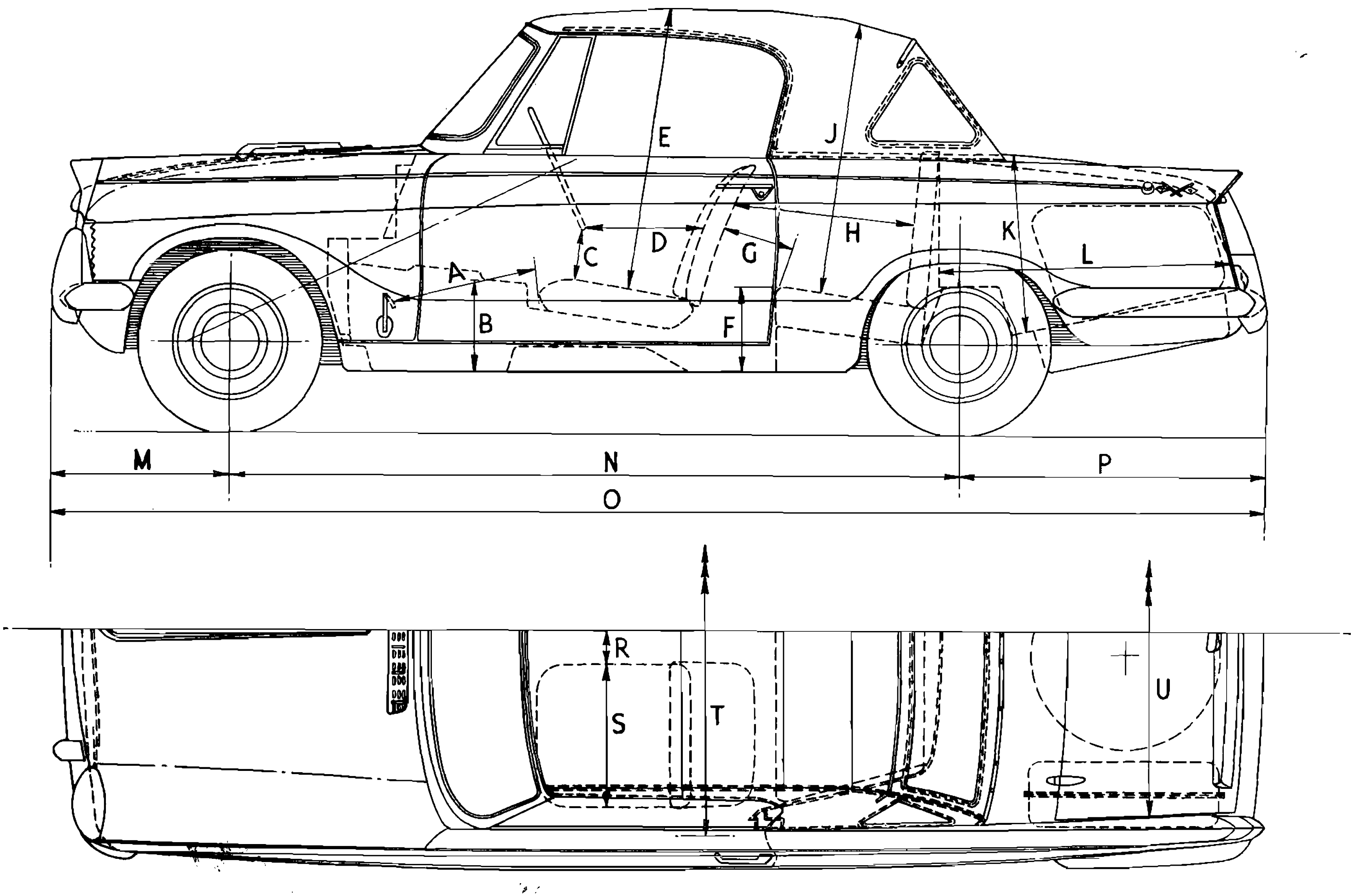


Triumph Herald Coupé—Overall Dimensions

VEHICLE DIMENSIONS

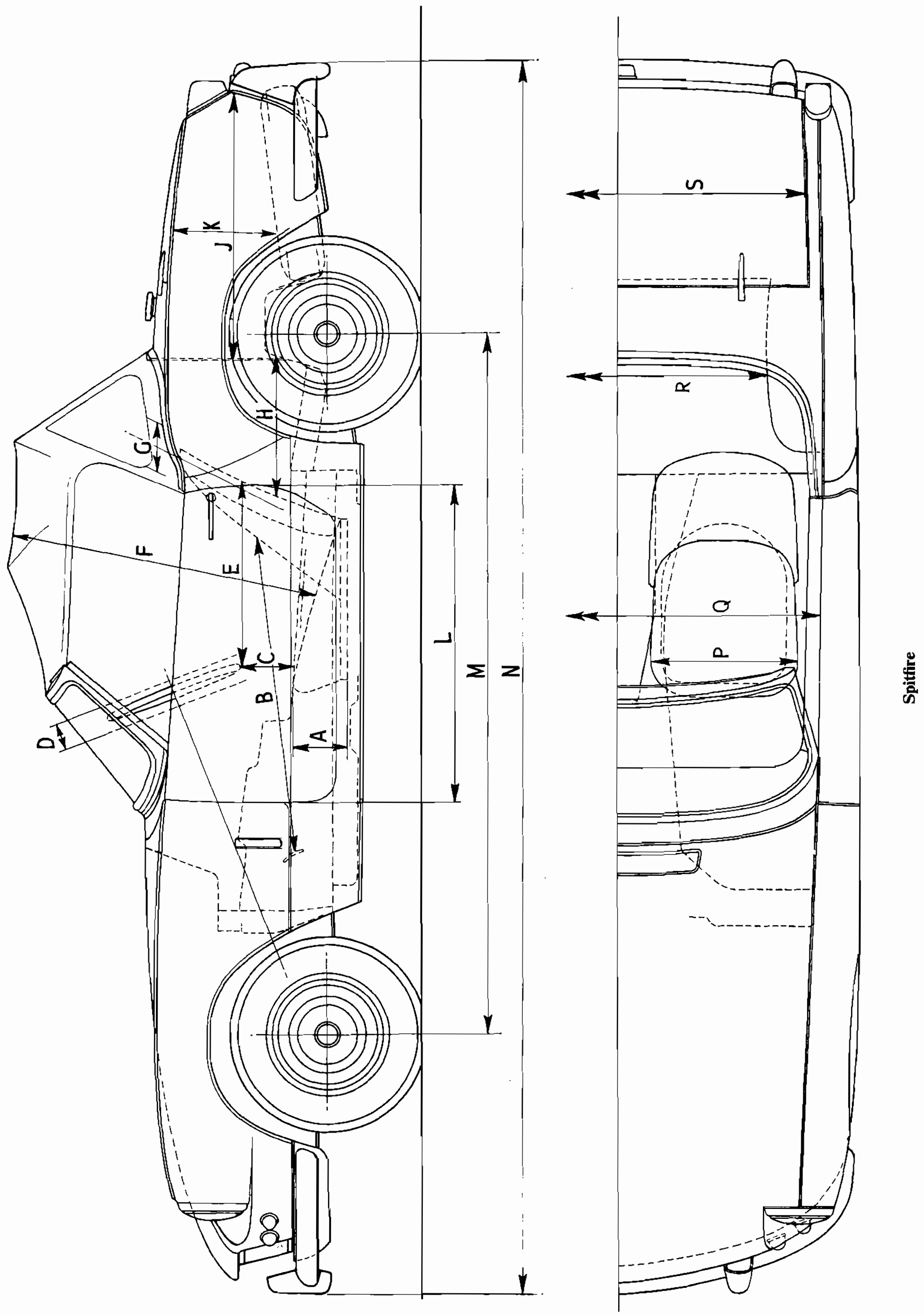
A	Max.	1′ $9\frac{3}{4}$″	55·30 cm.
	Min.	1′ 4″	40·64 cm.
B		1′ 0″	30·50 cm.
C		$5\frac{1}{2}$″	14·00 cm.
D	Max.	1′ $4\frac{1}{4}$″	41·30 cm.
	Min.	$10\frac{1}{4}$″	26·00 cm.
E		2′ 11″	88·90 cm.
F		1′ 9″	53·30 cm.
G		3′ 0″	91·40 cm.
H		1′ $10\frac{3}{4}$″	57·80 cm.
J		7′ $7\frac{1}{2}$″	2·320 m.
K		3′ $2\frac{1}{2}$″	97·80 cm.
L		12′ $8\frac{3}{8}$″	3·860 m.
M		1′ 6″	45·70 cm.
N		4″	10·20 cm.
P		4′ 1″	1·240 m.
Q		3′ 10″	1·170 m.
R		4′ $3\frac{1}{4}$″	1·300 m.
S		4′ 1″	1·220 m.
T		4′ $11\frac{11}{16}$″	1·520 m.
U		4′ $3\frac{1}{2}$″	1·300 m.

VEHICLE DIMENSIONS

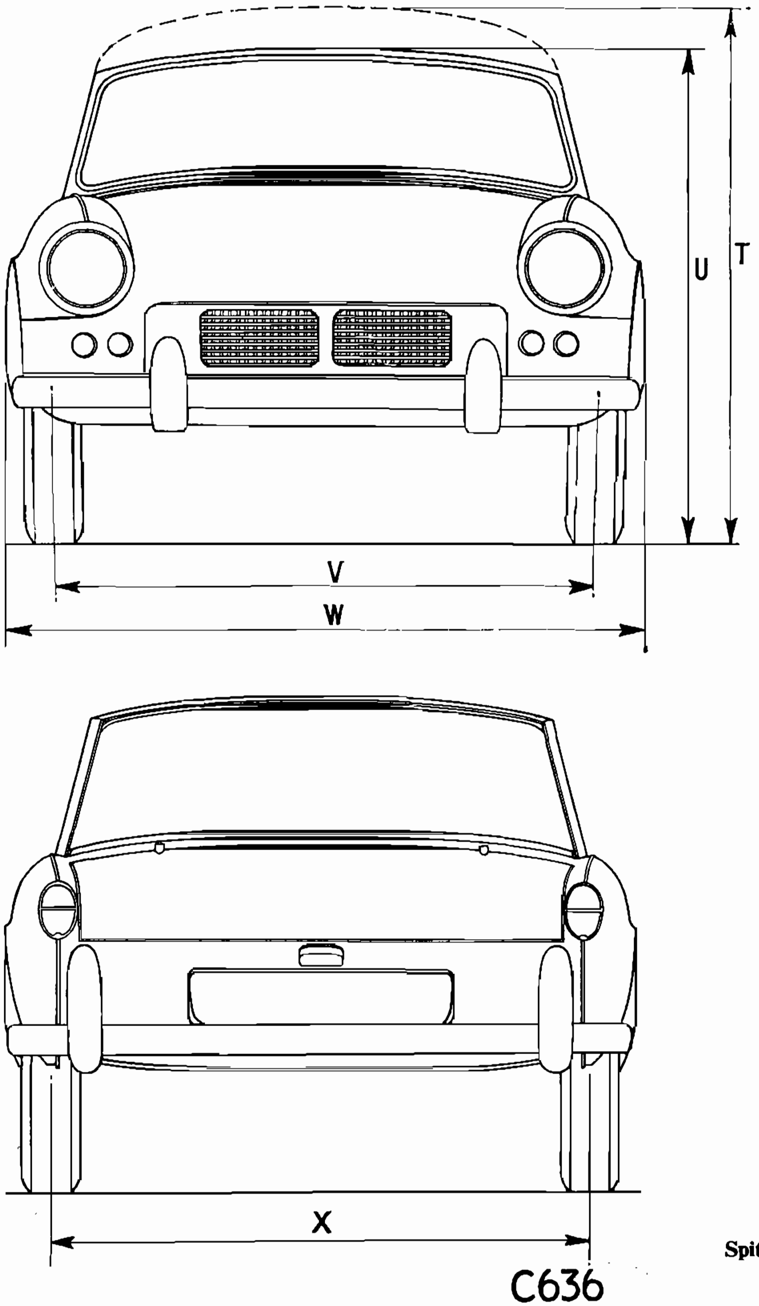


Triumph Herald 1200 and Vitesse Convertible

VEHICLE DIMENSIONS



Spitfire



VEHICLE DIMENSIONS

A		7″	17·78 cm.
B	Max.	3′ 10½″	118·11 „
	Min.	3′ 3″	99·06 „
C		7″	17·78 „
D		4″	10·16 „
E	Max.	1′ 10″	55·88 „
	Min.	1′ 2¼″	38·83 „
F		2′ 11″	88·90 „
G		7½″	19·05 „
H	Max.	1′ 4¾″	42·54 „
	Min.	9½″	24·15 „
J		1′ 8″	50·80 „
K		9″	22·86 „
L		2′ 4½″	72·39 „
M		6′ 11″	210·82 „
N		12′ 1″	368·30 „
P		1′ 5″	43·18 „
Q		3′ 10½″	118·11 „
R		2′ 11½″	90·17 „
S		3′ 6″	106·68 „
T		3′ 11½″	120·65 „
U		3′ 8¼″	111·40 „
V		4′ 1″	124·46 „
W		4′ 9″	144·78 „
X		4′ 0″	121·92 „

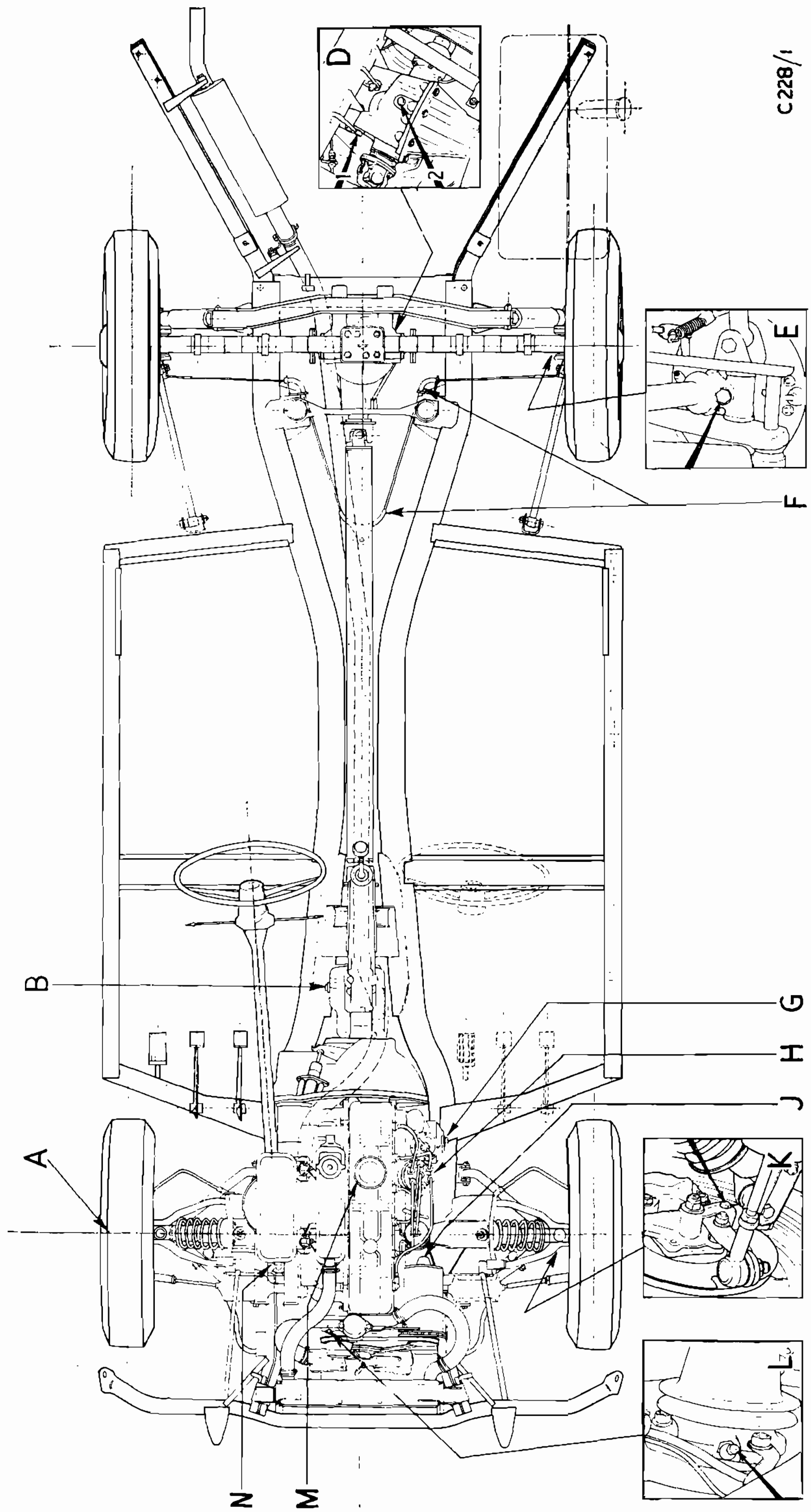
Spitfire—Overall Dimensions

NUT TIGHTENING TORQUES

OPERATION	DESCRIPTION	SPECIFIED TORQUES lbs. ft.	SPECIFIED TORQUES kgms.
ENGINE			
Chain Wheel Attachment	5/16" U.N.F. Setscrew	24 – 26	3·318 – 3·595
Clutch Attachment	5/16" U.N.C. Setscrew	18 – 20	2·489 – 2·765
Connecting Rod Bolts	3/8" U.N.F. Bolt	42 – 46	5·807 – 6·36
Cylinder Head	3/8" U.N.F. Nut	42 – 46	5·807 – 6·36
Engine Mounting to Frame Brackets	5/16" U.N.F. Setscrew	18 – 20	2·489 – 2·765
Fan to Pulley	1/4" U.N.F. Bolt	6 – 8	0·820 – 1·106
Flywheel Attachment	3/8" U.N.F. Bolt	42 – 46	5·807 – 6·36
Front Engine Bracket and Front Engine Plate	5/16" U.N.F. Bolt	18 – 20	2·489 – 2·765
Camshaft Locating Plate to Block	5/16" U.N.C. Bolt	18 – 20	2·489 – 2·765
Fuel Pump	5/16" U.N.C. Stud	12 – 14	1·659 – 1·936
Generator Bracket to Block	5/16" U.N.C. Bolt	16 – 18	2·212 – 2·489
Generator Pulley Attachment	7/16" U.N.F.	10 – 12	1·383 – 1·659
Generator to Engine Plate	5/16" U.N.F. Bolt	16 – 18	2·212 – 2·489
Generator to Mounting Bracket	5/16" U.N.F. Bolt	16 – 18	2·212 – 2·489
Gearbox and Rear Engine Plate Attachment	5/16" U.N.C. Stud	12 – 14	1·659 – 1·936
	5/16" U.N.C. Setscrew	14 – 16	1·936 – 2·212
Header Tank Attachment	1/4" U.N.F. Setscrew	6 – 8	0·830 – 1·106
Main Bearing Caps	7/16" U.N.C. Bolt	55 – 60	7·604 – 8·293
Manifold Exhaust Outlet	5/16" U.N.C. Stud	12 – 14	1·659 – 1·936
Manifold to Cylinder Head	3/8" U.N.C. Stud	24 – 26	3·318 – 3·595
Oil Filter to Crankcase		15 – 18	2·074 – 2·489
Oil Gallery Setscrews	5/16" U.N.C. Setscrew	18 – 20	2·489 – 2·765
Oil Pump to Block	1/4" U.N.C. Bolt	6 – 8	0·830 – 1·106
Rear Oil Seal Attachment	5/16" U.N.C. Bolt	16 – 18	2·212 – 2·489
Rocker Cover Nuts	5/16" U.N.F. Stud	1½	0·105
Rocker Pedestal	3/8" U.N.C. Stud	24 – 26	3·318 – 3·595
Starter Motor Attachment	3/8" U.N.C. Bolt	26 – 28	3·595 – 3·871
Sump Attachment	5/16" U.N.C. Bolt	16 – 18	2·212 – 2·489
Sump to Front and Rear Seal	5/16" U.N.C. Setscrew	16 – 18	2·212 – 2·489
Timing Cover Attachment	5/16" U.N.F. Setscrew	12 – 14	1·659 – 1·936
Water Elbow to Water Body	5/16" U.N.F. Setscrew	16 – 18	2·212 – 2·489
Water Pump to Cylinder Head	5/16" U.N.C. Bolt	18 – 20	2·489 – 2·765
Water Pump Pulley Attachment	5/16" U.N.F.	14 – 16	1·936 – 2·212
GEARBOX			
Clutch Housing to Gearbox	3/8" U.N.C.	24 – 26	3·318 – 3·595
Countershaft Location	5/16" U.N.F. Bolt	14 – 16	1·936 – 2·212
Coupling Operating Shaft Attachment	1/4" U.N.F. Bolt	6 – 8	0·830 – 1·106
Extension to Gearbox	5/16" U.N.C. Setscrew	14 – 16	1·936 – 2·212
Extension to Top Cover	5/16" U.N.F. Stud	12 – 14	1·659 – 1·936
Flange to Mainshaft	9/16" U.N.F.	70 – 80	9·678 – 11·060
Fulcrum—Reverse Operating Lever	3/8" U.N.F.	14 – 16	1·936 – 2·212
Mounting Bracket to Frame	7/16" U.N.F. Setscrew	28 – 30	3·871 – 4·148
Operating Shaft to Gear Lever	1/4" U.N.F. Bolt	6 – 8	0·830 – 1·106
Remote Control—Gear Lever			
Reverse Idler Shaft	5/16" U.N.F. Bolt	14 – 16	1·936 – 2·212
Selector Fork Attachment	5/16" U.N.F., Taper Wdgelok	9 – 10	1·244 – 1·383
*Slave Cylinder Attachment	5/16" U.N.F. Bolt	14 – 16	1·936 – 2·212
Speedo Sleeve Attachment	5/16" U.N.F. Bolt	14 – 16	1·936 – 2·212
Top Cover Attachment	1/4" U.N.F. Bolt	6 – 8	0·830 – 1·106
Vitesse. Slave Cylinder Attachment	5/16" U.N.C.	10 – 12	1·383 – 1·659

NUT TIGHTENING TORQUES—continued

OPERATION	DESCRIPTION	SPECIFIED TORQUES lbs. ft.	SPECIFIED TORQUES kgms.
REAR AXLE AND SUSPENSION			
Back Plate Attachment (axle shaft and hub attachment)	5/16" U.N.F. Bolt	16 – 18	2·212 – 2·489
Bearing Cap to Housing	3/8" U.N.F. Bolt	32 – 39	4·424 – 4·701
Crown Wheel to Differential Casing	3/8" U.N.F. Bolt	35 – 40	4·839 – 5·530
Hypoid Housing	5/16" U.N.F. Setscrew	16 – 18	2·212 – 2·489
Hypoid Pinion Flange Attachment	9/16" U.N.F.	70 – 85	9·678 – 11·752
Mounting Plate to Hypoid Housing	3/8" U.N.F.	26	3·595
Radius Arm Brackets to Frame	3/8" U.N.F. Bolt	24 – 26	3·318 – 3·595
Radius Arms to Brackets	3/8" U.N.F. Bolt	24 – 26	3·318 – 3·595
Rear Axle Mounting Plate to Frame	3/8" U.N.F.	26 – 28	3·595 – 3·871
Rear Axle to Frame	7/16" U.N.F. Bolt	38 – 40	5·254 – 5·530
Rear Damper Lower Attachment	7/16" U.N.F.	30 – 32	4·148 – 4·424
Rear Damper Upper Attachment	1/2" U.N.F. Fulcrum Pin	42 – 46	5·807 – 6·36
Rear Hub to Axle Shaft	5/8" U.N.F.	100 – 110	13·826 – 15·21
Road Spring to Axle Unit	3/8" U.N.F. Stud	28 – 30	3·871 – 4·178
Shaft Joint to Inner Axle Shaft	5/16" U.N.F. Bolt	24 – 28	3·318 – 3·595
Spring Ends to Vertical Link Plate	7/16" U.N.F. Bolt	42 – 46	5·807 – 6·36
Vertical Link Plates to Rear Hub Inner	7/16" U.N.F. Bolt	42 – 46	5·807 – 6·36
FRONT SUSPENSION UNIT			
Anti-Roll Bar Link Assembly	7/16" U.N.F.	38 – 42	5·254 – 5·807
Anti-Roll Bar—Stud	3/8" U.N.F. Stud	12 – 14	1·659 – 1·936
Anti-Roll Bar to Chassis	5/16" U.N.F. "U" Bolts	3 – 4	0·415 – 0·281
Back Plates and Tie Rod Levers to Vertical Links	3/8" U.N.F. Bolt	26 – 28	3·595 – 3·871
	5/16" U.N.F. Bolt	16 – 18	2·212 – 2·489
Ball Assembly to Upper Wishbone	5/16" U.N.F. Bolt	16 – 18	2·212 – 2·489
Ball Assembly to Vertical Link	7/16" U.N.F.	38 – 42	5·254 – 5·807
Brake Disc to Hub	3/8" U.N.F. Bolt	32 – 35	4·424 – 4·839
Caliper Mounting Plate to Vertical Link and	5/16" U.N.F. Setscrew	18 – 20	2·489 – 2·765
Tie Rod Lever	3/8" U.N.F. Bolt	32 – 35	4·424 – 4·839
Calipers to Mounting Plate	7/16" U.N.F. Bolt	50 – 55	6·913 – 7·604
Front Damper	7/16" U.N.F. Bolt	42 – 46	5·807 – 6·36
Front Suspension and Engine Mounting Bracket to Frame	3/8" U.N.F. Bolt	26 – 28	3·595 – 3·871
Fulcrum Brackets to Lower Wishbone	3/4" U.N.F. Bolt	26 – 28	3·595 – 3·871
Stub Axle to Vertical Link	1/2" U.N.F.	55 – 60	7·604 – 8·295
Tie Rod End Ball Joint Assembly	3/8" U.N.F.	26 – 28	3·595 – 3·871
Top Wishbone Attachment	3/8" U.N.F. Fulcrum Bolt	26 – 28	3·595 – 3·871
Trunnion to Wishbone	7/16" U.N.F. Bolt	42 – 46	5·807 – 6·36
Wishbone Assembly to Frame	3/8" U.N.F.	22 – 24	3·042 – 3·318
Vertical Link and Tie Rod Lever	3/8" U.N.F. Bolt	32 – 35	4·424 – 4·839
STEERING UNIT			
Coupling Pinch Bolts	1/4" U.N.F. Bolt	6 – 8	0·830 – 1·106
Lower to Upper Clamp	3/4" U.N.F. Bolt	4 – 6	1·2192 – 0·830
Safety Clamp Socket Setscrew		8	1·106
Steering Column Safety Clamp	1/4" U.N.F. Bolt	6 – 8	0·830 – 1·106
Steering Unit to Frame	5/16" U.N.F. "U" Bolt	14 – 16	1·936 – 2·212
BRAKE AND CLUTCH PEDAL			
Master Cylinder to Support Bracket	5/16" U.N.F. Setscrew	16 – 18	2·212 – 2·489
Pedal and Master Cylinder Mounting Bracket to Dash	1/4" U.N.F. Setscrew	6 – 8	0·830 – 1·106
MISCELLANEOUS			
Wheel Nuts	3/8" U.N.F.	38 – 42	5·254 [illegible] 807



Lubrication Chart (All Models)
(Note. Vitesse illustrated)

BASIC ESSENTIAL TOOL LIST — HERALD 1200, 12/50, VITESSE, SPITFIRE

The list of essential tools for servicing Herald 1200, 12/50, Vitesse and Spitfire models given below, forms List "A" of our "Essential Tool List Scheme". This scheme enables Standard-Triumph Dealers and Distributors to acquire a complete set of essential tools for servicing the complete range of Standard Triumph vehicles, without duplication of any individual item.

Lists B, C, D and E cover other vehicles in the Standard-Triumph range. New models, when they are announced, will be covered by appropriate lists.

List "A"

S.3600	Steering Wheel Remover.
S.4221A-5 ..	I.F.S. Coil Spring Adaptors.
S.336-3	Con. Rod Arbor Adaptor.
S.336-4	Con. Rod Arbor Adaptor.
S.4221A ..	Hand Press.
S.4221A-7 ..	Inner Axle Bearing Adaptor Set.
S.109A	Rear Hub Remover.
20.SM.98 ..	Preload Gauge.
S.101	Differential Case Spreader.
S.108	Pinion Bearing Setting Gauge.
S.4221A-4A ..	Pinion Bearing Adaptor Set.
S.4221A-8A ..	Differential Bearing Adaptor.
335	Connecting Rod Aligning Jig.
336	Arbor.

GLOSSARY OF PART NAMES AND ALTERNATIVES

ENGINE	**Gudgeon Pin**	Piston pin. Small-end pin. Wrist pin.
	Inlet Valve	Intake valve.
	Piston Oil Control Ring	Piston scraper ring.
	Induction Manifold	Inlet manifold. Intake manifold.
	Oil Sump	Oil pan. Oil reservoir. Sump tray.
	Core Plug	Expansion plug. Welch plug. Sealing disc.
	Dipstick	Oil dipper rod. Oil level gauge rod. Oil level indicator.
	Silencer	Muffler. Expansion box. Diffuser.
FUEL	**Carburettor Choke**	Carburettor Venturi.
	Slow Running Jet	Low speed jet. Idler jet.
	Volume Control Screw	Idling mixture screw.
	Fuel Pump	Petrol pump. Fuel lift pump.
	Air Cleaner	Air silencer, muffler.
	Fuel Tank	Petrol tank.
	Accelerator	Throttle.
CLUTCH	**Clutch Release Bearing**	Throwout bearing. Thrust bearing.
	Clutch Lining	Disc facing. Friction ring.
	Spigot Bearing	Clutch pilot bearing.
	Clutch Housing	Bell housing.
GEARBOX		Transmission.
	Gear Lever	Change speed lever. Gearshift lever.
	Selector Fork	Change speed fork. Shift fork.
	Input Shaft	Constant motion shaft. First motion shaft, drive gear. First reduction pinion. Main drive pinion. Clutch shaft. Clutch gear.
	Countershaft	Layshaft.
	Synchro Cone	Synchronizing ring.
	Reverse Idler Gear	Reverse Pinion.
REAR AXLE		Final Drive Unit.
	Crown Wheel	Ring gear. Final drive gear. Spiral drive gear.
	Bevel Pinion	Small pinion. Spiral drive pinion.
	'U' Bolts	Spring clips.
	Axle Shaft	Half-shaft. Hub driving shaft. Jack driving shaft.
	Differential Gear	Sun wheel.
	Differential Pinion	Planet wheel.
ELECTRICAL	**Generator**	Dynamo.
	Control Box	Cut-out, voltage regulator, voltage control, circuit breaker.
	Capacitor	Condenser.
	Interior Light	Dome lamp.
	Lens	Glass.
	Headlamp Rim	Headlamp surround. Headlamp moulding.
	Direction Indicators	Signal lamps. Flashers.
	Micrometer Adjustment	Octane selector.
	Rear Lamps	Tail lamps.

GLOSSARY OF PART NAMES AND ALTERNATIVES — continued

STEERING ..	**Drop Arm**	Pitman arm.
	Rocker Shaft	Pitman shaft. Drop arm shaft.
	Swivel Pin	Pivot pin. King pin. Steering pin.
	Stub Axle	Swivel axle.
	Track Rod	Cross tube. Tie rod.
	Draglink	Side tube. Steering connecting rod.
	Steering Column	Steering gear shaft.
	Steering Column Bearing ..	Mast jacket bearing.
	Steering Arm	Steering knuckle arm.
	Starter Tube	Control tube.
BRAKES ..	**Master Cylinder**	Main cylinder.
	Brake Shoe Lining	Brake shoe facing.
BODY	**Bonnet**	Hood.
	Luggage Locker	Boot. Luggage compartment.
	Luggage Locker Lid	Boot lid. Rear deck.
	Mudguards	Quarter panels. Fenders. Mud wings. Wings.
	Roof	Canopy.
	Nave Plate	Wheel disc. Hub cap.
	Finishing Strip	Moulding. Chromed strip.
	Windscreen	Windshield.
	Rear Window	Rear windscreen. Rear windshield. Backlight.
	Quarter Vent	(N.D.V.). No draught ventilator.

Abbreviations:
L.H.S. — Left-hand side (viewed from driver's seat).
R.H.S. — Right-hand side (viewed from driver's seat).

KEEPING THE WORKSHOP MANUAL UP-TO-DATE

Following a policy of constant improvement to quality and efficiency subsequent to the publication date of this manual, amendments dealing with design modifications, change of procedure, and additions, are issued to all Standard-Triumph Distributors and Dealers as circumstances warrant.

The amendments are numbered consecutively and list the accompanying new pages which also show the amendment numbers at the bottom. These pages should be inserted in the appropriate sections and the old pages destroyed.

To ensure that the manual is up-to-date, you are asked, when you receive them, to record, in the following columns, the amendment numbers and the pages affected. A quick glance down the column will then show any gap, in the sequence of amendment numbers, which can be rectified by writing immediately to the Service Division, Allesley, Coventry.

Amendment Number	Date	NEW PAGES ISSUED
1	July/64	2.301 to 2.313
2	Sept./65	Please *remove and destroy* the first issue and insert the second issue of the following pages :–
		5, 25, 27, 31, 0.101, 0.201, 0.203, 0.205, 0.207, 0.209, 1.141, 1.205, 1.317, 1.401, 1.403, 2.111,
		2.401, 5.209, 5.211, 5.245, 6.101, 6.103, 6.105, 6.107, 6.109, 6.111, 6.129, 6.131.
		Please insert the following new pages :– 1.319, to 1.329. 1.405, 1.407, 2.403; 6.102A.

Amendment Number	Date	NEW PAGES ISSUED

TRIUMPH

HERALD 1200, 12/50, VITESSE AND SPITFIRE

WORKSHOP MANUAL

GROUP 0

Comprising:

TRIUMPH
HERALD 1200, 12/50, VITESSE
and
SPITFIRE MODELS

GROUP 0

CONTENTS

RUNNING-IN FROM NEW

Running-in (General)

The importance of correct running-in cannot be too strongly emphasized, for during the first 500 miles (1,000 km.) of motoring, the working surfaces of a new engine are bedding down. Power and performance will improve only if during this vital period the engine receives careful treatment.

Whilst no specific speeds are recommended during the running-in period, avoid placing heavy loads upon the engine, such as using full throttle at low speeds or when the engine is cold. Running-in should be progressive and no harm will result from the engine being allowed to "rev." fairly fast provided that it is thoroughly warm and not pulling hard. Always select a lower gear if necessary to relieve the engine of load.

Full power should not be used until at least 500 miles (1,000 km.) have been covered and even then, it should be used only for short periods at a time. These periods can be extended as the engine becomes more responsive.

After 1,000 miles (1,600 km.) running, the engine can be considered as fully run-in.

To prevent possible damage to a valve seat as the metal stabilizes during the running-in period, valve grinding is recommended early in the life of the engine.

Recommended Speed Limits (Spitfire)

Avoid over-revving, particularly in the lower gears. The driver is advised not to drive the car continuously at engine speeds above 5,500 r.p.m. in any gear. However, whilst accelerating through the gears it is permissible to attain 6,000 r.p.m. for short periods, this speed being indicated by a red segment on the tachometer.

Vitesse Change-down Speeds

When an overdrive is fitted, observe the following change-down speed: overdrive 3rd to normal 3rd gear, not in excess of 70 m.p.h. (110 km.p.h.).

CUSTOMER PREPARATION SERVICE

Commission Number *Engine Number* *Date*

Owner's Name

Address *Registration Number* *Speedometer Reading*

Every precaution has been taken at the factory to ensure that the car reaches the customer in the best possible condition. A few preparatory operations remain, however, which in the best interests of all, must be carefully carried out by the selling Distributor or Dealer before the car is handed to the customer.

Details of the preparation service are as follows:—

MECHANICAL

☐ 1. Check cooling system for leaks and top up radiator level as necessary.

☐ 2. Check carburettors and petrol system for leaks.

☐ 3. Check brake/clutch master cylinders fluid level and top up as necessary.

☐ 4. Check and adjust tyre pressures.

ELECTRICAL

☐ 1. Top up battery with distilled water as necessary.

☐ 2. Check windscreen wiper operation.

☐ 3. Check operation of horn.

☐ 4. Check all instruments for operation.

☐ 5. Check flasher operation.

☐ 6. Check lamps for operation.

LUBRICATION

☐ 1. Check engine for correct oil level.

COACH

☐ 1. Fit front carpets and retainer strips.

GENERAL FINISH

1. Examine paintwork, touching-up as necessary.

2. Check interior trim and seats for cleanliness and seat slide(s) for correct operation.

3. Remove all masking tape and anti-corrosive preparation from chromium plating.

☐ 4. Wash and polish car, examine for leaks.

5. Check tool kit and that all literature is present.

ROAD TEST

☐ 1. Test car on road.

IMPORTANT

To avoid possible errors, mark the appropriate square as each operation is completed and record on the back of this form any points requiring special attention.

1,000 MILES (1,600 km.) FREE SERVICE OPERATIONS

1. Thoroughly lubricate all door hinges, luggage locker and bonnet hinges, locks and striker plates, pedal pivots, throttle controls, handbrake cable guides and rear hubs.

2. Remove plug from lower steering swivels, fit nipple and *fill with oil.*

3. Change oil in engine, gearbox and rear axle.

4. Examine and top up as necessary :
   (*a*) Water level in radiator.
   (*b*) Electrolyte level in battery.
   (*c*) Hydraulic fluid level in brake and clutch systems. (If top up is required, investigate for leakage).
   (*d*) S.U. Carburettor dashpots (if fitted).

5. Examine and tighten all nuts, particularly those securing the cylinder head, exhaust manifold, exhaust pipe and silencer attachments, steering unit, tie-rods and levers, differential unit universal couplings, rear spring, body mountings and suspension attachments.

6. Check oil filter for tightness.

7. Check and if necessary adjust:—
   (*a*) Ignition timing.
   (*b*) Fan belt.
   (*c*) Carburettor and controls for slow running.
   (*d*) Front wheel track alignment.
   (*e*) Front hubs, wheel nuts and tyre pressures.
   (*f*) Valve clearances.
   (*g*) Ignition distributor and sparking plug points.

8. Clean and refill air cleaner (oil bath type), clean out fuel pump.

9. Adjust brakes and clutch if required.

10. Check operation of all electrical equipment and focus headlamps.

11. Check and tighten starter and generator attachment bolts and terminals.

12. Clean battery terminals, smear with vaseline and check battery mounting but do not over-tighten holding down clamps.

13. Check all hydraulic pipe connections for tightness and all flexible hoses for clearance.

14. Road test car and report any defects.

15. Wipe clean door handles, controls and windscreen.

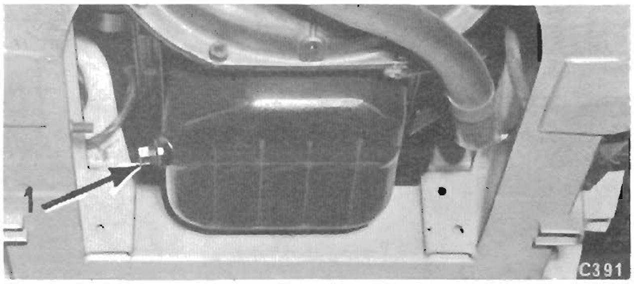


Fig. 4. Sump drain plug

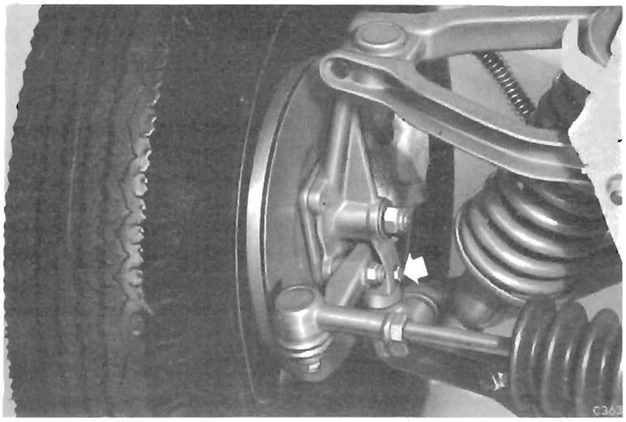


Fig. 5. Steering lower swivels

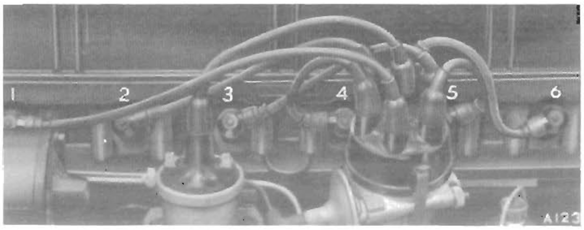


Fig. 6. Plug lead positions (Vitesse)

6,000 MILES (10,000 Km.)

At 6,000 mile (10,000 km.) intervals, carry out the work listed under the daily and weekly checks and the following additional work:

Change Engine Oil

Drain the oil sump by removing the plug shown arrowed. Refit the plug and refill with the appropriate grade of oil. The 6,000 mile (10,000 km.) period should be reduced for unfavourable conditions.

Favourable	Long distance journeys with little or no engine idling, on well-surfaced roads, reasonably free from dust.
Average	Medium length journeys on well-surfaced roads with a small proportion of stop/start operation.
Unfavourable	either of the following:
(*a*)	Operating during cold weather, especially when frequent engine idling is involved:
(*b*)	Extremely dusty conditions.

Additives which dilute the oil or impair its efficiency must not be used.

Steering Lower Swivels

Remove the plug shown arrowed and fit a grease nipple. Apply a grease gun filled with Hypoid Oil. Pump the gun until oil exudes from the swivel. Remove the nipple and fit the plug. Repeat with the opposite steering swivel.

IMPORTANT: The front road wheels should be jacked-up clear of the ground during this operation.

Slow Running

Check and, if necessary, adjust the engine slow running. (See Group 1).

Electrical

Check the operation of all electrical equipment and adjust headlamp settings. (See Group 6).

Sparking Plugs

Remove and clean the sparking plugs. Reset the gaps to 0·025" (0·635 mm.). Examine the ceramic insulators for cracks and damage likely to cause "H.T." tracking. Test the plugs before refitting them, and renew those that are suspect.

Plug Lead Positions

Ensure that the plug leads are attached to the sparking plugs as shown. Firing order is 1, 5, 3, 6, 2, 4 (Vitesse) and 1, 3, 4, 2 (for other models) taken in anti-clockwise order.

Carburettor Dashpots (Spitfire, Herald twin carb.)

Unscrew the hexagon plug from the top of each carburettor and withdraw the plug and damper assembly. Top up the damper chambers with the current grade of engine oil. The oil level is correct when, utilizing the damper as a dipstick, its threaded plug is $\frac{1}{4}''$ (6·3 mm.) above the dashpots when resistance is felt. Refit the damper and hexagonal plug. Using an oil can, apply oil to the throttle and choke control linkages.

Air Cleaners (Spitfire)

Remove and wash the air cleaners in fuel. Soak the gauzes in engine oil and allow to drain before wiping them clean. When refitting the cleaners, ensure that the holes above the carburettor flange setscrew holes are correctly aligned with corresponding holes in the air cleaner and gaskets.

If the engine is operating under dusty conditions, clean the filters more frequently.

Later Spitfire models are fitted with paper element air cleaners. Remove and clean at 6,000 miles (10,000 km.) using a high pressure air line to remove foreign matter from between the folds of the paper.

Air Cleaner (General)

Under extremely dusty conditions the air cleaner should be serviced every 1,000 miles (1,600 km.) or more frequently.

Element Removal (Fig. 9)

Slacken the clip (5) and remove the unit from the carburettor. Remove the screw (11), detach the end plate (6) and lift the element (8) from the container (9). Clean the casing interior and remove foreign matter from the element by means of compressed air or a brush. Adopt the reverse procedure to refit.

Element Removal (Fig. 10)

To remove the element (8) remove the two bolts (11) from below the air cleaner and remove the unit complete from the hose (5).

Remove the retaining screw (12) and detach the end plate (6). Remove the element (8) from the container (10). Thoroughly clean the casing interior, and use a low pressure air line or soft brush to clean between the folds of the paper element.

Adopt the reverse procedure to refit.

For Vitesse after Engine No. HB27985 see page 1·323.

Fig. 7. Filling carburettor dashpots

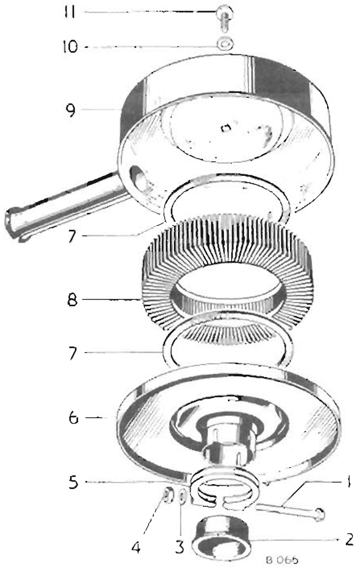


Fig. 8.
Air cleaner (Herald)

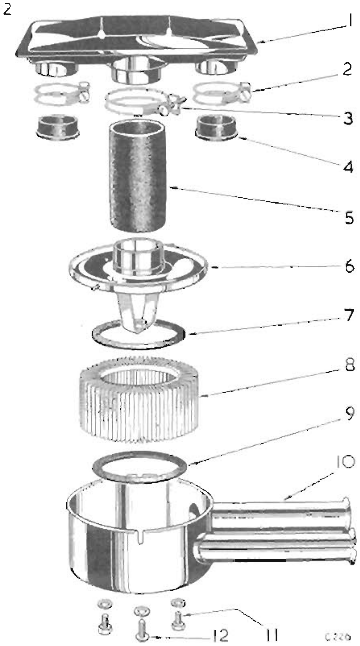


Fig. 9.
Air Cleaner (Vitesse)

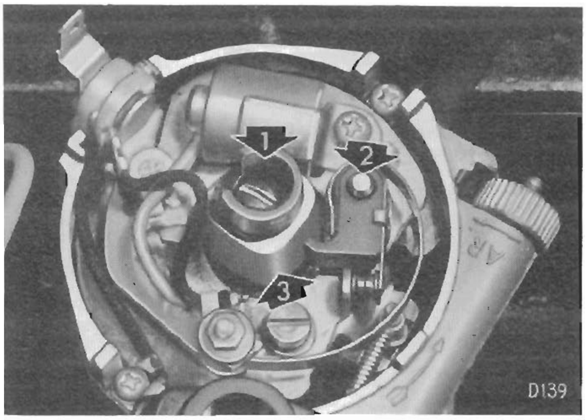


Fig. 10. Distributor lubrication

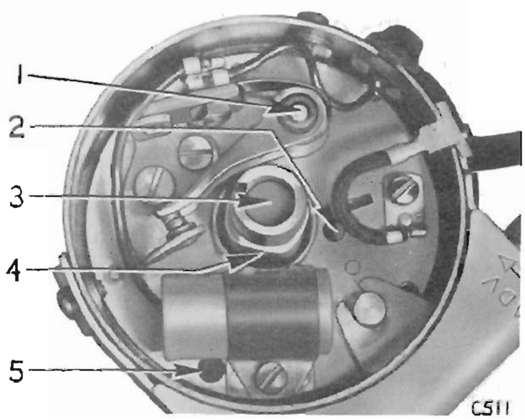


Fig. 11. Distributor lubrication (Spitfire)

Distributor (Fig. 10)

Release the clips and remove the distributor cap and rotor arm. Apply a few drops of thin oil to points (1) and (2), and lightly grease the cam (3).

Distributor (Fig. 11)

Release the clips and remove the distributor cap and rotor arm. Apply a few drops of thin oil to points (1), (2) and (3). Lightly grease the cam surface (4) and inject approximately 5 c.c. (one teaspoonful) of engine oil through the hole (5).

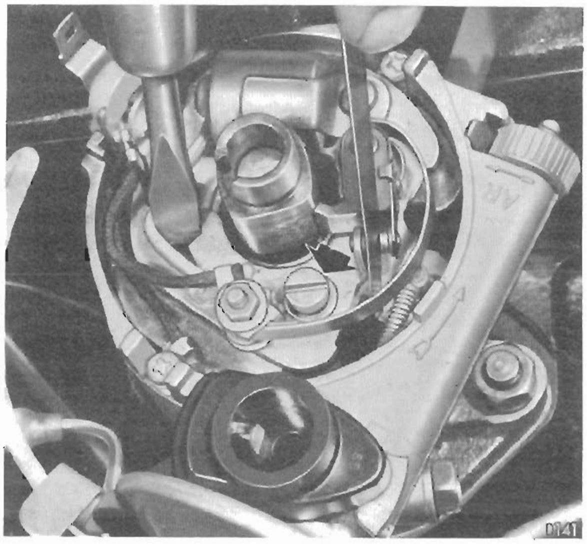


Fig. 12. Contact breaker points

Contact Breaker Points (Fig. 12)

With the cap and rotor arm removed, turn the engine until the contact breaker lever is operating on the highest point of the cam lobe, *i.e.*, gap at its widest. Slacken the fixed contact screw (arrowed) and, using a screwdriver as shown, adjust the gap to obtain 0·015" (0·381 mm.) using a feeler gauge between the contacts. Retighten the screw.

Renew worn or damaged points.

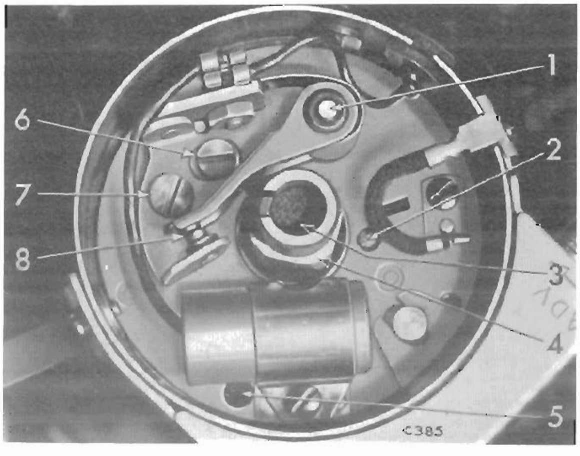


Fig. 13. Contact breaker points (Spitfire)

Contact Breaker Points (Fig. 13)

With the cap and rotor arm removed, turn the engine until the contact breaker lever is operating on the highest point of the cam lobe, *i.e.*, gap at its widest. Slacken the fixed contact screw (7) and turn the eccentric screw (6) to obtain 0·015" (0·381 mm.) gap using a feeler gauge between the contacts (8), and retighten screw (7).

Renew worn or damaged points.

Rocker Clearances (Fig. 15)

Adjust the rocker clearances to 0·010″ (0·254 mm.) (cold).

Turn the crankshaft until No. 1 push rod has reached its highest point; then rotate a further full revolution.

Re-check the clearance after tightening the locknut and readjust if necessary.

Repeat with the remaining valves.

General

Oil can lubricate:— Throttle controls, pedal pivots, seat adjusters, hinges, locks and catches.

Oil Filler Cap

Lift off cap, swill in fuel, dry and refit.

Brake Shoe Contamination

Brake shoes, contaminated with oil or grease are detrimental to brake efficiency. Should a brake be so affected, thoroughly clean the drum and backing plate with petrol, and renew the brake shoes. Hook the pull-off springs, through the correct holes, as shown.

Front Brake Adjustment

The disc brakes fitted to the front of a vehicle are self adjusting. Replacement shoe pads are necessary when the linings are reduced to approximately $\frac{1}{8}$″ (3·20 mm.) thickness.

NOTE: Two adjusters are provided on drum brakes fitted to the front of a vehicle.

Rear Brake Adjustment (Fig. 16)

Excessive foot pedal and handbrake travel indicates the need for rear brake adjustment. To adjust the shoes, turn the adjuster (3) clockwise until the shoes are hard against the drum; then slacken the adjuster by one notch increments until the drum is free to rotate.

NOTE: There is a constant drag on the rear wheels caused by the action of the differential and the axle oil. Do not confuse this with brake drag.

Handbrake Adjustment

Adjustment of the rear brake shoes re-adjusts the handbrake mechanism. If cable slackness remains, re-adjust the handbrake clevis shown on Fig. 17. Do not overtighten the cable.

Hydraulic System

Check the hydraulic pipe connections for leaks and flexible hoses for signs of chafing and adequate clearance to prevent such damage.

Wheels

Check wheel alignment by examining condition of tyre tread. Check tightness of wheel nuts.

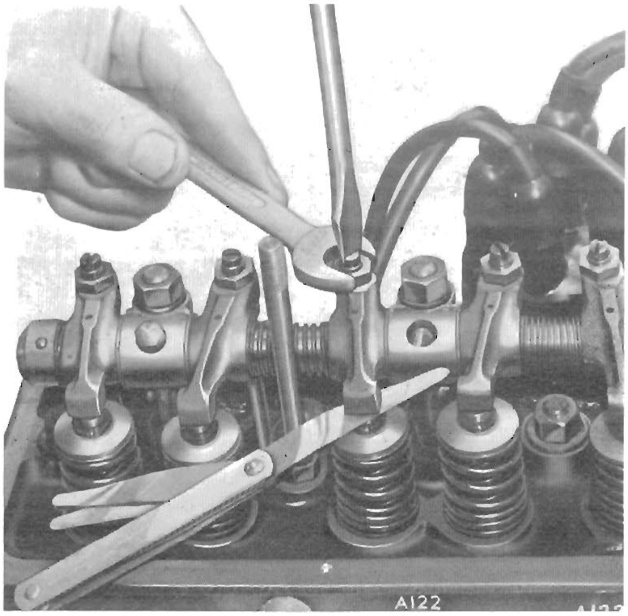


Fig. 14. Adjusting rocker clearances

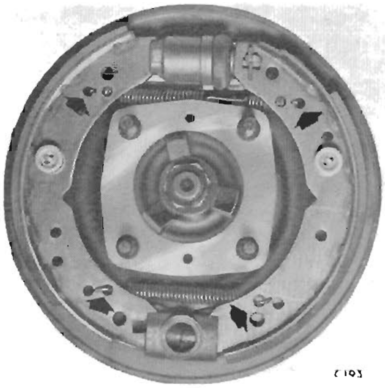


Fig. 15. Rear Brake

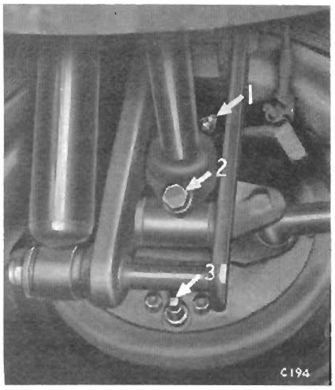


Fig. 16. Rear brake adjuster

Fig. 17. Handbrake adjuster

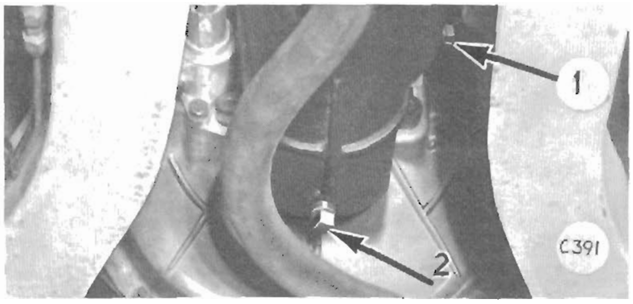


Fig. 18. Gearbox drain and level plugs

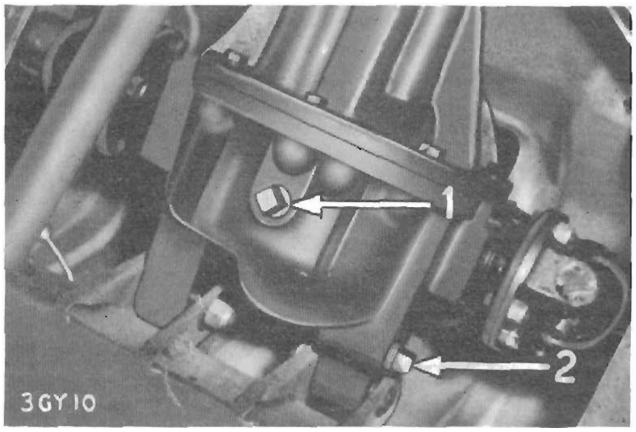


Fig. 19. Rear axle drain and level plugs

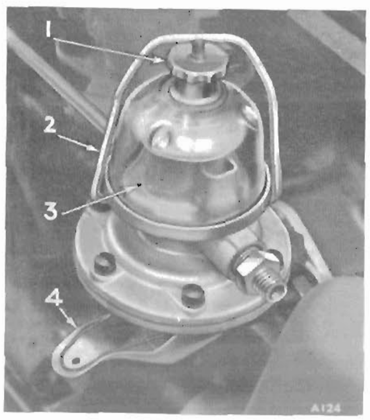


Fig. 20. Fuel pump (Vitesse)

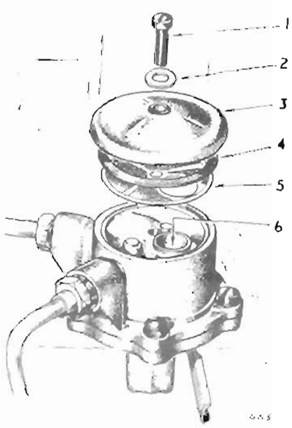


Fig. 21. Fuel pump

12,000 MILES (20,000 Km.)

At 12,000 mile (20,000 km.) intervals, carry out the work listed under 6,000 miles (10,000 km.) and the following additional work:–

Front Hubs

Check and adjust if necessary.

Top-up Gearbox (Fig. 18)

With the vehicle standing on level ground, remove the oil level plug (1) and, using a suitable dispenser such as a pump type oil can with flexible nozzle, filled with an extreme pressure (Hypoid) lubricant, top up the gearbox until the oil is level with the bottom of the filler plug threads.

Allow surplus oil to drain away before refitting the level plug and wiping clean.

Top-up Rear Axle (Fig. 19)

Remove the oil level plug (1) and, using the dispenser used for replenishing the gearbox, top up the rear axle with extreme pressure (Hypoid) lubricant until the oil is level with the bottom of the filler plug threads.

Allow surplus oil to drain away before refitting the level plug and wiping clean. Avoid overfilling and if an excessive amount of oil is required, check for leakage around the driving flange seal and the rear cover.

Fuel Pump (Fig. 20)

To remove and clean the sediment bowl, unscrew the nut (1), swing the stirrup sideways and lift off the bowl.

NOTE: The level of fuel in the tank is higher than the fuel pump, and fuel will syphon from the tank should the filter bowl be removed. To prevent this, disconnect the rubber connector tube from the tank in the luggage compartment before removing the sediment bowl, or plug the rubber connector of the inlet pipe at the pump.

Fuel Pump (Fig. 21)

Unscrew the bolt (1), lift off the cover (8) and the gauze (5) from its seating. Wash the gauze in petrol. Loosen sediment in the body with a thin screwdriver and remove with compressed air. Avoid damaging the non-return valve (6). Renew the joint (4) if this has deteriorated

Adopt the reverse procedure to re-assemble the pump.

Fan Belt Tension (Fig. 22)

Check and, if necessary, adjust the fan belt tension as follows:—

Slacken the adjusting bolt (6) and the pivot bolts (7 and 8). Pivot the generator until the belt can be moved ¾" to 1" (19 to 25 mm.) at its longest run (9). Maintaining the generator in this position, securely tighten the adjusting bolt and pivot bolts.

Water Pump

Remove the plug and fit a grease nipple. Apply the grease gun, giving five strokes only. Remove the nipple and refit the plug. A grease nipple is provided on the Vitesse.

Overdrive Filter

If an overdrive is fitted, unscrew the large knurled drain plug under the overdrive unit and withdraw the gauze filter for cleaning. Refit the filter and tighten the drain plug.

Replenish the unit with oil, and after a short run using the overdrive, re-check and adjust the oil level if necessary.

The same oil is used both for the overdrive unit and the gearbox, an internal transfer hole allows oil to flow from the gearbox into the overdrive unit until a common level is attained. *Do not use additives; their use may be detrimental to the proper operation of the unit.*

Sparking Plugs

Renew the sparking plugs (see Page 0·204). When replacing the plugs, make sure that they are the correct type and the gaps are set to 0·025" (0·635 mm.). The types recommended are given on page 6.

Rear Hubs (Fig. 23)

Remove the plug, shown arrowed, and fit a screwed grease nipple. Apply a grease gun until grease exudes from the bearing. Remove the nipple and refit the plug. Repeat with the opposite rear hub.

Steering Unit (Fig. 24)

Remove the plug from the top of the steering unit and fit a screwed grease nipple. Apply the grease gun and give 5 strokes only. Remove the nipple and refit the plug. Over-greasing can cause damage to the rubber bellows.

Check the tightness of all bolts and nuts, particularly the front and rear suspension, the steering and the wheel nuts.

Handbrake Cable Guides

Apply grease around the cable guides and the compensator sector.

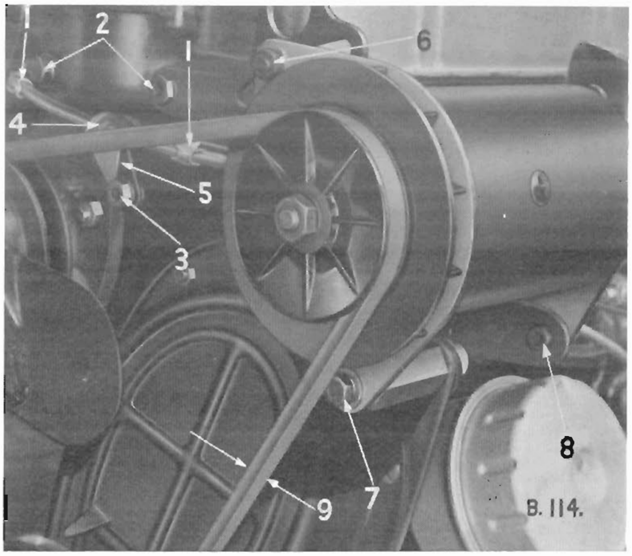


Fig. 22. Fan belt adjustment

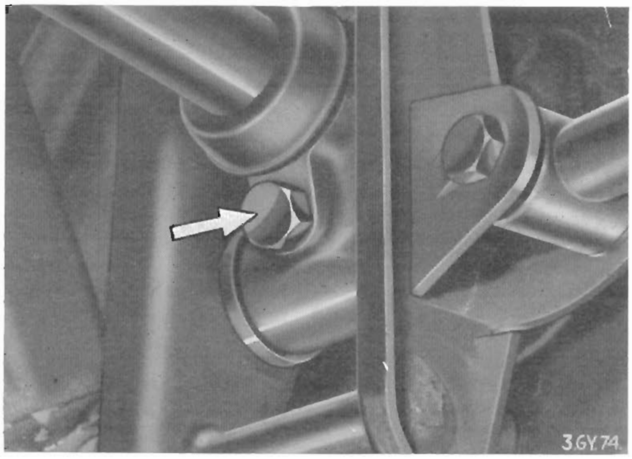


Fig. 23. Rear hub grease plug

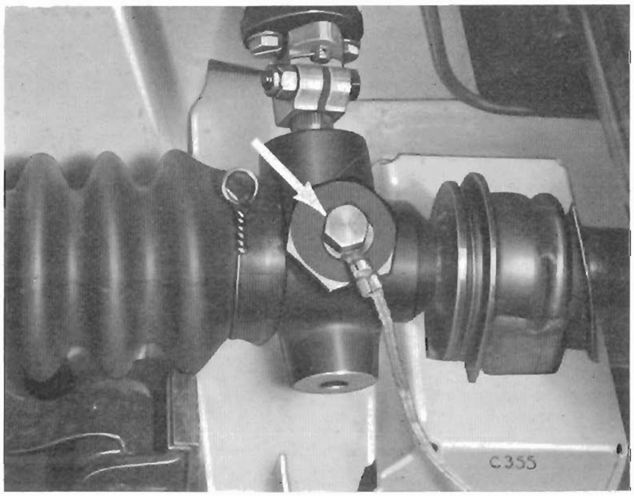


Fig. 24. Steering unit grease plug

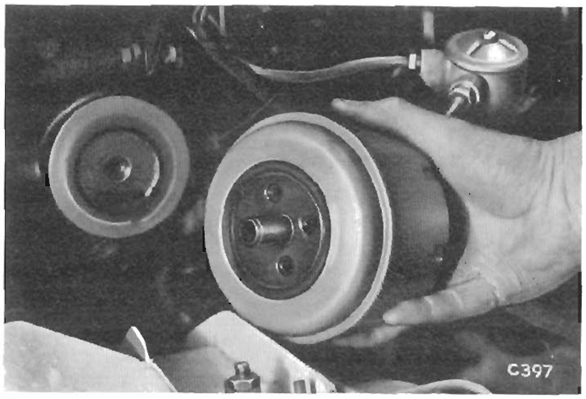


Fig. 25. Removing oil filter

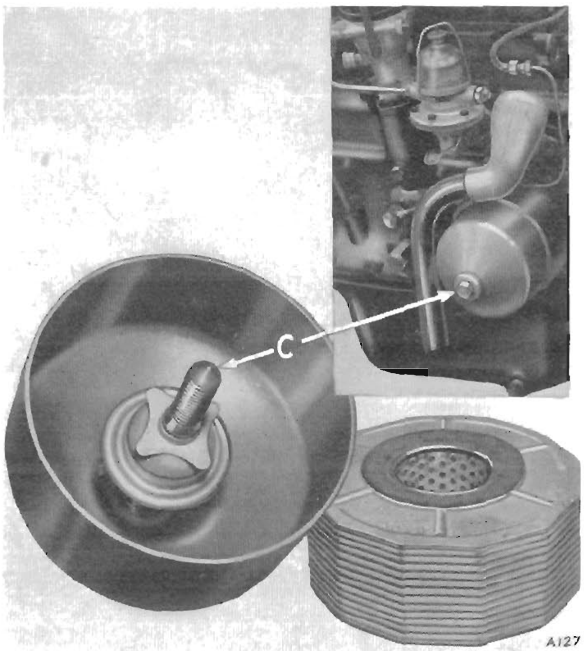


Fig. 26. Removing oil filter (Vitesse)

Universal Joints

Check tightness of coupling bolts.

Steering

Check tightness of steering unit attachment and "U" bolts, tie rods and levers.

Oil Filter (Fig. 25)

(HERALD and SPITFIRE)

Unscrew the old filter from the cylinder block and fit a new one. Ensure an oil-tight seal by smearing the joint face with oil before screwing the container firmly home.

NOTE: When removing the oil filter from any model, it is advisable to place a suitable receptacle below the engine to catch the oil remaining in the filter; approx. 1 pint (½ litre).

Oil Filter (Fig. 26) (VITESSE)

Unscrew the centre bolt (c) and remove the old filter from the cylinder block. Before fitting a new element, clean the container. Ensure an oil-tight seal by smearing the joint face with oil before screwing the container firmly home.

On L.H.D. models, it is necessary to remove L.H. engine bay valance before detaching oil filter.

Pull the wiring harness clear of the clips. Remove three nuts and two screws. Lift the valance panel clear and proceed as above.

Brakes

Remove wheels and brake drums and de-dust using a high pressure air line.

Generator

Inject a few drops of engine oil into the hole in the rear cap.

Air Cleaner

Renew paper element (see Page 0·205).

Exhaust System

Examine for defects (see Group 1, Section 4).

TRIUMPH

HERALD 1200, 12/50, VITESSE
AND
SPITFIRE

WORKSHOP MANUAL

GROUP 1

Comprising :

TRIUMPH
HERALD 1200, 12/50, VITESSE
and
SPITFIRE MODELS

GROUP 1

CONTENTS

DIMENSIONS AND TOLERANCES

PARTS & DESCRIPTION	HERALD 1200, 12/50 AND SPITFIRE				VITESSE				REMARKS
	DIMENSIONS NEW		CLEARANCES NEW		DIMENSIONS NEW		CLEARANCES NEW		
	ins.	mm.	ins.	mm.	ins.	mm.	ins.	mm.	
Crankshaft									
Main bearing journal dia.	2·0005 2·001	50·81 50·83			2·0005 2·001	50·81 50·83			
Main bearing internal dia.	2·0015 2·0037	50·84 50·89			2·0022 2·0025	50·856 50·863			Undersize bearings available: 0·010", - 0·020", 0·030", 0·040", (0·254, 0·508, 0·762, 1·016 mm.)
Main bearing housing internal dia.	2·146 2·1465	54·51 54·52			2·146 2·1465	54·51 54·52			
Rear journal width	1·2995 1·2975	33·01 32·95	0·006 to 0·014	0·152 to 0·3556	1·360 1·362	34·544 34·595			0·004" to 0·008" preferred (0·102 mm to 0·203 mm)
Thickness of thrust washers	0·091 0·093	2·31 2·36	0·006 to 0·014	0·152 to 0·3556	0·091	2·31	0·006 to 0·014	0·152 to 0·3556	0·004" to 0·008" preferred (0·102 mm. to 0·203 mm.)
Oversize thrust washers	0·096 0·098	2·44 2·49			0·096 0·098	2·44 2·49			
Crank pin dia.	1·6255 1·625	41·28 41·27			1·875 1·8755	47·625 47·638			
Connecting Rods									
Big end bearing internal dia.	1·627 1·626	41·32 41·3			1·8777 1·8765	47·694 47·663	0·001 0·0027	0·0254 0·0686	Undersize bearings available: - 0·010", —0·020", —0·030" (0·254, - 0·508, —0·762 mm.)
Con-rod end float on crankpin			0·0105 0·0126	0·2667 0·32			0·0086 0·0125	0·21844 0·3175	
I.D. small end bush	0·8126 0·8122	20·64 20·63	Light push fit		0·8126 0·8122	20·64 20·63	Light push fit		Light hand push fit at 68°F.
Gudgeon pin. dia.	0·8125 0·81226	20·64 20·63			0·8125 0·81226	20·64 20·63			

DIMENSIONS AND TOLERANCES—continued

PARTS & DESCRIPTION	HERALD 1200, 12/50 AND SPITFIRE				VITESSE				REMARKS
	DIMENSIONS NEW		CLEARANCES NEW		DIMENSIONS NEW		CLEARANCES NEW		
	ins.	mm.	ins.	mm.	ins.	mm.	ins.	mm.	
Piston Rings									
Compression ring widths	0·0777 0·0787	1·97 1·99	0·015 to 0·0035	0·038 to 0·089	0·0777 0·0787	1·97 1·99	0·0019 to 0·0035	0·0381 to 0·089	
Oil control ring widths	0·1552 0·1563	3·94 3·97	0·0007 to 0·0027	0·02 to 0·07	0·1552 0·1563	3·94 3·97	0·0007 to 0·0027	0·02 to 0·07	
Piston Ring Groove									
Compression rings	0·0812 0·0802	2·06 2·03			0·0797 0·0812	2·18 2·02			
Oil control rings	0·158 0·157	4·01 3·99			0·1552 0·1563	3·94 2·97			
Piston ring gaps in cylinders	0·008 0·013	0·2 0·33			0·008 0·013	0·2 0·33			
Piston Pins									
Grade : High	0·81242 0·81250	20·63003 20·6375							Colour, white
Medium	0·81234 0·81242	20·6334 20·6355			0·81234 0·81242	20·6334 20·6355			Colour, green
Low	0·81226 0·81234	20·6314 20·6334			0·81226 0·81234	20·6314 20·6334			Colour, yellow
Tappet dia.	0·6871 0·6867	17·45 17·46	0·002 0·0013	0·0508 0·033	0·6871 0·6867	17·45 17·46	0·002 0·0013	0·0508 0·033	
Tappet bore in cylinder block	0·688 0·6873	17·47 17·46			0·688 0·6873	17·47 17·46			

DIMENSIONS AND TOLERANCES—continued

PARTS & DESCRIPTION	HERALD 1200, 12/50 AND SPITFIRE				VITESSE				REMARKS
	DIMENSIONS NEW		CLEARANCES NEW		DIMENSIONS NEW		CLEARANCES NEW		
	ins.	mm.	ins.	mm.	ins.	mm.	ins.	mm.	
Camshaft									
Journal dia.	1·8402 1·8407	46·75 46·74	0·0026 to 0·0046	0·07 to 0·12	1·8402 1·8407	46·75 46·74	0·0026 to 0·0046	0·07 to 0·12	
Bore in block	1·8433 1·8448	46·82 46·86			1·8433 1·8448	46·82 46·86			
End float	0·008 0·004	0·20 0·10			0·008 0·004	0·20 0·10			
Oil Pump									
Depth of rotor	0·9995 0·9985	25·37 25·36	0·0006 to 0·0017	0·01524 to 0·043	1·4985 1·4995	38·062 38·087			A combined worn clearance of 0·004" (·1016 mm.) indicates necessity for lapping of the cover and housing face
Housing depth	1·002 1·001	25·45 25·43			1·500 1·501	38·1 38·125			
Max. permissible clearance between outer rotor and body			0·008	0·2032			0·008	0·2032	Renew outer rotor and/or housing if worn beyond this limit
Max. permissible clearance between outer and inner rotors			0·010	0·254			0·010	0·254	Renew inner and outer rotors if worn beyond this limit
Distributor Drive Gear									
End float			0·003 0·007	0·08 0·18			0·003 0·007	0·08 0·18	Adjust with paper washers beneath distributor pedestal
Spindle dia.	0·499 0·498	12·67 12·65			0·499 0·498	12·67 12·65			
Bush bore	0·5005 0·501	12·71 12·73	0·0005 to 0·003	0·0127 to 0·0762	0·5005 0·501	12·71 12·73	0·0005 to 0·003	0·0127 to 0·0762	

DIMENSIONS AND TOLERANCES—continued

PARTS & DESCRIPTION	HERALD 1200, 12·50 AND SPITFIRE				VITESSE				REMARKS
	DIMENSIONS NEW		CLEARANCES NEW		DIMENSIONS NEW		CLEARANCES NEW		
	ins.	mm.	ins.	mm.	ins.	mm.	ins.	mm.	
Oil Pressure Relief Valve Spring									
Free length	1·53	38·86			1·53	38·86			
Fitted length	1·25	31·75			1·25	31·75			
Load at fitted length	14·5 lb.	6·58 kg.			14·5 lb.	6·58 kg.			
Rocker shaft dia.	0·5612 0·5607	14·26 14·24	0·0023 to 0·0008	0·06 to 0·02	0·5612 0·5607	14·26 14·24	0·0023 to 0·0008	0·06 to 0·02	
Bore of rockers	0·562 0·563	14·275 14·300			0·562 0·562	14·275 14·300			
Valves	HERALD 1200, 12·50								
Inlet valve head dia.	1·308 1·304	33·22 33·12			1·301 1·305	33·045 33·147			
	SPITFIRE 1·245 1·241	 31·62 31·52							
Inlet valve stem dia.	0·311 0·310	7·89 7·87	0·001 0·003	·03 ·08	0·311 0·310	7·89 7·87	0·001 0·003	·03 ·08	
Exhaust valve head dia.	1·152 1·148	29·26 29·16			1·176 1·180	29·87 29·97			
Exhaust valve stem dia.	0·309 0·308	7·85 7·82	0·003 0·005	0·08 0·13	0·309 0·308	7·85 7·82	0·003 0·005	0·08 0·13	

DIMENSIONS AND TOLERANCES

PARTS & DESCRIPTION	HERALD 1200, 12/50 AND SPITFIRE				VITESSE				REMARKS
	DIMENSIONS NEW		CLEARANCES NEW		DIMENSIONS NEW		CLEARANCES NEW		
	ins.	mm.	ins.	mm.	ins.	mm.	ins.	mm.	
Valve Guides									
Length	2·25	57·15							
Bore	0·313 0·312	7·95 7·92			0·313 0·312	7·95 7·92			
Outside dia.	0·502 0·501	12·75 12·72			0·502 0·501	12·75 12·72			Press fit in cylinder head
Amount valve guides protrude above cylinder head top face	0·749 0·751	19·025 19·075			0·749 0·751	19·025 19·075			

VALVE SPRINGS

	HERALD 1200		HERALD 12/50 AND SPITFIRE		VITESSE OUTER		VITESSE INNER	
Fitted length	ins. 1·36	mm. 34·54	ins. 1·07	mm. 27·18	ins. 1·36	mm. 34·54	ins. 1·14	mm. 28·956
Fitted load	lbs. 27 to 30	kgs. 12·25 to 13·61	lbs. 117	kgs. 53·07	lbs. 27 to 30	kgs. 12·25 to 13·61	lbs. 11 to 14	kgs. 4·99 to 6·35
Total No. of coils	$7\frac{1}{4}$		6		$7\frac{1}{4}$		$7\frac{1}{2}$	

VALVE SEAT INSERT DIMENSIONS

	INSERT DIMENSIONS				BORE OUT				INSERT Part No.
	External dia.		Width		Diameter		Depth		
	Ins.	mm.	Ins.	mm.	Ins.	mm.	Ins.	mm.	
EXHAUST (Herald 1200, 12/50 & Spitfire)	1·253	31·83	0·25	6·35	1·25	31·75	0·25	6·35	132242
	1·252	31·8	0·248	6·15	1·249	31·72	0·248	6·15	
INLET (Herald 1200, 12/50)	1·441	36·6	0·25	6·35	1·428	36·52	0·25	6·35	132241
	1·440	35·576	0·248	6·15	1·437	36·5	0·248	6·15	
INLET (Spitfire)	1·3785	35·014	0·25	0·35	1·375	34·925	0·25	6·35	137778
	1·3795	35·039	0·248	6·15	1·376	34·95	0·248	6·15	
EXHAUST (Vitesse)	1·2535	31·839	0·216	5·464	1·250	31·75	0·219	5·563	130813
	1·2545	31·864	0·219	5·563	1·251	31·775	0·224	5·689	
INLET (Vitesse)	1·3785	35·014	0·216	5·464	1·375	34·925	0·219	5·563	130814
	1·3795	35·039	0·219	5·563	1·376	34·95	0·224	5·689	

ENGINE — DIMENSIONS AND TOLERANCES

HERALD 1200, 12/50 AND SPITFIRE

GRADE	F ins.	F mm.	G ins.	G mm.	H ins.	H mm.	Make
Cylinder Bore	2·7283 2·7280	69·299 69·290	2·7287 2·7284	69·309 69·301	2·7291 2·7288	69·319 69·312	
Piston Top Dia.	2·7254 2·7250	69·225 69·215	2·7258 2·7254	69·235 69·225	2·7262 2·7258	69·245 69·235	Automotive Engineering Co. Ltd.
Piston Bottom Dia.	2·7272 2·7268	69·271 69·261	2·7276 2·7272	69·281 69·271	2·7280 2·7276	69·291 69·281	
Piston Top Dia.	2·7120 2·7090	68·885 68·809	2·7120 2·7090	68·885 68·809	2·7120 2·7090	68·885 68·809	British Piston Ring Co. Ltd.
Piston Bottom Dia.	2·7271 2·7268	69·217 69·261	2·7275 2·7272	69·306 69·293	2·7279 2·7276	69·288 69·306	
Piston Top Dia.	2·7245 2·7242	69·302 69·202	2·7249 2·7246	69·212 69·272	2·7253 2·7250	69·222 69·215	Wellworthy
Piston Bottom Dia.	2·7271 2·7268	69·368 69·260	2·7275 2·7272	69·278 69·270	2·7279 2·7276	69·288 69·281	

VITESSE

GRADE	F ins.	F mm.	G ins.	G mm.	H ins.	H mm.	Make
Cylinder Bore	2·6279 2·6276	66·749 66·741	2·6283 2·6280	66·759 66·751	2·6287 2·6284	66·769 66·761	
Piston Top Dia.			2·6272 2·6250	66·685 66·675			Automotive Engineering Co. Ltd.
Piston Bottom Dia.			2·6272 2·6268	66·731 66·721			
Piston Top Dia.	2·6267 2·6264	66·566 66·558	2·6271 2·6268	66·728 66·720	2·6275 2·6272	66·738 66·730	British Piston Ring Co. Ltd.
Piston Bottom Dia.	2·6239 2·6236	66·648 66·639	2·6243 2·6240	66·657 66·650	2·6247 2·6244	66·667 66·660	

Cylinder Liner Bores .. Bore out block to 2·781″ — 2·78″ (69·637 mm.— 70·612 mm.).

ENGINE AND GEARBOX REMOVAL VITESSE

Disconnect the battery and drain the cooling system, engine and gearbox. Remove bonnet (Group 5).

Disconnect and plug the rubber fuel pipe from tank to prevent fuel siphoning.

Refer to Fig. 1 and disconnect:— (R.H.S.)
- Air cleaner/s (1).
- Carburettor, choke and throttle controls (2 and 3).
- Starter motor cable.
- Exhaust pipe flange and bracket to clutch housing (4).
- Heater hoses (5 and 6).

Referring to Page 1·203 remove the radiator and hoses.

Refer to Fig. 2 and disconnect:— (L.H.S.)
- Coil cables.
- Oil Pressure switch cable (9).
- Generator 'D' and 'F' cables (10 and 11).
- Earth strap.
- Fuel pipe to pump (12).
- Fan assembly (13).

Working inside the vehicle and referring to Fig. 12 remove :—
- Front seats and carpets.
- Cover attachments and gearbox cover.
- Speedometer cable (3).
- Clutch slave cylinder (5) and manoeuvre through the aperture clear of gearbox.
- Front end of propeller shaft (1).
- Overdrive solenoid cables (if fitted).

Remove the gearchange extension and fit a temporary cardboard cover to prevent the entry of foreign matter.

Attach a lifting cable to the engine lifting eyes and supporting the engine on a hoist, release :—
- Front engine mountings (1), Fig. 11.
- Rear engine mountings (2), Fig. 12.

Lift the engine and gearbox until the sump clears the chassis crossmember.

Continue to lift the unit and simultaneously move it forward until the gearbox is clear of the bulkhead aperture.

Manoeuvre the unit clear of the vehicle.

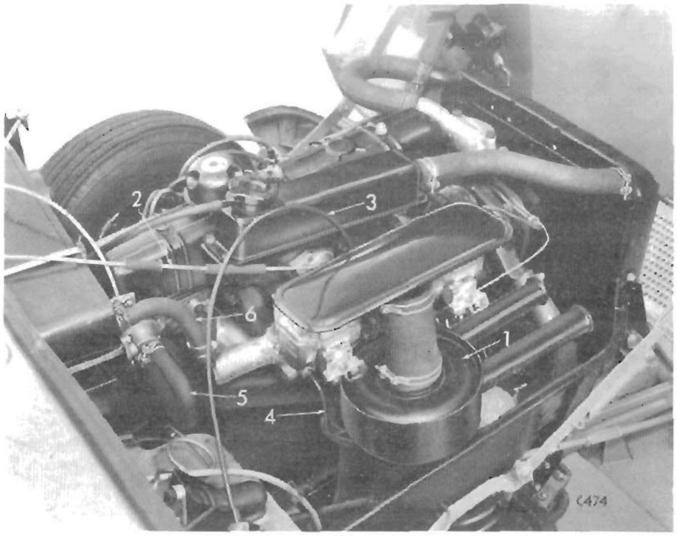


Fig. 1. R.H. side of Vitesse engine

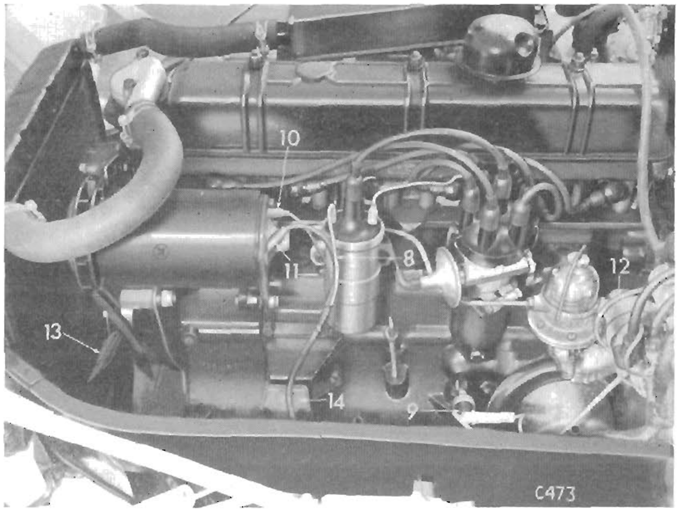


Fig. 2. L.H. side of Vitesse engine

HERALD 1200, 12/50 AND SPITFIRE ENGINE DETAILS

(Fixed Parts)

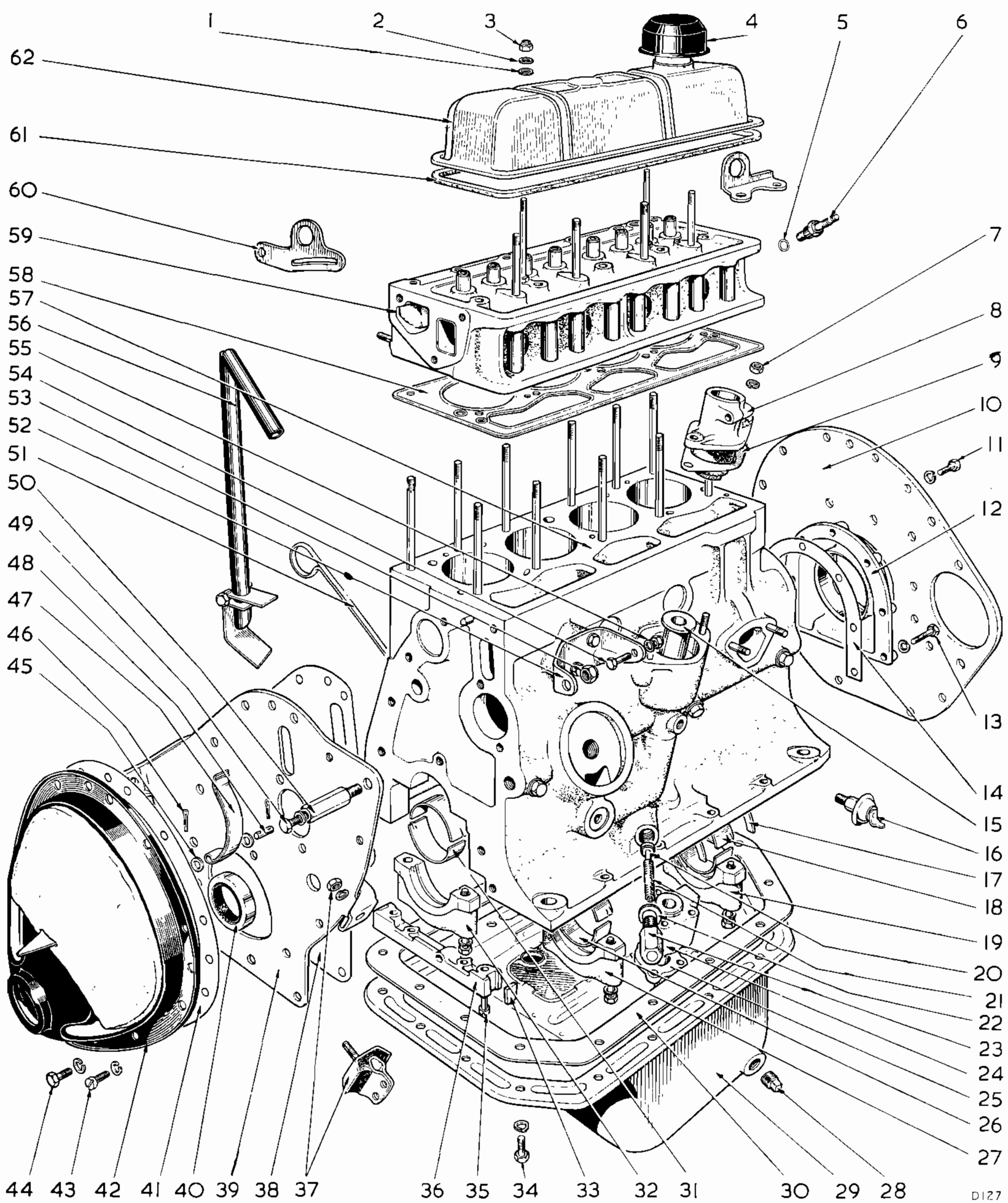


Fig. 3. Herald 1200, 12/50 and Spitfire engine details (fixed parts)

Key to Fig. 3

1	Fibre washer	32	Front main bearing cap
2	Plain washer	33	Sealing wedges
3	Nyloc nut	34	Sump bolt
4	Filler cap	35	Slotted screw
5	Copper/asbestos washer	36	Front sealing block
6	Sparking plug	37	Front engine mounting
7	Nut	38	Gasket
8	Adaptor	39	Front engine plate
9	Gasket	40	Oil seal
10	Rear engine plate	41	Gasket
11	Bolt	42	Front timing cover
12	Rear oil seal	43	Slotted setscrew
13	Bolt	44	Bolt
14	Gasket	45	Plain washer
15	Oil pump drive shaft bush	46	Split pin
16	Oil pressure switch	47	Chain tensioner
17	Crankshaft thrust washer	48	Pivot pin
18	Rear bearing shell	49	Bolt
19	Rear bearing cap	50	Generator pedestal
20	Relief valve	51	Dipstick
21	Spring	52	Bracket
22	Copper washer	53	Nyloc nut
23	Cap nut	54	Bolt
24	Oil pump body	55	Nyloc nut
25	Oil pump end plate	56	Breather pipe
26	Centre bearing shell	57	Cylinder block
27	Centre main bearing cap	58	Cylinder head gasket
28	Sump plug	59	Cylinder head
29	Sump	60	Generator adjusting link
30	Sump gasket	61	Rocker cover gasket
31	Front bearing shell	62	Rocker cover

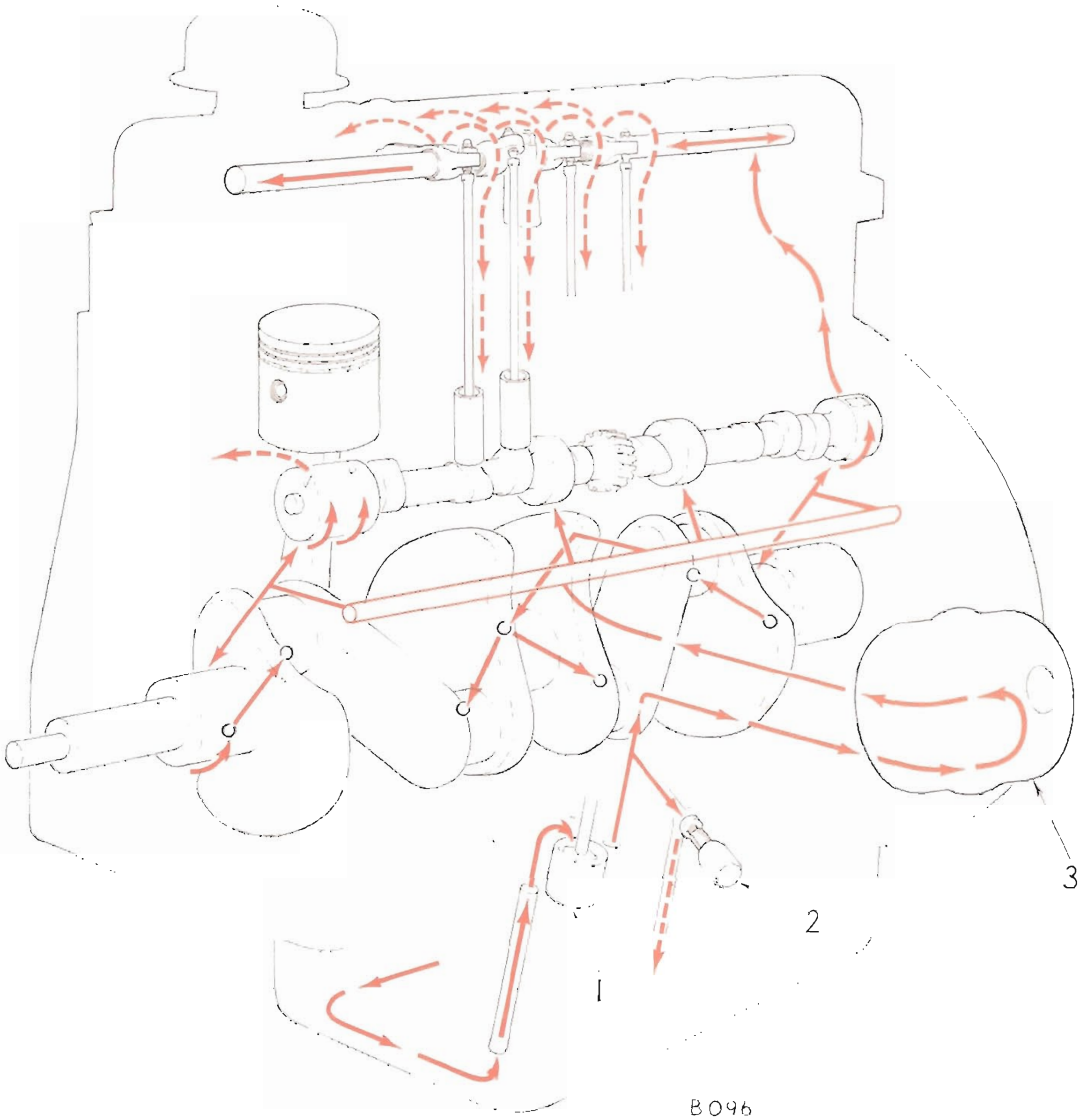


Fig. 4. Herald 1200, 12/50 and Spitfire engine oil circulation

HERALD 1200, 12/50 AND SPITFIRE ENGINE DETAILS
(Moving Parts)

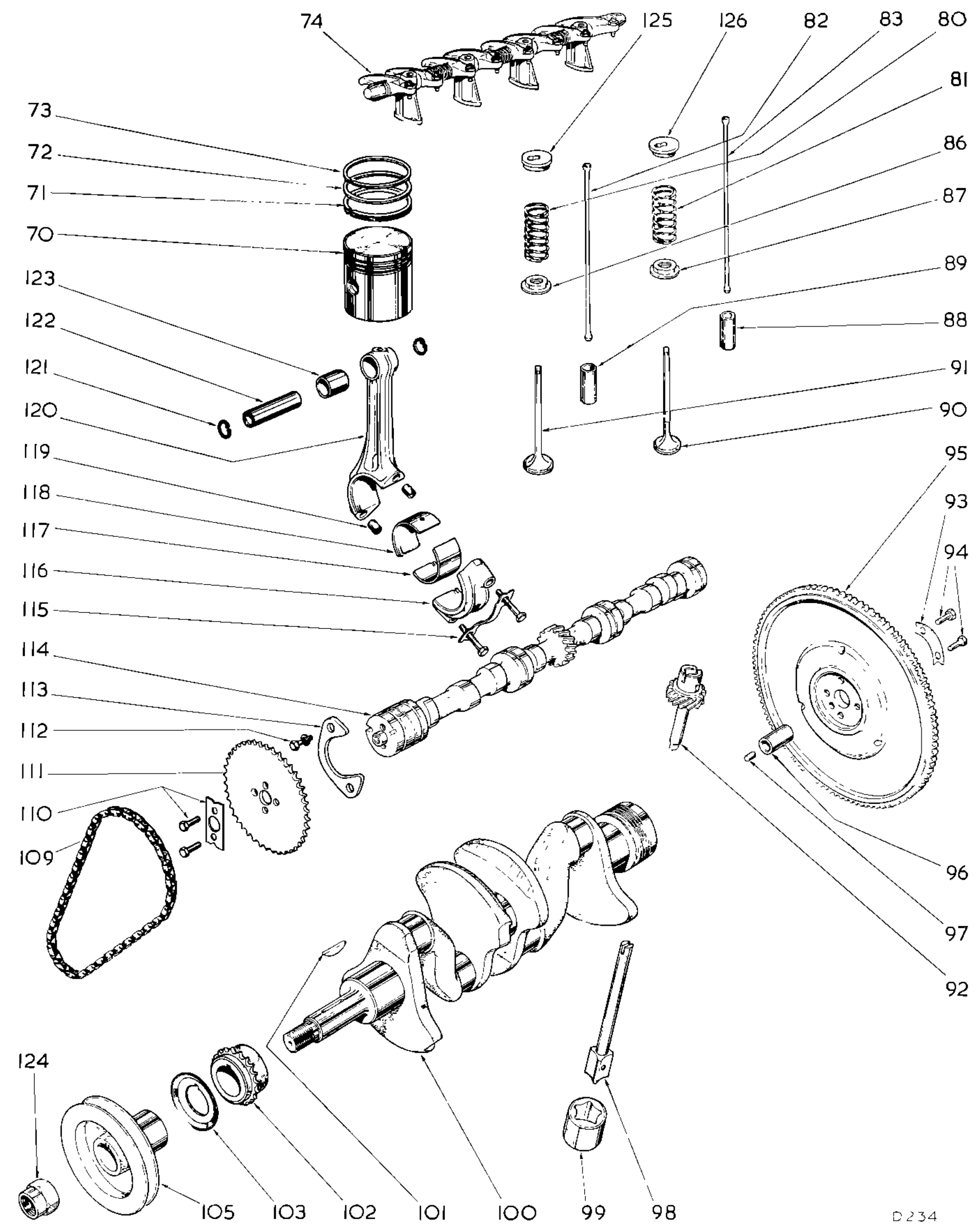


Fig. 5. Herald 1200, 12/50 and Spitfire engine details (moving parts)

Key to Fig. 5

70	Piston	100	Crankshaft
71	Oil control ring	101	Key
72	Taper compression ring	102	Sprocket
73	Plain compression ring	103	Flinger
74	Rocker assembly	105	Crankshaft pulley
80	Spring—outer	109	Timing chain
81	Spring—outer	110	Bolts and lock tab
82	Push rod	111	Camshaft sprocket
83	Push rod	112	Bolt
86	Lower collar	113	Keeper plate
87	Lower collar	114	Camshaft
88	Tappet	115	Bolt and locktab
89	Tappet	116	Conn-rod cap
90	Exhaust valve	117	Conn-rod bearing shell—lower
91	Inlet valve	118	Conn-rod bearing shell—upper
92	Distributor and oil pump drive gear	119	Dowels
93	Lock tab	120	Conn-rod
94	Bolt	121	Circlip
95	Flywheel	122	Gudgeon pin
96	Bush	123	Gudgeon pin bush
97	Dowel	124	Nut
98	Inner rotor and spindle	125	Collet
99	Outer rotor	126	Collet

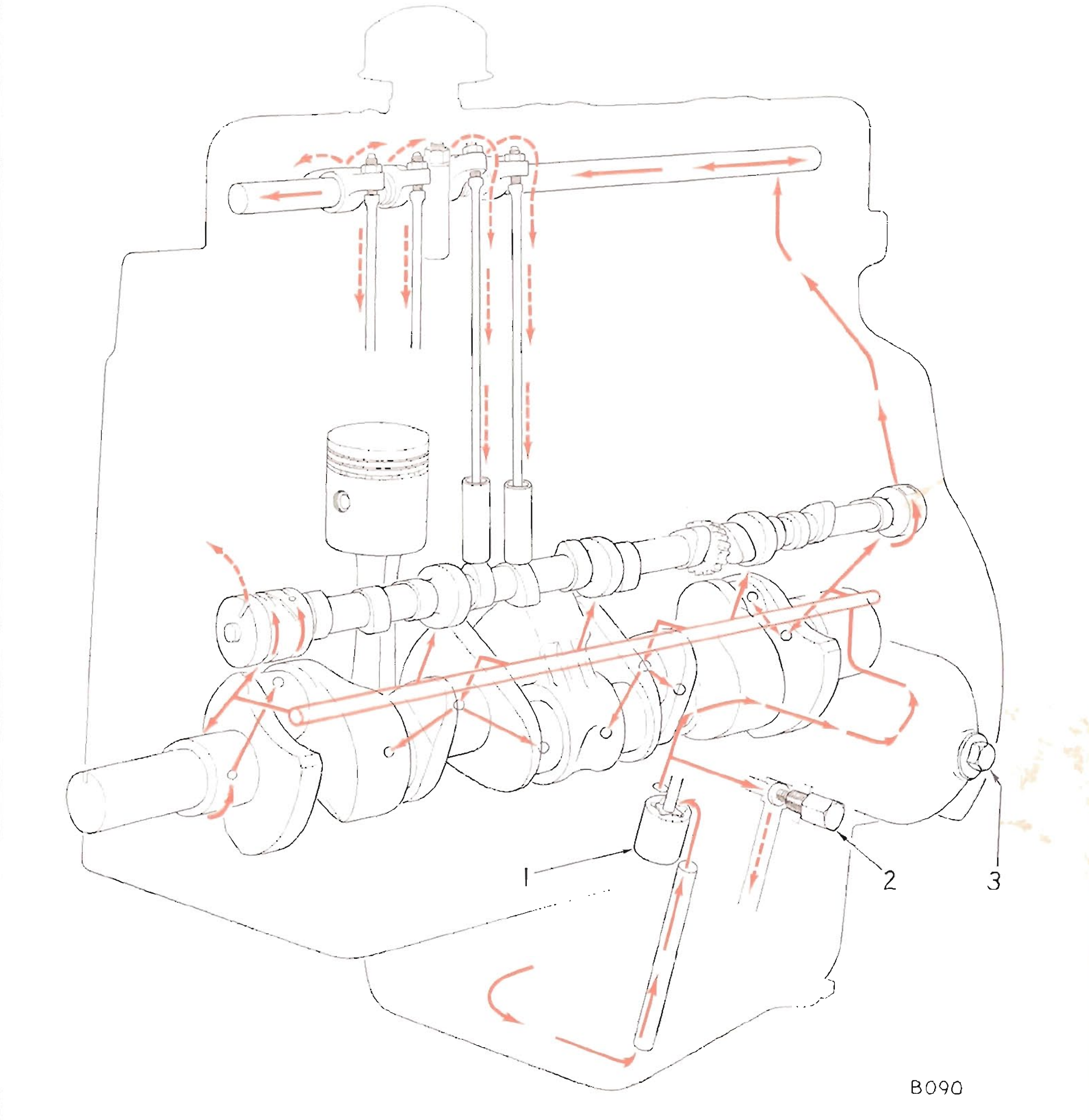


Fig. 6. Vitesse engine oil circulation

VITESSE ENGINE DETAILS

(Fixed Parts)

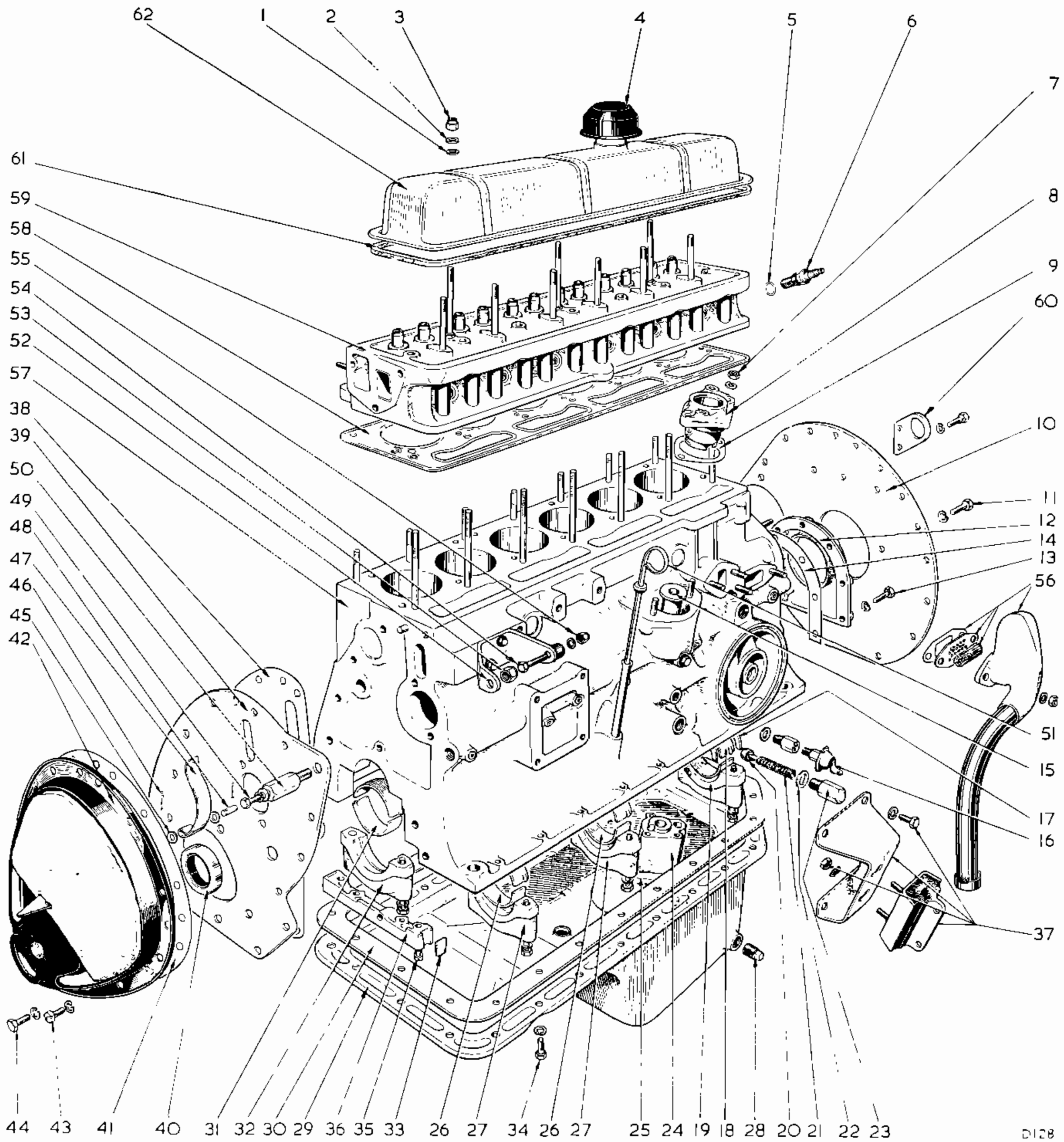


Fig. 7. Vitesse engine details (fixed parts)

Key to Fig. 7

1 Fibre washer
2 Plain washer
3 Nyloc nut
4 Filler cap
5 Copper/asbestos washer
6 Sparking plug
7 Nut
8 Adaptor
9 Gasket
10 Rear engine plate
11 Bolt
12 Rear oil seal
13 Bolt
14 Gasket
15 Oil pump drive shaft bush
16 Oil pressure switch
17 Crankshaft thrust washer
18 Rear bearing shell
19 Rear bearing cap
20 Relief valve
21 Spring
22 Copper washer
23 Cap nut
24 Oil pump body
25 Oil pump end plate
26 Centre bearing shell
27 Centre main bearing cap
28 Sump plug
29 Sump
30 Sump gasket
31 Front bearing shell
32 Front main bearing cap
33 Sealing wedges
34 Sump bolt
35 Slotted screw
36 Front sealing block
37 Front engine mounting
38 Gasket
39 Front engine plate
40 Oil seal
41 Gasket
42 Front timing cover
43 Slotted setscrew
44 Bolt
45 Plain washer
46 Split pin
47 Chain tensioner
48 Pivot pin
49 Bolt
50 Generator pedestal
51 Dipstick
52 Bracket
53 Nyloc nut
54 Bolt
55 Nyloc nut
56 Breather pipe
57 Cylinder block
58 Cylinder head gasket
59 Cylinder head
60 Generator adjusting link
61 Rocker cover gasket
62 Rocker cover

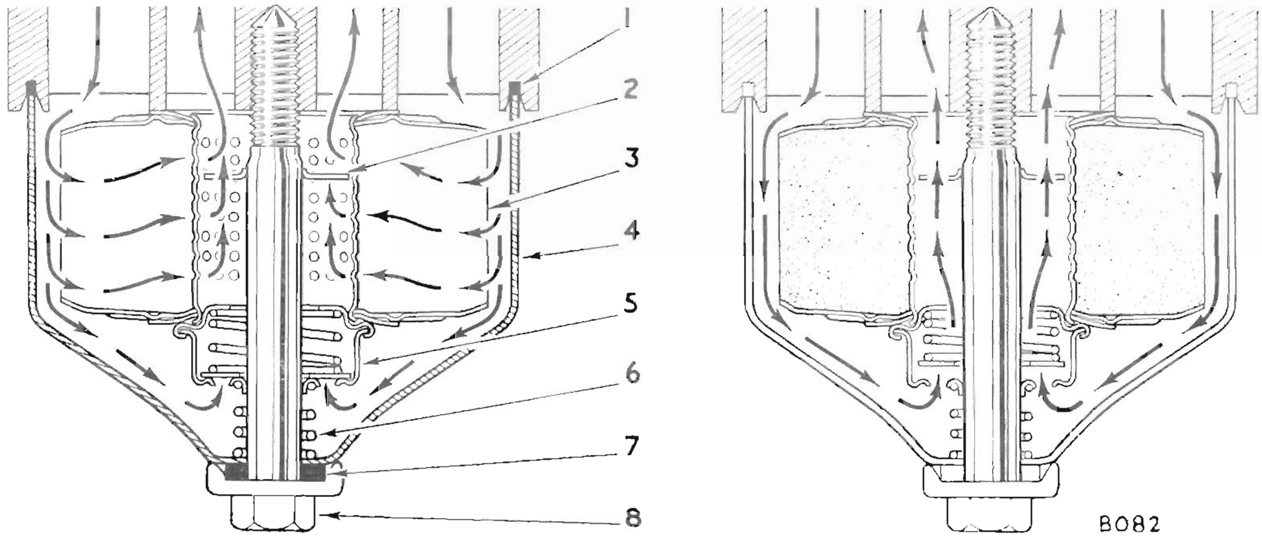


Fig. 8. Vitesse — oil filter operation

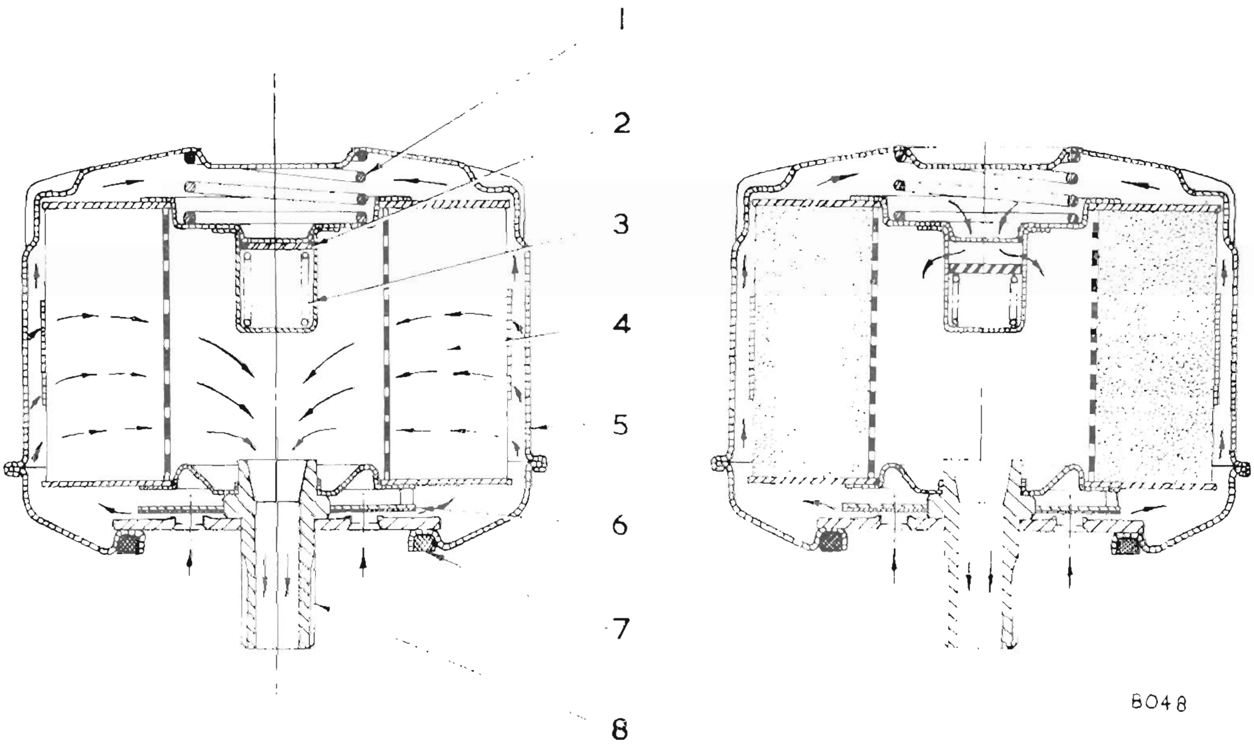


Fig. 9. Herald 1200, 12/50 and Spitfire — oil filter operation

VITESSE ENGINE DETAILS

(Moving Parts)

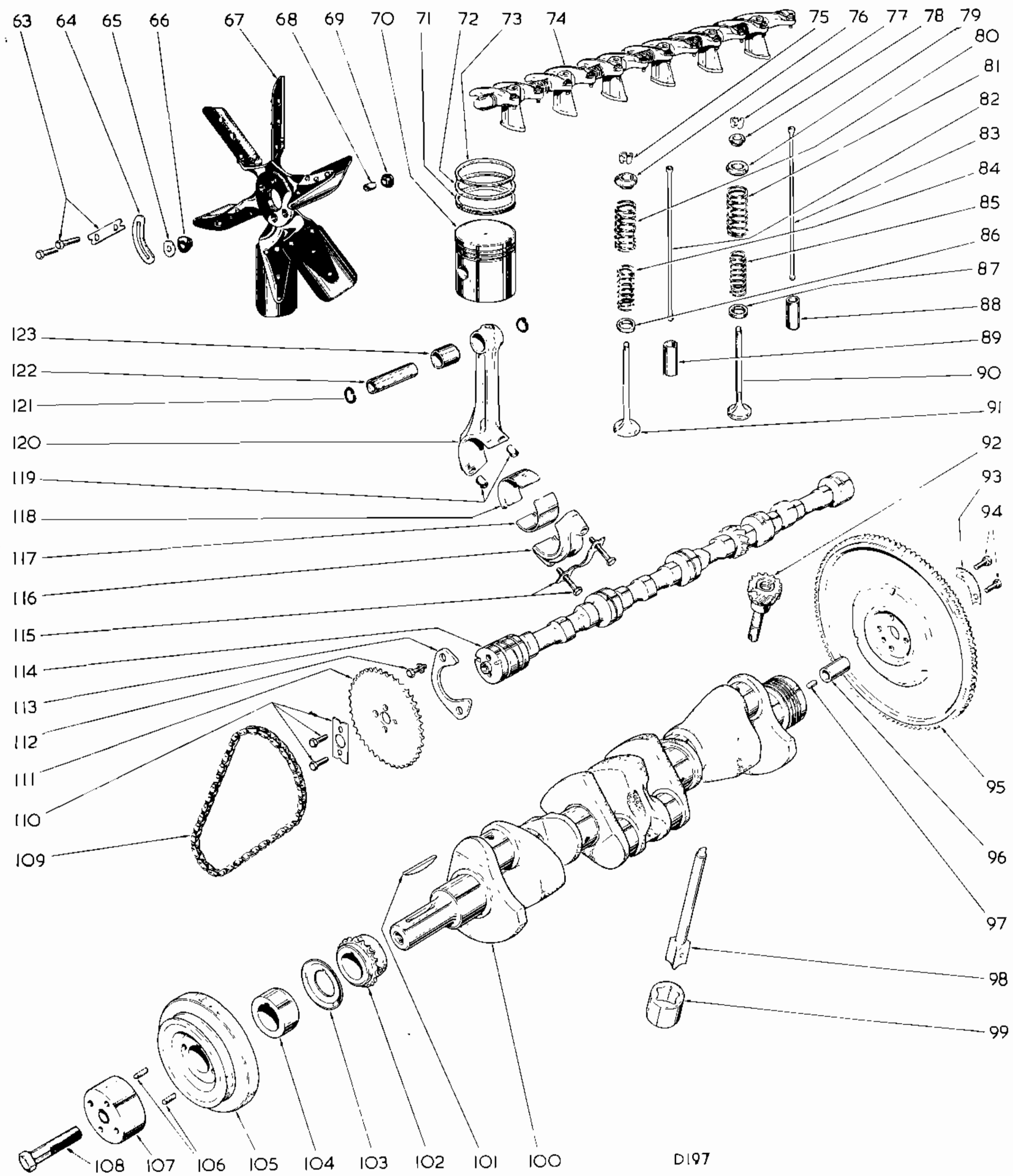


Fig. 10. Vitesse engine details (moving parts)

Key to Fig. 10

63 Bolts and lock tabs
64 Balancer
65 Washer
66 Rubber bush
67 Fan assembly
68 Steel bush
69 Rubber bush
70 Piston
71 Oil control ring
72 Taper compression ring
73 Plain compression ring
74 Rocker assembly
75 Split cotters
76 Collar
77 Split cotters
78 Inner collar (exhaust)
79 Outer collar (exhaust)
80 Spring—outer
81 Spring—outer
82 Push rod
83 Push rod
84 Spring—inner
85 Spring—inner
86 Lower collar
87 Lower collar
88 Tappet
89 Tappet
90 Exhaust valve
91 Inlet valve
92 Distributor and oil pump drive gear
93 Lock tab
94 Bolt
95 Flywheel
96 Bush
97 Dowel
98 Inner rotor and spindle
99 Outer rotor
100 Crankshaft
101 Key
102 Sprocket
103 Flinger
104 Distance piece
105 Crankshaft pulley
106 Dowels
107 Fan boss
108 Bolt
109 Timing chain
110 Bolts and lock tab
111 Camshaft sprocket
112 Bolt
113 Keeper plate
114 Camshaft
115 Bolt and lock tab
116 Conn-rod cap
117 Conn-rod bearing shell—lower
118 Conn-rod bearing shell—upper
119 Dowels
120 Conn-rod
121 Circlip
122 Gudgeon pin
123 Gudgeon pin bush

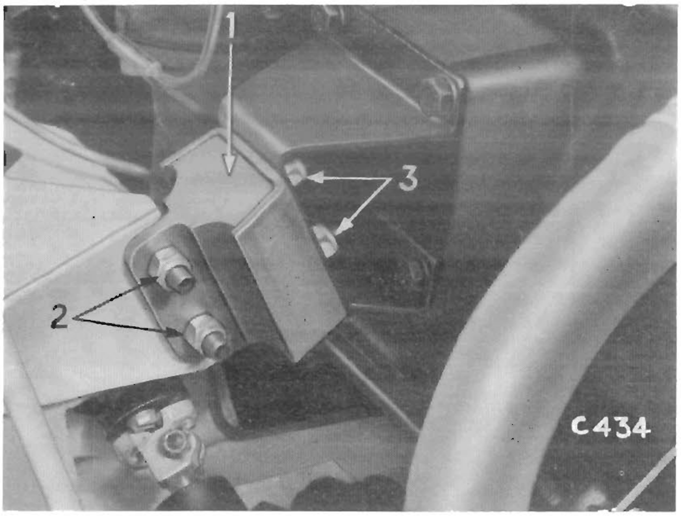


Fig. 11. Front engine mountings

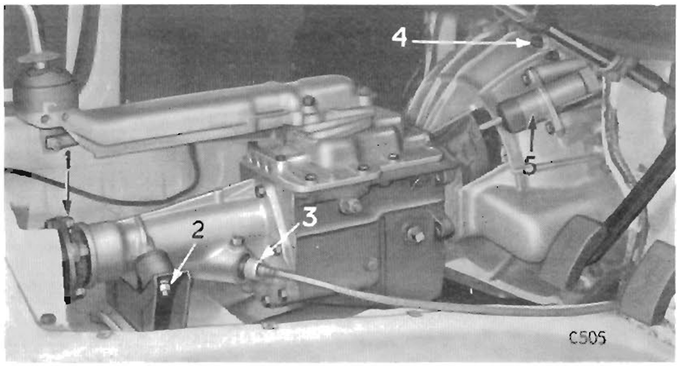


Fig. 12. Gearbox attachments

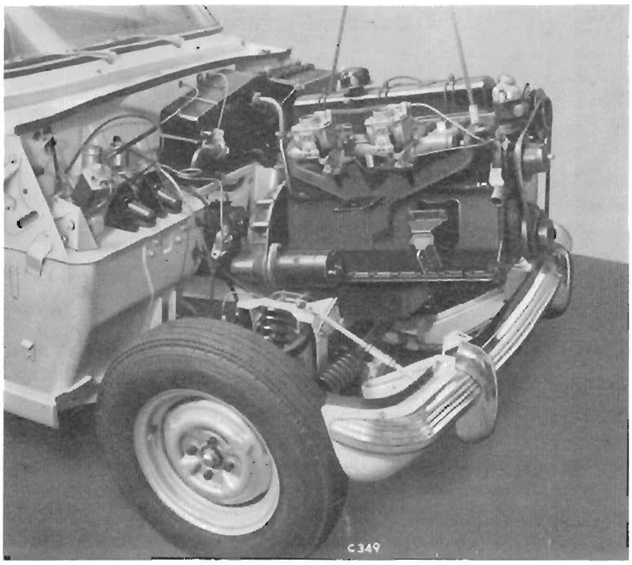


Fig. 13. Using sling to remove engine and gearbox

ENGINE INSTALLATION

Refit the clutch unit and gearbox to the engine.

Using a lifting cable and hoist, lift and manoeuvre the engine and gearbox unit into position.

Refit :

- Rear mountings (2), Fig. 12.
- Front mountings (1), Fig. 11.
- Gearchange extension.
- Propeller shaft.
- Clutch slave cylinder.
  Speedo cable.
  Overdrive solenoid cables (if fitted).
  Gearbox cover, Fig. 17.
- Carpets and seats.
- Starter motor cable.
  Exhaust pipe flange and bracket to clutch housing.
- Heater hoses.
- Carburettor choke and throttle controls.
- Air cleaner.
  Radiator and hoses, Page 1·203.

Referring to Fig. 2, refit :—

  Engine earthing strap.
- Fuel pipe to pump (12).
- Cable to coil (8) and 'D' and 'F' cable to generator (10 and 11).
- Oil pressure switch cable (9).

Fit the shouldered rubber bushes (66). Fig. 10, steel bushes (68), balancer (64) and fan (67), aligning the holes in the balancer, fan and boss (107) with the shank of a $\frac{1}{16}$" (1·6 mm.) dia. drill to maintain the original balance of the assembly.

Refit the bonnet (see group 5). Re-connect the battery, refill the cooling system, sump and gearbox to the correct levels.

Prime the carburettors, start the engine and tune the carburettors as described on page 1·311.

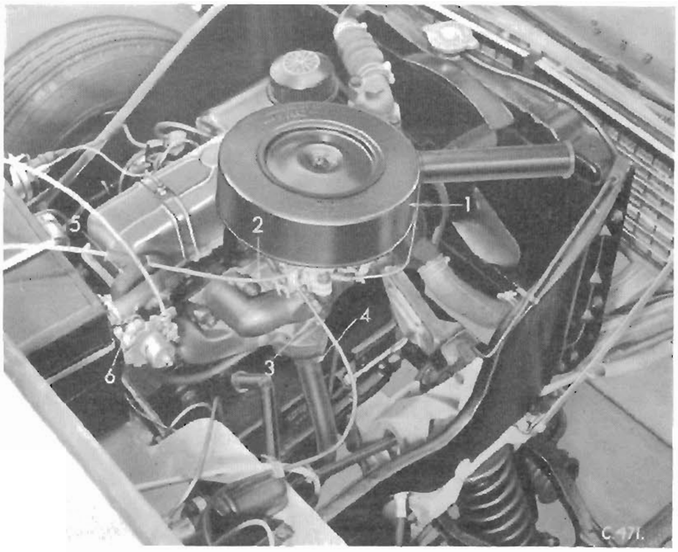


Fig. 14. Right-hand view of Herald 1200 engine

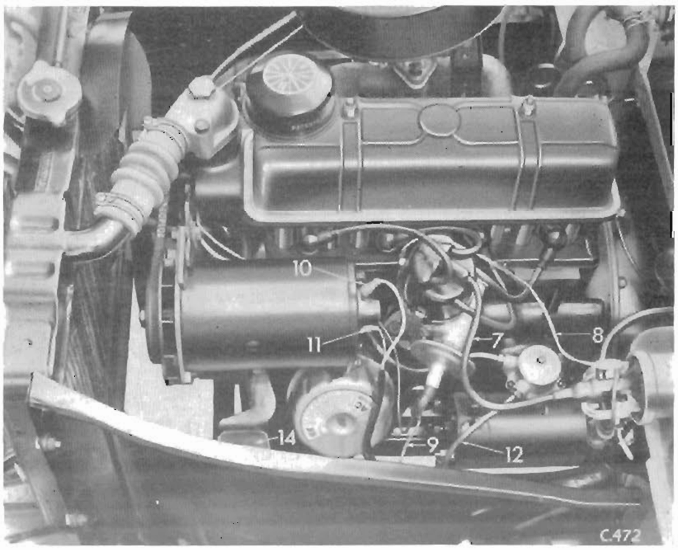


Fig. 15. Left-hand view of Herald 1200 engine

ENGINE AND GEARBOX REMOVAL

HERALD 1200, 12/50 AND SPITFIRE

Disconnect the battery and drain the cooling system, engine and gearbox. Remove bonnet (Group 5).

Disconnect and plug the rubber fuel pipe from tank to prevent fuel siphoning.

Refer to Fig. 14 and disconnect:— (R.H.S.)
- — Air cleaner/s (1).
- — Carburettor, choke and throttle controls (2 and 3).
- — Starter motor cable.
- — Exhaust pipe flange (4) and bracket to clutch housing.
- — Heater hoses (5 and 6).

Referring to Page 1·203 remove the radiator and hoses.

Refer to Fig. 15 and disconnect:— (L.H.S.)
- — Coil cables (7 and 8).
- — Oil Pressure switch cable (9).
- — Generator 'D' and 'F' cables (10 and 11).
- — Earth strap.
- — Fuel pipe to pump (12).
- — Tachometer cable (Spitfire only).

Working inside the vehicle and referring to Figs. 16, 17 and 18 remove:—
- — Front seats and carpets.
- — Cover attachments, facia support casting (Spitfire) and gearbox cover.
- — Speedometer cable.
- — Clutch slave cylinder (7).
- — Front end of propeller shaft (12 and 13).
- — Overdrive solenoid cables (if fitted).

Remove the gearchange extension and fit a temporary cardboard cover to prevent the entry of foreign matter.

Attach a lifting cable to the engine lifting eyes and, supporting the engine on a hoist, release:—
- — Front engine mountings (14), Fig. 15.
- — Rear engine mountings (10), Fig. 18.

Lift the engine and gearbox until the sump clears the chassis crossmember.

Continue to lift the unit and simultaneously move it forward until the gearbox is clear of the bulkhead aperture.

Manoeuvre the unit clear of the vehicle.

ENGINE INSTALLATION

Refit the clutch unit and gearbox to the engine.

Using a lifting cable and hoist, lift and manoeuvre the engine and gearbox unit into position. Referring to Figs. 14, 15, 16, 17 and 18.

Refit:—

- — Rear mountings (10).
- — Front mountings (14).
- — Gearchange extension.
- — Propeller shaft.
- — Clutch slave cylinder.
- — Speedo cable.
- — Overdrive solenoid cables (if fitted).
- — Gearbox cover, facia support casting (Spitfire).
- — Carpets and seats.
- — Starter motor cable.
- — Exhaust pipe flange (4) and bracket to clutch housing.
- — Heater hoses (5 and 6).
- — Carburettor choke and throttle controls (2 and 3).
- — Air cleaner (1).
- — Radiator and hoses.
- — Engine earthing strap.
- — Fuel pipe to pump (12).
- — Cable to coil (8) and 'D' and 'F' cable to generator (10 and 11).
- — Oil pressure switch cable (9).

Refit the bonnet (see group 5). Re-connect the battery, refill the cooling system, sump and gearbox to the correct levels.

Prime the carburettors, start the engine and tune the carburettors as described on pages 1·303 and 1·306.

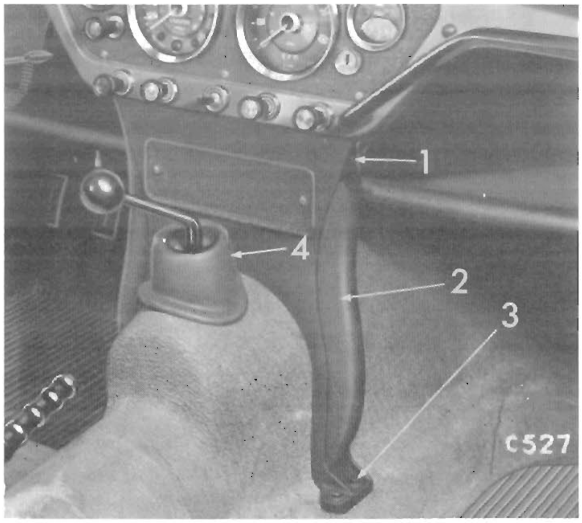


Fig. 16. Facia support casting (Spitfire)

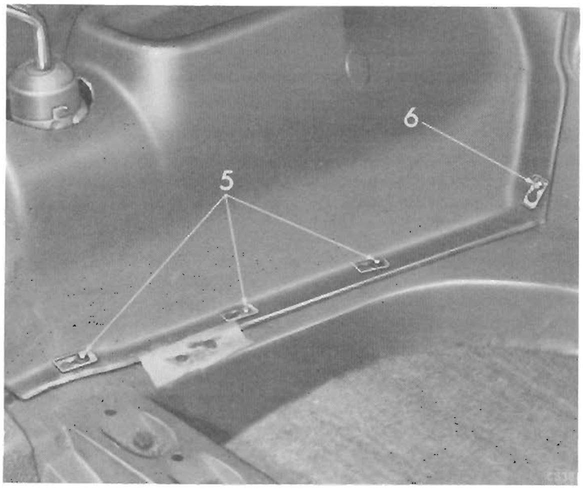


Fig. 17. Gearbox cover attachments

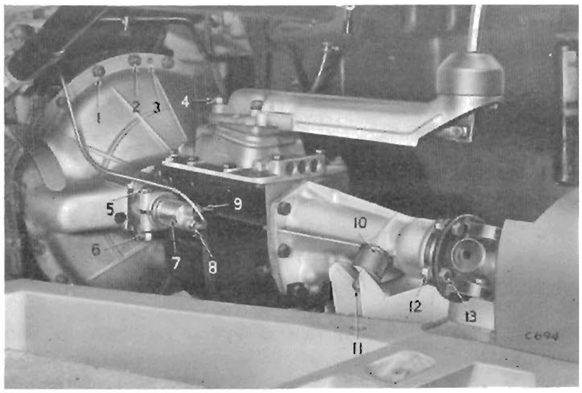


Fig. 18. Left-hand side of gearbox

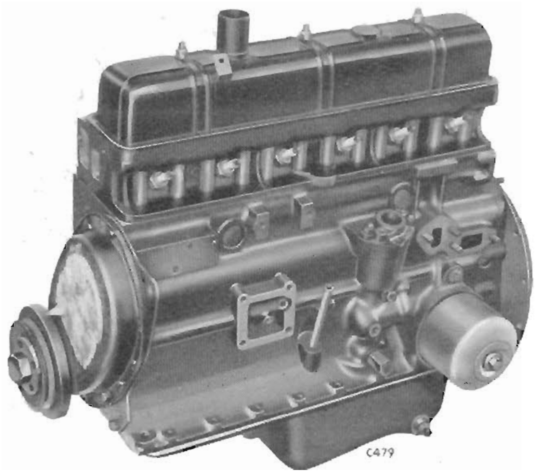


Fig. 19. Left-hand front view of Vitesse reconditioned unit

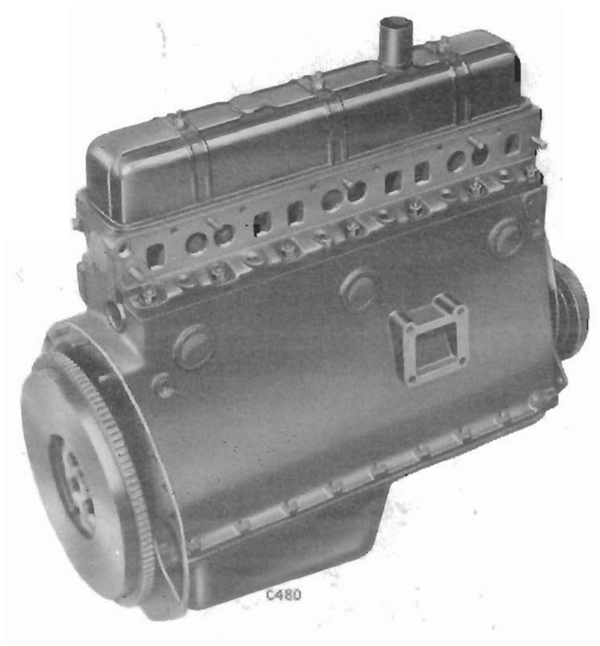


Fig. 20. Right-hand rear view of Vitesse reconditioned unit

REPLACEMENT UNIT

Removing Auxiliary Equipment

Before returning an engine for reconditioning, drain the sump and remove the following items:—

1 Gearbox and clutch unit
2 Generator and fan belt
3 Water pump
4 Fuel pump
5 Distributor
6 Coil
7 Inlet and exhaust manifold
8 Starter motor
9 Temperature transmitter
10 Top water elbow and thermostat
11 Sparking plugs

Refitting Auxiliary Equipment

Remove all masking tape from the apertures in the reconditioned unit and ensure that all joint faces are clean. Using new gaskets, fit the following items:—

1 Clutch unit and gearbox
2 Water pump
3 Generator and fan belt
4 Distributor. For timing see page 1·141.
5 Fuel pump
6 Coil. Ensure a good earth to the cylinder block
7 Inlet and exhaust manifolds
8 Top water elbow and thermostat
9 Temperature transmitter
10 Starter motor
11 Sparking plugs

REPLACEMENT UNIT

Removing Auxiliary Equipment

Before returning an engine for reconditioning, drain the sump and remove the following items:—

1 Gearbox and clutch unit
2 Generator and fan belt
3 Water pump
4 Fuel pump
5 Distributor
6 Coil
7 Inlet and exhaust manifold
8 Starter motor
9 Temperature transmitter
10 Top water elbow and thermostat
11 Sparking plugs

Refitting Auxiliary Equipment

Remove all masking tape from the apertures in the reconditioned unit and ensure that all joint faces are clean. Using new gaskets, fit the following items:—

1 Clutch unit and gearbox
2 Water pump
3 Generator and fan belt
4 Distributor. For timing see page 1·141.
5 Fuel pump
6 Coil. Ensure a good earth to the cylinder block
7 Inlet and exhaust manifolds
8 Top water elbow and thermostat
9 Temperature transmitter
10 Starter motor
11 Sparking plugs

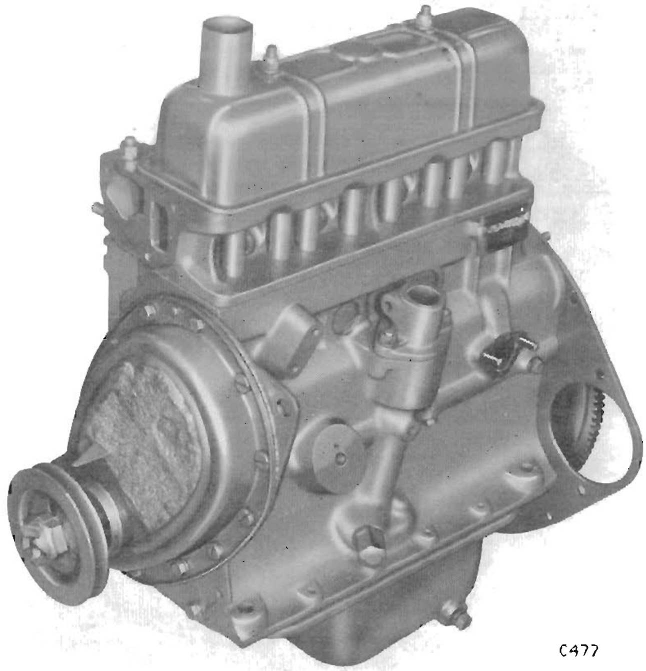


Fig. 21. Left-hand front view of Herald 1200, 12/50 or Spitfire reconditioned unit

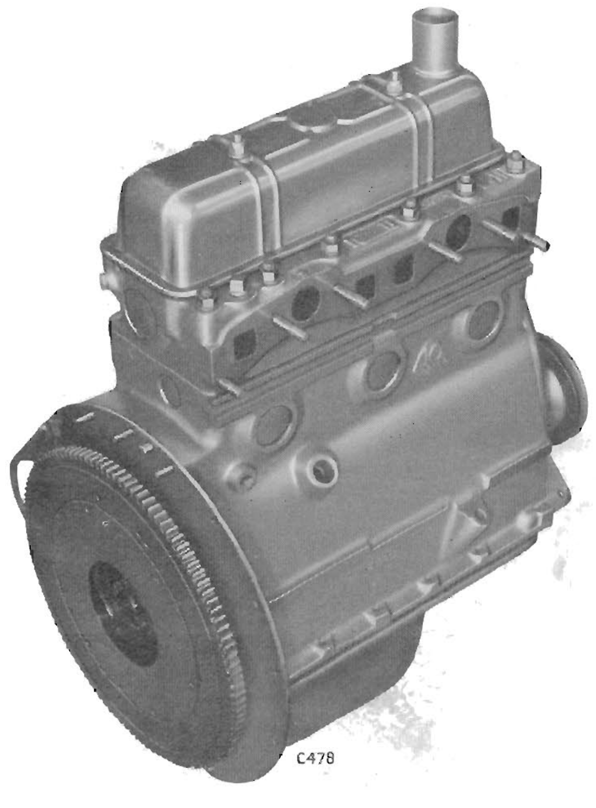


Fig. 22. Right-hand rear view of Herald 1200, 12/50 or Spitfire reconditioned unit

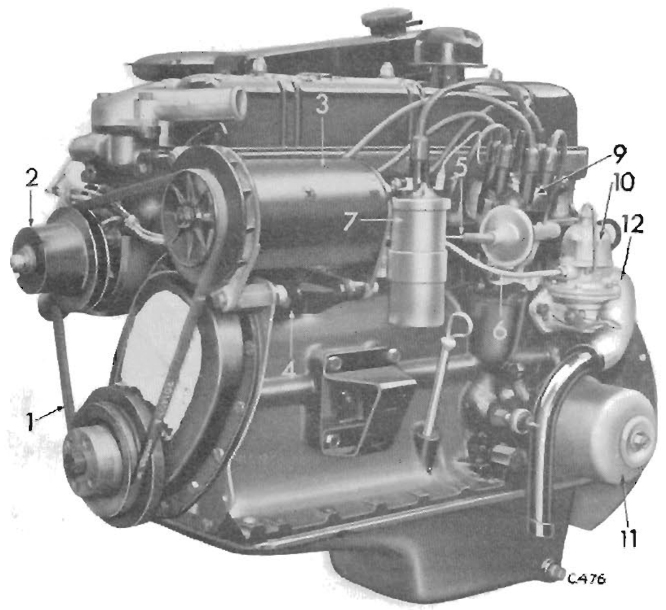


Fig. 23. Left-hand front view of Vitesse engine

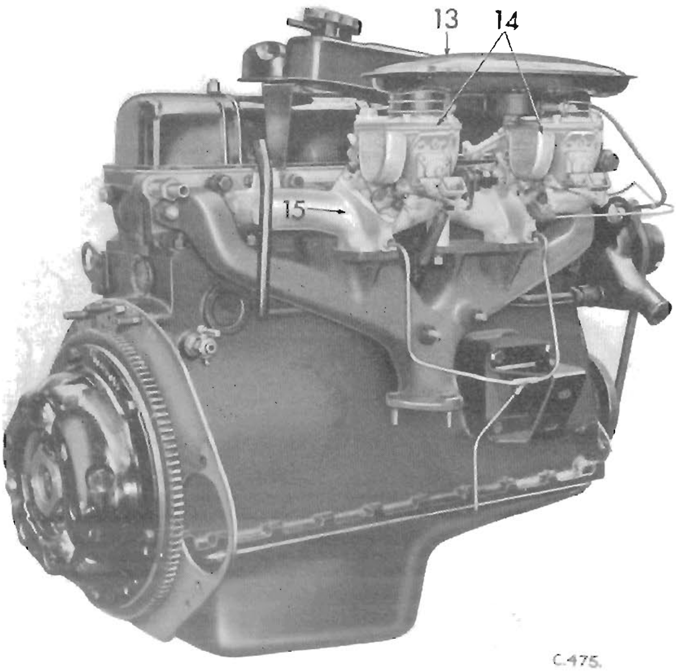


Fig. 24. Right-hand rear view of Vitesse engine

ENGINE DISMANTLING

Remove the gearbox and clutch assembly; place on a stand or bench and dismantle as follows:—

Refer to Figs. 23 and 24 and remove:—

- — Driving belt (1).
- — Water pump (2).
- — Generator (3) and bracket (4).
- — Fuel and vacuum pipes (5 and 6).
- — Coil (7), tachometer cable (Spitfire), distributor (9) and sparking plugs.
- — Fuel pump (10).
- — Oil filter (11).
- — Breather pipe (12).
- — Carburettors and manifolds (13, 14 and 15).
- — Dipstick.

To complete dismantling operations, refer to Figs. 3, 5, 7 and 10.

Remove:—

— Rocker cover (62), rocker shaft (74), push rods (82) and (83).

— Cylinder head (59), gasket (58), tappets (88) and (89).

Using a valve spring compressor, remove:—

— Collets (75) and (77), collar (76), (78) and (79), springs (80), (81), (84) and (85), collars (86) and (87), valves (90) and (91).

— Oil sump (29), gasket (30) and oil pump (24) and (25).

— Conn-rod caps (116) with bearing shells (117).

— Pistons (70), connecting rods (120) with bearing shells (118).

— Circlips (121) and eject the gudgeon pins (122).

Front sealing block (36), main bearing caps (19), (27) and (32) with bearing shells (18), (26) and (31).

— Flywheel (95).

— Distributor adaptor (8), drive gear (92).

— Bolt (108) or nut (124), fan boss (107), pulley (105), timing cover (42) and gasket (41), sprocket (111), chain (109) and distance piece (104).

— Camshaft keeper (113), camshaft (114).

— Front bearer plate (39) and crankshaft (100), bush (96).

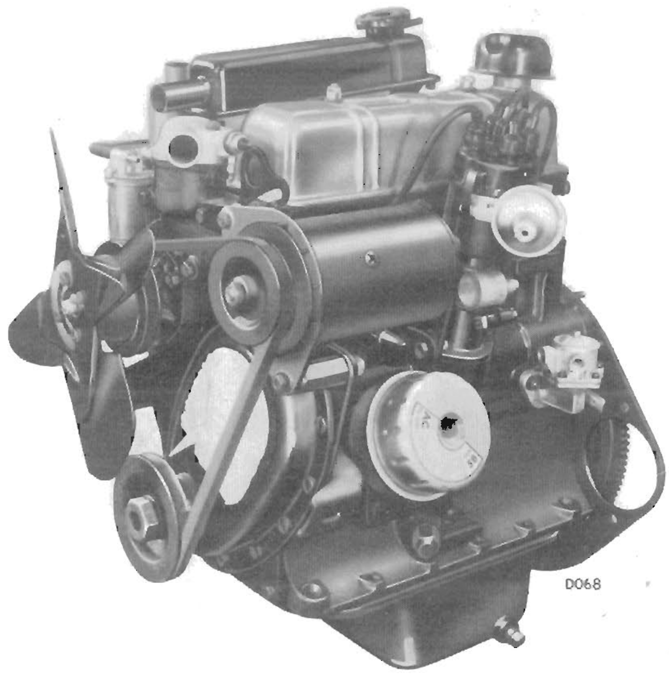


Fig. 25. Left-hand front view of Spitfire engine

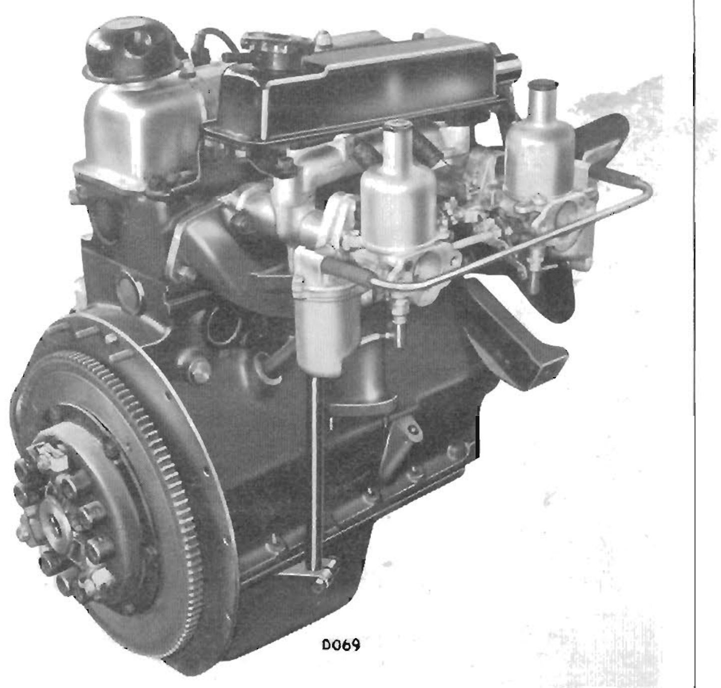


Fig. 26. Right-hand rear view of Spitfire engine

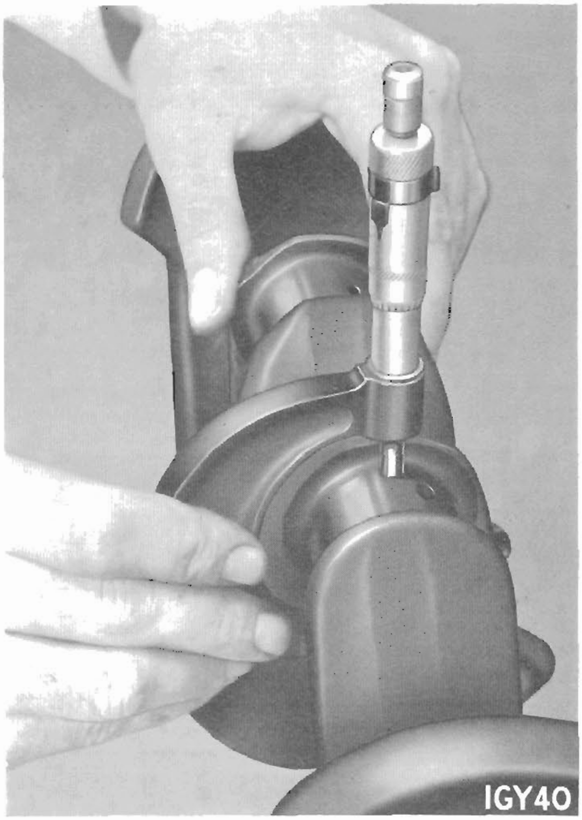


Fig. 27. Using a micrometer to measure crankpins

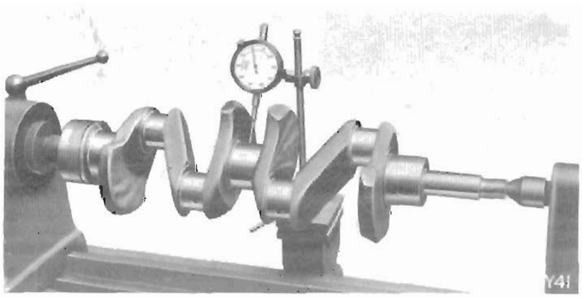


Fig. 28. Checking journal run-out between centres

ENGINE RECONDITIONING

General Recommendations

Scrape old gasket material from the joint faces and clean all engine components, preferably in a trichlorethylene degreasing plant, giving particular attention to oilways.

Assess the serviceability of all components by careful examination and by checking the measurements of worn surfaces against the maximum worn tolerances given on pages 1·102 to 1·108.

When rebuilding the engine, use new gaskets, lockplates, and renew damaged studs, nuts, bolts, spring washers and leaking core plugs.

Use Hylomar, Wellseal or Hermetite jointing compounds for all gasket joints and sealing block faces.

Tighten all nuts, bolts and studs to the appropriate torque figures.

Crankshaft Regrinding

Measure the diameter of the crankshaft journals and crankpins at various points to determine maximum wear, taper and ovality. If the wear exceeds the worn tolerance quoted on page 1·102 regrind the crankshaft to the nearest undersize dimension.

Undersize Bearings

Dimensions of undersize bearings are given on page 1·103.

Studs

Refit all studs and dowels to the cylinder block as shown on Figs. 29 and 30.

STUDS, DOWELS AND PLUGS

VITESSE

Illustration No.	*Size*	*No.*	*Part No.*
1	Stud, $\frac{3}{8}$″ UNF × 1·34″ . .	2	105124
2	Stud, $\frac{5}{16}$″ UNF × 1·38″ . .	2	106419
3	Dowel		127398
4	Setscrew, $\frac{5}{16}$″ UNF × $\frac{3}{8}$″ . .	1	HU.0803
5	Copper Washer, $\frac{5}{16}$″ I/D	1	500469
6	Dowel, $\frac{3}{8}$″ × 1″	1	DP.0616
7	Stud, $\frac{5}{16}$″ UNF × 1·31″ . .	3	101962
8	$\frac{1}{4}$″ NPSL Dry Seal Plug . .		
9	Dowel, $\frac{3}{8}$″ × $\frac{5}{8}$″	1	DP.0610
10	Stud, $\frac{3}{8}$″ UNF × 3·09 . .	6	132495
11	Stud, $\frac{5}{16}$″ UNF × 4·13″ . .	3	105123
12	Stud, $\frac{3}{8}$″ UNF × 4·44″ HC	7	133805
	$\frac{3}{8}$″ UNF × 4·63″ LC	7	119758
13	Stud, $\frac{3}{8}$″ UNF × 1·44″ HC	7	133804
	$\frac{3}{8}$″ UNF × 1·56″ LC	7	133803
14	Dowel, $\frac{5}{16}$″ × [illegible]″	2	DP.0514
15	Plug, $\frac{1}{2}$″ NF × ·38″	1	PS.1103
16	$\frac{1}{8}$″ NP. Dry Seal Plug . .	6	118686
17	Oil Pressure Switch Adaptor	1	129889
18	Copper Washer, $\frac{7}{16}$″ I/D . .	2	500463
19	Setscrew, $\frac{7}{16}$″ UNF × $\frac{1}{2}$″ . .	1	HU.1004
20	Plug, $\frac{3}{4}$″ UNF × $\frac{1}{2}$″	1	PU.1404
21	Stud, $\frac{5}{16}$″ UNF × 1·16″ . .	2	100433
22	Stud, $\frac{5}{16}$″ UNF × 1·16″ . .	2	100433
23	Stud, $\frac{5}{16}$″ UNF × 1·31″ . .		101962

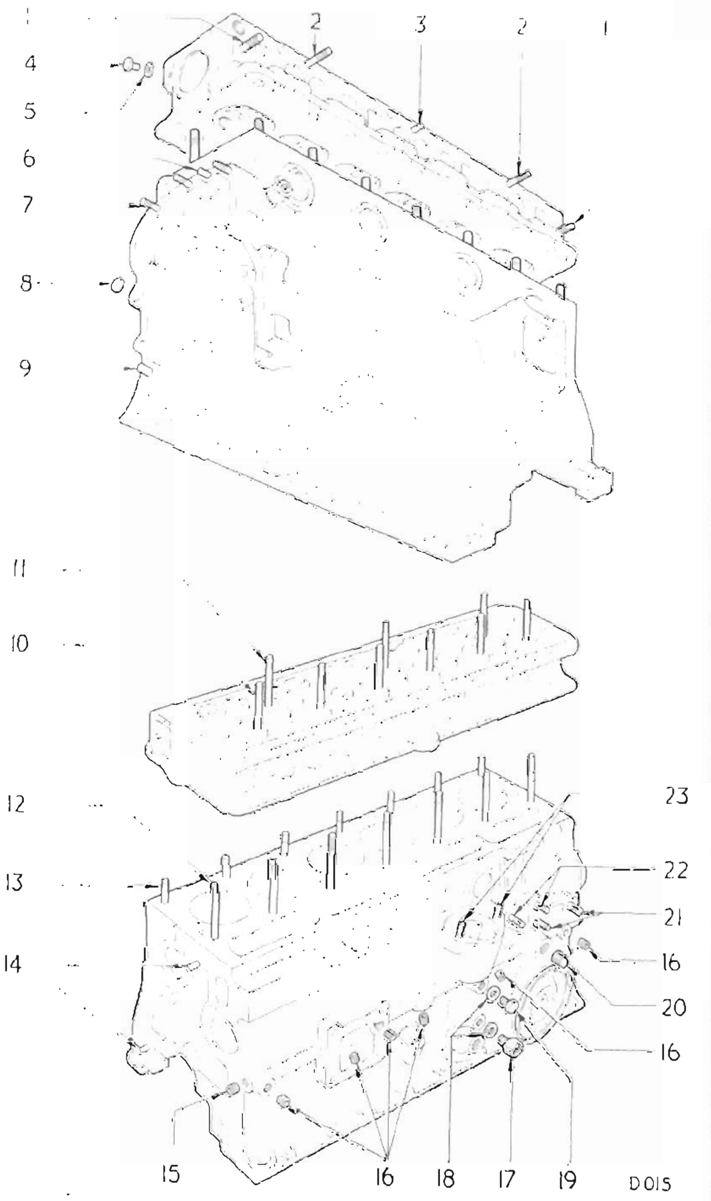


Fig. 29. Stud locations on Vitesse cylinder block

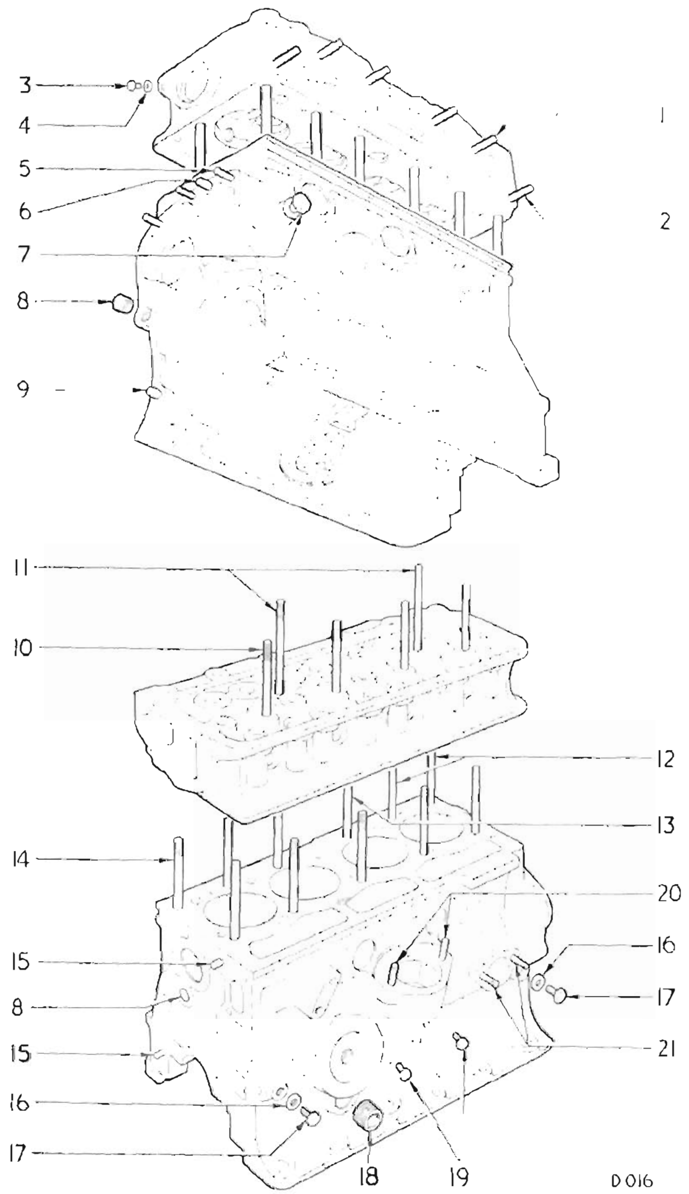


Fig. 30. Stud locations on Herald 1200, 12/50 and Spitfire cylinder block

STUDS, DOWELS AND PLUGS

HERALD 1200, 12/50 AND SPITFIRE

Illustration No.	*Size*	*No.*	*Part No.*
1	Stud, $\frac{3}{8}$" UNF × 1·34" ..	2	105124
2	Stud, $\frac{3}{8}$" UNF × 1·84" ..	4	105125
3	Setscrew, $\frac{5}{16}$" UNF × $\frac{3}{8}$" ..	1	HU.0803
4	Copper Washer, $\frac{5}{16}$" I/D ..	1	500469
5	Stud, $\frac{5}{16}$" UNF × 1·31" ..	3	101962
6	Dowel, $\frac{3}{8}$" × 1"	1	DP.0616
7	Drain Plug	1	129077
8	Core plug, $\frac{1}{2}$"	2	46549
9	Dowel, $\frac{3}{8}$" × $\frac{11}{16}$"	1	DP.0611
10	Stud, $\frac{3}{8}$" UNF × 3·09" ..	4	132495
11	Stud, $\frac{7}{16}$" UNF × 4·31" ..	2	105123
12	Stud, $\frac{3}{8}$" UNF × 4·38" LIFTING EYE	2	121217
13	Stud, $\frac{3}{8}$" UNF × 4·38" ACCEL. ABUTMENT	1	121217
14	Stud, $\frac{3}{8}$" UNF × 4·19" ..	9	105121
15	Dowel, $\frac{5}{16}$" × $\frac{5}{8}$"	2	DP.0514
16	Copper Washer, $\frac{5}{16}$" I/D ..	4	500469
17	Setscrew, $\frac{5}{16}$" UNF × 0·44"	4	101022
18	Plug, Oil Gallery	1	116516
19	Dry Seal Plug, 0·254" Hex.	2	101962
20	Stud, $\frac{5}{16}$" UNF × 1·31" ..		101962
21	Stud, $\frac{5}{16}$" UNF × 1·16" ..	2	100433

ENGINE RECONDITIONING

Except where otherwise stated, all numbered items are shown on Figs. 3, 5, 7 and 10.

Crankshaft and Bearings

Ensure that the bearing housings are clean and assemble the main bearing shells to the crankcase. Lubricate the crankshaft and fit it to the crankcase. Slide the thrust washers, white metal faces outward, between the rear bearing housing and crankshaft thrust faces.

Assemble the bearing shells to the caps and fit the caps to the crankcase, ensuring that the markings correspond with those on the crankcase as shown on Fig. 32.

Crankshaft End Float

Check the end float by moving the crankshaft fore and aft, as shown. The correct end float is 0·004"—0·006" (0·1—0·15 mm.).

Excess end float can be reduced by fitting 0·005" (0·127 mm.) oversize thrust washers.

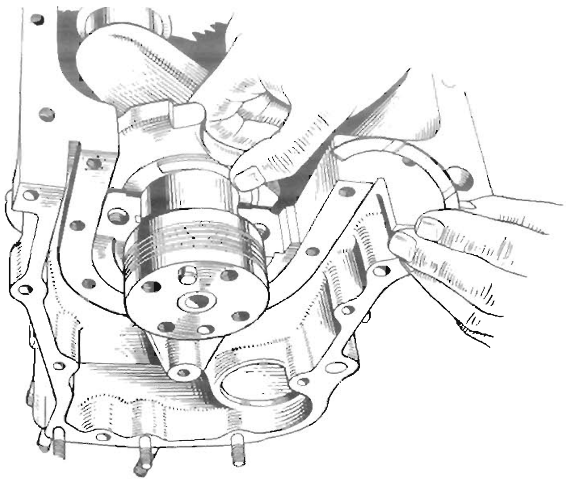


Fig. 31. Fitting crankshaft thrust washers

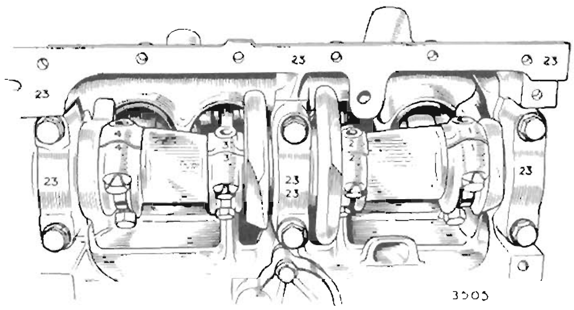


Fig. 32. Main and connecting rod bearing cap location markings

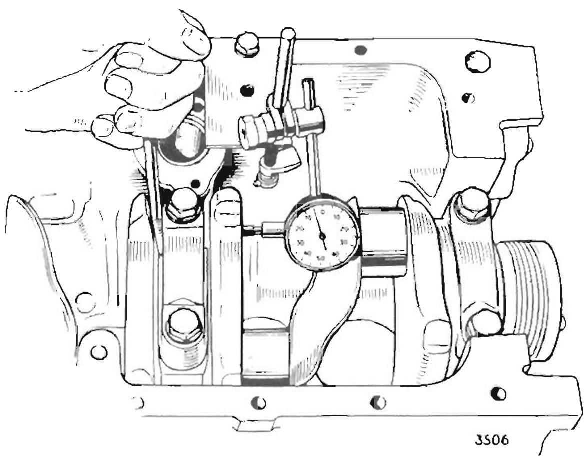


Fig. 33. Measuring crankshaft end float

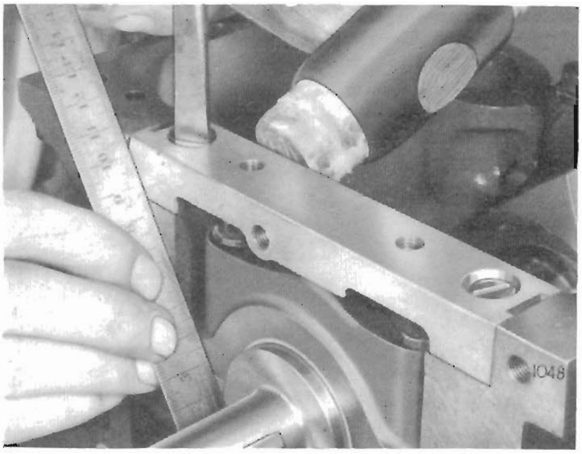


Fig. 34. Aligning front sealing block

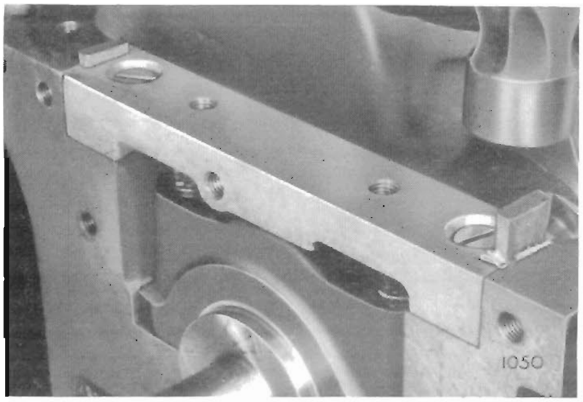


Fig. 35. Fitting front sealing block wedges

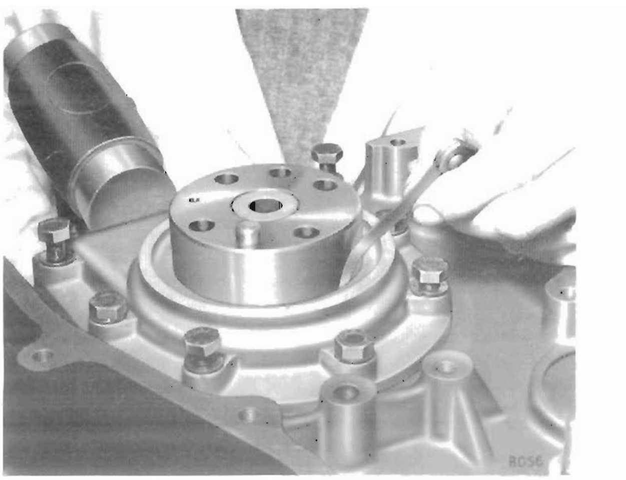


Fig. 36. Centralizing rear oil seal on end shaft

Front Sealing Block (Fig. 35)

Coat the ends of the sealing block with jointing compound and fit it to the cylinder block. Align the block with the front face of the crankcase and secure it with two cheese-headed screws. Drive two wood wedges into the slots of the sealing block and cut them off flush with the crankcase face.

Rear Oil Seal (Fig. 36)

Coat a new gasket with jointing compound and secure this and the rear oil seal to the crankcase with bolts and spring washers, leaving the bolts semi-tight. Use a 0·003″ (0·076 mm.) feeler strip and hide mallet to centralize the oil seal on the rear crankshaft journal before tightening the bolts.

From Commission Nos.: Spitfire, FC 2794; Herald 1200, GA 115730; Herald 12/50, GD 8314 the rear oil seal clearance is reduced to 0·002″ (0·0508 mm.).

Rear Engine Bearer Plate

Fit the rear bearer plate to the crankcase and secure with setscrews and spring washers.

Small End Bush

Use Tool No. 20SM.FT.6201 to renew small end bushes. Ensure that the small end bush oil feed holes are aligned.

Reaming the Gudgeon Pin Bush

Use Tool No. 6200A to ream the gudgeon pin bushes as shown.

Connecting Rod Alignment

Use connecting rod alignment Jig. No. 335, with adaptor No. 336-2 to check bend 'A' and twist 'B'. Determine amount of misalignment by inserting feeler gauges between the face of the fixture and one of the buttons.

Correct misalignment with a bending iron and re-check.

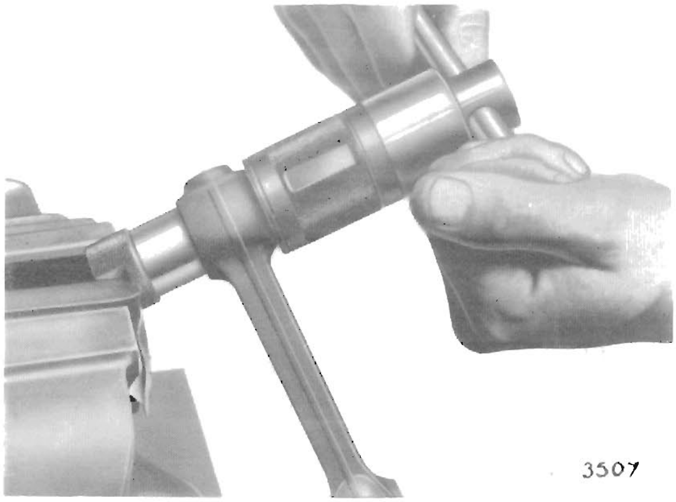


Fig. 37. Renewing small end bush — using tool No. 6201

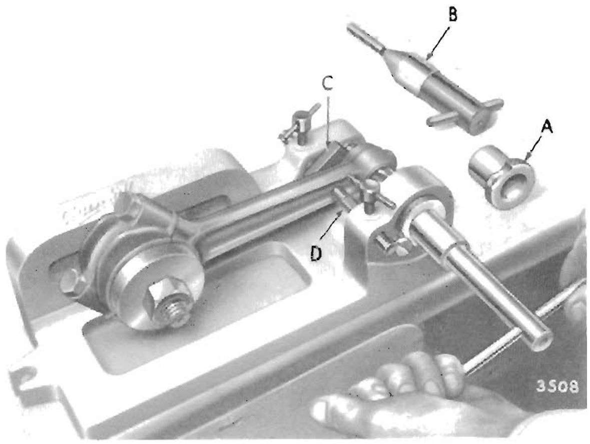


Fig. 38. Reaming the gudgeon pin bush — using tool No. 6200B

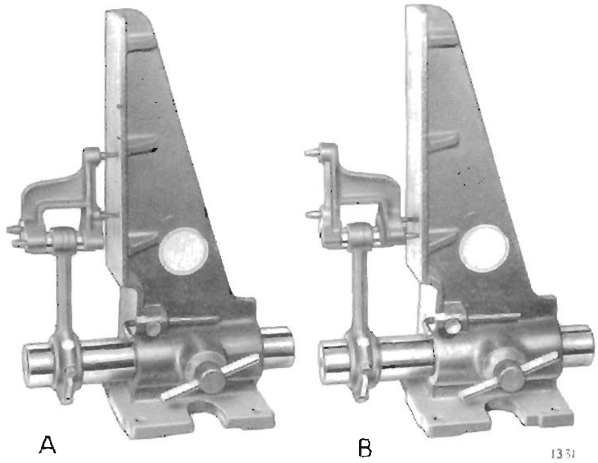


Fig. 39. Checking connecting rod for bend and twist — using tool No. S336-3

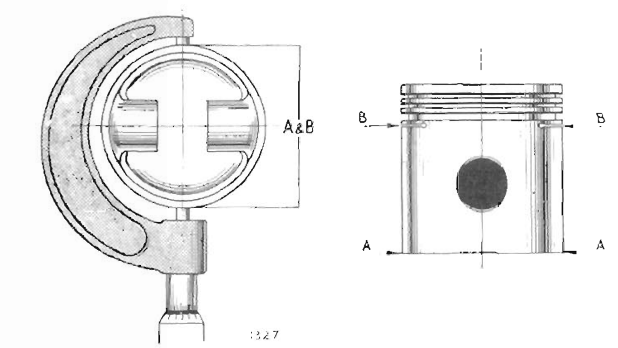


Fig. 40. Piston measurements

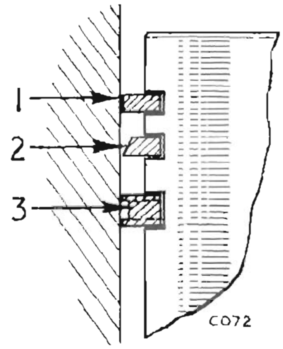


Fig. 41. Piston ring positions

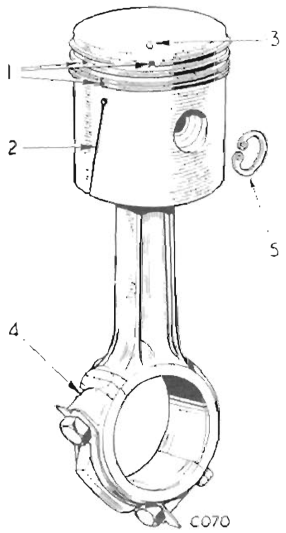


Fig. 42. Piston and connecting rod assembly

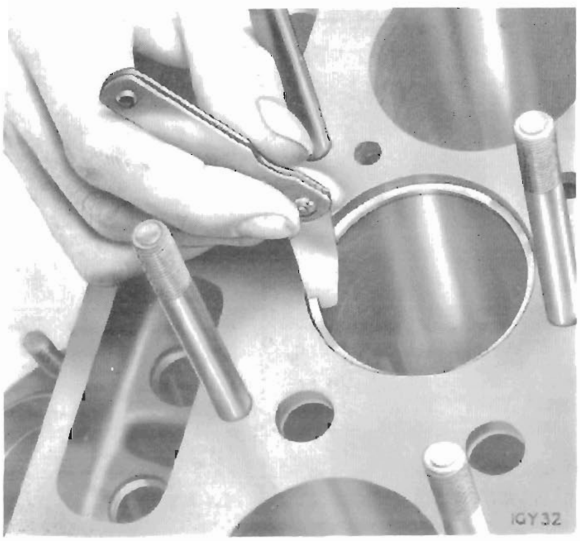


Fig. 43. Measuring piston ring gap in bore

Pistons and Cylinder Bores

Pistons and cylinder bores are graded 'F', 'G' or 'H' according to their dimensions. The appropriate symbol is stamped on the top face of each piston. When fitting new pistons to cylinder bores ensure that they are both of the same grade, for example, 'F' piston to 'F' bore. Dimensions are given on page 1·108.

Piston Measurements

The piston dimensions given on page 1·108 are the maximum when measured across the thrust faces at the top of the skirt 'BB' and bottom of the skirt 'AA' (Fig. 40).

Piston Weight

The maximum variation in weight between four pistons comprising a "set" must not exceed 4 drams (7·09 grammes).

Piston Rings (Fig. 41)

Rings are fitted to each piston as follows:

1. Compression ring (plain).
2. Taper faced compression ring. Fit with taper towards top and 'T' or 'Top' marking on upper face.
3. Oil control ring.

Gaps

First insert the ring into the cylinder bore, then use a piston to push the ring squarely down the bore to a point ¼" (6 mm.) from the top. Measure the gap with feeler gauges (Fig. 43). Specified gaps are given on page 1·103.

Ring to Groove Clearance

Piston ring thickness, width of ring groove in the piston and recommended clearances are given on page 1·103.

Fitting Connecting Rods to Pistons

Ensure that the oil feed holes are unobstructed. Assemble the piston to the connecting rod as shown. Secure the gudgeon pin with circlips.

Measuring Cylinder Bores

Check the cylinder bore diameters with a cylinder gauge or comparator such as the Mercer dial gauge shown on Fig. 44. Select an extension piece of suitable length, screw it into the instrument and lock it with the knurled locking ring. Using a 3" to 4" micrometer, set the feeler foot and extension piece to the correct bore diameter, rotate the dial to zero the needle, and tighten the locking screw.

Insert the gauge into the cylinder bore and, by taking readings at different positions, determine the maximum bore wear which normally occurs towards the top of the bore across its thrust axis. Re-bore cylinders worn in excess of the limits given on page 1·108 to suit the next oversize piston size.

If the cylinder bores are worn beyond the maximum re-bore diameter, the cylinder block must be bored out and cylinder liners pressed into the bores.

Fitting Pistons to Cylinder Bores

Using a piston ring clamp, compress the piston rings and insert each piston into its bore. Ensure that the connecting rod offset is towards the camshaft side of the engine

Fit the bearing shells to the connecting rods and caps, locating the bearing tags in the recesses provided. Fit the connecting rods to the crankpins, and assemble the caps, ensuring that the markings correspond as shown on Fig. 32. Fit new lockplates and securely tighten the connecting rod bolts and turn up the lockplate tabs.

OVERSIZE BORE DATA		
Oversize ..	0·020	0·040
Bore dia. ..	2·7488	2·7688
	2·7483	2·7683

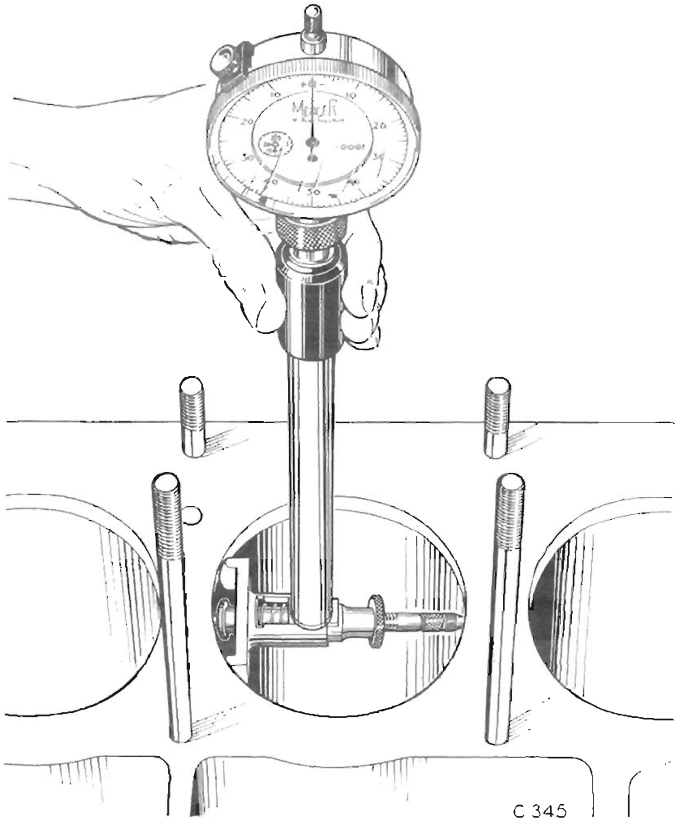


Fig. 44. Using a Mercer cylinder bore measuring instrument

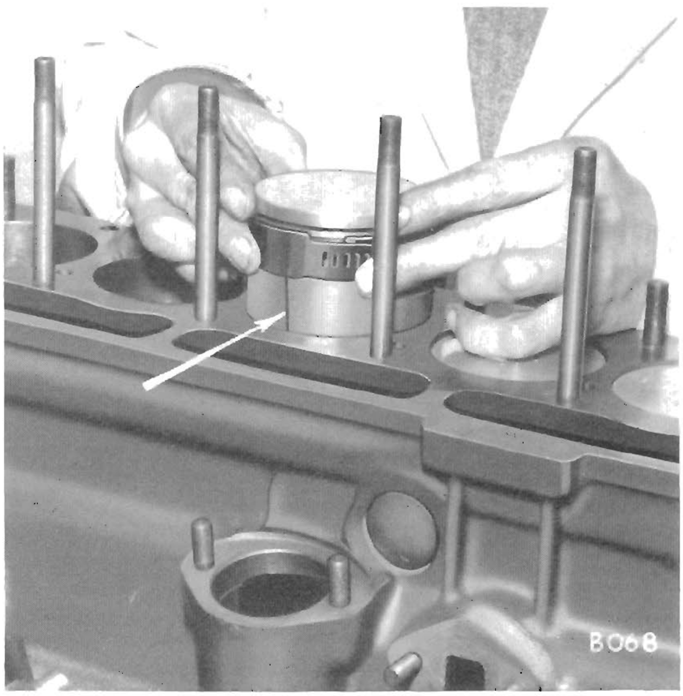


Fig. 45. Fitting pistons and connecting rods
Note split skirt to camshaft side of engine

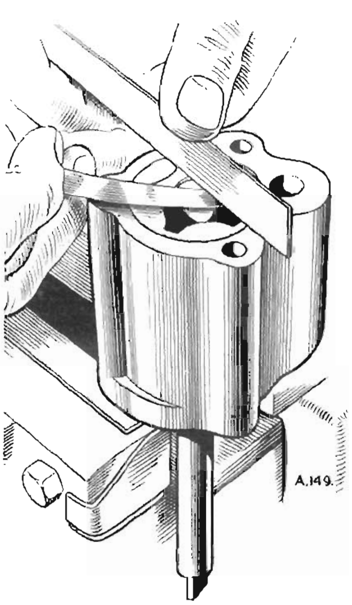


Fig. 46. Measuring rotor end float

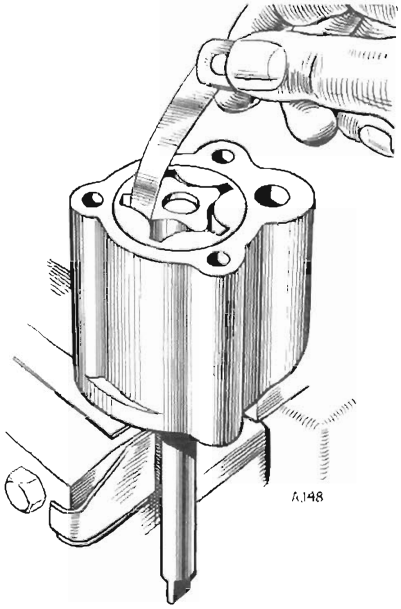


Fig. 47. Measuring clearance between inner and outer rotors

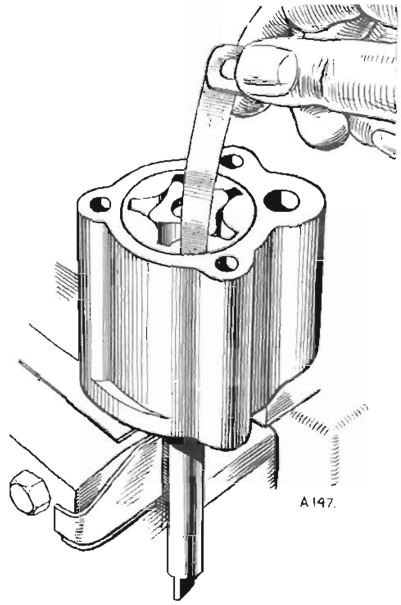
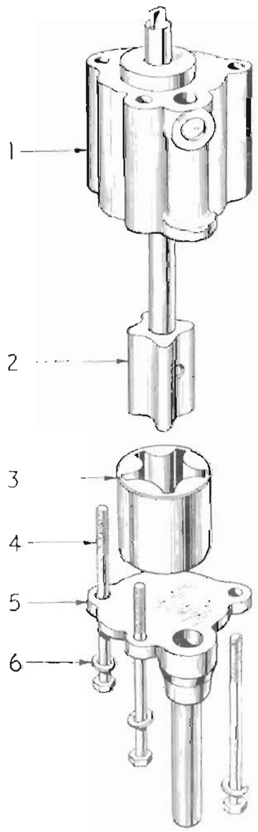


Fig. 48. Measuring clearance between outer rotor and pump body



1 Body

2 Inner rotor

3 Outer rotor

4 Bolt

5 End plate

6 Spring washer

Fig. 49. Exploded view of oil pump

Oil Pump

Measure clearance between inner and outer rotors.

This must not exceed 0·010″ (·254 mm.).

Measure clearance between outer rotor and body.

This must not exceed 0·010″ (·254 mm.).

Measure the rotor end clearance.

This should not exceed 0·004″ (0·102 mm.).

Re-face the end plate face if worn.

Re-assemble the pump as shown and attach it to the cylinder block.

Engine Bearer Plate

Using a straight edge, check the face of the bearer plate for flatness, and correct any irregularities.

Locate the gasket (38) and bearer plate (39) on two dowels and secure with bolts, stud and spring washers.

Oil Sump

Using a straight edge, check the sump flanges for distortion and rectify as necessary.

When fitting the oil sump, note that a long bolt is used to secure the breather pipe bracket and two short bolts are fitted to the front sealing block.

Flywheel

Flywheel Clutch Face

If the flywheel clutch face is deeply scored, renew the flywheel, or alternatively, skim the face in a lathe, maintaining the following tolerances:—

Max. flywheel face run-out relative to spigot face at a radius of 5″.	·003″ (·0762 mm.).
Balance	1 dram.

Replacing the Starter Ring Gear

The starter ring gear is an interference fit and is shrunk on to the flywheel during initial assembly. Remove the ring gear by using a copper drift whilst supporting the flywheel on wood blocks sufficiently thick to raise the ring gear clear of the bench surface.

With the engagement face of the teeth facing rearwards, fit a new ring gear by heating it in boiling water before pressing it on to the flywheel. This operation will be facilitated by use of a drift and 'G' clamps as shown on Fig. 50. Do not heat the ring gear with a flame, as this will adversely affect the hardness of the teeth.

Fitting the Flywheel to the Crankshaft

Ensure that the flywheel attachment flange on the crankshaft and the corresponding spigot and face on the flywheel are clean. Fit the crankshaft spigot bush to its bore in the crankshaft. Screw a ⅜″ U.N.F. stud into one of the crankshaft holes as a pilot and fit the flywheel to the crankshaft flange, ensuring that the dowel and dowel hole correspond. Tighten the flywheel attachment bolts and secure them with the lockplates. Using a dial indicator gauge as shown on Fig. 51, measure the flywheel face for run-out.

Maximum run-out must not exceed ·003″ (·0762 mm.).

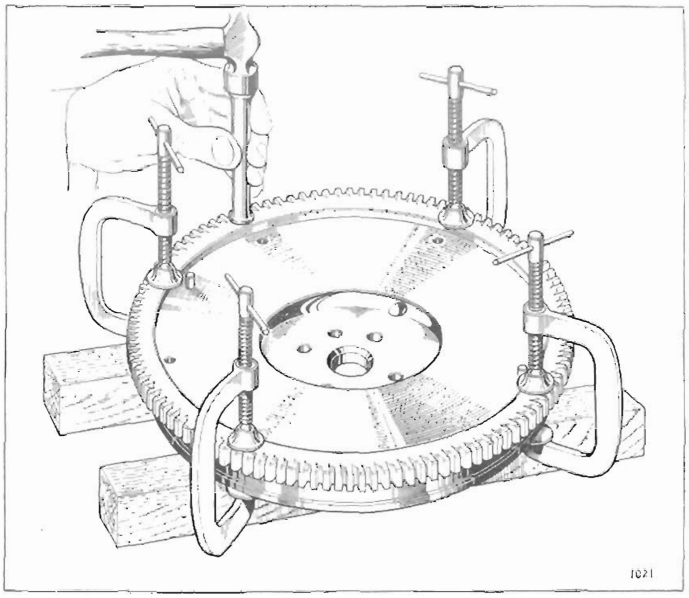


Fig. 50. Using clamps to fit a new ring gear to the flywheel

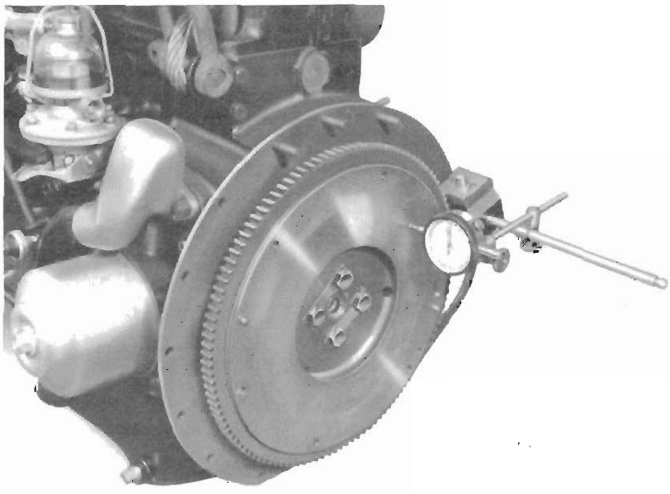


Fig. 51. Measuring flywheel face run-out with a magnetic base dial gauge

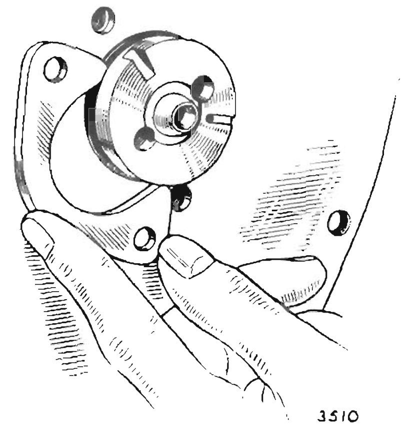
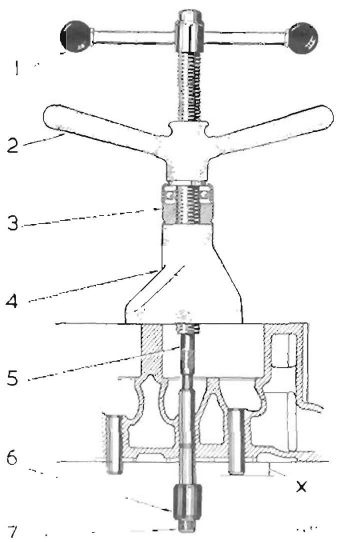
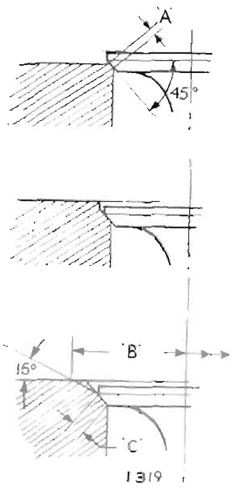


Fig. 52. Camshaft retainer plate



1 Handle
2 Threaded handle
3 Thrust race
4 Body
5 Adaptor
6 Distance collar
7 Knurled nut
X 0·749"—0·751"

Fig. 53. Renewing valve guides—using tool No. S60A-6



A = 0·060" (1·52 mm.)

B	*Inlet*	*Exhaust*
Spitfire	1·378" (35·0 mm.)	1·252" (31·8 mm.)
Herald 1200, 12/50	1·440" (36·5 mm.)	1·252" (31·8 mm.)
Vitesse	1·378" (35·0 mm.)	1·252" (31·8 mm.)

C = 0·10" (0·25 mm.) max.

Fig. 54. Correct and incorrect valve seat conditions

Camshaft

End Float

Assemble the camshaft retainer to the camshaft.

Measure the end float of the retainer on the camshaft. End float should be 0·003" to 0·0075" (0·08 mm. to 0·19 mm.).

Installation

Lubricate the camshaft bearings and insert the camshaft into the cylinder block. Fit the front retainer and secure it with two bolts and spring washers.

Tappets

Lubricate each tappet and insert it into the cylinder block, making sure that it rotates freely.

Cylinder Head Assembly

Examination

Remove carbon from the cylinder head and examine the valve seats for scores, burns and wear.

Inspect the valve springs for cracks or distortion and check the fitted load. Check the cylinder head welch plug for evidence of leakage and renew it if necessary.

Valve Guides

Check valve guide wear by inserting a new valve, lifting it ⅛" (3·2 mm.) from its seat and rocking it sideways. Movement of the valve head across its seat must not exceed 0·020" (0·5 mm.). If required, renew the guide by using Churchill Tool No. S.60A-6.

Valve guide protrusion above top face of the cylinder head must be:—

0·749"- 0·751" (19·025 - 19·075 mm.)

Valve Seat

When re-cutting the valve seats, ensure that the pilot of the cutter is a close fit in the valve guide. Should it be necessary to use a 15° cutter for reducing the seat width, do not exceed dimension 'B'.

Valve seat angle = 45°.

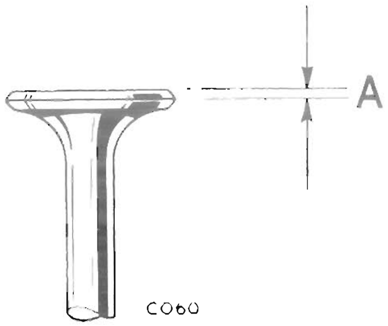


Fig. 54A. Minimum thickness at "A" $\frac{1}{32}$" (0·8 mm.)

Valve Seat Inserts

When the original valve seat cannot be rectified by re-cutting, use Churchill Tool No. 6056 with adaptors to bore out the old seats.

If both inlet and exhaust seat inserts are required, bore out the inlet seat recess first, fit the insert and then bore the exhaust recess, cutting into the edge of the inlet insert.

Remove all swarf from the cylinder head and drive the insert squarely into its bore. Secure it by peening the edges of the combustion chamber.

Cut a new seat on each valve insert as described under "Valve Seats".

Valves

Check valve stems for wear and distortion. Examine the condition of each valve face and re-face, or renew the valve as required. Remove the minimum necessary to clean up the face. Reject the valve if its head thickness is less than $\frac{1}{32}$" (0·8 mm.).

Valve Seat Grinding

Grind the valves into their respective seatings in the cylinder head.

Test each seating by lightly smearing the valve face with engineer's marking blue. Insert the valve into its seating and rotate it not more than $\frac{1}{8}$" (3 mm.) in each direction. A complete circle should appear on the valve seating, indicating satisfactory seating.

Valve Springs

If a spring testing machine is not available, use a spring balance as shown on Fig. 57 to check the valve springs. Valve spring data is given on page 1·106.

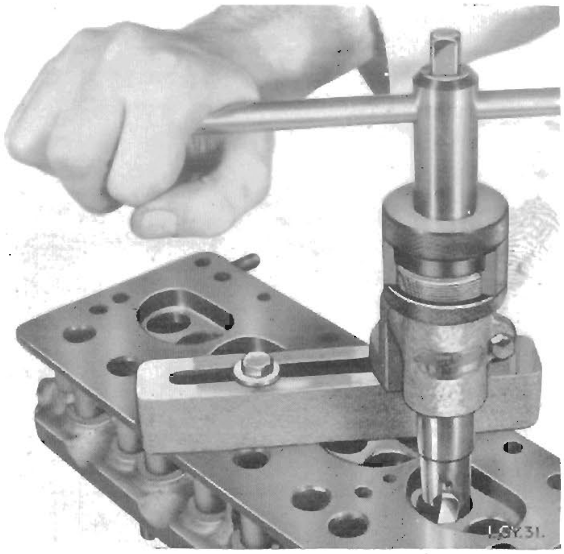


Fig. 55. Boring cylinder head for valve seat insert — using tool No. MFS6056-1

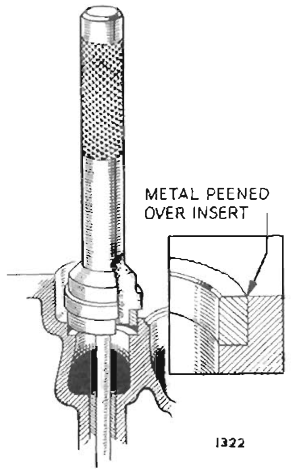


Fig. 56. Fitting valve seat insert —using tool No. S6057. Inset shows combustion chamber peened over insert

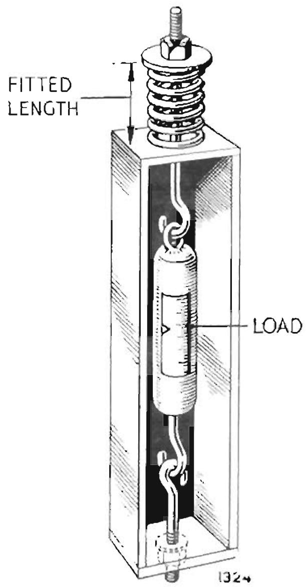


Fig. 57. Method of checking valve spring load at fitted length

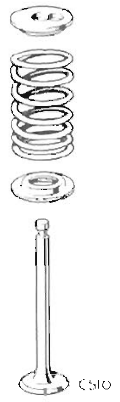


Fig. 58. Herald 1200, 12/50 valve and spring components

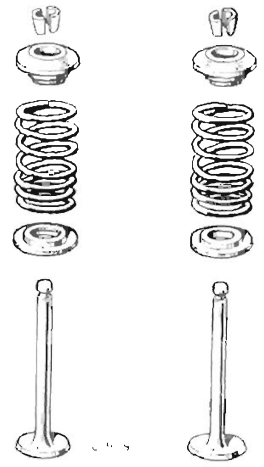


Fig. 59. Spitfire valve and spring components

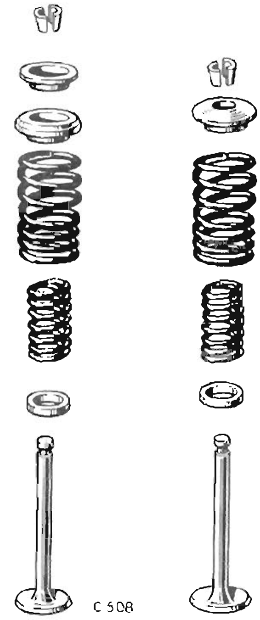


Fig. 60. Vitesse valve and spring components

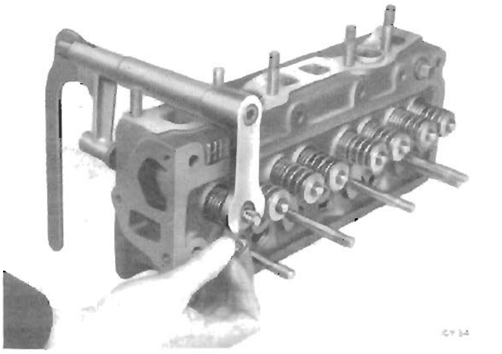


Fig. 61. Using valve spring compressor to fit valve collets

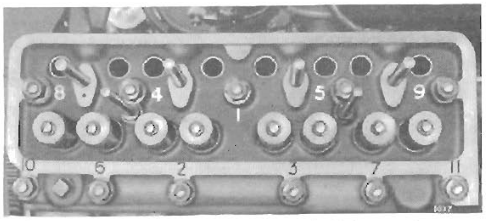


Fig. 62. Herald 1200, 12/50 and Spitfire cylinder head nut tightening sequence

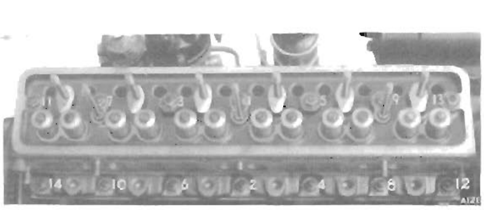


Fig. 63. Vitesse cylinder head nut tightening sequence

Assembly

Remove all traces of grinding paste, lubricate the valve stems and fit them to the guides. Assemble the valve springs, collars and collets as shown on Figs. 58 (Herald) or 59 (Spitfire) or 60 (Vitesse). Ensure that closed coils of the valve springs are nearest the cylinder head.

Cylinder Head Re-assembly

Coat a new cylinder head gasket with jointing compound and fit this over the cylinder head studs.

Lower the cylinder head onto the block, and fit the lifting eye, plain washers and nuts. Tighten the nuts in the order shown in Fig. 62 (Herald 1200, 12/50 and Spitfire) or Fig. 63 (Vitesse).

Insert the push rods, ensuring that their lower ends engage correctly in the tappets.

1 Rocker shaft
2 End cap
3 Mills pin
4 Locknut
5 Rocker, R.H.
6 Adjusting screw
7 Pedestal, rear
8 Shakeproof washer
9 Phillips head screw
10 Rocker, L.H.
11 Distance spring
12 Pedestal
13 Centre distance spring

NOTE: The Vitesse rocker assembly is similar but has 12 rockers, 6 pedestals and 5 distance springs.

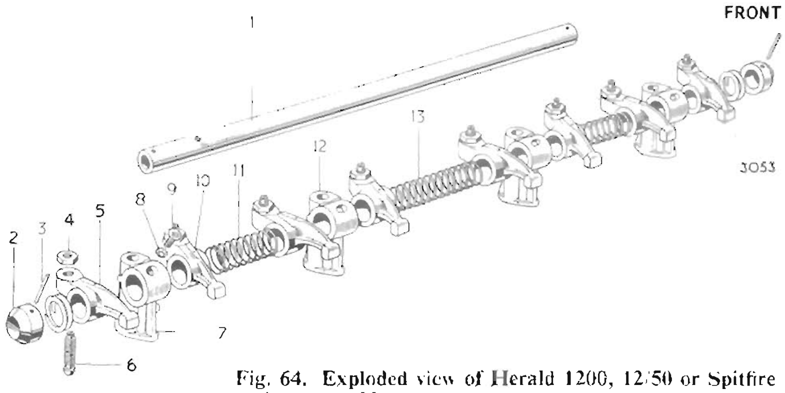


Fig. 64. Exploded view of Herald 1200, 12/50 or Spitfire rocker assembly

Lubricate and assemble the components onto the rocker shaft as shown on Fig. 64. Note that each pair of rockers are off-set and that a shouldered screw and shakeproof washer are used to locate the rear pedestal on the shaft. Slacken off the lock-nuts (4) and screw in the adjusters (6) to avoid bending the pushrods. Lower the rocker shaft assembly over the studs, simultaneously locating the rocker adjusters in the push rod cups.

Fit and progressively tighten the rocker shaft nuts.

Rocker Clearances

Check and if necessary adjust the rocker clearances when the tappet is resting on the back of the cam. To obtain this position, turn the crankshaft until number one push rod has reached its highest point, then turn a further full revolution to ensure that the push rod is fully down and the tappet is resting on the back of the cam.

If adjustment is necessary, slacken off the locknut and turn the adjusting screw until the correct clearance is obtained. (Fig. 65).

Tighten the locknut and re-check the clearance. Treat each rocker similarly.

Rocker clearances 0·01″ (0·25 mm.) cold.

Alignment of Timing Sprockets

Timing sprocket alignment is controlled by shims interposed between the rear face of the crankshaft sprocket and a shoulder on the crankshaft (Fig. 66).

To align the sprockets, temporarily fit the camshaft sprocket and check the alignment by placing a straight edge across both sprockets (Fig. 67). Remove or fit shims as required.

1 Valve
2 Rocker
3 Adjusting screw
4 Locknut
5 Push rod
6 Tappet
7 Cam

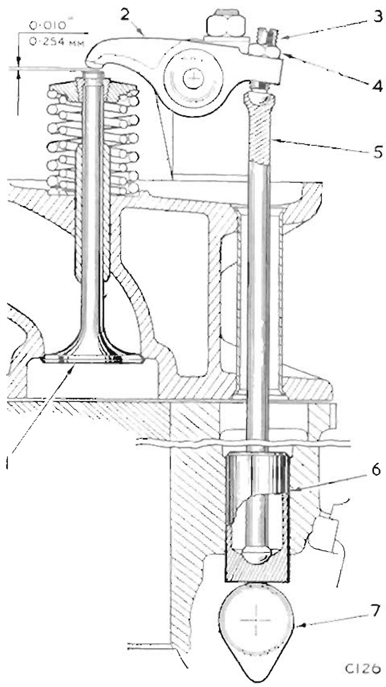


Fig. 65. Section through valve operating mechanism

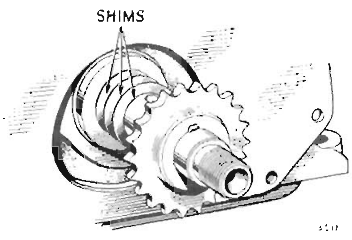


Fig. 66. Shims "A" behind crankshaft sprocket

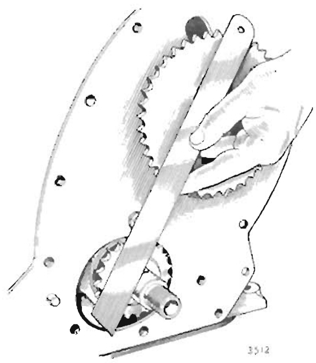


Fig. 67. Checking sprocket alignment

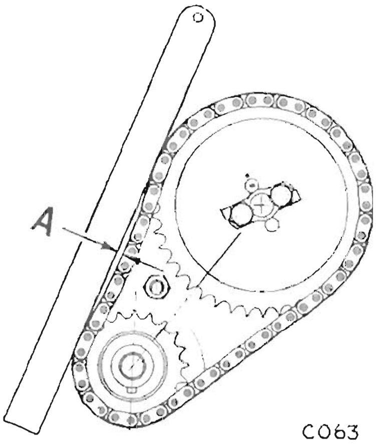


Fig. 68. Checking timing chain for wear
Dimension "A" should not exceed 0·4" (10 mm.)

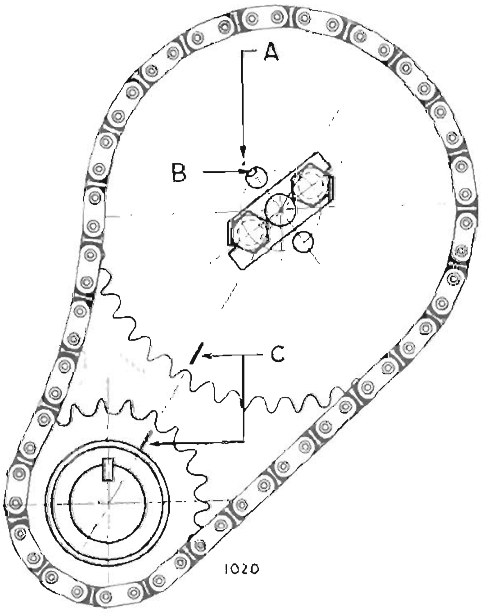


Fig. 69. Timing markings
A. Centre dot. B. Cut-out on camshaft. C. Scribed lines

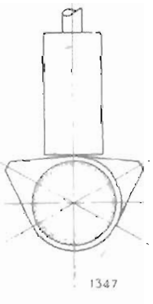


Fig. 70. Position of cams at point of balance

Timing Chain

Temporarily fit the timing chain and check the amount of slack as shown on Fig. 68.

Valve Timing with Marked Sprockets

If the original sprockets are being refitted, set the valve timing by utilizing the timing marks on the sprockets as shown on Fig. 69.

Valve Timing with Unmarked Sprockets

Temporarily attach the camshaft sprocket and turn the camshaft until number 8 (12) push-rod has reached its highest point. In this position, adjust number 1 rocker clearance to 0·040" (1 mm.).

Repeat the procedure with number 7 (11) push-rod and adjust number 2 rocker until its clearance is identical to that of number 1 rocker.

Again turn the camshaft until numbers 1 and 2 valves have reached the point of balance, that is, where one valve is about to open and the other about to close. Fig. 70 illustrates the position of the cams at this point.

Move the camshaft slowly to a point where the clearances between the rockers and valve stems are exactly equal ; this is the point of balance.

Turn the crankshaft to bring numbers 1 and 4 (or 1 and 6) pistons to T.D.C.

Fitting Timing Chain

Exercising the greatest care, remove the timing sprocket without disturbing the camshaft. Encircle both sprockets with the timing chain and offer up the camshaft sprocket to the camshaft.

NOTE : The camshaft timing sprocket is provided with four holes which are equally spaced but offset from a tooth centre. Half tooth adjustment is obtained by rotating the sprocket 90 degrees from its original position. A quarter tooth adjustment may be obtained by turning the sprocket "back to front". By rotating it 90 degrees in this reversed position, three-quarters of a tooth variation is obtained.

After securing the sprocket, re-check the timing to ensure that the camshaft has not been disturbed during this operation. With number 1 piston at T.D.C. numbers 1 and 2 rocker clearances should be identical.

Adjust the rocker clearances to 0·010" (0·254 mm.).

Timing Cover (Figs. 72 and 73)

Renew a worn or damaged oil seal.

Remove a worn tensioner by opening the blade sufficiently to spring it over the pin. Fit a new blade by reversing this procedure.

Position the oil thrower (103), dished face outwards, adjacent to the sprocket on the crankshaft and insert a Woodruffe key (101) into the keyway.

Fit a new gasket (41) on the dowels and stud. Compress the chain tensioner (47) and fit the timing cover (42), releasing the tensioner when it engages the chain. Secure the timing cover with the bolts (43) and (44).

Fan Pulley Assembly

HERALD 1200, 12/50 AND SPITFIRE

Fit the pulley (105) and secure it with the bolt (108).

VITESSE

Fit the seal extension (104) to the crankshaft with its chamfered edge leading. Assemble the pulley (105) and secure it with the bolt (108).

Rocker Cover

Apply jointing compound to the cover flange face and fit a new cork gasket. Leave to dry on a flat surface with a weight on top of the cover. Fit the rocker cover to the cylinder head and secure it, using a fibre washer, plain washer and nyloc nut on each attachment stud.

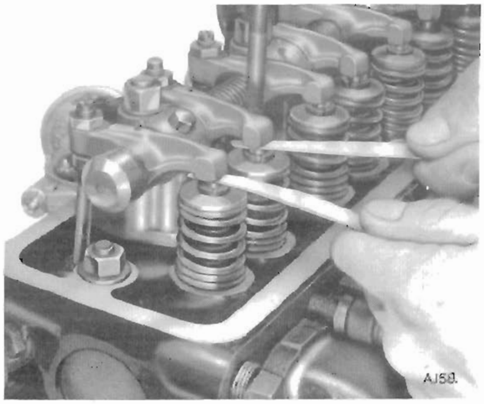


Fig. 71. Using feeler gauges of equal thickness to determine point of balance

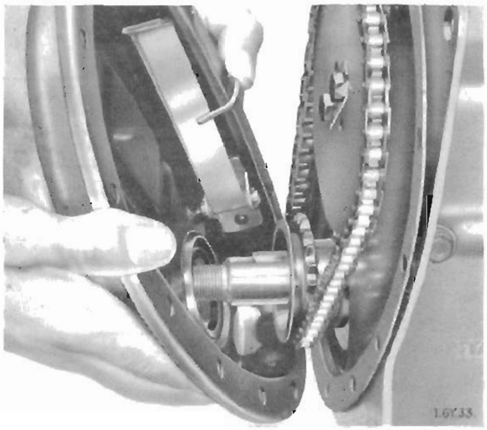


Fig. 72. Fitting timing cover to Herald 1200, 12/50 engine

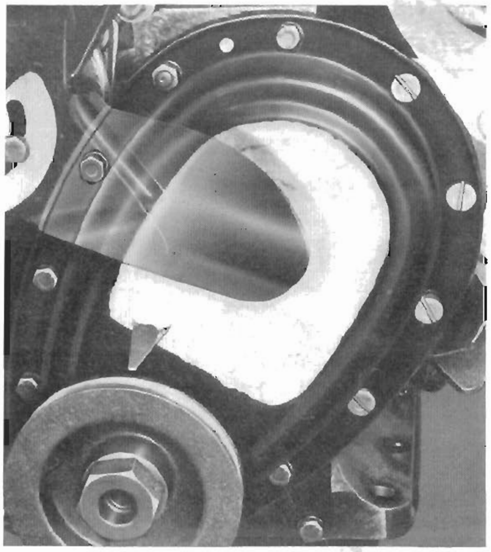


Fig. 73. Spitfire and Herald 1200, 12/50 timing cover attachments

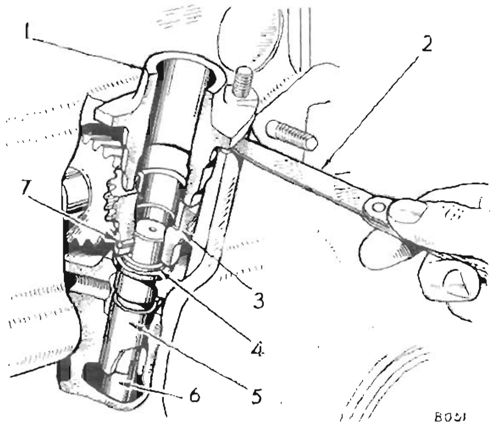


Fig. 74. Determining the packing required under the distributor pedestal

1	Distributor pedestal	5	Bush
2	Feeler gauge	6	Oil pump drive gear
3	Distributor drive	7	Pin
4	½" (12·7 mm.) I/D washer		

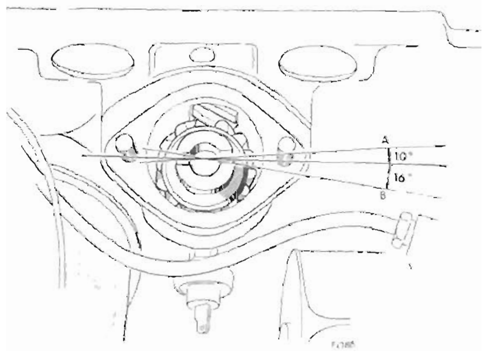


Fig. 75. Position of slot in the distributor drive gear with No. 1 piston at T.D.C. on the compression stroke

A — Herald 1200, 12/50 B — Spitfire

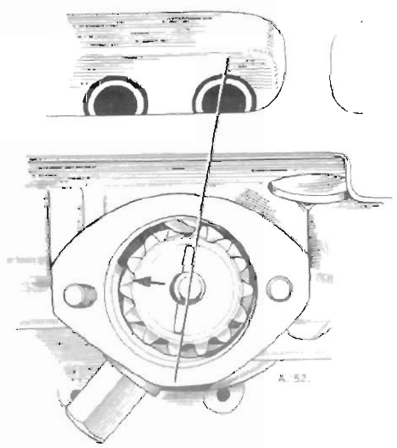


Fig. 76. Position of slot in distributor drive gear with No. 1 piston at T.D.C. on the compression stroke (Vitesse)

Distributor Drive Gear End Float (Fig. 74)

Determine the requisite amount of packing under the distributor pedestal to give 0·003" to 0·007" (0·076 mm. to 0·178 mm.) distributor drive gear end float by the following procedure.

Insert the oil pump drive shaft (6) through the bush (5) and rotate the shaft to engage its driving tongue with the oil pump driving slot. Measure the thickness of a plain washer (4). Fit the washer and the gear (3) over the shaft and fit the distributor pedestal.

Measure the gap between the pedestal and cylinder block as shown. Subtract this dimension from the washer thickness to determine the end float of the gear.

Example 1

If the washer thickness is	0·062"	1·57 mm.
and the width of the gap is	0·060"	1·52 mm.
Then the gear float will be +	0·002"	0·05 mm.

The float of 0·002" (0·0508 mm.) is insufficient and requires packing of 0·003" (0·08 mm.) thickness to produce an end float of 0·005" (0·12 mm.) (mean of tolerance).

Example 2

Thickness of washer	0·062"	1·57 mm.
Width of gaps	0·065"	1·65 mm.
Clear interference	0·003"	0·08 mm.

In this example, the interference of 0·003" (0·08 mm.) requires packing of 0·008" thickness (0·2 mm.) to give an end float of 0·005" (0·12 mm.).

Remove the pedestal gear and drive shaft, and withdraw the ½" I.D. washer from the shaft.

To Position Timing Gear

Position the crankshaft at T.D.C. with No. 1 piston on the compression stroke.

Fit the Woodruffe key to the oil pump drive shaft and lower the shaft into the bush, engaging the driving tongue with the oil pump driving slot. Rotate the shaft so that the key is pointing outwards at right angles to the cylinder block.

Lower the distributor drive gear on to the shaft, allowing it to turn as it meshes with the camshaft gear.

With the gear resting on the bush, the distributor drive slots must be in the position shown on Fig. 75 (Herald 1200, 12/50 and Spitfire) and Fig. 76 (Vitesse).

Fit the paper packing washers and secure the distributor pedestal.

Distributor Timing

Adjust the distributor points to 0·015″ (0·4 mm.). Secure the clamp plate to the pedestal and lower the distributor into the pedestal engaging its driving dog with the slot of the gear. With the crankshaft at T.D.C. and firing on No. 1 cylinder (the pointer on the timing chain cover aligned with the mark or hole on the rim of the crankshaft pulley), the rotor arm must be positioned as shown on Fig. 77 (Herald 1200, 12/50), Fig. 78 (Spitfire) or Fig. 79 (Vitesse).

HERALD 1200, 12/50

With the vernier scale set fully retarded, rotate the distributor clockwise until the contact breaker points are commencing to open. Tighten the clamp bolt (4) and rotate the screw (9) counter-clockwise until 2¼ divisions are visible (6·8 : 1 compression ratio), or 3¾ divisions (8 : 1 compression ratio).

Ignition settings are :—
6·8 : 1 ratio = 9° B.T.D.C.
8 : 1 ratio 15° B.T.D.C.

SPITFIRE

Rotate the adjusting screw counter-clockwise to fully retard the distributor setting. Rotate the distributor clockwise until the contact breaker points commence to open. Tighten the clamp bolt and rotate the adjusting screw clockwise 13 clicks (1 click = 1°) to give a firing point of 13° B.T.D.C.

Ignition timing 13° B.T.D.C.

SPITFIRE MK. II
Ignition timing 17° B.T.D.C.

VITESSE
Up to and including Engine No. HB 15,000

Set the vernier adjustment at the end of its scale (fully retarded) and rotate the distributor in a clockwise direction until the C.B. points are commencing to open. Tighten the clamp bolt and rotate the screw counter-clockwise until 2½ divisions appear on the scale. As one division is equal to 4° crankshaft angle, this adjustment will give a firing point of 10° B.T.D.C.

VITESSE
From Engine No. 15,001

There is no micro-adjustment on distributor. Set crankshaft at 10° mark on damper rim, firing on No. 1 cylinder. Rotate distributor clockwise until the CB points begin to open; tighten clamp bolt.

NOTE : These settings are nominal and should be adjusted to give the best road test performance.
Distributor rotation — anti-clockwise.
Firing order : Herald 1200, 12/50 and Spitfire. 1, 3, 4, 2.
Vitesse, 1, 5, 3, 6, 2, 4.

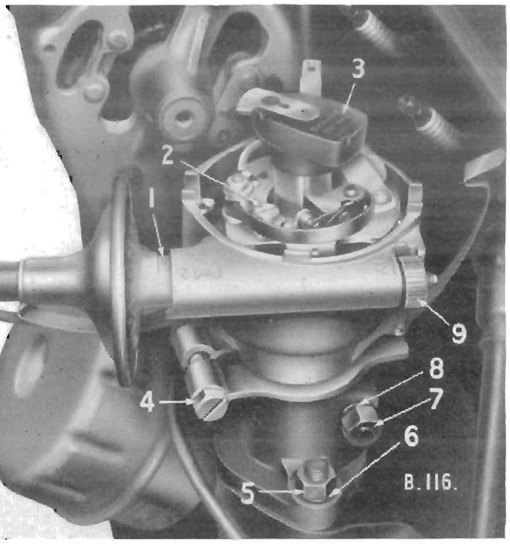


Fig. 77. Distributor rotor arm position at T.D.C. Firing on No. 1 cylinder (Herald 1200, 12/50)

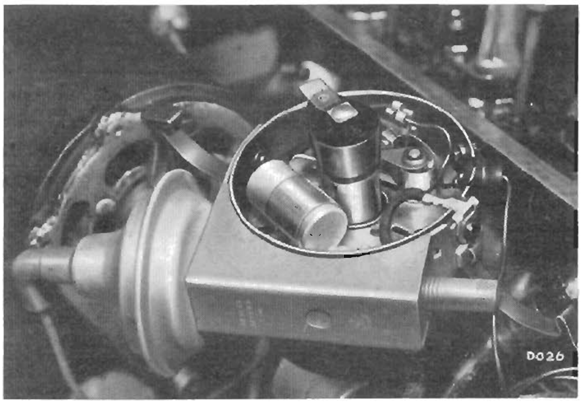


Fig. 78. Distributor rotor arm position at T.D.C. Firing on No. 1 cylinder (Spitfire)

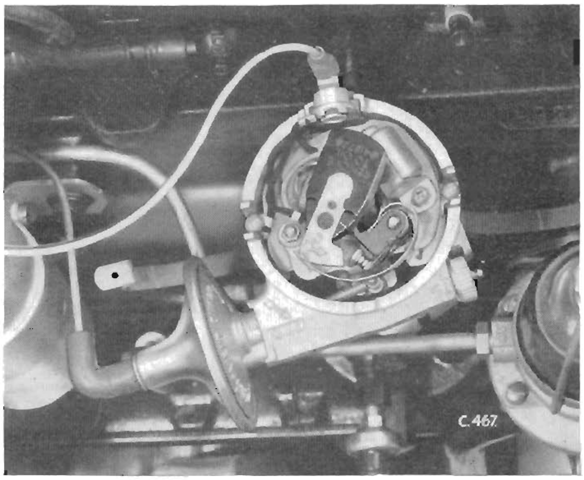
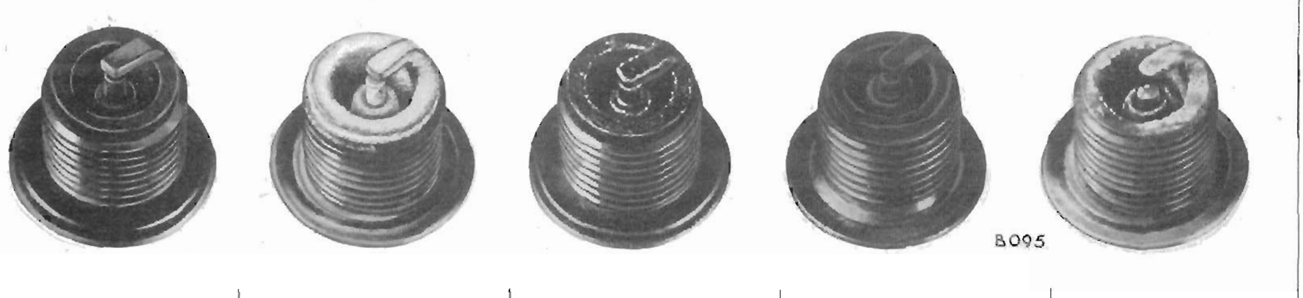


Fig. 79. Distributor rotor arm position at T.D.C. Firing on No. 1 cylinder (Vitesse)



Correct grade | Too cool running | Too hot running | Mixture too rich | Worn out plug

Fig. 80. Guide to sparking plug conditions

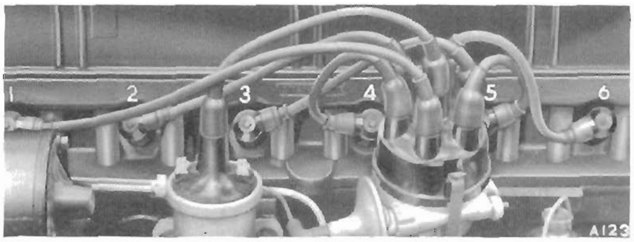


Fig. 81. Vitesse H.T. cable positions

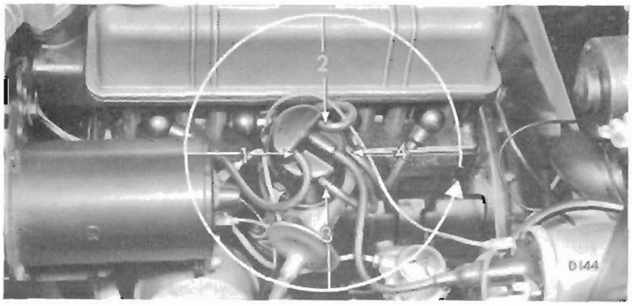


Fig. 82. Herald 1200. 12/50 H.T. cable positions

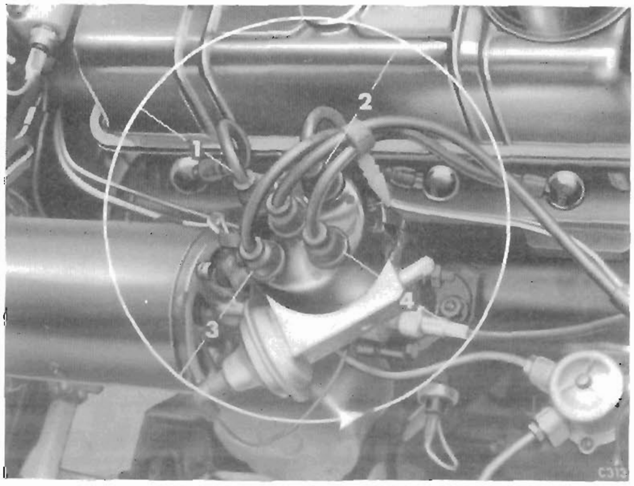


Fig. 83. Spitfire H.T. cable positions

Sparking Plugs

The life of spark plugs and the periods at which they should be cleaned varies with the condition of the engine and the work it performs. As a general recommendation, adjust electrode gaps to 0·025" (·635 mm.) every 3,000 miles and renew plugs every 12,000 miles.

Fig. 80 provides an easy guide for identifying the various plug conditions.

Smear the threads of new plugs with graphite grease to prevent the possibility of seizure and damage to the cylinder head.

Coil and H.T. Cables

VITESSE

HERALD 1200, 12/50 AND SPITFIRE

Re-connect the H.T. cables to the coil and sparking plugs as shown on Figs. 82 and 83.

Secure the coil to the cylinder block and connect the H.T. cables as shown on Fig. 81.

These cables are of special construction and must under no circumstances be replaced by copper cored cables. See "H.T. ignition cables" (Group 6).

Fuel Pump

Service the fuel pump as described on page 1·301 and assemble it to the engine, with a new gasket.

Water Pump

Service the water pump as described on page 1·204 and assemble it to the engine as shown on Fig. 84.

Generator

Service the generator as described in Group 6, and assemble it to the engine as shown. Adjust the fan belt.

Manifolds

Assemble the inlet and exhaust manifolds and attach them to the engine. The details are shown on pages 1·401 and 1·402.

Carburettors

Fit the carburettors, with new gaskets and insulation washers, to the inlet manifold. Connect the controls, pipes and attach the air cleaners. Service the carburettors as described on pages 1·302 to 1·316.

Oil Filter

HERALD 1200, 12/50 AND SPITFIRE

Fit a new filter unit to the crankcase as described under 6,000 miles Lubrication.

VITESSE

Renew the element as described under 6,000 miles Lubrication and secure the unit to the crankcase using a new rubber seal.

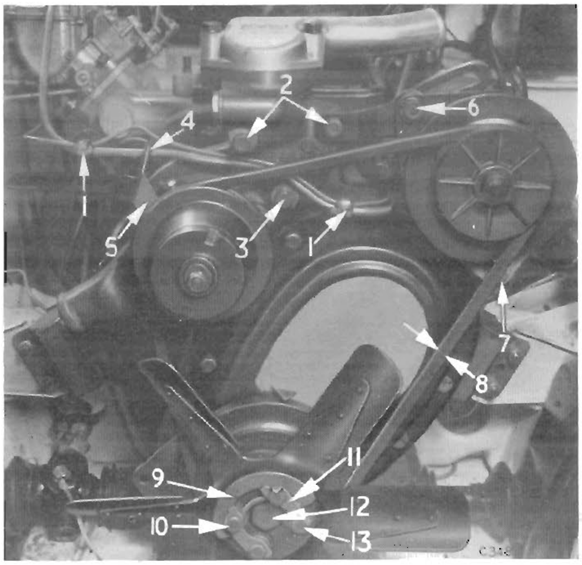


Fig. 84. Vitesse water pump, generator and fan installation

Key to Fig. 84

1 Clip
2 Bolts, unequal lengths
3 Bolt
4 Grommet
5 Bracket
6 Generator adjustment bolt
7 Generator pivot bolt—Front
8 Slack in belt—¾″ (19 mm.)
9 Fan balancer
10 Bolt
11 Lockplate
12 Bolt
13 Bolt

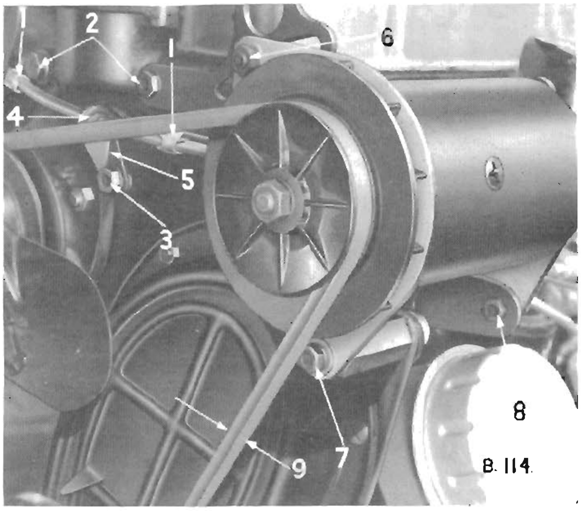


Fig. 85. Herald 1200. 12/50 and Spitfire water pump and generator installation

Key to Fig. 85

1 Clip
2 Bolts, unequal lengths
3 Bolt
4 Grommet
5 Bracket
6 Generator adjustment bolt
7 Generator pivot bolt—front
8 Generator pivot bolt—rear
9 Slack in belt—¾″ (19 mm.)

COOLING SYSTEM

Description

Circulation of water in the pressurized cooling system, shown on Fig. 1, is assisted by a belt-driven water pump of the impeller type and controlled by a thermostat.

Filling

Close the drain taps and set the heater control in the hot position. Some Herald 1200 and Spitfire models are fitted with cylinder block drain plugs.

Remove the filler cap, fill with clean soft water, and refit the cap. Warm up the engine and replenish the water level if necessary.

Draining

Remove the filler cap, set the heater control in the hot position and open the radiator and cylinder block drain taps (or remove the plug).

Flushing

Periodically flush the cooling system, using a proprietary flushing compound, following the instructions supplied.

Pressure Testing (Fig. 3)

Use an A.C. pressure tester to test the cooling system as follows:—

With the engine warm, remove the filler cap, and top up the water level. Using an adaptor, fit the pressure tester to the filler neck and pump up to a pressure of 7 lbs. sq. in. (0·492 kg/cm²).

The cooling system should maintain this pressure for 10 seconds.

A more severe test may be applied by following the above procedure with the engine running. Absence of external leaks accompanied by pressure fluctuations usually indicates a leaking cylinder head gasket.

Filler Cap (Fig. 2)

Use an A.C. pressure tester to check the operation of the filler pressure cap as follows :

1. Rinse the cap in water to remove sediment and fit the cap to the tester whilst wet, as shown.
2. Pump up the pressure until the gauge pointer stops rising.
3. Reject the cap if it will not register and maintain 7 lbs. sq. in. (0·492 kg/cm²) for 10 seconds without additional pumping.

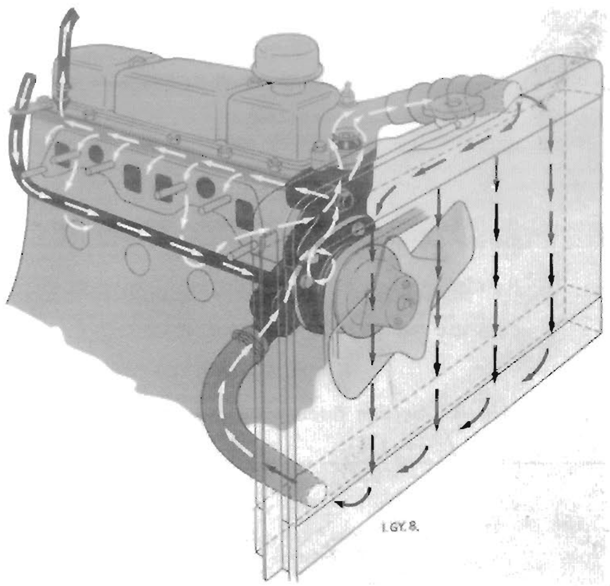
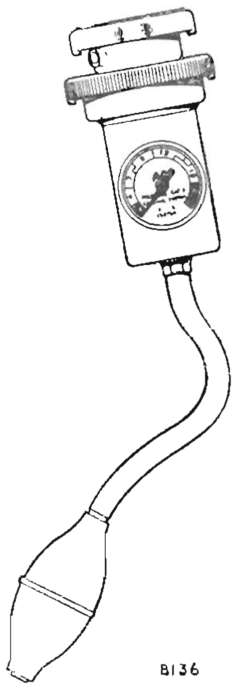


Fig. 1. Water circulation

Fig. 2. Testing the radiator filler cap



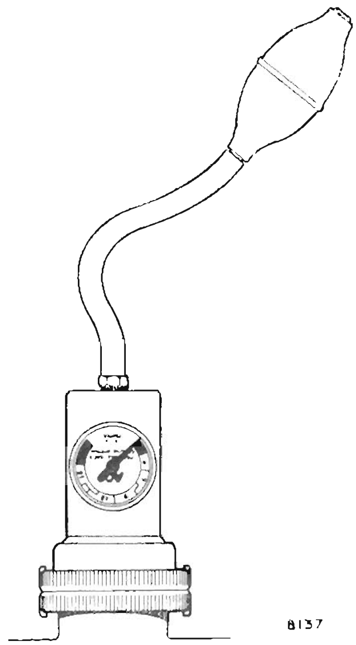
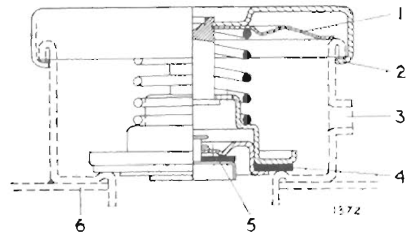


Fig. 3. Testing the cooling system



1	Spring friction plate	4	Pressure valve seal
2	Retaining lugs	5	Vacuum valve seal
3	Pressure release pipe	6	Header tank

Fig. 4. Section through radiator filler cap

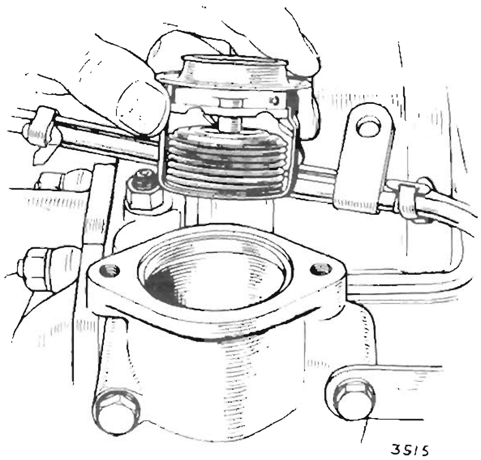


Fig. 5. Removing thermostat from water pump body

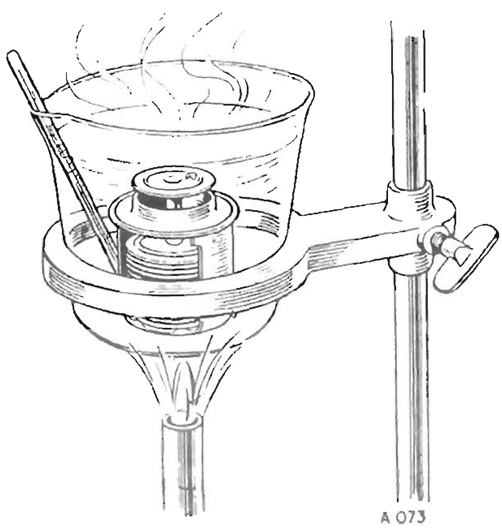


Fig. 6. Testing the Thermostat

Anti-freeze Mixtures

To protect the cooling system during frosty weather, use an inhibited Glycol base anti-freeze solution. Because of the searching effect of these solutions, check the system for leaks before adding the anti-freeze.

Approved brands of anti-freeze are given on pages 24 & 25. For quantities of anti-freeze mixtures required to safeguard the system at specific temperatures, consult the manufacturers' recommendations.

It is recommended that fresh anti-freeze is used each year, since the inhibitor becomes exhausted and the components in contact with the cooling water may corrode. When topping up the coolant, use a mixture of anti-freeze and water.

Thermostat

Drain the cooling system, detach the outlet cover and remove the thermostat from its housing (Fig. 5).

Testing the Thermostat

Test the thermostat by heating it in water together with a thermometer as shown on Fig. 6. Note the temperatures at which the valve starts to open.

Part No. 127745.

Opening temperatures	– 69° to 74°C. (156° to 165°F.).
Fully open	– 85°C. (185°F.).
Maximum Valve Lift	– 0·33"/0·36" (8·38/9·144 mm.).

A wax-filled thermostat, Part No. 140970, was introduced from Commission Nos. Herald 1200, GA 157639; Herald 12/50, GD 40190; Spitfire, FC 40410; Vitesse, HB 23300.

Opening temperatures	– 79·5° to 83·5°C. (175° to 183°F.)
Fully open	– 93·5° to 96°C. (200° to 205°F.)
Minimum valve lift	0·312" (7·925 mm.)
Maximum valve lift	– 0·875" (22·225 mm.)

Cold Climates (Herald only)

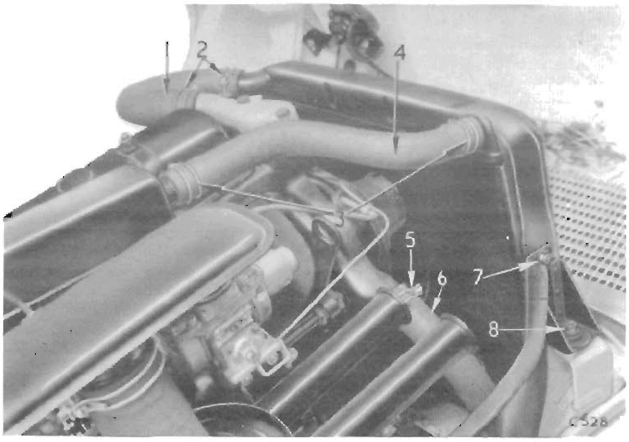
Part No. 122744.

Opening temperatures	– 80°C. (176°F.).
Fully open	– 95°C. (203°F.).
Maximum Valve Lift	– 0·28" (7·112 mm.).

NOTE : This thermostat must be removed and replaced by Part No. 127745 during summer months.

To Refit

Reverse the removal procedure.



1 Top hose
2 Clips
3 Clips
4 Filler tank hose
5 Clip
6 Bottom hose
7 Side valance attachment
8 Radiator to chassis bracket attachment

Fig. 7. Vitesse radiator attachments

From Commission No. HB 26150, Vitesse has a sealed cooling system similar to Spitfire Mk. II (see Page 1·206).

RADIATOR

Removal

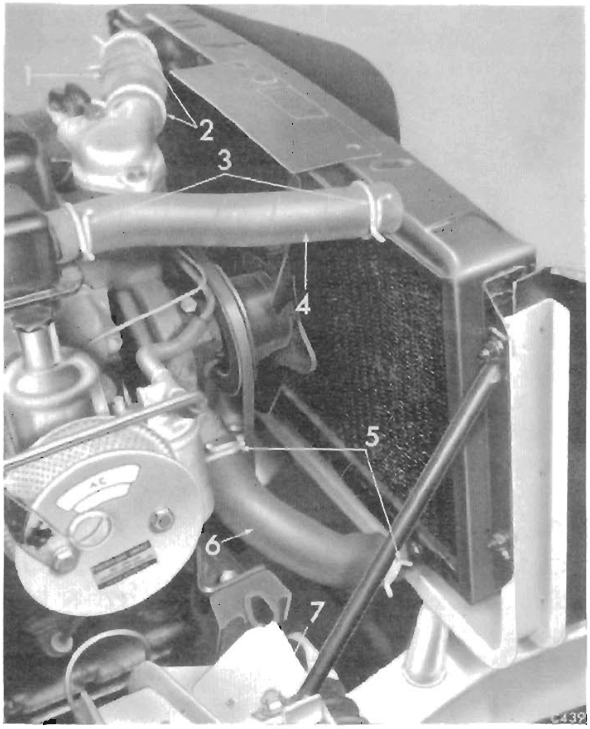
Drain the cooling system and remove or disconnect items in the order shown on Figs. 7, 8 or 9.

Lift out the radiator.

Refitting

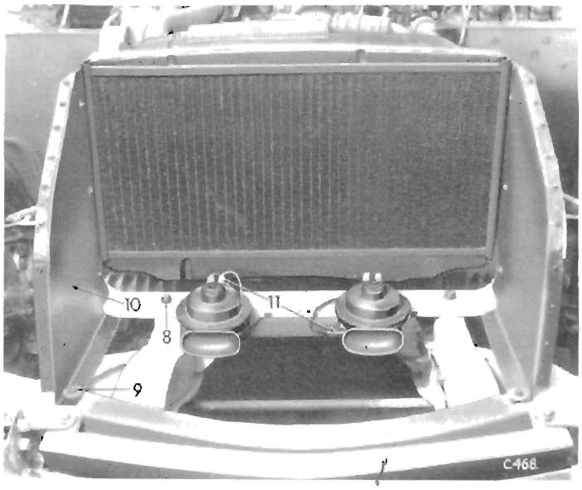
Reverse the sequence of operations shown on Figs. 7, 8 or 9.

NOTE: Composition packings are fitted between the lower radiator attachment points and the chassis brackets on Vitesse models.



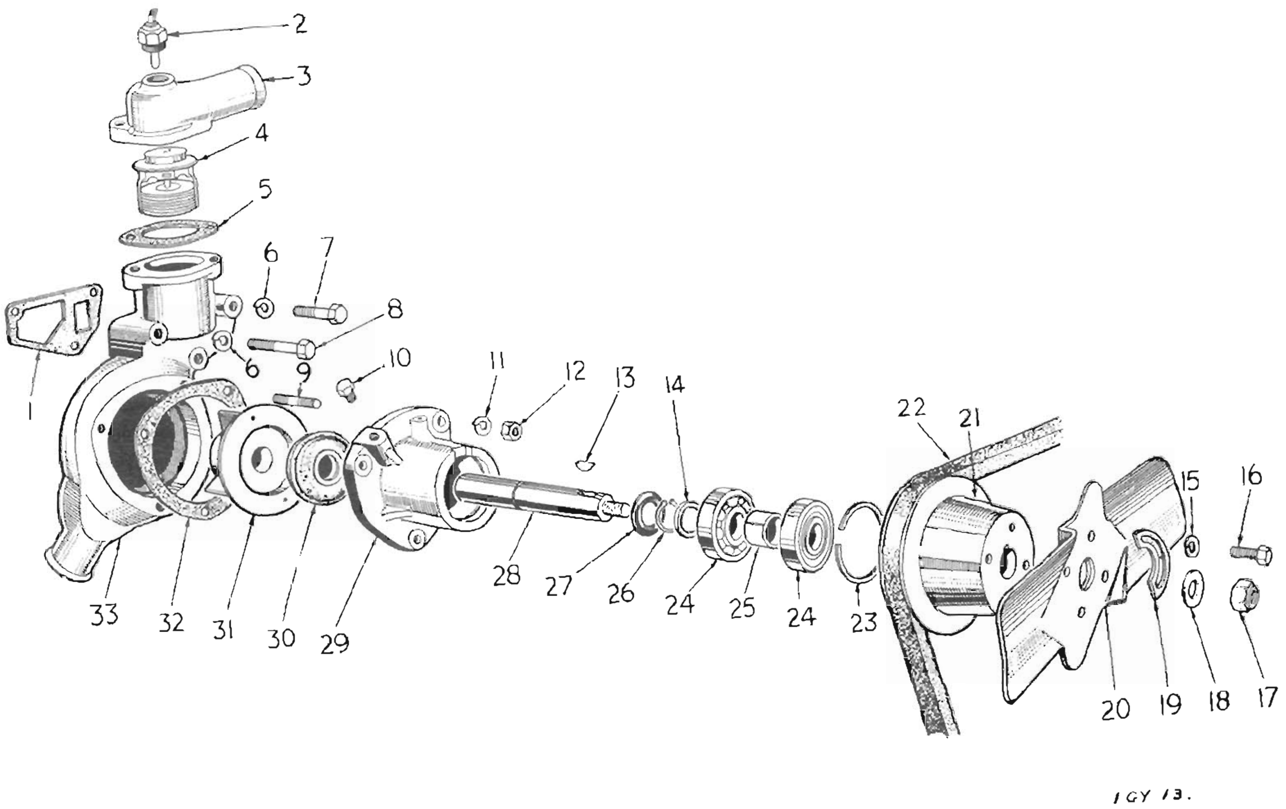
1 Top hose
2 Clips
3 Clips
4 Filler tank hose
5 Clips
6 Bottom hose
7 Stay attachment

Fig. 8. Spitfire radiator attachments (Rear view)



8 Radiator sub frame to chassis
9 Duct to chassis
10 Radiator duct
11 Horn Lucar connectors

Fig. 9. Spitfire radiator attachments (front view)



1	Gasket—Body to cylinder head	12	Nut	23	Circlip
2	Temperature transmitter	13	Woodruffe key	24	Ball race
3	Top elbow	14	Distance piece	25	Distance piece
4	Thermostat	15	Spring washer	26	Circlip
5	Gasket—Elbow to body	16	Setscrew	27	Spinner
6	Spring washer	17	Nyloc nut	28	Spindle
7	Bolt	18	Plain washer	29	Bearing housing
8	Bolt	19	Fan balancer	30	Seal assembly
9	Stud	20	Fan	31	Impeller
10	Grease plug	21	Pulley	32	Gasket
11	Spring washer	22	Driving belt	33	Body

Fig. 10. Exploded water pump assembly (Herald 1200, 12/50)
Spitfire has 4 fan blades and Vitesse has items 15 to 20 deleted

Water Pump (Fig. 10)

Removal

1. Disconnect the battery and drain the cooling system.
2. Slacken the generator attachments, swing the generator inwards and remove the driving belt.
3. Disconnect the top and lower radiator hose and the temperature transmitter cable (Spitfire).
4. Remove three bolts and detach the water pump from the cylinder block.

To remove the bearing housing only, remove nut (12), spring washer (11) and unscrew two bolts. Remove the housing (29) and gasket (32) from the pump body (33).

To Refit

Reverse the removal procedure and tension the driving belt.

Bearing Housing Assembly (Fig. 10)

To Dismantle

1. Remove items (17) and (18) and detach the pulley (21).
2. Use Churchill Tool No. FTS.127 with Press S 4221A to remove the impeller (31) and seal assembly (30). (See Fig. 11.)
3. Remove the circlip (23) and drift out shaft and ball race assembly.
4. Remove the spinner (27), circlip (26), washer (14) and Woodruffe key (13) from the shaft (28) and press off items (24) and (25).

Re-Cutting the Sealing Gland Face (Fig. 12)

Use Churchill Tool No. S.126 as follows:—

1. Insert the pilot of the tool from the gland side of the housing.
2. Fit the bush (small diameter leading), tool bearing and knurled nut on the protruding pilot.
3. Turn the knurled nut to bring the cutters into contact with the seal face. Rotate the tommy bar and simultaneously tighten the knurled nut to maintain a light cut until the gland face is free from score lines. Periodically remove and clean the tool whilst carrying out the cutting operation. The depth of the gland face from the housing mounting face must not exceed 0·265" (6·7 mm.).

Re-Assembly (Fig. 10)

1. Fit items (27), (26) and (14) to the shaft (28). Pack the ball races (24) with grease and press them onto the shaft with their sealed faces outwards and the spacer (25) between them.
2. Using a tubular drift, drive the bearings with the shaft (28), into the housing and secure with the circlip (23). Press the seal assembly (30) into the impeller (31).
3. Using a 0·030" (0·762 mm.) thick spacer, press the impeller (31) onto the shaft (28) as shown on Fig. 13. Solder the impeller to the end of the shaft to prevent leakage.
4. Fit the Woodruff key (13) and pulley (21) to the shaft (28), securing with a Nyloc nut (17) and plain washer (18).

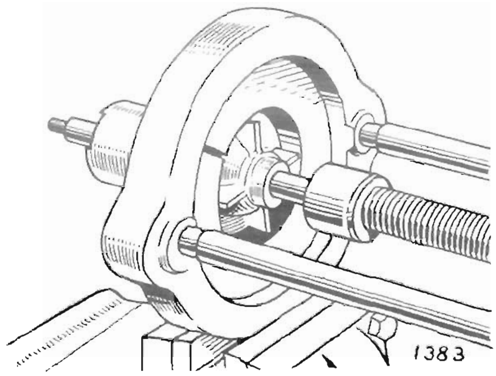


Fig. 11. Removing impeller from pump spindle

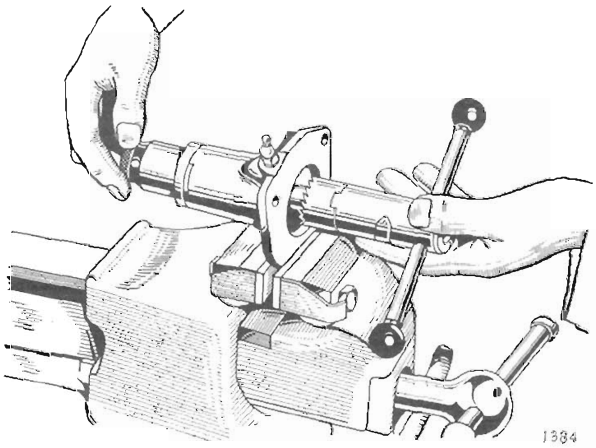


Fig. 12. Re-cutting sealing gland face

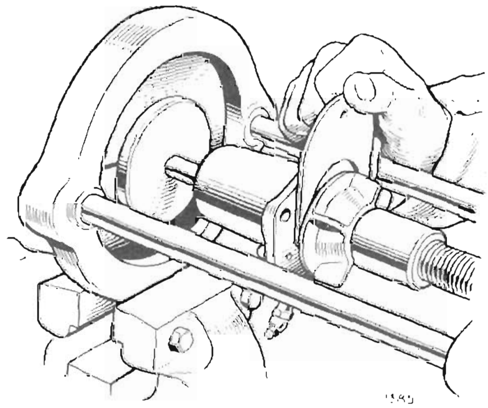
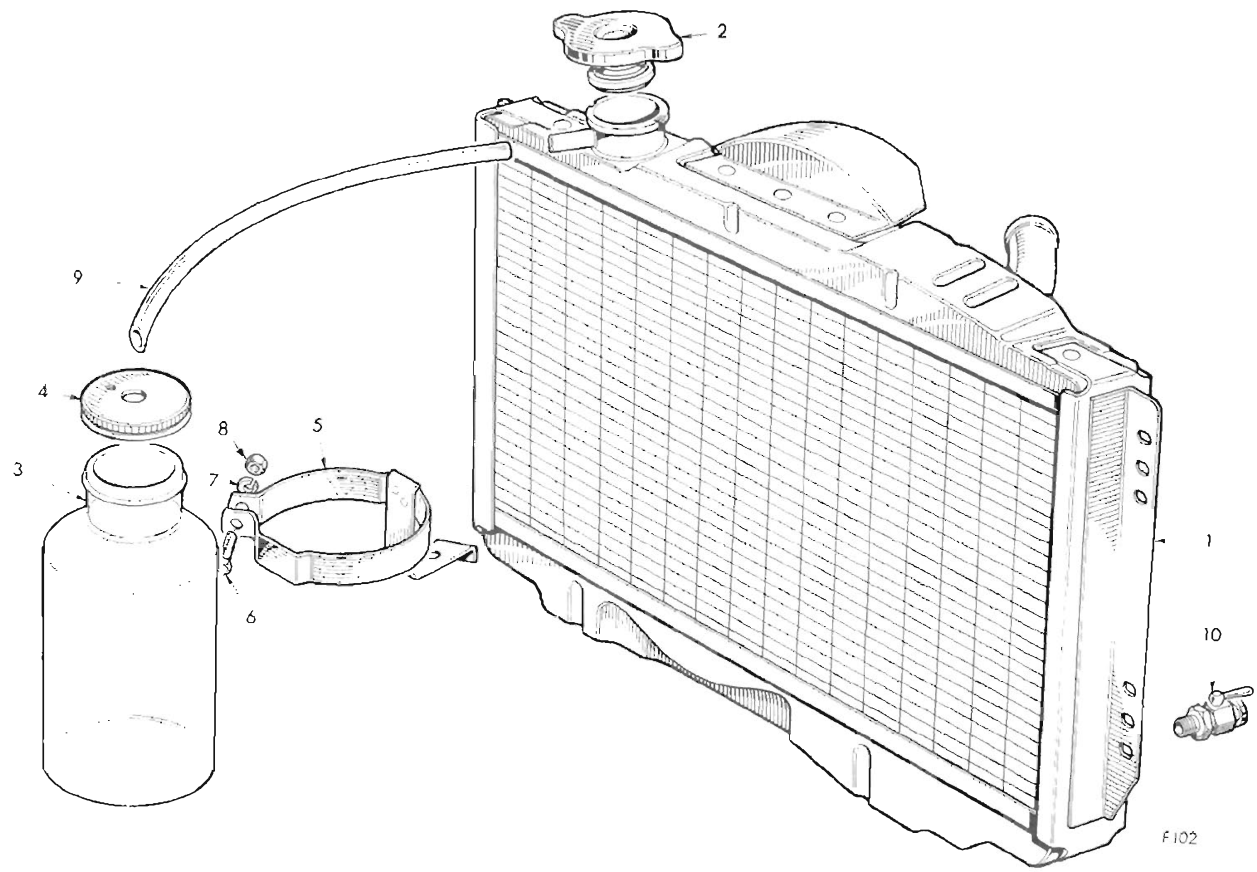


Fig. 13. Using gauge to obtain 0·030" (0·762 mm.) clearance between impeller and housing face



1	Radiator block	6	Screw
2	Filler cap	7	Spring washer
3	Overflow bottle	8	Nut
4	Cap	9	Overflow pipe
5	Strap	10	Drain tap

Fig. 14. Spitfire Mk. II radiator details

1 Retaining screw
2 Washer
3 Cover
4 Joint
5 Gauze
6 Screw
7 Body
8 Screws
9 Retainer
10 Valves
11 Upper retainer
12 Diaphragm assembly
13 Spring
14 Washer
15 Washer
16 Retainer
17 Spindle
18 Operating lever
19 Return spring
20 Operating fork
21 Distance washer
22 Priming lever assembly
23 Lower body

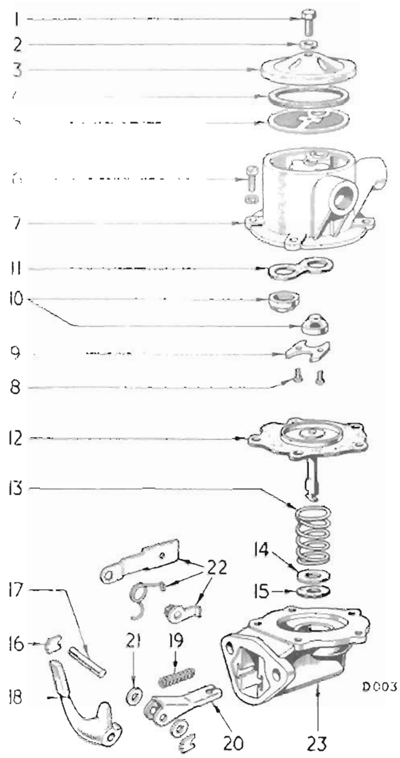


Fig. 1. Exploded view of Spitfire and Herald 1200, 12/50 fuel pump

FUEL PUMP

To Dismantle Fuel Pump

(a) Clean the exterior of the pump and file a mark across both flanges to facilitate re-assembly.

(b) Dismantle in the sequence given on Figs. 1 and 2. Re-assemble by reversing the sequence.

(c) To remove the diaphragm assembly (12) first turn it through 90° in an anti-clockwise direction and lift it out of engagement with operating fork (20) (Fig. 1) or (21) (Fig. 2).

* The valves (10) are identical, but on fitting them to the upper body ensure that the inlet valve is pointing towards the diaphragm and the outlet valve points away from the diaphragm, as shown on the illustrations.

1 Stirrup
2 Sediment bowl
3 Filter gauze
4 Joint
5 Screw
6 Spring washer
7 Body
8 Screw
9 Retainer
10 Valves
11 Upper retainer
12 Diaphragm assembly
13 Spring
14 Cup
15 Washer
16 Washer
17 Lower body
18 Circlip
19 Spindle
20 Operating lever
21 Operating fork
22 Return spring
23 Distance washer
24 Priming lever assembly
25 Gasket
26 Spring washer
27 Nut

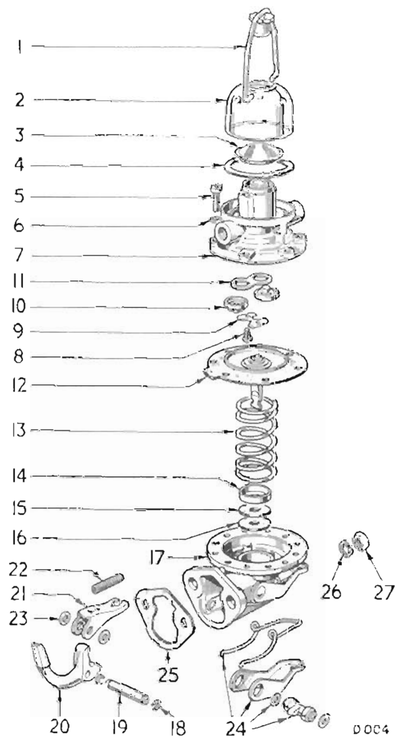


Fig. 2. Exploded view of fuel pump—Vitesse

EXPLODED B 30 PSE1 CARBURETTOR

(Fitted to Herald 1200, 12/50)

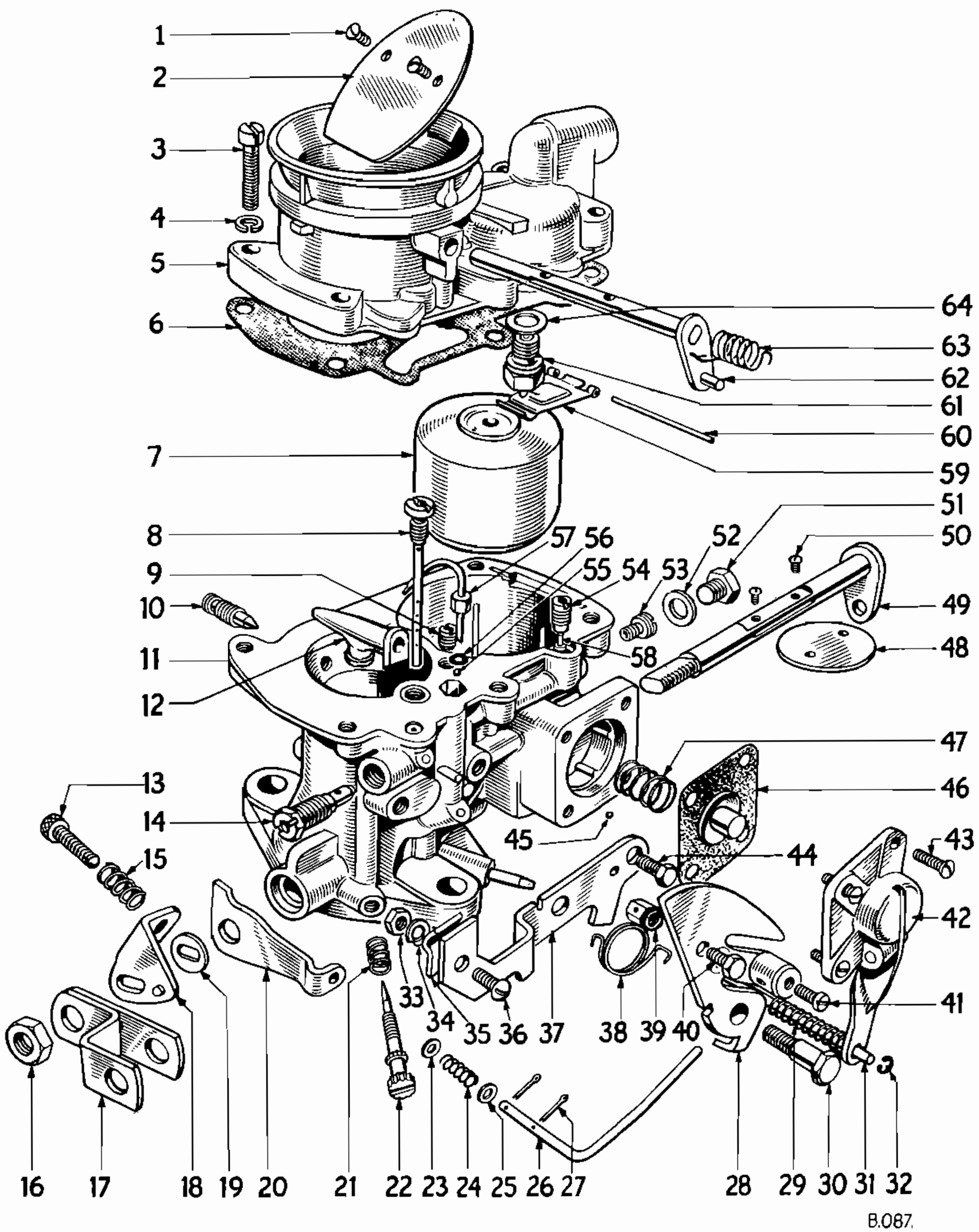


Fig. 3. Exploded B30 PSE1 carburettor

Key to Figs. 3 and 4

1 Screw
2 Strangler
3 Screw
4 Spring Washer
5 Top cover
6 Gasket
7 Float
8 Air correction jet
9 Econostat fuel jet
10 Spraying bridge retaining screw
11 Body
12 Spraying bridge
13 Slow running adjustment screw
14 Slow running fuel jet
15 Spring
16 Nut
17 Throttle lever
18 Stop lever
19 Slotted washer
20 Strangler—inter-connection lever
21 Spring
22 Volume control screw
23 Washer
24 Spring
25 Washer
26 Strangler inter-connection push rod
27 Split pin
28 Strangler operating cam
29 Spring
30 Pivot bolt
31 Accelerator pump push rod
32 Circlip
33 Nut
34 Spring washer
35 Cable clip
36 Screw
37 Abutment bracket
38 Spring
39 Solderless nipple
40 Pinch screw
41 Pinch screw
42 Pump cover and lever assembly
43 Screw
44 Setscrew
45 Non-return ball valve
46 Pump diaphragm
47 Diaphragm spring
48 Throttle butterfly
49 Throttle spindle
50 Screw
51 Main jet access plug
52 Fibre washer
53 Main jet
54 Pump chamber non-return valve body
55 Non-return ball valve
56 Fibre washer
57 Accelerator pump jet
58 Pump chamber non-return valve
59 Float lever
60 Float lever pivot
61 Needle valve
62 Strangler cam follower and spindle
63 Return spring
64 Fibre washer
65 Solderless nipple
66 Screw
67 Abutment bracket
68 Choke cable
69 Throttle cable
70 Nuts
71 Rubber sleeve
72 Fuel pipe

CARBURETTORS

HERALD 1200, 12/50 — B.30 PSE1 CARBURETTOR

Idling Adjustment (Fig. 4)

1. Set the throttle (slow-running adjustment) screw (13) until the idling speed is approximately 500 r.p.m.
2. Unscrew the volume control screw (22) until the engine begins to hunt.
3. Screw in until the hunting disappears and the engine idles smoothly.
4. If the engine speed increases, re-adjust its speed to 500 r.p.m. by re-setting the slow running screw.
5. This may cause slight hunting, which may be corrected by further slight adjustment of the volume control screw. (Under no circumstances should this screw be fully tightened.)

Removal (Fig. 4)

1. Remove the air cleaner assembly, disconnect the fuel pipe (72) and withdraw the rubber sleeve (71) from the stub pipe on the carburettor.
2. Release the choke inner and outer cables (68) from the abutment bracket and cam plate screw (40).
3. Disconnect the throttle cable (69) from the throttle lever. Remove two nuts (70) and lift off the carburettor.

Re-fitting

Refit the carburettor by reversing the removal procedure. Fit a new flange gasket and adjust the length of the inner choke cable to ensure that the choke butterfly cam plate is against its stop on the abutment bracket when the choke knob is fully in.

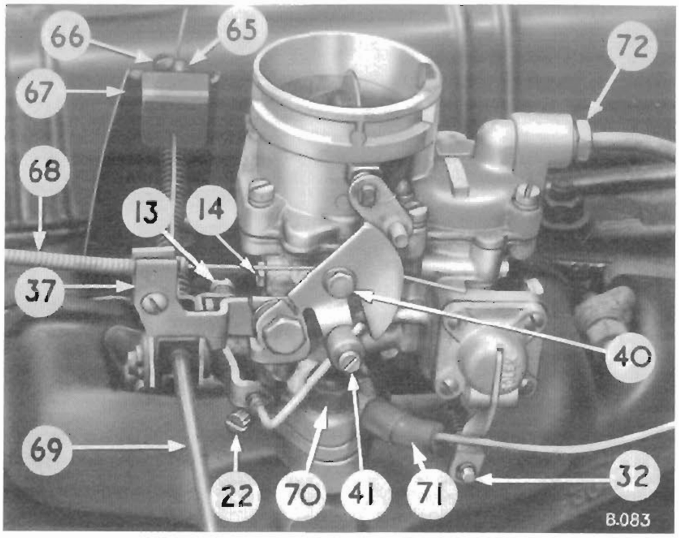


Fig. 4. B30 PSE1 carburettor details

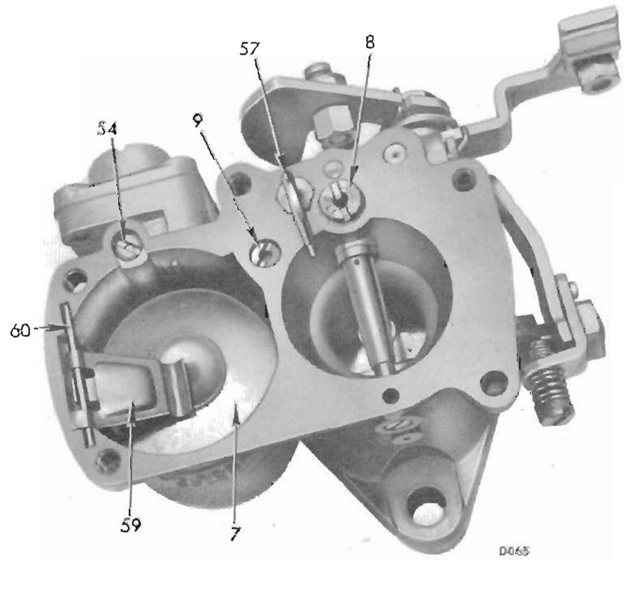


Fig. 5. B30 PSE1 carburettor, showing the top cover removed

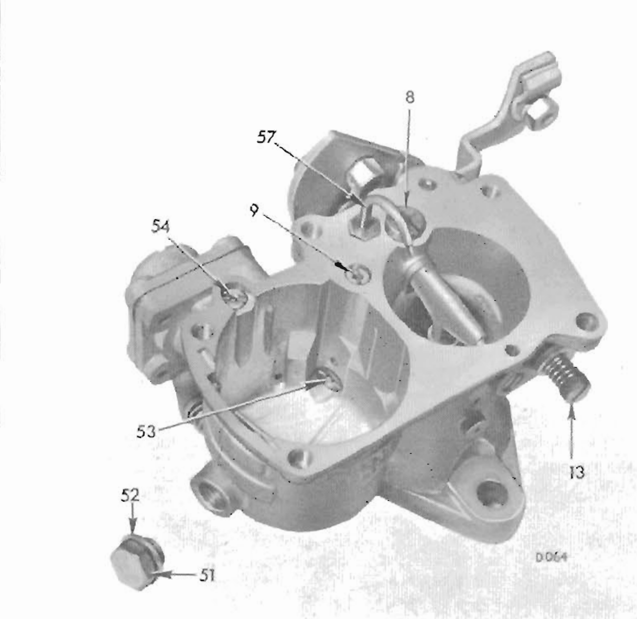


Fig. 6. Access to main jet (53) through plug orifice (51)

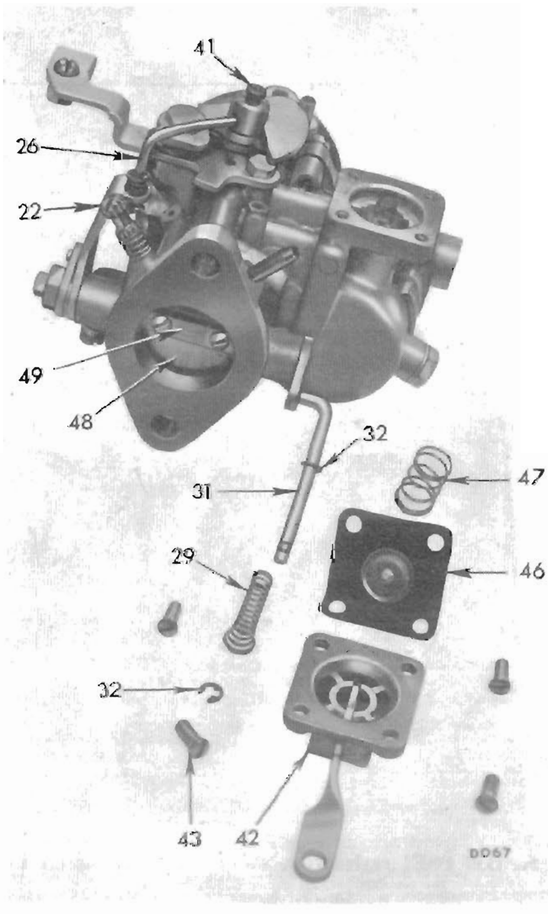


Fig. 7. Accelerator pump details

Dismantling (Fig. 3)

The following dismantling procedure is given in two stages. Stage one should be adopted only when it becomes necessary to clean out the float chamber, jet and passages. Stage two gives additional operations necessary for complete dismantling.

Stage 1

Disconnect the fuel pipe and remove: air cleaner, screws (3), spring washers (4), top cover (5) and gasket (6).

Lift out the spindle (60), float lever (59) and float (7).

Remove the plug (51), washer (52) and, using a long screwdriver, unscrew the main jet (53). Unscrew the pilot jet (14) and the air correction jet (8). Remove the valve body (54), valve (58) and take out the accelerator pump jet (57), taking care to catch the ball valve (55) from beneath it. Take out the screws (43) from the accelerator pump cover (42) and swing the cover to one side on the pump lever.

Remove the diaphragm (46) and spring (47), taking care not to lose the ball valve from its seating within the accelerator pump chamber.

Using clean fuel and an air line, clean out the float chamber, jets and fuel passage.

Re-assemble by reversing Stage 1 of the dismantling procedure.

Stage 2

TOP COVER

Unscrew the needle valve (61) and take off the fibre washer (64). Remove the screws (1), lift the strangler butterfly (2) from its slot in the spindle (62), withdraw the spindle from the top cover (5) and remove the spring (63).

MAIN BODY

Unscrew the nut (16) and remove the throttle lever (17), idling stop lever (18), washer (19) and strangler inter-connection lever (20).

Take out the screws (50), lift the throttle butterfly (48) from its slot in the spindle (49) and withdraw the spindle.

Release the push rod (31) and spring (29) by removing circlips (32) from both ends of the rod.

Slacken the screw (41), withdraw the push rod (26) from the strangler cam and release the lever (20), spring (24) and washers (23) (25) by extracting the split pins (27).

Remove the setscrews (44), pivot bolt (30) and take off the cam plate (28), spring (38) and bracket (37).

Remove the volume control screw (22) and spring (21). Unscrew the Econostat jet (9), take out the screw (10) and remove the spraying bridge (12).

Re-assembly

Fit the spraying bridge (12) to the body (11) and secure with the screw (10), secure the abutment bracket (37), return spring (38) and cam plate (28) to the carburettor body with screw (44) and pivot bolt.

Fit the volume control screw (22) with spring (21).

Assemble the throttle spindle (49) to the body (11) and fit the butterfly (48) retaining it with the screws (50). Position the washer (25) and spring (24) on the rod (26) and secure it to the lever (20) with the washer (23) and split pin (27). Secure the push rod (26) to the cam plate boss (28) with the screw (41). Assemble items (20), (19), (18) and (17) to the spindle (49), securing with the nut (16). Fit the push rod (31) to the spindle lever (49) and fit the spring (29), pump lever and circlip (32) positioning it in the first groove on the rod (31).

Assemble the ball valve (45), washer (52) and plug (51) the valve body (54) and valve (58), ball (55), washer (56) and pump jet (57), the Econostat fuel jet (9) and air correction jet (8), the float (7), lever (59) and pivot (60) to the body (11).

Assemble the spring (63) to the spindle (62) and fit the spindle to the top cover (5), fit the strangler (2) and secure with screws (1). Fit the needle valve (61) and washer (64), position the gasket (6) on the body (11), hold the strangler (2) open and fit the cover (5) to the body, securing with screws (3) and washer (4). Adjust the throttle/strangler inter-connecting rod (26) by inserting a length of 0·027″ (0·7 mm.) wire (A) between the throttle butterfly (48) and the bore of the carburettor body. With the strangler (2) held fully closed, tighten the screw (41) as shown on Fig. 9.

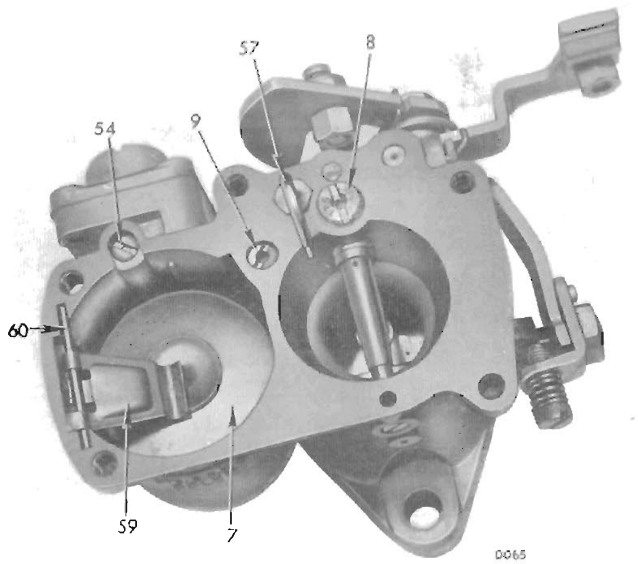


Fig. 8. Carburettor float and jet details

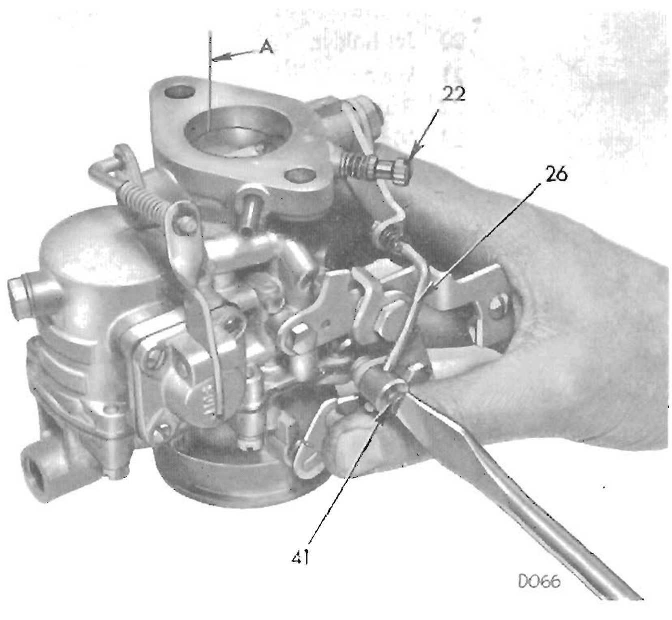


Fig. 9. Adjusting the throttle and choke inter-connection, using a piece of 0·027″ (0·7 mm.) wire "A" between the throttle butterfly and bore of carburettor body

EXPLODED S.U. CARBURETTOR

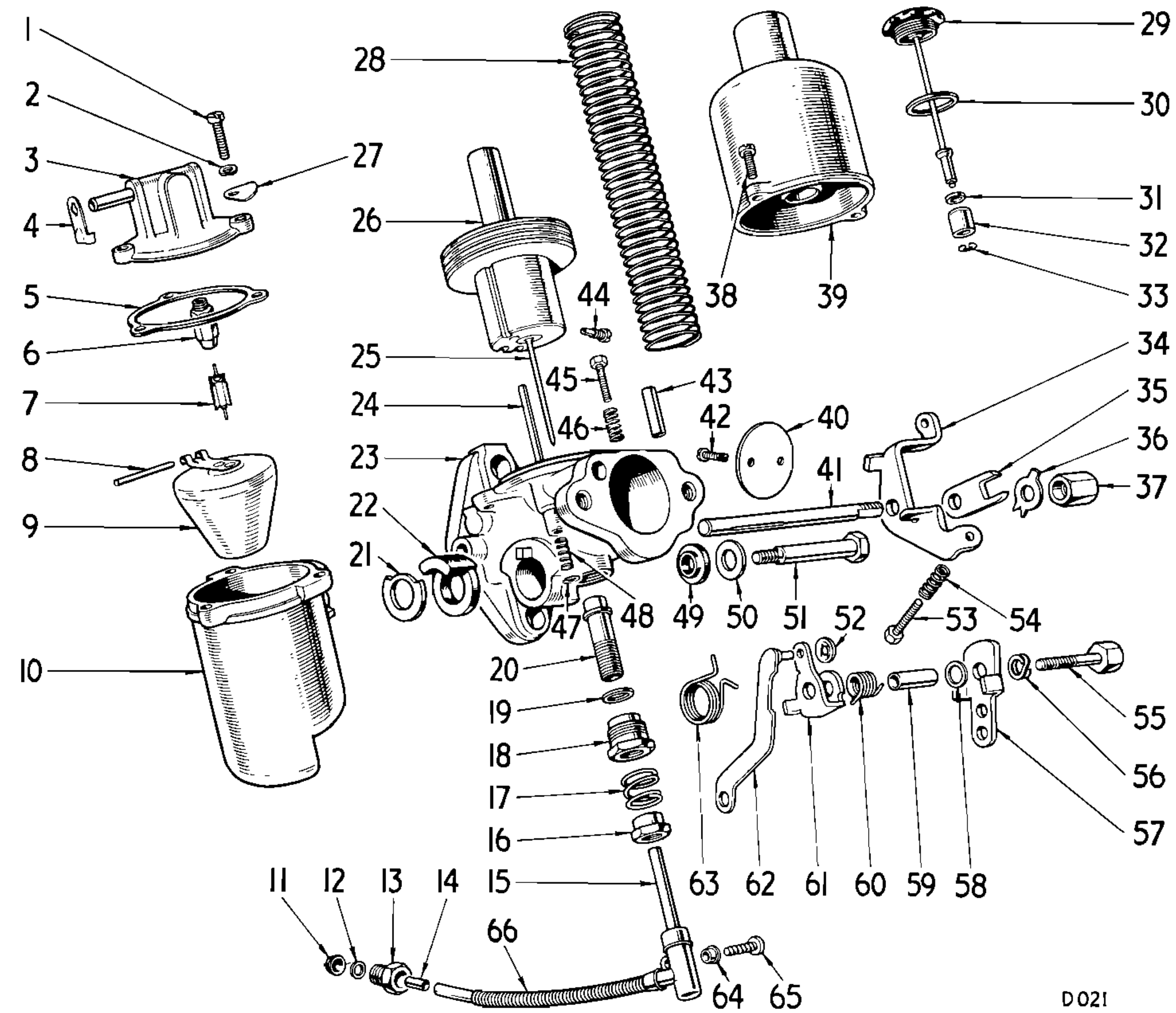


Fig. 10. Exploded S.U. carburettor

Key to Fig. 10

1	Screw	34	Throttle adjusting bracket
2	Spring washer	35	Throttle fork
3	Float chamber lid	36	Lock tab
4	Breather hole shroud	37	Nut
5	Gasket	38	Screw
6	Needle valve body	39	Vacuum chamber
7	Needle valve	40	Throttle disc
8	Float spindle	41	Throttle spindle
9	Float	42	Screw
10	Float chamber	43	Mixture enrichment cable abutment
11	Cup	44	Needle retaining screw
12	Washer	45	Throttle adjusting screw
13	Union nut	46	Spring
14	Sleeve	47	Circlip
15	Jet	48	Spring
16	Adjusting nut	49	Rubber seal
17	Spring	50	Plain washer
18	Gland nut	51	Bolt
19	Washer	52	Circlip
20	Jet holder	53	Throttle adjusting screw
21	Washer	54	Spring
22	Rubber seal	55	Bolt
23	Main body	56	Spring washer
24	Lifting pin	57	Cam lever
25	Needle	58	Distance washer
26	Piston	59	Tube
27	Identification plate	60	Return spring
28	Spring	61	Pick-up lever
29	Cap	62	Jet lever
30	Washer	63	Return spring
31	Washer	64	Shouldered washer
32	Piston	65	Screw
33	Circlip	66	Flexible pipe

SPITFIRE

CARBURETTORS

Replenishing Dampers (Fig. 11)

Remove the dampers and replenish the dashpots with thin engine oil, grade SAE 20 (but no thicker than SAE 30). The oil level is correct when the damper is approximately ¼" (6 mm.) above the dashpots when resistance is felt.

Cleaning Suction Chamber and Piston

At approximate intervals of twelve months, detach the piston unit. Clean the piston and the inside bore of the suction chamber. Re-assemble dry except for a few spots of thin oil on the piston rod.

Replenish the damper reservoir.

Cleaning Float Chambers

Every 6,000 miles (10,000 km.) disconnect the fuel feed pipes and remove both float chamber lids and float assemblies. Remove any sediment from the float chambers, re-assemble the carburettors and re-connect the fuel pipes.

Jet Centralising *(Fig. 12)*

If the suction piston is lifted by hand and released, it should fall freely and hit the inside "jet bridge" with a soft metallic click when the jet adjusting nut (2) is screwed to its topmost position.

If a click is audible only when the jet is in the fully lowered position, the jet should be centralised as follows:—

Holding the jet (3) in its upper position, slacken the gland nut (1) and move the jet assembly laterally until the jet is concentric with the needle, then tighten the gland nut. The piston should now fall freely and hit the jet bridge with a soft metallic click.

Lower the jet and again lift and release the piston, noting any difference in the sound of impact. If a sharper impact sound results, repeat the centralising operation to achieve identical sounds with the jet raised and lowered.

Re-connect the jet lever (62) Fig. 10, replenish the dampers and tune the carburettors before replacing the air cleaners.

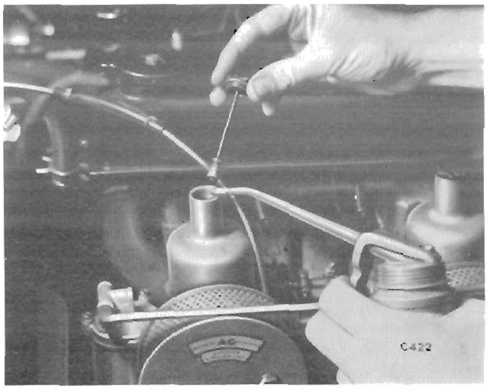


Fig. 11. Replenishing damper chambers

1 Jet gland nut
2 Jet adjusting nut
3 Jet assembly
4 Nylon tube
8 Piston lifting pin
9 Oil well

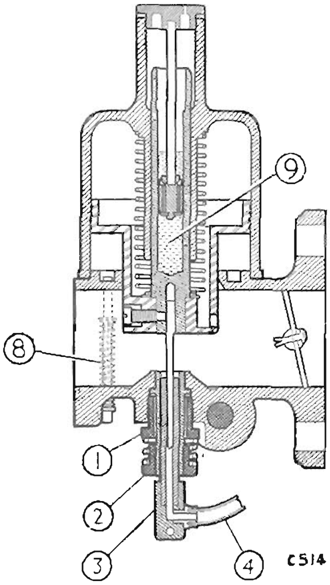


Fig. 12. Cross section of carburettor showing jet and piston assemblies

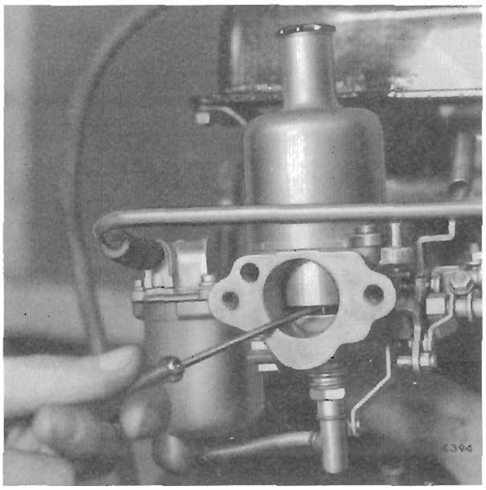


Fig. 13. Method of lifting piston to check jet centralization

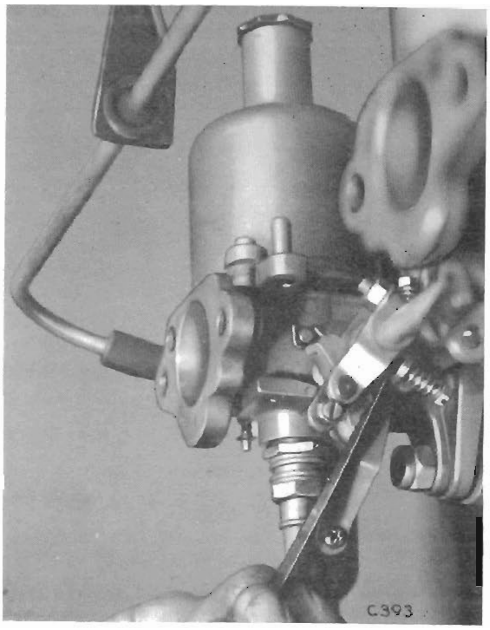


Fig. 14. Using a 0·015" (0·4 mm.) feeler gauge to obtain correct jet/throttle interconnection clearance

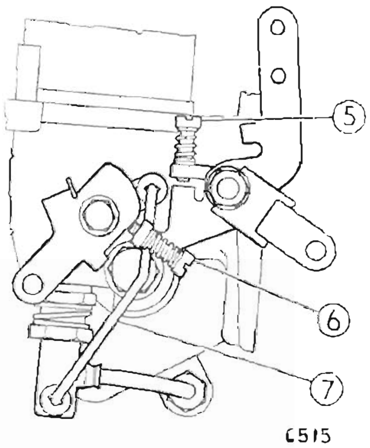


Fig. 15. Jet and throttle interconnection adjustment screws

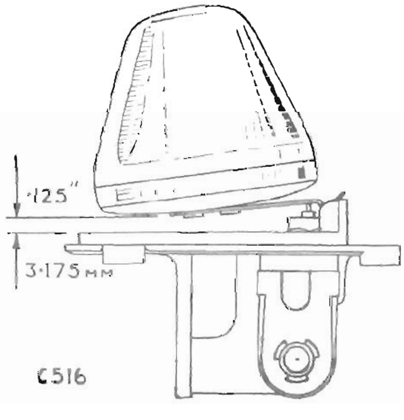


Fig. 16. Method of checking float level

Jet and Throttle Interconnection Adjustment (Figs. 14 and 15)

With the choke control fully "IN", the engine warm and idling on a closed throttle, adjust the screw (6) to give a clearance of 0·015" (0·4 mm.) between the end of the screw and rocker lever.

Always check this adjustment when the throttle stop screw (5) is altered.

Float Chamber Fuel Level (Fig. 16)

The level of fuel in the float chamber is adjusted by setting the float lever on the float chamber lid, as follows:—

1. Disconnect the fuel feed pipe and remove the float chamber lid.
2. Invert the lid and, with the float lever resting on the needle valve, measure the gap between the lever and lower lid face as shown. This is easily measured by using a small piece of ⅛" (10 SWG, 3·25 mm.) thick mild steel plate as a slip gauge.
3. If necessary, bend the float lever to obtain the correct setting.
4. Refit the float chamber lid, and re-connect the fuel pipe.

Carburettor Removal (Fig. 17)

1. Remove the air cleaners and disconnect the mixture enrichment cable (3), throttle control rod (7), throttle return springs (4), and fuel feed pipes (8) and (9).

2. Remove the flange nuts and lift off the carburettors complete with linkage.

Refitting

1. Using new gaskets, refit the carburettors, with the throttle and mixture enrichment spindles positioned between them.

2. Re-connect the throttle control rod (7), mixture enrichment control (3) and fuel feed pipes (8) and (9), and the return springs (4).

3. Ensure that the gaps between the spindle forks and pegs are correct by checking them as described in paragraph 7 on page 1·310 and shown on Fig. 23.

TUNING CARBURETTORS

Twin carburettor installations cannot be successfully tuned unless the general condition of the engine, ignition and the fuel system is satisfactory.

1. Remove the air cleaners and run the engine until it has attained its normal operating temperature. Slacken the clamping bolts on the throttle spindle connections. Close the throttles fully by unscrewing the idling adjustment screws and then open them by screwing down one and a half turns.

2. Remove the suction chambers and pistons. Rotate the jet adjusting nuts until each jet is flush with the bridge of its carburettor, or as near to this as possible. (Both jets being in the same relative position to the bridge of their respective carburettors.) Replace the pistons and suction chamber assemblies and check that the pistons fall freely onto the bridges of the carburettors. Turn down the jet adjusting nuts two complete turns (12 flats).

3. Start the engine and adjust the throttle adjusting screws (Fig. 20) to give the desired idling speed (approx. 550 r.p.m.) by moving each throttle adjusting screw an equal amount. Using a length of 0·3″ (3 mm.) approx. bore tubing, listen to the hiss in the intake (Fig. 21) and adjust the throttle adjusting screws until the intensity of the hiss is similar in both intakes. This will synchronize the throttles.

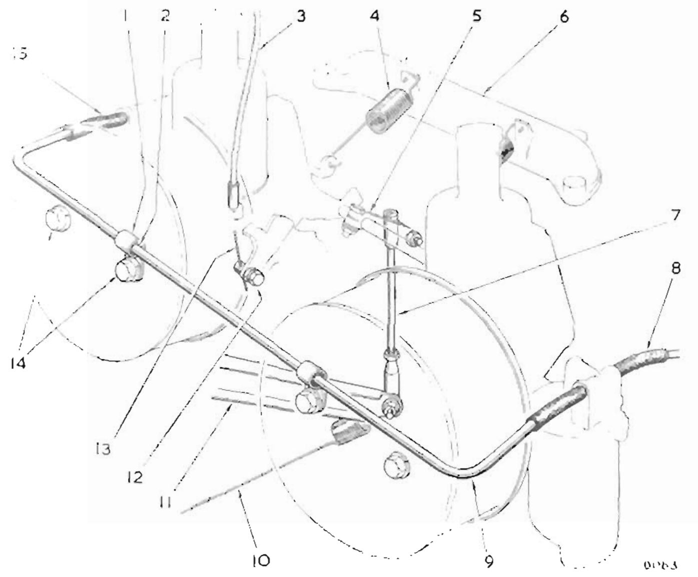


Fig. 17. Carburettor fuel pipe and control details

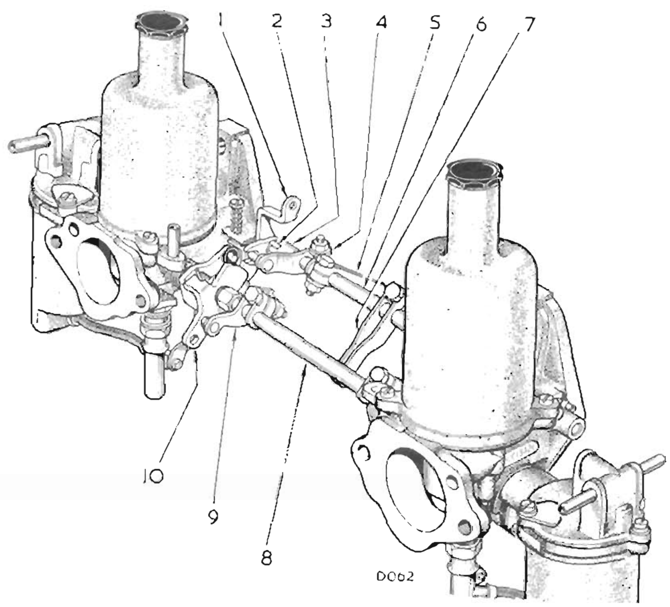


Fig. 18. Throttle and mixture enrichment linkages

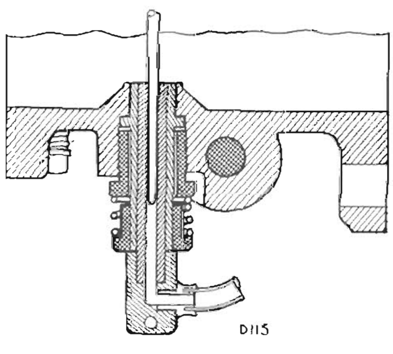


Fig. 19. Jet raised level with carburettor bridge

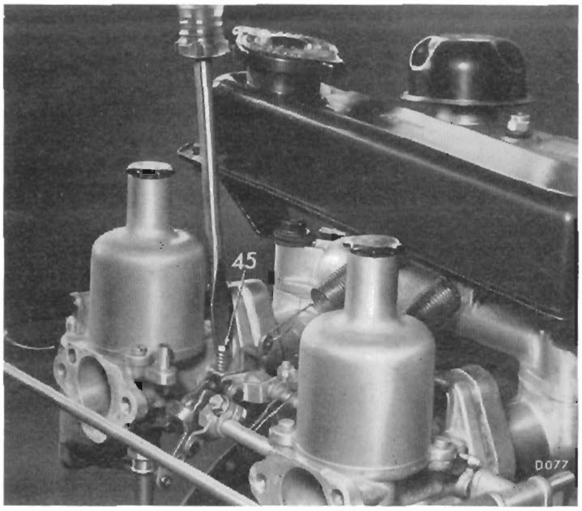


Fig. 20. Adjusting throttle stop screws

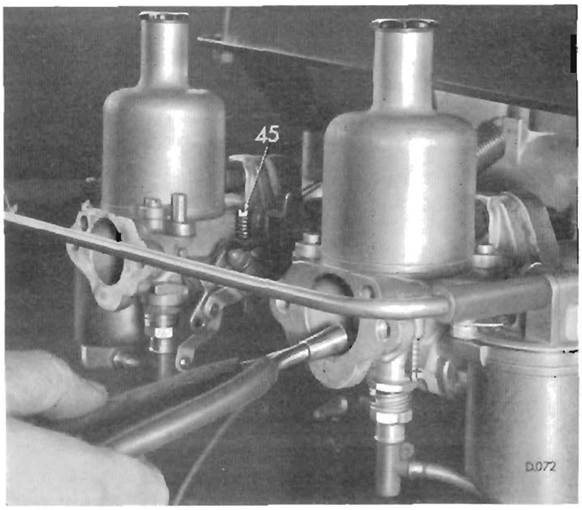


Fig. 21. Listening to volume of hiss at carburettor intakes

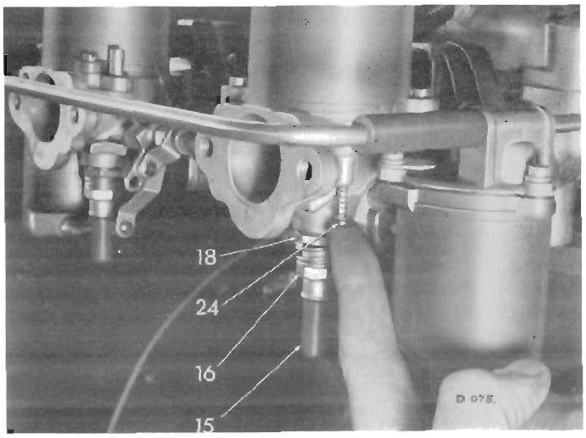


Fig. 22. Using piston lifting pin to check mixture strength

4. Adjust the mixture by screwing both the jet adjusting nuts up or down by the same amount until the fastest idling speed is obtained consistent with even firing. During the adjustment press the jets upwards and ensure that they are in contact with the adjusting nuts.

   As the jets are adjusted the engine will probably run faster, and it may be necessary to unscrew the throttle adjusting screws a little, each by the same amount, to reduce the speed.

5. Check the mixture strength by lifting the piston of the front carburettor by approximately $\frac{1}{32}$" (·75 mm.) when:

   (a) If the engine speed increases, the mixture strength of the front carburettor is too rich;

   (b) If the engine speed immediately decreases, the mixture strength of the front carburettor is too weak;

   (c) If the engine speed momentarily increases very slightly, the mixture strength of the front carburettor is correct.

   Repeat the operation at the rear carburettor and, after adjustment, re-check the front carburettor, since the two carburettors are interdependent.

6. When the mixture is correct the exhaust note should be regular and even. If it is irregular with a splashy type of misfire and with a colourless exhaust, the mixture is too weak. If there is a rhythmical type of misfire in the exhaust beat together with a blackish exhaust the mixture is too rich.

7. The throttle on each carburettor is operated by a lever and pin with the pin working in a forked lever attached to the throttle spindle. A clearance exists between the pin and fork which must be maintained when the throttle is closed and the engine is idling to prevent any load from the accelerator linkage being transferred to the throttle butterfly and spindle.

   To set this clearance move each throttle shaft lever downwards in turn until the lever pin rests lightly on a ·015" (·38 mm.) feeler inserted between the lever and the lower arm of the carburettor throttle lever fork (Fig. 23). Tighten the clamp bolt of the throttle shaft lever at this position. The pins on the throttle shafts should then have clearance in the forks.

3 Check that the jet control linkage has approximately $\frac{1}{16}$" (1·5 mm.) free movement before it starts to pull on the jet levers.

Set the mixture control knob on the dash panel to its maximum movement without moving the jets and adjust the fast-idling cam screws to give an engine speed of about 1,000 r.p.m. when hot.

Make sure that the jet is hard up against the bottom face of the adjusting nut of each carburettor after any movement of the nut.

Before starting to tune the carburettors, check that each adjusting nut is unscrewed by the same amount. When slow running is satisfactory, one nut may be unscrewed more than the other. Such variation is normal on new carburettors and more pronounced on worn ones.

Effect of Altitude and Climatic Extremes on Standard Tuning

The jet needle used for normal tuning is suitable for temperate climates from sea level up to 6,000 ft. (1829 mm.). Above that altitude, depending upon climatic heat and humidity, the use of weaker tuning may be necessary. Because of the wide variations of such conditions, there is no arbitrary factory recommendation for a particular needle. The owner will need to experiment with weaker needles until a satisfactory one is determined. Occasionally, a weaker piston return spring may effect the necessary weakening.

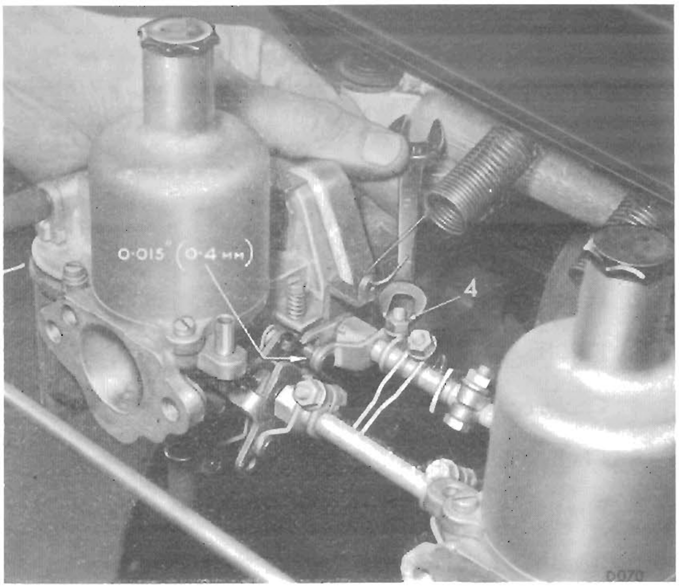


Fig. 23. Adjusting throttle spindle clamps to give clearance of peg in fork

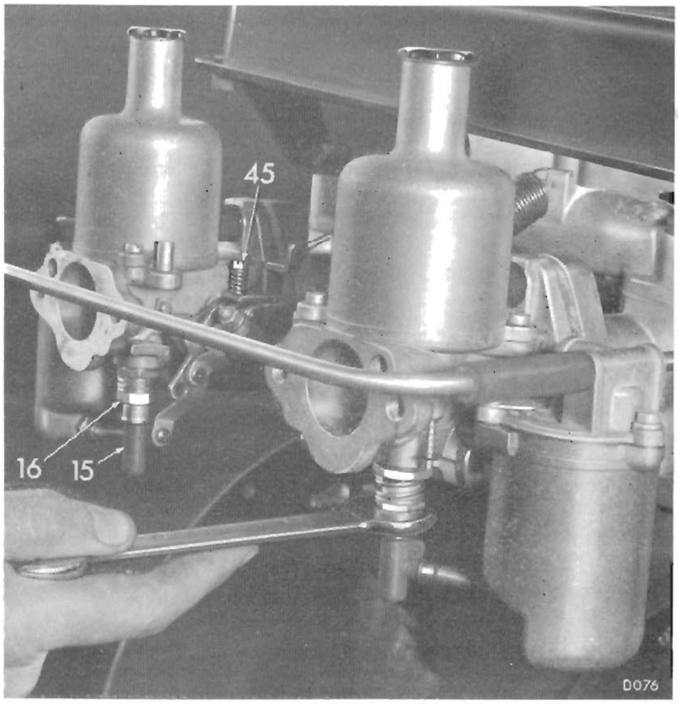


Fig. 24. Rotating the jet adjusting nuts with a spanner

B 32 P1H SEMI-DOWNDRAUGHT CARBURETTOR DETAILS

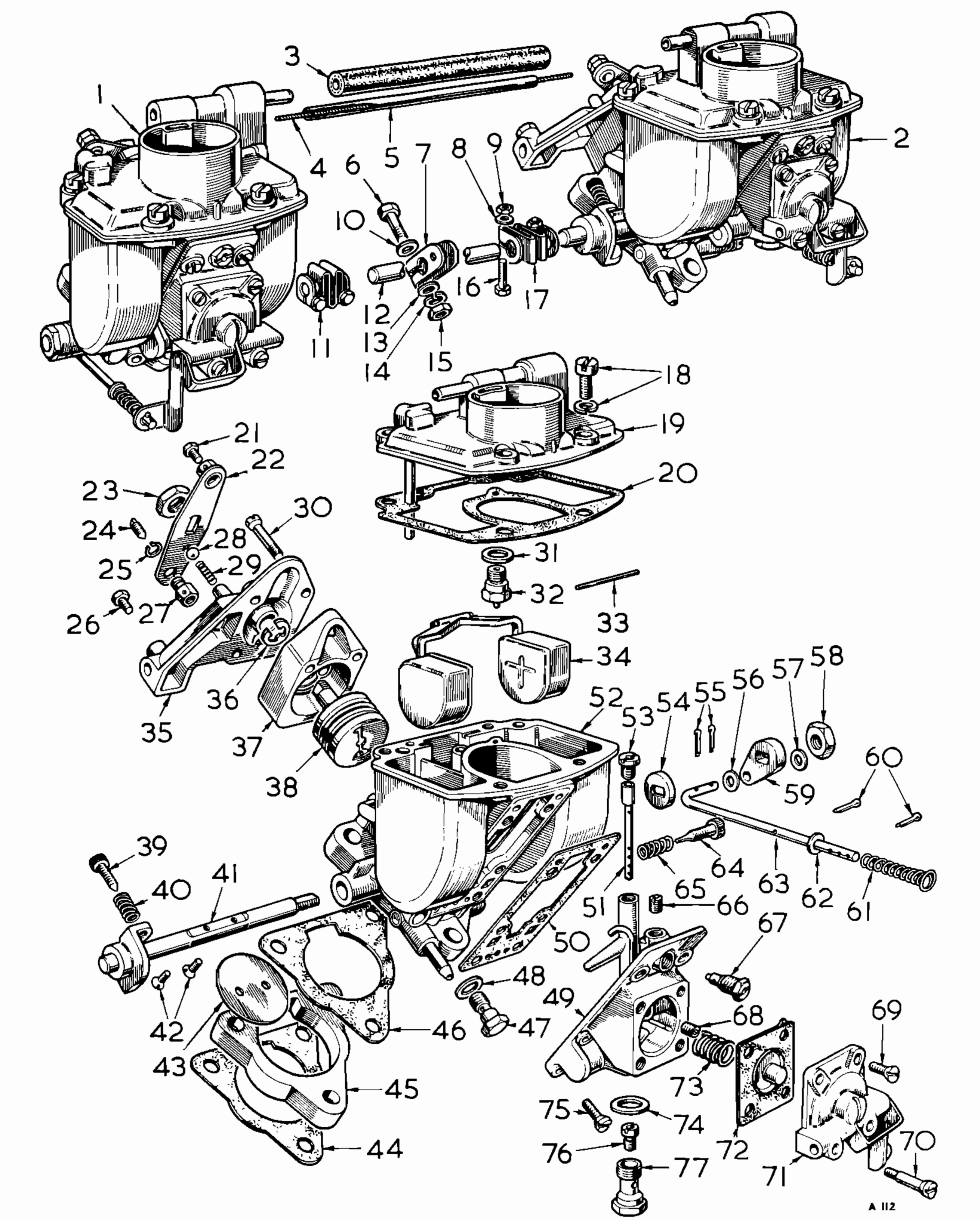


Fig. 27. Exploded B32 P1H semi-downdraught carburettor

Key to Fig. 27

1	Rear carburettor	27	Nipple	53	Air correction jet
2	Front carburettor	28	Ball	54	Distance piece
3	Fuel hose	29	Spring	55	Split pins
4	Choke cable—inner	30	Bolt	56	Plain washer
5	Choke cable—outer	31	Fibre washer	57	Plain washer
6	Pinch bolt	32	Needle valve	58	Nut
7	Accelerator lever	33	Pivot pin	59	Lever
8	Plain washer	34	Float assembly	60	Split pins
9	Nut	35	Starter cover	61	Spring
10	Plain washer	36	Circlip	62	Plain washer
11	Coupling assembly	37	Starter body	63	Push rod
12	Coupling rod	38	Disc valve	64	Idling mixture adjusting screw
13	Spring washer	39	Stop screw	65	Spring
14	Plain washer	40	Spring	66	Idling mixture air bleed jet
15	Nut	41	Throttle spindle	67	Idling mixture fuel jet
16	Pinch bolt	42	Screws	68	Pump jet
17	Spring coupling	43	Throttle disc	69	Screw
18	Screw and spring washer	44	Gasket	70	Screw
19	Top cover	45	Insulation gasket	71	Pump cover plate assembly
20	Gasket	46	Gasket	72	Pump diaphragm
21	Pinch screw	47	Starter jet	73	Spring
22	Lever	48	Washer	74	Fibre washer
23	Nut	49	Jet block assembly	75	Screw
24	Pinch screw	50	Gasket	76	Main jet
25	Circlip	51	Emulsion tube	77	Main jet carrier
26	Screw	52	Carburettor body		

VITESSE

SOLEX B.32 PIH CARBURETTORS

(Fitted up to Engine No. HB 6798)

Early production Vitesse six cylinder engines are fitted with twin Solex B.32 PIH-32 mm. semi-downdraught carburettors, each having twin float chambers positioned astride the choke tube bore; a progressive Zero Starter with quick-drive away and fast-idle system, and an accelerator pump.

To improve hot starting, modifications were made, rendering both pumps inoperative, as described in Service Information Sheet 1/68. The pumps have since been completely discarded and blanking plates fitted in lieu.

The illustrations appearing in this section show the original carburettors with pumps attached. The pumps should be made inoperative as follows:

1. Remove the pump jets (68), Fig. 27, and fit blanking plugs, Part No. 512087.
2. Disconnect and remove the pump operating rods (63).
3. Remove the operating arms from the diaphragm covers (71), by drifting out the securing pins.

From engine number HB 858HE, the jet settings given on page 7 have been adopted and may be used to advantage on earlier carburettors.

Idling Adjustment

To facilitate correct carburettor tuning, ensure that the compressions on all cylinders are even. Check the following items and make the necessary adjustments.

1. **Ignition timing** — 10° B.T.D.C. static. Advance slightly on test if necessary.
2. **Valve clearances** (cold) — Inlet and exhaust, 0·010″.
3. **Choke control** — Ensure that both operating levers return to the fully closed position.
4. **Jets** — Ensure that all jets are perfectly clean.
5. **Carburettor floats** — Examine both floats for damage or punctures and renew if necessary.
6. **Needle valve height** — Remove each float chamber lid, invert it and place a straight edge across the machined face, directly over the needle valve. *The top of the needle valve should just touch the edge.*

   If the needle valve is more than 0·020″ (0·51 mm.) below the straight edge, fit an additional washer 0·020″ (0·51 mm.) thick (Solex Carb. Number 10593) between the needle valve and top cover.

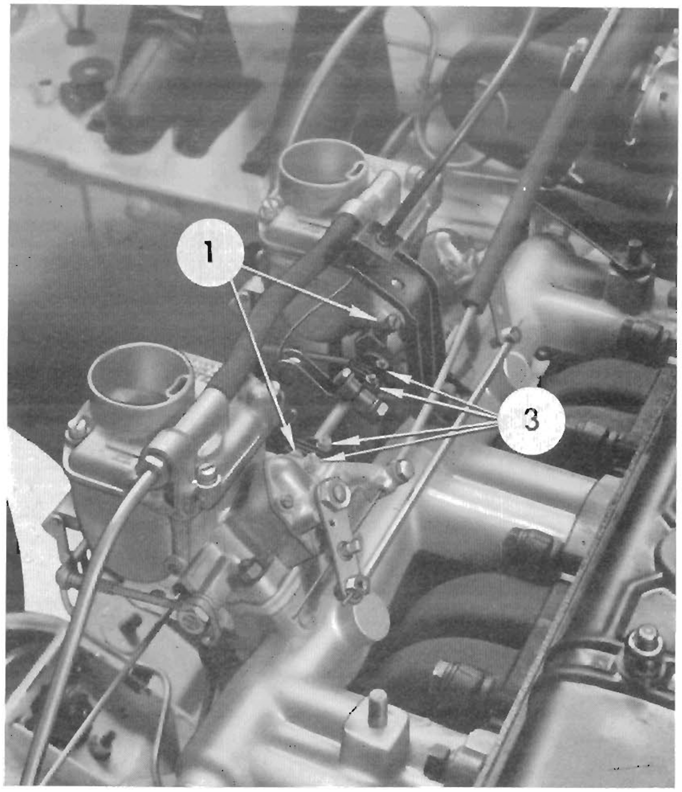


Fig. 25. L.H. view of carburettors, showing flexible linkage clamping bolts (3) and throttle stop screws (1)

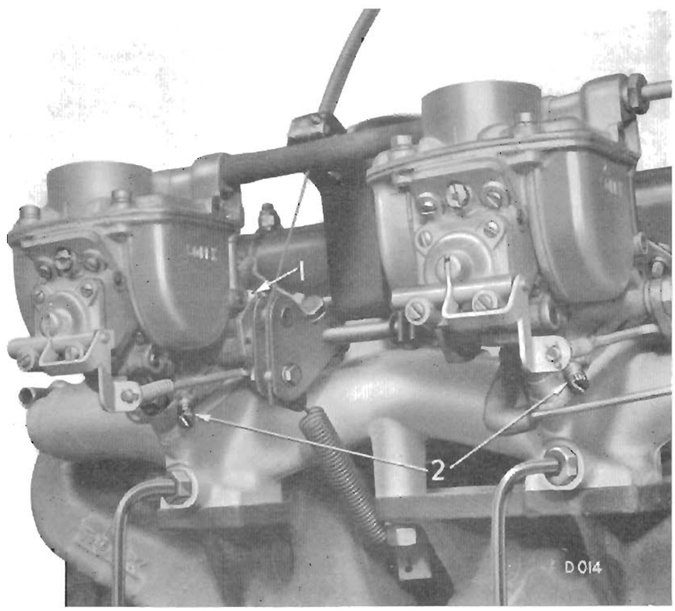


Fig. 26. R.H. view of carburettors, showing mixture control screws (2) and throttle stop screws (1)

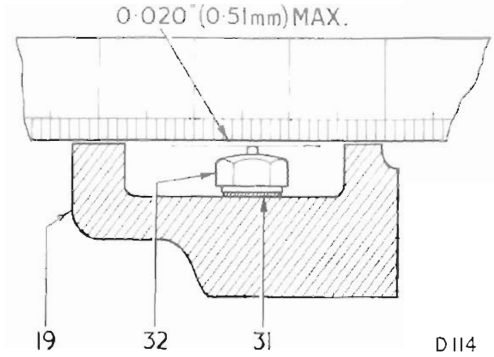


Fig. 28. Checking needle valve height

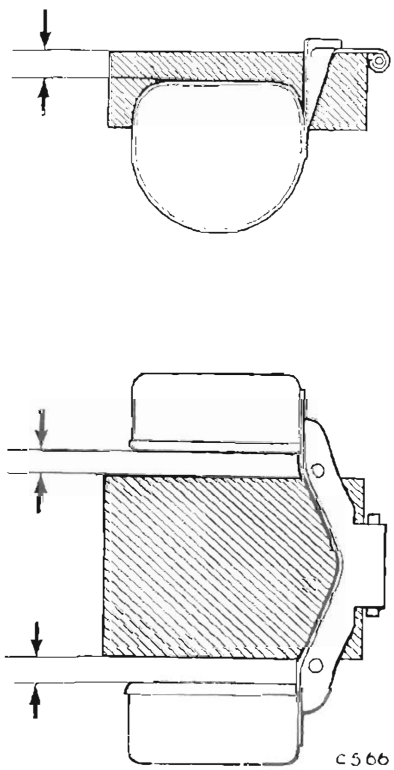


Fig. 29. Checking and adjusting float setting

7. **Float adjustment** — Using an oblong wood or metal block, 1¼" × 2" × ½" (38·1 × 50·8 × 12·7 mm.), place the float on the block as indicated on Fig. 29.

   The pivot pin boss must lie squarely up to the edge of the block.

   Set each float individually to achieve symmetry between the tops and inner faces of the floats and the block as shown.

   Re-assemble the carburettors and ensure that the floats move freely in the float chambers.

8. **Tuning and synchronising the carburettors**—

   Slacken the clamping bolt (3) Fig. 25 on the flexible linkage between the carburettors and, whilst the engine is warm, adjust the carburettors as follows:

   (a) Unscrew both slow running screws (1) Fig. 25 and ensure that the throttles are closed by manual pressure on the screw heads. Open both throttles an equal amount by rotating the screws (1) one turn clockwise.

   (b) Gently screw the mixture control screws clockwise until light contact is made with the casting seat and then unscrew them approximately one full turn.

   (c) Start the engine and adjust the slow running control screws (2) Fig. 26 equally until the idling speed is approximately 500 r.p.m.

   (d) Screw out both mixture control screws a quarter of a turn at a time, until the engine begins to "hunt", indicating richness.

   (e) Screw the mixture screws in by equal amounts until the "hunting" disappears and the engine idles smoothly.

   (f) If the engine speed has now increased due to the mixture adjustment, reduce the speed to approximately 600-650 r.p.m. by adjusting the slow running screws by equal amounts.

   (g) If operation (f) causes irregular idling, re-adjust both mixture screws to maintain synchronisation.

   (h) Ensure that both throttles are against their stops and re-tighten the connecting linkage between the carburettors.

VITESSE

Removal (Fig. 27)

Dismantle and clean the carburettors as follows:—

1. Release the hose clips, detach the support strut and remove the air cleaner and air box assembly.

2. Disconnect the fuel pipes and vacuum advance pipe. Disconnect the connecting cables (4) and (5) and the choke control cable. Slacken the pinch bolts (16) and withdraw the spring couplings (11) and (17) from the throttle spindle.

3. Remove the flange nuts and lift off the carburettors.

Dismantling

1. Take out the screws (18) and lift off the top cover (19) and gasket (20). Unscrew the needle valve (32) with washer (31), and lift out floats (34) and pivot pin (33).

2. Take out the bolts (30) and detach the starter unit. Unscrew the nut (23) and remove the lever (22), ball (28) and spring (29). Remove the cover (35), circlip (36) and withdraw the disc assembly from the body (37).

3. Take out the screws (75) and remove the jet block assembly (49) and gasket (50). Remove the jets (66) and (67), main jet carrier (77), screw (64), emulsion tube (51) and air correction jet (53). Take out the screws (69) and (70) and remove the pump details (71), (72) and (73) and jet (68).

4. Remove the push rod (63), lever (59), screws (42), disc (43) and withdraw the spindle (41).

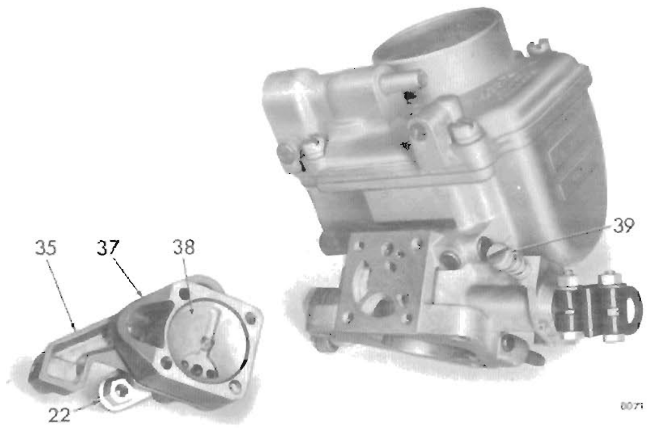


Fig. 30. Starter unit removed from carburettor

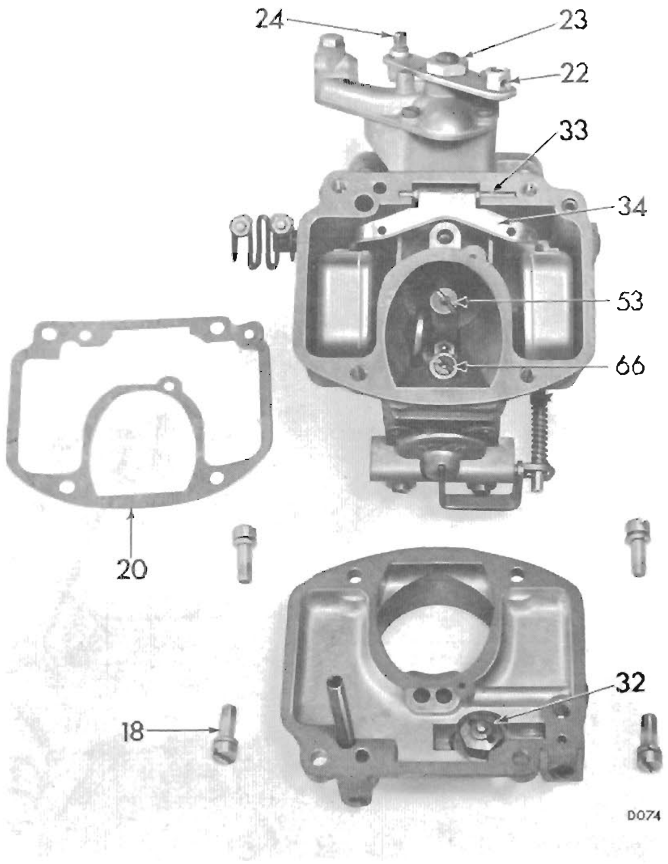


Fig. 31. Top cover details

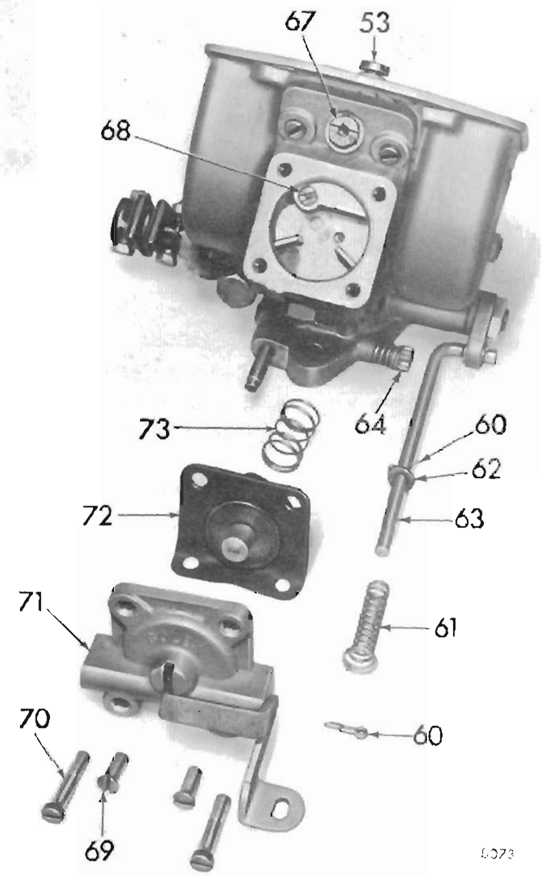


Fig. 32. Accelerator pump components

Re-assembly

Re-assemble the carburettor by reversing the dismantling procedure. Renew damaged gaskets and washers. Refit the accelerator pump push rod (63) with the outer split pin (60) in the centre hole.

Refitting

Refit the carburettors by reversing the removal sequence. Renew the gaskets (44) and (46) and the asbestos gasket (45). Ensure that throttle spindles and starting carburettor levers are synchronised and able to close fully.

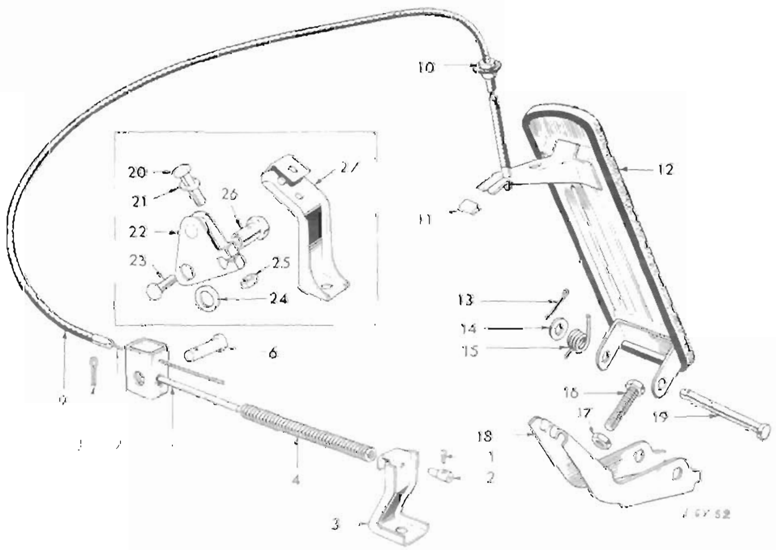
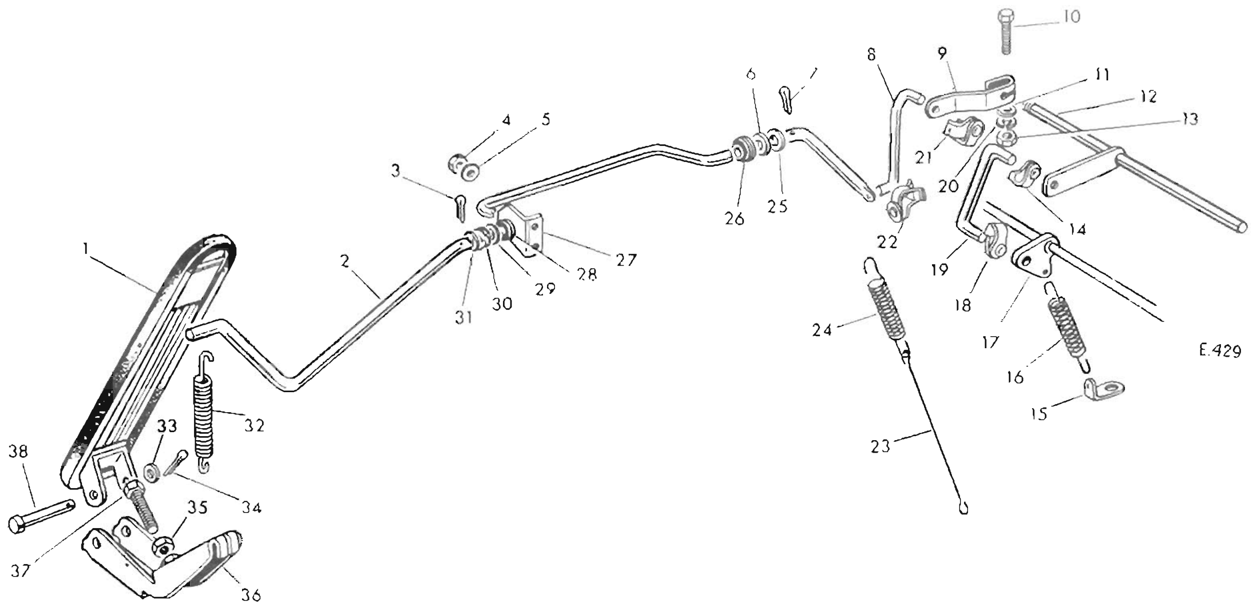


Fig. 33. Herald 1200 accelerator controls (inset showing Vitesse)

1 Screw
2 Nipple
3 Abutment bracket
4 Spring
5 Guide rod
6 Clevis pin
7 Inner cable
8 Split pin
9 Outer cable
10 Rubber washer
11 Clip
12 Accelerator pedal
13 Split pin
14 Washer
15 Return spring
16 Stop bolt
17 Lock nut
18 Bracket
19 Pivot pin
20 Pinch bolt
21 Plain washer
22 Lever
23 Setscrew
24 Washer
25 Nut
26 Nipple
27 Abutment bracket

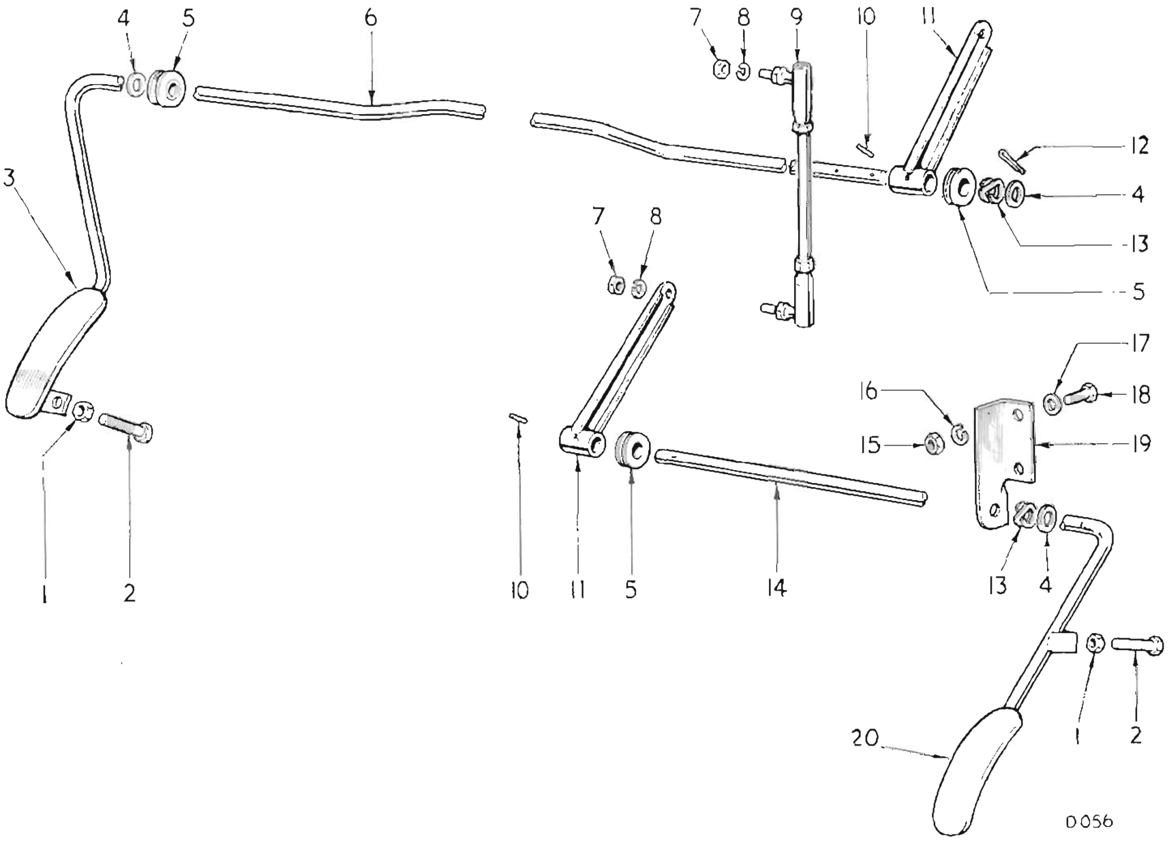
NOTE: Items 20 to 27 in inset show Vitesse condition.



1	Pedal	14	Clip	*27	Bracket
2	Cross-shaft	15	Bracket	28	Bearing
*3	Split pin	16	Spring	*29	Plain washer
*4	Nut	17	Connecting rod assembly	*30	Double spring washer
*5	Plain washer	18	Clip	*31	Plain washer
6	Felt washer	19	Link	32	Spring
7	Split pin	20	Spring washer	33	Plain washer
8	Link	21	Clip	34	Split pin
9	Actuating lever	22	Clip	35	Locknut
10	Setscrew	23	Extension	36	Bracket assembly
11	Plain washer	24	Spring	37	Setscrew
12	Lever assembly	25	Plain washer	38	Pin
13	Nut	26	Bearing		

* R.H.S. only

Fig. 34. Vitesse accelerator controls (From Commission Nos. HC.7605 R.H.S. and HB.7556 L.H.S.)



1	Nut	11	Lever
2	Stop bolt	12	Split pin
3	Accelerator pedal	13	Anti-rattle washer
4	Washer	14	Rod (R.H. drive)
5	Bearing	15	Nut
6	Rod	16	Spring washer
7	Nut	17	Plain washer
8	Spring washer	18	Bolt
9	Link	19	Bracket (R.H. drive)
10	Mills pin	20	Pedal

Fig. 35. Spitfire accelerator controls (L.H. and R.H. drive)

VITESSE

SOLEX B32.1H CARBURETTORS
(Fitted from Engine No. HB 6799 to HB 27985)

These carburettors are basically similar to those described on page 1·313 but differ in respect of the following:

1. The accelerator pump is discarded.
2. The jet block is of different form.

Jet settings are identical to those given on page 7.

To Check Needle Valve Height (Fig. 36)

Slacken the clips (2) and (3) (Fig. 40), securing air box (1) to carburettors and air cleaner hose (5) and remove the air box.

Remove the interconnecting fuel hose (3) from between the carburettors and disconnect the fuel line (60) to front carburettor.

Remove the screws (12), lift off and invert the float chamber cover.

Place a straight edge across the machined face (Fig. 28) and directly over the needle valve. The top of the needle valve should just touch the straight edge.

If the needle valve is more than 0·020" (0·51 mm.) below the straight edge, fit an additional washer 0·020" (0·51 mm.) thick (Solex Carb. Number 10593) between the needle valve and top cover.

Re-assemble the carburettor by reversing the part dismantling procedure above.

To Check Float Adjustment

Remove the float chamber lid as detailed above.

Remove the gasket (14) (Fig. 37), lift out the twin floats (19) and remove the pivot pin (18).

Using a wood or metal block, 1½" × 2" × ½" (38·1 × 50·8 × 12·7 mm.) place the float assembly as shown in Fig. 29.

Set each float individually until the inner and top faces of the floats are symmetrical to the block.

Re-assemble the carburettors, ensuring that the floats move freely in the float chambers.

Jet Block — Removal (Fig. 36)

Remove the six screws (32) and withdraw the jet block (28).

Starter Block — Removal (Fig. 38)

Disconnect the choke cable (4) and (5) and interconnecting cable (62).

Remove the four screws (56), using a short or right-angle screwdriver, and lift off the starter block.

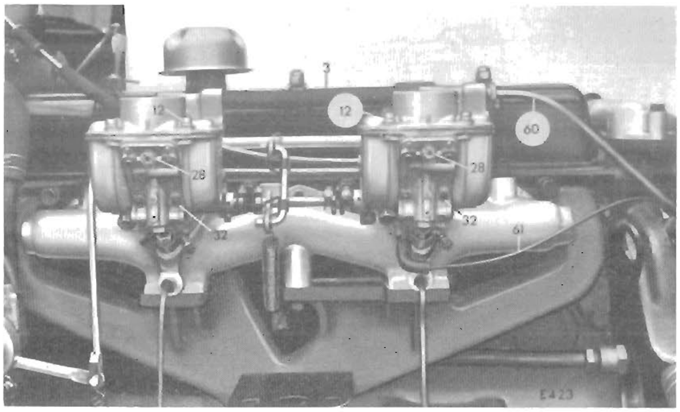


Fig. 36. R.H. view of carburettors

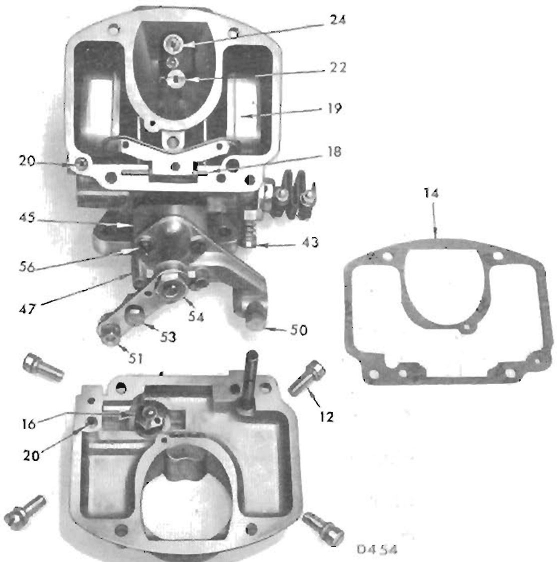


Fig. 37. Top cover and float chamber details

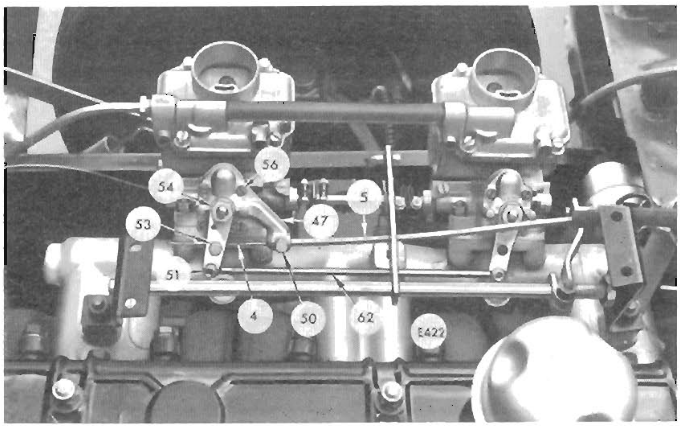


Fig. 38. L.H. view of carburettors

B32.1H SEMI-DOWNDRAUGHT CARBURETTOR DETAILS

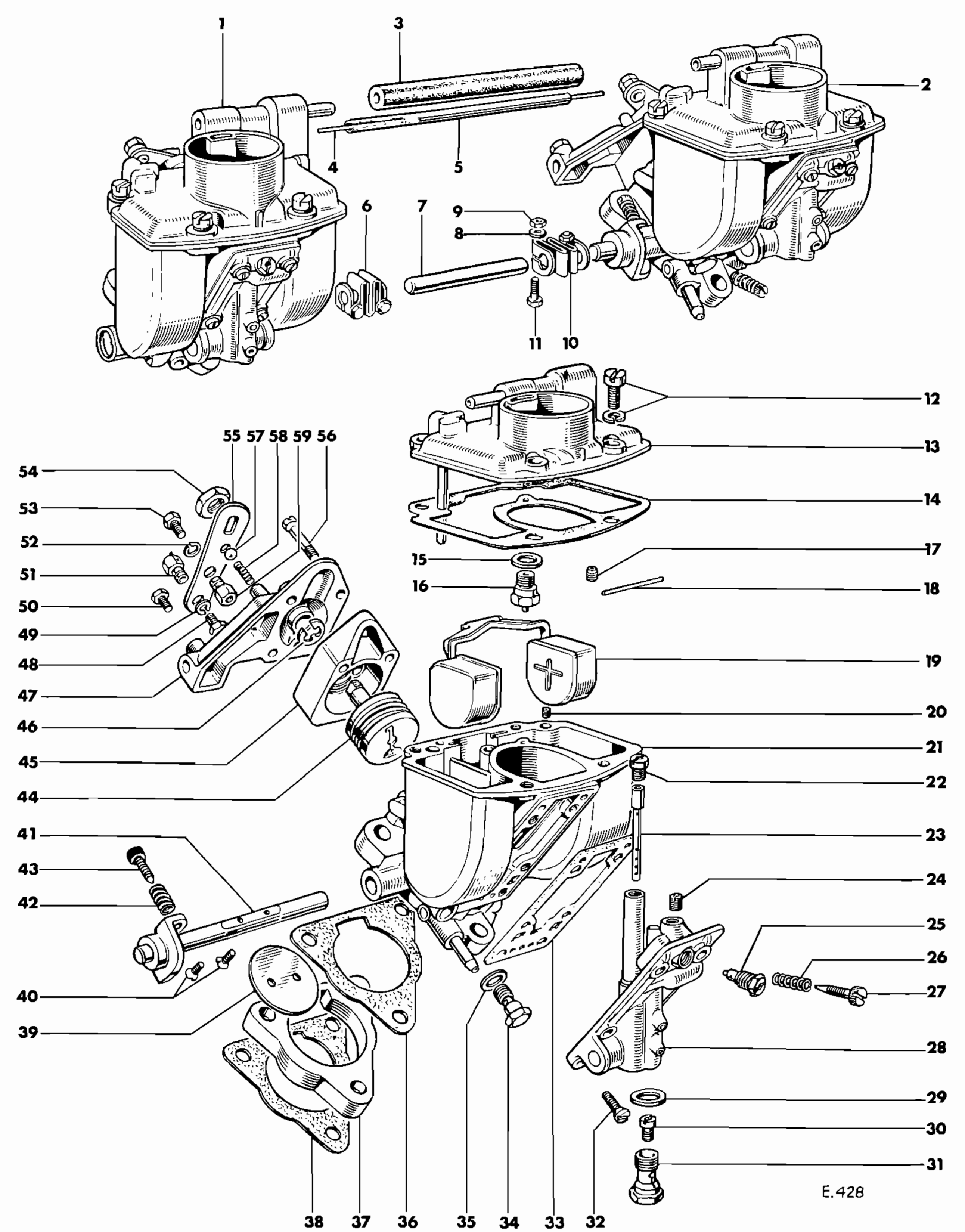
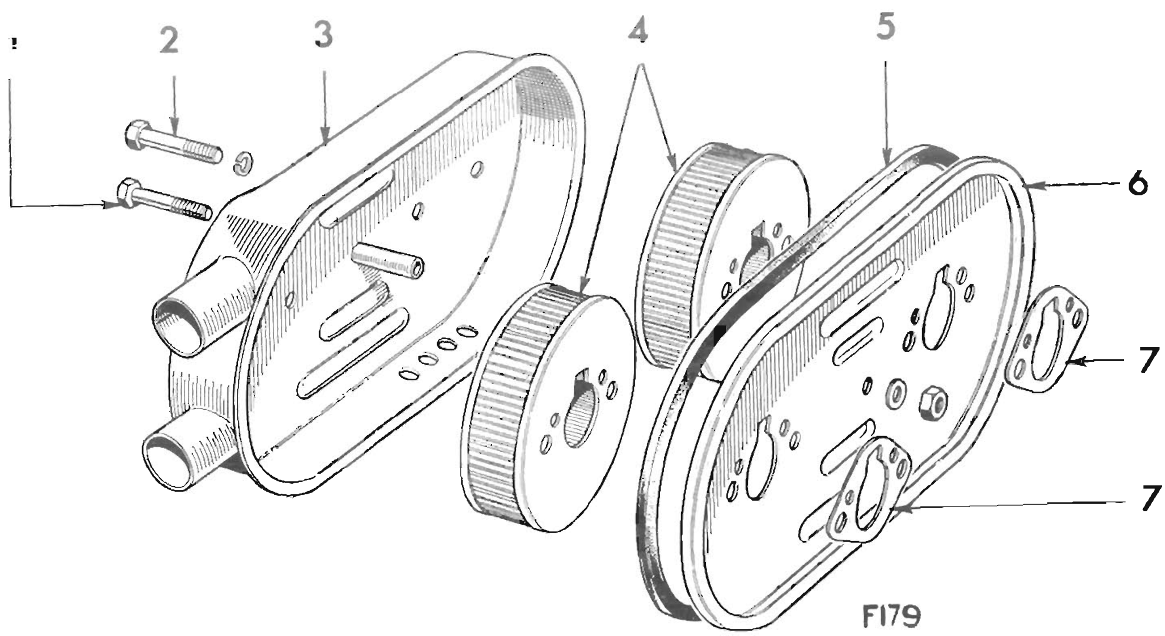


Fig. 39. Exploded B32.1H carburettor

Key to Fig. 39

1 Rear carburettor
2 Front carburettor
3 Fuel hose
4 Choke cable—inner
5 Choke cable—outer
6 Coupling assembly
7 Coupling rod
8 Plain washer
9 Nut
10 Spring coupling
11 Pinch bolt
12 Screw and spring washer
13 Top cover
14 Gasket
15 Fibre washer
16 Needle valve
17 Econostat air bleed
18 Pivot pin
19 Float assembly
20 Econostat jet
21 Carburettor body
22 Air correction jet
23 Emulsion tube
24 Idling mixture air bleed jet
25 Idling mixture fuel jet
26 Spring
27 Idling mixture adjusting screw
28 Jet block
29 Fibre washer
30 Main jet
31 Main jet carrier
32 Screw
33 Gasket
34 Starter jet
35 Fibre washer
36 Gasket
37 Insulation gasket
38 Gasket
39 Throttle disc
40 Screws
41 Throttle spindle
42 Spring
43 Throttle stop screw
44 Disc valve
45 Starter body
46 Circlip
47 Starter body cover
48 Inter-connecting cable locking screw
49 Circlip
50 Choke outer cable locking screw
51 Swivel
52 Circlip
53 Choke inner cable locking screw
54 Nut
55 Starter lever
56 Bolt
57 Ball
58 Spring
59 Swivel



1 Bolt
2 Bolt
3 Front cover
4 Element
5 Seal
6 Back plate
7 Gasket

Fig. 43. Air cleaner details
Vitesse Zenith-Stromberg (Series 150CD) carburettors

AIR CLEANER

The air cleaner comprises two paper elements housed in a container attached to the carburettor intake flanges. When operating under conditions similar to those prevailing in the United Kingdom both elements should be removed for cleaning every 6,000 miles. Depending upon the severity of conditions, this period should be reduced where excessive amounts of dust are encountered.

A choked air cleaner will adversely affect combustion efficiency.

To Remove

Unscrew four bolts (2) securing the container to the carburettor flanges.

Withdraw the container from the carburettor flanges, remove the centre bolt (1), take off the cover plate (3), and lift out the elements (4).

Clean out the container and use a high pressure air line, or foot pump, to remove dust from between the folds of the paper element.

Re-assemble the air cleaner by reversing the foregoing procedure. (See Fig. 46).

ZENITH - STROMBERG (SERIES 150CD)
CARBURETTOR DETAILS

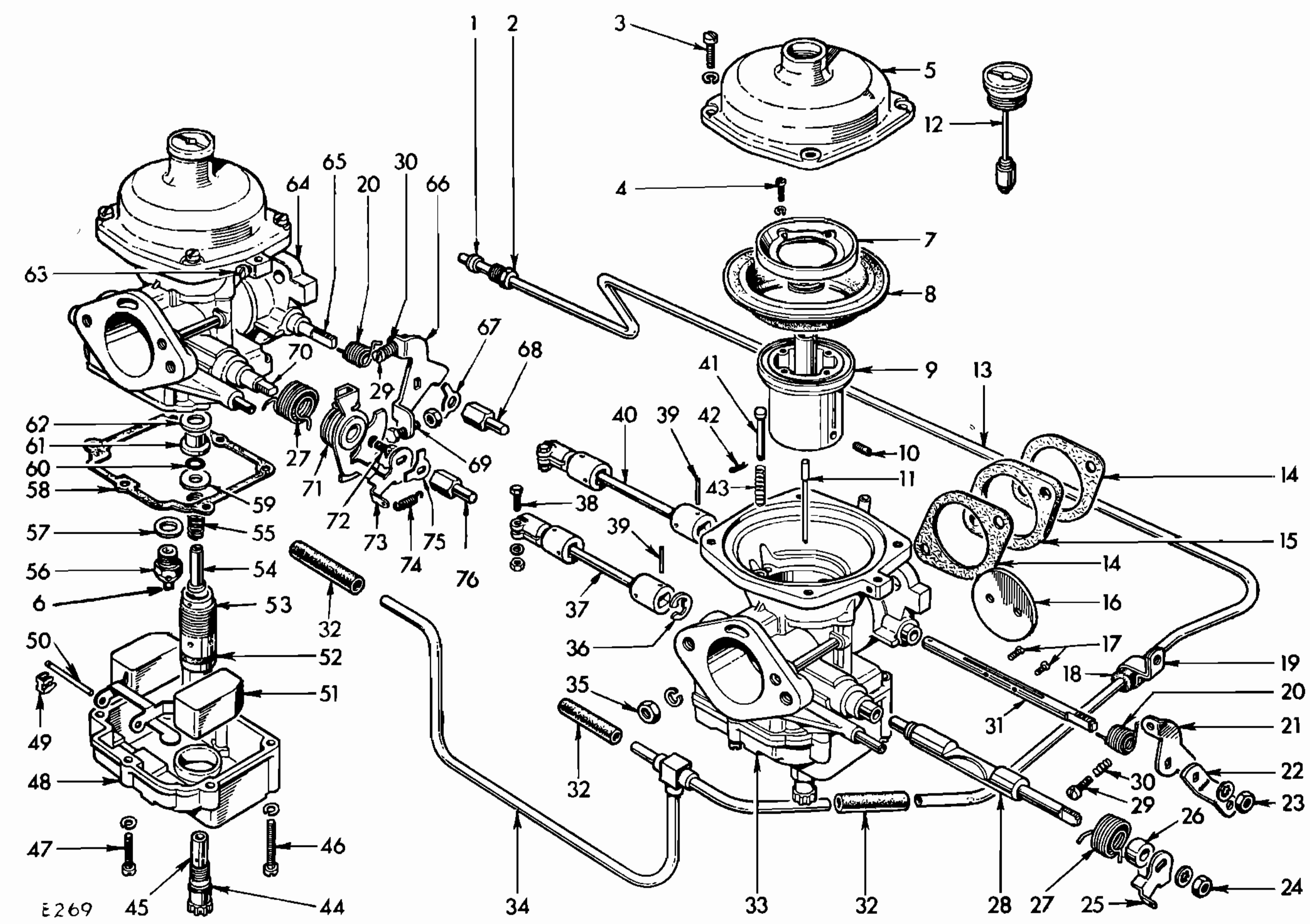


Fig. 44. Vitesse, Stromberg carburettor details

Key to Fig. 44

1	Sleeve	27	Spring	52	"O" ring
2	Nut	28	Starter bar	53	Bushing screw
3	Screw	29	Screw	54	Jet
4	Screw	30	Spring	55	Spring
5	Cover	31	Spindle	56	Needle seat
6	Needle	32	Connection	57	Washer
7	Retaining ring	33	Float chamber	58	Gasket
8	Diaphragm	34	Pipe	59	Washer
9	Air valve	35	Nut	60	"O" ring
10	Locking screw	36	Retaining ring	61	Bushing
11	Needle	37	Coupling	62	Washer
12	Damper	38	Bolt	63	Screw
13	Pipe	39	Pin	64	Body
14	Gasket	40	Coupling	65	Spindle
15	Insulator	41	Pin	66	Stop
16	Throttle	42	Clip	67	Washer
17	Screw	43	Spring	68	Nut
18	Grommet	44	"O" ring	69	Screw
19	Bracket	45	Adjusting screw	70	Starter bar
20	Spring	46	Screw (long)	71	Lever
21	Stop	47	Screw (short)	72	Screw
22	Lever	48	Float chamber	73	Lever
23	Nut	49	Clip	74	Spring
24	Nut	50	Pin	75	Washer
25	Lever	51	Float assembly	76	Nut
26	Bush				

Carburettor — Removal

Slacken the clips (2) and (3) (Fig. 40) securing air box (1) to carburettors, and hose (5) to air cleaner. Remove the air box and hose.

Disconnect the fuel pipe (60) (Fig. 36) and advance vacuum pipe (61) from the front carburettor and remove the fuel hose (3) from between the carburettors.

Disconnect the choke control cable (4) (Fig. 38) and (5) and interconnecting cable (62).

Unhook the return spring from the throttle coupling rod (7) (Fig. 39). Slacken the clinch bolts (11) and withdraw the spring couplings (6) and (10) from the throttle spindles.

Remove the flange nuts and lift off the carburettors.

Dismantling (Fig. 39)

Remove the screws (12) and lift off the float chamber cover (13) and gasket (14). Unscrew the needle valve (16). Lift out the twin float assembly (19) and remove the pivot pin (18).

Remove the four screws (56) and lift off the starter unit. Unscrew the nut (54) and remove the lever (55), ball (57) and spring (58). Remove the cover (47), circlip (46) and withdraw the disc valve (44) from the body.

Remove the six screws (32) and withdraw the jet block assembly (28) and gasket (33). Remove idling mixture air bleed jet (24) and fuel jet (25), main jet carrier (31) and main jet (30), air correction jet (22) and emulsion tube (23). Remove the idling mixture adjusting screw (27) and spring (26) and the starter jet (34).

Remove the screws (40), withdraw the throttle disc (39) and spindle (41).

Re-assembly

Re-assemble the carburettor by reversing the dismantling procedure. Renew gaskets and washers as necessary.

Refitting

Refit the carburettors by reversing the removal sequence. Renew gaskets (36) and (38), and asbestos gasket (37). Ensure that the throttle spindles and starting levers are synchronised and able to close fully.

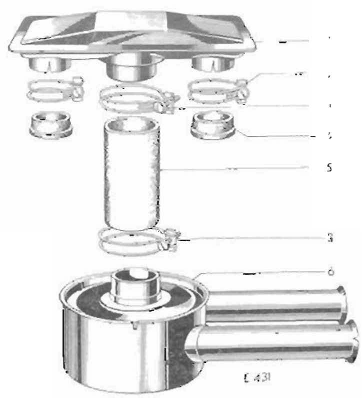


Fig. 40. Air box and hose details

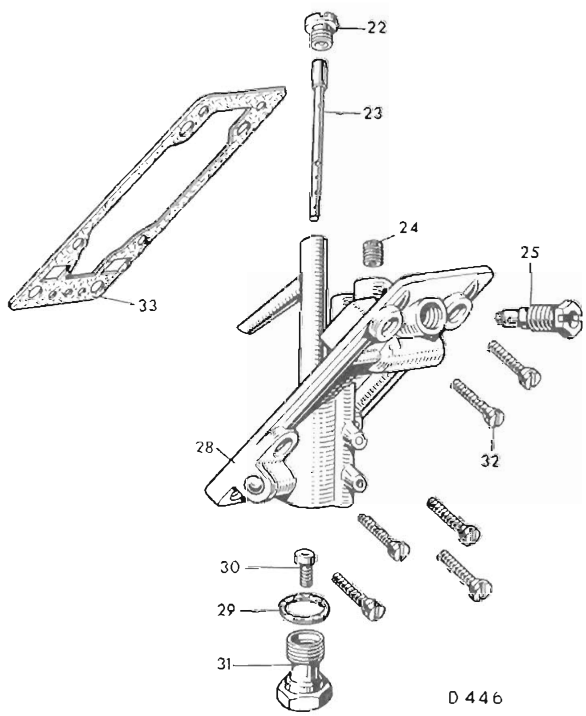


Fig. 41. Exploded view of jet block

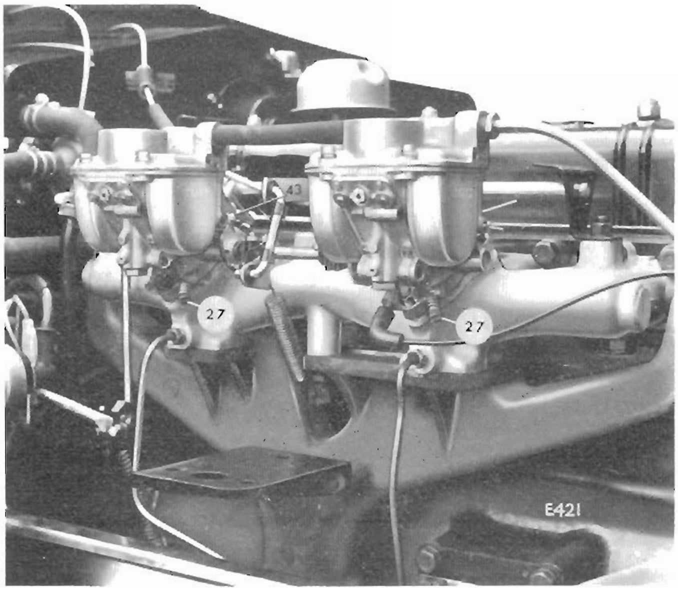


Fig. 42. R.H. view of carburettors showing throttle stop screws (43) and mixture control screws (27)

Tuning and Synchronising the Carburettors

The general condition of the engine, ignition and fuel system must be satisfactory to enable successful tuning of twin carburettor installation to be carried out.

1. With the engine at normal working temperature, slacken the throttle coupling pinch bolts. Unscrew the throttle stop screws (43) and ensure that the throttles are fully closed by manual pressure on the screw heads. Open both throttles an equal amount by rotating the screw (43) one turn clockwise.
2. Gently screw in the mixture control screws (27) until light contact is made with the casing seat and then unscrew them approximately one full turn.
3. Start the engine and adjust the throttle stop screws (43) equally until the idling speed is approximately 500 r.p.m.
4. Screw out both mixture control screws, a quarter of a turn at a time, until the engine begins to "hunt".
5. Screw in the mixture control screws until the "hunting" disappears and the engine idles smoothly.
6. If the engine speed has now increased due to the mixture adjustment, reduce the engine speed to approximately 600-650 r.p.m. by screwing out the throttle stop screws equal amounts.
7. If operation 6 causes irregular idling, re-adjust both mixture control screws.
8. Ensure that both throttles are against their stops and retighten the spring coupling pinch bolts.

VITESSE

ZENITH-STROMBERG CARBURETTORS FITTED FROM ENGINE No. HB27986

(SERIES 150.CD)

Starting from Cold

The mixture is enriched for cold starting when the choke control is pulled. This operates a lever (71) which rotates the starter bar (28) to lift the air valve (9) and needle (11), thus increasing the area of the annulus between needle and jet orifice. Simultaneously, a cam on the lever (71) opens the throttle beyond its normal idle position to provide increased idling speed, according to the setting of the screw (69).

When the motor fires the increased depression will lift the air valve (9) to weaken the initial starting mixture and prevent the engine stalling through over richness.

While the choke remains in action the car may be driven away but the control knob should be released or pushed in gradually as the engine attains normal working temperature. This will progressively decrease the extent of enrichment and the degree of throttle opening for fast-idle to the point where the screw (69) is out of contact with the cam on the choke lever and the throttle is permitted to return to the normal idle position as determined by the setting of the throttle stop screw (29).

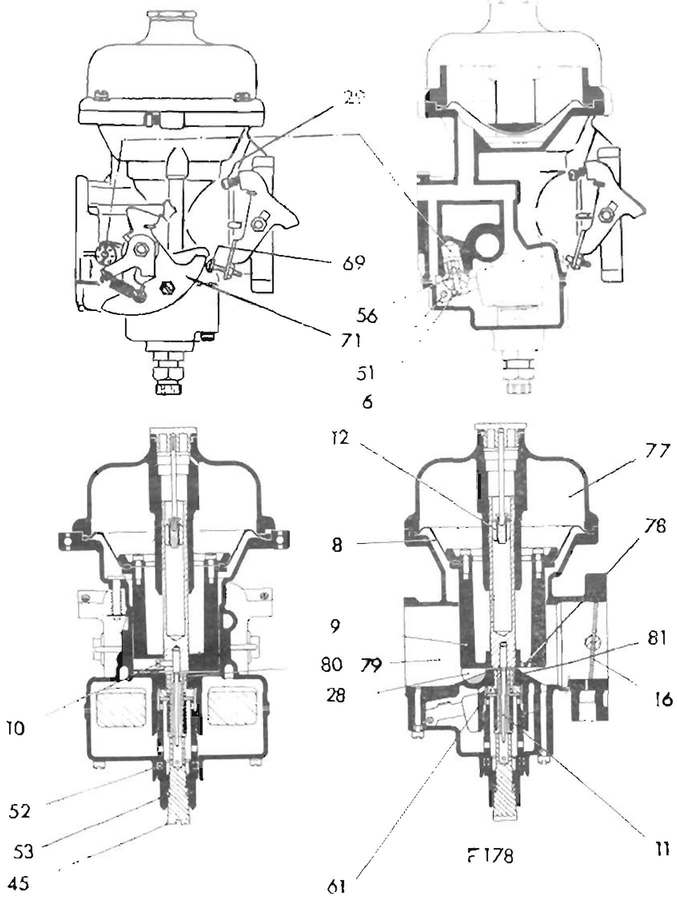
NOTE : *The accelerator pedal should not be depressed when starting from cold.*

Normal Running

With the opening of the butterfly throttle, manifold depression is transferred, via a drilling (78) in the air valve, to the chamber (77) which is sealed from the main body by the diaphragm (8).

The pressure difference between chamber (77) and that existing in the bore (79) causes the air valve to lift, thus any increase in engine speed or load will enlarge the effective choke area since the air valve lift is proportional to the weight of air passing the throttle (16). By this means air velocity and pressure drop across the jet orifice remain approximately constant at all speeds.

As the air valve (9) rises it withdraws a tapered metering needle (11), held in the base of the air valve by the screw (10), from the jet orifice (80) so that fuel flow is increased relative to the greater air flow.



77 Chamber

78 Air valve drilling

79 Bore

80 Jet orifice

81 Bridge

Fig. 45. Functional diagram

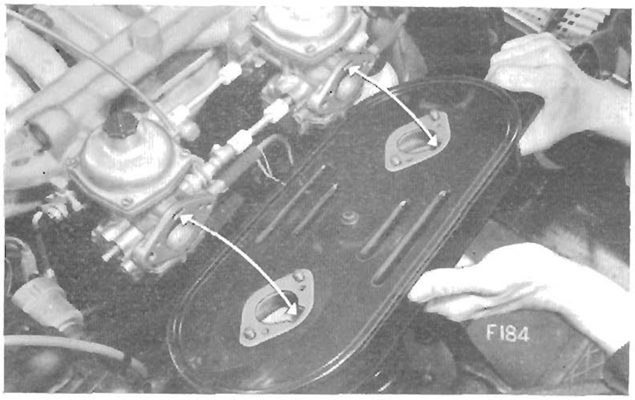


Fig. 46. Air box alignment

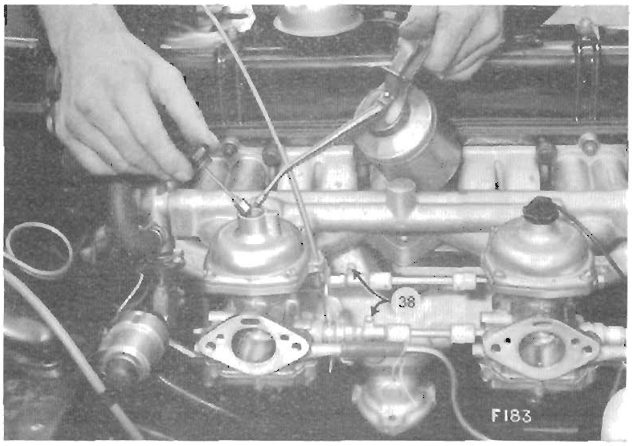


Fig. 47. Topping-up damper chambers

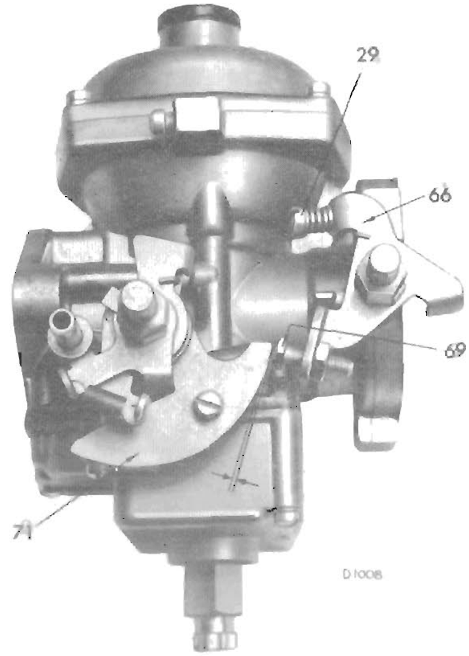


Fig. 48 Carburettor adjustment

Acceleration

At any point in the throttle range a temporarily richer mixture is needed at the moment of further throttle opening. To provide this, a dashpot or hydraulic damper is arranged inside the hollow guide rod of the air valve

The rod is filled with S.A.E. 20 oil to within a $\frac{1}{2}$" of the end of the rod in which the damper (12) operates, when the throttle is opened, the immediate upward motion of the air valve is resisted by this plunger during which time the suction or depression at the jet orifice is increased to enrich the mixture.

Setting the Idling

Two adjustment screws are used to regulate the idle speed and mixture. The throttle stop screw (29) controls the speed and the jet adjusting screw (45) determines the ratio of air-fuel mixture entering the cylinders. Turn the jet adjusting screw **clockwise** to weaken the mixture strength: **anti-clockwise** to enrich it.

With the engine at normal working temperature, remove the air cleaner and hold the air valve (9) down on to the bridge (81) in the throttle bore. Screw up the jet adjustment screw (45) a coin is ideal for this purpose—until the jet contacts the underside of the air valve. From this position turn down the jet adjusting screw three turns. This establishes an approximate jet position from which to work.

Run the engine until it is thoroughly warm and adjust the stop screw (29) to give an idle speed of 600/650 r.p.m.

The idling mixture is correct when the engine beat is smooth and regular and the air intake "hiss" is equal on both carburettors.

As a check, lift the air valve a very small amount ($\frac{1}{32}$") using the piston-lifting pin (41) and listen to the effect on the engine. If the engine speed rises appreciably, the mixture is too rich, and if the engine stops, the mixture is too weak. Properly adjusted, the engine speed will either remain constant or fall slightly on lifting the air valve.

Adjusting and Synchronising Twin Carburettor Installation

Loosen the clamping bolts (38) on the throttle spindle couplings between the two carburettors. Unscrew the throttle stop screw (29) to permit the throttle in each carburettor to close completely, and re-tighten the clamping bolts (38).

Ensure that screw (69) is adjusted to give a gap of $\frac{1}{16}$" (1·575 mm.) as shown arrowed Fig. 48.

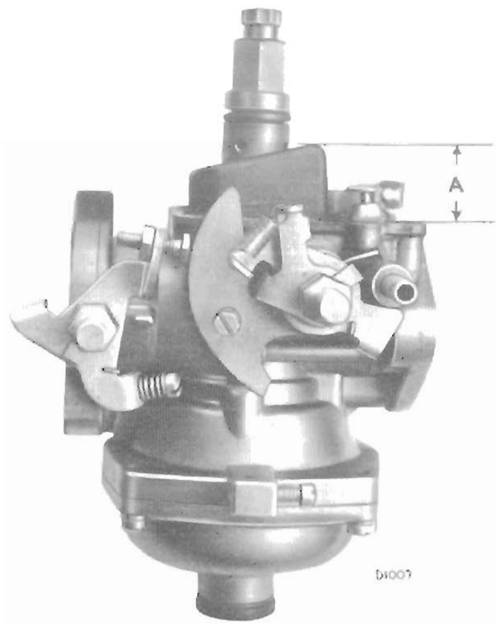


Fig. 49. Checking float chamber fuel level

Screw in the throttle stop screws (29) to the point where the end of the screw is just contacting the carburettor body. From this point rotate each stop screw one complete turn to open the throttles an equal amount to provide a basis from which final idling speed can be set.

Having reconnected the throttles and set each open an equal amount, regulate the jet adjusting screws (45) as detailed under the heading "Setting the Idling".

NOTE: Satisfactory idling depends upon the general engine condition and tappet adjustment, spark plugs, and ignition timing, which should be inspected if idling is not stable.

Float Chamber Fuel Level (Fig. 49)

To check the float level, remove the carburettor from the engine and remove the float chamber. Invert the carburettor. Check that the highest point of the float, when the needle is against its seating, is 18 mm. above the face of the main body. See "A". Reset the level by carefully bending the tag which contacts the end of the needle. The addition of a thin fibre washer under the needle valve seat will lower the fuel level.

Jet Centralisation

Efficient operation of the carburettor depends upon a freely moving air valve and a correctly centred needle in the jet orifice.

Check the air valve for free movement by lifting the valve. A valve failing to fall freely indicates a sticking valve or an off-centred jet, causing the needle (11) to foul the jet orifice.

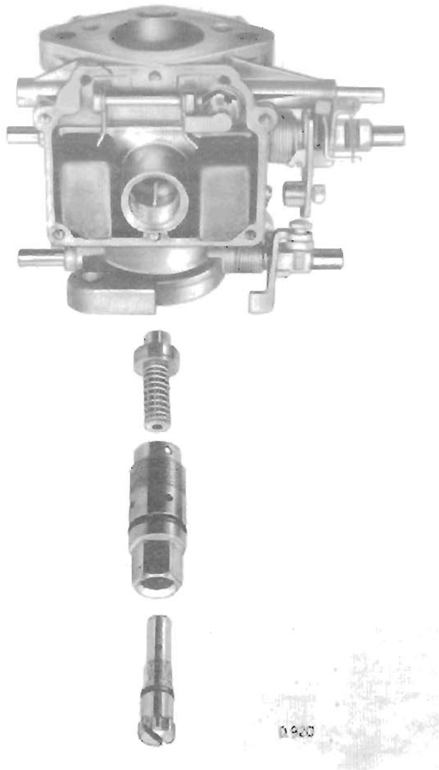


Fig. 50 Jet bushing screw and adjusting screw

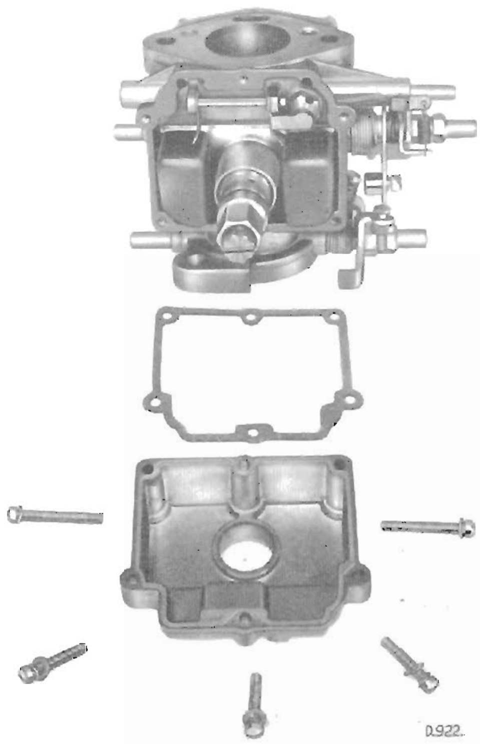


Fig. 51 Float chamber details

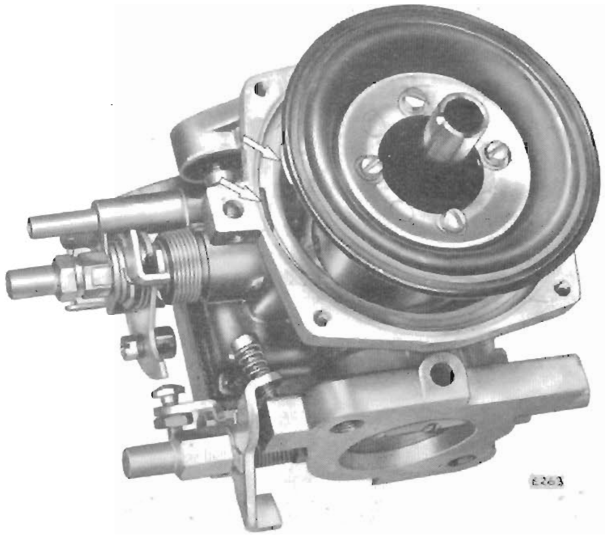


Fig. 52. Diaphragm location

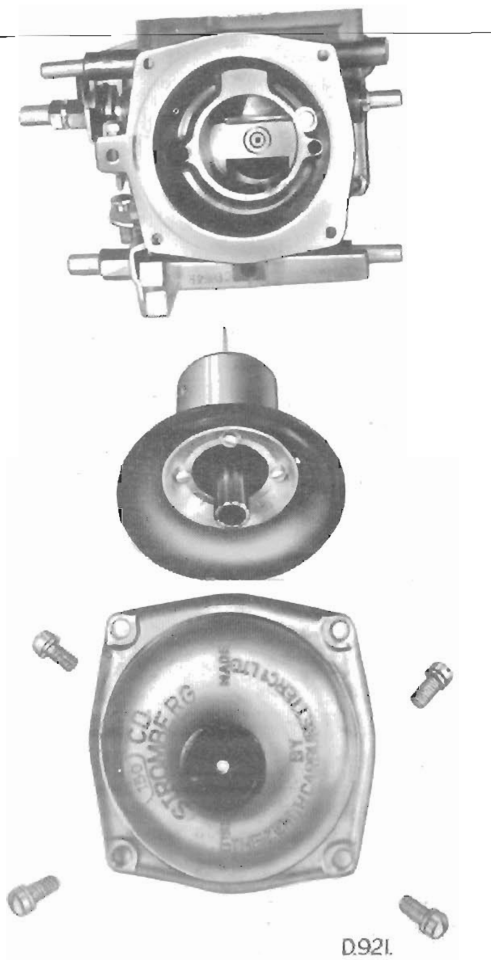


Fig. 53. Top view of carburettor with cover and air valve assembly removed

Rectify by removing and cleaning the valve and bore in paraffin, or by re-centralising the jet.

> NOTE : When required, the jet needle must be renewed by one bearing the same code number. The shoulder of the needle must be fitted flush with the lower face of the air valve.

Procedure (Fig. 45)

1. Lift the air valve (9) and fully tighten the jet assembly (53).
2. Screw up the orifice adjuster until the top of the orifice (80) is just above the bridge (81).
3. Slacken off the jet assembly (53) to release the orifice bush (61).
4. Allow the air valve (9) to fall; the needle will then enter the orifice and thus centralise it.
5. Slowly tighten the assembly (53), checking frequently that the needle remains free in the orifice. Check by raising the air valve approximately ¼" and allowing it to fall freely. The piston should then stop firmly on the bridge.
6. Re-set the engine idling.

SPITFIRE MK. I

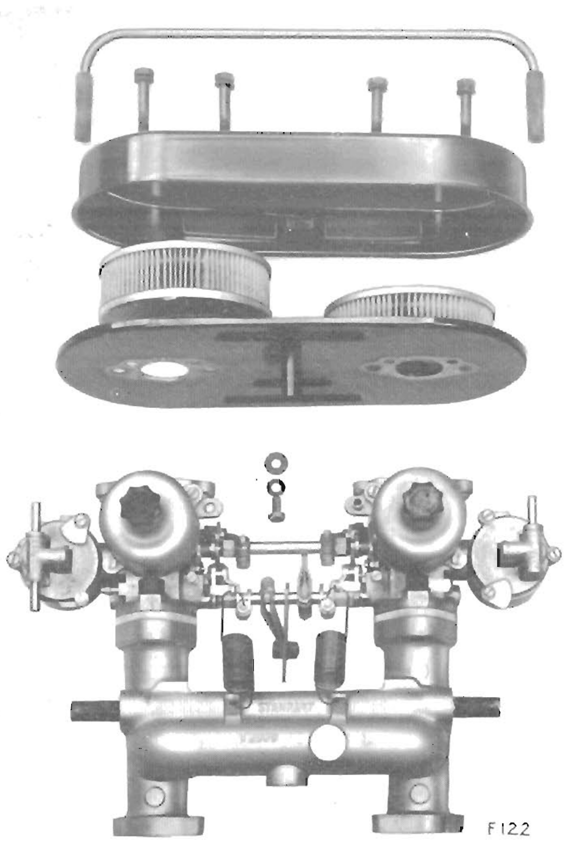


Fig. 54. Air cleaner details

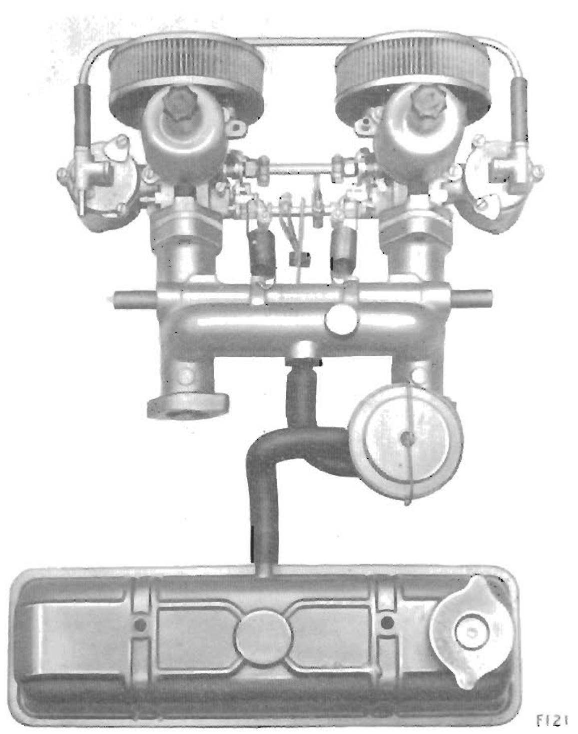


Fig. 55. Special requirements for N.A.D.A.

Gasket
2 Stud
3 Inlet and exhaust manifold
4 Manifold drain pipe
5 Drain pipe bracket
6 Stud
7 Nut
8 Washer
9 Clamp

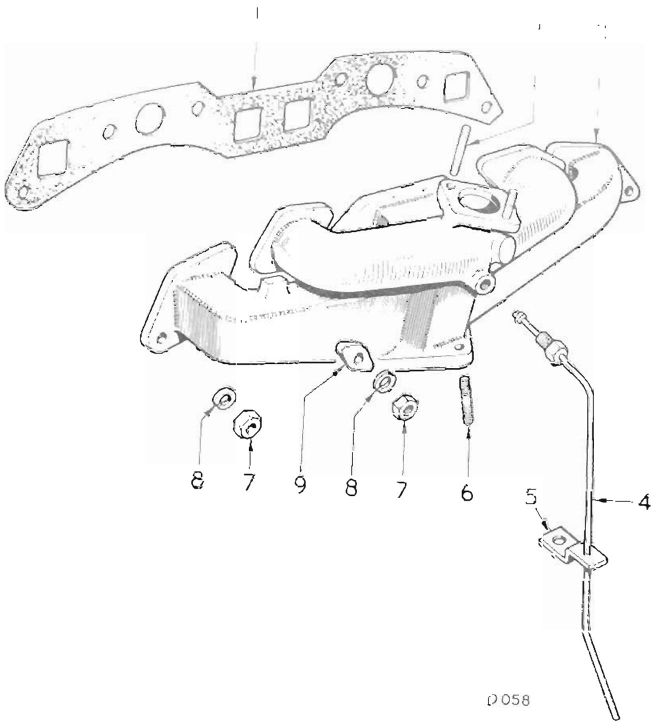


Fig. 1. Herald 1200 manifold details

1 Stud
2 Drain pipe assembly
3 Bracket
4 Stud
5 Nut
6 Spring washer
7 Clamp
8 Inlet and exhaust manifold
9 Gasket

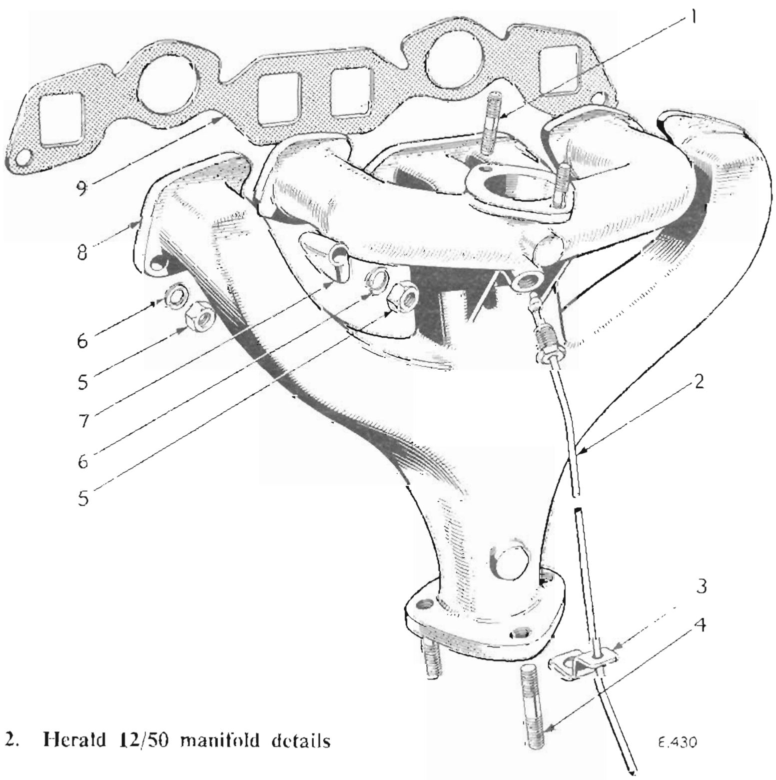
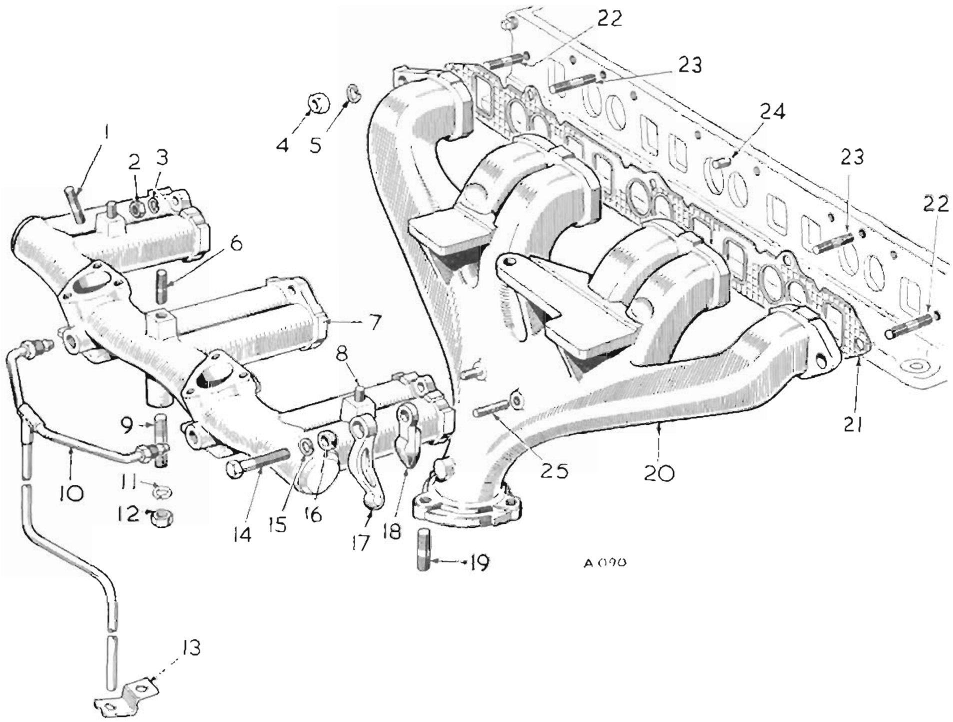
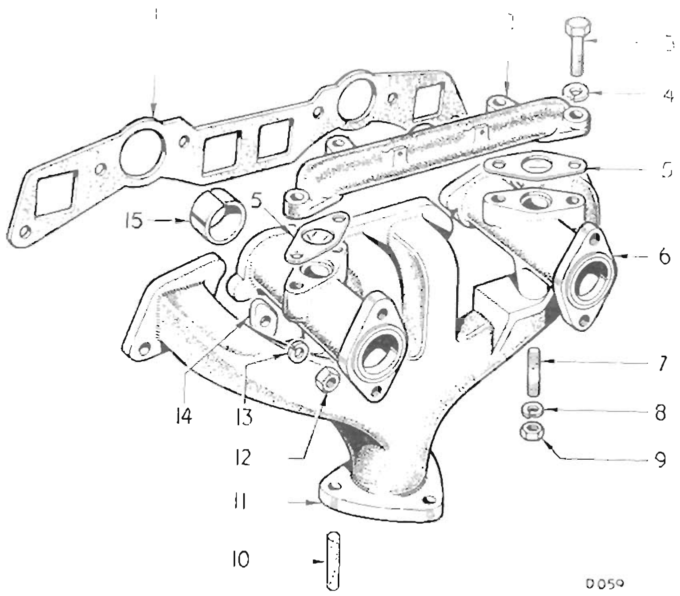


Fig. 2. Herald 12/50 manifold details



1	Stud - carburettor	13	Clip
2	Nut	14	Bolt
3	Spring washer	15	Spring washer
4	Nut	16	Coned washer
5	Spring washer	17	Clamp
6	Stud	18	Clamp pivot
7	Inlet manifold	19	Stud—exhaust flange
8	Stud	20	Exhaust manifold
9	Stud—inlet to exhaust manifold	21	Gasket
10	Drain pipe	22	Stud
11	Spring washer	23	Stud
12	Nut	24	Dowel
		25	Stud—air cleaner bracket

Fig. 3. Vitesse manifold details



1	Gasket	9	Nut
2	Balance pipe	10	Stud
3	Bolt	11	Exhaust manifold
4	Spring washer	12	Nut
5	Gasket	13	Spring washer
6	Inlet manifold	14	Clamp
7	Stud	15	Location sleeve
8	Spring washer		

Fig. 4. **Spitfire manifold details**

EXPLODED VIEW OF SPITFIRE EXHAUST SYSTEM

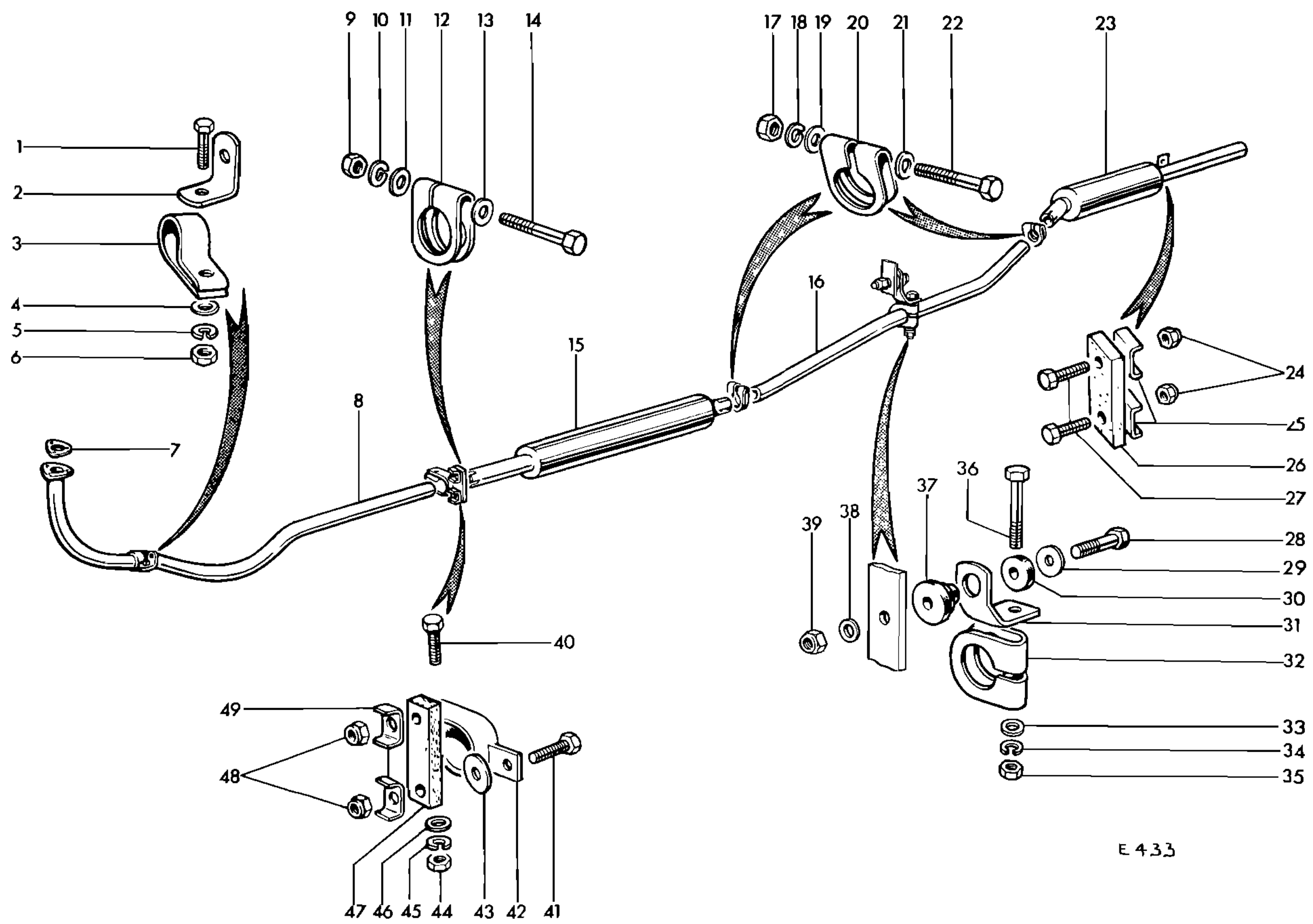


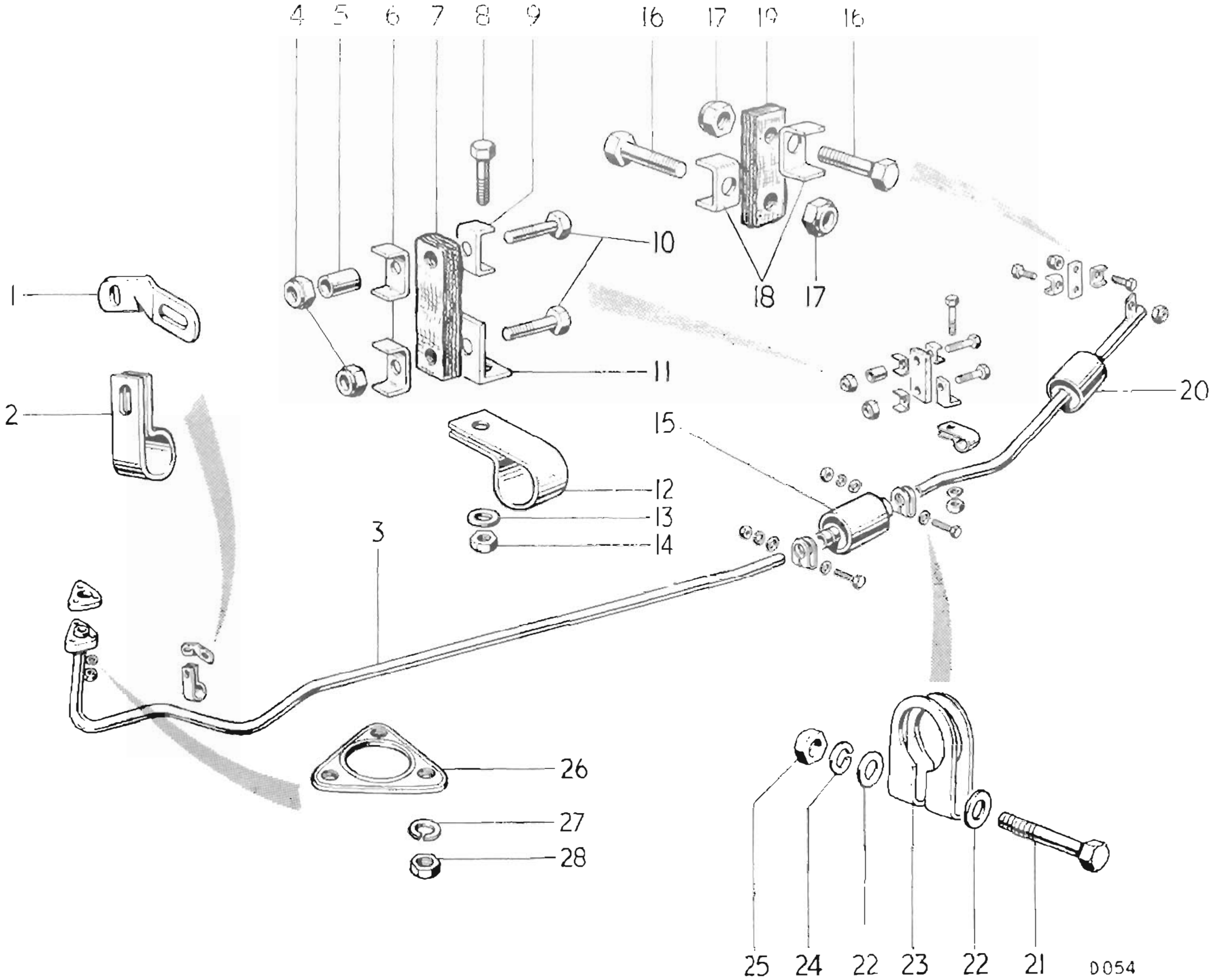
Fig. 5. Exploded view of Spitfire exhaust system

Key to Fig. 5

1	Bolt	18	Spring washer	34	Spring washer
2	Angle bracket to clutch housing	19	Plain washer	35	Nut
3	Pipe Clip	20	Clamp	36	Bolt
4	Plain washer	21	Plain washer	37	Grommet
5	Spring washer	22	Bolt	38	Plain washer
6	Nut	23	Secondary silencer	39	Nyloc nut
7	Gasket	24	Nyloc nut	40	Bolt
8	Front exhaust pipe	25	Plate	41	Bolt
9	Nut	26	Fabric strip	42	Clip and bracket
10	Spring washer	27	Bolt	43	Plain washer
11	Plain washer	28	Bolt	44	Nut
12	Clamp	29	Plain washer	45	Spring washer
13	Plain washer	30	Grommet washer	46	Plain washer
14	Bolt	31	Mounting bracket	47	Fabric strip
15	Main silencer	32	Clamp	48	Nyloc nut
16	Rear exhaust pipe	33	Plain washer	49	Plate
17	Nut				

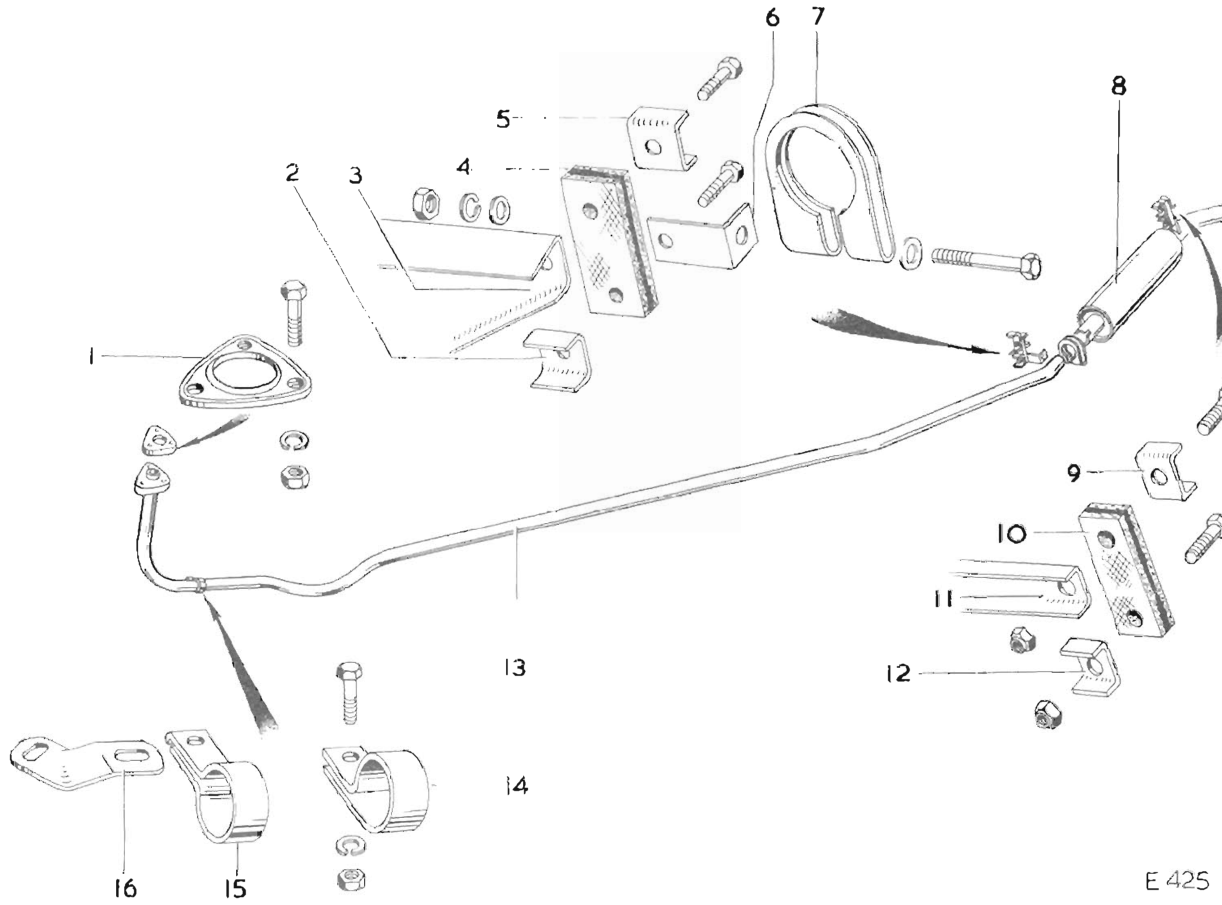
NOTE: Items 9 to 14 and 28 to 39 .. .. Fitted from Commission No. FC.28017

Items 40 to 49 .. .. Fitted up to Commission No. FC.28016



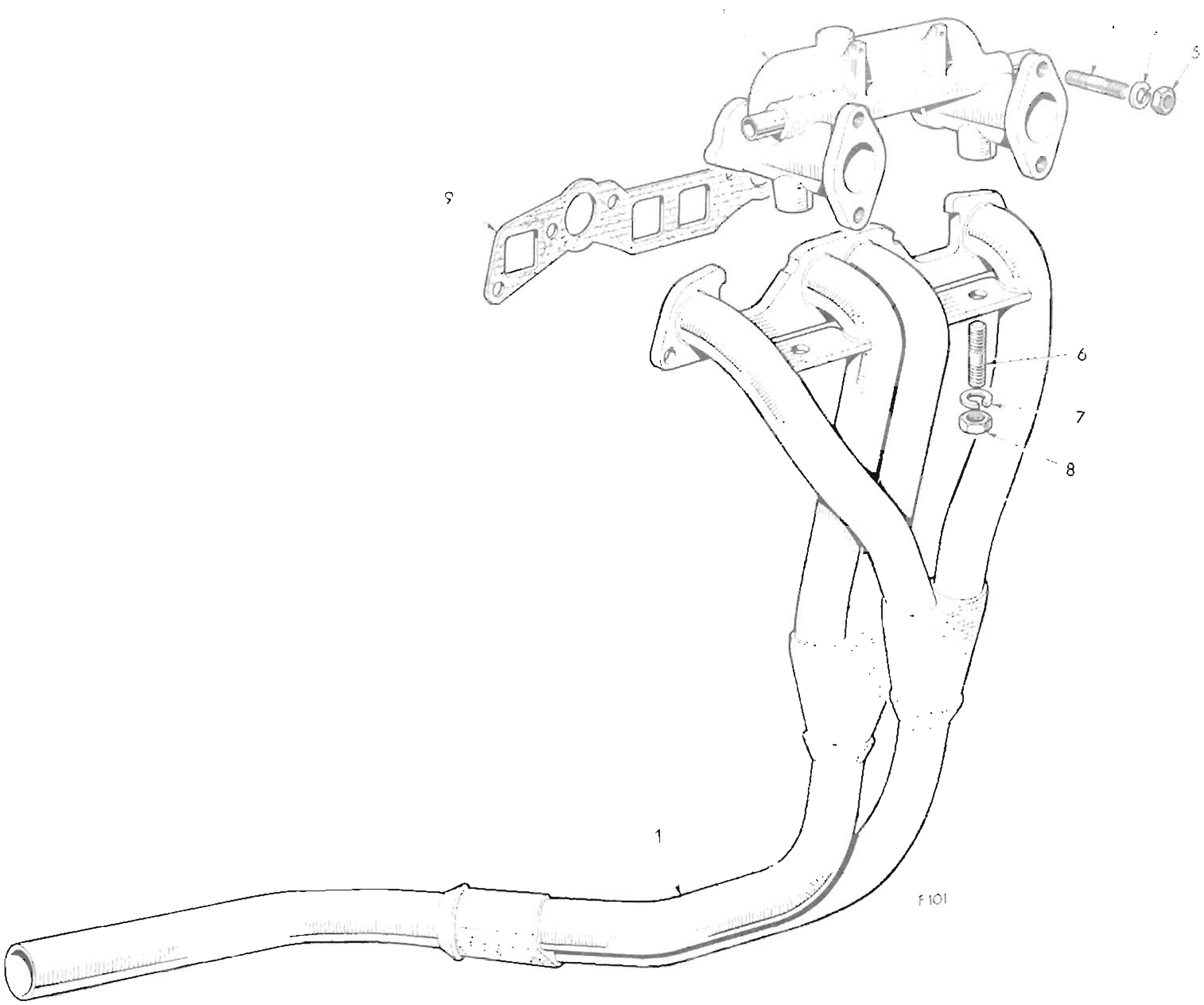
1	Bracket—front pipe to clutch housing	15	Intermediate silencer
2	Clip	16	Bolt
3	Front exhaust pipe	17	Nyloc nut
4	Nyloc nut	18	Plate
5	Distance piece	19	Fabric strap
6	Plate	20	Rear silencer and tail pipe
7	Fabric strap	21	Pinch bolt
8	Bolt	22	Plain washer
9	Plate	23	Clip
10	Bolts	24	Spring washer
11	Angle bracket	25	Nut
12	Pipe clip	26	Flange gasket
13	Washer	27	Spring washer
14	Nut	28	Nut

Fig. 6. **Exploded view of Herald Mk. I exhaust system**



1	Gasket	9	Plate
2	Plate	10	Fabric strap
3	Mounting bracket	11	Mounting bracket
4	Fabric strap	12	Plate
5	Plate	13	Exhaust pipe
6	Angle bracket	14	Clip
7	Clip	15	Clip } Vitesse only
8	Silencer and tail pipe	16	Bracket } Vitesse only

Fig. 7. Exploded view of Herald Mk. II, 12/50 and Vitesse exhaust system



1	Exhaust manifold	6	Stud
2	Inlet manifold	7	Spring washer
3	Stud	8	Nut
4	Spring washer	9	Gasket
5	Nut		

Fig. 8. Spitfire Mk. II manifold details

TRIUMPH

HERALD 1200, 12/50, VITESSE
AND
SPITFIRE

WORKSHOP MANUAL

GROUP 2

Comprising :

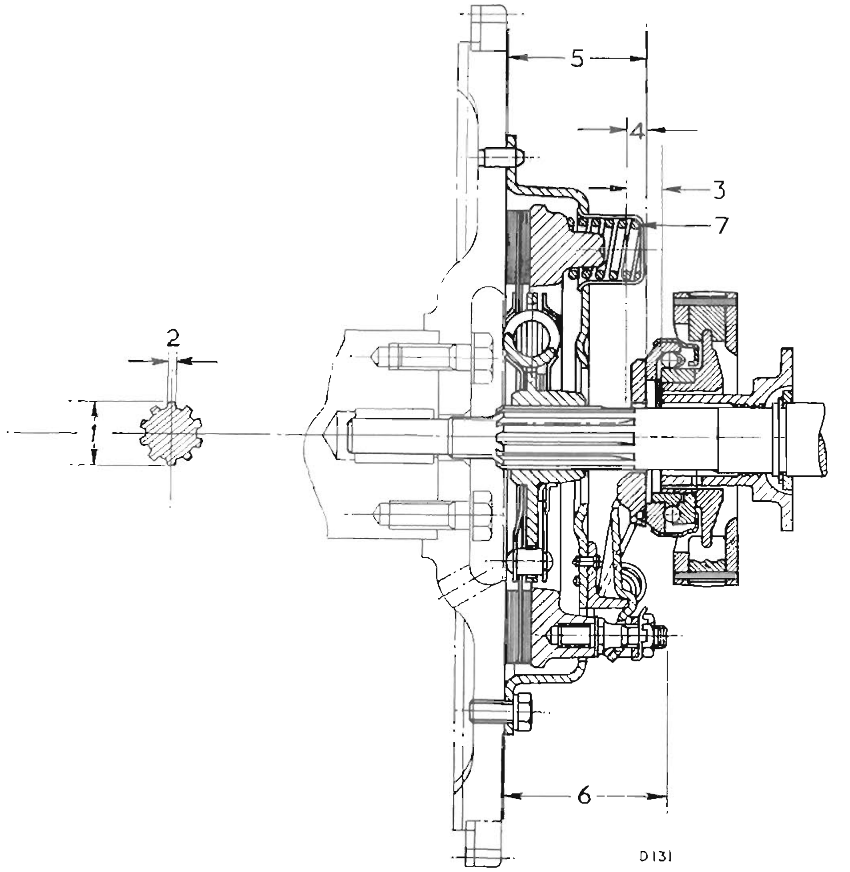
GROUP 2

TRIUMPH

HERALD 1200, 12/50, VITESSE and SPITFIRE MODELS

GROUP 2

CONTENTS



CLUTCH DATA

TYPE	6A "Single Dry Plate"
OPERATION	Hydraulic
ADJUSTMENT	Self adjusting
DRIVEN PLATE	Belleville washer type, cushioned by white/light green springs
FACINGS	Mintex M19
1. Spline diameter O/D	0·871″/0·873″ (22·12/22·17 mm.)
2. Splines	0·875″ (22·22 mm.) × 10 SAE splines
3. Maximum travel available	0·27″ (6·86 mm.)
4. Minimum travel to release	0·24″ (6·09 mm.)
5. Release lever plate height	1·83″ (46·48 mm.) using 0·305″ (7·797 mm.) gauge plate in place of driven plate
6. Maximum height of adjusters	2·22″ (56·39 mm.) at full release
7. Thrust springs — 3 Dark Blue	90/100 lbs. (40·82/45·36 kgs.)
6 Red	75/85 lbs. (34/38·5 kgs.)

Fig. 1. Sectional view of the clutch (Herald 1200, 12/50 and Spitfire)

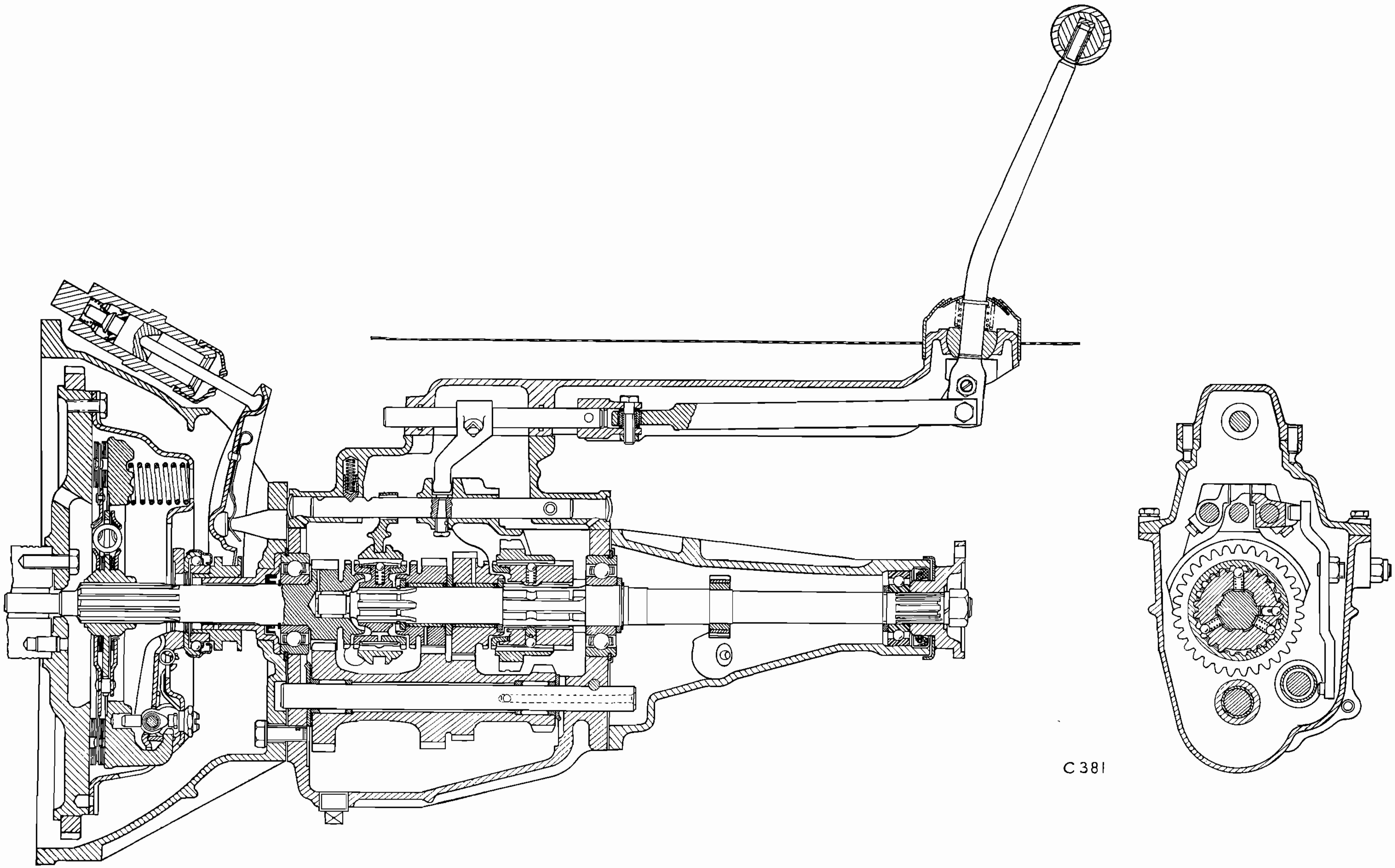
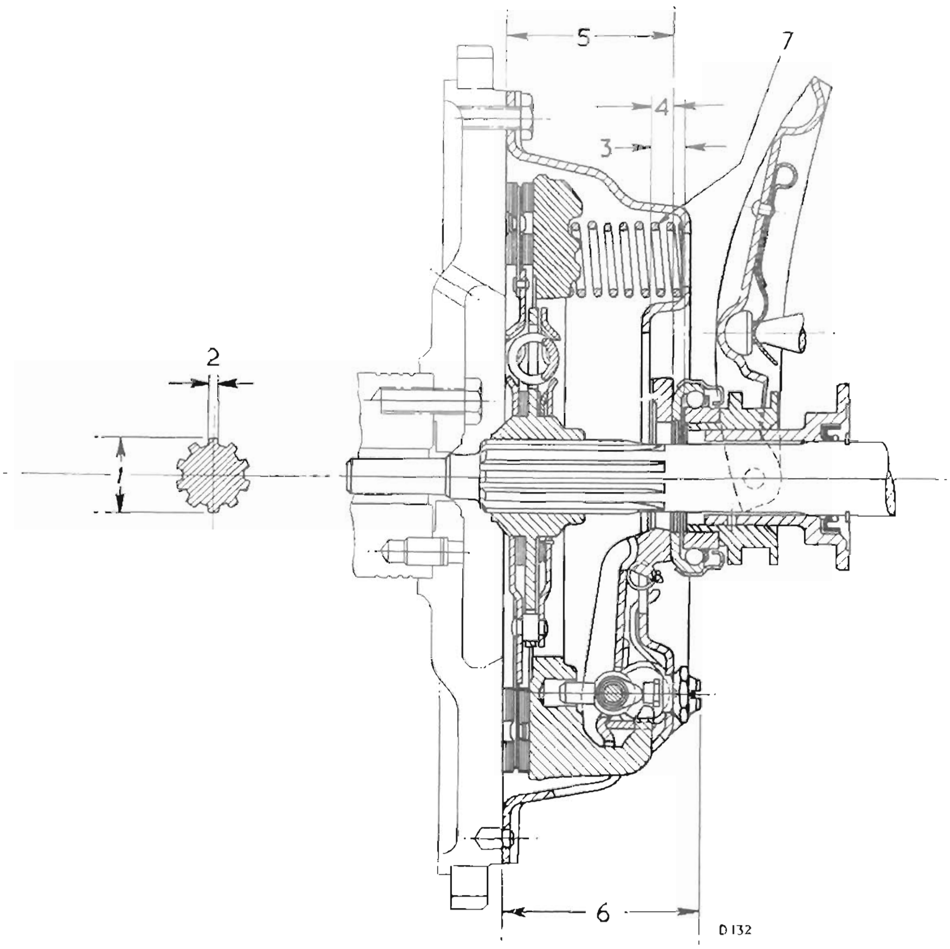


Fig. 2. Section of clutch (Vitesse) and gearbox unit. The gearbox is identical for the Herald 1200, 12/50, Vitesse and Spitfire



CLUTCH DATA

TYPE	8A6 "Single Dry Plate"
OPERATION	Hydraulic
ADJUSTMENT	Self adjusting
DRIVEN PLATE	Belleville washer type, cushioned by white/light green springs
FACINGS	Wound yarn (RY2)
1. Spline diameter (O/D)	0·996"/0·998" (25·3/25·35 mm.)
2. Splines	1·00" (25·4 mm.) × 10 SAE splines
3. Maximum travel available	0·42" (10·67 mm.)
4. Minimum travel to release	0·37" (9·4 mm.)
5. Release lever plate height	2·18" (53·54 mm.) using a 0·33" (8·38 mm.) gauge plate in place of driven plate
6. Maximum height of adjusters	2·70" (68·58 mm.)
7. Thrust springs — 6 Light Grey	195/205 lbs. (88·45/92·98 kgs.)

Fig. 3. Sectional view of the clutch (Vitesse)

MASTER CYLINDER OPERATION

A. Clutch Driving Condition

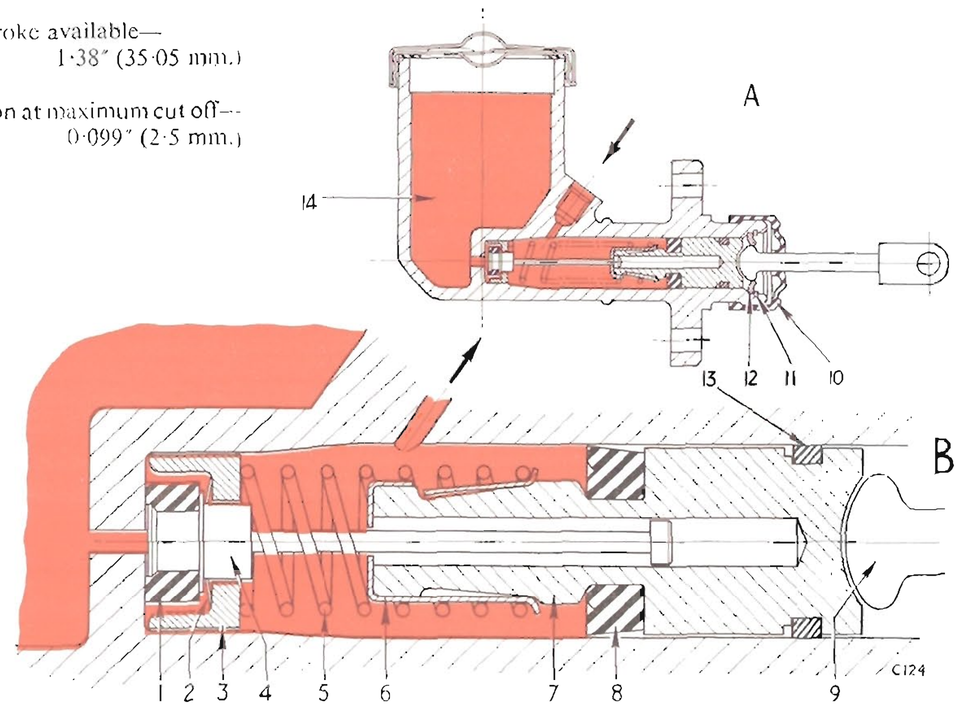
When the clutch pedal is released, the push rod (9) is returned to its stop (12) by the pedal return spring. This permits the plunger (7) to move rearwards under pressure of the spring (5). The flange on the end of the valve shank (4) contacts the spring retainer (6) and as the plunger continues to move rearwards, the valve shank (4) lifts the seal (1) from its seat on the end of the cylinder bore and compresses the spring (2). Hydraulic fluid can then flow past the three-legged distance piece (3) and seal (1) either to or from the reservoir.

B. Clutch Released Condition

Initial movement of the push rod (9) and plunger (7) releases the valve shank (4) and permits the spring (2) to press the valve shank (4) and seal (1) against its seat. This cuts off communication between the cylinder and reservoir. Continued movement of the plunger displaces fluid through the hydraulic pipelines and releases the clutch.

Maximum stroke available—
1·38″ (35·05 mm.)

Stroke position at maximum cut off—
0·099″ (2·5 mm.)



1	Valve seal	6	Spring retainer	11	Circlip
2	Spring (valve seal)	7	Plunger	12	Push rod stop
3	Distance piece	8	Plunger seal	13	Plunger seal
4	Valve shank	9	Push rod	14	Fluid reservoir
5	Plunger return spring	10	Dust cover		

Fig. 4. Section through clutch master cylinder

CLUTCH MASTER CYLINDER

To Remove (Fig. 5)

Proceed as follows:—

1. Empty the master cylinder through the clutch slave cylinder bleed nipple.
2. Pull back the rubber dust excluder.
3. Withdraw the clevis pin securing the push rod to the pedal.
4. Uncouple the hydraulic pipeline from the master cylinder.
5. Remove the bolts (16) from the master cylinder mounting flange and withdraw the unit from the bulkhead.

NOTE : Extreme cleanliness is essential when dealing with any part of the hydraulic system. Component parts should be cleaned in hydraulic fluid or alcohol.

To Dismantle (Fig. 6)

1. Remove the circlip (11) and the push rod stop (12) and push rod (9).
2. Withdraw the plunger (7) and recuperation valve assembly (19) from the cylinder bore.
3. Using a small screwdriver, lift the tag on the spring retainer (6) over the flanged end of the plunger (7) and detach the recuperating valve assembly.
4. Release the valve shank (4) from the spring retainer (6) by manoeuvring the flange on the stem through the eccentrically positioned hole in the end face of the spring retainer. The spring (5), distance piece (3) and spring (2) may now be withdrawn from the valve shank (4).
5. Remove the valve seal (1) from the shank (4) by carefully easing it off with the fingers.
6. Similarly, detach the rubber seals (8) and (13) from the piston grooves.

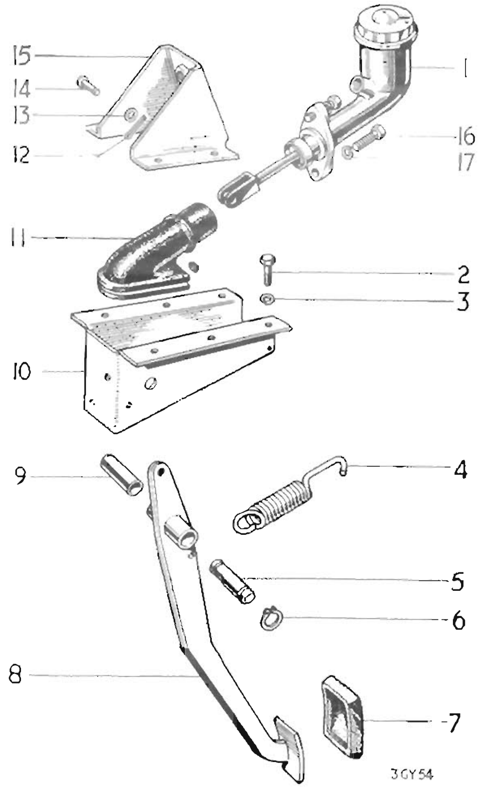
To Re-assemble

Reverse the dismantling procedure and note the following:—

1. When fitting the rubber seals, apply hydraulic fluid to ease their entry into the bore of the cylinder and ensure that their lips face forward.
2. Avoid trapping the spring (2) between the valve shank locating shoulder and the distance piece (3). The washer must be fitted with its domed side adjacent to the valve shank face.

To Refit

Reverse the removal operations, refill with hydraulic fluid and bleed the system as described on page 2·106.



1	Master cylinder	10	Pedal bracket
2	Bolt	11	Rubber dust excluder
3	Spring washer	12	Split pin
4	Return spring	13	Plain washer
5	Pivot pin	14	Clevis pin
6	Circlip	15	Master cylinder bracket
7	Pedal rubber	16	Bolt
8	Pedal	17	Spring washer
9	Pedal pivot bush		

Fig. 5. Exploded clutch pedal and bracket assembly

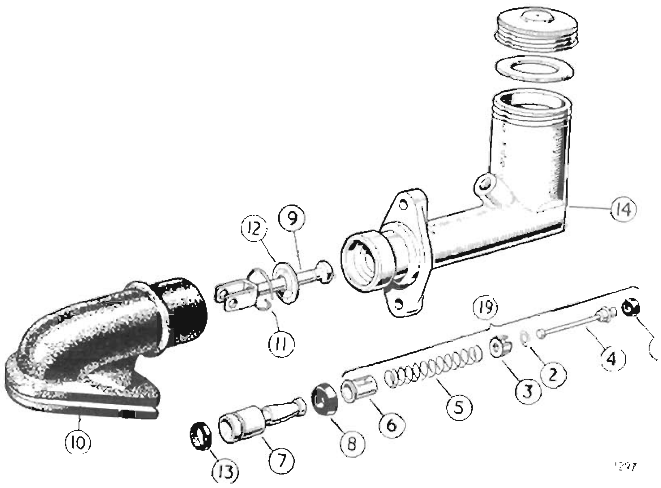


Fig. 6. Exploded clutch master cylinder
Annotations are given under Fig. 4.

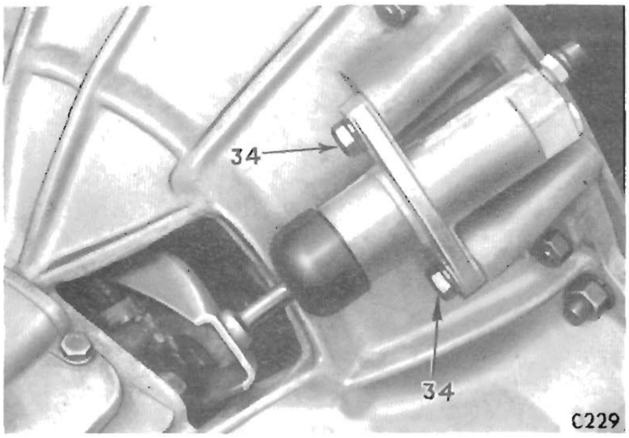


Fig. 7. Location of clutch slave cylinder (Vitesse)

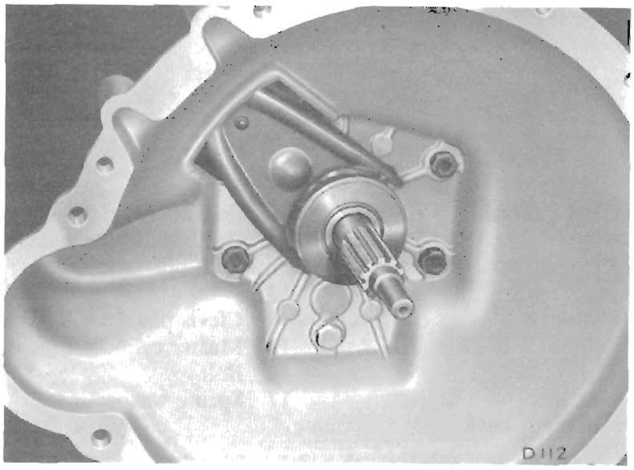


Fig. 8. Clutch release bearing (Vitesse)

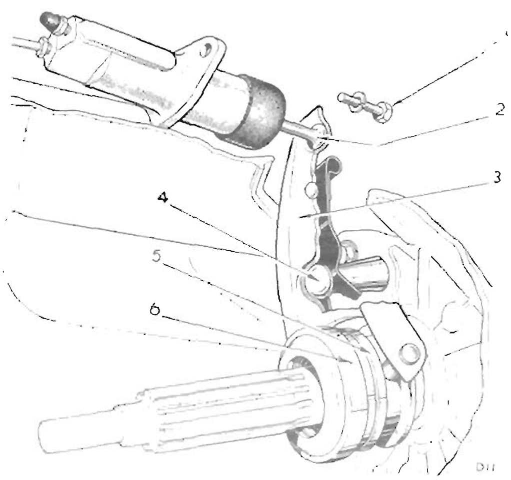


Fig. 9. Clutch release lever attachment (Vitesse)

SLAVE CYLINDER (Fig. 12)

To Remove

Drain the hydraulic system by attaching a tube to the bleed nipple (25) and pumping the clutch pedal. Remove the tube and disconnect the hydraulic feed pipe (26).

Release the slave cylinder by removing the bolt/s (34).

To Refit

Reverse the removal procedure, ensuring that the push rod is correctly engaged in the piston cup. Re-connect the hydraulic feed pipe, refill and bleed the system.

To Dismantle

Remove the cover (32), circlip (31) and shake out the piston (30) and spring (28). Detach the seal (29) from the piston.

To Re-assemble

Lubricate the components with hydraulic fluid and assemble the seal (29) to the piston (30), placing the sealing lip towards the closed end of the cylinder (27). Insert the spring (28) and piston (30) into the cylinder bore. Spring the circlip (31) into position and re-attach the rubber cover (32).

Bleeding the Hydraulic System

The presence of air in the system will prevent the proper functioning of the clutch and will necessitate bleeding to expel the air.

During the bleeding operation, keep the reservoir topped-up with new brake fluid and ensure that the level does not fall below half full. If the reservoir is allowed to empty, air will be drawn into the system, necessitating re-bleeding.

With the aid of a second operator, bleed the system as follows:—

Wipe the bleed nipple clean, attach a length of rubber tubing to the nipple and allow the end of the tube to hang in a glass jar partly filled with brake fluid.

Unscrew the bleed nipple about a quarter turn, and, giving fast full strokes with a slight pause between each stroke, pump the clutch pedal until the clutch fluid entering the glass container is free from air bubbles.

IMPORTANT. Ensure that the piston returns to its maximum travel at the end of each stroke. A sticking piston will be obvious from the feel of the pedal.

Finish with a few slightly faster applications of the pedal, using the bottom half of the stroke, until it is apparent that all air has been excluded. Close the bleed screw during the last pedal application, or with the pedal fully depressed.

CLUTCH RELEASE BEARING

To Remove

Referring to Fig. 11 for Herald 1200, 12/50 and Spitfire vehicles:— drive the pin (17) from the clutch housing and remove the operating lever (22). Drive out the pins (20) and release the bearing sleeve (15) by extracting the plugs (16). Withdraw the bearing (14) from the sleeve.

Referring to Fig. 9 for Vitesse vehicles:—remove the slave cylinder attachment bolts (1) and move the push rod (2) clear of the release lever (3). Unclip the lever from its spherical pivot pin (4), withdraw the bearing sleeve (5) and take off the bearing (6).

To Refit

Reverse the removal procedure.

CLUTCH

Removal

Remove the gearbox as described on page 2·205. Progressively unscrew the clutch attachment setscrews and detach the cover assembly and driven plate from the flywheel face.

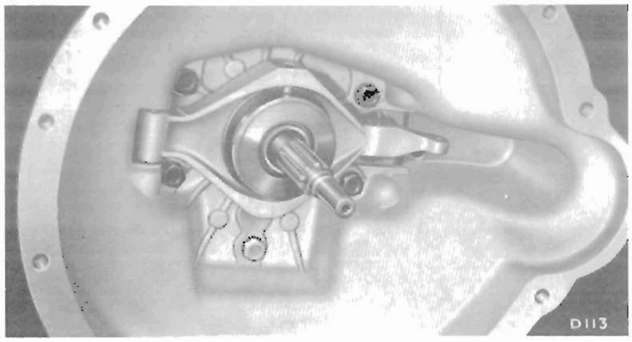


Fig. 10. Clutch release bearing and operating lever (Herald 1200, 12/50 and Spitfire)

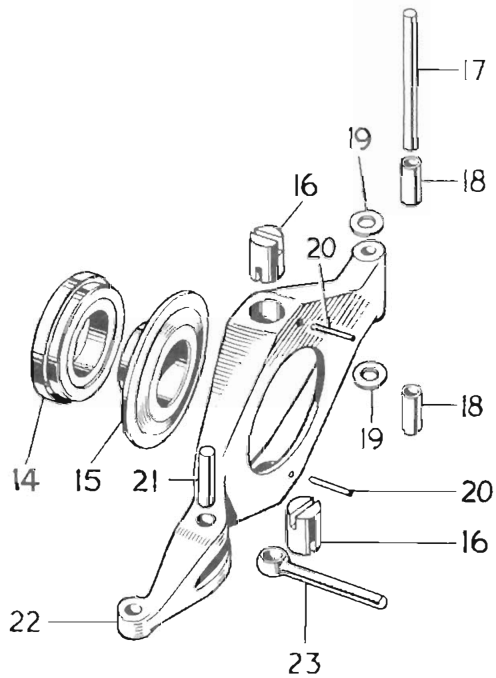


Fig. 11. Exploded operating lever assembly (Herald 1200, 12/50 and Spitfire)

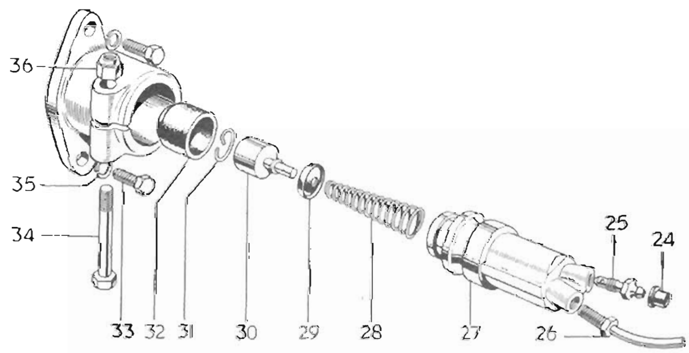
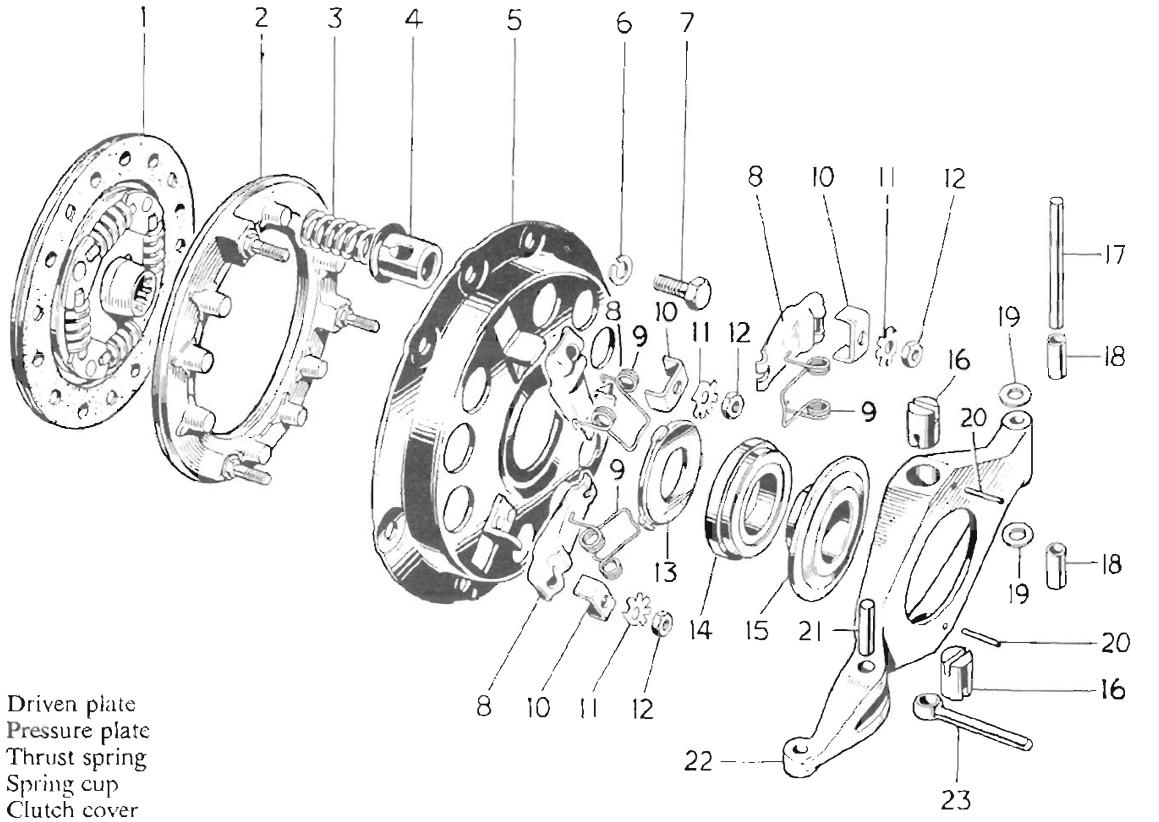


Fig. 12. Exploded slave cylinder details



1 Driven plate
2 Pressure plate
3 Thrust spring
4 Spring cup
5 Clutch cover
6 Spring washer
7 Setscrew
8 Toggle
9 Retaining spring
10 Bridge piece
11 Lockplate
12 Adjusting nut
13 Release lever plate
14 Release bearing
15 Bearing carrier
16 Thrust plugs
17 Hinge pin
18 Bush
19 Spacer washer
20 Lockpin
21 Push rod pin
22 Operating lever
23 Push rod

Fig. 13. Exploded clutch unit (Herald 1200, 12/50 and Spitfire)

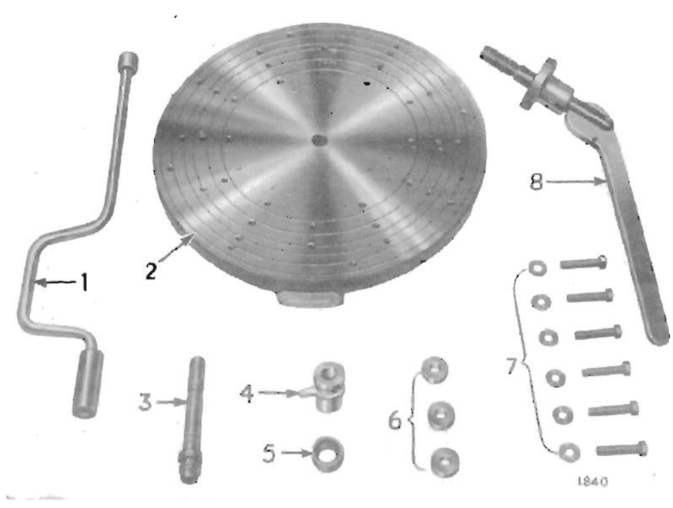
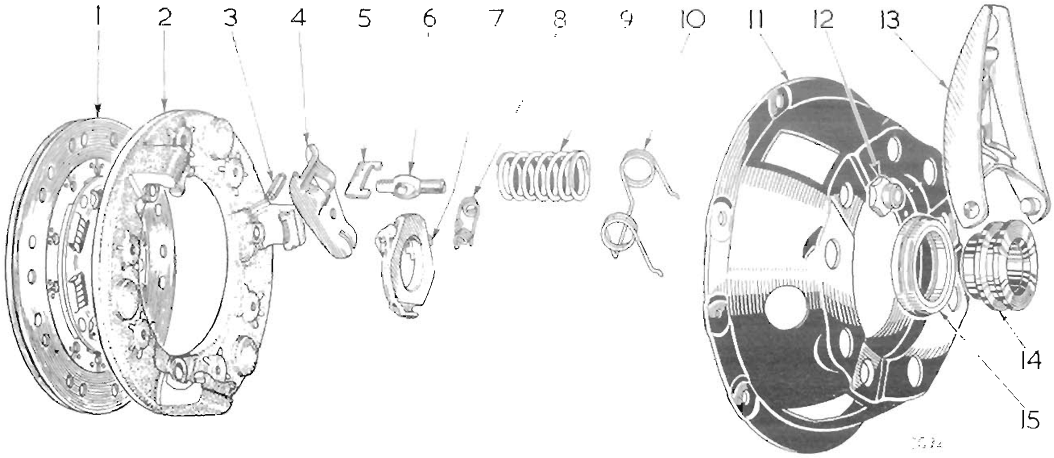


Fig. 14. Clutch assembly fixture No. 99A

Dismantling (Fig. 14)

The Churchill clutch assembly fixture No. 99A is recommended for servicing the clutch units fitted to the Herald 1200, 12/50, Spitfire and Vitesse models. The method of dismantling is as follows:—

1. Position the spacers (6) on the baseplate and place the clutch unit over the spacers, with the release levers as near as possible over the spacers.
2. Mark the pressure plate, cover and toggles to facilitate re-assembling them to their original positions. Fit the operating handle (8) to the baseplate, and clamp the clutch unit by levering the handle. Secure the unit to the baseplate with six setscrews (7). Remove the operating handle.
3. Referring to Fig. 13, hold the release lever plate (13) down and detach the retaining springs (9). Remove the release lever plate.



1	Driven plate	6	Eyebolt	11	Clutch cover
2	Pressure plate	7	Release lever plate	12	Adjusting nut
3	Toggle pin	8	Release plate retainer spring	13	Operating lever
4	Toggle	9	Thrust spring	14	Bearing sleeve
5	Strut	10	Anti-rattle spring	15	Release bearing

Fig. 15. Exploded clutch unit (Vitesse)

4. Continue to dismantle the clutch as follows:—

(a) HERALD 1200, 12/50 AND SPITFIRE (Fig. 13)
Release the lockplates (11) and remove the nuts (12), lockplates (11), bridge pieces (10) and toggle levers (8). Progressively slacken the setscrews retaining the cover to the baseplate and lift off the cover (5), retainers (4), springs (9) and pressure plate (2).

(b) VITESSE (Fig. 15)
Break the staking on the adjusting nuts (12) and remove them. Progressively release the baseplate setscrews and detach the cover (11), toggle levers (4), eyebolts (6), pins (3), struts (5) and springs (9). Detach the pressure plate (2).

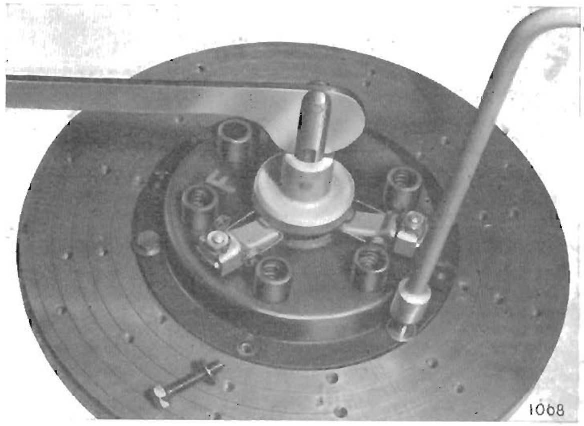


Fig. 16 Attaching clutch unit to Churchill fixture (Herald and Spitfire).

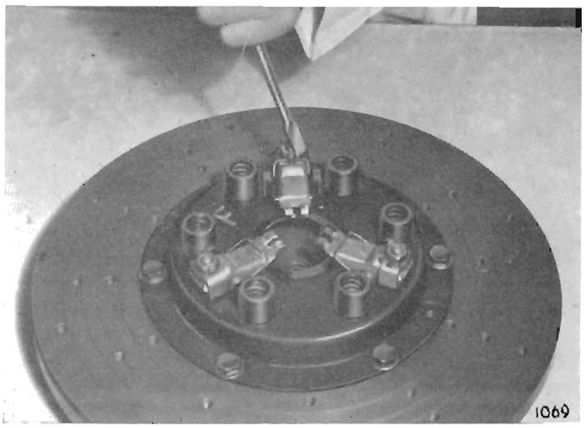


Fig. 17 Releasing lockplates (Herald and Spitfire).

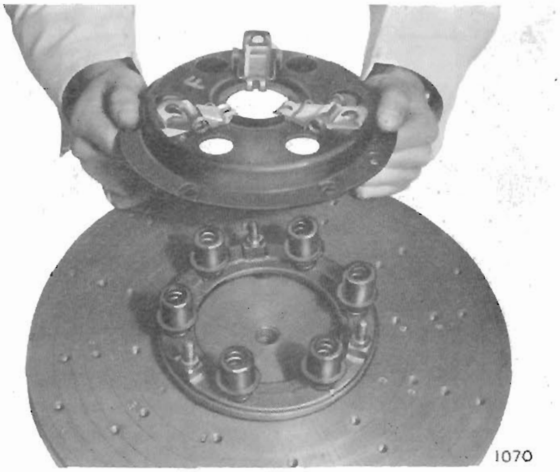


Fig. 18. Removing clutch cover assembly (Herald and Spitfire)

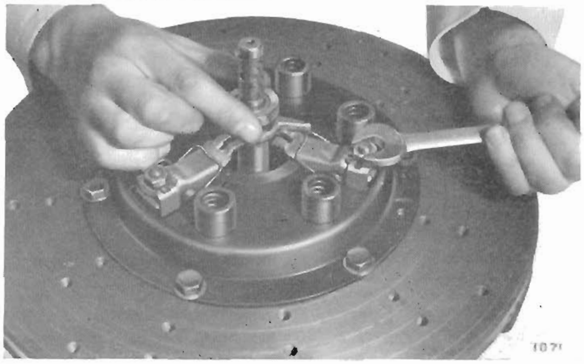


Fig. 19. Adjusting toggle height (Herald and Spitfire)

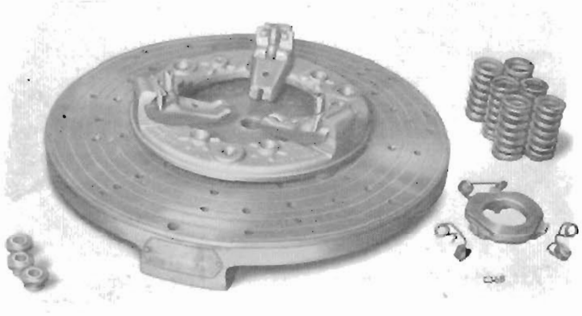


Fig. 20. Assembling toggles to pressure plate (Herald and Spitfire)

Fig. 21. Gauge finger fitted prior to adjusting toggle height (Vitesse)

Re-assembly

(a) HERALD 1200, 12/50 AND SPITFIRE

Position the pressure plate (2) on the baseplate, with the distance pieces positioned under the lever fulcrum studs. Fit the springs (3), cups (4) and cover (5). Tighten the cover down to the baseplate.

Assemble the toggle levers (8), bridge pieces (10), lockplates (11) and nuts (12). Fit the gauge finger (4), Fig. 14, with adaptor No. 5 and adjust the nuts (12) until the gauge finger just contacts the ends of each lever (8), Fig. 19. Remove the gauge and stud, fit the operating lever and operate the clutch a few times. Refit the stud and gauge, re-check the lever height and adjust if necessary. When correctly adjusted, bend up the lock-plates (11) against the nuts (12). Fit the release plate (13) and secure it with the springs (9). Check the run-out of the release plate with a clock gauge as shown on Fig. 23. This must not exceed 0·015" (0·38 mm.). If satisfactory, remove the clutch from the baseplate.

(b) VITESSE

Position the pressure plate (2) on the baseplate with the distance pieces positioned under the lever fulcrum studs. Assemble the pressure plate (2), springs (9), eyebolts (6), pins (3), studs (5), toggles (4), anti-rattle springs (10) and fit the cover (11). Secure the cover to the baseplate with setscrews and fit the nuts (12) to the eyebolt threads (6).

Adjust the toggle height as described under "Adjustment" and fit the release plate (7) and springs (8). Check the run-out of the release plate with a clock gauge (Fig. 23). This must not exceed 0·015" (0·38 mm.). If satisfactory, remove the clutch from the baseplate.

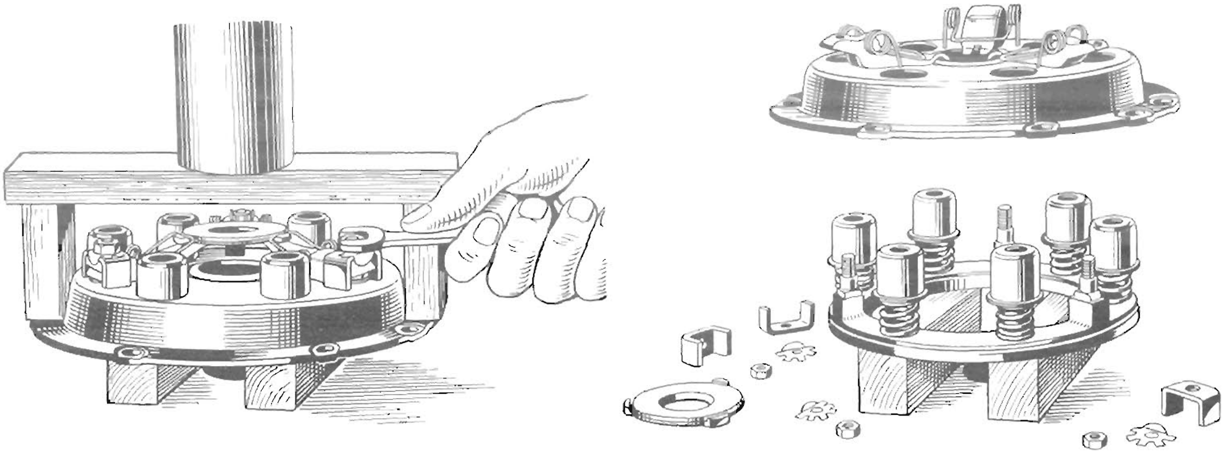


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Fig. 22. Using a press and wood blocks as an alternative to Churchill fixture No. 99A

Refitting the Clutch Unit

Check the clutch driven plate for run-out by mounting it on a mandrel between lathe centres and rotating it slowly whilst the plunger of a dial indicator bears against the outside face of the friction lining.

The maximum run-out must not exceed 0·035" (0·23 mm.). Prise the plate in the required direction until the run-out is within specified limits.

Check the flywheel clutch face for satisfactory condition, and refit the clutch unit as follows:-

With the longer boss of the splined hub towards the gearbox, offer the driven plate up to the flywheel and centralise it by using a special shaft which fits the splined bore of the hub and locates in a bush at the rear of the crankshaft. A discarded input shaft sawn off to suit can be conveniently used for this purpose.

Locate the cover assembly over the two dowels and secure the cover pressing by evenly tightening the setscrews to the correct torque. Remove the centralising shaft.

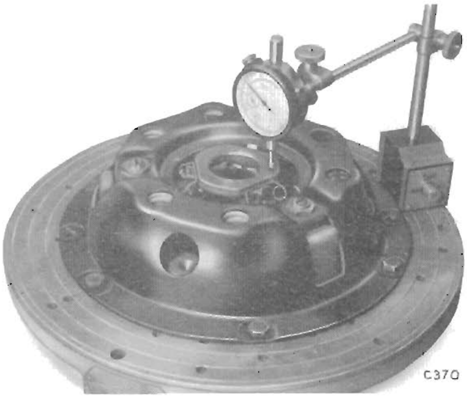


Fig. 23. Using a dial gauge to check run-out of release plate

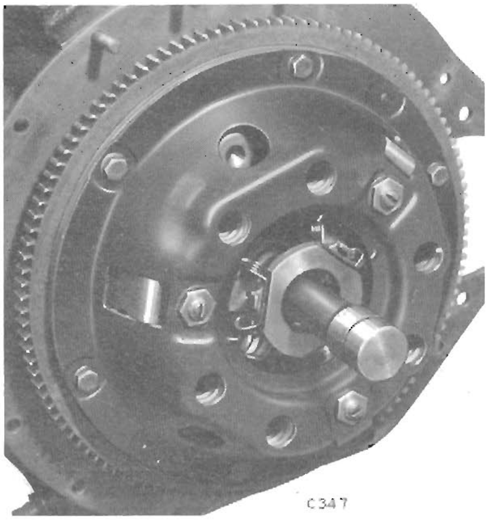
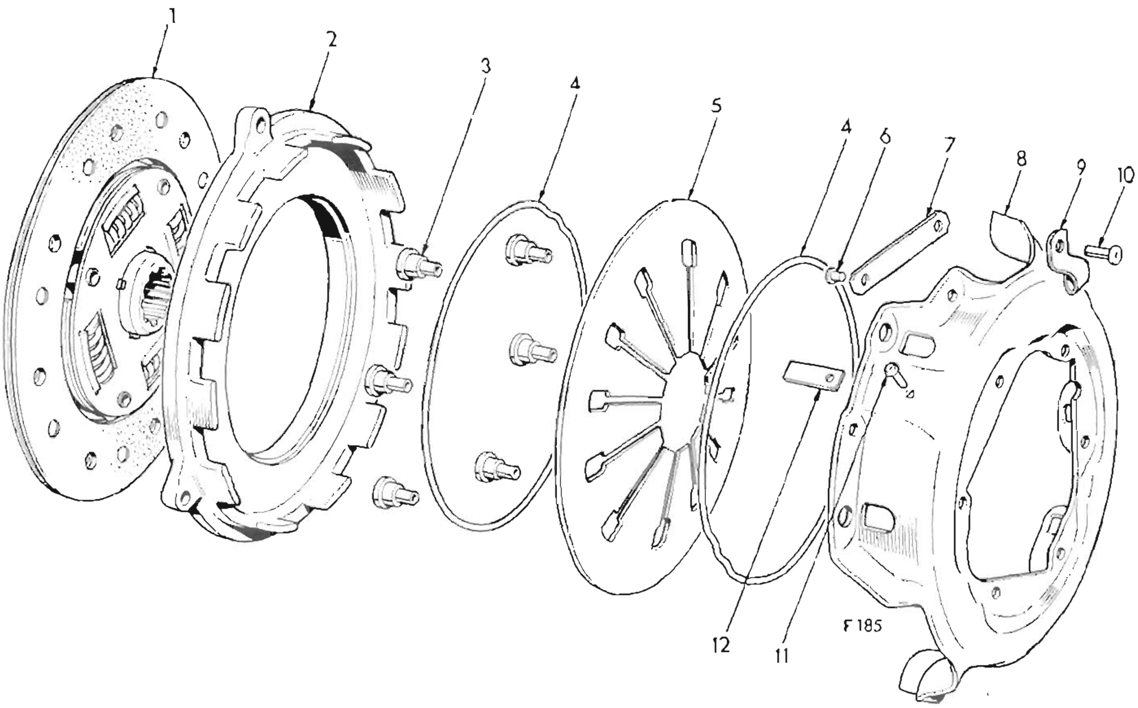


Fig. 24. Centralizing the clutch driven plate



1 Driven plate

2 Pressure plate

3 Rivet

4 Fulcrum ring

5 Diaphragm spring

6 Rivet

7 Drive strap

8 Cover pressing

9 Retaining clip

10 Rivet

11 Rivet

12 Balance weight

Fig. 25. Clutch details

SPITFIRE MK. II

CLUTCH UNIT

The diaphragm spring clutch unit fitted to the Spitfire Mk. II must not be dismantled for any reason.

Should any fault develop in the unit, a complete replacement assembly must be fitted.

DIMENSIONS AND TOLERANCES

PARTS AND DESCRIPTION	DIMENSIONS NEW ins.	DIMENSIONS NEW mm.	CLEARANCE NEW ins.	CLEARANCE NEW mm.	REMARKS
Input Shaft					
Input shaft spigot bush. Length ..	1·06	26·924			
Bore in crankshaft	0·754	19·1516	0·002	0·0508	
	0·753	19·1262	0·0005	0·0127	
Number of splines	10				
Dia. of journal for front ball race ..	1·0005	25·4127	—0·0008	—0·0103	
	1·0001	25·4025	—0·0001	—0·0025	
Input shaft spigot race ball dia.	0·688	17·475			Torrington needle roller bearing. Press fit in bore.
	0·687	17·449			
Mainshaft					
Spigot dia.	0·5000	12·7			Runs in Torrington needle roller bearing.
	0·4995	12·6873			
2nd/3rd gear bush journal dia. ..	0·8738	22·1945	0·0027	0·0686	
	0·8733	22·1818	0·0012	0·0305	
Centre ball race journal dia.	1·0004	25·4101	+0·0002	0·0051	*Transition fit*
	1·0000	25·4	–0·0002	—0·0051	
Mainshaft 2nd/3rd gear circlip groove width	0·079	2·0066	0·010	0·254	
	0·076	1·9304	0·004	0·1016	
Mainshaft 2nd/3rd gear circlip groove bottom dia.	0·795	20·193			
	0·790	20·0660			
Mainshaft length between front end of 1st gear splines and front face of 2nd/3rd gear circlip groove ..	2·609	66·2686			
	2·607	66·2178			
Mainshaft rear ball race journal dia. ..	0·7504	19·067	0·0006	0·0152	
	0·7501	19·055	0·0001	0·0025	
Mainshaft Gears and Bushes					
3rd speed gear—I.D.	1·0945	27·8003	0·0037	0·0940	
	1·0935	27·7749	0·0007	0·0178	
Width of hub between thrust faces ..	0·996	25·2984			
	0·998	25·3492			
3rd speed bush—I.D.	0·876	22·2504	0·0027	0·0686	
	0·875	22·2250	0·0012	0·0305	
3rd speed bush—O.D.	1·0928	27·7571	0·0037	0·0940	
	1·0908	27·7063	0·0007	0·0178	
Length of bush	1·002	25·4508	0·002	0·0508	End float of gear on bush.
	1·000	25·4	0·006	0·1524	
2nd speed gear—I.D.	1·0945	27·8003	0·0027	0·0686	
	1·0935	27·7749	0·0012	0·0305	
Width of hub between thrust faces ..	1·121	28·4734			
	1·123	28·5242			
2nd speed bush—I.D.	0·876	22·2504	0·0027	0·0686	
	0·875	22·2250	0·0012	0·0305	
2nd speed bush—O.D.	1·0928	27·7571	—0·0037	–0·0940	
	1·0908	27·7063	—0·0007	–0·0178	

The minus sign indicates an interference fit

GEARBOX — DIMENSIONS AND TOLERANCES — continued

PARTS AND DESCRIPTION	DIMENSIONS NEW ins.	mm.	CLEARANCE NEW ins.	mm.	REMARKS
HERALD 1200, 12/50 & SPITFIRE					
Countershaft gear cluster bore—both ends	0·7815	19·85			
	0·7805	19·825			
Depth of bore (rear)	1·53	38·862			
Depth of bore (front)	1·44	36·576			
VITESSE					
Countershaft gear cluster bore—both ends	0·8434	21·3224			
	0·8439	21·4351			
Depth of bore (rear)	1·025	26 035			
Depth of bore (front)	0·962	24·4348			
Clutch Release Bearing Details					
O.D. front cover extension	1·249	31·725	·0045	·1143	
	1·247	31·674	0·0015	0·0381	
Release bearing sleeve I.D. . . .	1·2515	31·788	0·0035	0·0889	
	1·2505	31·7627	0·0015	0·0381	
Release bearing sleeve journal O.D.	1·5007	38·1177	0·0012	0·03048	
	1·5002	38·1051	0·0002	0·00508	
Clutch release bearing—I.D.	1·500	38·1	0·0012	0·03048	
	1·4995	38·0873	0·0002	0·00508	
Clutch release bearing—O.D. . .	2·625	66·675			
—Length . .	0·670	17·018			
Ball and Needle Roller Bearing Details			0·0035	0·0889	
Front and centre ball races—					
Hoffman MS. 10K.—O.D. . .	2·4995	63·487	Nil	Nil	
	2·4990	63·475	·001	·0254	
I.D.	1·0002	25·405	-·0008	·02032	
	0·9997	25·392	·0001	·00254	Transition fit.
Mainshaft spigot bearing—					
Torrington needle roller No. B.810 :					
I.D.	0·5	12·7			
O.D.	0·6875	17·4625			
Length	0·625	15·875			Stamped end must face outwards.
Depth of press fit into constant pinion shaft end face	0·47	11·938			
Rear extension ball race					
Hoffman LS.8—O.D.	1·8747	47·617	−0·001	−0·0254	
	1·8742	47·605	−0·000	−0·0000	
—I.D.	0·7502	19·055	−0·0006	−0·0152	
	0·7498	19·045	−0·0001	−0·0025	

GEARBOX — DIMENSIONS AND TOLERANCES — continued

PARTS AND DESCRIPTION	DIMENSIONS NEW ins.	DIMENSIONS NEW mm.	CLEARANCE NEW ins.	CLEARANCE NEW mm.	REMARKS
Mainshaft Gears and Bushes—continued					
Length of bush	1·127 1·125	28·6258 28·575	0·002 0·006	0·0508 0·1524	End float of gear on bush.
2nd/3rd gear thrust washer	0·154 0·152	3·9116 3·8608			
2nd gear thrust washer	0·124 0·122	3·1496 3·0988			
3rd gear circlip washer	0·124 0·122	3·1496 3·0988			
2nd/3rd gear mainshaft circlip thickness	0·072 0·069	1·8288 1·7526	0·010 0·004	0·254 0·1016	
2nd/3rd mainshaft circlip—I.D.	0·79	20·066			
2nd/3rd mainshaft circlip—O.D.	0·94	23·876			
Mainshaft maximum permissible end float of 2nd/3rd gears and bushes, thrust washers and circlip on mainshaft	0·004 0·019	0·1016 0·4824	0·012 0·004	0·3048 0·1016	Recommended end float 0·004″ to 0·010″ (0·1016 to 0·254 mm.). Obtain if necessary by selective assembly of components.
Hub width between thrust faces	0·849 0·839	21·5646 21·3106			
Reverse Gear					
Pinion—I.D. bush	0·6580 0·6573	16·7132 16·6954	0·003 0·0018	0·0762 0·04572	
Reverse gear spindle—Main dia.	0·6555 0·6550	16·6497 16·6370	0·003 0·0018	0·0762 0·04572	
End dia.	0·5618 0·5613	14·2697 14·2570	0·0015 0·0002	0·0381 0·0051	
Countershaft and Gears					
Countershaft—O.D.	0·6555 0·6550	16·6497 16·6370	0·003 0·018	0·0762 0·0457	
Countershaft—Length	8·75	222·25			
Countershaft bushes—Length	1·385 1·365	35·18 34·67			
I.D. Bushes—Countershaft gears	0·6580 0·6573	16·713 16·6954	0·003 0·018	0·0762 0·0457	
Distance between end thrust faces	5·971 5·969	151·6634 151·6126			
Thickness of front thrust washer	0·125 0·123	3·175 3·1242			
Thickness of rear thrust washer	0·068 0·066	1·7272 1·6764			
Thickness of rear rotating thrust washer	0·0665 0·0635	1·6891 1·6129			
Overall permissible end float			0·0125 0·0015	0·3125 0·0381	Obtain if necessary by selective assembly of thrust washers.

EXPLODED ARRANGEMENT OF GEARBOX DETAILS

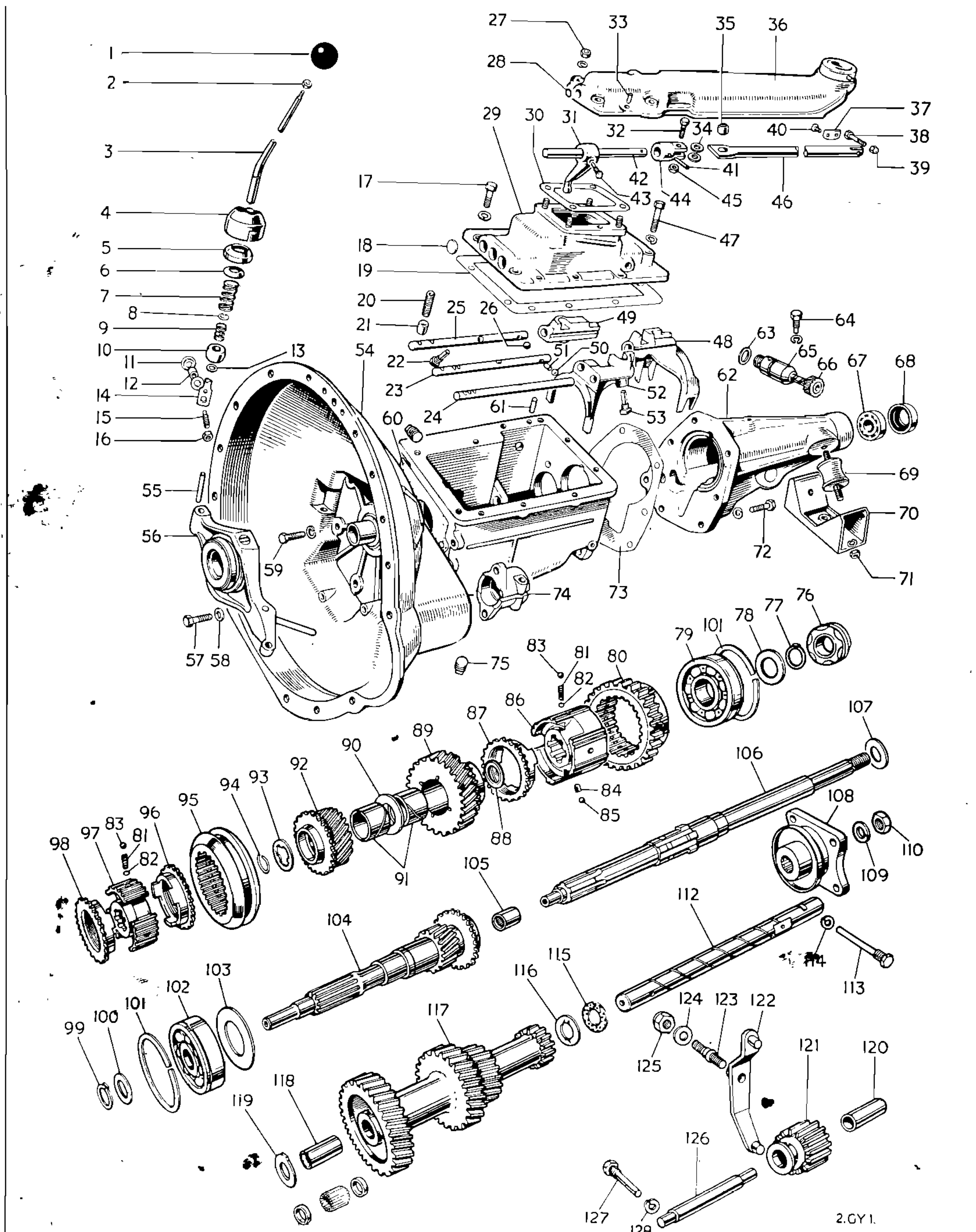


Fig. 1. Exploded Arrangement of Gearbox Details

Key to Fig. 1

1 Knob
2 Locknut
3 Gear change lever
4 Cover
5 Shield
6 Plate
7 Spring
8 Circlip
9 Spring
10 Nylon sphere
11 Stepped nylon washer
12 Bush
13 Washer
14 Lever end
15 Reverse stop pin
16 Locknut
17 Bolt
18 Welch plug
19 Gasket
20 Spring
21 Plunger
22 Taper locking pin
23 1st/2nd selector shaft
24 3rd/top selector shaft
25 Reverse selector shaft
26 Interlock ball
27 Nut
28 Rubber "O" ring
29 Top cover
30 Gasket
31 Selector ball-end
32 Bolt
33 Dowel
34 Washer
35 Bonded rubber bush
36 Gear change extension
37 Reverse stop
38 Bolt
39 Nyloc nut
40 Screw
41 Mills pin
42 Remote control shaft (front)
43 Taper locking pin
44 Fork
45 Nut
46 Remote control shaft (rear)
47 Bolt
48 1st/2nd selector fork
49 Reverse selector
50 Interlock ball
51 Interlock plunger
52 Top/3rd selector fork
53 Taper locking pin
54 Clutch housing
55 Pin
56 Clutch release mechanism
57 Wedgelock bolt
58 Plain washer
59 Bolt
60 Gasket
61 Dowel
62 Rear extension
63 Rubber "O" ring
64 Peg bolt
65 Speedo drive gear housing
66 Speedo drive gear
67 Extension ball race
68 Oil seal
69 Gearbox mounting rubber
70 Mounting bracket
71 Nut
72 Bolt
73 Gasket
74 Clutch slave cylinder bracket
75 Sump plug
76 Speedo driving gear
77 Circlip
78 Distance washer
79 Ball race
80 1st speed gear
81 Spring
82 Shim
83 Synchromesh ball
84 Plunger
85 Ball
86 2nd speed synchro hub
87 2nd speed synchro cup
88 Thrust washer
89 2nd speed mainshaft gear
90 Thrust washer
91 Bushes
92 3rd speed mainshaft gear
93 Thrust washer
94 Circlip
95 3rd/top synchro sleeve
96 3rd speed synchro cup
97 3rd/top inner synchro hub
98 Top synchro cup
99 Circlip
100 Distance washer
101 Circlip
102 Ball race
103 Oil deflector
104 Input shaft
105 Torrington needle roller bearing
106 Mainshaft
107 Distance washer
108 Driving flange
109 Spring washer
110 Nut
112 Countershaft
113 Peg bolt
114 Spring Washer
115 Rear fixed thrust washer
116 Rear rotating thrust washer
117 Countershaft gear cluster
118 Countershaft bush
119 Front fixed thrust washer (Vitesse has needle rollers and retaining rings)
120 Reverse gear bush
121 Reverse gear
122 Reverse gear actuator
123 Actuator pivot
124 Plain washer
125 Nyloc nut
126 Reverse gear shaft
127 Reverse shaft retaining bolt.
128 Spring washer

GEARBOX REMOVAL

To Remove Gearbox Leaving Engine in Position

Raise the vehicle on a ramp or support it on axle stands. Disconnect the battery, drain the gearbox and remove the front seats and carpets.

Referring to Fig. 2, release the casting (2), fitted only to the Spitfire, by removing the bolts (1) and (3) and by detaching the tachometer drive cable from the instrument.

The following instructions are common to all models:—

Remove the gear lever knob and grommet (4).

Release the gearbox cover (7) by removing the fasteners (5), and (6) and three screws on the engine side of the bulkhead.

Remove the attachments (8), withdraw the slave cylinder (9) and allow it to hang on its pipe (10).

Take out the bolts (11) and completely remove the propeller shaft.

Release the front exhaust pipe from the manifold and clutch housing.

Remove the starter motor and release the speedo drive (12) from the gearbox extension.

Remove the nuts (13), lift off gear change extension (14) and fit a cardboard cover to prevent the entry of foreign matter.

Remove the nuts (15), jack up under the sump until the gearbox extension clears the mounting bracket and take off the mountings (16).

Remove the clutch housing flange attachments (17) and withdraw the gearbox.

To Refit

Reverse the removal procedure.

IMPORTANT: Do not allow the gearbox to hang on the clutch spigot shaft whilst fitting it to the engine.

Refill the gearbox with oil.

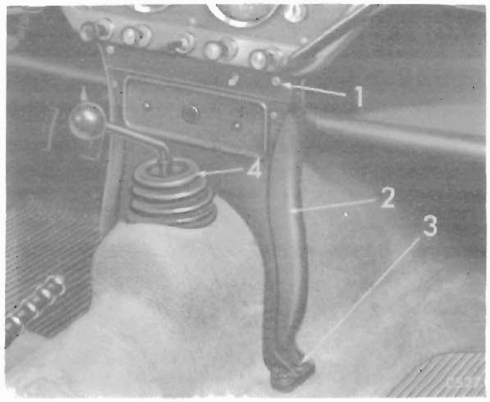


Fig. 2. Spitfire facia support attachments

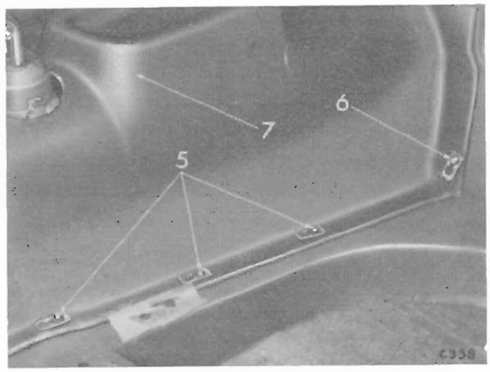


Fig. 3. Gearbox cover fixings

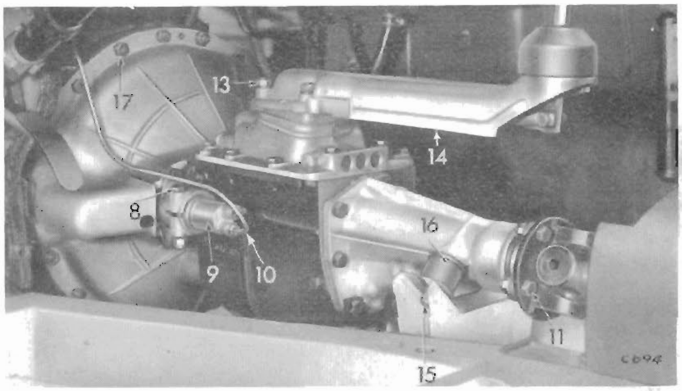


Fig. 4. Herald 1200, 12/50 and Spitfire gearbox attachments

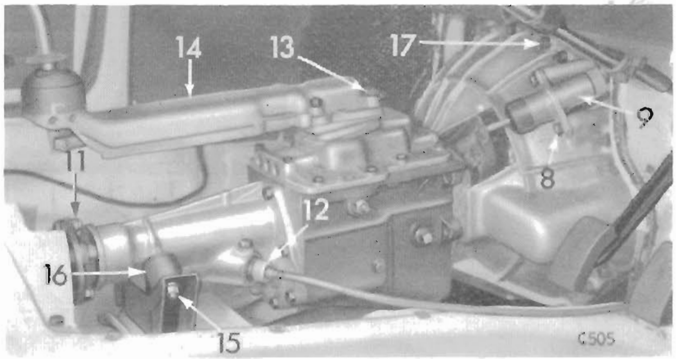


Fig. 5. Vitesse gearbox attachments

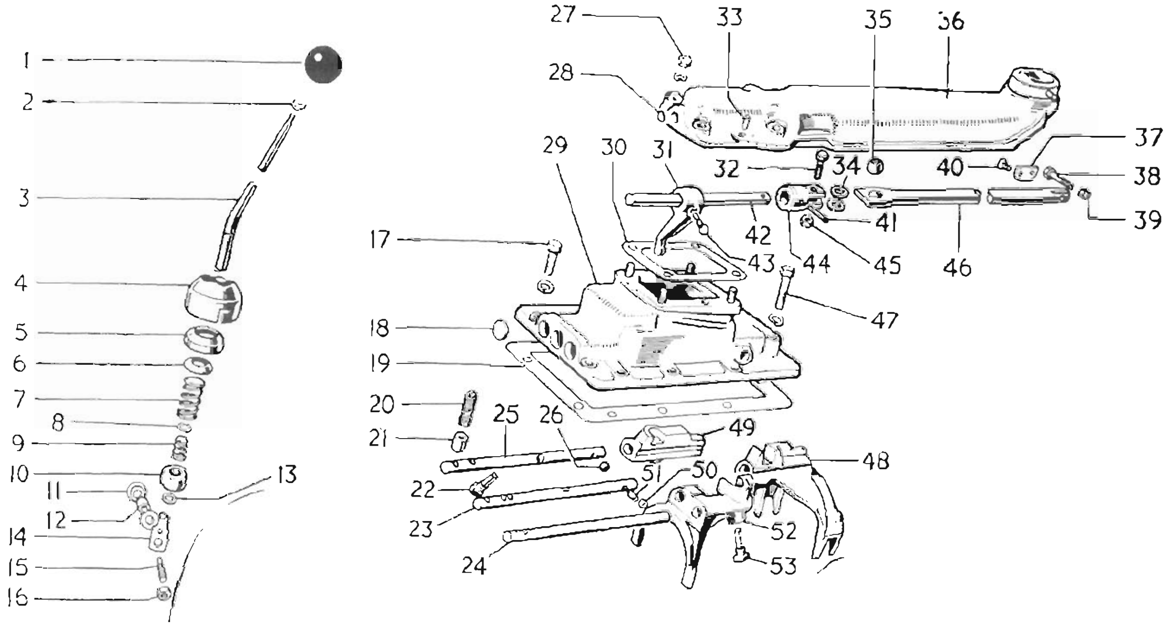


Fig. 6. Exploded top cover details

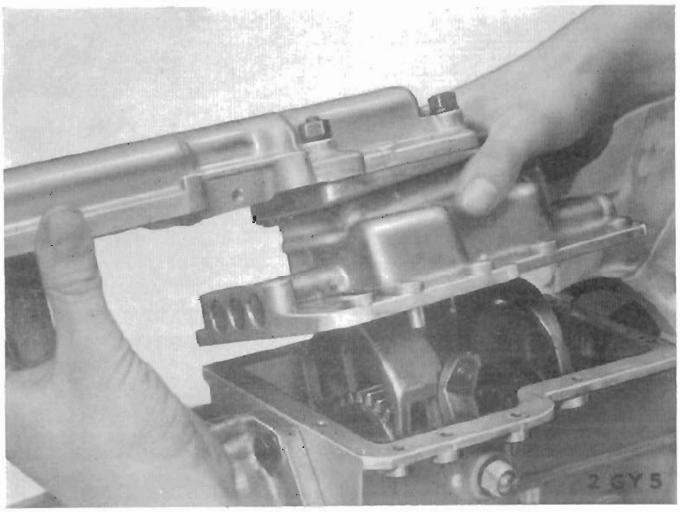


Fig. 7. Removing top cover

DISMANTLING OPERATIONS

Top Cover

Withdraw the bolts (17), (47) lift off the top cover (29) and joint washer (19).

Remove the nuts (27) and the spring washers then lift off the extension (36) and the paper joint (30).

Remove the Nyloc nut (39) and bolt (38), releasing the shaft (46) from the gear change lever (3). Remove gear lever knob (1) by releasing locknut (2) and unscrewing knob.

Release cap (4) as shown on Fig. 9. Lift the lever assembly out of the extension and remove the cups (5) and (6), together with the outer spring (7).

Remove the snap ring (8) from the gear lever and detach the inner spring (9) and Nylon sphere (10). Detach the reverse stop plate (37) by removing the two countersunk screws (40). Unscrew reverse stop bolt (15) from gear lever.

Remove the threaded taper locking pin (43) and withdraw the shaft (42) from the extension casing (36) and selector (31).

Remove the rubber 'O' rings from the extension casing bore (Fig. 11).

Detach the locknut (45) and unscrew the pivot bolt (32) from the coupling fork (44). Withdraw the shaft (46) from the coupling, together with fibre washers (34).

Detach the coupling fork from shaft (42) by drifting out the hollow spring steel pin (41).

Dismantle the selector shaft and fork assemblies by driving out the Welch plugs (18) with a $\frac{1}{8}$″ (3·17 mm.) dia. pin punch as shown in Fig. 10 ensuring that the selector shafts are clear.

Remove the threaded tapered locking pins (53) and (22) from the selector shafts and forks.

Push the selector shaft (25) out of the cover, followed by items (23) and (24). Remove the two interlock balls (26), (50), plunger (51), three selector plungers (21) and three springs (20).

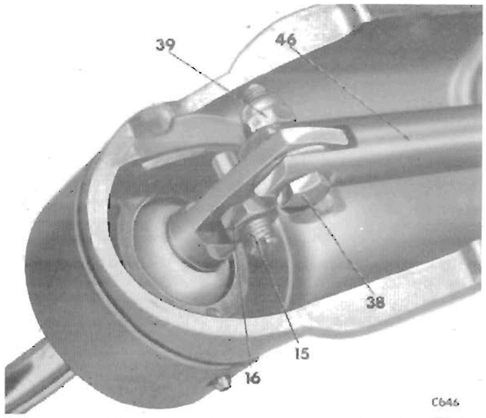


Fig. 8. Control shaft to gearlever attachment details

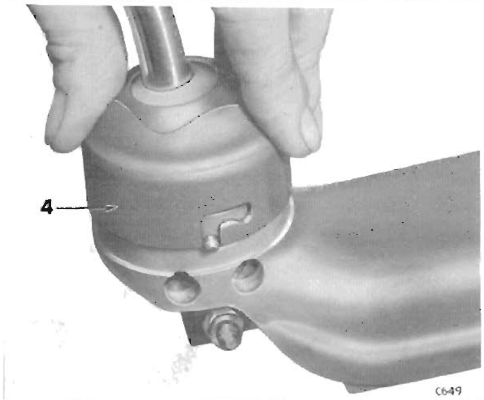


Fig. 9. Turning the cover to release the gearlever assembly

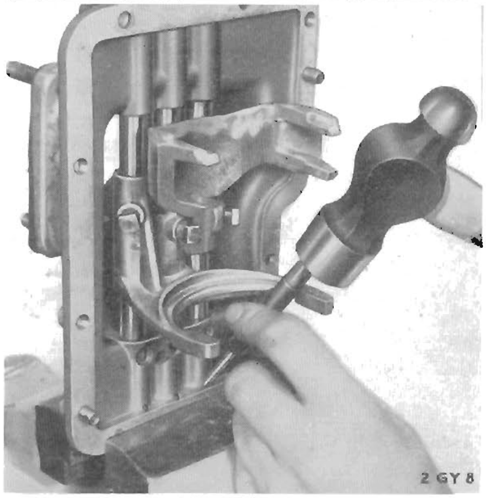


Fig. 10. Removing selector shaft welch plugs

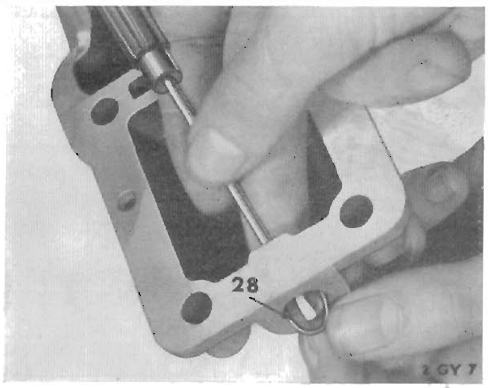


Fig. 11. Removing rubber 'O' ring from extension

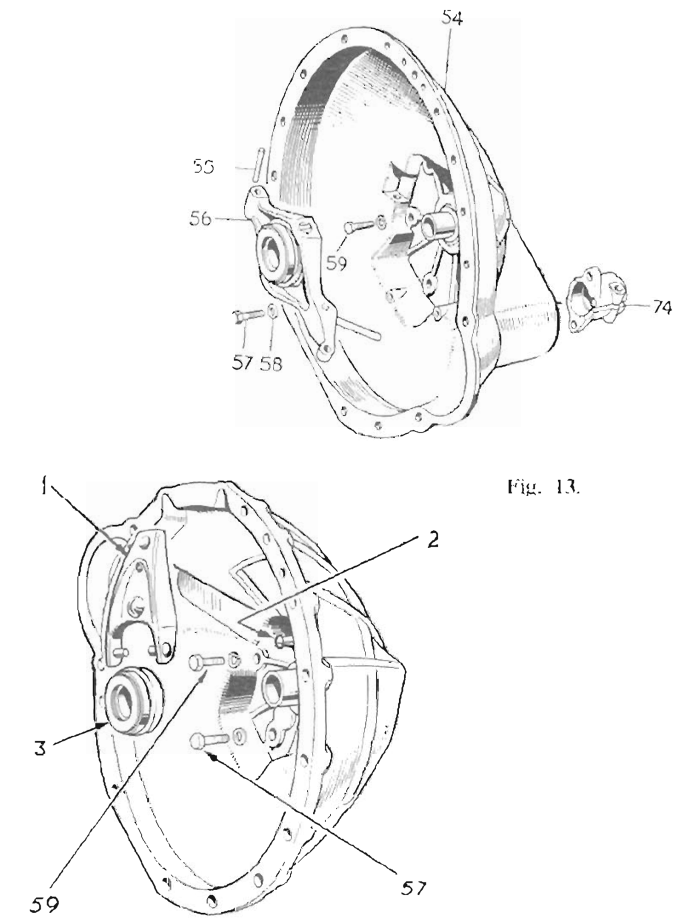


Fig. 13.

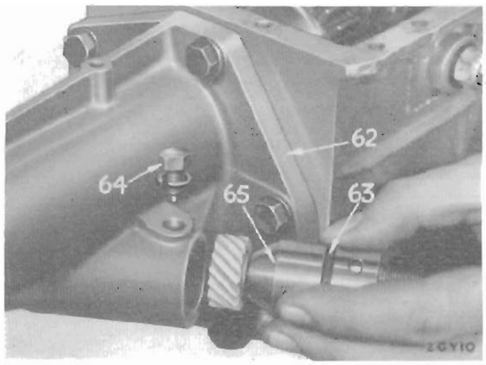


Fig. 14. Withdrawing speedometer driving pinion

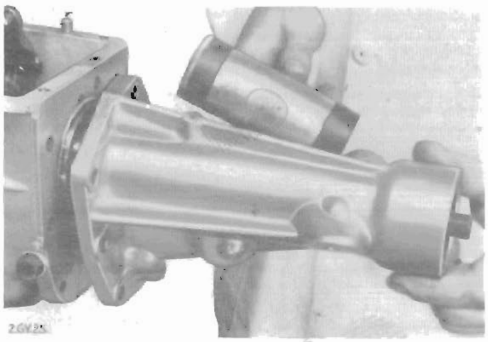


Fig. 15. Removing rear extension

Clutch Housing

HERALD 1200, 12/50 AND SPITFIRE

Drift out the pivot pin (55) from the clutch housing (54) and remove the operating lever assembly (56). Release the clutch housing by removing the slave cylinder bracket (74), four bolts (59) and one Wedgelock bolt (57).

VITESSE

Unclip the release lever pressing (1) from the pivot ball (2) and remove the lever and bearing (3). Remove the bolts (59) and (57) to release the clutch housing.

Rear Extension

Remove the nut (110), and spring washer (109) and withdraw the driving flange (108) from the mainshaft (106).

Withdraw six bolts (72) and one longer bolt securing the extension (62) to the gearbox. Remove the extension by lightly tapping the mounting lugs with a hide-faced hammer. Remove the paper joint washer (73) and distance washer (107) from the mainshaft.

Remove the peg bolt (64) and withdraw the housing (65) from the extension (62). Remove the gear and shaft from the housing and detach the rubber 'O' ring.

Eject the ball race (67) and oil seal (68) from the extension.

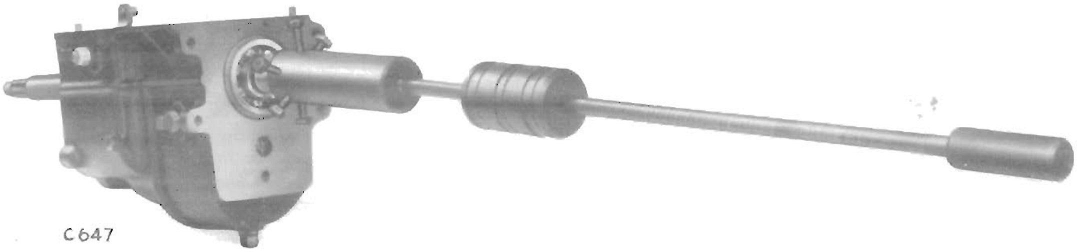


Fig. 16. Using Churchill main tool 4235A with adaptor S.4235A-2 to remove input shaft assembly

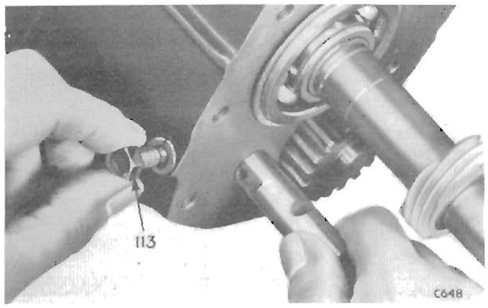


Fig. 7. Withdrawing the layshaft

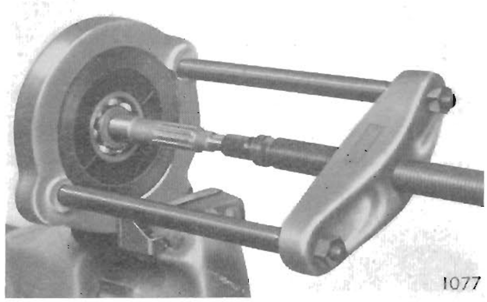


Fig. 18. Using Churchill press and adaptors to remove input shaft bearing

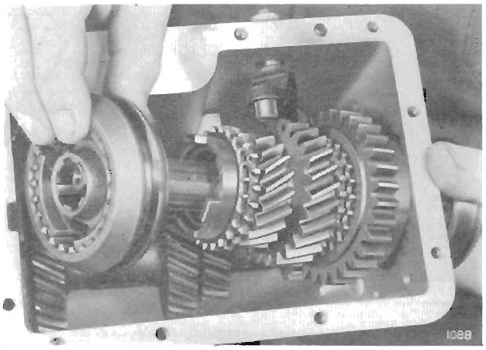


Fig. 19. Tilting the mainshaft and removing synchro unit

Countershaft

HERALD 1200, 12/50 AND SPITFIRE

Extract the countershaft locating bolt (113) and eject the countershaft (112), permitting the countershaft gear cluster to drop clear of the mainshaft gear.

VITESSE

Eject the countershaft and retain the needle roller bearings by inserting a length of rod 0·655″ (16·64 mm.) dia. × 5·5″ (139·7 mm.) long.

Input Shaft

Utilizing Churchill tool as shown in Fig. 16, withdraw the input shaft assembly from the gearbox.

Remove the two circlips (99), (101), the distance washer (100), then place in a press and extract the ball race (102) and oil deflector (103), Fig. 18.

Mainshaft and Gears

Using a hollow drift, drive the mainshaft (106) rearwards, as shown on Fig. 20, until the rear ball race (79) is clear of its housing.

Tilt the mainshaft assembly (Fig. 19) and extract the synchro unit (92), (95) and the synchro cups (96) and (98).

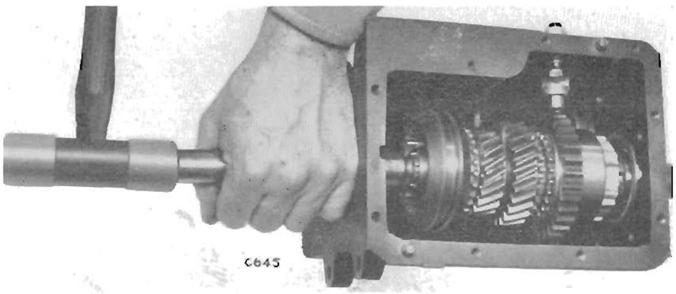
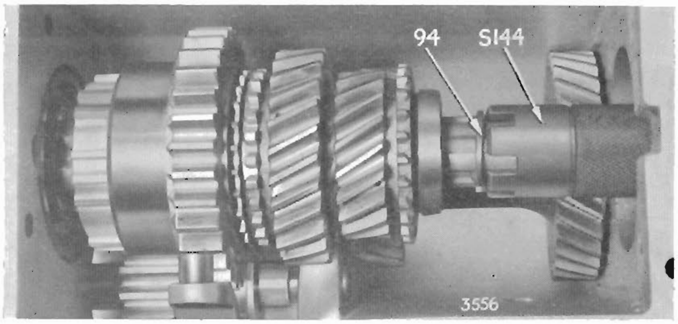
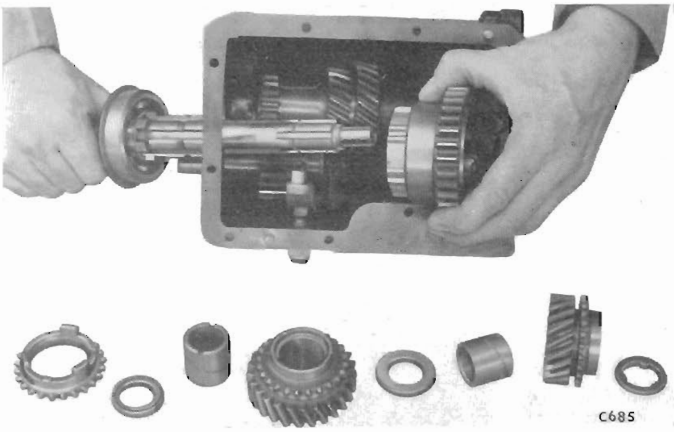


Fig. 20. Driving the mainshaft rearwards to allow the shaft to be tilted



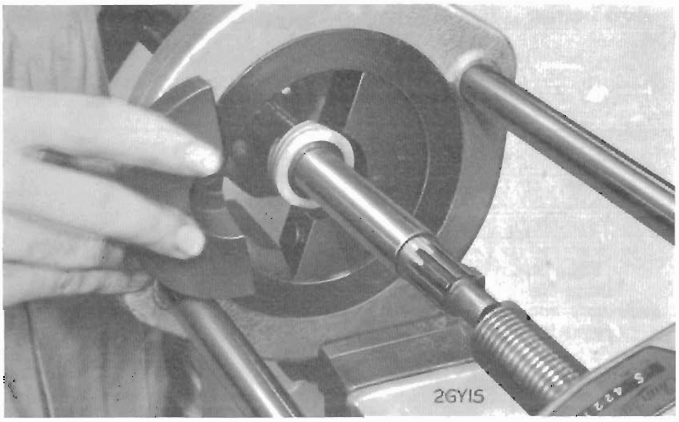
Re-position the mainshaft and, using a special extractor, remove the circlip (94).

Fig. 21. Using Churchill tool S.144 to remove mainshaft circlip



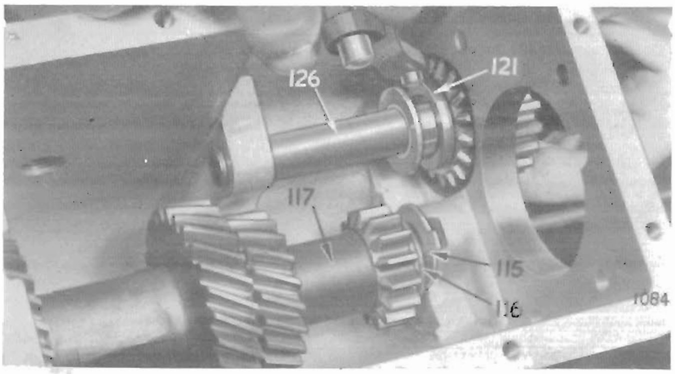
Again drive the mainshaft rearwards and as this is now being finally withdrawn remove the mainshaft details as they are released from the shaft.

Fig. 22. Removing mainshaft details



Completely dismantle the mainshaft by removing the nylon speedo driving gear (76), the circlips (77) and (101), distance washer (78) and ball race (79).

Fig. 23. Using Churchill press and adaptors to remove speedometer driving gear



Eject the reverse idler gear (121) rearwards. Remove the dowel bolt (127) and withdraw the reverse idler gear shaft (126).

Remove the rear thrust washer (115) and, after lifting the gear cluster (117) from the casing, remove the front thrust washer (119) and the rear rotating thrust washer (116).

Fig. 24. Ejecting the reverse pinion

Drift out worn countershaft bushes and fit new ones.

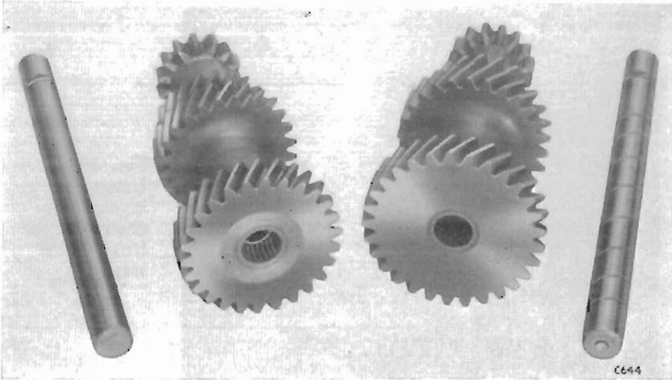


Fig. 25. Showing (left) the Torrington needle roller bearings fitted to Vitesse countershaft and (right) the bushes fitted to Herald 1200 and Spitfire.

Complete the dismantling of the transmission case by unscrewing the nut (125) and removing the operating lever (122) and pivot pin (123).

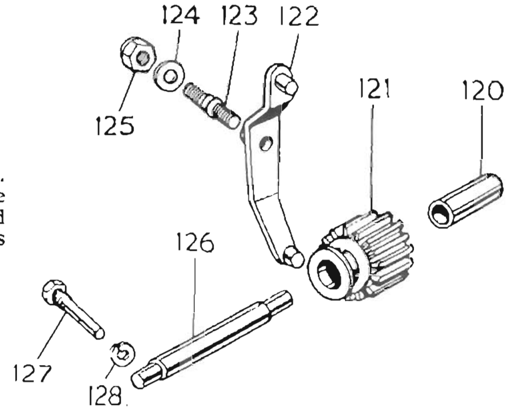


Fig. 26. Reverse pinion and lever details

Both synchro units are dismantled by withdrawing their outer synchro sleeves. It should be noted that spring-loaded balls are retained by these sleeves and to prevent losing any balls or springs it is advisable to cover each unit with clean rag whilst withdrawing its sliding member.

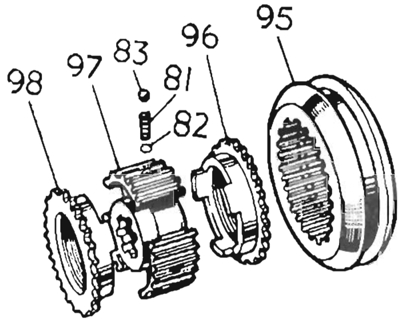


Fig. 27. Dismantled "Top" and "Third" synchro unit

In addition to the synchro balls and springs fitted to the second speed synchro unit, this is also provided with an interlock plunger and ball.

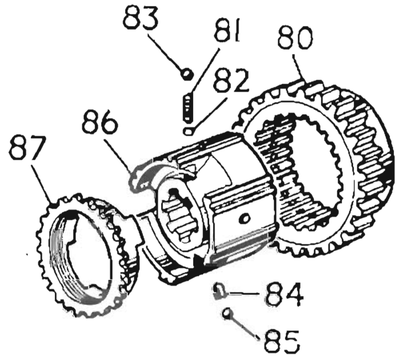


Fig. 28. Dismantled second gear synchro unit

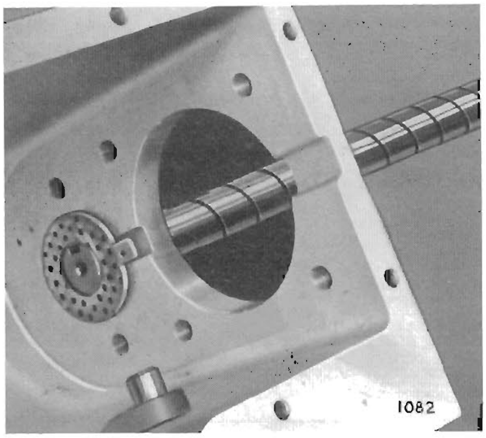


Fig. 29. Using the layshaft to centralise the front thrust washer

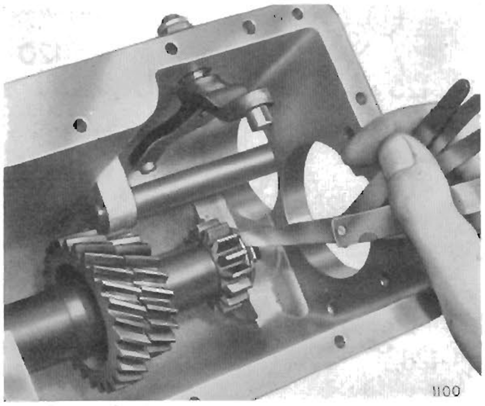


Fig. 30. Using feeler gauges to measure countershaft end float

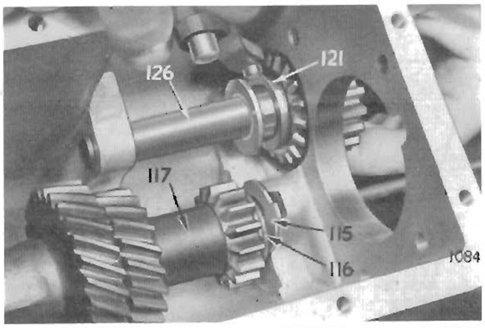


Fig. 31. Inserting reverse pinion

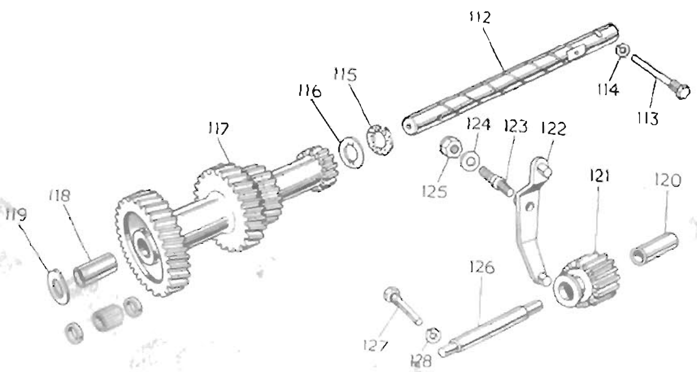


Fig. 32. Exploded countershaft and reverse pinion details

ASSEMBLY OPERATIONS

Having thoroughly cleaned and carefully examined the gearbox components, renew all defective and doubtful items and proceed to re-assemble them as follows:

Countershaft

Using heavy grease to support it, smear the steel face of the front countershaft thrust washer (119) and locate this in the gearcase, placing the bronze face towards the gear with its tag in the recess provided. Centralise the washer by inserting the rear end of the countershaft (112) through the gearcase as shown on Fig. 29.

Attach the rear rotating thrust washer (116) in a similar manner, engaging its tags in the rear slotted face of the countershaft gear cluster, then lower the assembly into the casing.

Push the gear cluster towards the front thrust washer until this is nipped, then having smeared the rear thrust washer (115) with grease, insert this between the casing and the rotating thrust washer (116) and correctly position its tag in the recess provided.

To enable the countershaft gear end-float to be measured, it will now be necessary to align the thrust washers and the gear cluster with appropriate holes in the gearbox, then install the countershaft (112).

Using feeler gauges inserted between the rear fixed thrust washer (115) and the adjacent rotating washer (116) measure the gear end-float as shown on Fig. 30.

Although permissible limits of 0·0015" to 0·0125" (0·04 to 0·31 mm.) are quoted on page 2·203, an end-float of 0·006" (0·15 mm.) is recommended. Adjust by selective assembly of available thrust washers. If it is necessary to reduce the thickness of any thrust washer, DO NOT REMOVE METAL FROM THE BRONZE FACE.

Eject the countershaft (112) allowing the gear cluster to drop to permit installation of the mainshaft assembly.

Reverse Idler Gear

Screw the pivot pin (123) into the reverse idler gear selector lever (122) until a thread protrudes through the attached boss on the lever, then assemble this in the gearcase and secure it with a nut (125) and plain washer (124).

Position the reverse idler gear shaft into the casing and, having aligned its locating hole, secure the shaft by inserting the locking pin (127) with lock washer (128) and tightening.

Slide the reverse idler gear (121) over the shaft and engage its annular groove with the pin attached to the lower end of the operating lever (122) as shown on Fig. 31.

Synchro Units

1. Assemble synchro springs (81), balls (83) and shims (82) to the 3rd/Top synchro hub (97). Fit the outer sleeve (95).
2. Repeat with 2nd synchro unit.
3. Test axial release load which should be:
   3rd/Top: 19/21 lbs. (8·618/9·525 kg.);
   2nd: 19/21 lbs. (8·618/9·525 kg.).

NOTE: If the actual release loads differ from those specified, adjust the number of shims beneath each synchro spring to give the correct loading.

2nd and 3rd Mainshaft Gear End Float on Bushes

Measure the end float of each gear on its respective bush as shown on Fig. 35. This should be 0·002″ to 0·006″ (0·05 to 0·1524 mm.). Fit a new bush to increase float; decrease float by reducing bush length.

CAUTION: Reduced bush length will increase end float of bushes on mainshaft.

Overall End Float of Bushes (Mainshaft)

Assemble the thrust washer (88), bush (91), washer (90), bush (91) and thrust washer (93) to the mainshaft. Secure the assembly with a discarded half-circlip (94) and measure the total end float of the bushes and thrust washers on the mainshaft. If necessary, adjust the end float by selective use of thrust washers to give 0·004″ to 0·010″ (0·1016 to 0·254 mm.).

Fig. 33. Checking Top/3rd synchro release load. A spring balance is attached to the hook and the pull pressure increased to the point of release

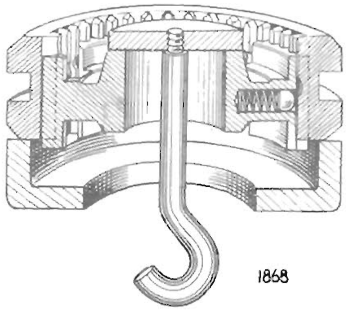
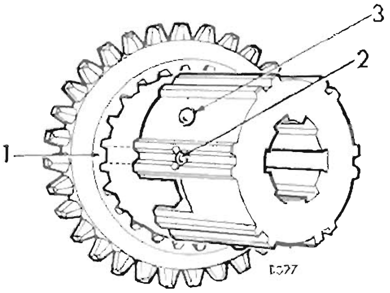


Fig. 34. Second speed synchro unit, showing "master" spline (1), the interlock ball (2) and the synchro ball (3)



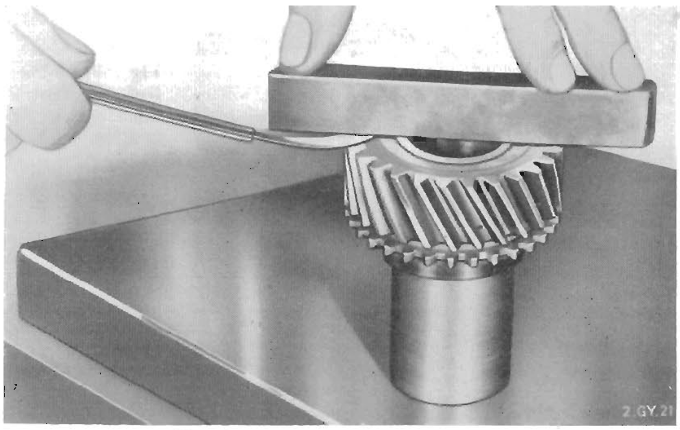


Fig. 35. Measuring gear end-float

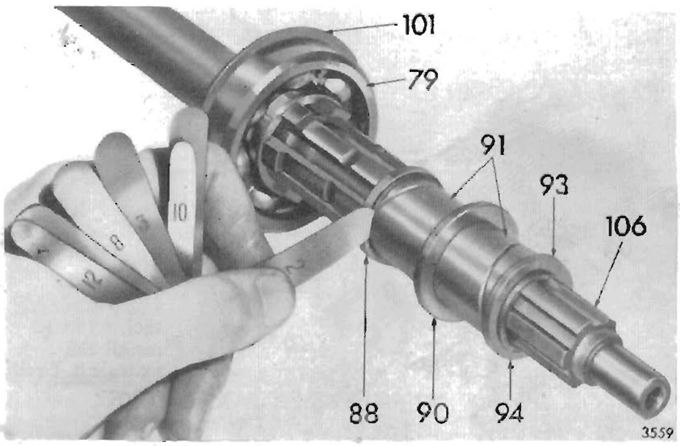


Fig. 36. Measuring overall bush end-float

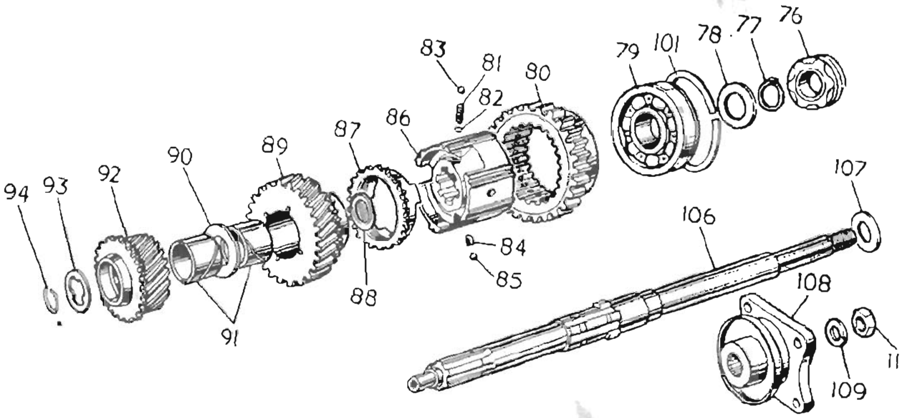


Fig. 37. **Exploded mainshaft details**

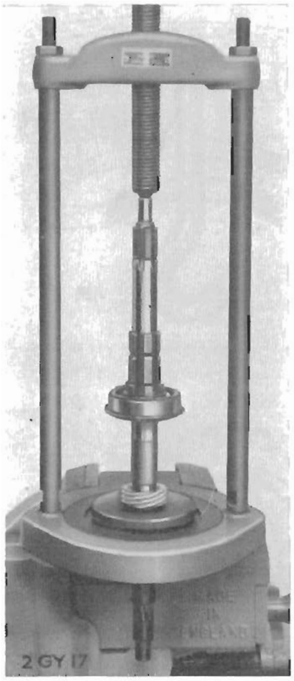


Fig. 38. Refitting the speedometer drive gear.

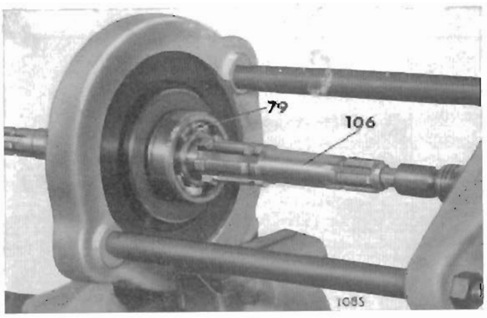


Fig. 39.
Refitting the mainshaft bearing

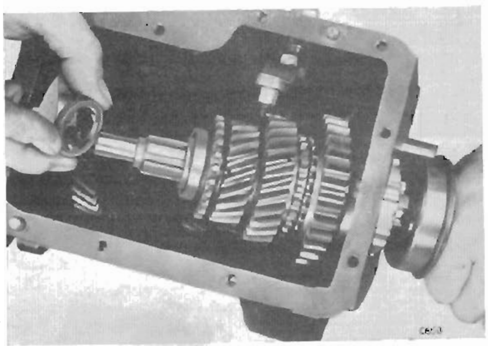


Fig. 40.
Assembling the thrust washer with its scrolled face towards the gears

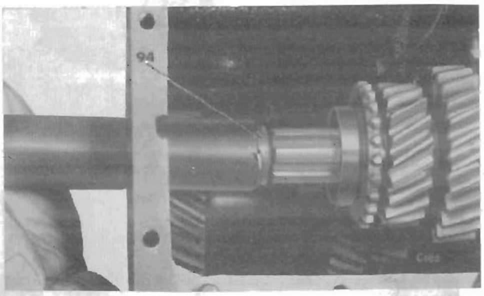


Fig. 41.
Using Churchill tool S.145 to install the mainshaft circlip

Mainshaft Assembly

Placing the circlip groove to the rear, press the ball race (79) on the mainshaft (106), followed by the distance washer (78) and the Seeger circlip (77), which must be correctly located in the mainshaft groove.

Next press the speedo drive gear (76) on to the mainshaft as shown on Fig. 38 and spring the large circlip (101) into the ball race groove.

Pass the mainshaft through the gearbox and, holding it as shown on Fig. 40, thread the mainshaft components on to the shaft in this order:—

1. Second gear synchro unit assembly with gear portion forward (make sure that the interlock plug (82) and ball (83) are correctly located in this unit).
2. Second speed synchro cup (make sure that the three lugs locate in the synchro hub).
3. Rear thrust washer (88) with its scrolled face forward.
4. Second speed gear (89) and bush (91).
5. Centre thrust washer (90).
6. Third speed gear (92) and bush (91).
7. Front thrust washer (93) with its scrolled face rearward.

Utilising a special tool as shown on Fig. 41 install the circlip (94). Placing the longer boss of the inner synchro member forwards, slide the "top and third" synchro unit with baulk rings attached over the mainshaft and complete the installation by driving the rear ball race into its housing.

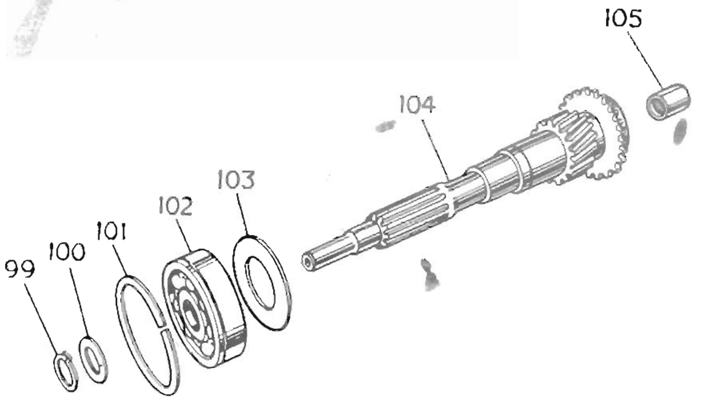


Fig. 42. Exploded input shaft details

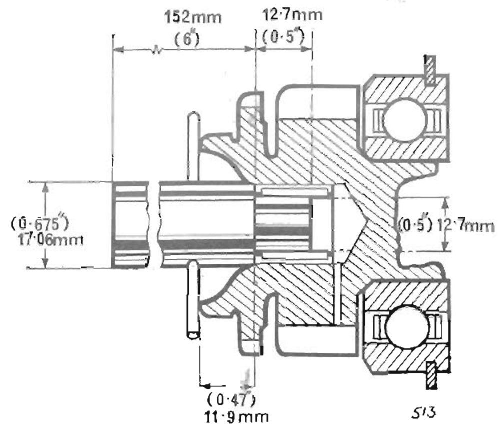


Fig. 43. Details of drift used for driving the needle bearing into the pinion

Input Shaft

Removal of the needle roller bearing (105) is not possible and necessitates replacement of the input shaft (104). Use a special drift, detailed on Fig. 43, to ensure that the new bearing is positioned at the correct depth.

Smear the oil deflector plate (103) with grease and place it over the spigot on the input shaft. Avoiding any disturbance of this plate, press the ball race (102) on to the shaft as shown on Fig. 44. Secure the ball race by fitting the distance washer (100) and the circlip (99) ensuring that the latter is correctly located in its annular groove in the shaft.

Having installed the large circlip (101) on the ball race outer member and placed the "top" synchro cup (93) over its cone on the input shaft, offer up the assembly and as the ball race is being driven into its housing, simultaneously locate the baulk-ring lugs in their respective slots in the synchro hub as shown on Fig. 45.

Countershaft

Align the thrust washers and countershaft gear cluster by pushing a 0·655" (16·64 mm.) dia. rod, having a short taper on one end, through the gearbox and countershaft assembly. Then eject this tool with the actual countershaft, taking care to maintain contact between the two shafts whilst the former is being driven out. Secure the shaft by aligning the lock pin holes and inserting the lock pin (113) with the lock washer (114).

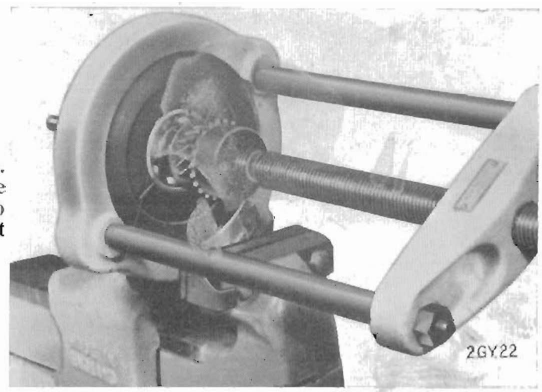


Fig. 44. Pressing the ball race onto the input shaft

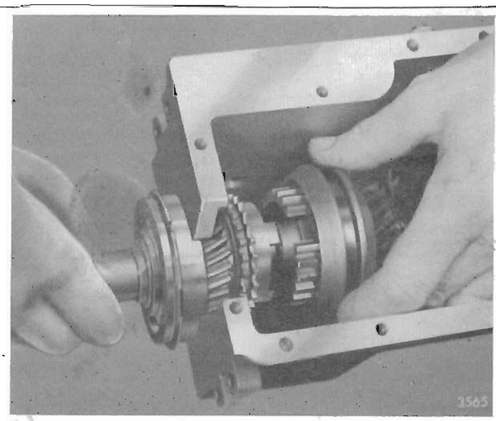


Fig. 45. Installing the input shaft assembly

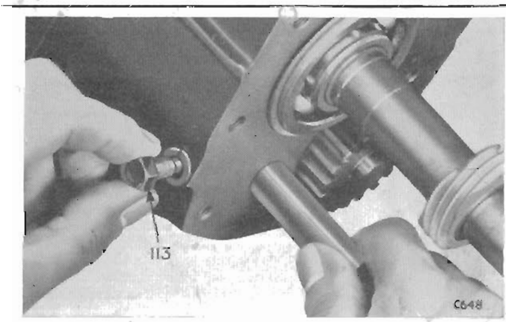


Fig. 46. Installing the layshaft and locking pin

Fig. 47. Fitting the rear oil seal

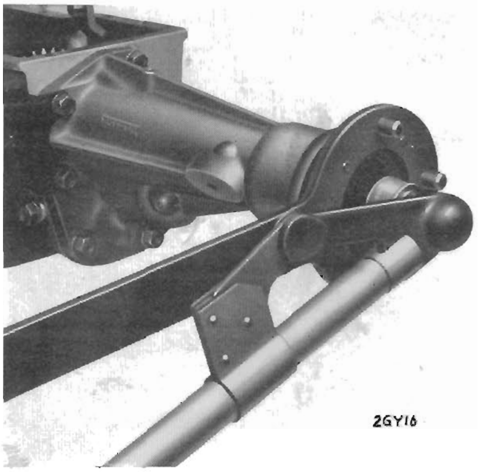


Fig. 48. Using a torque wrench to tighten the driving flange nut

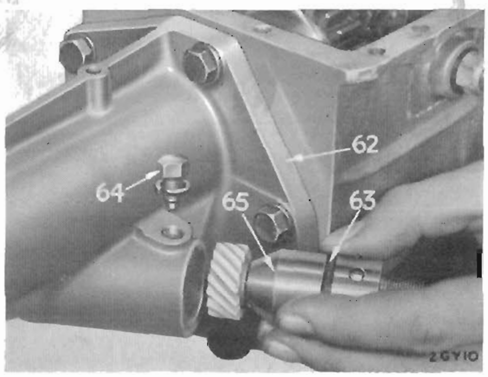


Fig. 49. Inserting the speedometer drive pinion

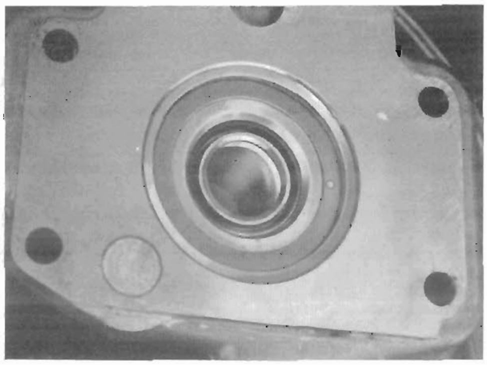


Fig. 50. Position of front cover oil seal (Vitesse)

Rear Extension

Drive the ball race (67) into its bore in the rear end of the housing, followed by the oil seal (68) with the sealing lip facing forward (see Fig. 47).

Lubricate the speedometer drive shaft and insert this into its housing (65). Renew the rubber 'O' ring (63) if it is torn or perished.

Insert the drive gear assembly into the rear extension, aligning the location hole with the corresponding hole in the extension. Insert and tighten the peg bolt (64) and spring washer as shown in Fig. 49.

Feed the distance washer (107) over the end of the mainshaft and, after smearing the joint washer (73) with grease, locate this on the rear face of the gearbox.

Using a hollow drift to drive the rear ball race over the mainshaft, install the extension and fit the securing setscrews (72) with lockwashers.

Fit the driving flange (108), spring washer (109) and nut (110), tightening the latter to the correct torque.

Front Cover Oil Seal (VITESSE)

If necessary, extract the front cover oil seal and drive in new seal, with its sealing lip facing the rear of the gearbox, into the recess in the clutch housing.

Coat the paper joint washer (60) with grease, then assemble the washer and clutch housing (54) to the gearbox. In the case of the Vitesse, protect the oil seal by wrapping the input shaft clutch splines with adhesive tape. Secure the cover with one wedge-lock bolt (57), plain washer (58) and 4 bolts (59) with spring washers.

Re-Assembly

To re-assemble the clutch housing and clutch release mechanism, reverse the removal sequence and note the following:—

To prevent oil leakage, fit a new copper plated steel washer (58) beneath the lower bolt (57).

Top Cover

Having inserted the plungers and springs into the cover (Fig. 51) slide the "third and top" selector shaft (24) into the front end of the cover (29) whilst feeding the shaft into position, press down on the selector plunger, thus enabling the shaft to pass over it and through the appropriate selector fork. Continue to insert the shaft until its middle indent registers with the plunger, *i.e.*, the neutral position.

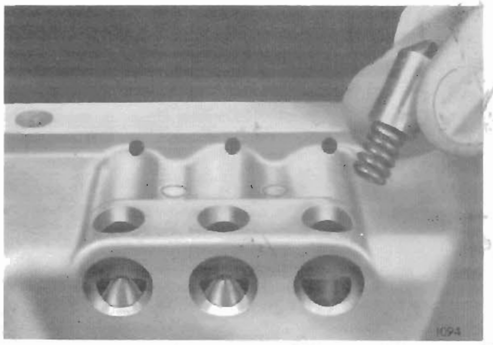


Fig. 51. Fitting selector plunger and spring to top cover

Repeat the procedure with the "reverse" shaft (25) and selector (49) until this also has reached the neutral position.

Insert the interlock plunger (51) into the "first and second" speed shaft (23) and assemble this and its selector fork (48) into the cover by adopting a similar procedure, except that this shaft also passes through the "third and top" selector fork.

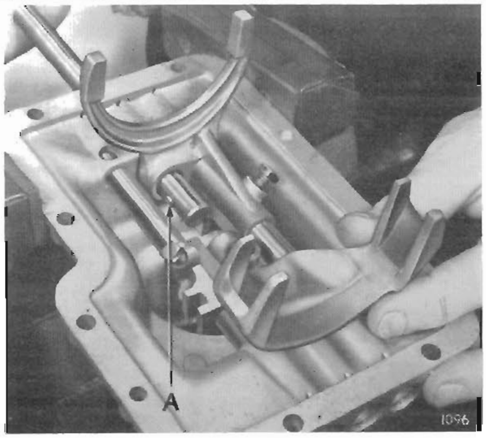


Fig. 52. Inserting 1st/2nd speed selector shaft showing interlock plunger at position (a)

Before the shaft (23) has been pushed to its neutral position, insert the two interlock balls (50) and (26) into the transverse bore connecting the shaft bores at the rear of the casting as shown on Fig. 53 then push the shaft further into the cover until its selector plunger registers with the middle indent, and the interlock balls and plunger are retained by the shafts.

Secure the forks and reverse selector by inserting threaded tapered locking pins. Using sealing compound around the edges of the welch plugs (18) drift these into the ends of the selector shaft bores.

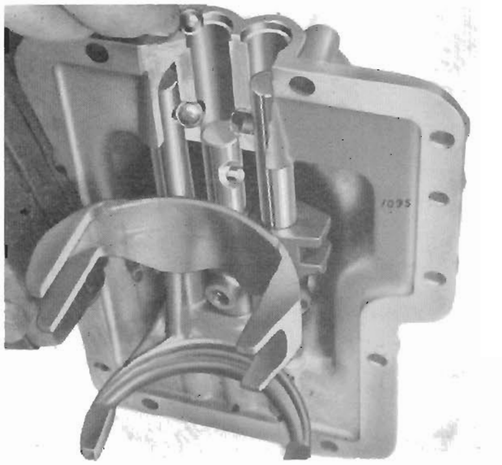


Fig. 53. Lid cut away to show interlock plunger and balls

Ensure that all selectors and gears are in their neutral position, then place the joint washer and top cover assembly over the two dowels on the gearbox. Secure these items with setscrews and lockwashers, placing the longer ones at the rear.

Fig. 54. Fitting top cover assembly to gearbox

DIMENSIONS, CLEARANCES AND SPECIAL TOOLS

	Dimensions New ins.	mm.	Clearances New ins.	mm.
Pump				
Plunger diameter	·3742	9·504	·0002	·005
	·3746	9·514	·0016	·041
Pump body bore	·3748	9·52	·0002	·005
	·3758	9·545	·0016	·041
Pin for roller diameter	·2497	6·342	·0007	·018
	·2502	6·355	·0022	·056
Roller bore diameter	·251	6·375	·0007	·018
	·252	6·4	·0022	·056
Pump Roller Bush				
Outside diameter of bush	·3736	9·49	·0005	·013
	·3745	9·512	0023	·058
Inside diameter of roller	·375	9·525	·0005	·013
	·3759	9·548	·0023	·058
Inside diameter of bush	·251	6·375	·0007	·018
	·2518	6·396	·002	·051
Outside diameter of pin	·2497	6·342	·0007	·018
	·2502	6·355	·002	·051
Relief Valve				
Relief valve plunger diameter	·3122	7·93	·0002	·005
	·3127	7·942	·0013	·033
Relief valve body bore diameter	·3129	7·958	·0002	·005
	·3135	7·963	·0013	·033
Operating piston diameter	·8735	22·187	·0003	·008
	·8742	22·205	·002	·051
Operating piston bores	·8745	22·212	·0003	·008
	·8755	22·237	·002	·051
Operating valve diameter	·2494	6·335	·0003	·008
	·2497	6·342	·0012	·03
Operating valve bore	·25	6·35	·0003	·008
	·2506	6·365	·0012	·03
Gearbox Mainshaft				
Diameter at hub bush	·9236	23·46	·004	·102
	·9244	23·48	·006	·152
Bush internal diameter	·9284	23·581	·004	·102
	·9296	23·612	·006	·152
Diameter at sunwheel	·873	22·174	·003	·076
	·874	22·2	·005	·127
Inside diameter of sunwheel bush	·877	22·276	·003	·076
	·878	22·301	·005	·127
Diameter at steady bearing	·562	14·275		
	·5625	14·287		
Planet pin diameter: 0·802 to 1 ratio (25%)	·4372	11·105		
	·4375	11·112		
Miscellaneous				
Clutch movement from direct to overdrive	·04	1·016		
	·06	1·524		
Hydraulic operation pressure	510 – 530 lbs/sq. in. (35·853 – 37·259 kg/cm.)			
Ratio	25%			

SPECIAL TOOLS

L.178	Assembly ring for uni-directional clutch
L.201	Dummy mainshaft
L.202	Annulus tail shaft remover and replacer (use with hand press RG.4221B)
L.203	Planet gear needle bearing remover and replacer
L.204	Tail shaft oil seal remover adaptors (use with main tool 7657)
L.205	Oil pump body remover adaptor
L.183A	Oil pump body remover (main tool)
L.183A2	Oil pump body remover adaptor
L.206A	Pump body replacer
L.207	Operating piston "O" ring fitting tool
L.208	Annulus spigot bearing remover
L.209	Annulus spigot bearing replacer
L.210A	Clutch thrust ring bearing remover adaptor (use with adjustable puller No. 55)
L.211	Tailshaft bearing nut wrench
L.212	Tailshaft oil seal replacer
L.213	Oil pump body key
L.214	Speeds drive gear and bearing remover
L.215	Clutch thrust ring bearing replacer
7657	Oil seal remover (main tool)
RG.4221B	Handpress
S.4221A	Handpress
No. 55	Adjustable puller
L.252	Operating piston remover

LAYCOCK DE NORMANVILLE OVERDRIVE

The overdrive is an additional gear unit, mounted on the rear face of the gearbox in place of the normal extension. When in operation, the unit provides a higher overall gear ratio than is available with the standard transmission. Reduced engine speed, resulting from the higher ratio, will reduce fuel consumption, increase engine life, and ensure greater driving comfort, providing the unit is used correctly.

The overdrive is operated by an electrical solenoid, controlled by a switch mounted on the steering column. An inhibitor switch, fitted in the electrical circuit, prevents engagement of overdrive in reverse, first and second gears.

Suggested minimum engagement speeds are:	Top gear	40 m.p.h.
	Third gear	30 m.p.h.
Maximum disengagement speeds are:	Top gear	At driver's discretion.
	Third gear	70 m.p.h.

Disengagement of the overdrive at a speed higher than stated may cause damage from "over-revving".

WORKING PRINCIPLES

Overdrive Gears

The epicyclic gear train of the unit consists of a central sungear, meshing with three planet gears which in turn mesh with an internally toothed annulus.

Overdrive Disengaged (Fig. 1)

A cone clutch (A), mounted on the externally splined extension of the sungear (G) is spring-loaded, by four clutch springs (L), via a thrust ring (K) and bearing (M), against the annulus (E) thus locking the gear train and permitting over-run and reverse torque to be transmitted.

Overdrive Engaged (Fig. 2)

When overdrive is selected, two hydraulically operated pistons (I) acting against bridge pieces (J), move forward and, overcoming the spring pressure, cause the cone clutch (A) to engage the brake ring (B) with sufficient load to hold the sungear (G) at rest. The planet carrier (D) can now rotate with the input shaft (H) causing the planet gears (F) to rotate about their own axis to drive the annulus at a faster speed than the input shaft, this being allowed by the free-wheeling action of the uni-directional clutch (C).

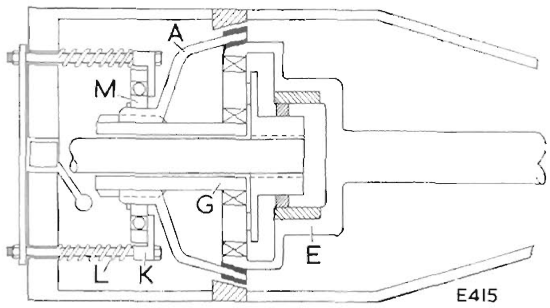


Fig. 1. Overdrive disengaged

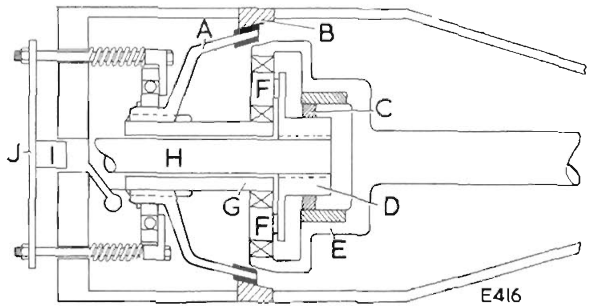


Fig. 2. Overdrive engaged

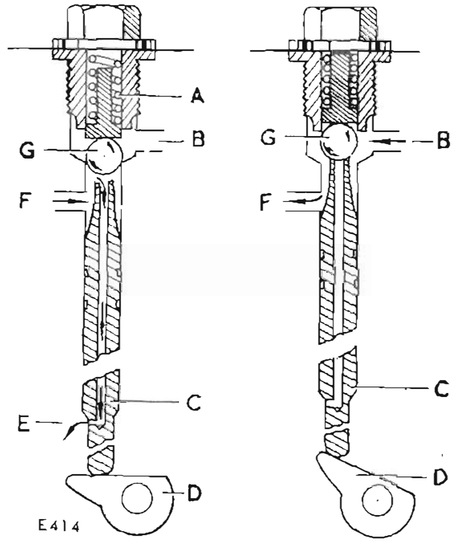
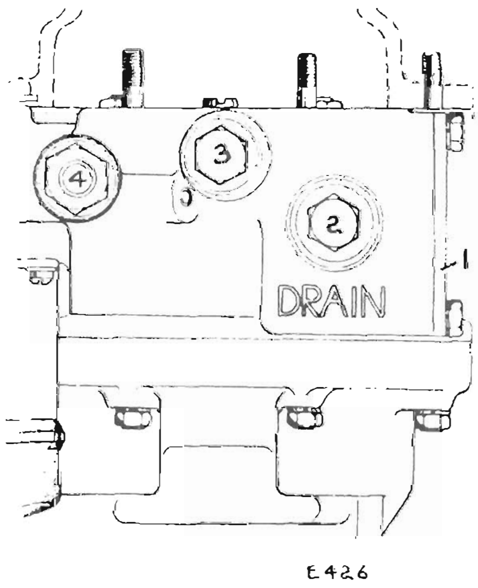


Fig. 3. Operating valve



1 Filter cover plate
2 Drain plug
3 Non-return valve plug
4 Relief valve plug

Fig. 4. Front casing viewed from underneath

HYDRAULIC SYSTEM

Hydraulic pressure is developed by a plunger pump, cam operated, from the input shaft. The pump draws oil through a wire mesh filter and delivers it to the operating valve. A relief valve, incorporated in the system, controls the working pressure.

Operating Valve (Fig. 3)

In direct drive position, the ball valve (G) is seated in the casing thereby isolating the supply (B) from the operating cylinders (F).

When overdrive is selected, a solenoid causes cam (D) to rotate lifting the ball from its seat in the casing, and sealing the top of the valve, thus directing oil under pressure from port (B) to the operating cylinders (F).

When the valve is returned to the direct drive position, oil from the operating cylinders is exhausted down the hollow valve stem through the restrictor (E).

LUBRICATION

Being interconnected, the gearbox and overdrive unit have a common oil level, indicated by a plug on the side of the gearbox. When draining the oil, remove the overdrive unit drain plug and gearbox drain plug. Access to the gauze filter, which must be removed and cleaned prior to refilling with oil, is effected by removing plate (1) (Fig. 4) retained by four setscrews.

Spill oil, from the relief valve, is diverted through drilled passages to a bush in the front casing, then into the mainshaft and along a central drilling to the rear bearing in the annulus. From the bearing, oil is passed, due to centrifugal force, through the uni-directional clutch to an oil thrower, from which it is picked up by a catcher on the planet carrier and then to the planet gears via the hollow bearing pins.

> NOTE : All gearbox and overdrive units fitted to new cars are filled with a special oil, formulated to give all necessary protection to new gears. Under normal circumstances, this oil should not be changed, but may be topped up with any of the approved oils. If a new unit is fitted, or parts of an existing unit are renewed, the unit should be replenished with new special oil, supplied with a new unit, or ordered separately from the Spares Division.

Should difficulty be experienced in obtaining the special oil, use one of the approved lubricants listed on page 24. ON NO ACCOUNT SHOULD ANTI-FRICTION ADDITIVES BE PUT INTO THE OIL.

After refilling the gearbox and running the car for a short distance, re-check and top up the oil level to replace the oil which has been distributed around the hydraulic system. Always use clean oil and take great care to prevent the entry of foreign matter when any part of the casing is opened.

SERVICING

The Operating Valve

Access to the valve plug, on top of the unit, is gained by removal of the gearbox cover (page 2·205, Fig. 3). Operate the solenoid several times to release the hydraulic pressure. Unscrew the valve plug and, with the aid of a small magnet, remove the spring, plunger and valve. Taking great care to avoid damage to the valve seat, remove the operating valve, by inserting a length of stiff wire down its centre and drawing it up. Ensure that the small hole at the bottom of the valve, breaking through to the central drilling, is not choked. This hole provides a passage for oil exhausted from the operating cylinders when the valve is moved to the "direct drive" position.

If necessary the ball can be reseated as follows:

Place the ball on a block of wood, position the seat of the valve on the ball and give the valve a sharp gentle tap. Clean the valve seat in the casing, locate the ball on its seat and gently tap the ball using a copper drift. Tapping the ball too hard will close the mouth of the valve seat and prevent valve re-assembly.

Adjustment of Solenoid Operating Lever

The operating valve, referred to above, is raised by a cam pinned on a transverse shaft. A solenoid-operated lever is attached to the opposite end of the shaft (Fig. 6).

Remove the cover plate from the solenoid housing, move the operating lever until a $\frac{3}{16}$" (4·762 mm.) setting pin, pushed through the hole in the lever aligns with a hole in the casing. With the solenoid energised, screw the adjusting nut until it just contacts the operating lever. Remove the setting pin and de-energise the solenoid. Energise the solenoid and re-check the alignment of the holes.

Check that the current consumption is approximately 2 amps. A reading of 20 amps. indicates that the solenoid plunger is not moving far enough to switch from the solenoid operating coil to the holding coil of the solenoid and the operating lever must be re-adjusted.

CONTINUOUS HIGH CURRENT WILL CAUSE PREMATURE SOLENOID FAILURE.

With the solenoid de-energised, re-align the setting holes and insert the setting pin. Hold the solenoid plunger against the blanking plug (Fig. 7) and check that dimension "A" is ·150" to ·155" (3·81 to 3·937 mm.). Obtain this dimension by varying the thickness of the washer between the blanking plug and the casing, as necessary.

If an adjustable type of solenoid stop is fitted, proceed as follows:—

With the solenoid de-energised, re-align the setting holes and insert the setting pin. Hold the solenoid plunger against the adjustable stop, then adjust the stop until, with the plunger hard up

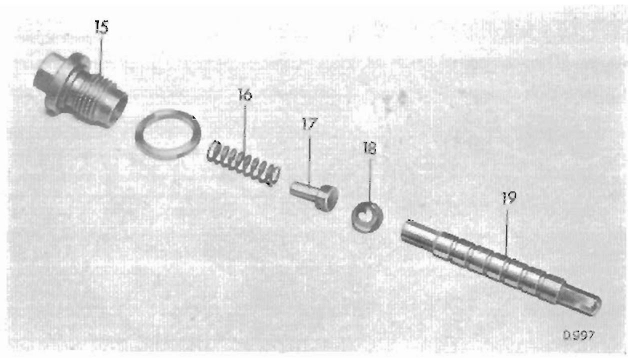
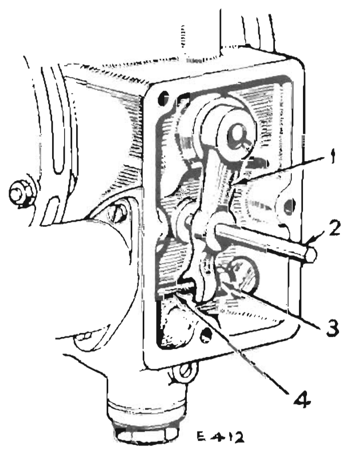


Fig. 5. Operating valve components



1	Operating lever	3	Adjusting nut
2	Setting pin	4	Solenoid plunger

Fig. 6. Adjustment of operating lever

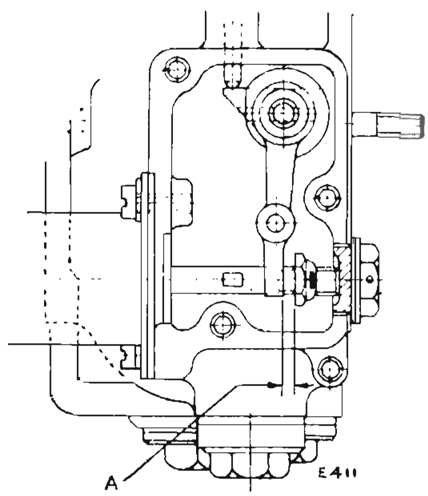


Fig. 7. Dimensional checks

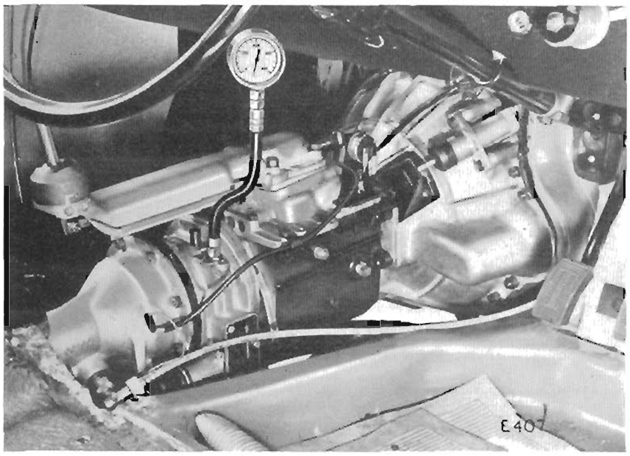


Fig. 8. Testing oil pressure

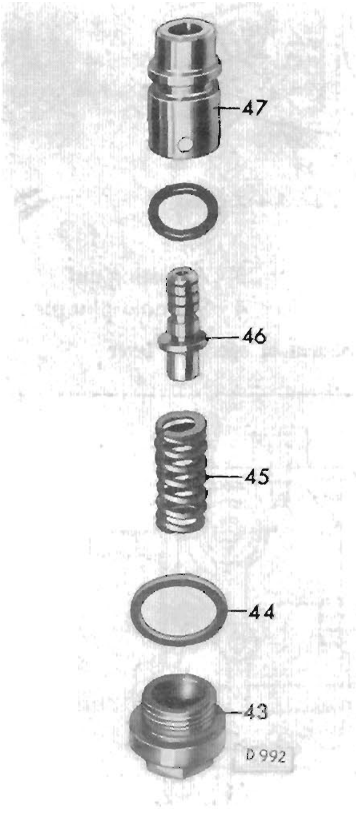


Fig. 9. Relief valve components

against the stop there is a gap of ·150″ to ·155″ (3·81 to 3·937 mm.) between the fork of the lever and the nut. When this gap has been obtained, tighten the locknut against the solenoid bracket until one of the slots in the locknut is in alignment with the drilled hole in the stop then secure with locking wire.

Testing Oil Pressure

Release the hydraulic pressure by switching on the ignition, engaging top gear and operating the overdrive switch several times, remove the operating valve plug and replace it with the hydraulic test equipment (Churchill Tool L.188).

Jack up the rear wheels of the car securely, start the engine and run up to about 20 m.p.h. on the speedometer. Check the hydraulic pressure in overdrive. See page 2·301.

Lack of pressure when overdrive is selected may indicate that the pump non-return valve requires cleaning and re-seating and/or the relief valve and filter cleaning.

Relief Valve

Access to the relief valve is gained by removing the plug at the bottom of the front casing adjacent to the solenoid housing cover plate. Remove the spring. The relief valve body can be withdrawn by inserting a length of stiff wire, shaped into a hook form, into the hole in the side of the body and pulling out.

The relief valve plunger can then be pushed out of the relief valve body.

Pump — Functional Check

To check that the pump is working, jack up the rear wheels of the car securely, remove the operating valve plug and start the engine. Engage top gear and with the engine running slowly, watch for oil being pumped into the valve chamber. If none appears the pump is not functioning and its non-return valve should be cleaned and re-seated. To re-seat FIRST REMOVE the valve body using Tool No. L.213, then, after cleaning, tap the ball sharply onto its seat. A flow of oil does not necessarily indicate that the hydraulic pressure is correct.

Sticking Clutch

If overdrive cannot be disengaged after carrying out the procedure outlined on page 2·305, the fault may result from a sticking cone clutch. This condition is more likely to occur on a new unit, due to insufficient "bedding in" of the clutch, than on a unit which has been in service for some time.

The clutch can usually be freed by giving the brake ring several sharp blows with a hide mallet from underneath when the car is on a hoist.

The Electrical Circuit

Because many operational failures are due to corroded terminals and faulty wiring, check the wiring and connections before dismantling any part of the overdrive unit.

Good earth connections are essential on all earthed components. This applies particularly to the solenoid because of the heavy current passed momentarily each time the overdrive is engaged.

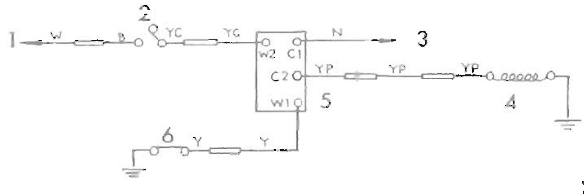
Incorrect adjustment of the solenoid, resulting in failure of the main winding contact to open, may cause damage to the solenoid and relay.

If the overdrive fails to operate after checking all the electrical connections, refer to Fig. 10, and proceed as follows:

1. Switch on the ignition and engage top gear. Set the column control switch (1) to overdrive position. Check that the battery voltage is present at terminals C.1 and W.2.
2. Short out the terminals on C.1 and C.2 on the relay unit (3). If the solenoid (4) operates then the relay unit, column switch and gearbox isolator switch are suspect. Remove short circuiting link from between terminals C.1 and C.2.
3. Earth terminal W.1 on the relay unit. If the overdrive solenoid operates, then the gearbox isolator switch is suspect. If the relay unit does not operate, renew the relay unit.
4. Earth the yellow/green cable on the switch. If the solenoid operates, renew the control switch.

OVERDRIVE REMOVAL

Remove the eight nuts securing the unit to the gearbox adaptor plate. Break the connector adjacent to the solenoid valve and withdraw the units.



1	To SW on coil	4	Solenoid
2	Overdrive switch	5	Relay
3	To No. 1 on ignition switch	6	Gearbox isolator switch

Fig. 10. Overdrive circuit

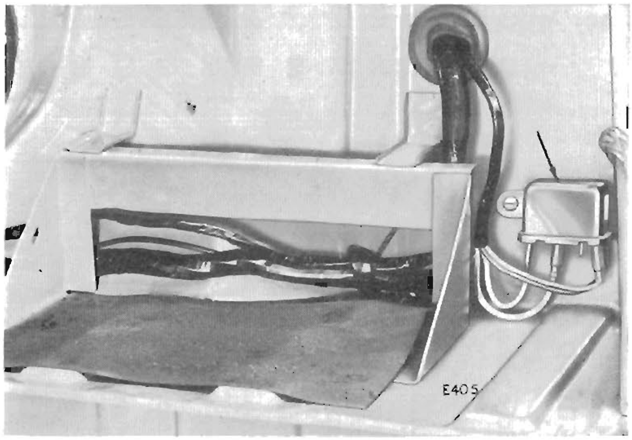


Fig. 11. Location of relay

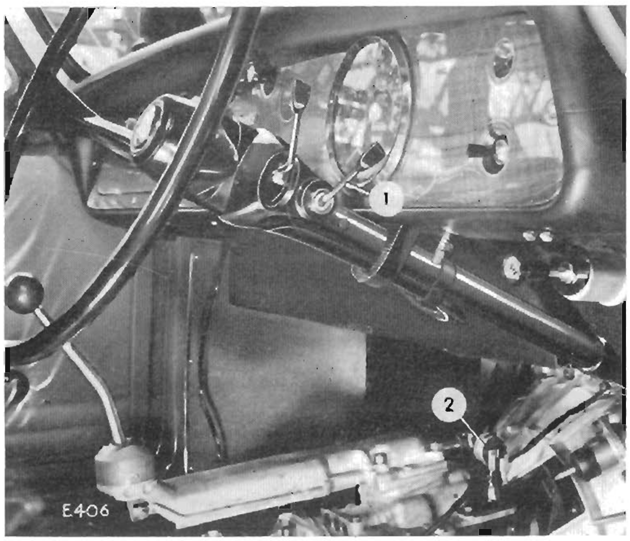


Fig. 12. Location of (1) overdrive switch, (2) gearbox isolator switch

EXPLODED ARRANGEMENT OF OVERDRIVE UNIT

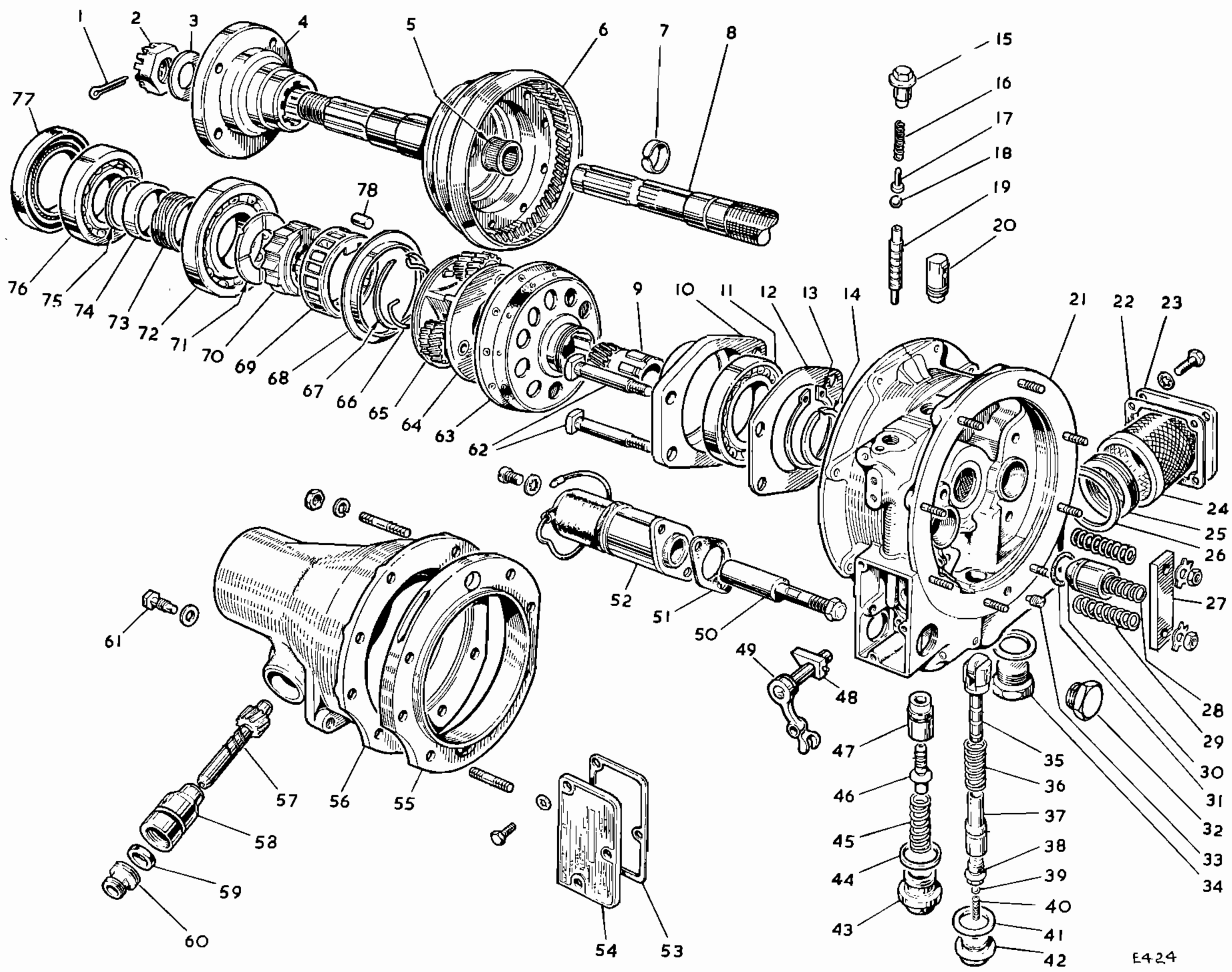


Fig. 13. Overdrive unit

KEY TO FIG. 13

1	Split pin	27	Bridge piece	53	Gasket
2	Nut	28	Bias spring	54	Cover plate
3	Washer	29	Clutch return spring	55	Brake ring
4	Coupling flange	30	Piston	56	Rear casing
5	Needle bearing	31	Piston 'O' ring	57	Speedometer pinion
6	Annulus	32	Plug	58	Speedometer pinion bush
7	Spring	33	Pump locating screw	59	Seal
8	Main shaft	34	Plug	60	Screwed end
9	Sungear	35	Pump plunger	61	Locating screw
10	Thrust ring	36	Return spring	62	Bolts
11	Thrust bearing	37	Pump body	63	Cone clutch
12	Retaining plate	38	Non-return valve body	64	Planet carrier assembly
13	Circlip	39	Ball	65	Planet gear
14	Circlip	40	Spring	66	Spring
15	Plug	41	Washer	67	Circlip
16	Spring	42	Plug	68	Oil thrower
17	Plunger	43	Plug	69	Cage
18	Ball	44	Washer	70	Inner member
19	Operating valve	45	Spring	71	Thrust washer
20	Lubrication bush	46	Relief valve plunger	72	Front bearing
21	Front casing	47	Relief valve body	73	Speedometer drive gear
22	Gasket	48	Cam	74	Distance piece
23	Cover plate	49	Operating lever	75	Spacer
24	Filter	50	Solenoid plunger	76	Rear bearing
25	Magnetic rings	51	Gasket	77	Oil seal
26	Rubber/Steel washer	52	Solenoid	78	Roller

DISMANTLING (Fig. 13)

To prevent damage or faulty operation resulting from the inclusion of foreign matter, scrupulous cleanliness must be observed during all service operations. Prepare a clean area in which to lay out the dismantled unit and clean containers to receive the smaller parts.

With the front casing uppermost, secure the unit in suitably protected vice jaws. Release the tab washers securing the four bridge piece retaining nuts, remove the nuts, washers, bridge pieces (27) and, from the operating piston bores, remove the bias springs (28).

Loosen the two solenoid securing screws to prevent the rubber solenoid cover fouling during front casing removal.

Progressively loosen, to ensure gradual release of the clutch spring loading, the eight nuts securing the front casing (21) and brake ring (51) to the rear casing (56). Remove the nuts, spring washers and lift off the front casing. If the brake ring remains with the rear casing, tap gently to remove.

Remove the four clutch return springs (29) and withdraw the clutch sliding member complete with thrust bearing (11), thrust ring (10), retaining plate (12) and sungear (9).

Operating Valve and Relief Valve

Remove as detailed on pages 2·305 and 2·306 respectively.

Pump

IMPORTANT: Remove the pump locating screw (33) before extracting the pump body.

Remove the pump plug (42), non-return valve spring (40) and ball (39), and the pump locating screw (33), see note above. Unscrew the non-return valve body (38) using tool L.213. Using tools L.183A, L.183A2 and adaptor L.205, extract the pump body as follows (Fig. 14):—

Screw the spindle into the pump body, position the adaptor against the casing and screw the wing nut down.

Filter

Remove the cover plate (23), retained by four setscrews and withdraw the filter (24), three magnetic rings (25), and the rubber/steel bonded sealing washer (26).

Operating Pistons

Withdraw the operating pistons (30) from their respective housings using tool L.252.

Sliding Clutch Member

Remove the sungear retaining circlip (14) from its groove in the sungear extension and withdraw the sungear (9).

Remove the thrust bearing retaining plate (12), bearing circlip (13) from its groove on the cone clutch hub and press the hub from the bearing (11) and thrust ring (10). Extract the bearing from the thrust ring using tool L.210A.

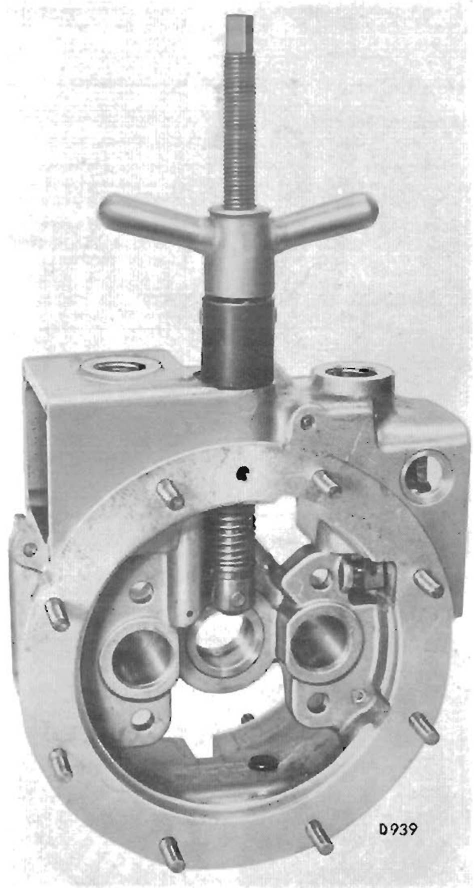


Fig. 14. Extracting pump body

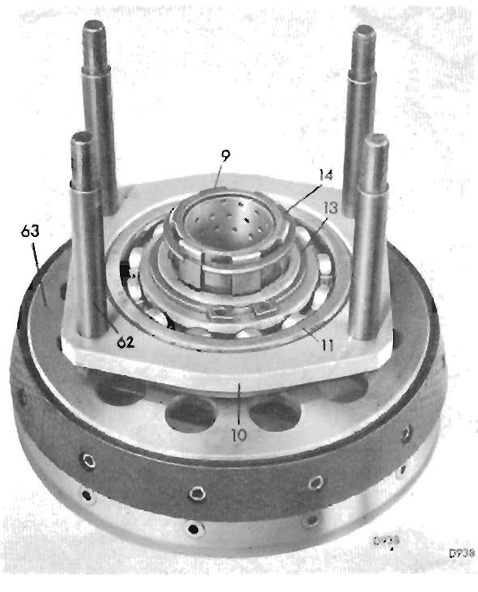


Fig. 15. Clutch sliding member assembly

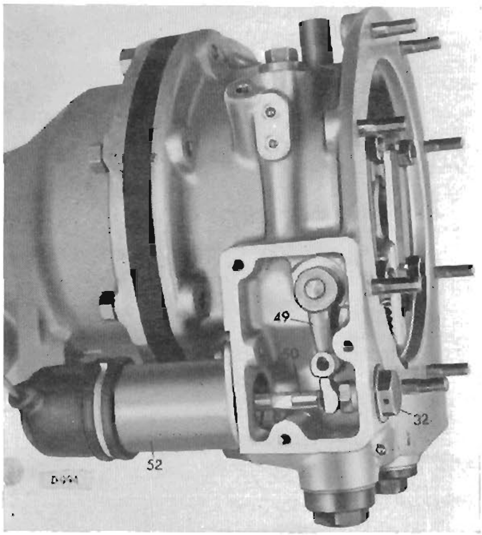


Fig. 16.
View of unit from right-hand side showing solenoid cover removed

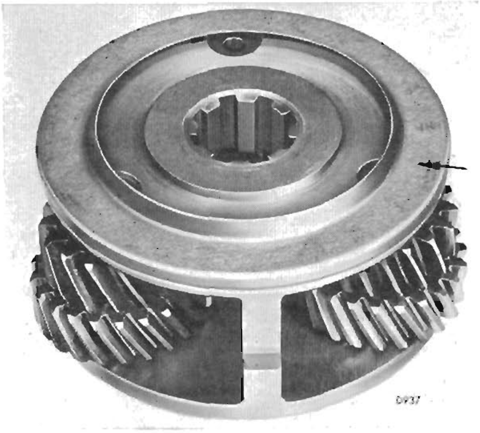


Fig. 17.
Planet carrier assembly and oil pick-up ring

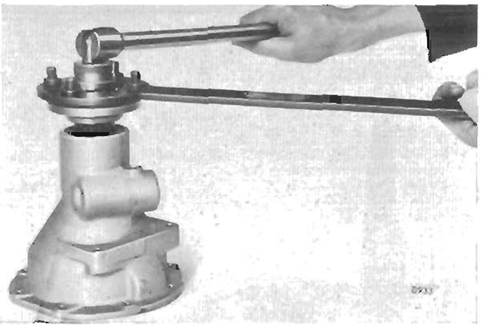


Fig. 18.
Removal of coupling flange nut

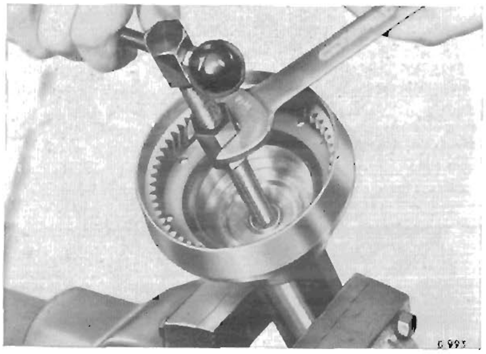


Fig. 19.
Removing needle bearing from annulus

Solenoid

Remove the cover plate (54), retained by four setscrews, blanking plug (32), and unscrew the adjusting nut. Unscrew the two solenoid retaining screws and remove the solenoid (52) and plunger (50).

Planet Carrier Assembly

Inspect the gear teeth for damage and wear and check for excessive movement indicating needle bearing or retaining pin wear.

If necessary, renew the complete carrier assembly (64).

Annulus, Removal from Rear Casing

Remove the speedometer bush locating screw (61) and, to avoid damage to threads, use tool L.214 to extract speedometer drive bush (58) and pinion (57) from the rear casing.

Remove the split pin (1) and nut (2) securing the coupling flange (4) and press the annulus forward out of the rear case (56). The rear bearing (76) and oil seal (77) will remain in situ while the front bearing (72), speedometer drive gear (73), distance piece (74) and spacer washer (75) will be withdrawn with the annulus.

Remove circlip (67) and brass oil thrower ring (68) and withdraw the uni-directional clutch from the annulus.

The needle bearing (5) in the centre of the annulus may be withdrawn using tool L.208 as follows:—

Withdraw the central bolt from the tool and locate the outer part of the tool inside the bearing, ensuring the four tangs register behind it. Insert the central bolt and screw against the annulus.

Tap out the oil seal and rear bearing from the rear casing.

RE-ASSEMBLY (Fig. 13)

Renew gaskets, "O" rings, seals and tab washers, as necessary, during re-assembly operations.

Operating Valve

Locate the operating valve (19) within its orifice in the front casing and check that its hemispherical end abuts the flat of the operating cam (48). Position the steel ball (18), plunger (17) and spring (16) and secure with blanking plug (15).

Relief Valve

Insert the relief valve plunger (46) in the relief valve body and locate the assembly within its orifice at the base of the front casing. Insert the spring (45), locating it on the boss of the plunger, and secure with the relief valve blanking plug (43).

Pump

Assemble the pump plunger (35), spring (36) and body (37) and locate the assembly within its orifice in the front casing, locating the flat of the plunger roller fork against the thrust button situated below the centre bush. Press the pump body home, using tool L.206A, until the annular groove in the pump body is in alignment with the locating screw orifice. Insert the dowelled locating screw and tighten, ensuring that the dowel locates in the groove.

Screw in the non-return valve body (38), using tool L.213, position the ball (39) and spring (40) in the body and fit the retaining plug, ensuring that the spring locates correctly in the plug recess.

Filter

Position the three magnetic rings (25) in the mouth of the filter (24) and the bonded steel/rubber sealing ring (26) in the filter housing with its steel face against the casing.

Locate the filter in its housing, open end against the rubber surface of the bonded washer, fit the cover plate (23) and secure with the four retaining setscrews. Fit the drain plug (34).

Operating Pistons

Replace the pistons with the open end of the piston bore facing forward, carefully easing the sealing rings into the cylinder bores.

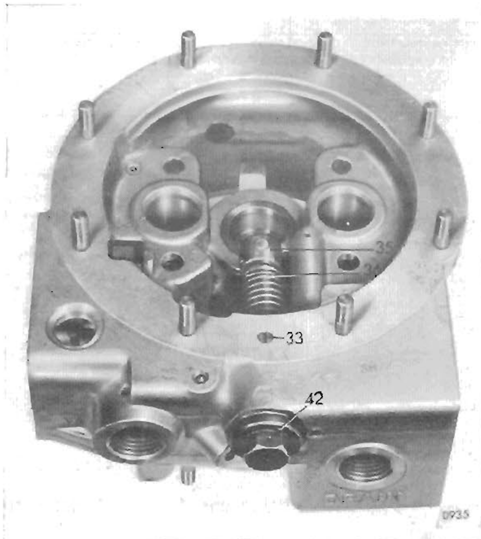


Fig. 20. View of front casing showing pump installed

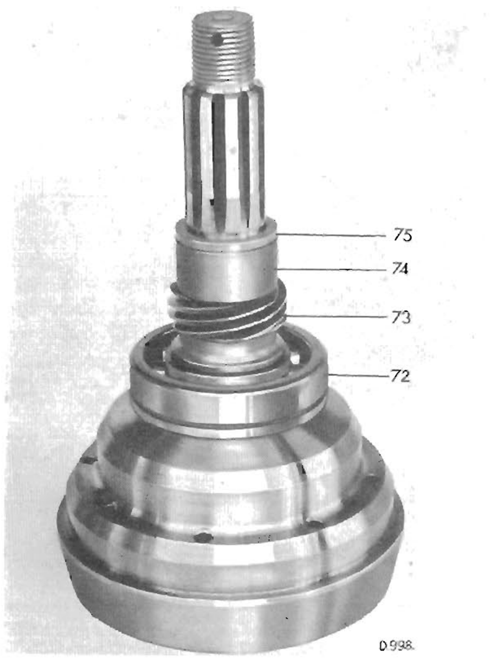


Fig. 21. Annulus prior to fitting to rear casing

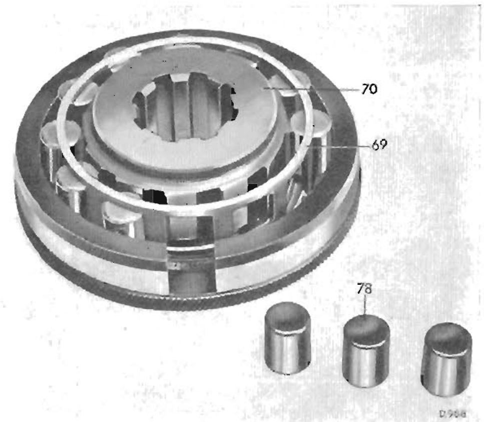


Fig. 22. Fitting rollers to uni-directional clutch

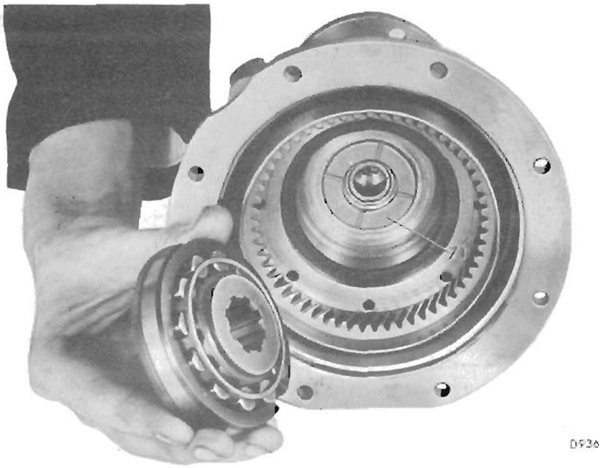


Fig. 23. Fitting uni-directional clutch to annulus

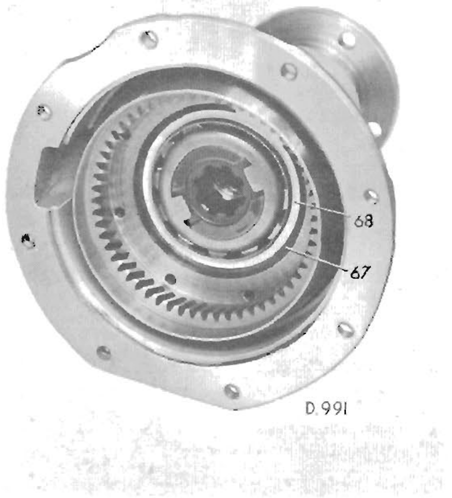


Fig. 24. Uni-directional clutch in position

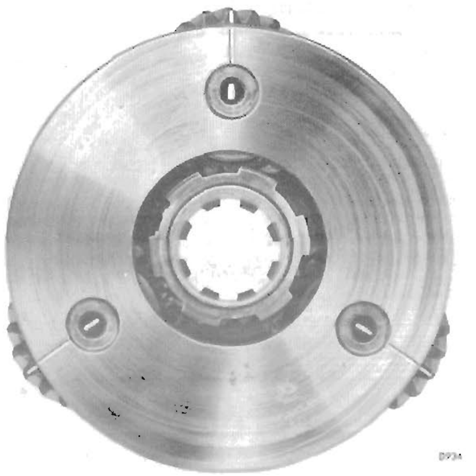


Fig. 25. Planet gear alignment

Annulus and Rear Casing

Locate the front bearing (72) over the annulus tail shaft and press into position against the locating shoulder at the rear of the annulus.

Position the speedometer drive gear (73), distance piece (74), and, if fitted, the spacing washer (75) on the tail shaft. Fit the assembly to the rear casing.

NOTE : Where new parts have been fitted, make a dimensional check between the distance piece and abutment shoulder for the rear bearing. Fit spacing washers, as required, to give a ·005" to ·010" (·1270 to ·254 mm.) end float between the rear bearing and the casing.

Press the rear bearing (76) on the tail shaft and into the rear casing simultaneously. Fit the oil seal (77) using tool L.212.

Press the rear coupling flange (4) on the tail shaft, locate the washer (3) and secure with nut (2) and split pin (1).

Insert the speedometer drive pinion (57) and bush (58) turning the annulus as necessary to engage the gear. Align the bush and casing holes and fit the dowelled locating screw (61).

Insert the needle bearing (5) in the centre of the annulus using Tool L.209.

Fit the spring (66) in the roller cage (69) of the uni-directional clutch, engaging one end in the cage. Insert the inner member (70), engaging the opposite end of the spring, and ensure that the slots of the inner member engage the tongues of the cage.

Place the assembly, front face down, in the assembly tool L.178 (Fig. 22) and fit the rollers. Check that the spring rotates the cage to drive the rollers up the inclined faces of the inner member.

Refit the thrust washer (71) and uni-directional clutch (Fig. 23) transferring the clutch direct from the assembly tool. Fit the brass oil thrower ring (68) and secure with circlip (67).

Planet Gears

Rotate the gears until the ETCHED lines on the gear and carrier coincide (Fig. 25). NOTE: On one of the three gears the etched line occurs on the same tooth as the centre pop mark. Insert the sungear and recheck the etched lines for alignment. Position the assembly within the annulus and remove the sungear.

Clutch Sliding Member

Press the thrust bearing (11) into the thrust ring and fit the four bolts ensuring the heads are correctly positioned. Press the assembly on the cone clutch hub and secure with circlip (13). Fit the retaining plate (12).

Insert the sungear (9) in the splined bore of the cone clutch and secure with circlip (14). Locate the assembly within the annulus and fit the four clutch return springs (29).

Front Case to Rear Case

Position the brake ring, both faces coated with suitable jointing compound, on the rear face of the front case, ensuring the kidney-shaped slot in the brake ring is located at the bottom (Fig. 26).

Fit the front casing to the rear casing. Clutch spring pressure will now be felt and it will be necessary to exert a slight pressure to bring the two casings together sufficiently to start the nuts. Tighten diametrically opposed nuts until the two faces meet.

Locate the bias springs (28) within the piston bores, fit the bridge pieces (27) and secure with nuts and tab washers.

Position the solenoid plunger (50) in the fork of the operating lever (49) and screw on the adjusting nut, replace the solenoid and secure with the two setscrews. Adjust as detailed on page 2·305 and, on completion, refit cover plate (54) and blanking plug (32).

Refitting Overdrive to Gearbox

Align the splines of the planet carrier and uni-directional clutch using a long screwdriver. Check the alignment by inserting dummy mainshaft (Tool No. L.201) (Fig. 27).

ROTATE THE GEARBOX MAINSHAFT AND POSITION THE PUMP OPERATING CAM WITH ITS HIGHEST POINT UPPERMOST. Engage first gear to retain this position. Check that the spring clip (7) is correctly located in its groove on the mainshaft and does not protrude above the splines.

NOTE : It is essential that rotation of gearbox mainshaft and overdrive coupling flange is avoided until the unit is fitted to the gearbox.

Remove the dummy mainshaft and fit the unit to the gearbox, secure with spring washers and nuts. Reconnect the solenoid cable.

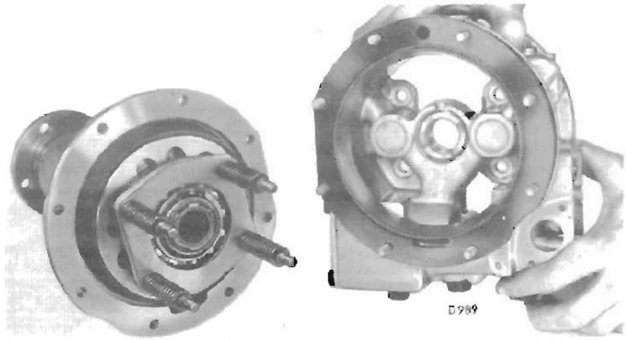


Fig. 26. Offering front case to rear case

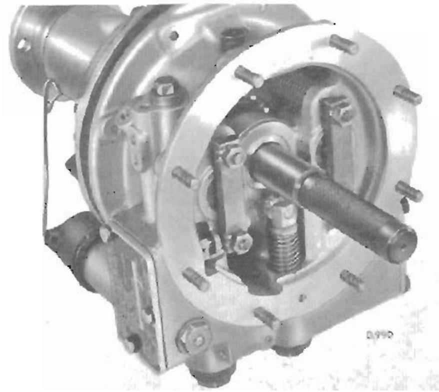


Fig. 27. Alignment check using Tool No. L201

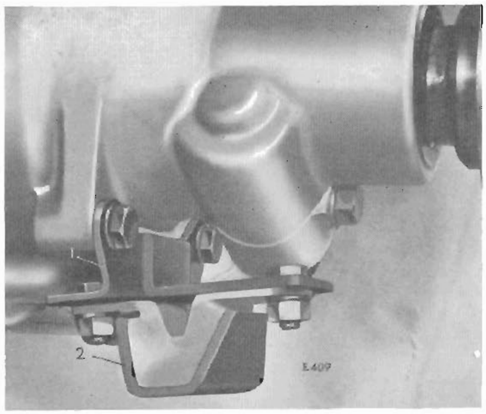


Fig. 28. Overdrive support bracket (1) and flexible mounting (2)

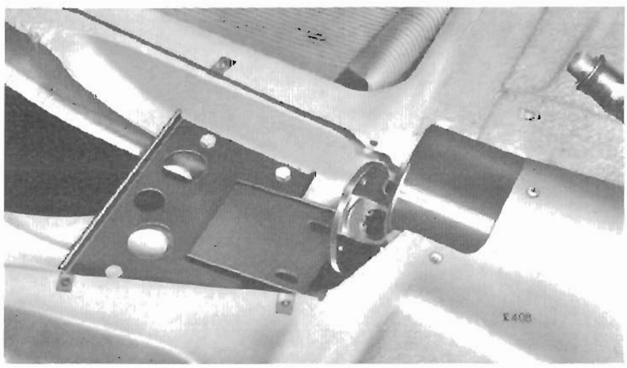
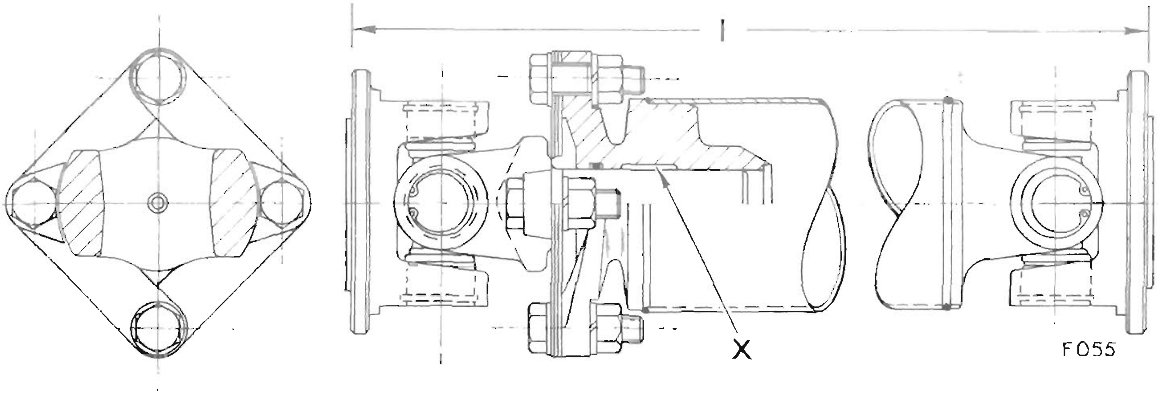


Fig. 29. Overdrive mounting platform



X — Grease as specified below

Fig. 1. Strap drive propeller shaft

VEHICLE AND STANDARD-TRIUMPH PART NUMBER	OVERALL LENGTH CLOSED— DIMENSION (1) ins.	cms.	EXTENSION— DIMENSION (2) ins.	cms.
Herald 1200 and 12/50 206275				
207410 (BRD)	50·250	127·64	Zero	
208033 (Hardy Spicer)	50·130	127·33		
212549 (BRD Strap drive) ..				
Vitesse 208942	47·110	119·66	1·68	4·27
(BRD Ordinary sliding spline) ..	46·990	119·35	1·58	4·02
Vitesse with overdrive 208338 ..	43·650	110·87	1·68	4·27
(BRD ordinary sliding spline) ..	43·530	110·57	1·58	4·02
Spitfire 210508 (Frictionless BRD)	41·375	105·09	0·50	1·27
Spitfire with overdrive 210985 (Frictionless BRD)	38·00	96·52	0·50	1·27

For lubricating the rollers in the bearing cups (3), Fig. 8, use Shell Dentax 250 or Retinax A, or equivalent. Lubricate at "X", Fig. 1, with this grease, when assembling.

For lubricating splines, sliding and frictionless, use Duckham's grease Grade No. Q5648 or Rocol Molytone 320, or equivalent.

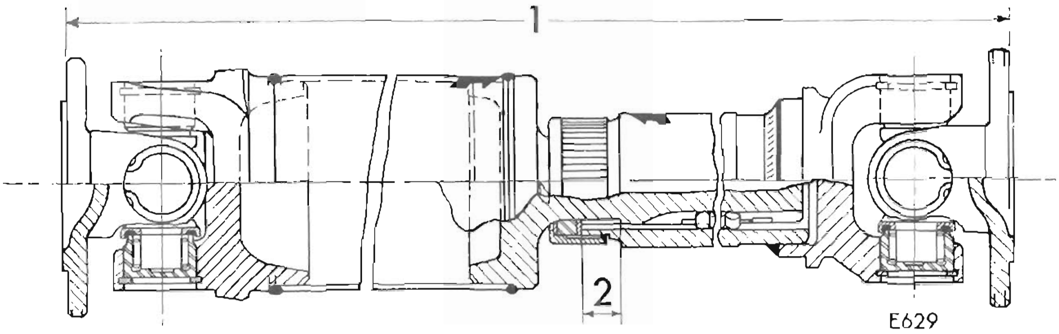


Fig. 2. Frictionless shaft sectioned

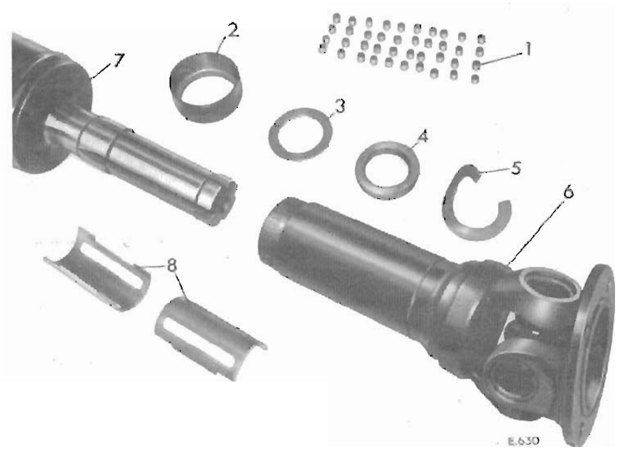


Fig. 3. Telescopic section exploded

Fig. 4. Arrangement of rollers

Key to Fig. 3

1	Rollers	5	Stop washer
2	Dust cap	6	Sliding yoke
3	Washer	7	Shaft
4	Felt ring	8	Restrainers

FRICTIONLESS PROPELLER SHAFT

Dismantling

Unscrew the dust cap (2), carefully slide off the yoke (6), collect forty rollers (1) and remove the restrainers (8). Remove the split stop washer (5), felt sealing ring (4), washer (3) and dust cap (2).

Assembling

Fit the dust cap (2) and the washer (3). Before fitting the new felt sealing ring (4), soak it in clean engine oil. Fit the split washer (5), and use pliers to make it flat again.

Fill the four grooves along the shaft (7) with the grease specified on page 2·401. Fit the roller end-travel restrainers (8), and through their slots stick ten rollers into each groove as shown in Fig. 4.

Align the arrows on the shaft (7) and the yoke (6) so that the front and rear yokes are in the same plane. Very carefully slide on the yoke (6), ensuring that all rollers remain correctly positioned within the restrainer slots. Screw the dust cap (2) securely on to the yoke (6).

See page 2·403 for universal joint servicing.

PROPELLER SHAFT

Herald 1200 and 12/50 models are fitted with propeller shafts having a needle bearing universal joint at each end and no telescopic section, whilst propeller shafts fitted to Vitesse and Spitfire models incorporate a telescopic section at the front end.

To Remove

Raise the vehicle on stands or a ramp.

Remove the carpet and gearbox cover as described on page 2·205.

Remove the bolts and nyloc nuts securing the propeller shaft flanges to the gearbox and rear axle unit.

Detach the propeller shaft.

On Herald and Spitfire models, it may be necessary to lever the engine/gearbox unit forward to disengage the propeller shaft from the gearbox and axle driving flanges.

To Refit

Reverse the removal procedure, using new nyloc nuts if the original nuts can be screwed on to the bolts with finger pressure.

To Dismantle

Universal Joints (Fig. 8)

Individual parts of the needle roller bearing assemblies should not be renewed. If necessary, fit a new set of bearing parts, comprising:—

Spider, oil seals, retainers, needle bearing assemblies and retaining rings.

Remove the circlips (2). If the circlips cannot readily be removed from the yokes, remove paint from the holes and tap the end of the bearing cup, thus relieving pressure on the circlip.

Support the forked end of the shaft as shown (Fig. 6) and by striking the flange with a soft mallet, drive out the needle bearing cap until it is sufficiently exposed to be removed with a pair of grips. Reverse the shaft and extract the opposite cup in a similar manner.
Remove the seals (4, Fig. 8).

Support the two exposed trunnions of the spider on wooden blocks (Fig. 7) and, by striking the radiused portion of the forked end of the shaft, drive out the needle bearing cup until it is sufficiently exposed to be removed. Repeat the operations to remove the remaining cup. Remove the spider from the forked end of the shaft.

Dismantle the universal joint at the opposite end in a similar manner.

Fig. 5. Removing a circlip

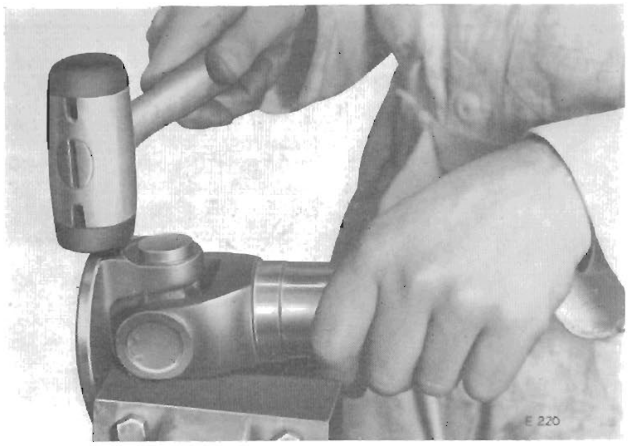


Fig. 6. Removing a bearing cup from the flange

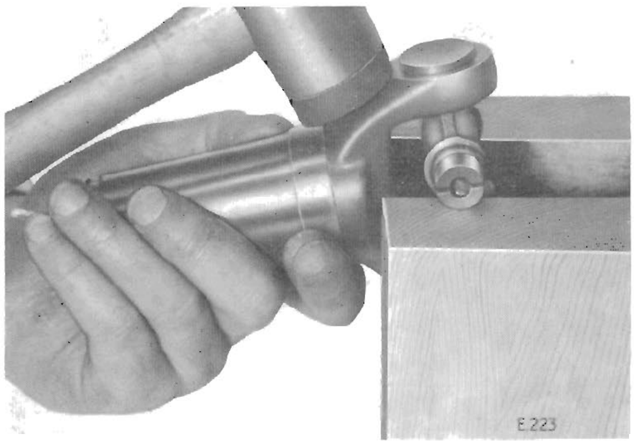
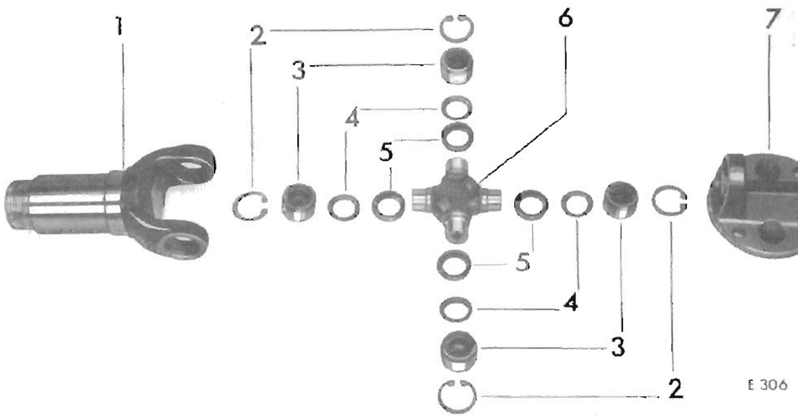


Fig. 7. Removing a bearing cup from the shaft



1 Sliding yoke
2 Circlips
3 Bearing cups
4 Seals
5 Retainers
6 Spider
7 Flange

Fig. 8. Universal coupling details

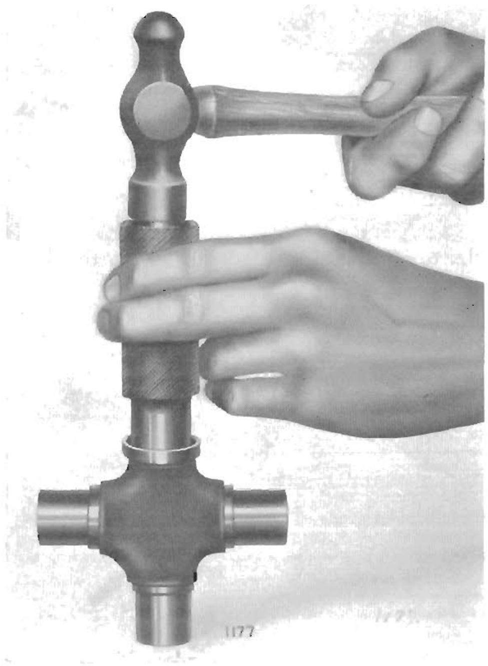


Fig. 9. Fitting spider journal seal retainer

To Re-assemble

Apply jointing compound to the journal shoulders on the new spider. Fit the oil seal retainers over the trunnions using a tubular drift (Fig. 9).

Smear the spider journals and the seal retainers with the grease recommended on page 2·401. Coat the inside of the races with this grease to retain the needle rollers, then one-third fill with grease.

Fit the oil seals.

Insert the spider into the flange yoke, ensuring that **the lubricator boss is fitted away from the yoke.** Using a soft-nosed drift, about $\frac{1}{32}$ in. (·8 mm.) smaller in diameter than the hole in the yoke, tap the bearing into position. It is essential that the bearing races are a light drive fit in the yoke trunnions.

Repeat this operation with the remaining bearings and retain them with the circlips (2).

Re-assemble the opposite end universal joint by repeating the above procedure.

TRIUMPH

HERALD 1200, 12/50, VITESSE
AND
SPITFIRE

WORKSHOP MANUAL

GROUP 3

Comprising:

TRIUMPH
HERALD 1200, 12/50, VITESSE
and
SPITFIRE MODELS

GROUP 3

CONTENTS

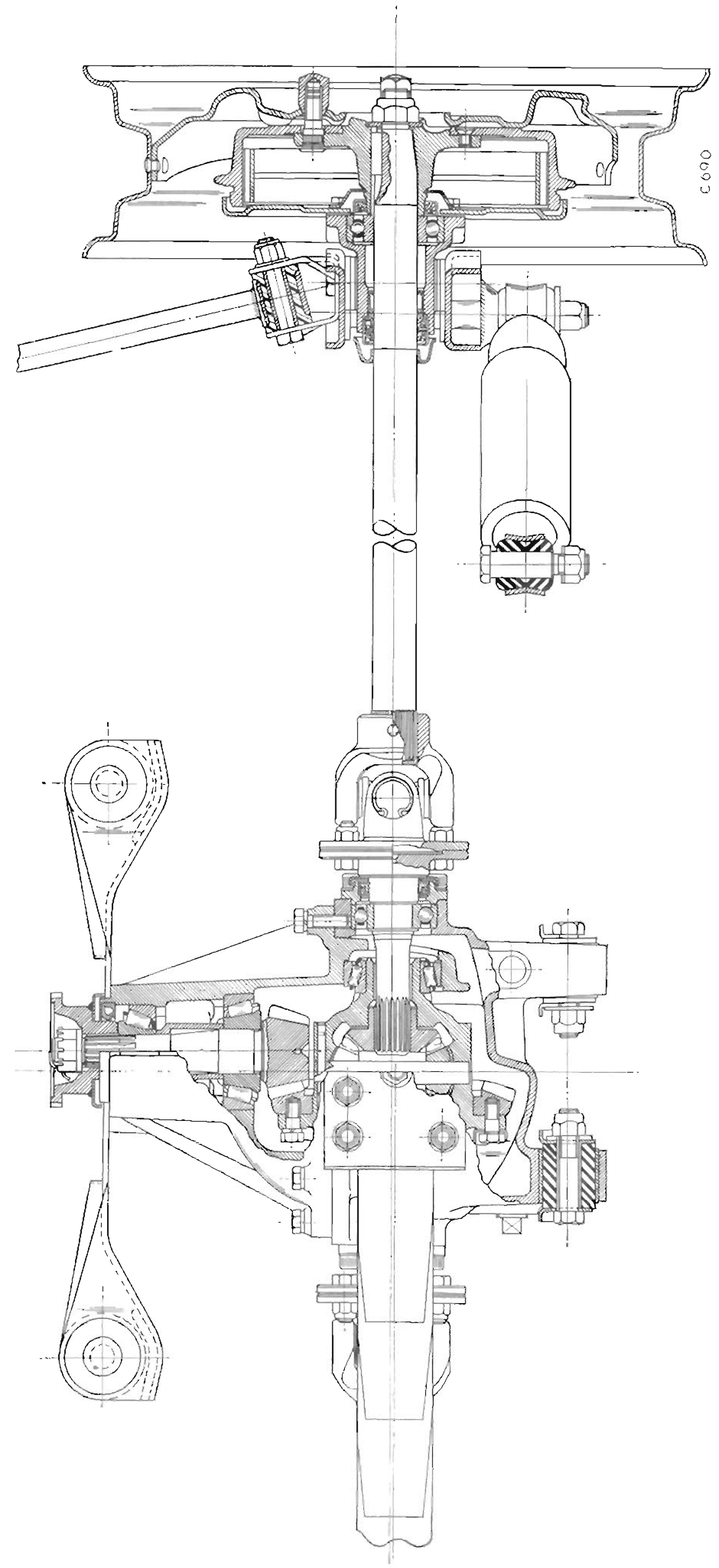


Fig. 1. Rear Axle Arrangement

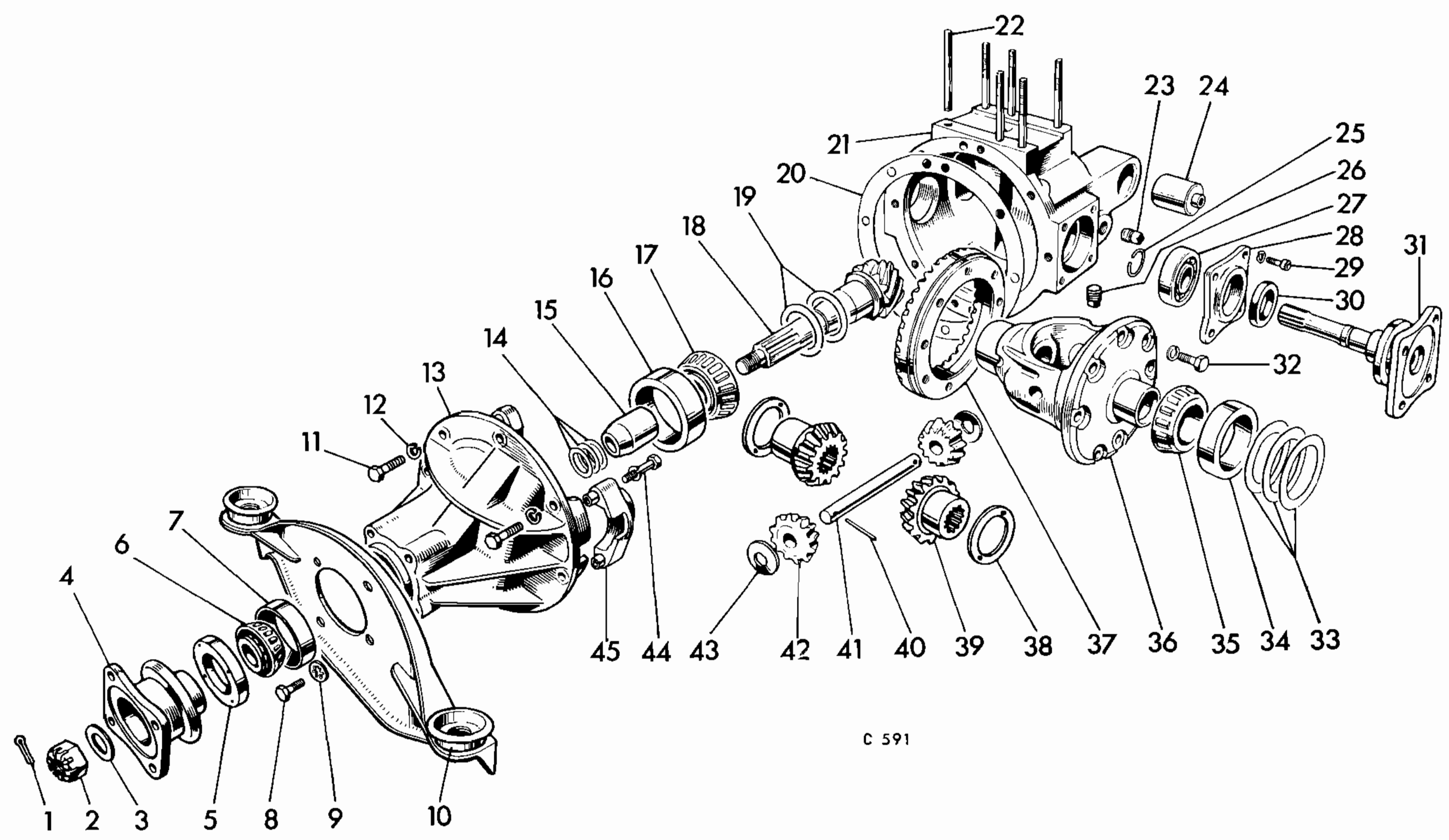


Fig. 2. Exploded differential unit

Key to Fig. 2

1	Split pin	24	Metalastik bush
2	Slotted nut	25	Circlip
3	Plain washer	26	Drain plug
4	Propeller shaft flange	27	Ball race
5	Oil seal	28	Seal housing plate
6	Pinion tail bearing	29	Bolt
7	Pinion tail bearing outer ring	30	Oil seal
8	Bolt	31	Inner axle shaft
9	Lock washer	32	Bolt
10	Front mounting plate	33	Shims
11	Bolt	34	Bearing outer ring
12	Washer	35	Tapered bearing
13	Hypoid housing	36	Differential carrier
14	Shims	37	Crown wheel
15	Spacer	38	Thrust washer
16	Pinion head bearing outer ring	39	Sun gear
17	Pinion head bearing	40	Cross shaft lock pin
18	Pinion	41	Cross shaft
19	Shims	42	Planet gear
20	Gasket	43	Thrust washer
21	Hypoid casing	44	Cap bolt
22	Studs	45	Bearing cap
23	Oil level plug		

REAR AXLE — DIMENSIONS AND TOLERANCES

PARTS AND DESCRIPTION	DIMENSIONS WHEN NEW		CLEARANCES WHEN NEW		REMARKS
Axle Ratio	4·1 : 1				
Track	4 ft. (122 cms.)				
Crown Wheel	ins.	mm.	ins.	mm.	
Number of teeth	37				
Locating diameter	3·6875	93·662	0·0010	0·0254	Diameter of location on carrier
	3·6885	93·687	0·0030	0·0762	3·6855"/3·6865" (90·012/90·037 mm.).
Maximum permissible run-out	·003	·0762			When bolted to differential carrier.
Pinion					
Number of teeth	9				
Diameter of journal—					
for pinion head bearing	1·0006	25·415			Bearing press-fit. Interference of
	1·0011	25·428			0·0011"/0·0000" (0·028/0·0000 mm.).
for pinion tail bearing	0·7504	19·06			Bearing light drive fit. Limits allow
	0·7509	19·073			clearance of 0·0002" to interference of 0·0009" (0·005 to 0·0229 mm.).
Spline diameters—Maximum	0·719	18·263			
	0·728	18·491			
—Minimum	0·6424	16·317			Driving flange locating diameter.
	0·6439	16·355			
Thread dimensions	$\frac{7}{16}$" × 18 t.p.i.— U.N.F.				
Hypoid Housing	ins.	mm.	ins.	mm.	
Internal diameter for :—					
Pinion head bearing outer ring	2·6860	68·2244			Ring is press fit in bore. Interference
	2·6870	68·2498			of 0·0005"/0·0021" (0·0127/0·0280 mm).
Pinion tail bearing outer ring	2·1235	53·937			Ring is press fit in bore. Interference of
	2·1245	53·962			0·0005"/0·0021" (0·0127/0·0280 mm.).
Differential bearing outer rings	2·4408	61·996			With bearing caps tightened, limits
	2·4418	62·022			allow clearance of 0·0008" (0·0203 mm.) to interference of 0·0008" (0·0203 mm.)
Width between differential bearing outer ring abutments	5·120	130·048			
	5·128	130·251			
Maximum spreading load for entry of assembled differential unit	3360 lbs. (1524 kg.)				
Inner Axle Shafts	ins.	mm.	ins.	mm.	
Bearing journal diameter	0·8754	22·215			Bearing press fit. Interference of
	0·8759	22·228			0·0002" (0·005 mm.) to 0·0011" (0·028 mm.).
Number of serrations	18				
External diameter of serrations	0·7877	20·007			
	0·7917	20·109			
Oil seal journal diameter	1·130	28·702			
	1·135	28·829			
Outer Axle Shafts	ins.	mm.			
Shaft length	18·53	470·662			
Shaft end to centre line of universal coupling	0·880	22·352			
Number of serrations	24				

REAR AXLE — DIMENSIONS AND TOLERANCES — continued

PARTS AND DESCRIPTION	DIMENSIONS WHEN NEW		CLEARANCES WHEN NEW		REMARKS
Outer Axle Shafts—continued	ins.	mm.	ins.	mm.	
External diameter of serrations	1·0377 1·0417	26·347 26·459			
Mills Pin—Type	G.P.3				
—Length	1·63	41·402			
Keyway width	0·1865 0·1875	4·7371 4·7625			
Driving key dimensions					
Pinion Setting Dimensions					
Distance from head bearing abutment face on pinion to centre of crown wheel bearings.	3·000	76·2			
Pinion centre-line 'offset' below crown wheel centre-line	0·7495 0·7505	19·037 19·063			
Pinion bearing pre-load (without oil seal)	12-16 lbs/in. (0·0138/ 0·0185 mkg.)				
Backlash between pinion and crown wheel	ins. 0·004 0·006	mm. 0·1016 0·1524			Controlled by shims fitted between differential bearings and axle casing.
Differential Unit					
Differential sun gear—					
Number of teeth	16				
Journal diameter	1·1235 1·1243	28·537 28·557	0·0017 0·0045	0·043 0·114	Clearance of gear in case.
Number of internal serrations	18				
Internal diameter	0·725 0·729	18·415 18·517			
Thrust washer thickness	0·0345 0·0375	0·8765 0·9525			
Differential planet gear—					
Number of teeth	10				
Internal diameter	0·5000 0·5015	12·7 12·738	0·0005 0·0025	0·013 0·064	Clearance of crosspin in gear.
Thrust washer thickness	0·036 0·056	0·9144 1·4224			Thrust washers available in 0·004" (0·1016 mm.) steps.
Backlash between any two pairs of gears	0·000 0·016	0·0 0·406			
Hubs (rear)					
Inner hub assembly—Internal dia. for :—					
Needle roller bearing	1·2500 1·2510	31·750 31·775	0·0005 0·0015	0·0127 0·0381	Bearing in hub.
Hub bearing outer ring and outer grease seal	2·2493 2·2499	57·132 57·147			
Inner grease seal	1·4990 1·5000	38·075 38·100			
Diameter of hub bearing outer ring	2·2490 2·2495	57·1246 57·1373			Limits allow clearance of 0·0009" (0·0229 mm.) to interference of 0·0002" (0·0051 mm.), bearing in hub.
External diameter of needle roller bearing	1·2495	31·7373			
Dimensions from face of needle roller bearing to inner face of hub	0·5000	12·700			

HUB AND OUTER AXLE SHAFT ASSEMBLY

Removal

1. Jack up the rear of the vehicle, support it on chassis stands and remove the nave plate, wheel nuts and road wheel.
2. Disconnect the flexible brake hose (7) from the chassis bracket (6) and steel pipe (5).
3. Disconnect the handbrake cable from the handbrake lever (9).
4. Using a jack to relieve the damper of load, remove the bolt to release the radius arm (8).
5. Remove four bolts (10) to release the axle shaft coupling flange.
6. Remove the nyloc nut (1) and washer (2) from the damper lower attachment eye, slacken the upper nut (4) and pull the bottom of the damper clear of its mounting pin.
7. Remove the jack from beneath the vertical link plates and whilst supporting the brake assembly by hand, remove the bolt (3) from the road spring eye.
8. Withdraw the hub and outer axle shaft assembly from the vehicle.

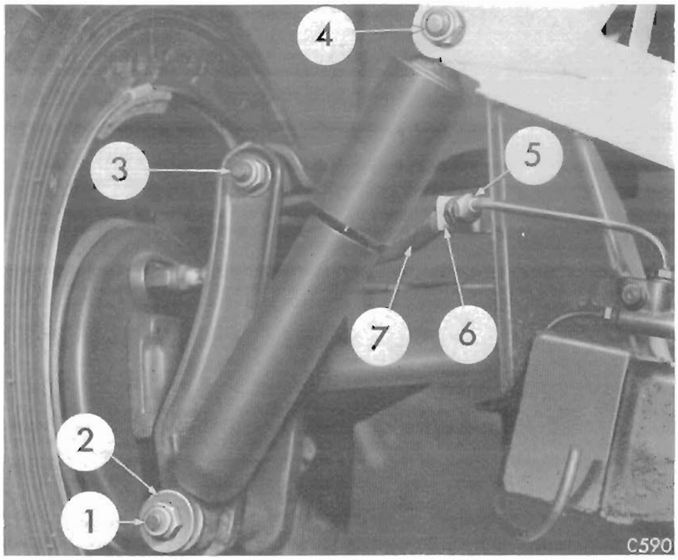


Fig 3. Rear damper attachment

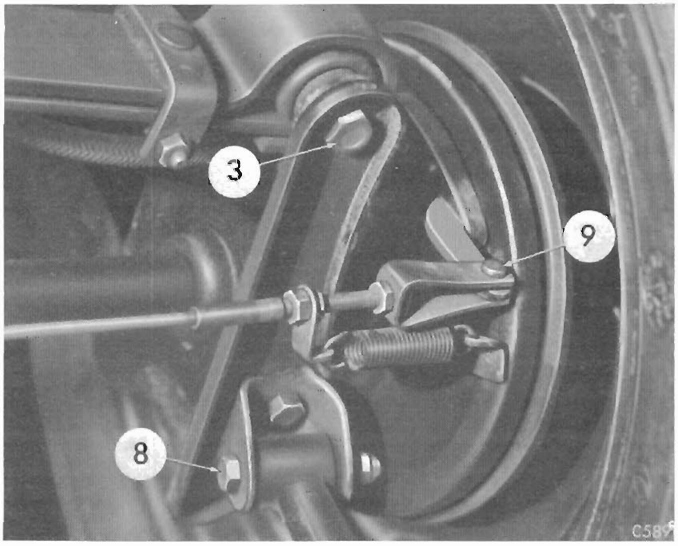


Fig. 4. Handbrake connection to brake lever

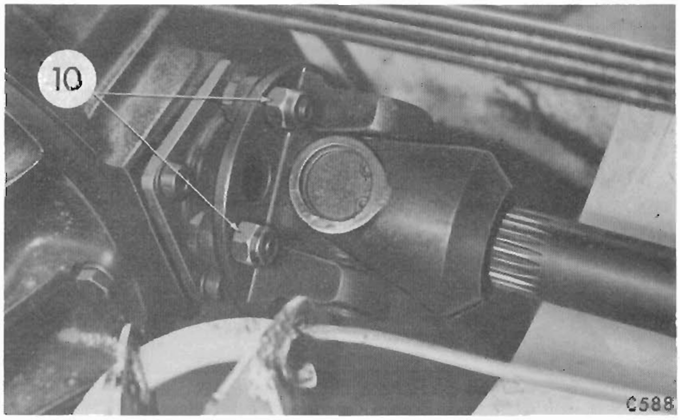
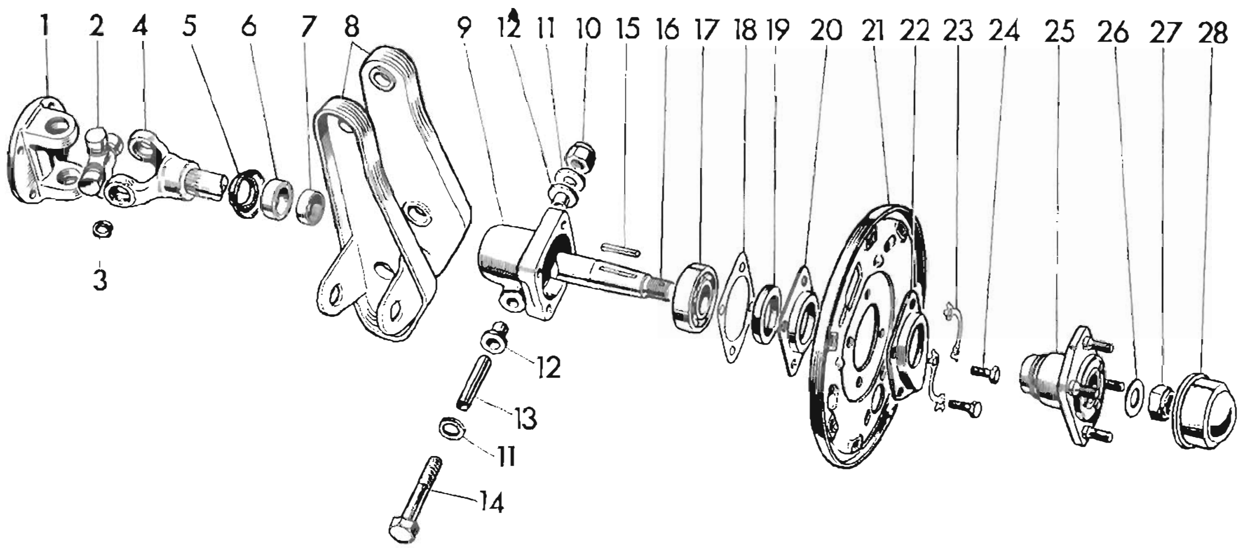


Fig. 5. Axle shaft coupling



1	Inner yoke	10	Nyloc nut	20	Outer seal housing
2	Needle roller and spider assembly	11	Rubber seal	21	Brake backing plate
3	Circlip	12	Nylon bush	22	Grease trap
4	Outer axle shaft yoke	13	Steel bush	23	Lockplate
5	Flinger	14	Bolt	24	Bolt
6	Inner oil seal	15	Hub driving key	25	Hub
7	Needle roller bearing	16	Axle shaft	26	Plain washer
8	Vertical link	17	Ball race	27	Nyloc nut
9	Trunnion housing	18	Paper joint	28	Hub cap
		19	Outer oil seal		

Fig. 6. Exploded arrangement of outer axle shaft components

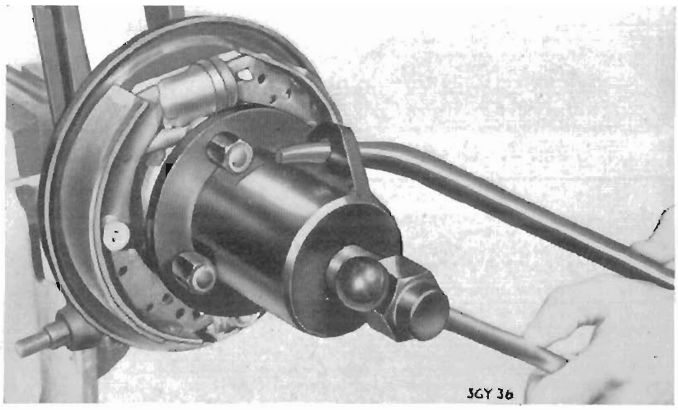


Fig. 7. Using Churchill extractor No. S109 to remove rear hub

Outer Axle Shaft (Fig. 6)

To Dismantle

1. Remove the countersunk screws and detach the brake drums.
2. Remove the hub cap (28), hub nut (27), plain washer (26) and extract the hub (25) and key (15).
3. Remove the nyloc nut (10) and withdraw the bolt (14). Detach the vertical link (8) from the trunnion, remove the rubber rings (11) and steel bush (13) from the nylon inserts in the trunnion.
4. Release the lock plates (23), withdraw four setscrews (24) and remove the grease trap (22), brake backing plate (21), seal housing (20) and joint (18). Remove the oil seal (19) from its housing.
5. Remove the ball race (17), trunnion housing (9) and flinger (5) together, using Churchill tool No. S.4221A with adaptors S.4221A/14.
6. Drift out the inner oil seal (6) and needle roller bearing (7) from the trunnion.

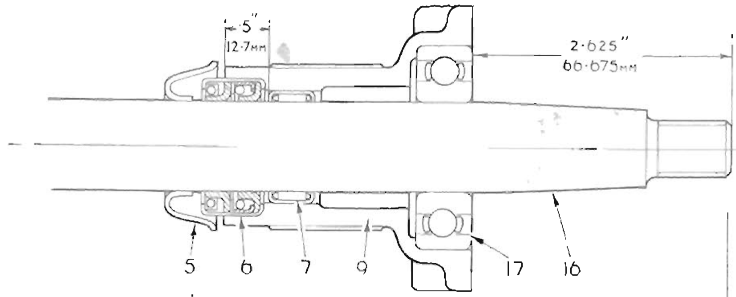


Fig. 8. Section through rear hub

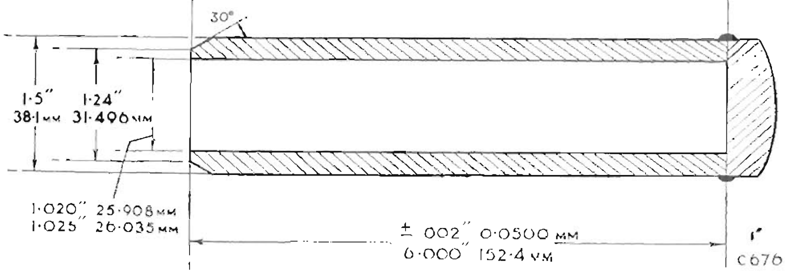


Fig. 9. Details of tool for drifting the flinger into position

Re-assembly

1. Fit the needle roller bearing (7) into the trunnion (9), pressing on the lettered end, to a depth of 0·5" (12·7 mm.) from the trunnion face.
2. With the sealing lips trailing, drift the inner oil seal (6) into the trunnion (9).
3. Drive the flinger (5) on to the axle shaft as shown on Fig. 8.
4. Pack the needle rollers with grease and pass the axle shaft through the trunnion, taking care not to damage the inner oil seal.
5. Secure the axle shaft in the protected jaws of a vice, pack the ball race with grease and drift it on to the shaft as shown on Fig. 11.
6. With the sealing lip trailing, press a new seal (19) into the seal housing (20). Coat a new paper joint (18) with grease, position it on the trunnion outer face, and assemble the seal housing, brake back plate assembly (21) (with wheel cylinder at the top) and grease trap (22) (with duct to bottom). Secure the assembly with bolts (24) and new lockplates (23).
7. Insert the key (15) into its keyway in the axle shaft and, ensuring that the tapers are clean, fit the hub (25) and secure it with a plain washer (26) and nyloc nut (27).
8. Secure the brake drums with the countersunk screws and refit the hub cap (28).
9. Complete the trunnion assembly by fitting the nylon bushes (12), steel sleeve (13), rubber seals (11) and vertical link (8).

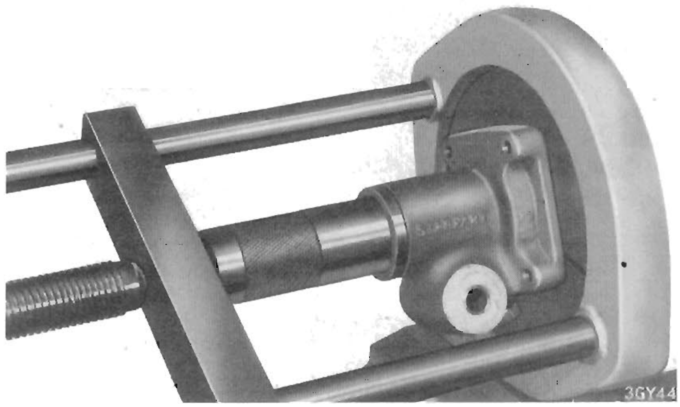


Fig. 10. Using Churchill tool S300 (with stop ring) to press the needle bearing into the trunnion

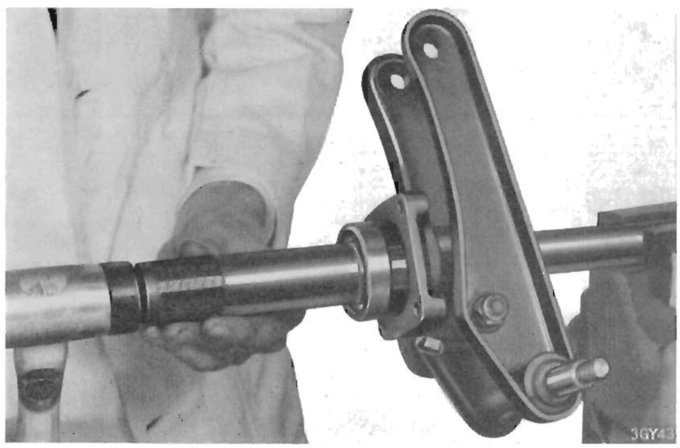


Fig. 11. Using Churchill driver S4221A/6 to drift the ball race on to the shaft

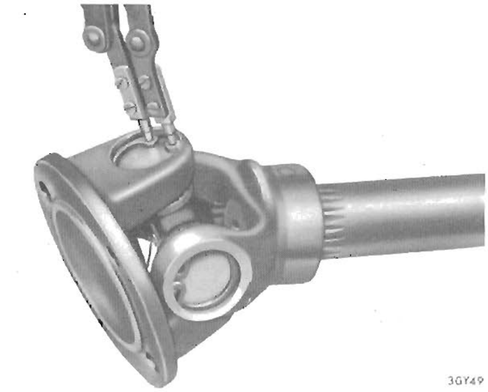


Fig. 12
Removing circlips

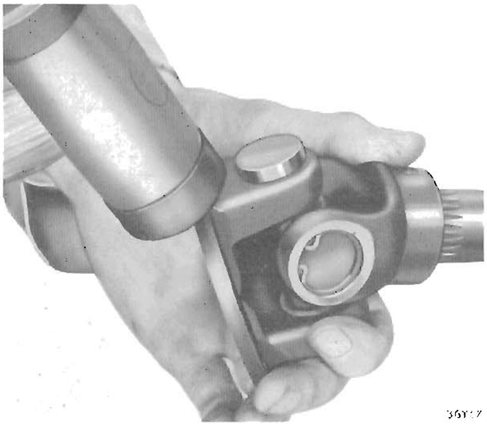


Fig. 13
Tapping cap from flange yoke

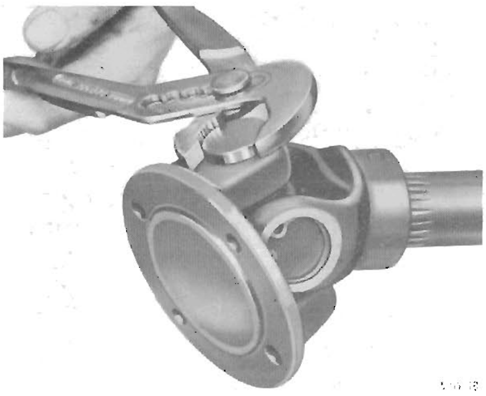


Fig. 14
Using grips to remove needle roller cup

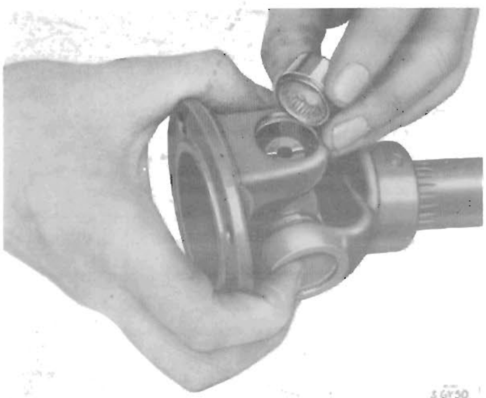


Fig. 15
Fitting cup and needle rollers

OUTER AXLE SHAFT COUPLINGS

Inspection

Jack up the rear of the car and support it on chassis stands. Remove the nave plates and road wheels.

Place a trolley jack under the vertical link and raise it until the assembly assumes its normal operating position.

Remove the bolts securing the coupling to the inner axle shaft. Taking care not to damage the flange faces, lever the flanges apart, easing the vertical link outwards on the jack.

Holding the axle shaft firmly, move the flange yoke axially along the spider journals. If end float exists, renew the spider and cup assemblies. This will necessitate removal of the outer axle shaft assembly as described on page 3·105.

Repeat the inspection procedure on the other axle shaft coupling.

Dismantling (Fig. 16)

1. Secure the axle shaft in a vice and remove the circlips (7) retaining the roller cups (6).
2. Support the flange yoke and tap it with a hide-faced mallet (Fig. 13) to partially eject the cup from the yoke, when it may be completely withdrawn by the use of grips (Fig. 14). Repeat the operation with the opposite cup.
3. Detach the flange yoke from the spider and, by repeating operation 2, remove the spider from the outer yoke. A tight cup may be removed by gripping it in the jaws of a vice and tapping the yoke with a hide-faced mallet.

Replacement of Parts

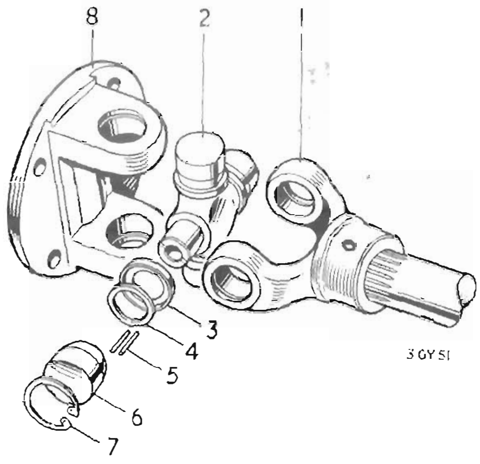
The needle rollers, cups, spiders, seals and circlips are supplied only as a complete package. The occurance of wear in the bores of a universal joint yoke will necessitate its removal. The outer yoke is attached to the axle shaft and can only be obtained as an assembly.

Re-assembly

1. Manoeuvre the spider (2) into the outer yoke (1) and, using a hide-faced mallet, drive the cups squarely into the yoke, ensuring that the needle rollers engage with the spider journals. Repeat with the flange yoke.
2. Secure the cups in the yokes by inserting the circlips in their grooves.

Refitting (Fig. 17)

1. Assemble the vertical link to the road spring eye, leaving the nyloc nut semi-tight at this stage.
2. Carefully jack up the vertical link plate and secure the extended damper to its lower attachment (5).
3. Re-attach the radius arm to the vertical link bracket (1).
4. Secure the outer axle shaft to the flange of the inner axle shaft (3) and remove the jack.
5. Load the vehicle to a "Static Laden" condition and tighten the nyloc nut securing the vertical link to the road spring.
6. Re-connect the handbrake cable to the handbrake lever (2).
7. Re-connect the flexible brake pipe to the chassis bracket and steel pipe.
8. Adjust and bleed the brake system.
9. Fit the road wheel and wheel nuts.



1	Yoke	5	Needle rollers
2	Spider assembly	6	Needle roller cup
3	Steel cup	7	Circlip
4	Cork seal	8	Flange yoke

Fig. 16. Exploded universal joint assembly

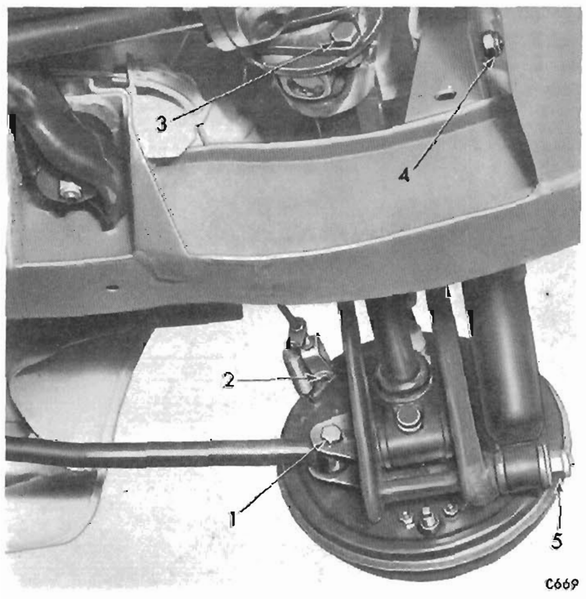


Fig. 17. Outer axle shaft assembly

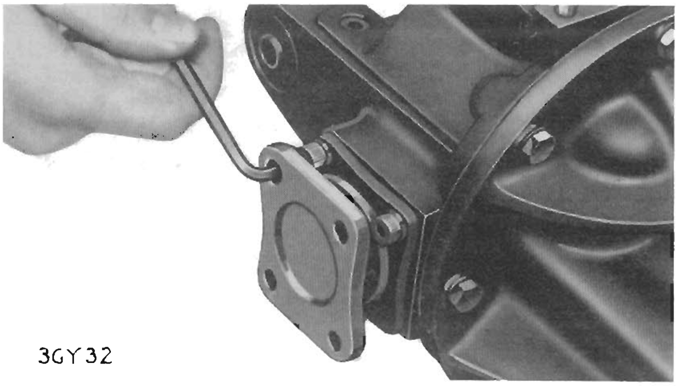


Fig. 18. Using an Allen key to remove the screws securing the inner axle shaft

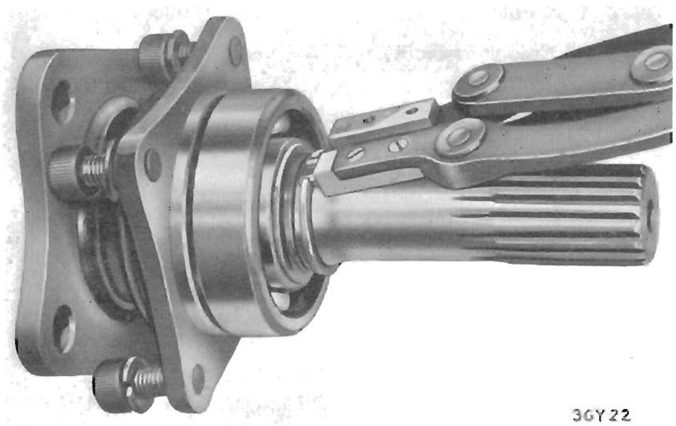


Fig. 19. Removing circlips

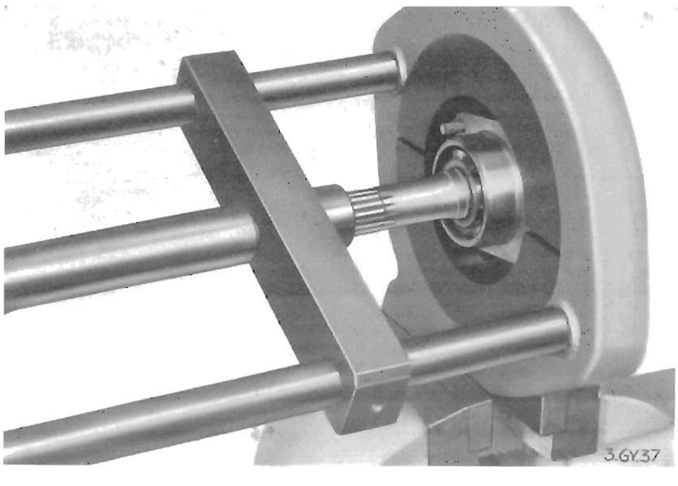


Fig. 20. Using Churchill press and adaptor set S4221A-7 to press the inner axle shaft from the bearing

INNER AXLE SHAFT AND BEARING ASSEMBLIES (Figs. 2 and 21)

Removing Inner Axle Shafts

1. Remove the hub and outer axle shaft assembly, as described on page 3·105.
2. Drain rear axle oil.
3. Align a hole in the axle shaft flange with each of the seal housing plate retaining screws; then, utilizing a $\frac{3}{16}$" (4·763 mm.) Allen key, as shown on Fig. 18, unscrew the Allen screws from the hypoid casing. With the exception of Vitesse models, the screws cannot be completely withdrawn.
4. Withdraw the inner axle shaft assembly.

Dismantling Inner Axle Shaft Assembly

1. Remove the circlip (25) and, using a Churchill Press and Adapter Set No. S4221A-7, insert the split ring, S4221A-7/1, between the Allen screw heads and the back of the driving flange. Withdraw the race from the inner axle shaft, as shown on Fig. 20.
2. Detach the seal housing plate (28) and drive the oil seal (30) from its housing.

Re-assembly

1. With the lip of the seal leading, drive a new seal into the housing plate (28).
2. With the sealing lip trailing, slide the housing on to the inner axle shaft, taking care not to damage the seal as it passes over the serrations.
3. Insert the four Allen screws and spring washers through the holes in the seal housing plate.
4. Press the ball race on to the axle shaft, as shown on Fig. 22.
5. Fit the circlip (25) to the inner axle shaft groove.

Refitting

1. Insert the inner axle shaft into the hypoid housing and secure it by tightening the Allen screws.
2. Refill the hypoid housing with oil and re-connect the outer axle shaft.

PINION OIL SEAL

To Replace (Fig. 2)

1. Drain the hypoid unit, disconnect the rear end of the propeller shaft and remove the driving flange.
2. Lever out the old oil seal (5) and drive a new one into position.
3. Refit and secure the pinion shaft flange (4) and reconnect the propeller shaft.
4. Replenish the hypoid unit.

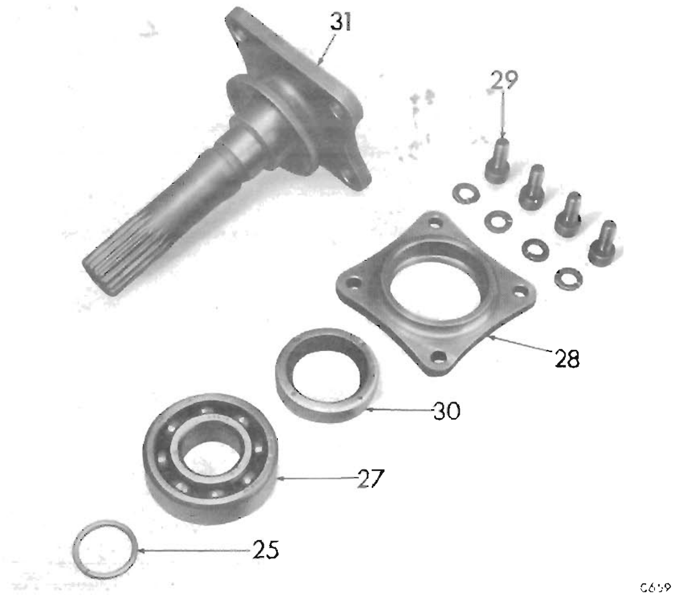


Fig. 21. Dismantled inner axle shaft assembly

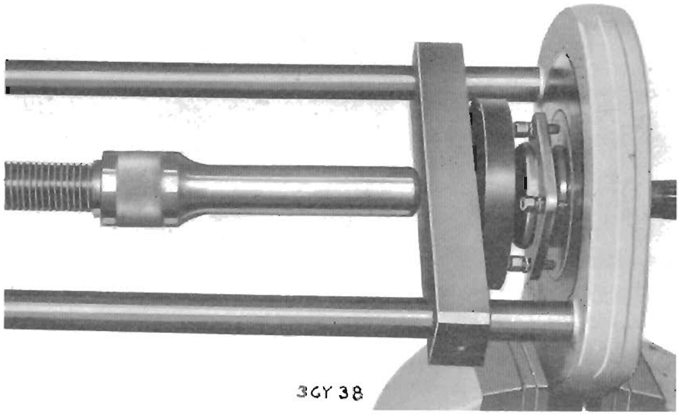


Fig. 22. Pressing the inner axle shaft through the bearing and housing

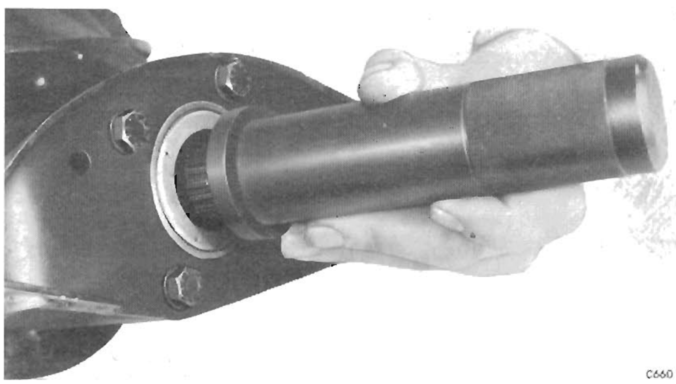


Fig. 23. Using a drift to drive a new seal into position

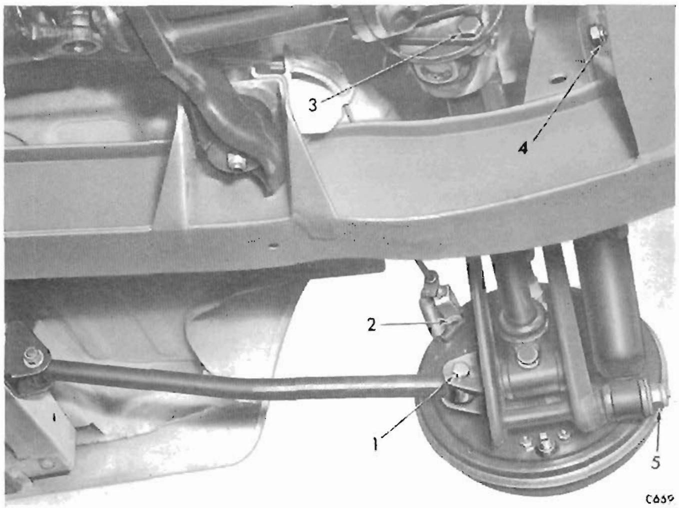


Fig. 24. Axle shaft attachments

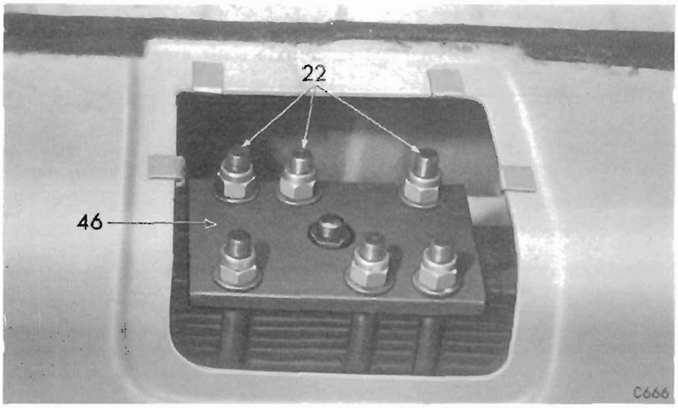


Fig. 25. Cover removed to show rear road spring attachment

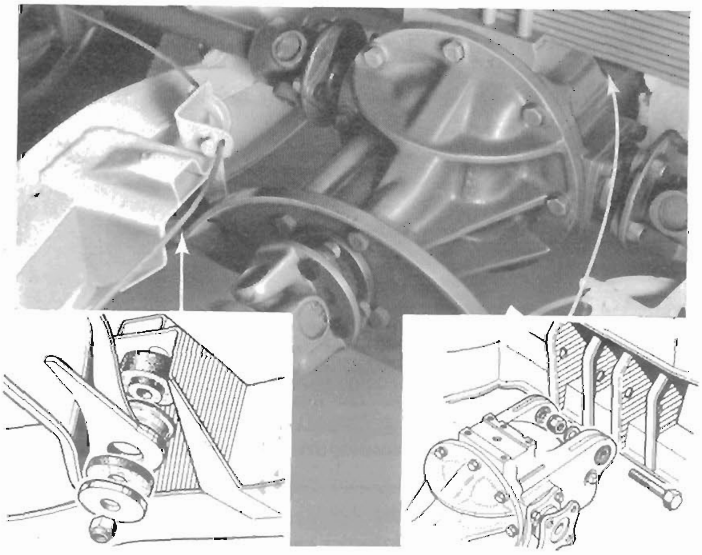


Fig. 26. Differential unit attachments

HYPOID UNIT

To Remove from Vehicle

1. Jack up the rear of the vehicle, place on stands and drain the hypoid unit.
2. Remove the nave plates, wheel trims, road wheels and disconnect the brake hose.
3. Support the vertical link with a screw jack to relieve the damper of spring load.
4. Remove the nyloc nut and washer from the damper lower attachment eye, slacken the upper nut and pull the bottom of the damper clear of its mounting pin.
5. Release both rear exhaust pipe mountings and the rear end of the propeller shaft. Disconnect the inner shaft coupling.
   Remove the screw jack from the vertical link.
6. Repeat operations 1 to 5 on the opposite side of the vehicle.
7. Raise the boot lid, turn back the floor covering and remove the spring access plate from the floor.
8. Release the spring retaining plate (46) and remove the three rear studs (22) from the axle casing.
9. With an assistant taking the weight of the hypoid unit, release the front mounting by removing the nyloc nuts, large plain washers and rubber bushes.
   Release the rear attachment by removing the nyloc nuts, plain washers and withdrawing the bolts. Manoeuvre the hypoid unit forward and down from beneath the vehicle.

To Refit

1. Offer up the hypoid unit to its rear mounting points and fit the two bolts through the rear mounting lugs.
2. Fit the front rubber bushes, ensuring that the upper ones spigot into the corresponding holes in the front mounting plate. Fit the plain washers and tighten the nyloc nuts.
3. Refit the three rear spring attachment studs (22), the spring plate (46), plain washers and tighten the nyloc nuts.
4. Jack up each vertical link and connect the axle shaft couplings.
5. Refit the dampers and tighten the attachments.
6. Reconnect the propeller shaft and the two rear exhaust pipe mountings.
7. Replenish the unit with oil, refit the brake hoses, adjust the brakes and bleed the hydraulic system.
8. Refit the road wheels, remove the jack stands, tighten the wheel nuts and refit nave plates.

DIFFERENTIAL UNIT (Fig. 2)

General Recommendations

Scrape existing joint material from the joint faces and clean the axle components, preferably in a trichlorethylene degreasing plant, giving particular attention to the bearings.

Examine all joint faces and bearing locations for burrs and other damage likely to affect proper seating of the components and rectify as necessary.

Avoid the intermixing of bearing components and keep all shim packs intact. Assess the serviceability of all components by careful examination and by checking the measurement of worn surfaces against the maximum worn tolerances given on pages 3·103 and 3·104.

When re-building the axle, use new gaskets, lock plates and spring washers and renew damaged studs, nuts, bolts and unserviceable components. Use Hylomar, Wellseal or Hermetite for all gasket joints.

Tighten all nuts, bolts and studs to the appropriate torque figures listed on pages 22 and 23.

To Remove Differential Housing from Casing

Clean the unit with paraffin, and place it on a clean bench. Remove the inner axle shafts (31) as described on page 3·110. Remove the bolts (11) and spring washers (12) and withdraw the differential housing.

To Refit

Reverse the removal procedure, ensuring that the differential housing and casing flange faces are clean. Fit a new paper joint, coated with grease, between the two faces.

Removal of Differential Carrier

Remove the bearing cap bolts (44) and detach the bearing caps (45). Assemble the Churchill spreading tool on the housing face as shown on Fig. 29. Spread the fixture by turning the double-ended tensioner screw until it is hand tight, then complete the spread by moving it a further half-turn with a spanner.

IMPORTANT. DO NOT OVER-SPREAD BY EXCEEDING THIS AMOUNT OR THE HOUSING WILL BE DAMAGED BEYOND REPAIR.

Lift the differential carrier from the housing. If the bearings are likely to be re-used, suitably identify them or, preferably, tie the bearing outer rings and shims to their respective inner races.

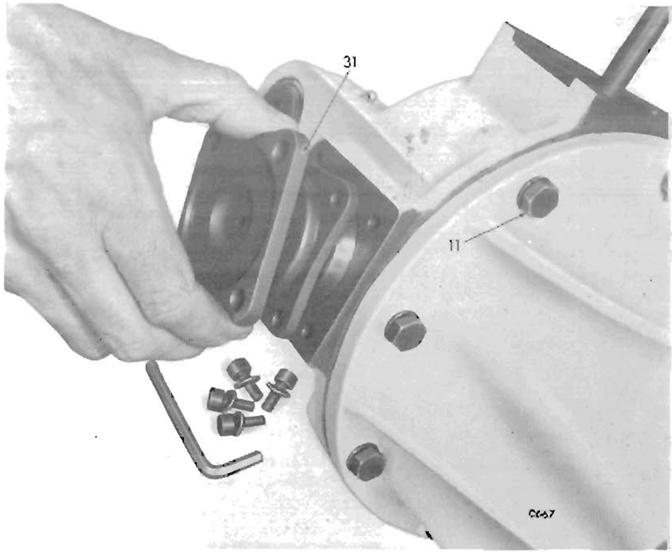


Fig. 27. Withdrawing the inner axle shaft

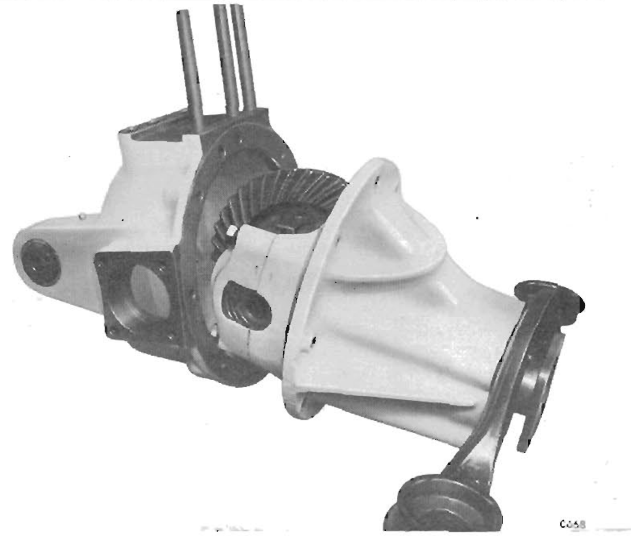


Fig. 28. Showing the differential unit removed from its casing

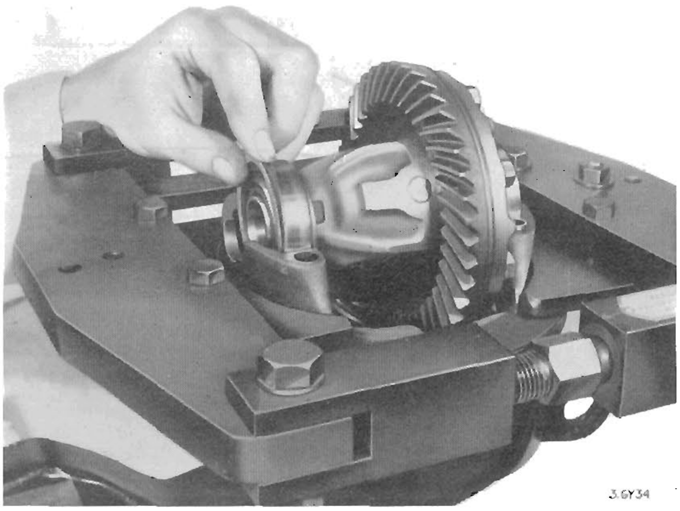


Fig. 29. Using a Churchill spreading tool to release the differential carrier

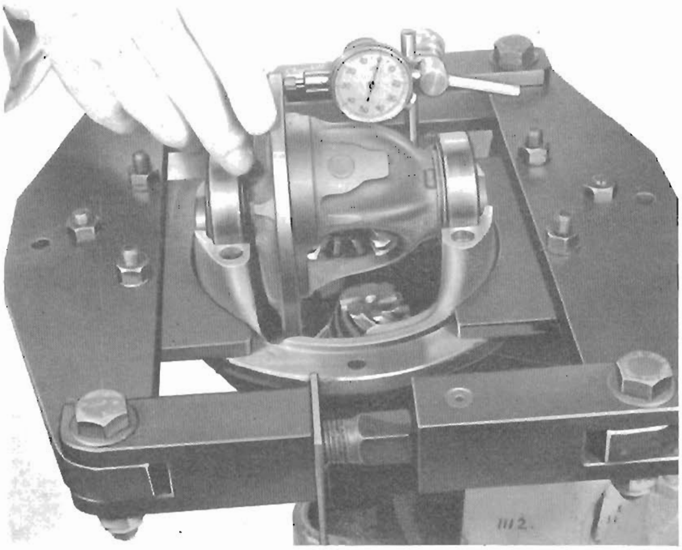


Fig. 30. Measuring the crown wheel mounting face of the carrier prior to dismantling

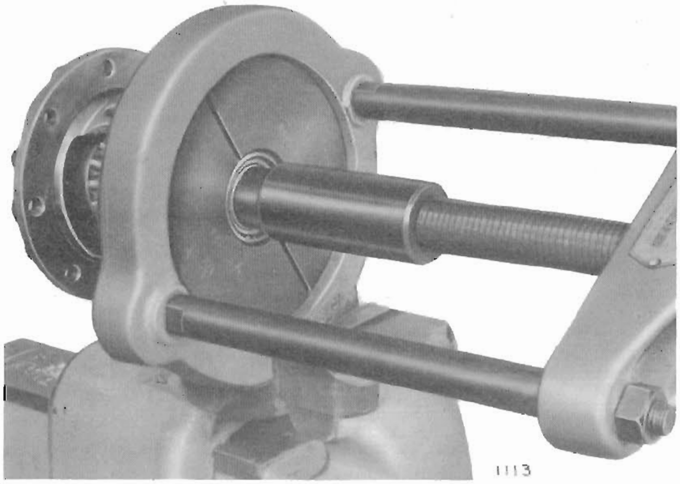


Fig. 31. Using Churchill press and adaptor ring S102 to remove the crown wheel carrier bearings

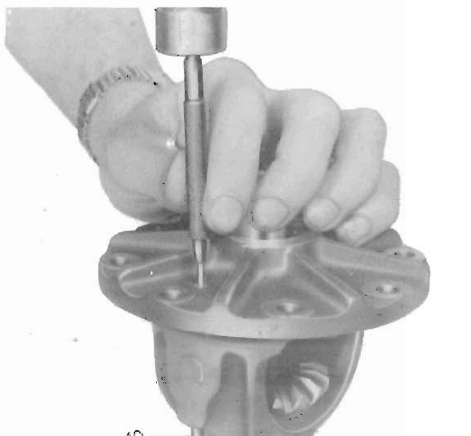


Fig. 32.

Using a pin punch to drive out the cross shaft lock pin

Dismantling the Differential Unit

Remove the fixing bolts (32) and detach the gear (37) from the carrier. Refit the differential assembly, complete with bearings and shims, but without the crown wheel, into the pinion housing, and release the Churchill spreading tool.

With a dial indicator gauge mounted on the housing and the plunger operating squarely against the carrier face, slowly rotate the carrier and check the "run-out". Maximum "run-out" must not exceed 0·003".

Remove the differential carrier (36), the spreading tool (S.101) and, by use of the special puller shown on Fig. 31, remove the bearings (35).

Drive out the cross-shaft lock pin (40) and complete the dismantling by removing the cross-shaft (41), the differential gears (42), (39) and thrust washers (43), (38).

Removing Pinion

Remove the split pin (1), nut (2) and plain washer (3). Withdraw the flange (4) from the pinion (18) and drive the pinion from the casing. Carefully keeping all shims intact, remove these and the spacer from the pinion. Extract the pinion head bearing as shown on Fig. 35.

Drive out the pinion tail bearing (7), the oil seal (5) and the outer ring of the head bearing (16). See Fig. 34.

Remove the four Wedgelock setscrews (8) and front mounting plate (10).

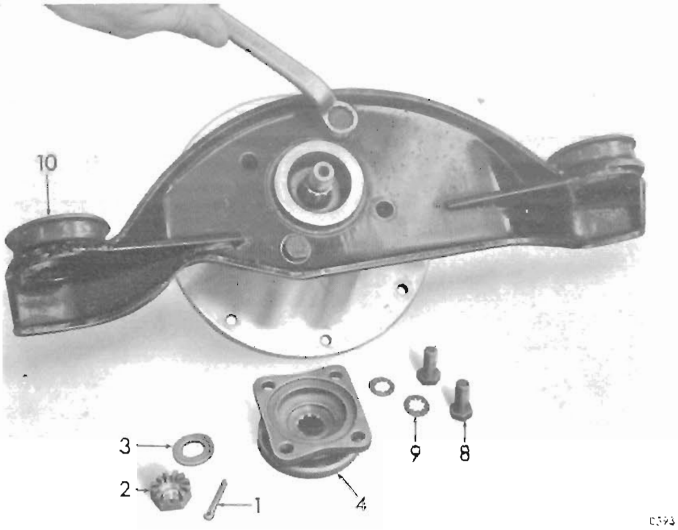


Fig. 33. Removing the front mounting plate

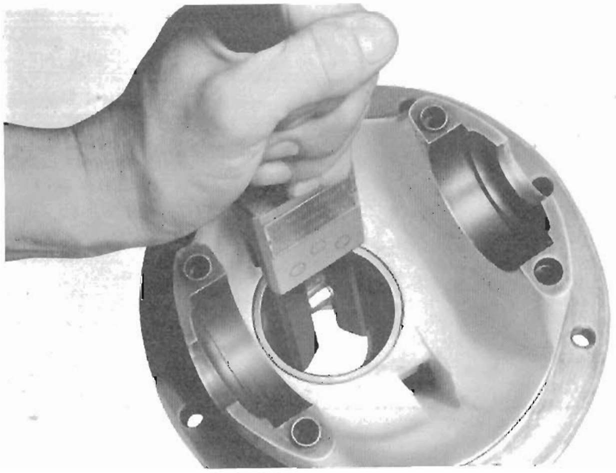


Fig. 34. Using tool No. S123A to remove pinion bearing outer rings

Examination of Pinion Housing

Before proceeding to re-assemble the axle components, check the bearing housing for burrs or other damage likely to prevent correct seating of the bearings.

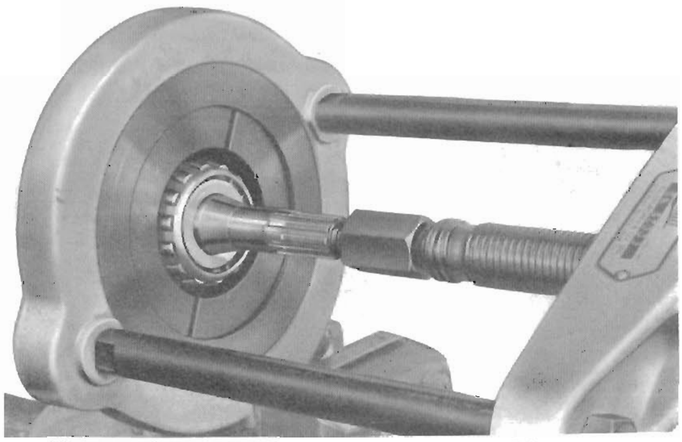


Fig. 35. Using Churchill press and adaptors S4221A-4 to remove pinion head bearing

Re-assembly

Carefully examine all components and decide which items require renewal. If slight damage to the crown wheel or the pinion necessitates replacement, discard both items and fit a new matched pair. These gears are lapped together during manufacture and etched with similar marking to identify them as a pair, therefore, before fitting, ensure that each gear is similarly marked as shown on Fig. 39 at 'A'.

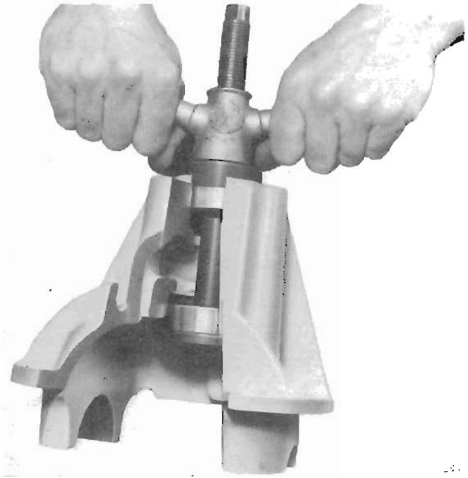


Fig. 36.

Using tool No. S124 to refit the pinion bearing outer rings

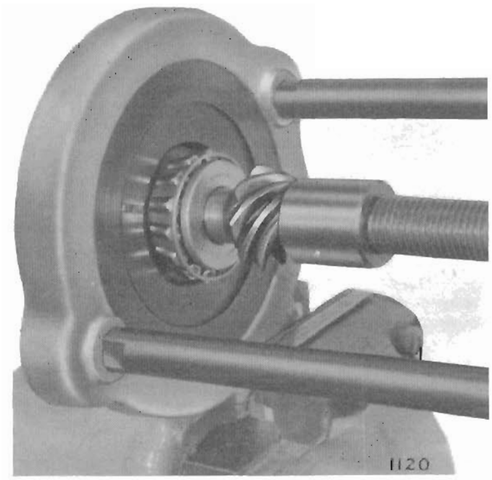


Fig. 37.

Using Churchill press and adaptor S4221A-4 to fit pinion head bearing

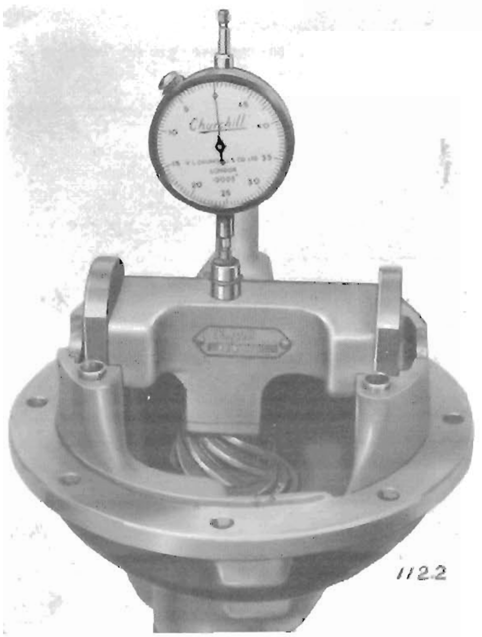


Fig. 38.

Using Churchill setting gauge S108 to determine pinion head shim thickness

Installing Pinion and Bearings

Locate the outer rings of the pinion bearings (7), (16) in the differential housing (13) and, using the special tools shown on Fig. 36, draw the rings into position. Omitting the shims (19), at this stage, lightly oil the head bearing (17) and press it on to the pinion (18).

Install the pinion into the housing and omitting the spacer (15), shims (14) and oil seal (5) assemble the tail bearing (6), driving flange (4), plain washer (3) and nut (2). Tighten the nut until a torque of 12·16 lb./in. is required to rotate the driving flange as shown on Fig. 42.

IMPORTANT. To ensure correct location of the bearing rollers, spin the pinion whilst tightening the flange nut. When new bearings are used, adjust the torque to the high limit, *i.e.*, 16 lb/in.; conversely, use the low limit of 12 lb/in. when the original bearings are re-fitted.

Adjusting Pinion

Using the ground button, depress the dial gauge plunger to its limit and "zero" the gauge.

Place the gauge in the axle casing with the plunger contacting the pinion (Fig. 38).

Exerting downward pressure on the gauge, centralize the gauge by rocking it slightly to obtain a maximum reading. This indicates the thickness of shims required between a normal pinion and head bearing.

A pinion of normal height bears the letter 'N' on the top face of the pinion. Hypoid pinions not marked in this manner bear a number preceded by a plus or minus sign as shown at "B" on Fig. 39. These symbols indicate the amount which must be added to, or subtracted from the gauge reading. *E.G.*, if a gauge reading of "15" is obtained when measuring a pinion bearing the symbol "+3" then a shim thickness of 15 + 3 thousandths of an inch will be required.

Having determined the requisite shim thickness, remove the pinion, bearings and driving flange from the housing but leave the bearing outer rings in place. Assemble the shims (19) to the pinion and refit the head bearing.

PINION HEAD BEARING SHIMS		
THICKNESS		PART No.
ins.	mm.	
0·003	0·0762	100562
0·005	0·127	100563
0·010	0·254	100564

PINION TAIL BEARING SHIMS		
THICKNESS		PART No.
ins.	mm.	
0·003	0·0762	104562
0·005	0·127	104563
0·010	0·254	104561

Adjusting Pinion Bearing Pre-load

Assemble the distance piece (15) and the shim pack (14) to the pinion shaft and fit the assembly into the housing.

NOTE : The thickness of the shim pack (14) may require re-adjusting to give correct pre-loading.

Drive the bearing (6) on to the pinion shaft and fit the driving flange (4), plain washer (3) and nut (2). Tighten the nut to 70 lb/ft. torque.

Attach a pre-load gauge to the driving flange as shown in Fig. 42. Slowly move the weight along the graduated scale and note the point at which it falls. The gauge should read 12-16 lb/in.

Higher readings require a thicker shim pack between the tail bearing and distance piece: lower readings require a thinner shim pack.

NOTE : One thousandth of an inch shim thickness 4 lb in. torque.

When the pre-load is correct, remove the driving flange and fit a new oil seal. Re-attach the flange, plain washer and nut. Tighten the nut and secure it with a split pin.

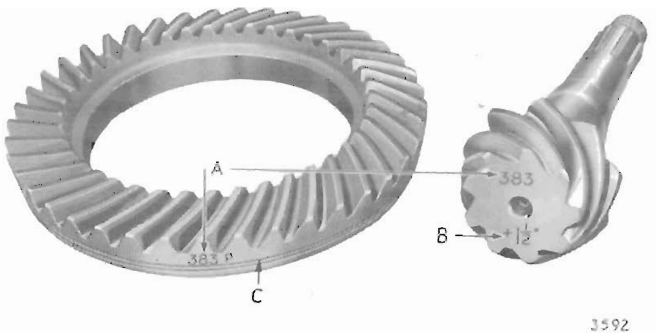


Fig. 39. Pinion and crown wheel identification markings

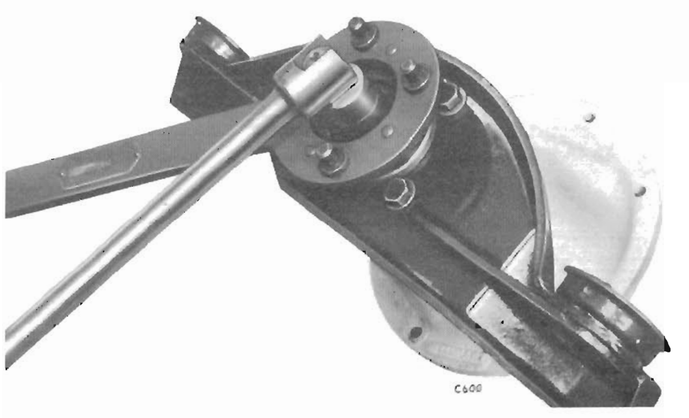


Fig. 40

Fig. 41

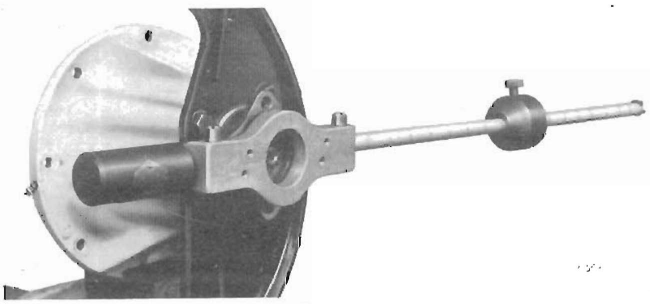


Fig. 42

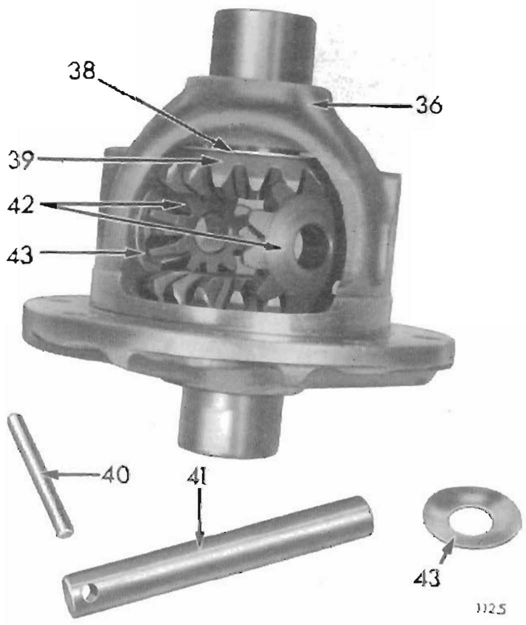


Fig. 43. Differential gears

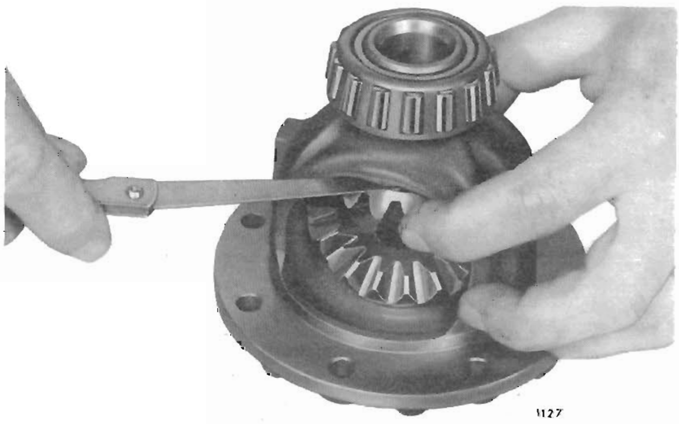


Fig. 44. Measuring differential gear end float

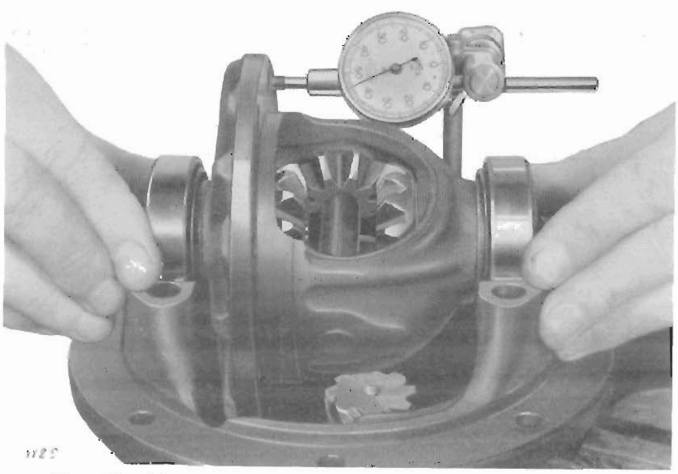


Fig. 45. Measuring total end float of differential carrier

Differential Gears (Fig. 43)

Assemble the sun gears (39), planet gears (42) and thrust washers (38), (43) into the differential carrier (36).

Insert the cross shaft into the carrier and check the planet gear backlash. By selection of planet gear thrust washers, listed below, reduce the end float to give minimum backlash consistent with freedom of rotation.

Insert the cross shaft locating pin (40) and secure it by peening the metal over the end of the pin.

DIFFERENTIAL PLANET GEAR THRUST WASHERS

THICKNESS		PART No.
ins.	mm.	
0·056	1·4224	108939
0·052	1·3208	108938
0·048	1·2192	108937
0·047	1·1938	142168
0·044	1·1176	108936
0·043	1·0922	142167
0·040	1·016	108935
0·036	0·9144	104572

Measuring Total Differential Float

Fit the differential bearings to the carrier journals and place the assembly in the housing, omitting the shims.

Attach a dial gauge to the housing so that the dial plunger operates squarely against the crown wheel mounting face of the carrier (Fig. 45). Pressing both bearing outer rings towards each other, move the assembly away from the gauge and "zero" the dial.

Similarly, move the assembly towards the gauge, and note the dial reading. This indicates the total end float and is referred to as dimension 'A' (see Fig. 47).

Remove the dial gauge and the differential carrier from the hypoid housing.

Crown Wheel—Measuring "In and Out" of Mesh

Ensuring that the mounting faces are clean and free from burrs, attach the crown wheel (37) to the carrier (36) and secure with bolts (32) and new spring washers.

Refit the differential unit in the hypoid casing and position the dial gauge as shown on Fig. 46.

Move the differential unit away from the gauge, to the "Full Mesh" position and "zero" the dial.

Move the differential unit towards the gauge and note the dial reading. This is the "in and out" of mesh dimension used in the following calculations and is referred to as dimension 'B' (see Fig. 47).

Lift the differential carrier from the housing, taking care not to mix the bearing outer rings.

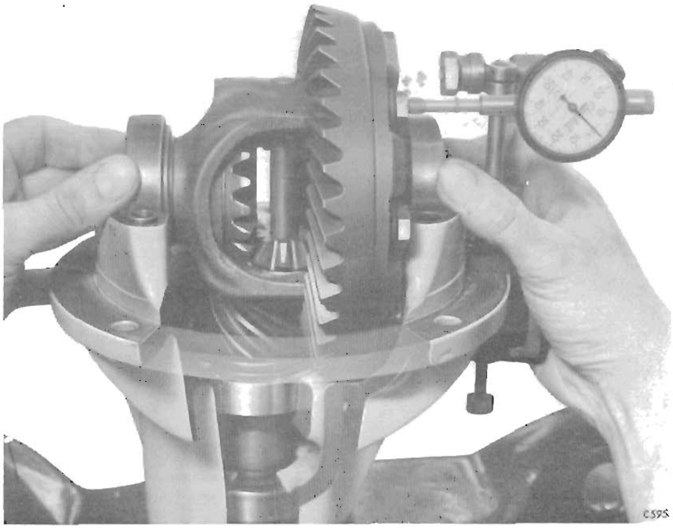


Fig. 46. Using a dial gauge to measure "in and out" of mesh

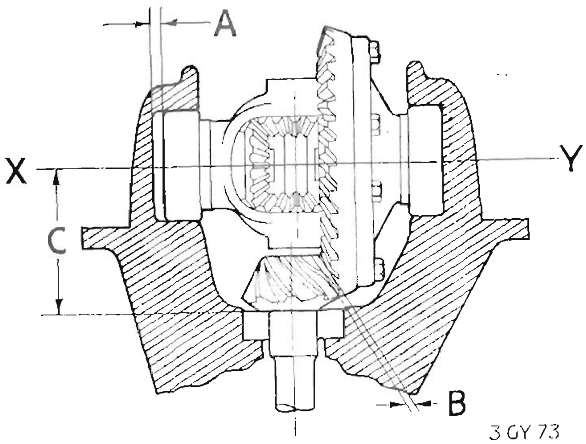


Fig. 47. Diagram for calculating shim thickness

Differential Bearing Pre-load

By substituting correct measurements in place of those used in the following examples, calculate the thickness of both shim packs as follows:—

Example

Total float 'A'	0·060″
Plus 0·003″ pre-load	0·003″
Total thickness of shims required	0·063″
Shim thickness at 'Y'	
In/Out of mesh clearance 'B'	0·025″
Subtract specified backlash	0·005″
Shim pack thickness required at 'Y'	0·020″
Shim thickness at 'X'	
Total shim thickness	0·063″
Minus shim pack thickness at 'Y'	0·020″
Shim pack thickness required at 'X'	0·043″

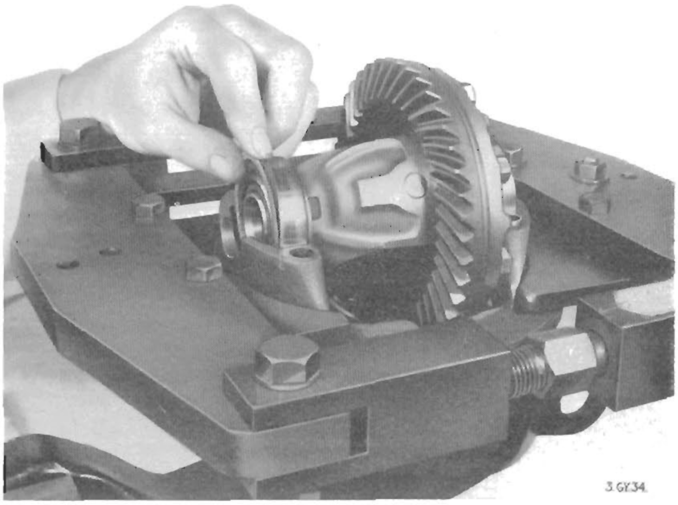


Fig. 48. Using spreading tool S101 to insert shim pack

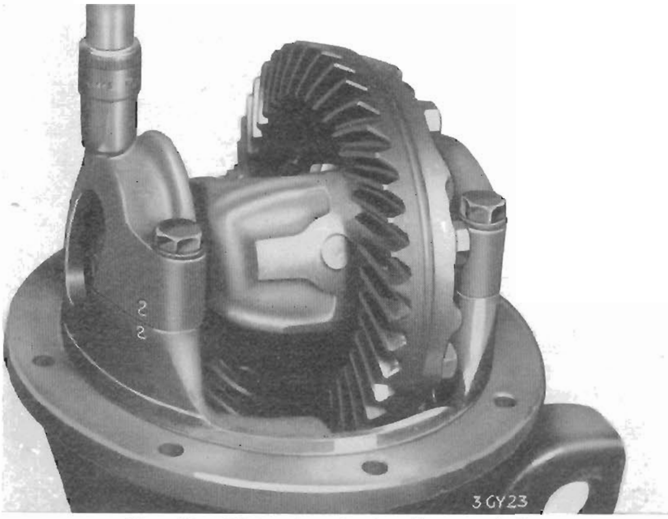


Fig. 49. Tightening the bearing cap bolts

Fig. 50. Using a dial gauge to measure crown wheel backlash

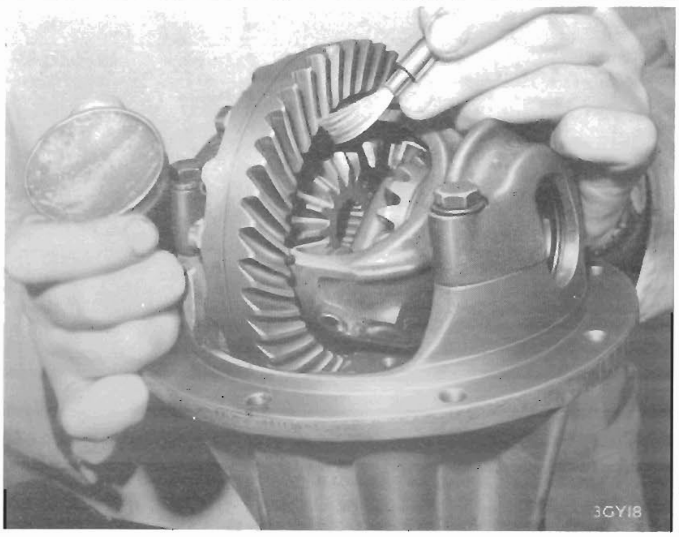


Fig. 51. Painting crown wheel teeth to check pinion marking

DIFFERENTIAL CARRIER BEARING SHIMS

THICKNESS		PART No.
ins.	mm.	
0·020	0·508	123817
0·016	0·4064	123816
0·014	0·3556	123815
0·013	0·3302	123814
0·009	0·2286	123813

Using the axle spreading tool, and again taking care not to overspread, re-insert the differential carrier complete with shims into the casing. Remove the axle spreader, assemble the caps to their respective bearings and tighten the securing bolts.

Crown Wheel Backlash

Mount the dial gauge on the casing (Fig. 50) and by moving the crown wheel in either direction, take up the free movement, noting the readings on the dial gauge. Measure this backlash at several positions, each of which should be within the limits of 0·004″ - 0·006″ (0·1 - 0·15 mm.).

Should the backlash be excessive, reduce the thickness of the shim pack at 'X' Fig. 47 and add an equal amount to 'Y'. If the backlash is insufficient, reverse the procedure.

Tooth Markings

After setting the backlash to the required figure, use a small brush to lightly smear eight or ten of the crown wheel teeth with engineers' blue. Move the painted gear in mesh with the pinion to obtain a good tooth impression.

(a) Correct Markings (Fig. 52)

When the gear meshing is correctly adjusted, the markings obtained should closely approximate those shown at (a), this being the ideal contact.

The area of contact is evenly distributed over the working depth of the tooth profile and is located slightly nearer to the TOE than the heel.

(b) High Contact

The markings shown at (b) are those produced by high contact, *i.e.*, when the tooth contact is heavy on the crown wheel face or addendum and caused by the pinion being too far out of mesh. To rectify, move the pinion deeper into mesh by adding shims between the pinion and head bearing. To maintain the existing pinion bearing pre-load, an equal amount of shims must also be added between the tail bearing inner cone and the bearing distance piece.

(c) **Low Contact**

Fig. 52 (c) shows heavy markings on the crown wheel flank or dedendum this being the opposite to that shown in (b). Rectification of this condition necessitates moving the pinion out of mesh by removing an equal amount of shims from the positions described in (b).

NOTE: When correcting for (b), the new position will tend to move the tooth contact towards the toe on drive and the heel on coast, whilst correcting for (c) will tend to move the tooth contact towards the heel on drive and the toe on coast. In either case it may be necessary, after correcting the pinion mesh, to re-adjust the crown wheel as described in (d) and (e).

(d) **Toe Contact**

The markings shown on Fig. 52 (d) result when the tooth contact is concentrated at the small end of the tooth. To rectify this condition, move the crown wheel out of mesh, *i.e.*, increase backlash by transferring shims from the crown wheel side of the differential to the opposite side.

(e) **Heel Contact**

Fig. 52 (e) shows the markings obtained when the tooth contact is concentrated at the large end of the tooth. This condition is rectified by reducing backlash, *i.e.*, by transferring shims in the opposite direction as for (d).

IMPORTANT: Whatever corrections are necessary, it is most important that the backlash at all times is within the specified limits.

(i) BACKLASH. When adjusting for backlash, always move the crown wheel as this member has more direct influence on backlash.

(ii) CROWN WHEEL MOVEMENT. Moving the gear out of mesh has the effect of moving the tooth contact towards the heel and raising it slightly towards the top of the tooth.

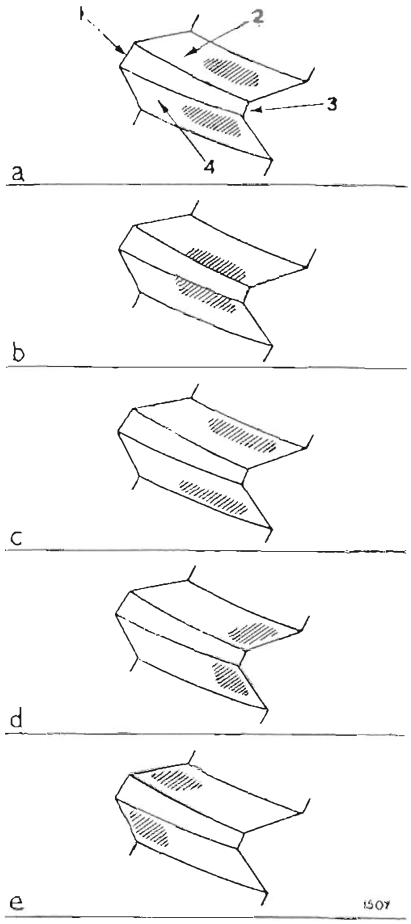
(iii) PINION MOVEMENT. Moving the pinion out of mesh raises the tooth contact on the face of the tooth and slightly towards the heel on drive, and towards the toe on coast.

Having assembled the differential unit, refit it to the casing (as described on page 3·113) and attach the assembly to the vehicle (as described on page 3·112).

Refill the axle with one of the approved lubricants listed on page 24.

ADDENDUM — upper part of tooth profile.

DEDENDUM — lower part of tooth profile.



1 Heel (outer end)

2 Coast side (concave)

3 Toe (inner end)

4 Drive side (convex)

Fig. 52. Typical gear tooth markings

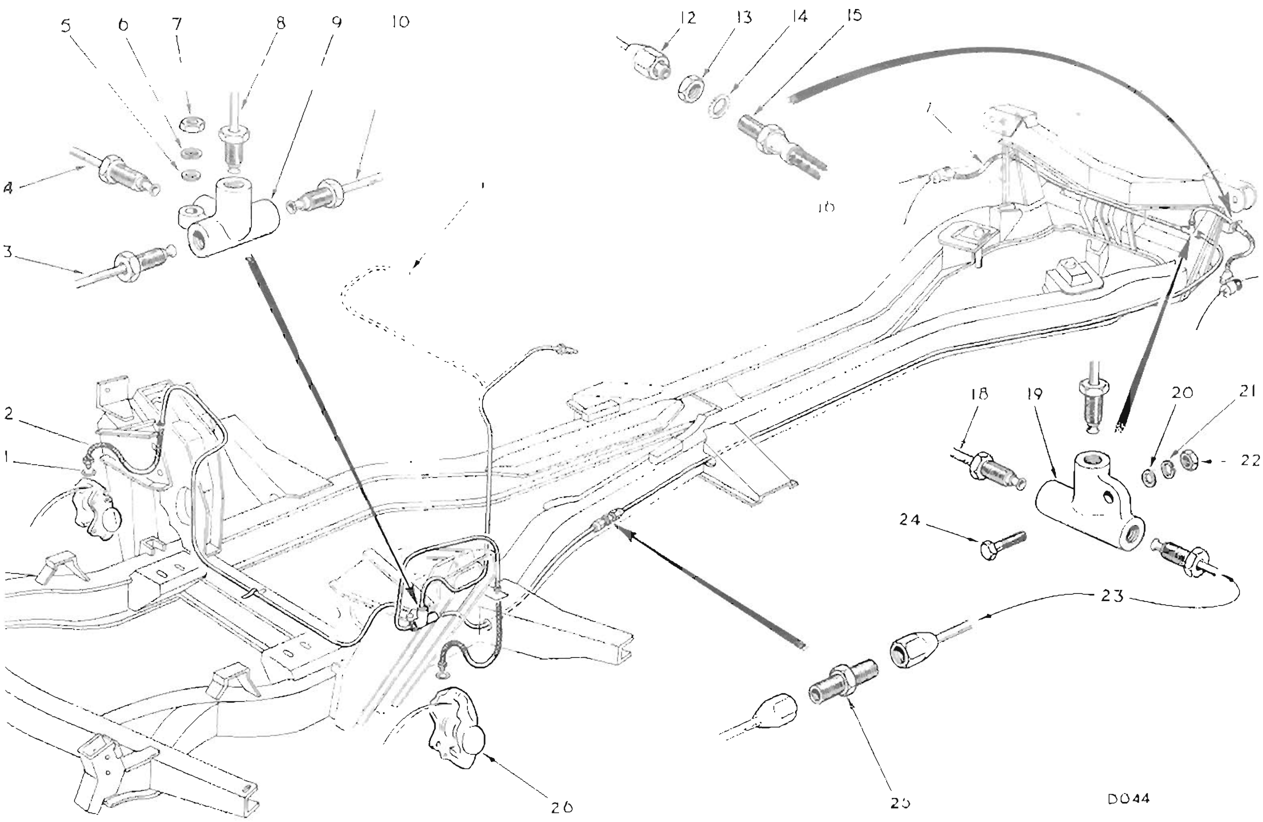


Fig. 1. Spitfire brake pipe layout

1 Copper washer
2 Flexible hose
3 Pipe—4-way union to L.H. front brake
4 Pipe—4-way union to R.H. front brake
5 Plain washer
6 Spring washer
7 Nut
8 Pipe—4-way union to master cylinder
9 4-way union
10 Pipe 4-way union to rear brakes
11 Pipe—4-way union to master cylinder (R.H. drive)
12 Pipe union to flexible hose
13 Nut
14 Shakeproof washer
15 Flexible hose—threaded end
16 Rear wheel cylinder
17 Flexible hose—rear brakes
18 Pipe—3-way union to R.H. rear brake
19 3-way union
20 Plain washer
21 Spring washer
22 Nut
23 Pipe—master cylinder to 3-way union
24 Bolt
25 Pipe connector
26 Front brake caliper unit

BRAKE DATA

System	Girling Hydraulic			
		Herald 1200	Spitfire, 12/50	Vitesse
Front	.. .. ..	Drum, 8″ × 1¼″	Disc, 9″	Disc, 9″
Rear	.. .. ..	Drum, 7″ × 1¼″	Drum, 7″ × 1¼″	Drum, 8″ × 1¼″
Total Swept Area ..	.. .. ..	118 sq. in.	199 sq. in.	207 sq. in.
Adjustment	Discs, self-adjusting ; Drums, front 2 adjusters, rear 1 adjuster.			
Handbrake	Centrally mounted hand lever operating rear brakes mechanically.			
Disc Pad Material ..	Don 55.			
Shoe Lining Material ..	Herald 1200, 12/50 and Spitfire, Ferodo M.S.1 ; Vitesse, Don 24.			
Fluid Type	Wakefield, Girling or Lockheed Hydraulic Fluid.			
Discs	Maximum permissible run-out, ·004″.			

MASTER CYLINDER OPERATION

A. Brakes Released Condition

When the brake pedal is released, hydraulic pressure created by the brake shoe pull-off spring, plus the plunger return spring (5), causes the plunger (7) to return to its rear stop (12). The last $\frac{1}{32}$" (0·794 mm.) of movement withdraws the valve shank (4) rearwards, lifting the seal (1) from its seat on the end face of the cylinder, thus permitting recuperation of the hydraulic fluid to the reservoir via the drilled passage.

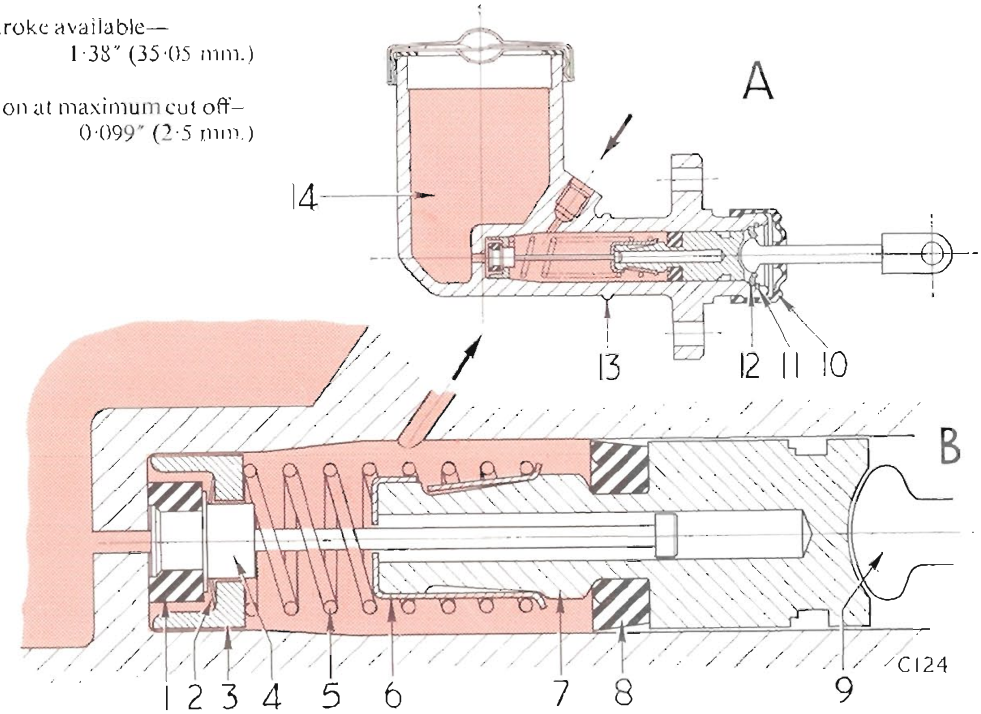
B. Brakes Applied Condition

Pressure applied to the push-rod (9) by operation of the pedal, forces the plunger (7) forward. This in turn allows the valve shank (4) to move forward under the influence of the spring (5) until the valve spacer contacts the end face of the cylinder. The spring washer (2) then forces the valve shank and seal (1) forward until the seal contacts the end face and closes the passage to the reservoir.

Continued movement of the piston displaces fluid through the hydraulic pipe lines and applies the brakes, the valve shank (4) passing further into the hollow centre of the piston as the latter moves down the cylinder bore.

Maximum stroke available—
1·38" (35·05 mm.)

Stroke position at maximum cut off—
0·099" (2·5 mm.)



1	Valve seal	6	Spring retainer	11	Circlip
2	Spring (valve seal)	7	Plunger	12	Push rod stop
3	Distance piece	8	Plunger seal	13	Identification ring(s)
4	Valve shank	9	Push rod	14	Fluid reservoir
5	Plunger return spring	10	Dust cover		

Fig. 2. Section through brake master cylinder

BRAKE MASTER CYLINDER

Removal (Fig. 3)

1. Empty the brake hydraulic system.
2. Pull back the rubber dust excluder (11) and withdraw the clevis pin (14) securing the push rod to the pedal.
3. Detach the fluid pipe from the master cylinder.
4. Remove the two bolts (16) which secure the master cylinder to its mounting bracket (15) and withdraw the unit from the bulkhead.

Dismantling (Fig. 2)

1. Depress the push rod (9), remove the circlip (11) and withdraw the push rod and return stop plate (12).
2. Shake out the plunger (7) and the recuperation valve assembly. If necessary, apply low pressure compressed air to the outlet union to eject the plunger assembly.
3. Lift the locating clip on the spring retainer (6) and remove the retainer from the plunger (7) with the valve and spring assembly.
4. Detach the valve shank (4) by passing it through the offset hole in the retainer. Remove the spring (5), distance piece (3) and spring (2) from the valve shank. Using fingers, detach the seal (1) from item (4) and the seal (8) from item (7).

Re-Assembly (Fig. 2)

1. Refit the seals (1) and (8) to items (4) and (7).
2. Fit the spring (2), distance piece (3) and spring (5) to the valve shank (4), attach the spring retainer (6) and fit the assembly to the plunger (7). Lubricate the assembly with clean hydraulic fluid and insert it in the master cylinder bore. Fit the push rod (9) with stop plate (12) and the circlip (11).

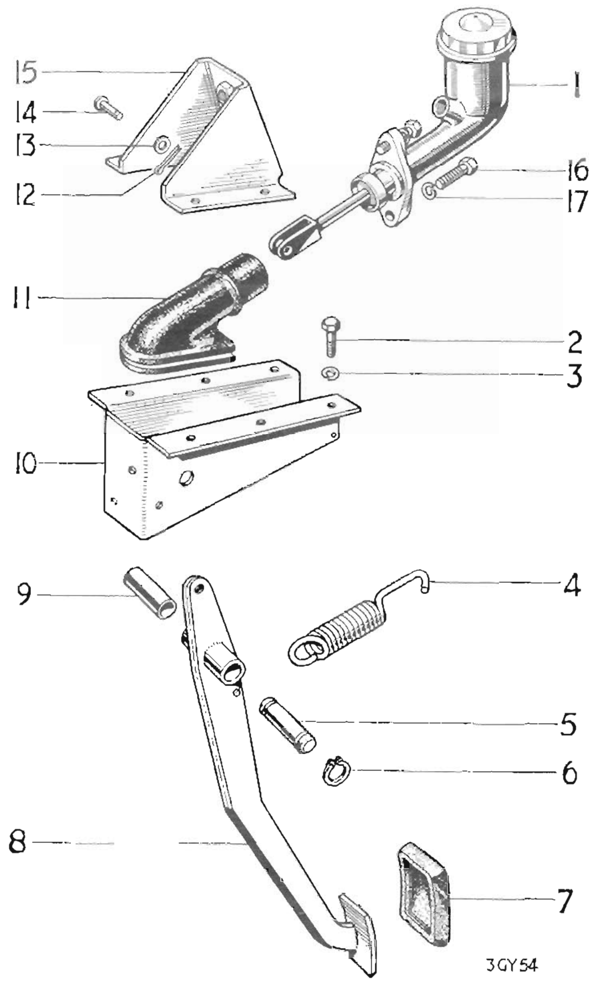
To Refit (Fig. 3)

Secure the master cylinder to its mounting bracket. Using a new split pin, refit the clevis pin securing the push rod to the pedal. Refit the rubber dust excluder and the fluid pipe to the cylinder and refill and bleed the system as described on page 3·204.

BRAKE PEDAL

To Renew Pivot Bush

1. Pull back the rubber dust excluder (11) and withdraw the clevis pin (14).
2. Detach the pedal return spring (4), remove the circlip (6), push the pivot pin (5) from the bracket and pedal and withdraw the pedal from the bracket.
3. Renew the pivot bush and re-assemble by reversing the dismantling sequence.



1	Master cylinder	10	Pedal bracket
2	Bolt	11	Rubber dust excluder
3	Spring washer	12	Split pin
4	Return spring	13	Plain washer
5	Pivot pin	14	Clevis pin
6	Circlip	15	Master cylinder bracket
7	Pedal rubber	16	Bolt
8	Pedal	17	Spring washer
9	Pedal pivot bush		

Fig. 3. Exploded brake pedal and bracket assembly

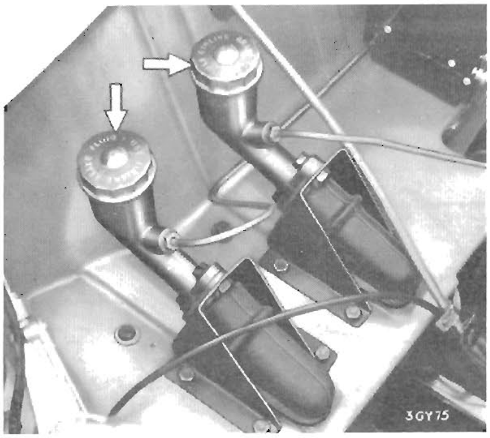


Fig. 4.

Brake and clutch master cylinder filler caps

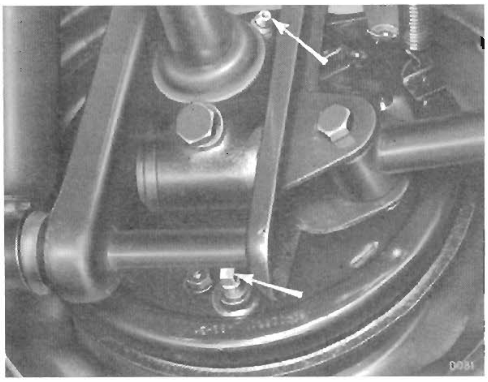


Fig. 5.

Rear drum brake adjusters and bleed nipple

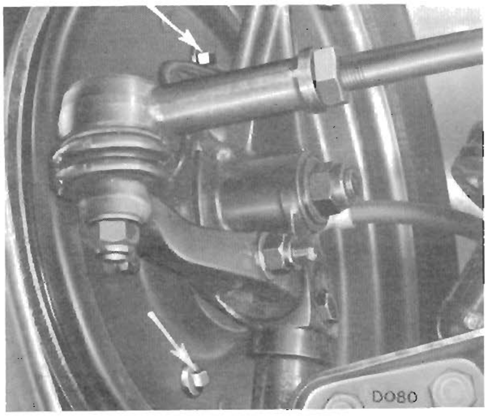


Fig. 6.

Front drum brake adjusters and bleed nipple

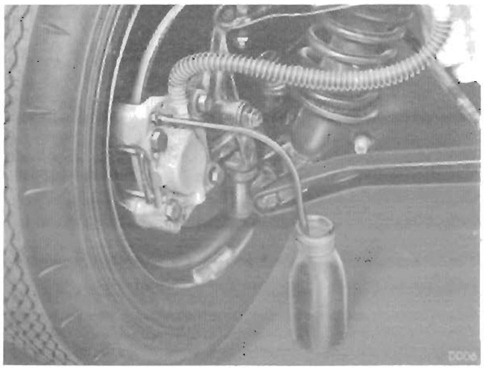


Fig. 7.

Bleeding disc brakes

BLEEDING THE HYDRAULIC SYSTEM

Air is compressible, and its presence in the system will prevent the correct functioning of the brakes. Therefore, if a pipe joint has been uncoupled, or if air has been admitted for other reasons, the system must be bled to expel this air.

With the aid of a second operator, proceed as follows :

1. During the bleeding operation, keep the reservoir topped-up with new brake fluid and ensure that the level does not fall below half full. If the reservoir is allowed to empty, air will be drawn into the system, necessitating re-bleeding.
2. Turn the rear brake adjusters clockwise to lock the drums.
3. Commencing with the rear wheel cylinder furthest from the master cylinder, wipe the bleed nipple clean, attach a length of rubber tubing to the nipple and allow the end of the tube to hang in a glass jar partly filled with brake fluid.
4. Unscrew the bleed nipple about a quarter turn, and, giving fast full strokes with a slight pause between each stroke, pump the brake pedal until the fluid entering the glass container is free from air bubbles.
5. **Important.** Ensure that the piston returns to its maximum travel at the end of each stroke. A sticking piston will be obvious from the feel of the pedal.
6. Finish with a few slightly faster applications of the pedal, using the bottom half of the stroke, until it is apparent that all air has been excluded. Close the bleed screw during the last pedal application, or with the pedal fully depressed.
7. Repeat the procedure for the three remaining brakes, finishing with the front wheel cylinder nearest to the master cylinder. If bleeding of any cylinder continues without success for a considerable time, it may be that air is being drawn in past the bleed screw threads. In such instances, the bleed screw should be tightened at the end of each downward stroke of the pedal, allowing the piston to return fully before re-opening of the bleed screw, close the bleed screw finally during the last pedal application.
8. Adjust all brakes in the normal manner and, whilst applying pressure to the brake pedal, check for leaks at all pipe joints and unions, flexible hose connections, wheel cylinders and master cylinder.

NOTE : When replenishing the system, particularly where disc brakes are fitted, use only new fluid that has been stored in a container sealed from the atmosphere.
Immediately bleeding is completed, re-seal residual fluid in the container, before it is again stored, as exposure to atmosphere lowers the fluid boiling point.

BRAKES

Front Brakes (VITESSE, HERALD 12/50 AND SPITFIRE)

Self-adjusting front brakes consists of Girling 9" discs with double acting caliper units, each containing two quickly detachable friction pads.

Friction Pad Replacement

1. Jack up the car and remove the front road wheels.
2. Release two spring retainers (9) and remove the pad retainer pins (10).
3. Lift the friction pads (4) from the caliper and renew them if worn. Do not attempt to re-line worn pad assemblies.
4. Before fitting new pads, push the pistons (6) back to the full extent of their travel. Refit the pads and insert the retainer pins (10) securing them with the spring retainer clips (9).

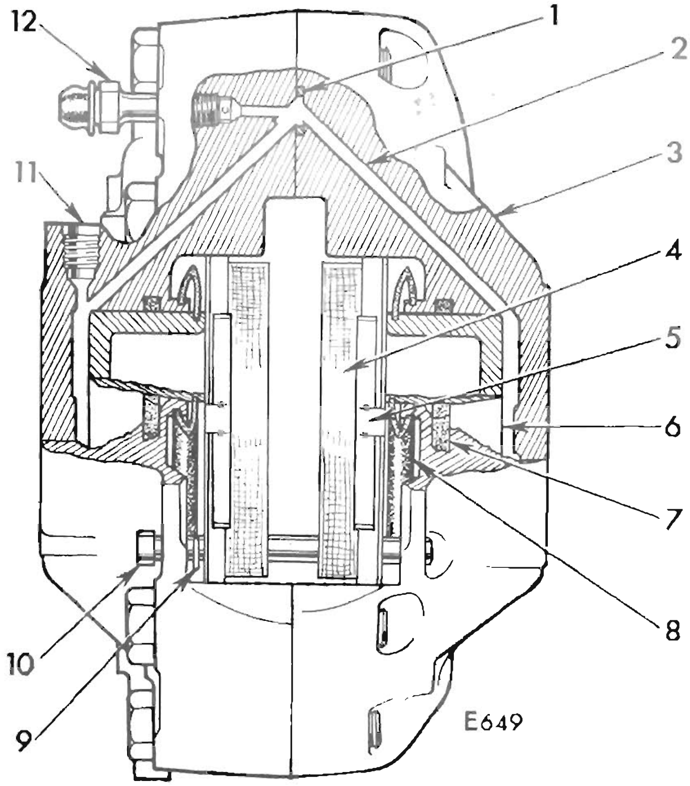
Caliper Cylinder Maintenance

To replace piston sealing rings or dust excluders, dismantle as follows : –

1. Release the rigid pipe and locknut at the support bracket. Unscrew the flexible hose from the caliper.
2. Remove two bolts (21) securing the caliper to its support bracket.
3. Remove the caliper and withdraw the pistons from the body.
4. Carefully remove the rubber sealing ring (7) from its recess.
5. Clean the piston, cylinder and rubbers with clean brake fluid ONLY.
6. Examine all components for serviceability and renew where necessary.

Re-Assembly

1. Fit a new piston seal (7) into the recess in the cylinder.
2. Locate the projecting lip of the rubber dust excluder (8) in its recess in the cylinder.
3. Insert the piston (6), closed end leading, into the cylinder, taking care not to damage the polished surface. Push the piston fully home and engage the outer lip of the dust excluder with the recess in the piston. Replace the friction pads.
4. Assemble the caliper over the disc, and refit to the mounting bracket.
5. Refit the flexible brake hose and bleed the system.



1 Rubber "O" ring
2 Fluid transfer channels
3 Caliper body
4 Brake pad
5 Anti-squeal plate
6 Piston
7 Piston sealing ring
8 Dust cover
9 Retaining clip
10 Retaining pin
11 Flexible hose connection
12 Bleed nipple

Fig. 8. Section through caliper assembly

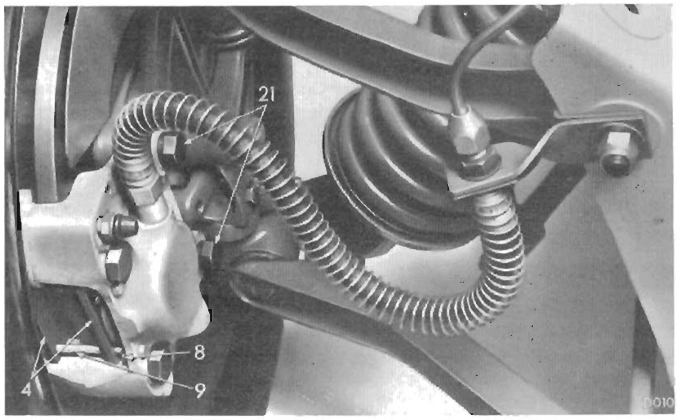


Fig. 9. Location of caliper attachments, bolts and brake pad details

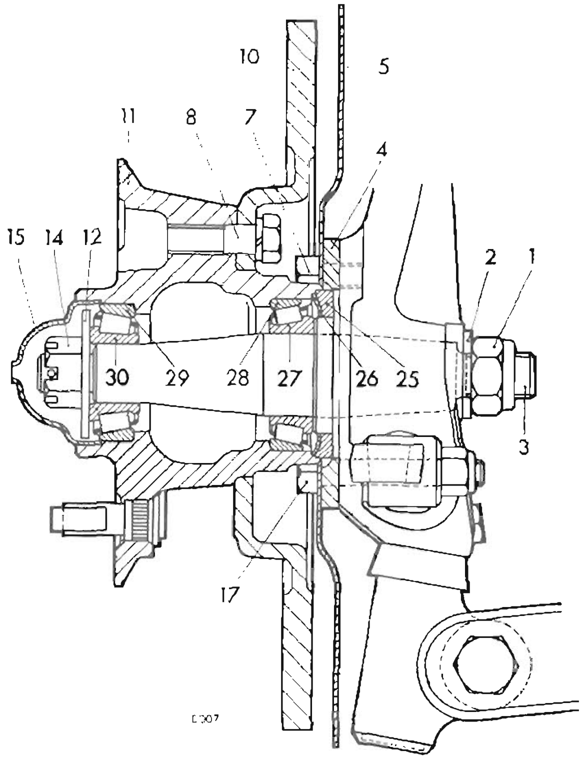


Fig. 10. Section through hub

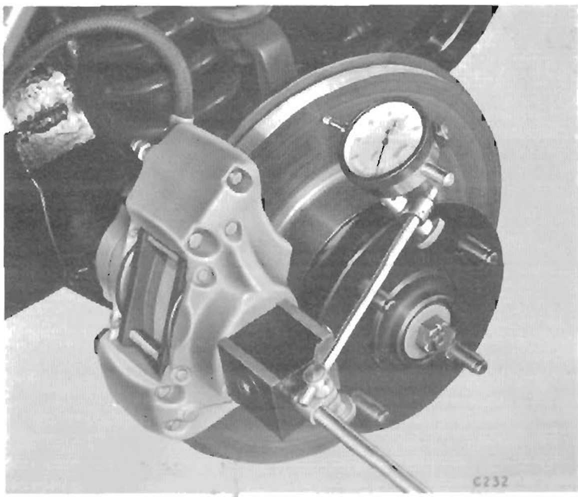


Fig. 11. Measuring disc run-out

Disc and Hub Removal (Figs. 10 and 12)

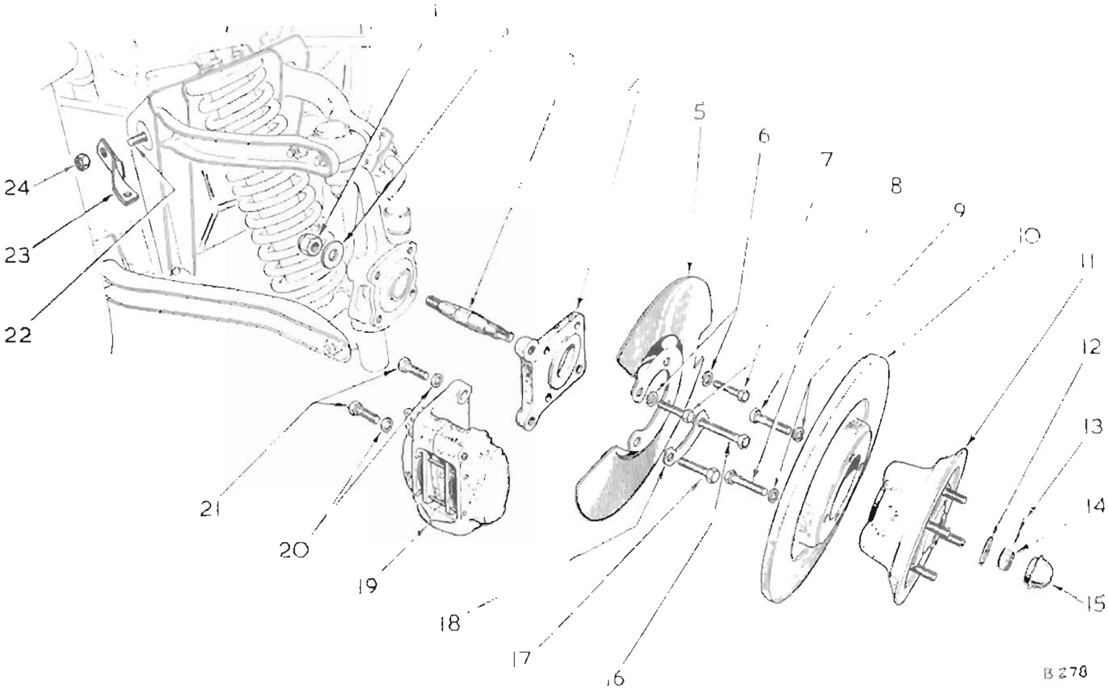
1. Remove caliper assembly (19).
2. Remove the grease retaining cap (15) from the hub by screwing through it a No. 10 U.N.F. setscrew (supplied in tool kit).
3. Remove the split pin, slotted nut (14) and plain washer (12) from the stub axle (3).
4. Withdraw the hub (11) complete with the outer race (30) and the outer part of the inner race (28).
5. Detach the brake disc (10) from the hub (11) and degrease the hub components.

If new bearings are required, drift the old bearing outer rings and the oil seal (25) with retainer (26) from the hub. New bearings should only be fitted as complete sets.

Re-Assembly

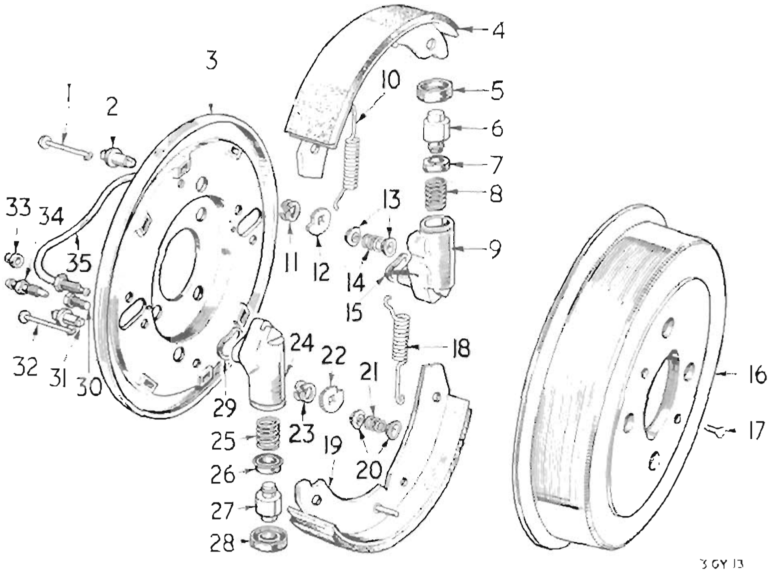
1. Fit the bearing outer rings (28) and (29) with their tapers facing outwards. Refit the disc (10), securing with bolts (8) and washers (9).
2. Assemble the inner races (27) and (30) and fit the hub and disc to the stub axle. Fit the washer (12) and slotted nut (14) and, whilst rotating the hub, tighten the nut (14) with finger pressure only. Slacken the nut back to the nearest split pin hole and mark its position by centre punching the end of the nut and stub axle. The hub should have 0·003″ to 0·005″ (·076 mm. to 0·127 mm.) end float. If slackening back the nut produces excessive end float, remove the nut and file the rear face so that when refitted the correct end float is provided.

   NOTE: Maximum permissible run-out on the friction faces of the disc is ·002″ (0·0508 mm.).
3. Remove the nut (14), washer (12), hub (11) and races (27) and (30). Pack the races and hub with an approved grease.
4. Secure a new hub sealing felt (25) to the seal retainer (26) with jointing compound. Allow the compound to dry, then soak the seal in engine oil and squeeze out surplus oil.
5. Fit the races (27) and (30) and seal retainer (26) to the hub, with the felt seal facing inwards.
6. Fit the hub assembly to the stub axle, securing it with the washer (12) and nut (14). Tighten the nut until the centre punch marks correspond, and secure the nut with a new split pin (13).
7. Fit the cap (15). Secure the caliper assembly with bolts (21) and spring washers (20).



1	Nyloc nut	9	Spring washers	17	Bolt
2	Washer	10	Disc	18	Lock plate
3	Stub axle	11	Hub	19	Caliper assembly
4	Caliper mounting bracket	12	Washer	20	Spring washer
5	Disc shield	13	Split pin	21	Bolts
6	Spring washers	14	Slotted nut	22	Bolt
7	Bolts	15	Cap	23	Bracket
8	Bolts	16	Bolt	24	Nyloc nut

Fig. 12. Exploded disc brake components



1 Steady pin
2 Adjuster shank
3 Backplate
4 Brake shoe
5 Dust excluder
6 Piston
7 Seal
8 Spring
9 Wheel cylinder
10 Return spring
11 Spring
12 Adjuster cam
13 Steady pin cups
14 Spring
15 Seal
16 Brake drum
17 Countersunk screw
18 Return spring
19 Brake shoe
20 Steady pin cups
21 Spring
22 Adjuster cam
23 Spring
24 Wheel cylinder
25 Spring
26 Seal
27 Piston
28 Dust excluder
29 Seal
30 Screw
31 Adjuster shank
32 Steady pin
33 Dust cap
34 Bleed screw
35 Bridge pipe

Fig. 13. Exploded front brake assembly (L.H. side)

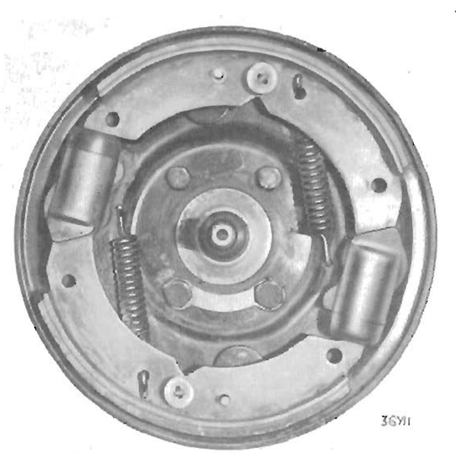


Fig. 14.

Arrangement of brake shoes and pull-off springs (front right-hand side)

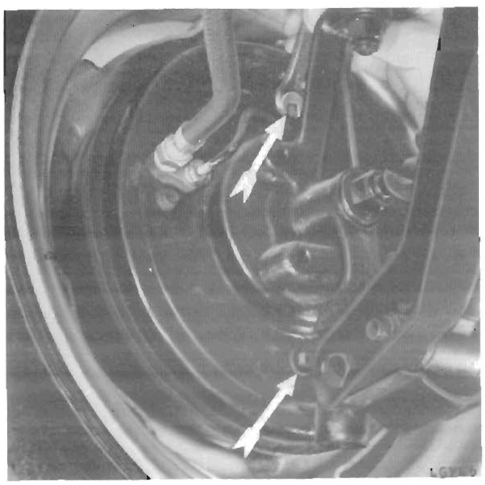


Fig. 15.

Front drum brake shoe adjusters

DRUM BRAKES

Front Brake Shoes (HERALD 1200 ONLY)

To Remove

Jack up the front of the car and place it on chassis stands. Remove the nave plate, road wheel, and turn both adjusters anti-clockwise to the off position.

Remove the brake drum (16), release the anchor pins (1), cups (13) and springs (14).

Detach the return springs (10) and (18) by lifting the shoes (4) and (19) from their abutments.

Manoeuvre the shoes and springs clear of the backplate (3) ensuring that the lower piston (27) does not fall from its cylinder.

Secure the piston in position with a rubber band, wire or string.

Re-Assembly

Apply white grease sparingly to the adjuster cam faces and shoe ends. Do not contaminate the linings with grease.

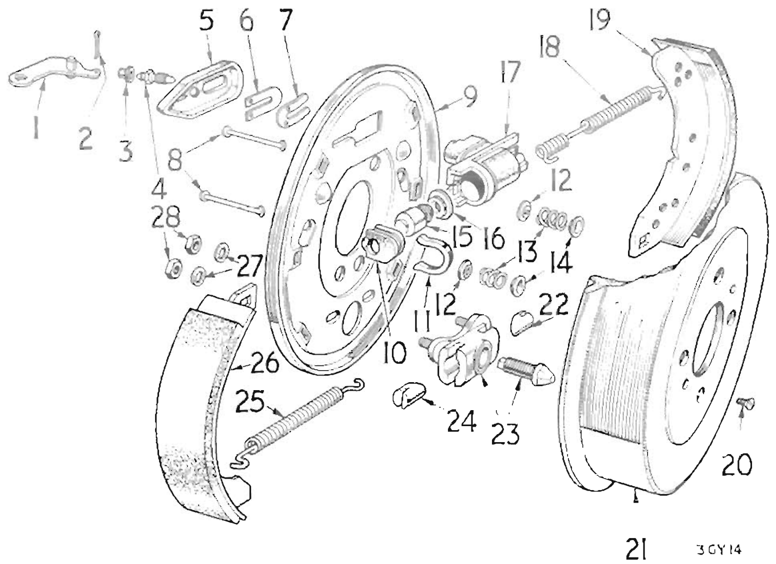
Assemble the shoes, pull-off springs and shoe anchor pins to the backplate, and remove the rubber band retaining the lower piston.

Refit the brake drum, adjust the brake as follows :

Adjustment

Each front brake has two adjusters. Operating each adjuster separately, turn it fully clockwise to lock, and turn it back by single notch increments until the drum is free to rotate.

Refit the road wheel, remove the chassis stands, tighten the wheel nuts and refit the nave plate.



1	Handbrake lever	16	Seal
2	Split pin	17	Wheel cylinder
3	Dust cap	18	Return spring
4	Bleed nipple	19	Brake shoe
5	Dust excluder	20	Countersunk screw
6	Retaining clip	21	Brake drum
7	Retaining clip	22	Adjuster tappet
8	Steady pins	23	Adjuster wedge and body
9	Backplate	24	Adjuster tappet
10	Dust excluder	25	Return spring
11	Clip	26	Brake shoe
12	Steady pin cups	27	Shakeproof washers
13	Springs	28	Nuts
14	Steady pin cups		
15	Piston		

Fig. 16. Exploded rear brake assembly (L.H. side)

Rear Brake Shoes (All Models)

To Remove

Jack up the rear of the car and place it on chassis stands. Remove the nave plate, road wheel, brake drum and turn the adjuster anti-clockwise to the off position.

Withdraw the split pin (2), release the anchor pins (8), cups (12) and (14) and springs (13).

Detach the return springs (18) and (25) by lifting the shoes out of their abutments, disengaging the front shoe from the handbrake lever, and manoeuvring the shoes until the tension of the return springs is released.

Re-Assembly

Lightly smear the shoe steady posts and the ends of the shoe webs with white (zinc base) grease, taking care not to contaminate the linings.

Assemble the springs to the shoes, as shown on Fig. 17, engage the front shoe with its abutments, ensuring that the handbrake lever enters the slotted shoe web ; then manoeuvre the rear shoe into position.

Fit a new split pin (2) to the handbrake lever (1).

Refit the brake drum and adjust the shoe clearances as follows :

Adjustment

Each rear wheel brake is provided with one adjuster which is turned fully clockwise to lock. Turn the adjuster anti-clockwise by single notch increments until the drum is free to rotate.

Refit the road wheel, remove the chassis stands, tighten the wheel nuts and refit the nave plate.

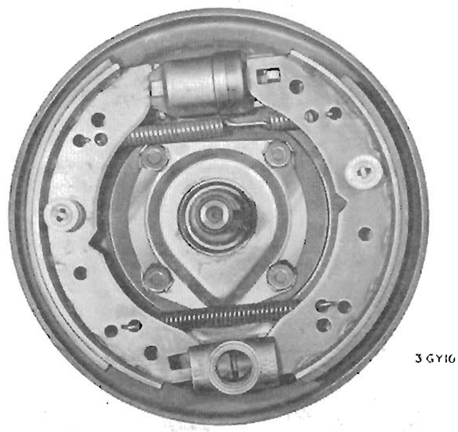


Fig. 17.

Arrangement of brake shoes and pull-off springs (rear right-hand side)

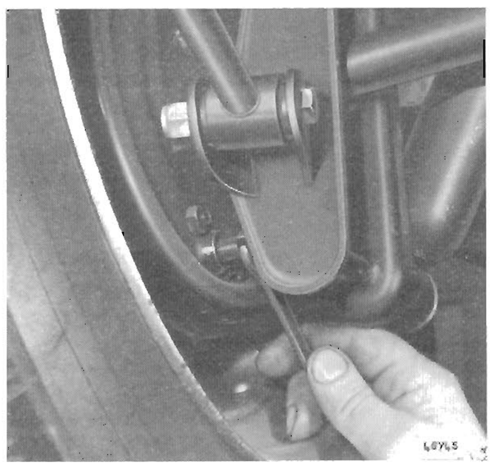
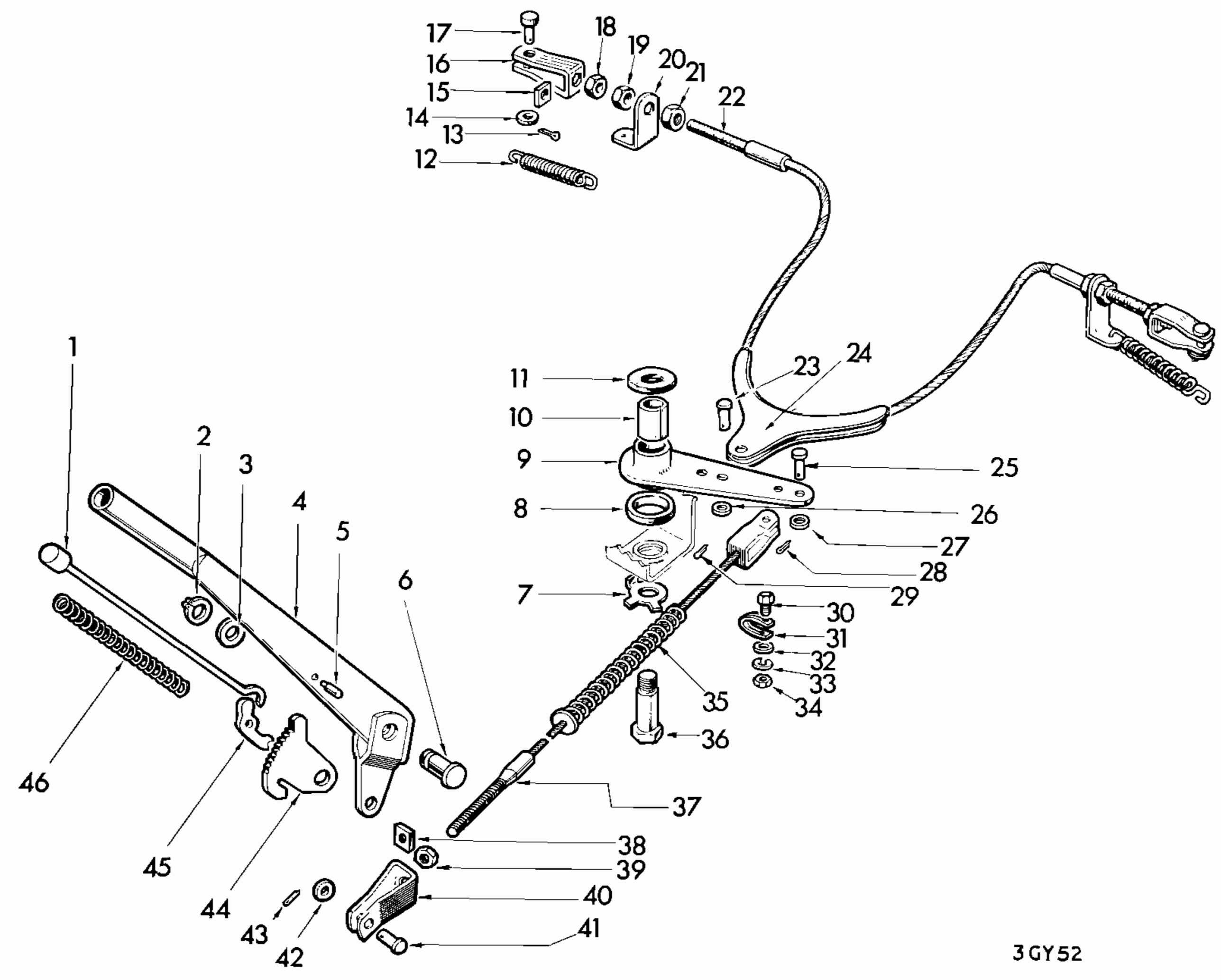


Fig. 18.

Rear brake shoe adjuster

ARRANGEMENT OF HANDBRAKE COMPONENTS



1 Pawl release rod
2 Circlip
3 Plain washer
4 Handbrake lever
5 Pawl pivot pin
6 Pivot pin
7 Lock plate
8 Rubber seal
9 Relay lever
10 Bush
11 Felt seal
12 Pull-off spring
13 Split pin
14 Plain washer
15 Square nut
16 Clevis
17 Clevis pin
18 Locknut
19 Adjusting nut
20 Adjustable spring anchor
21 Locknut
22 Secondary cable
23 Clevis pin
24 Compensator sector
25 Clevis pin
26 Plain washer
27 Plain washer
28 Split pin
29 Split pin
30 Clamp bolt
31 Clamp
32 Plain washer
33 Spring washer
34 Nut
35 Spring
36 Pivot bolt
37 Primary cable
38 Square nut
39 Locknut
40 Clevis
41 Clevis pin
42 Plain washer
43 Split pin
44 Ratchet
45 Pawl
46 Pawl spring

Fig. 19. Arrangement of Handbrake components

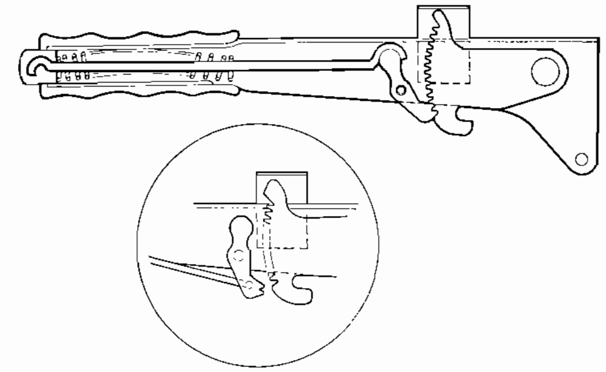


Fig. 20. Arrangement of Herald 1200, 12/50 and Vitesse handbrake lever ratchet and pawl. Inset shows Spitfire arrangement

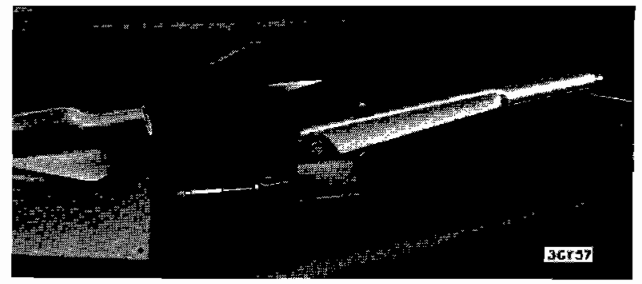


Fig. 21. Primary cable adjuster

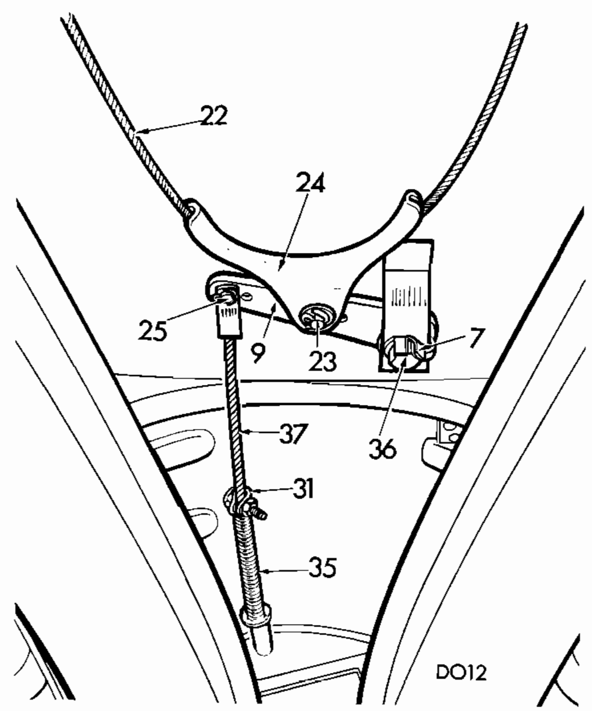


Fig. 22. Handbrake relay lever and compensator

HANDBRAKE MECHANISM

Handbrake Lever
To Remove and Dismantle

Remove the front seats and the centre carpet. Take out four screws to release the combined cover/gaiter and manoeuvre it clear of the handbrake lever.

Release the handlever by removing the circlip (2), washer (3), pivot pin (6) and the clevis pin (41). Take out the ratchet (44) and withdraw the pawl release rod (1), spring (46) and pawl (45).

To Re-Assemble and Refit

Reverse the foregoing procedures.

Primary Cable
To Remove

Take out the pivot pin (6), lift the handlever from its bracket and withdraw the clevis pin (41).

Unscrew the clevis fork (40) and pull the free end of the cable through the floor. Withdraw the clevis pin (25) and remove the clamp (31) from the cable.

To Refit

Reverse the removal procedure and, with the handlever in the off position, adjust the cable to position the relay as shown on Fig. 25.

Moving the clamp (31) against the spring (35), compress the spring approximately 1″ (25·4 mm.) and tighten the clamp. Ensure that the spring does not become coil bound when the handbrake is fully applied.

Relay Lever
To Remove

Take out the clevis pin (25), unscrew the pivot bolt (36) and withdraw the relay clear of the propeller shaft. Remove the clevis pin (23) and, if necessary, renew the bearing (10).

To Refit

Insert the clevis pin (23), securing the compensator sector (24) to the relay lever (9), and fit plain washer (26) and split pin (29).

Attach the primary cable clevis fork to the outer hole of the relay lever (9). Smear the relay lever bush (10) and the pivot bolt (36) with grease, and assemble the lever to the body floor bracket, placing the felt seal (11) above the lever and the rubber seal (8) below, as shown on Fig. 19.

Insert the pivot bolt (36) with its tab washer (7) through the relay lever and floor bracket. Tighten the bolt and lock with the tab washer.

Secondary Cable

To Remove

Release the cable "pull-off" springs (12) from the cable brackets (20) and remove the clevis pins (17).

Release the tab washer (7), remove the pivot bolt (36), lower the relay lever (9) and remove the clevis pin (23).

Lift off the compensating sector (24) and remove the cable by pulling it through the curved guides shown on Fig. 24.

To Refit

Feed the threaded ends of the cable through the left- and right-hand guides.

Assemble the compensating sector (24) over the cable and secure it to the relay lever (9) with the clevis pin (23). Refit the relay lever.

Whilst the cable is still slack, apply grease liberally to the cable guides and compensator sector, working the cable backwards and forwards to distribute the grease.

Re-assemble and connect both ends of the cable to the brake levers as shown on Fig. 23.

Handbrake Adjustment

Under normal circumstances, adjustment of the rear brakes will automatically provide satisfactory handbrake adjustment. Stretched cables will necessitate further adjustment as follows:—

1. Jack up the rear wheels, release the handbrake and lock the brake drums by screwing each brake adjuster fully in.
2. Disconnect the pull-off spring (12) and remove the clevis pin (17) from the brake lever.
3. Adjust the clevis (16) at each end of the cable by equal amounts to reduce the cable slackness. The cables are too tight if the clevis pins cannot be easily inserted without straining the cables.

   Secure the clevis pins, re-connect the spring (12) and readjust the cable brackets (20) to provide slight spring tension. Turn each rear brake adjuster back by one notch increments until the wheels are free to rotate. Lower the vehicle and remove the jack.

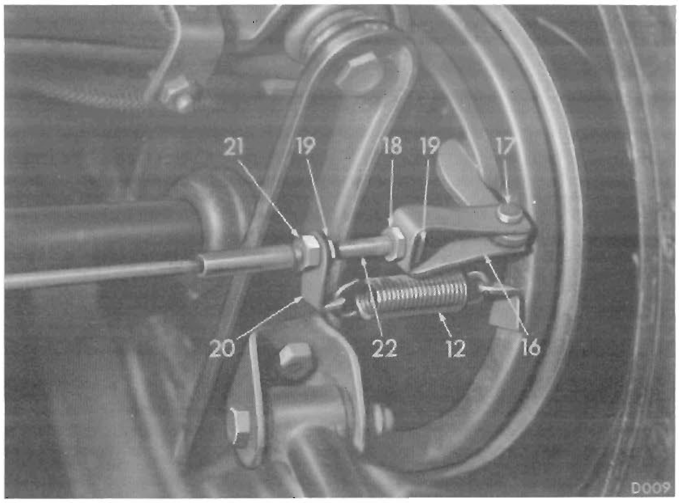


Fig. 23. Handbrake secondary cable arrangement

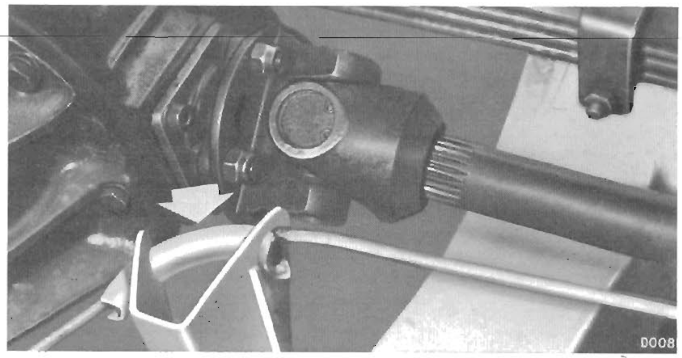


Fig. 24. Secondary cable guides

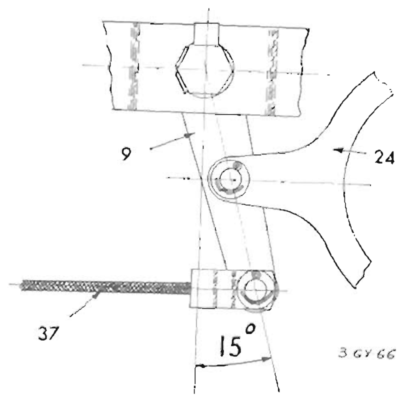


Fig. 25. Showing the correct angular position of the relay lever when the brakes are released

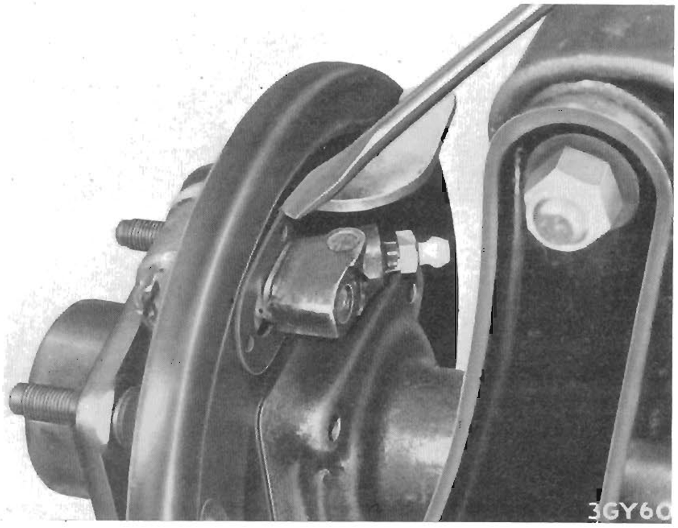


Fig. 26. Removing retaining plate from rear wheel cylinder

Fig. 27. Removing rear wheel cylinder

Fig. 28. Churchill brake efficiency recorder

FRONT WHEEL CYLINDERS

Removal

1. Drain the hydraulic system through the brake bleed nipple, and remove the brake shoes.
2. Disconnect the flexible brake hose from the steel pipe and its support bracket. Unscrew the hose from the cylinder.
3. Detach the bridge pipe from the two wheel cylinders, remove the setscrews and withdraw the cylinders from the backplate.

To Refit

Reverse the removal procedure, adjust the brakes and bleed the hydraulic system.

REAR WHEEL CYLINDERS

Removal

1. Repeat operations 1 and 2 above.
2. Disconnect the handbrake cable clevis from its lever.
3. Remove the dust excluder, retaining plate and spring clip, and withdraw the cylinder from the backplate.

To Refit

Reverse the above procedure.

TO RENEW PISTON SEALS

1. Remove the rubber dust excluder and withdraw the piston.
2. Remove the old seal from the piston and, using fingers only, fit the new seal with its lip towards the bottom of the cylinder.
3. Lubricate the seal with hydraulic fluid, fit the piston into the cylinder and refit the dust excluder.

WHEELS AND TYRES

Removal

1. Using the special lever provided in the tool kit, remove the nave plate as shown on Fig. 1. **Partially** slacken the wheel nuts.
2. Chock the wheels, jack up the car, unscrew the wheel nuts and remove the road wheel.

Refitting

Smear the attachment studs with oil or grease to prevent corrosion, fit the wheel, and secure it by fitting and progressively tightening the nuts. Refit the nave plate by engaging its rim over two of the attachment projections and springing it over the third projection by giving it a sharp blow with the palm of the hand.

Wheel Tolerances

S.M.M. and T. Standard tolerances are:

(a) Wobble.
The lateral variation measured on the vertical inside face of a flange should not exceed $\frac{3}{32}$" (2·4 mm.).

(b) Lift.
The difference between the high and low points of a rotating wheel measured at any location on either tyre bead seat should not exceed $\frac{3}{32}$" (2·4 mm.).

Radial and lateral eccentricity outside these limits contribute to static and dynamic unbalance respectively. Severe radial eccentricity imposes intermittent loading on the tyre, which cannot be rectified by static or dynamic balancing. Irregular tyre wear will result from this defect.

In the interests of safety, renew wheels having damaged or elongated stud holes, and as there is no effective method of correcting pressed steel wheels which do not conform to the above tolerances, these should also be renewed.

Ensure that rim seatings and flanges in contact with the tyre beads are maintained free from rust and dirt.

Tyre and Wheel Balance

The original degree of balance is not necessarily maintained, and it may be affected by uneven tread wear, by repairs, by tyre removal and refitting or by wheel damage and eccentricity. The vehicle may also become more sensitive to unbalance due to normal wear of moving parts.

If roughness or steering troubles develop and mechanical investigation fails to disclose a possible cause, wheel and tyre balance should be suspected. Static unbalance can be measured when the tyre and wheel assembly is stationary. Dynamic unbalance can be detected only when the assembly is revolving.

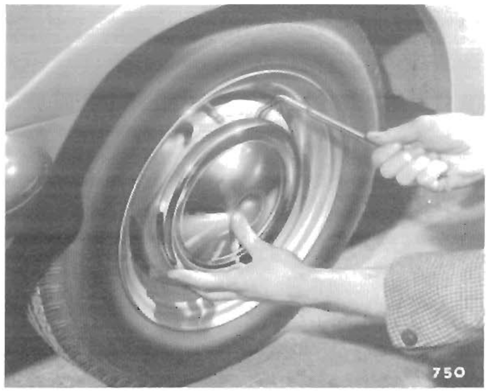


Fig. 1. Removing nave plate (Herald 1200, 12/50 and Spitfire)

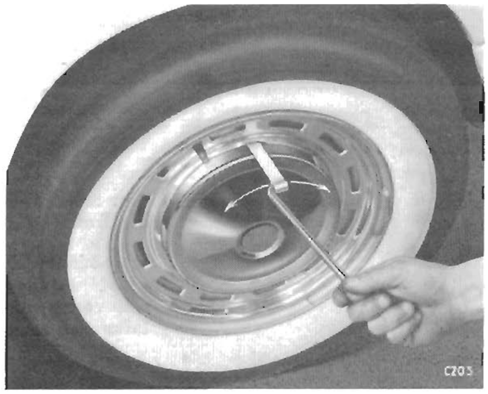


Fig. 2. Removing nave plate (Vitesse)

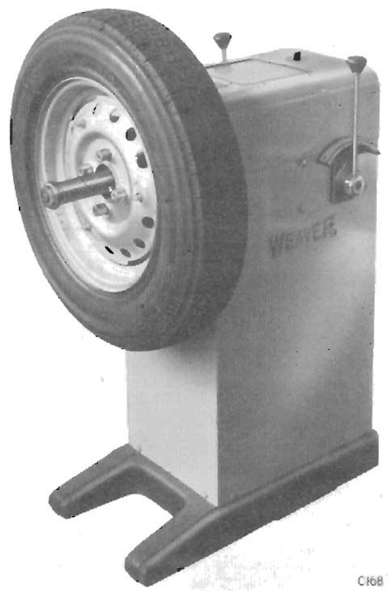


Fig. 3. Checking the dynamic balance of road wheel and tyre assembly

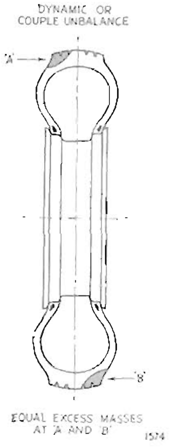


Fig. 4. Showing equal masses at "A" and "B" which result in dynamic balance

There may be no heavy spot—that is, there may be no natural tendency for the assembly to rotate about its centre due to gravity, but the weight may be unevenly distributed each side of the tyre centre line (Fig. 4). Laterally eccentric wheels give the same effect. During rotation the offset weight distribution sets up a rotating couple which tends to steer the wheel to right and left alternately. Dynamic unbalance of tyre and wheel assemblies should be measured on a Balancing Machine and suitable corrections made when vehicle shows sensitivity to this form of unbalance. Where it is clear that a damaged wheel is the primary cause of severe unbalance it is advisable to renew the wheel.

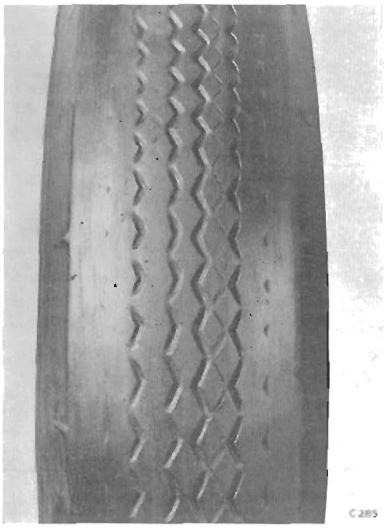


Fig. 5. Tyre wear resulting from under-inflation

Under-inflation causes fast wear, excessive heating, and can bring about tyre failure through blow-out

FACTORS AFFECTING TYRE LIFE

Inflation Pressures

There is an average loss of 13 per cent. tread mileage for every 10 per cent. reduction in inflation pressure below the recommended figure.

Severe and persistent under-inflation produces unmistakable evidence on the tread (Fig. 5). It also causes structural failure due to excessive friction and temperature within the casing.

Pressures higher than those recommended reduce tread life by concentrating the load on a small tread area. Excessive pressures overstrain the casing cords, cause rapid wear, and make the tyres more susceptible to impact fractures and cuts.

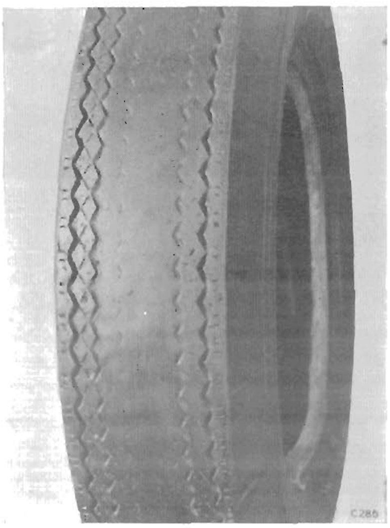


Fig. 6. Tyre wear resulting from over-inflation

This causes the fabric to be easily damaged, and seriously shortens tyre life by rapidly wearing the centre of the tread

Effect of Temperature

Air expands with heating and tyre pressures increase as the tyres warm up. Pressures increase more in hot weather than in cold weather and as a result of high speed.

Pressures in warm tyres should not be reduced to standard pressure for cold tyres. "Bleeding" the tyres increases their deflections and causes their temperatures to climb still higher. The tyres will also be under-inflated when they have cooled.

The rate of tread wear may be twice as fast at 50 m.p.h. as at 30 m.p.h.

High speed causes increased temperatures due to more deflections per minute and a faster rate of deflection and recovery. The resistance of the tread to abrasion decreases with increased tyre temperature.

Camber, Castor and King Pin Inclination

These angles normally require no attention unless they have been disturbed by a severe impact or abnormal wear of front end bearings. It is always advisable to check them if steering irregularities develop.

Wheel camber, usually combined with road camber, causes a wheel to try to turn in the direction of lean, due to one side of the tread attempting to make more revolutions per mile than the other side. The resulting increased tread shuffle on the road and the off centre tyre loading tend to cause rapid and one-sided wear. Unequal cambers introduce unbalanced forces which try to steer the car one way or the other. This must be countered by steering in the opposite direction which increases tread wear.

Castor and king pin inclination by themselves have no direct bearing on tyre wear but their measurement is often useful for providing a general indication of the condition of the front end geometry and suspension.

Braking

Braking factors not directly connected with the method of driving can affect tyre wear. Correct balance, lining clearances, and freedom from binding are important. Braking may vary between one wheel and another.

Tyre wear may be affected if shoes are re-lined with non-standard material having unsuitable characteristics or dimensions. Front tyres, and particularly near front tyres, are very sensitive to any conditions which add to the severity of front braking in relation to the rear.

Local "pulling up" or flats on the tread pattern can often be traced to brake drum eccentricity (Fig. 8). The braking varies during each wheel revolution as the minor and major axes of the eccentric drum pass alternatively over the shoes.

Wheel Alignment and Road Camber

An upstanding sharp "fin" on the edge of each pattern rib is a sure sign of misalignment and it is possible to determine from the position of the "fins" whether the wheels are "toed in" or "toed out" (Fig. 9).

"Fins" on the inside edges of the pattern ribs indicate toe in. "Fins" on the outside edges, indicate toe out.

Sharp pattern edges may be caused by road camber even when wheel alignment is correct. In such cases it is better to make sure by checking with an alignment gauge.

Road camber affects the direction of the car by imposing a side thrust and if left to follow its natural course the car will drift towards the nearside. This is instinctively corrected by steering towards the road centre.

Fig. 7. The results of excessive front wheel camber

Possibly caused by wear or impact damage to the suspension unit

Fig. 8. Spotty tread wear

Resulting from mechanical front end faults such as inefficient suspension, out of balance wheel assembly or grabbing brakes

Fig. 9. Tyre wear resulting from front wheel misalignment

Excessive toe-in or toe-out will cause a feather edge of rubber on the tread design

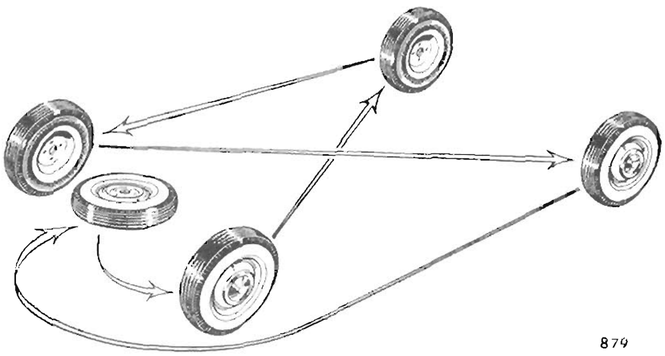


Fig. 10. Diagram of wheel interchanging

Tyre Interchanging

Uneven tyre wear may be caused by road conditions, traffic conditions, driving methods and certain features of design which are essential to the control, steering and driving of a vehicle. Close attention to inflation pressures and the mechanical condition of the vehicle will not always prevent irregular wear. It is therefore recommended that front tyres be interchanged with rear tyres at least every 3,000 miles. Diagonal interchanging between near front and off rear and between off front and near rear provides the most satisfactory first change because it reverses the direction of rotation.

Subsequent interchanging of front and rear tyres should be as indicated by the appearance of the tyres, with the object of keeping the wear of all tyres even and uniform.

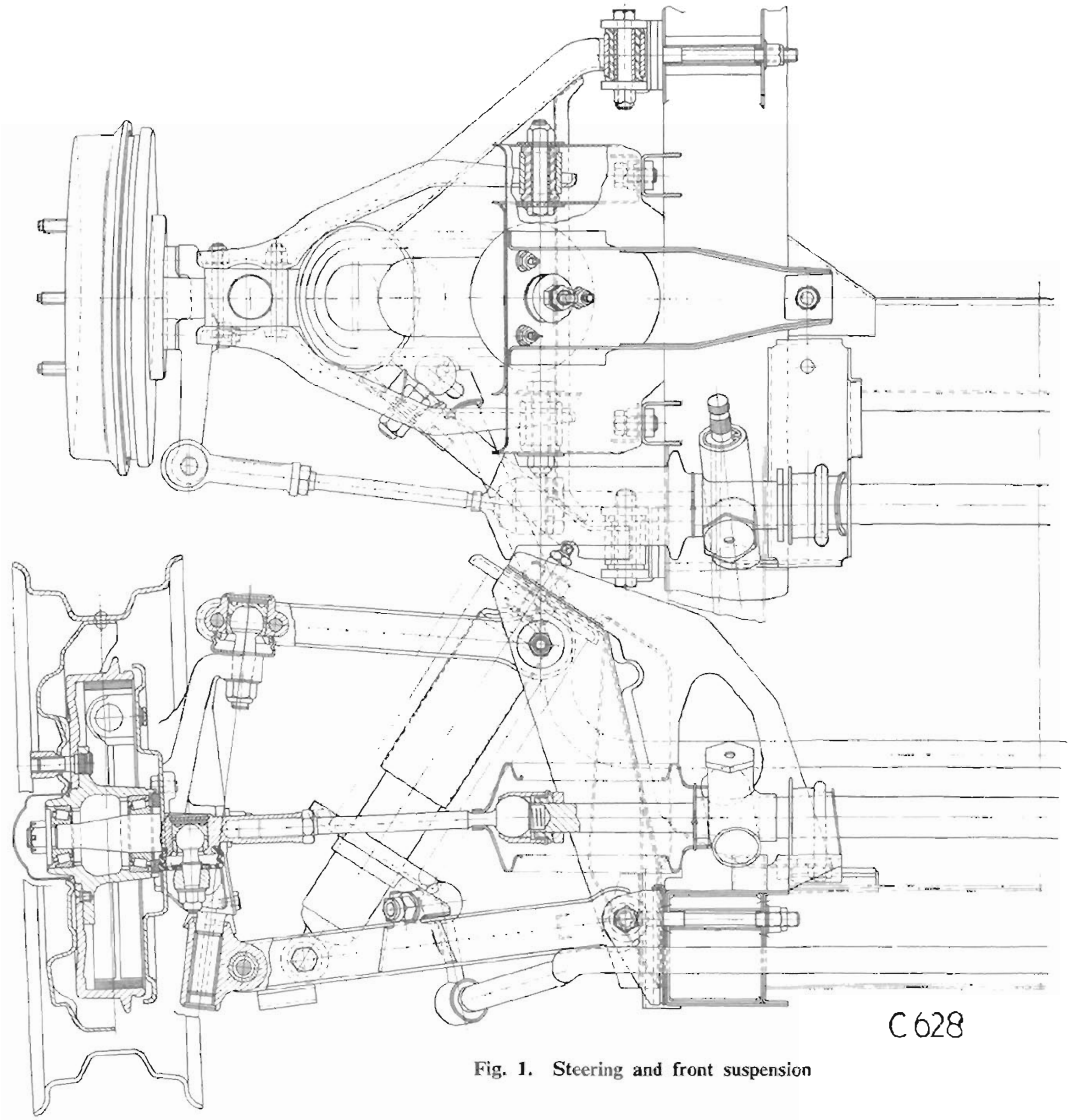


Fig. 1. Steering and front suspension

FRONT SUSPENSION GEOMETRY DATA

ITEM	DESCRIPTION	DIMENSIONS
Upper Wishbone	Inner fulcrum centre to outer fulcrum centre	7·75″ (19·685 cm.)
Lower Wishbone	Inner fulcrum centre to outer fulcrum centre	10·13″ (25·433 cm.)
Steering Axis Inclination	.. ..	6¾°
Toe-in (front & rear)	Static laden (See Page 4·201)	0″ to $\frac{1}{16}$″ (1·6 mm.)
Track at Ground Level	Distance between wheel centres at ground level (static laden)	Drum brakes 48″ (121·9 cm.) Disc brakes 48·94″ (124·3 cm.)
Camber angle Herald 1200 Herald 12/50 Vitesse	See Page 4·203 (Static laden)	Front 2° pos. Rear 2° neg.
Castor angle	See Page 4·203 (Static laden)	4° pos.
Spitfire Camber Angle	See Page 4·203 (Static laden)	Front 2° pos. Rear 3° neg.

TRIUMPH

HERALD 1200, 12/50, VITESSE
AND
SPITFIRE

WORKSHOP MANUAL

GROUP 4

Comprising :

GROUP 4

TRIUMPH
HERALD 1200, 12/50, VITESSE
and
SPITFIRE MODELS

GROUP 4

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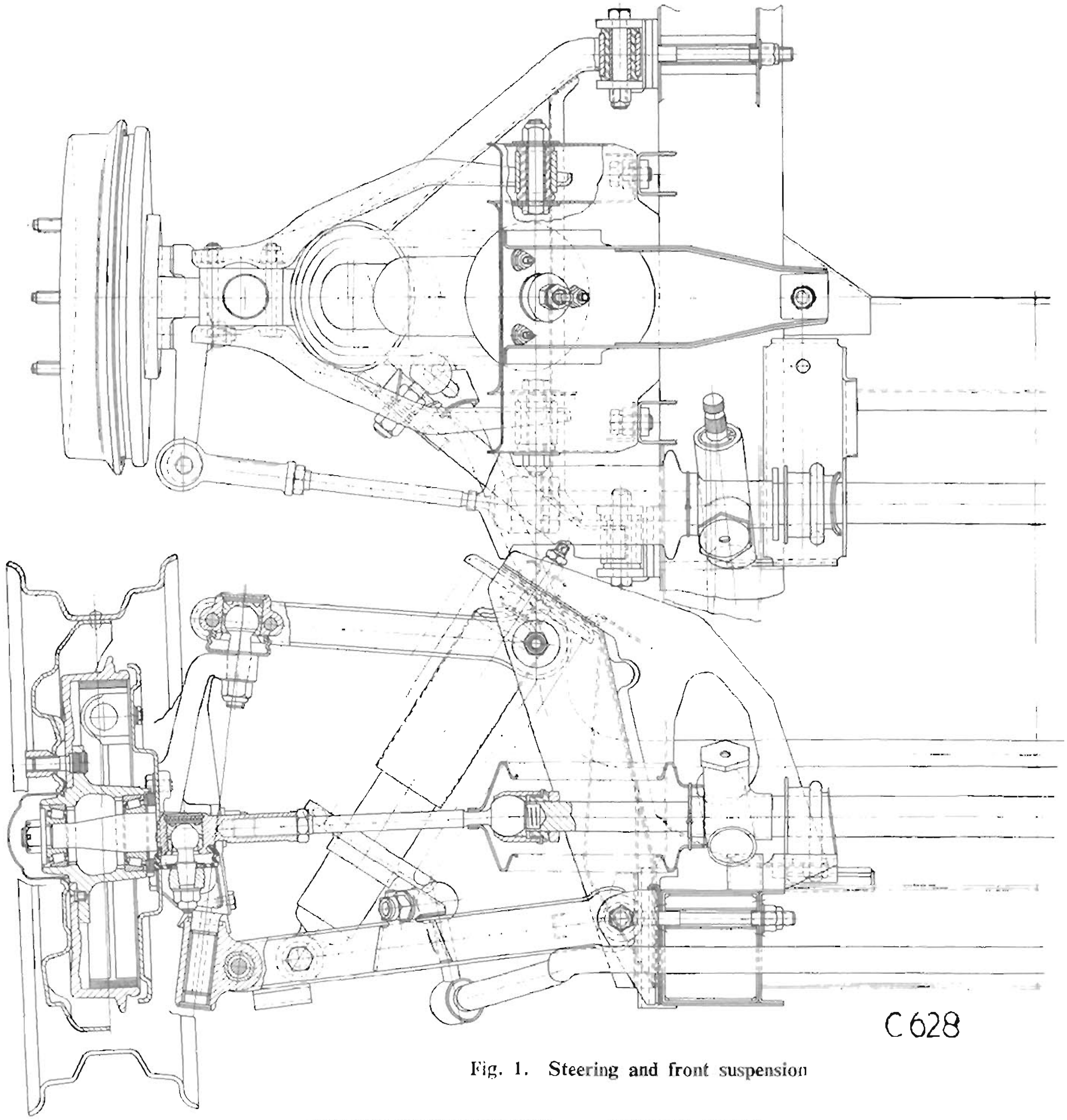

Fig. 1. Steering and front suspension

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Lower Wishbone	Inner fulcrum centre to outer fulcrum centre	10·13" (25·433 cm.)
Steering Axis Inclination	.. ..	$6\frac{3}{4}$°
Toe-in (front & rear)	Static laden (See Page 4·201)	0" to $\frac{1}{16}$" (1·6 mm.)
Track at Ground Level	Distance between wheel centres at ground level (static laden)	Drum brakes 48" (121·9 cm.) Disc brakes 48·94" (124·3 cm.)
Camber angle Herald 1200 Herald 12/50 Vitesse	See Page 4·203 (Static laden)	Front 2° pos. Rear 2° neg.
Castor angle	See Page 4·203 (Static laden)	4° pos.
Spitfire Camber Angle	See Page 4·203 (Static laden)	Front 2° pos. Rear 3° neg.

FRONT ROAD SPRINGS

MODEL	PART No.	FREE LENGTH Approx.	FITTED LENGTH	FITTED LOAD	RATE	IDENTIFICATION
Herald Heavy Duty and Courier Van	209033	10·97″ 278·6 mm.	8·18″ ± ·09″ 207·8 mm. ± 2·29 mm.	790 lbs. 358·7 kg.	284 lb/in. 5071 kg/m.	Yellow
Spitfire	209685	12·59″ 319·8 mm.	7·80″ ± ·09″ 198·1 mm. ± 2·29 mm.	718 lb. 325·97 kg.	150 lb/in. 2875 kg/m.	Green
	210566	12·21″ 310·2 mm.	7·42″ ± ·09″ 188·5 mm. ± 2·29 mm.	718 lbs. 325·97 kg.	150 lb/in. 2875 kg/m.	Light blue
Herald & 12/50 Interchangeable	208056	12·08″ 306·8 mm. 12·11″ 307·6 mm.	8·18″ ± ·09″ 207·8 mm. ± 2·29 mm. 8·18″ ± ·09″ 207·8 mm. ± 2·29 mm.	790 lb. 358·7 kg. 790 lb 358·7 kg.	203 lb/in. 3624 kg/m. 201 lb/in. 3590 kg./m.	White
Vitesse	209009	12·49″ 317·3 mm.	8·18″ ± ·09″ 207·8 mm. ± 2·29 mm.	940 lb. 426 kg.	229 lb/in. 4089 kg/m.	Brown
Herald (Competition)	209013	10·47″ 282 mm.	7·68″ ± ·09″ 193 mm. ± 2·29 mm.	790 lb. 358·7 kg.	284 lb/in. 5071 kg/m.	Black

Spring packings, Part Number 125441 fitted between upper spring plate and suspension brackets on both sides of vehicle when equipped with heavy duty springs. Fitted to L.H. steering vehicles with normal spring on L.H. side only. (Except Heavy Duty springs, Estate Cars and Courier Van.)

REAR ROAD SPRINGS

MODEL	PART No.	BLADE THICKNESS	No. OF BLADES	LADEN CAMBER	LOAD	RATE
Herald Courier	305686	0·3125″ 7·94 mm.	8	1·75″ Neg. ± ·13″ 44·45 mm. ± 3·3 mm.	1910 lb. 903 kg.	552 lb/in. 9855 kg/m.
Herald Estate Car Vitesse Estate Car	304860	0·31″ 7·87 mm.	7	1·63″ Neg. ± ·13″ 41·4 mm. ± 3·3 mm.	1735 lb. 817·7 kg.	510 lb/in. 9106 kg/m.
Herald & Vitesse Coupé	303724	0·2188″ 5·56 mm.	8	0·93″ Neg. ± ·13″ 23·62 mm. ± 3·3 mm.	1010 lb. 458·54 kg.	202 lb/in. 3607 kg/m.
Herald & Vitesse Convertibles	305945	0·2188″ 5·56 mm.	11	1·94″ Neg. ± ·13″ 49·28 mm. ± 3·3 mm.	1420 lb. 664·7 kg.	270 lb/in. 4821 kg/m.
Herald & Vitesse Saloon & 12/50	303727	0·2188″ 5·56 mm.	11	1·54″ Neg. ± ·13″ 39·12 mm. ± 3·3 mm.	1420 lb. 664·7 kg.	270 lb/in. 4821 kg/m.
Spitfire	305894	0·2188″ 5·56 mm.	7	1·88″ Neg. ± ·13″ 38·9 mm. ± 3·3 mm.	945 lb. 429·1 kg.	166 lb/in. 2964 kg/m.
Herald Saloon and Estate Competition	305544	0·31″ 7·87 mm.	7	2·25″ Neg. ± ·13″ 57·2 mm. ± 3·3 mm.	1735 lb. 817·7 kg.	510 lb/in. 9106 kg/m.
Herald Saloon, Coupé, Convertible Competition	305543	0·2188″ 5·56 mm.	12	2·5″ Neg. ± ·13″ 63·5 mm. ± 3·3 mm.	1420 lb. 644·68 kg.	295 lb/in. 5267 kg/m.
Herald & Vitesse Saloon, Convertible Heavy Duty	305288	0·2188″ 5·56 mm.	12	1·54″ Neg. ± ·13″ 39·12 mm. ± 3·3 mm.	1420 lb. 644·68 kg.	295 lb/in. 5267 kg/m.

DAMPERS — FRONT

MODEL	DAMPER PART NUMBER	DAMPER AND SPRING UNIT PART NUMBER
Herald Saloon, Coupé, Convertible	206262	208176
Vitesse HEAVY DUTY	134635	134811
Herald Estate Car	208022	208178
Courier Van and Herald HEAVY DUTY	208022	209317
Herald Saloon, Coupé, Convertible, Estate Car, Courier Van	134635	209679
Spitfire	206262	209766
Vitesse and Herald Competition	209021	209030

DAMPERS — REAR

MODEL	DAMPER PART NUMBER
Herald and Vitesse Saloon, Coupé, Convertible	123100
Spitfire	123100
Herald and Vitesse and Courier and Heavy Duty for Saloon, Coupé, Convertible ..	132111
Herald and Vitesse Competition	209022

FRONT HUB BEARINGS

	HERALD & SPITFIRE	VITESSE
Outer		
Standard Part No.	100536	129897
British Timken Part No. — Cone	03062	LM.11949
— Cup	03162	LM.11910
Bore	0·6255″ (15·89 mm.) 0·6250″ (15·875 mm.)	0·75005″ (19·051 mm.) 0·750″ (19·050 mm.)
O.D.	1·6256″ (41·293 mm.) 1·6250″ (41·275 mm.)	1·782″ (45·245 mm.) 1·781″ (45·244 mm.)
Inner		
Standard Part No.	100573	129897
British Timken Part No. — Cone	07100S	L.44649
— Cup .	07210X	L.44610
Bore	1·0006″ (27·415 mm.) 1·0000″ (25·4 mm.)	1·0633″ (27·008 mm.) 1·0625″ (26·98 mm.)
O.D.	2·0006″ (50·815 mm.) 2·0000″ (50·8 mm.)	1·981″ (50·26 mm.) 1·980″ (50·292 mm.)

FRONT SUSPENSION

General

Before disturbing any part of the front suspension assembly, jack up the front of the vehicle and lower it on to stands placed under the chassis sidemembers, rearward of the front cross-member. Remove the road wheels and dismantle either R.H. or L.H. suspension unit as follows:—

Suspension Sub-Assembly Removal

1. Open bonnet.
2. Slacken the impact clamps (see Page 4·212) and withdraw steering column from coupling (only necessary when removing sub-assembly on driver's side).
3. Empty the hydraulic system and disconnect the hydraulic brake flexible hose from the bracket or side valance (Fig. 2).
4. On Herald 1200, Mk. II, 12/50 and Vitesse models, remove the nut and bolt securing each valance to the sub-frame.
5. Disconnect the anti-roll bar link (2) from the lower wishbone (Fig. 9).
6. Remove the nyloc nut, plain washer, and using an extractor (Fig. 3), detach the tie rod end from the steering arm.
7. Note the number and position of shims (31) between the chassis frame and front and rear lower wishbone fulcrum brackets (32). Remove the nyloc nut (29) and washer (30) securing each fulcrum bracket to the chassis.
8. Remove 4 bolts (1) Fig. 4, spring and plain washers and tapping plates from the outer face of the sub-frame and one bolt (2), spring and plain washer securing the inner end of the sub-frame to the chassis frame.
9. Remove the suspension sub-assembly from the chassis frame.

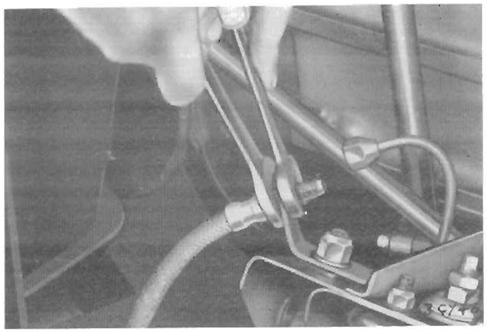


Fig. 2. Disconnecting Hydraulic brake hose

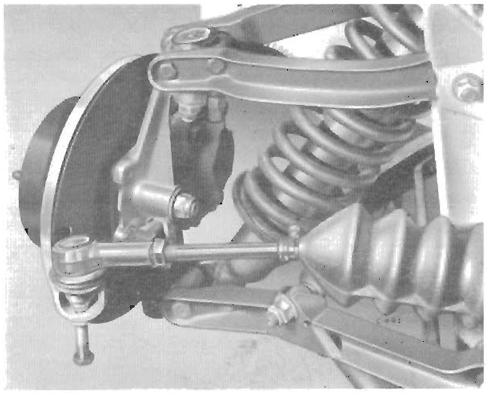


Fig. 3. Using Tool No. S.160 to remove tie-rod end from steering lever

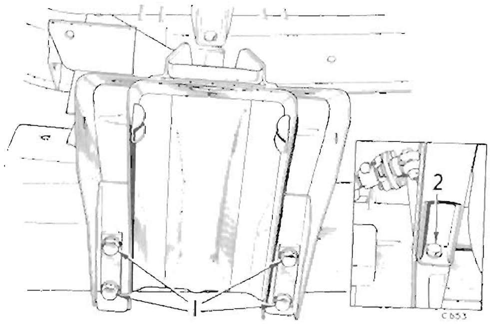


Fig. 4. sub-frame attachment points

1 Outer bolts
2 Inner bolts

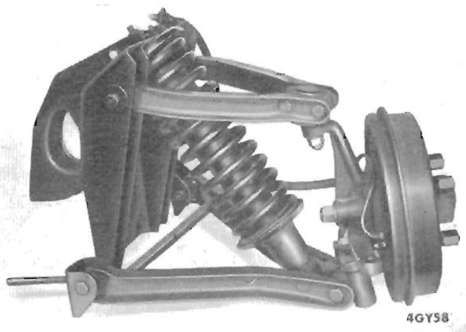
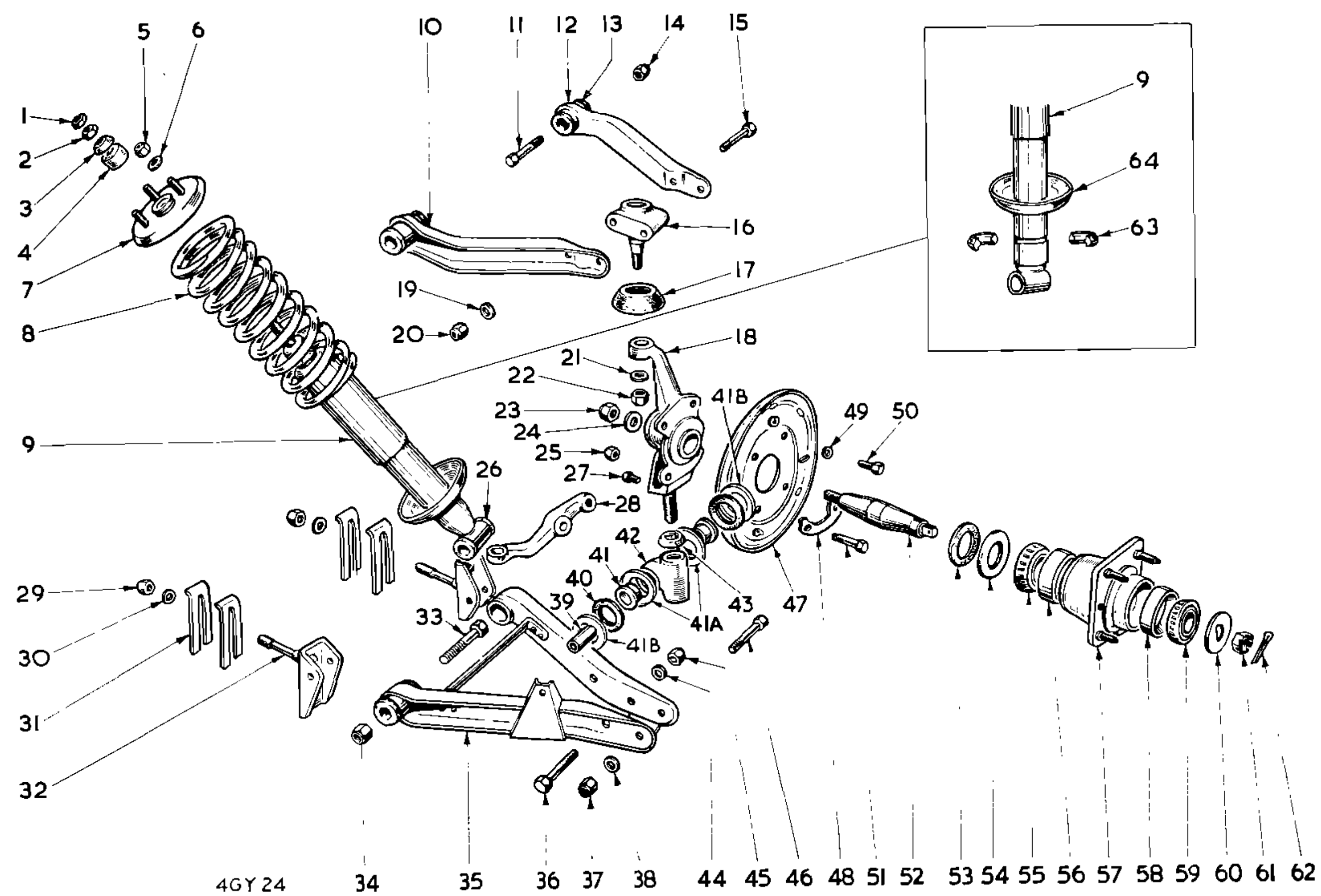


Fig. 5. Suspension sub-assembly detached from frame

EXPLODED

ARRANGEMENT OF

FRONT SUSPENSION DETAILS



1 Locknut
2 Nut
3 Washer
4 Rubber bush
5 Nyloc nut
6 Plain washer
7 Upper spring pan
8 Road spring
9 Damper
10 Front upper wishbone arm
11 Bolt
12 Rear upper wishbone arm
13 Rubber bush
14 Nyloc nut
15 Bolt
16 Ball joint
17 Rubber gaiter
18 Vertical link
19 Plain washer
20 Nyloc nut
21 Plain washer
22 Nyloc nut
23 Nyloc nut
24 Plain Washer
25 Nyloc nut
26 Rubber bush
27 Plug
28 Steering arm
29 Nyloc nut
30 Plain washer
31 Shim
32 Inner fulcrum bracket
33 Fulcrum bolt
34 Nyloc nut
35 Lower wishbone assembly
36 Suspension unit fulcrum bolt
37 Nyloc nut
38 Plain washer
39 Steel bush
40 Rubber seal
41 Nylon bush
41A Washer
41B Washer
42 Lower trunnion
43 Rubber seal
44 Plain washer
45 Nyloc nut
46 Fulcrum bolt
47 Brake backplate
48 Locking plate
49 Spring washer
50 Setscrew
51 Bolt
52 Stub axle
53 Felt seal
54 Seal retainer
55 Taper roller bearing—inner
56 Roller bearing outer ring
57 Hub
58 Roller bearing outer ring
59 Taper roller bearing—outer
60 "D" washer
61 Slotted nut
62 Split pin
63 Spring retaining collet
64 Spring cup

Fig. 6. Exploded front suspension. Inset Woodhead-Monroe type

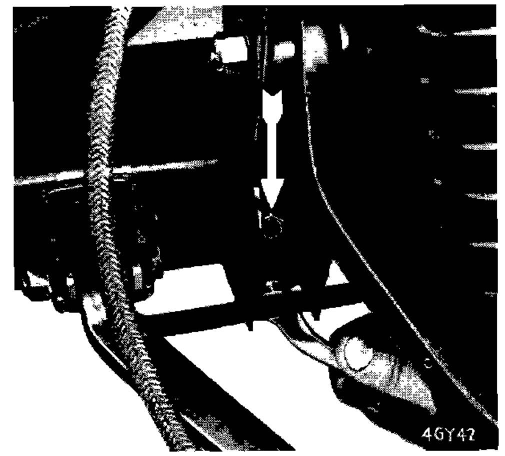


Fig. 7. Tightening sub-frame attachment bolts

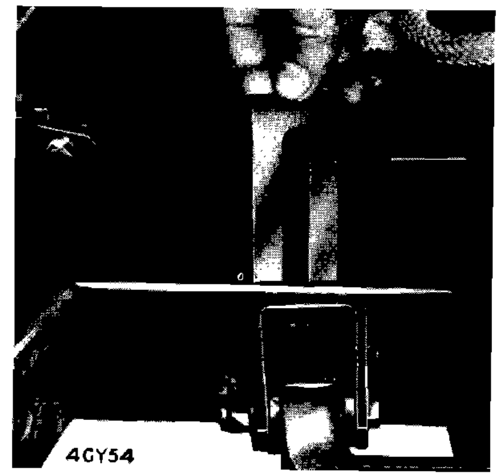


Fig. 8. Fitting shims between lower fulcrum bracket and chassis frame

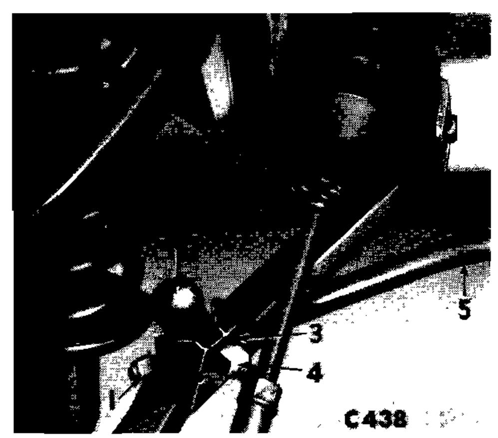


Fig. 9. Anti-roll bar attachment to lower wishbone

To Refit

1. Insert the lower inner fulcrum bracket studs through the holes in the chassis frame and secure with washers (30) and nyloc nuts (29). Insert the shims (31) between the brackets (32) and chassis frame, ensuring that they occupy their original positions. Tighten the nyloc nuts (29).
2. Offer up the sub-frame and secure it with the inner attachment bolt, spring and plain washer, and four outer bolts, spring and plain washers (Fig. 7) and two tapping plates. Finally tighten the bolts.
3. Refit the steering tie rod end to the steering arm.
4. Secure the valance or radiator stay to the sub-frame.
5. Re-connect the anti-roll bar link (2) to the lower wishbone and secure with a washer (3) and nyloc nut (4), Fig. 9.
6. Re-connect the flexible hose, refill and bleed the hydraulic system.
7. If necessary, re-connect the steering column to the flexible coupling and re-tighten the impact clamp.
8. Fit the road wheels and nuts.
9. Remove chassis stands and lower vehicle to ground.
10. Check and if necessary adjust the castor and camber angles and front wheel alignment.

Dismantling Suspension (Fig. 6)

The front suspension may be dismantled with the sub-frame either on or off the chassis frame, as follows:—

1. Remove the front road spring assembly as described on page 4·112. Dismantle the spring and damper as described on page 4·113.
2. Remove the two screws and detach the brake drum (Herald 1200 drum brakes).
   Remove bolts, Fig. 10, and detach the brake caliper assembly from its bracket (Herald 1200, Spitfire or Vitesse disc brakes). If the sub-frame is left in position, tie the caliper unit or brake assembly to the chassis frame, or detach the back plate.
3. Remove the grease cap, split pin (62), slotted nut (61) and washer (60), then detach the hub assembly from the stub axle (52). Dismantle the hub as described on page 4·116.
4. Release the tabwasher (48) and remove four bolts, tabwasher, washers and nyloc nut securing the steering arm (28), brake backing plate (47), or caliper mounting bracket and dust shield to the vertical link (18).
5. Remove nyloc nuts (14) and bolts (11) securing the inner ends of the upper wishbones to the sub-frame.
6. Release the anti-roll bar from the lower wishbone (Fig. 9). Remove nyloc nuts (29) and washers (30) and detach the lower wishbone brackets (32) from the chassis frame. Note the number and disposition of the shims (31).
7. Detach the vertical link and wishbone assembly from the chassis sub-frame.
8. Remove the nyloc nut (22), washer (21) and, using an extractor (Fig. 12), separate the upper ball joint (16) from the vertical link (18).
9. Remove the bolts (15), nyloc nuts (20) and detach the ball joint (16) from the outer ends of the wishbone arms (10) and (12).
10. Remove the nyloc nut (37), bolt (46) and detach the lower wishbone assembly (35) from the lower trunnion (42), followed by the steel bush (39), shouldered nylon bushes (41) and dust seals (40) (see Fig. 13).
11. Unscrew the vertical link (18) from the lower trunnion (42) and remove the dust seal (43).
12. Remove the nyloc nut (23), plain washer (24) and press the stub axle (52) from the vertical link (18).
13. If necessary, press the rubber bushes (13) from the inner ends of the upper and lower wishbone arms.

Fig. 10. Disc brake caliper attachment bolts

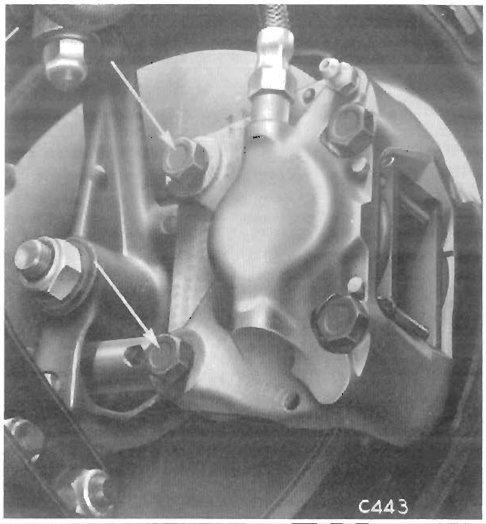


Fig. 11. Drum brake backplate attachments

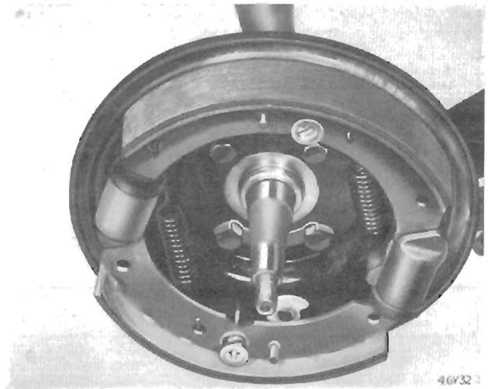


Fig. 12. Using extractor No. S166A to remove upper wishbone ball joint assembly

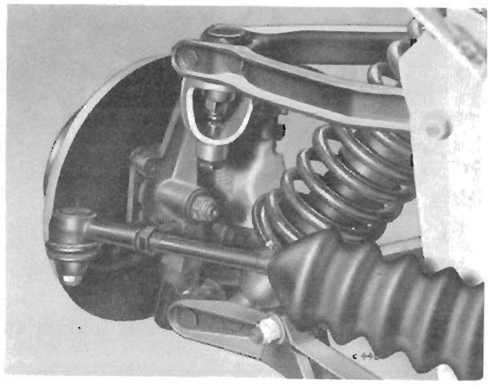
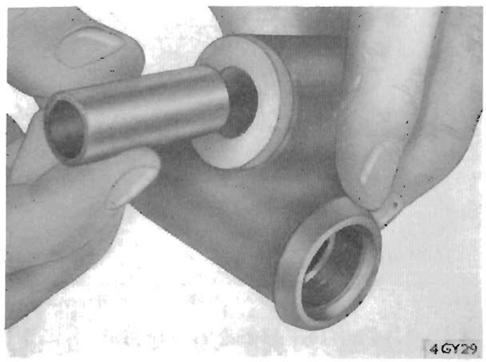


Fig. 13. Removing steel bush from lower trunnion



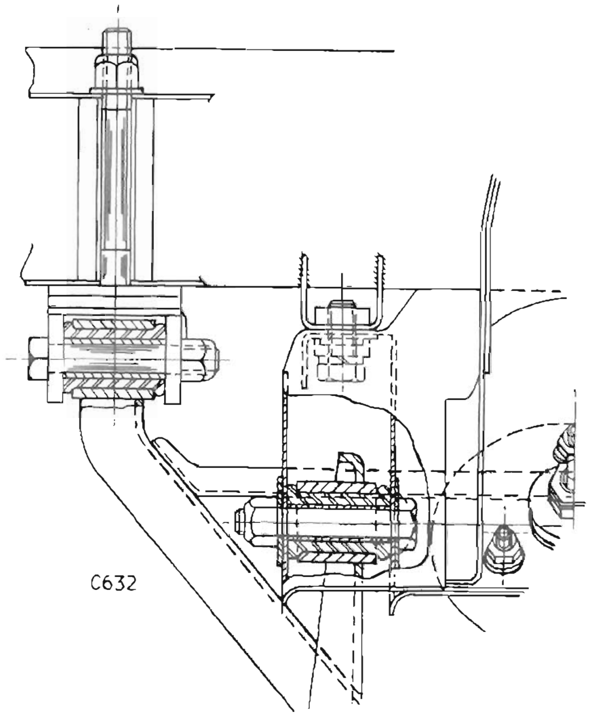


Fig. 14. Cross section of upper and lower inner fulcrum pivots

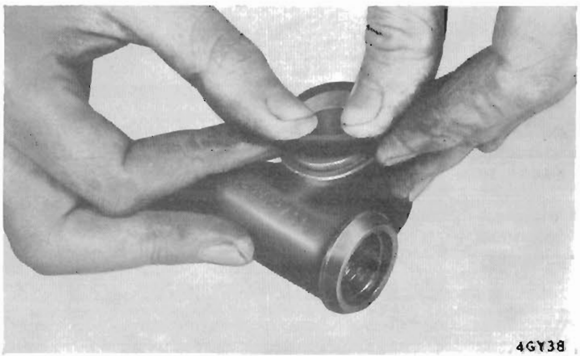


Fig. 15. Fitting seals to lower fulcrum nylon bushes

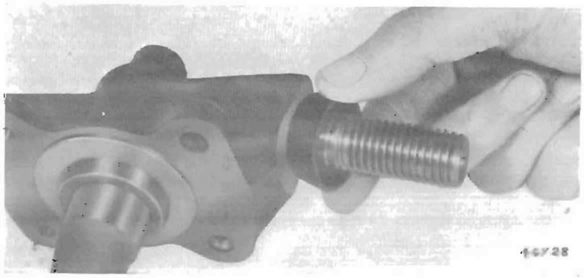


Fig. 16. Fitting rubber seal to vertical link

Front Suspension Re-Assembly (Fig. 6)

1. Using a suitable press and pilot tool, press the rubber bushes (13) into the eyes at the inner ends of the upper wishbones (10) and (12) and lower wishbones (35) until they protrude equally either side of the wishbone eyes as shown on Fig. 14.

2. Fit the stub axle (52) to the vertical link (18), with the split pin hole in its outer end horizontal. Secure the stub axle with the plain washer (24) and nyloc nut (23).

3. Fit two nylon bushes (41) with a washer (41A) beneath the flange, steel sleeve (39) and spring the rubber dust excluders (40) over the nylon bush flanges on the lower trunnion (42) (see Fig. 15).

4. Fit the rubber seal (43) to the vertical link (Fig. 16), screw the vertical link into the bronze trunnion (42) as far as possible, then unscrew it to the first working position.

NOTE : The L.H. threaded vertical link and trunnion must be fitted to the L.H. side of the vehicle and the R.H. threaded components to the R.H. side of the vehicle. The R.H. threaded trunnion has a reduced diameter at its lower end for identification (see Fig. 17).

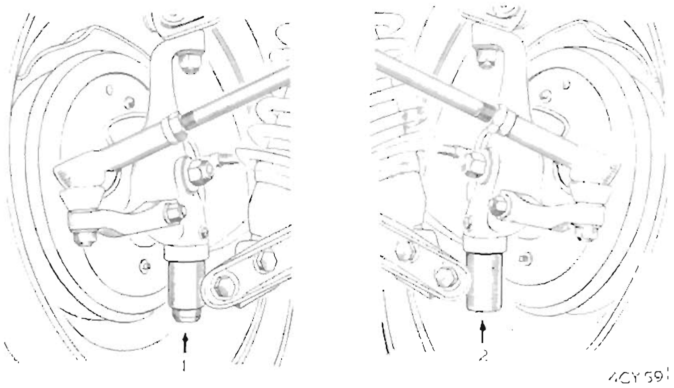


Fig. 17. Identification of R.H. lower trunnion by reduced dia. at lower end

5. Fit the washers (41B) and insert bronze trunnion (42) between the outer ends of the lower wishbone (35); retain in position with the bolt (46), washer (38) and nyloc nut (37). (Fig. 18).

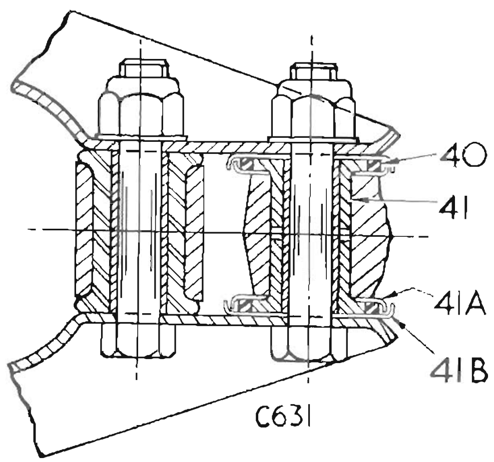


Fig. 18. Cross section of lower wishbone attachments to lower trunnion and damper/spring unit

6. Fit the brackets (1) and (2) (Fig. 19) to the inner eyes of the lower wishbone arms. Note that the bracket fitted to the front wishbone must have the longest portion below the chassis attachment stud centre line and the bracket fitted to the rearmost wishbone arm must have its longest portion above the stud centre line.

7. Fit the ball joint assembly (16) between the outer ends of the upper wishbone arms (10) and (12) and secure with bolts (15), washers (19) and nyloc nuts (20).

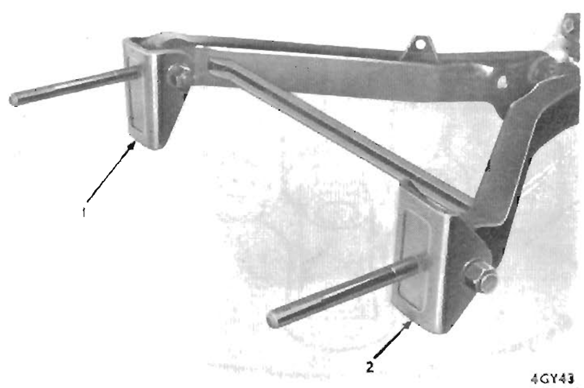


Fig. 19. Positions of lower fulcrum brackets, (1) front, (2) rear

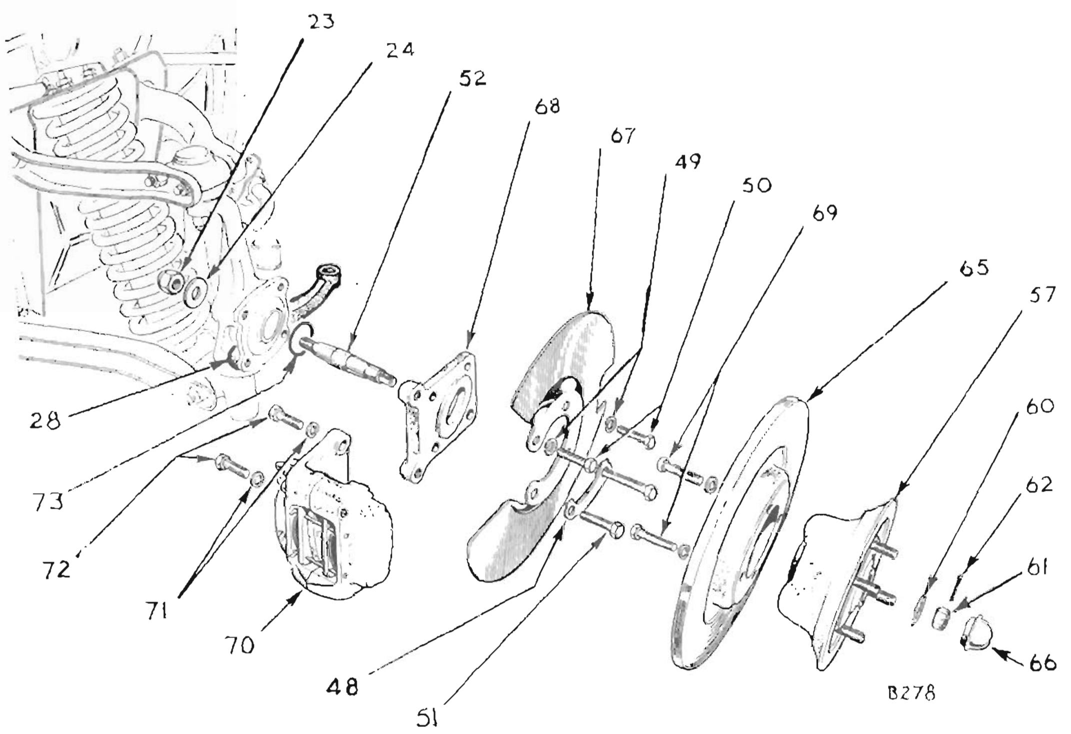


Fig. 20. Exploded disc brake components

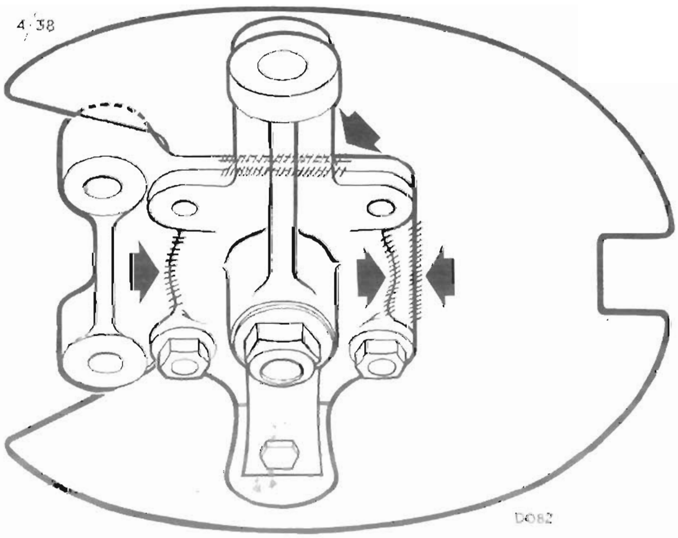


Fig. 21. Positions of Expandite Seal-a-Strip between disc brake caliper bracket and vertical link

8. Assemble the ball joint tapered shank to the vertical link (18) and fit the nyloc nut (22) and washer (21).

9. Assemble the steering arm (28) and brake backing plate (47) to the vertical link (18). On disc brake models, assemble the dust shield and caliper bracket as shown on Fig. 21, sealing the dust shield to the vertical link and caliper bracket with Expandite Seal-a-Strip (105 S) Part No. 554420.

   NOTE: Vehicles with Commission Nos. from G.A.99486 (Herald 1200), F.C.2393 (Spitfire), H.B.7082 (Vitesse) and G.D.215 (Herald 12/50) have a rubber seal (73), Fig. 33, fitted between the recessed face of the caliper bracket and the vertical link.

Secure the components with bolts (51), spring washers (49), nyloc nut (25) and a new tab-washer (48). Tighten the bolts and nyloc nut to the torques quoted on page 23. Secure the tabs against the two lower bolt heads as shown on Fig. 22.

10. Assemble and adjust the hub assembly as instructed on page 4·116.

11. Secure the upper (10 and 12) and lower wishbone (35) and inner fulcrums (32) to the chassis and sub-frame, ensuring that the shim packs are correctly located between the fulcrum brackets and chassis frame as shown on Fig. 23. Do not tighten bolts 36, 11 and 33, Fig. 6, at this stage.

12. Assemble and fit the damper/spring unit to the front suspension as described on page 4·112.

13. Fit the tie rod end to the steering arm and secure with nyloc nut and washer.

14. Refit the brake drum or caliper assembly, ensuring that any shims between the caliper and bracket are refitted. Adjust the brake shoe clearance in the drum as described on page 3·208.

15. Lubricate the vertical link lower trunnion (see page 0·204).

16. Refit the road wheels and lower the vehicle to the ground. To allow the rubber bushes to assume their correct working position, load the car before tightening the inner fulcrum bolts (11 and 33) and the damper lower attachment bolt (36). Check the castor, camber and front wheel alignment.

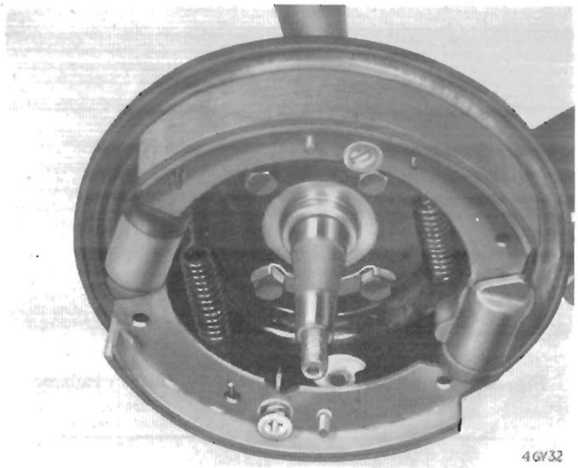


Fig. 22. Locking tabs securing backing plate and steering arm bolts

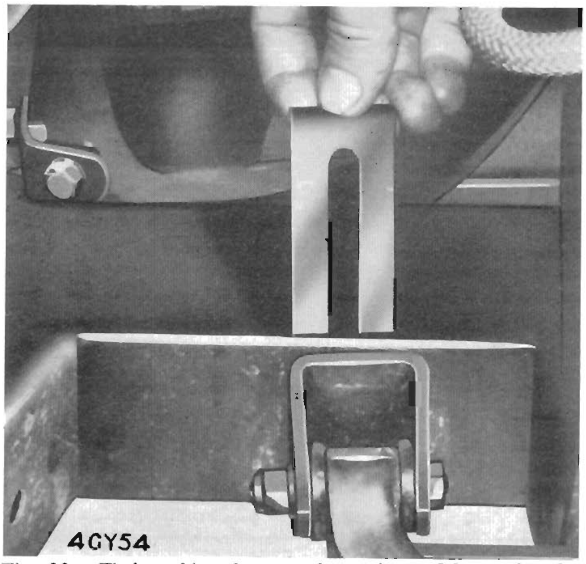


Fig. 23. Fitting shims between lower inner fulcrum bracket and chassis frame

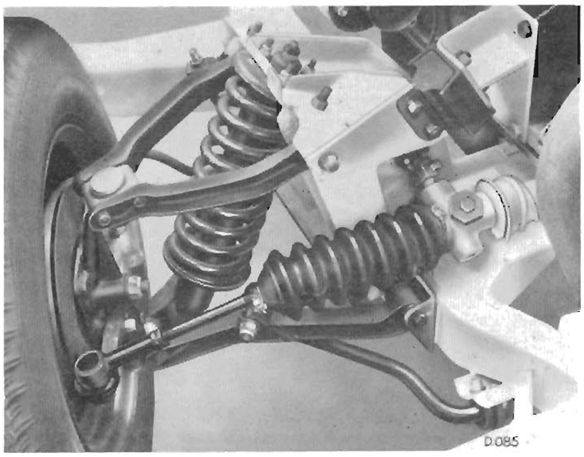


Fig. 24. Upper and lower wishbone attachments

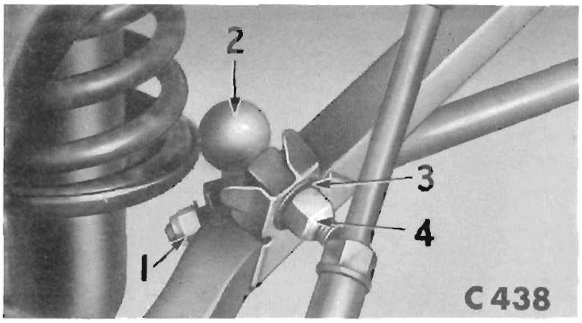


Fig. 25. Anti-roll bar attachment to lower wishbone

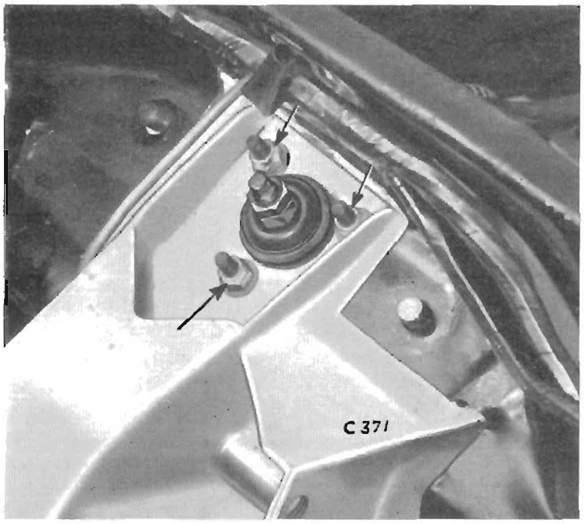


Fig. 26. Spring and damper attachments to chassis sub-frame

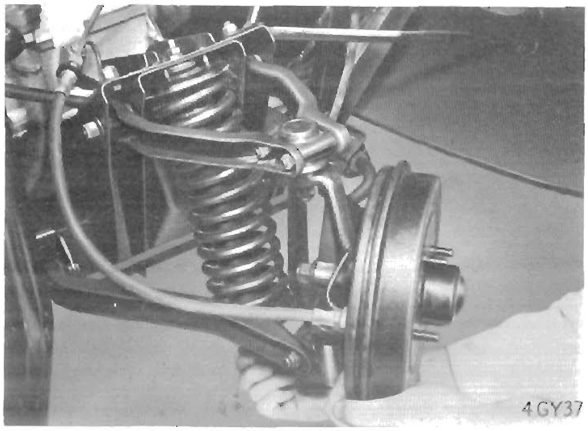


Fig. 27. Removing spring and damper assembly from front suspension

Front Road Spring Assembly (Fig. 28)

Removal

1. Jack up front of vehicle and support on chassis stands.
2. Open bonnet.
3. Remove hub disc, wheel nuts and road wheel.
4. Disconnect anti-roll bar from lower wishbone.
5. Remove the three nuts (4) and washers (6) that secure the upper spring pan (7) to the chassis sub-frame (see Fig. 26).
6. Remove the nut (18), plain washers (17) and (15) and bolt (14) from the damper lower attachment eye.
7. Support the brake drum assembly and withdraw the road spring assembly, Fig. 27.

Fitting

1. Support the brake drum assembly and enter the road spring assembly from beneath, passing the three studs of the upper spring pan through the holes in the chassis sub-frame.
2. Secure the damper lower eye to the wishbone with the bolt (14), plain washers (15) and (17) and nyloc nut (18).

Secure the upper spring pan to the chassis sub-frame with three washers (6) and nyloc nuts (4). A packing piece is fitted between the upper spring pan and chassis sub-frame on the left-hand side of left-hand drive vehicles.

4. Attach the anti-roll bar to the lower wishbone (Fig. 25).
5. Fit road wheel, wheel nuts and hub disc.
6. Close bonnet.
7. Jack up front of vehicle, remove chassis stands and lower vehicle to ground.

Dampers (Fig. 28)

Removal

1. Remove road spring and damper assembly.
2. Using a press, compress as many coils as possible of the road spring just sufficient to relieve the load from the damper top nuts, Fig. 29.
3. Remove the locknut (1), nut (2), washer (3) and rubber (5) from the top of the damper.
4. Carefully release the load from the road spring and withdraw the assembly from the press.
5. Withdraw the damper (11) from the upper spring pan (7) and road spring (10).
6. Remove the lower spring pan (12) and collets (13) from the damper (Woodhead-Monroe type only).

Refitting

1. Fit the washer (9) and rubber (8) to the top of the damper (11).
2. Fit the collets (13) and lower spring pan (12) to the damper (Woodhead-Monroe type only).
3. Extend the damper (11) and insert it into the road spring (10) and upper spring pan (7).
4. Using a press, compress the road spring sufficient to enable the completion of the damper attachment to the upper spring pan, Fig. 29.
5. Fit the rubber (5), the washer (3), nut (2) and locknut (1).

1 Locknut
2 Nut
3 Washer
4 Nyloc nut
5 Rubber bush
6 Washer
7 Upper spring pan
8 Rubber bush
9 Washer
10 Road spring
11 Damper
12 Lower spring pan
13 Collets
14 Bolt
15 Washer
16 Metalastik bush
17 Washer
18 Nyloc nut

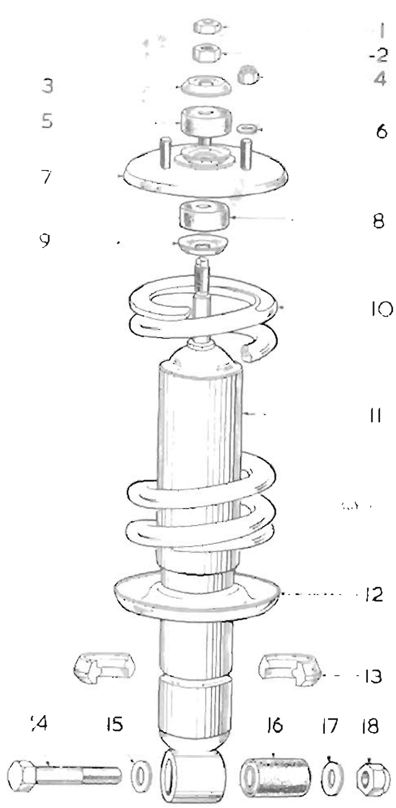


Fig. 28. Exploded view of front road spring and damper assembly

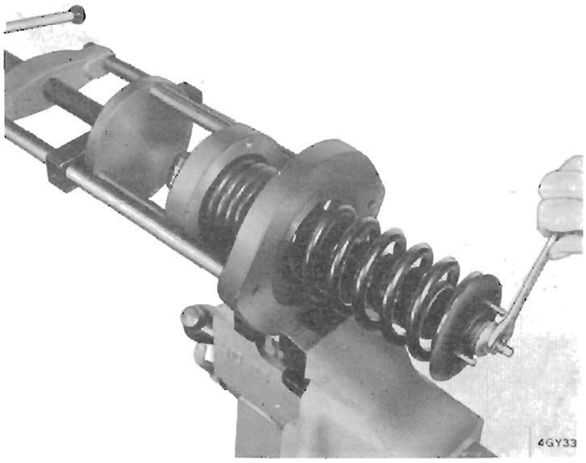


Fig. 29. Using press S.4221A with adaptor S.4221A-5 to compress the front road spring

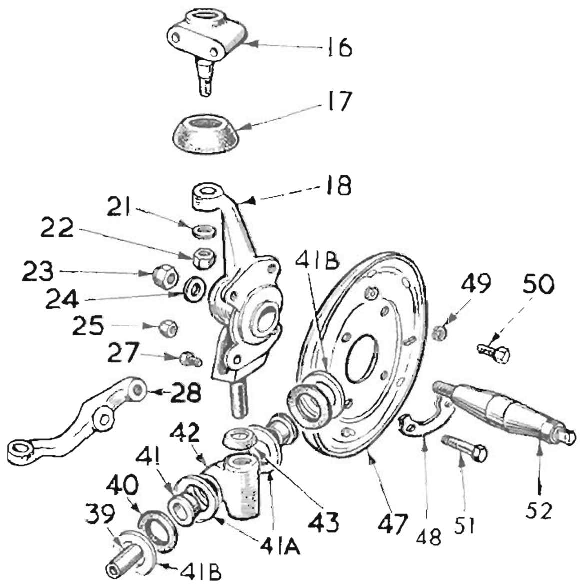


Fig. 30. Vertical link, steering arm and associated details

Vertical Link

Removal

1. Open bonnet.
2. Remove the two screws and the brake drum, or detach the caliper unit from its bracket (disc brakes).
3. Remove the grease cap, split pin, slotted nut, washer and hub assembly from the stub axle.
4. Release the locktabs, remove four bolts (50) and (51), tabwasher (48), washers and one nyloc nut (25) securing the brake backing plate (47) and steering lever (28) to the vertical link (18). On disc brake models remove the dust shield and caliper bracket. Remove the brake backing plate (47) and tie it to the chassis frame to prevent it hanging on the flexible hose.

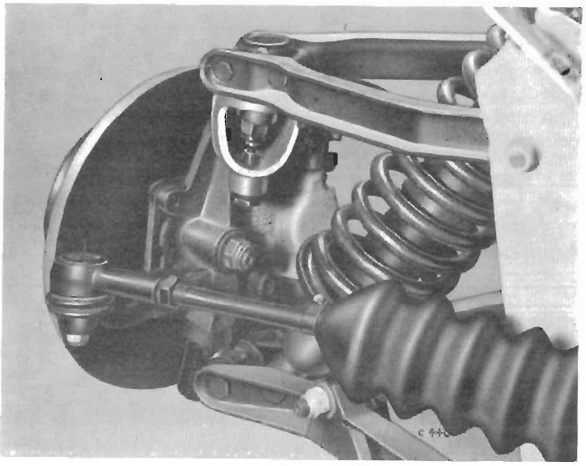


Fig. 31. Using tool No. S.166A to release top ball joint from vertical link

5. Remove the nyloc nut (22) and washer (21) and, using an extractor, separate the vertical link (18) from the tapered pin of the ball joint (16) as shown on Fig. 31.

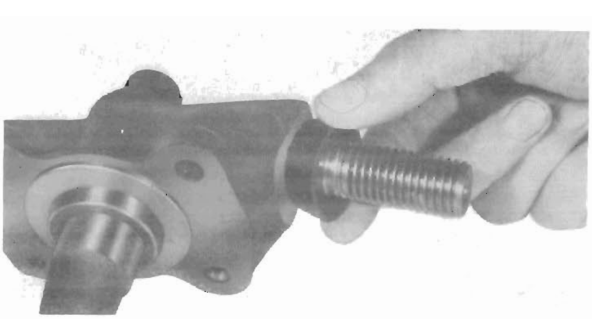


Fig. 32. Removing rubber seal from vertical link

6. Unscrew the vertical link (18) from the trunnion (42) and withdraw the seal (43) see Fig. 32. The vertical link fitted to the left-hand side of the vehicle has a left-hand thread and the vertical link fitted to the right-hand side of the vehicle has a right-hand thread.
7. Remove the nyloc nut (23) and plain washer (24) and, using a press, remove the stub axle (52) from the vertical link (18).

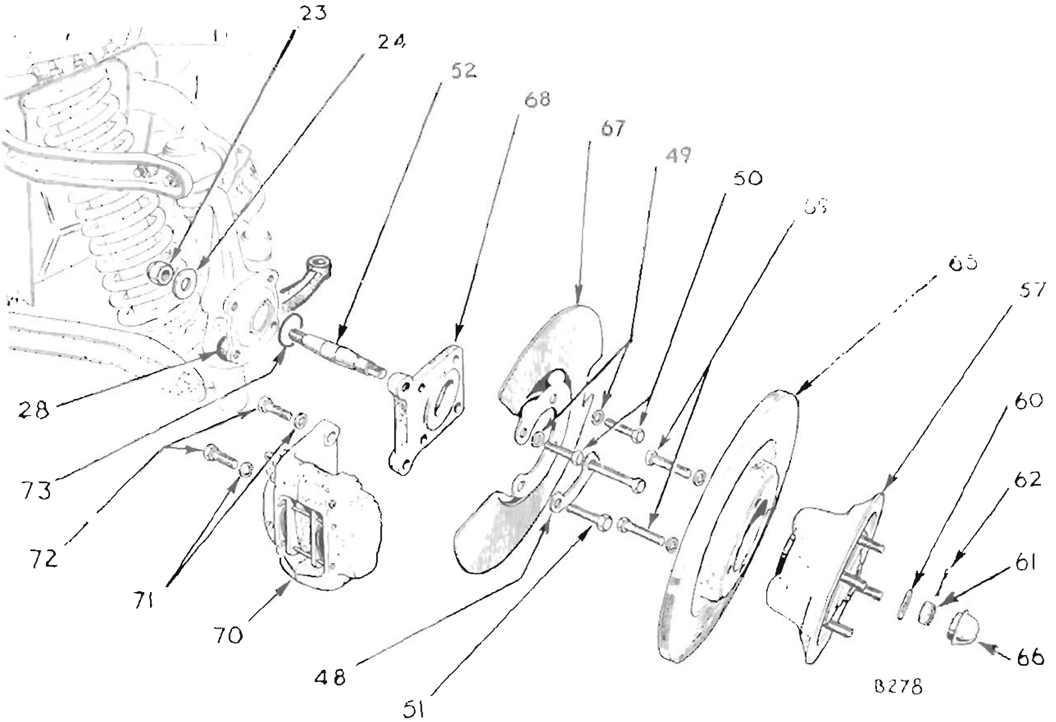


Fig. 33. Exploded details of disc brake components

Refitting

1. Insert the stub axle (52) into the vertical link (18) with the split pin hole in its outer end horizontal. Fit the washer and nyloc nut securing the stub axle to the vertical link.
2. Fit the rubber seal (43) to the vertical link, Fig. 32. Screw the vertical link into the bronze trunnion as far as possible then unscrew it to the first working position, *i.e.*, so that it does not bottom when the road wheel is turned to full front or back lock.
3. Insert the tapered pin of the ball joint (16) into the tapered hole in the top of the vertical link (18) and retain in position with the washer (21) and nyloc nut (22).
4. Untie the brake backing plate assembly from the chassis frame and locate it in position on the vertical link. Insert the steering lever (28) through the aperture in the vertical link (18). Retain the brake backing plate (47) or caliper bracket dust shield and steering lever (28) in position by fitting the tabwasher, washers, bolts and nyloc nut. On disc brakes, seal the dust shield to the vertical link and caliper bracket with expandite seal-a-strip (105 S) Part No. 554420.
   Turn up tabs of the locking plate against the side of the bolt heads, Fig. 34.
5. Assemble and adjust the hub assembly as instructed on pages 4·116 and 4·117.
6. Adjust the brake shoe drum clearance as instructed on page 3·208.
8. Lubricate the vertical link lower bronze trunnion as instructed on page 0·204.
9. Close bonnet.

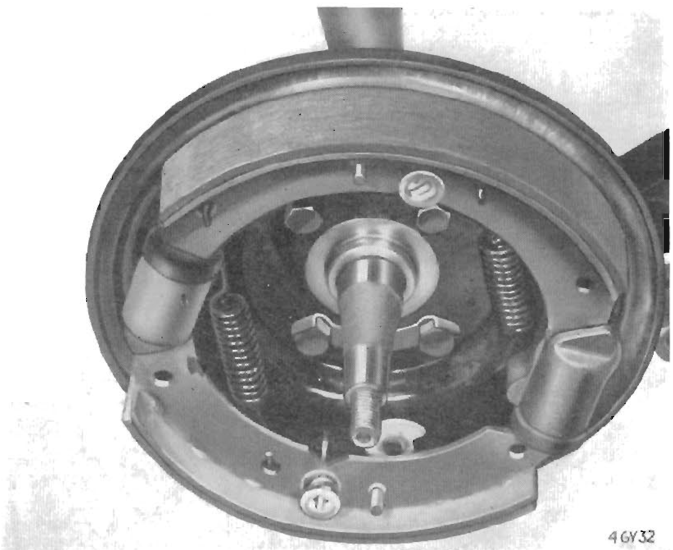


Fig. 34. Securing the heads of steering attachment bolts with lock tabs

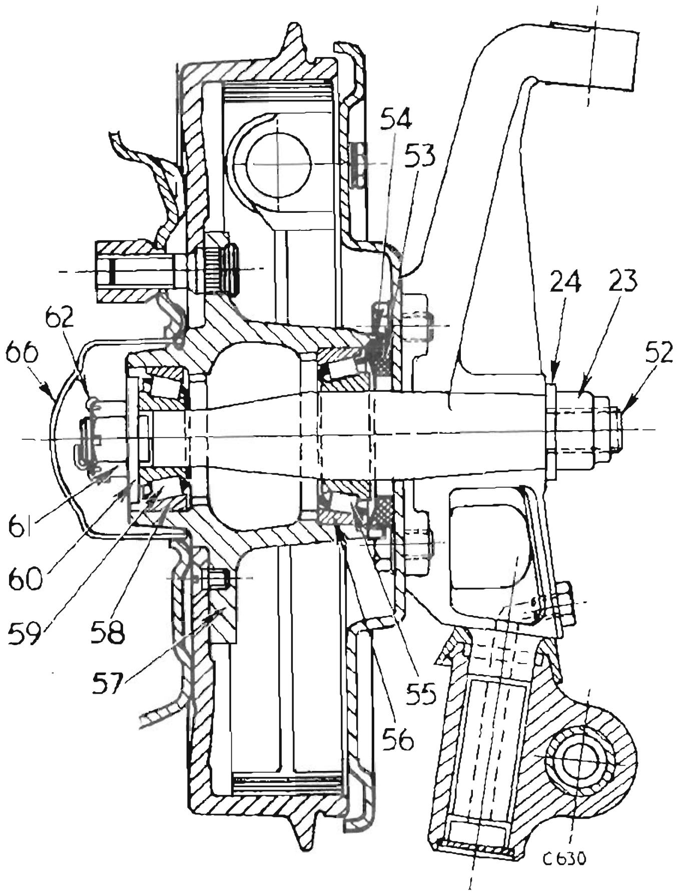


Fig. 35. Cross section of Herald 1200 drum brake and hub assembly

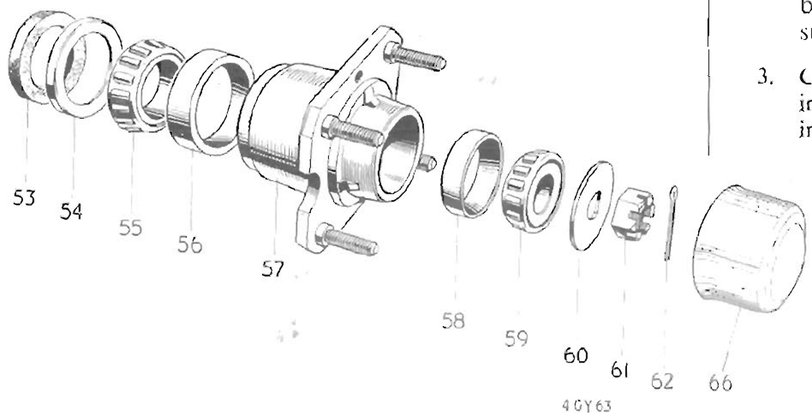


Fig. 36. Exploded view of drum brake hub bearing details

Hubs

Removal

1. Remove the two screws and the brake drum, or detach the brake caliper unit (disc brakes).

2. Remove the grease cap (66), split pin (62) slotted nut (61) and washer (60) then pull the hub assembly from the stub axle.

Dismantling

1. Remove the outer roller bearing inner member (59) from the hub.

2. Using a soft metal drift, tap the inner roller bearing inner member (55) and felt seal assembly (53) and (54) from the hub (57).

3. Tap the outer rings (56) and (58) of the outer and inner roller bearings from the hub.

4. If necessary, remove the bolts (69), Fig. 37, and detach the disc (65) from the hub (57).

Assembly

1. Obtain the correct adjustment by assembling the hub bearings dry, as follows :—Press the roller bearing outer rings (56) and (58) into the hub until they contact their respective seatings. Fit the bearings and the hub to the stub axle and retain by the washer and the slotted nut. Whilst rotating the hub by hand, tighten the nut only sufficiently to remove slackness. Slacken the nut back to the nearest split pin hole and record its position by marking the washer and the nut.

2. Remove the hub assembly and pack the space between the outer rings with grease and smear grease over the outer rings.

3. Coat the rollers of the inner roller bearing inner member (55) with grease and insert it into its outer ring.

4. Tap the felt seal retainer (54) into the hub. Oil the felt seal (53), squeeze out surplus oil and fit the seal to the retainer (54). On disc brake models ensure that the disc registers are clean and free from burrs before fitting the disc to the hub, and securing with bolts and spring washers.

5. Fit the hub assembly to the stub axle.

6. Coat the rollers of the outer roller bearing inner member (59) with grease and insert it into its outer ring in the hub (57).

7. Fit the washer (60) and slotted nut (61), tightening the nut until the marks correspond. Secure the nut with a new split pin and refit the grease cap.

8. Fit the brake drum and retain with two screws, or refit the caliper unit.

Adjustment in Service

1. Whilst spinning the hub, tighten the slotted nut to 5 lb/ft. (0·7 mkg.) then unscrew the slotted nut one flat to give 0·002" to 0·008" (0·05 mm. to 0·2 mm.) end float of the hub.

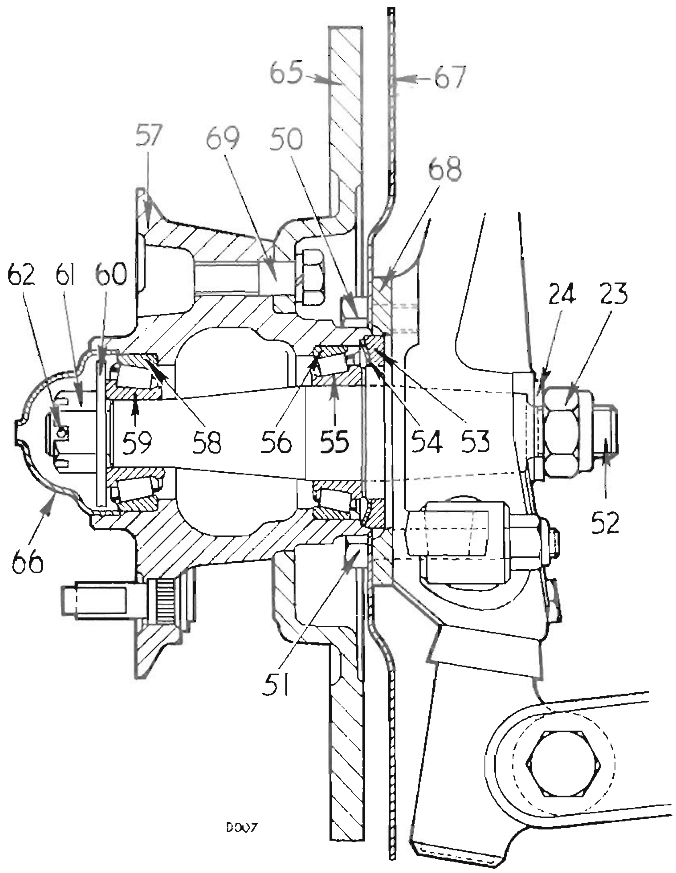


Fig. 37. Cross section of disc brake and hub assembly

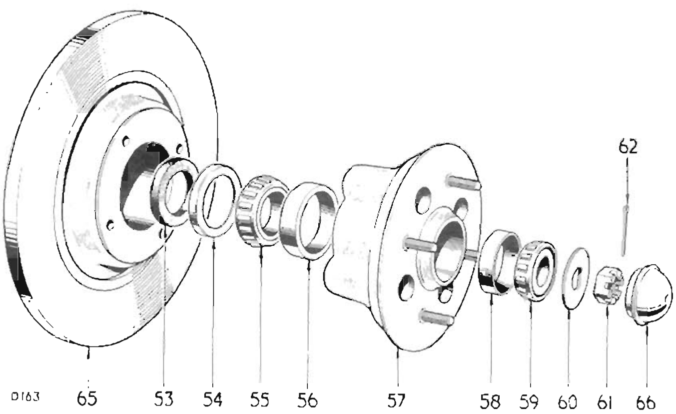
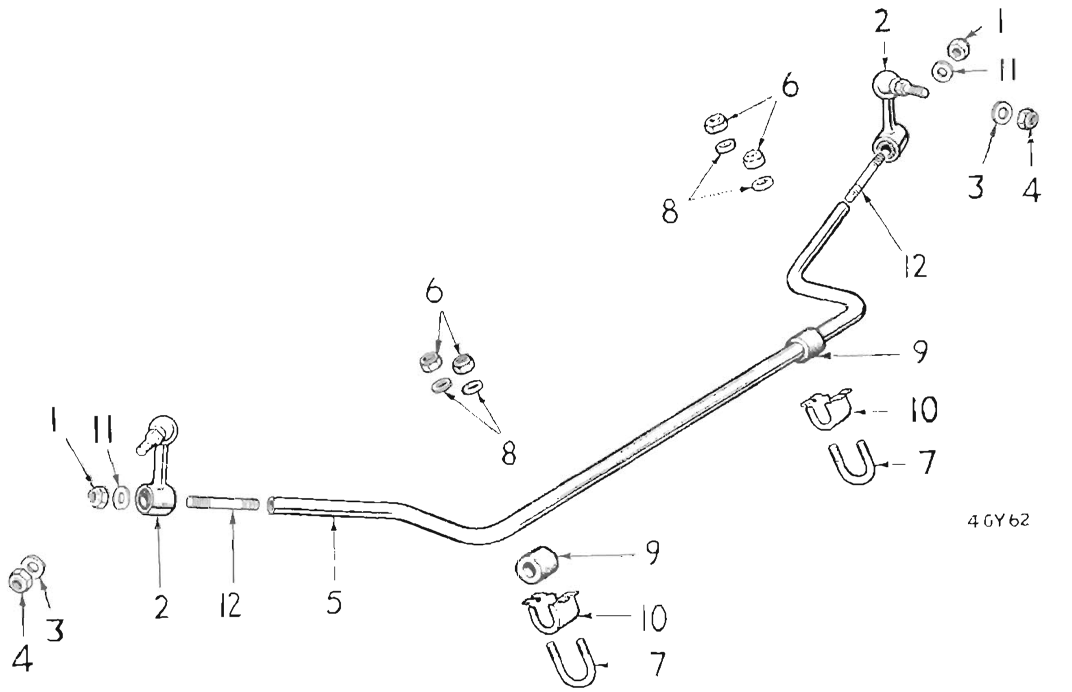


Fig. 38. Exploded view of disc brake hub bearing details



1	Nyloc nut	4	Nyloc nut	7	"U" bolt	10	Clamp
2	Link	5	Anti-roll bar	8	Plain washer	11	Plain washer
3	Plain washer	6	Nyloc nut	9	Rubber bush	12	Stud

Fig. 39. Exploded details of anti-roll bar

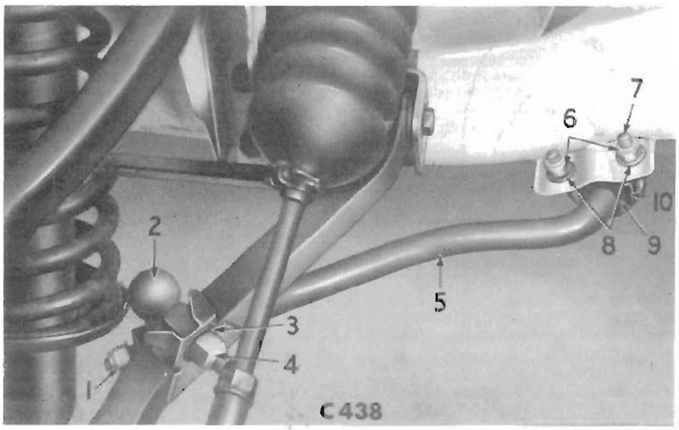


Fig. 40. Anti-roll bar link attachments to lower suspension wishbone

Anti-Roll Bar

Removal

1. Remove the nyloc nuts (4) and plain washers (3).

2. Remove the nyloc nuts (6), plain washers (8), clamps (10) and "U" bolts (7) and withdraw anti-roll bar (5). If necessary remove the nuts (1), washers (11) and detach links (2) from anti-roll bar (5).

Replacement

1. Fit the clamps over the rubber bushes (9) on the anti-roll bar (5) and attach to the chassis crossmember with "U" bolts (7), plain washers (8) and nyloc nuts (6).

2. Assemble the links (2) to the anti-roll bar (5) with washers (11) and nuts (1).

3. Engage the links in the lower wishbone bracket and fit the nyloc nuts (4) and plain washers (3).

4. Tighten all nuts with the vehicle in the static laden condition.

REAR SUSPENSION

Before carrying out any work on the rear suspension, jack up the rear of the vehicle and support it on chassis stands. Remove the road wheels.

Rear Road Spring

Removal

1. Disconnect each brake hose from its steel pipe and chassis bracket by unscrewing union nut (66), Fig. 41, and removing nut (65) whilst holding the flexible pipe (63) stationary.

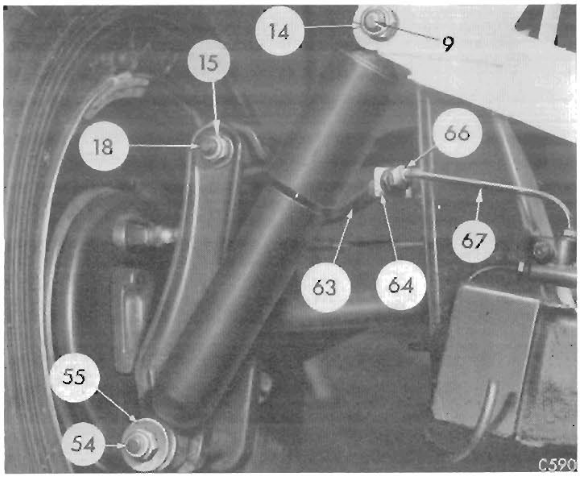


Fig. 41. Rear suspension brake hose, damper and vertical link attachments

2. Disconnect the handbrake cable (60) from the backplate lever withdrawing the clevis pin (58). Disconnect the spring (61). Fig. 42.

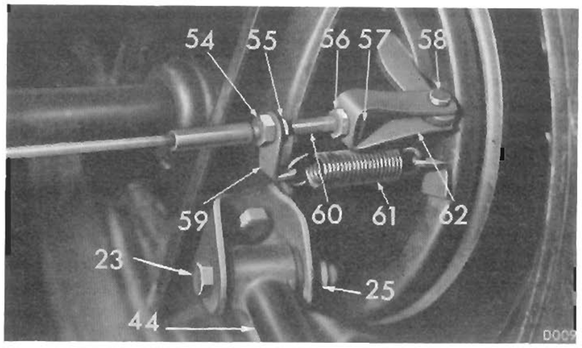


Fig. 42. Handbrake connections

3. Jack up the vertical link (12), as shown on Fig. 43, to relieve the dampers of load. Remove nuts (8), bolts (7), Fig. 50, and disconnect the axle shaft couplings.
4. Slacken the damper upper attachment bolt (9), Fig. 41, remove the nyloc nut (54) and washer (55) from the lower attachment and pull the damper (11) clear of its lower fulcrum. Remove the jack from the vertical link.

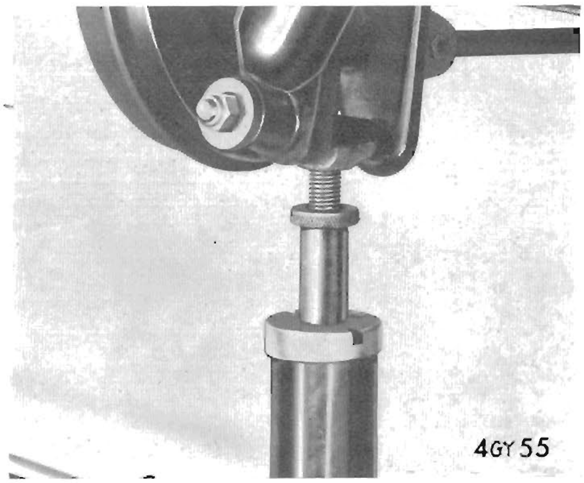
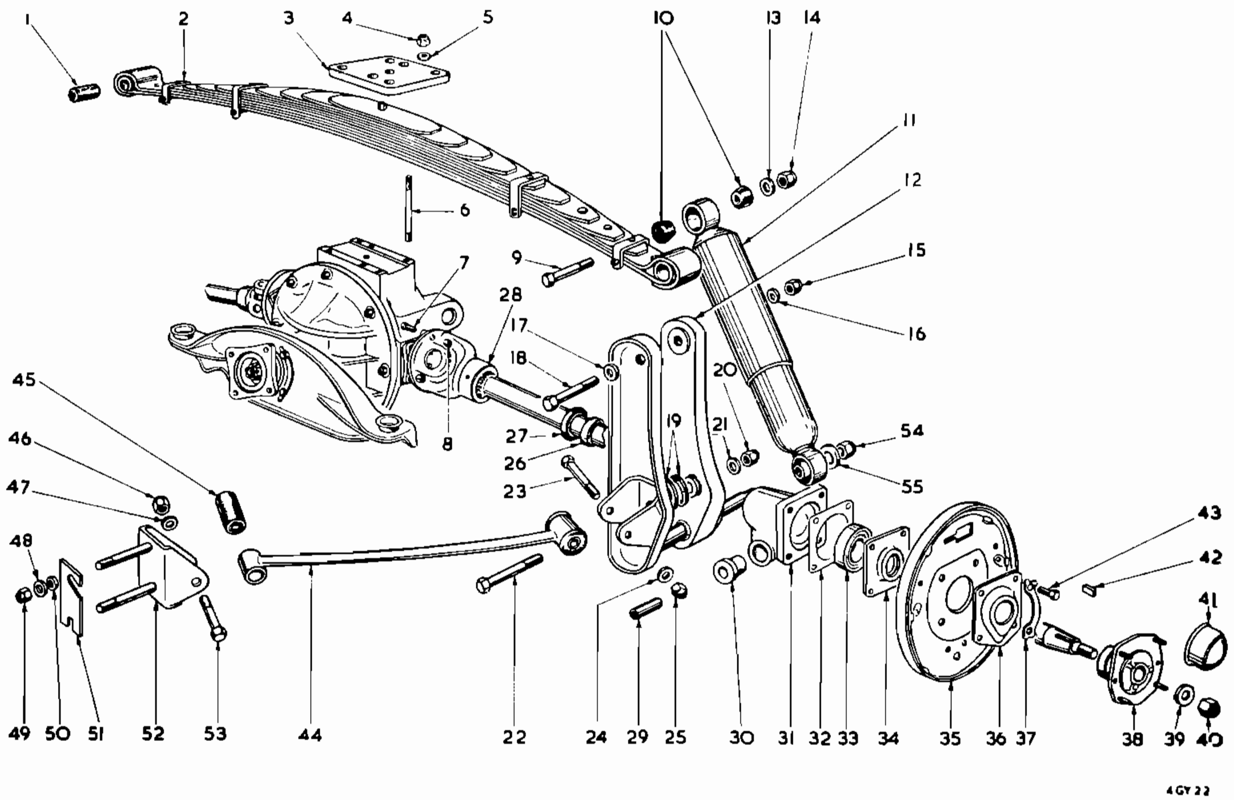


Fig. 43. Using jack beneath vertical link to relieve damper of load

REAR SUSPENSION DETAILS



1	Metalastik bush	19	Rubber seal	37	Locktab
2	Road spring	20	Nyloc nut	38	Hub
3	Clamp plate	21	Plain washer	39	Plain washer
4	Nyloc nut	22	Bolt	40	Nyloc nut
5	Plain washer	23	Bolt	41	Hub cap
6	Stud	24	Plain washer	42	Key
7	Bolt	25	Nyloc nut	43	Setscrew
8	Nyloc nut	26	Seal	44	Tie-rod
9	Bolt	27	Flinger	45	Metalastik bush
10	Rubber bush	28	Axle shaft	46	Nyloc nut
11	Damper	29	Steel sleeve	47	Plain washer
12	Vertical link	30	Flanged nylon bush	48	Plain washer
13	Plain washer	31	Trunnion housing	49	Nyloc nut
14	Nyloc nut	32	Gasket	50	Plain washer
15	Nyloc nut	33	Ball race	51	Shim
16	Plain washer	34	Seal housing	52	Tie-rod bracket
17	Plain washer	35	Brake backplate	53	Bolt
18	Bolt	36	Grease retainer		

Fig. 44. Exploded view of rear suspension

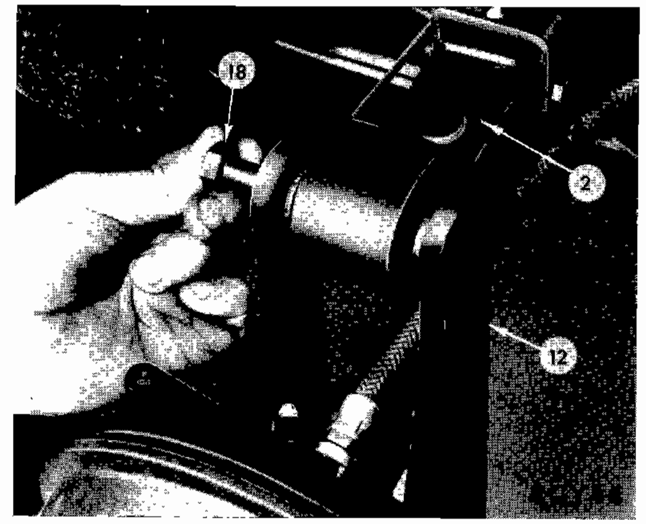


Fig. 45. Removing the spring eye bolt

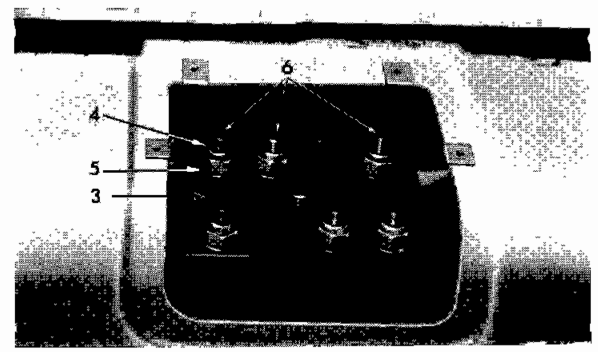


Fig. 46. Spring clamp plate attachments

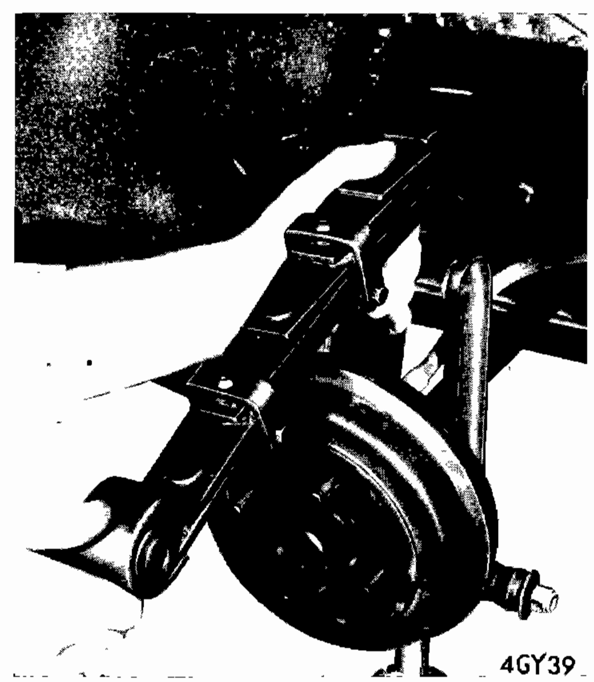


Fig. 47. Removing road spring

5. Supporting the vertical link (12), remove the bolt (18) from the road spring eye as shown on Fig. 45.

6. Raise boot lid, turn back the floor covering and remove the spring access plate from the floor (Fig. 49).

7. Remove the six nyloc nuts (4), plain washers (5), detach the spring clamp plate (3) and unscrew the three rear studs (6) from the axle casing (Fig. 46).

8. Withdraw the road spring from the vehicle (Fig. 47).

Refitting

1. Fit the road spring into its recess in the axle casing, with the centre bolt spigoting in its locating hole. The spring is marked 'FRONT' for correct location.

2. Refit the three studs (6) with the shorter threaded portion leading, into the axle casing. Refit the spring clamp plate (3) and tighten the nyloc nuts (4).

3. Apply "Prestik" sealer to the edge of the access plate, refit the plate, securing with four screws, Fig. 49, and liberally apply "Seelastik" to the joint.

4. Attach the vertical links (12) to the spring eyes with bolts (18), washers (16) and (17) and nyloc nut (15). Do not tighten the nut (15) at this stage.

5. Jack up the vertical links (12), fit the dampers as described on page 4·122 and reconnect the axle shaft couplings.

6. Connect the handbrake cable to the back-plate lever, refit the pull-off spring (61), Fig. 42, reconnect the flexible brake hose. Adjust and bleed the brakes.

7. Place a trolley jack under the differential casing, remove the chassis stands and, with the vertical links supported at their running height, load the car and lower its rear end until the axle shafts assume their static laden operating position. This is to allow the rubber bushes to assume their correct working position before tightening the nuts (15), (14) and (54).

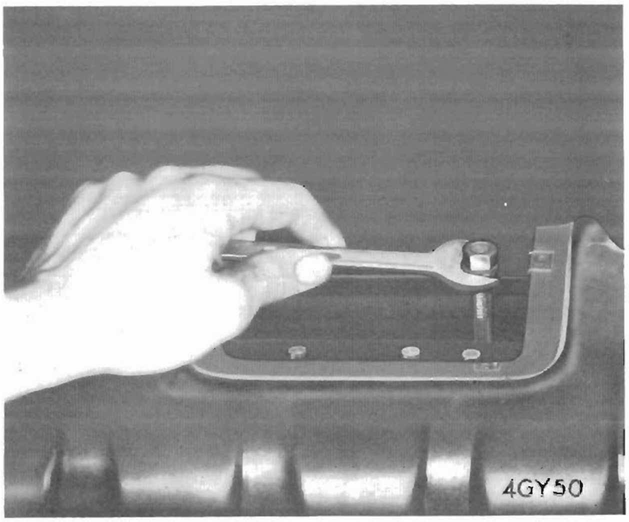


Fig. 48. Removing/refitting studs to axle casing

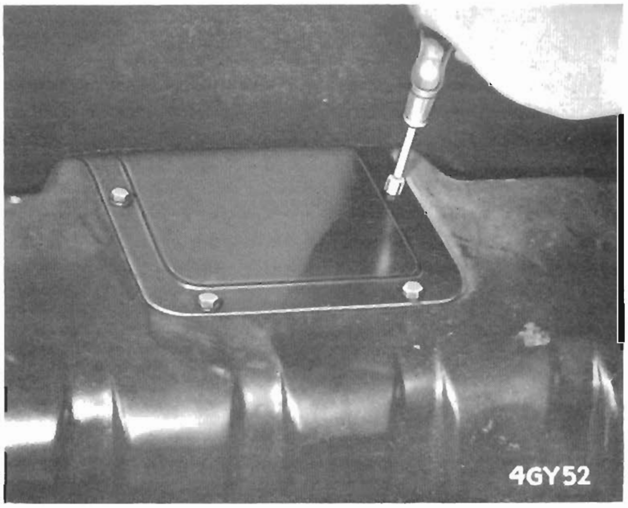


Fig. 49. Removing/fitting cover plate to spring access aperture

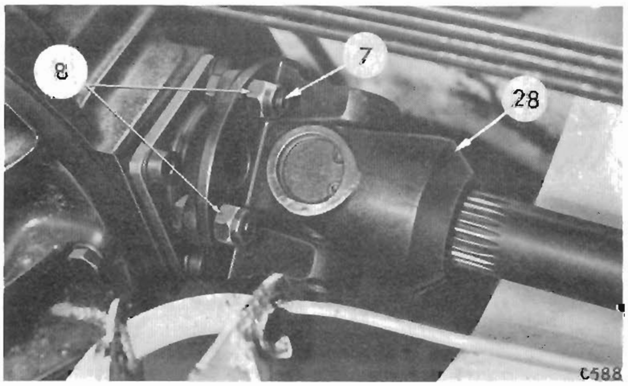


Fig. 50. Axle shaft universal joint attachments

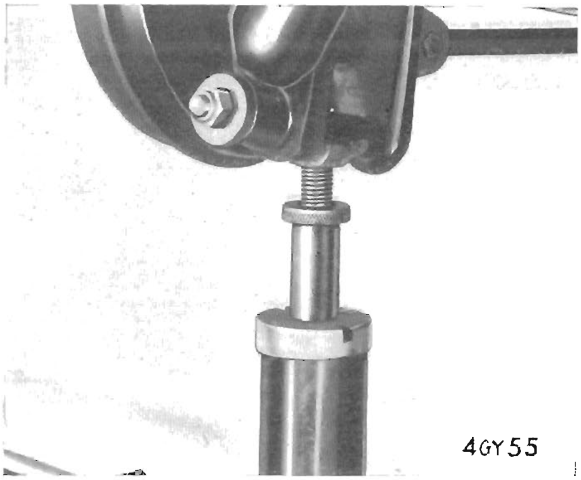


Fig. 51. Using jack to support vertical link

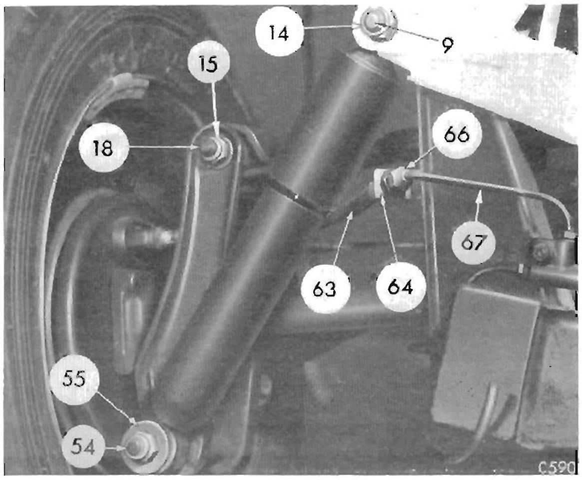


Fig. 52. Damper attachment details

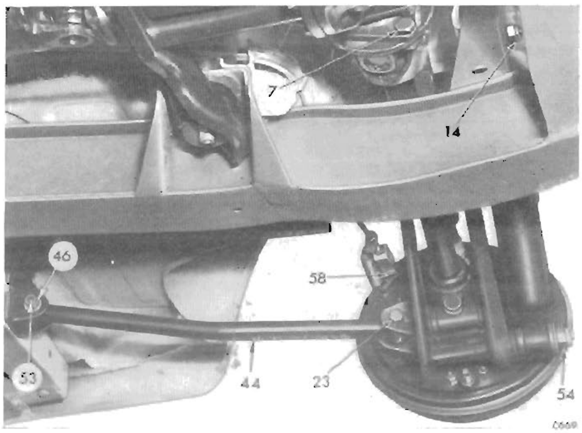


Fig. 53. Radius rod attachments (Herald 1200, 12/50 and Vitesse)

DAMPERS

Removal

1. Jack up the vertical link (12) to relieve the damper (11) of load, as shown on Fig. 51, remove the bolt (9) from the upper attachment and the nyloc nut (54) from the lower damper eye.

2. Pull the damper clear of its attachment points.

Refitting

Bleed air from the damper by holding it in a vertical position and operating the damper over its full stroke. Maintaining the unit in a vertical position, refit the damper by reversing the removal procedure, fitting new rubber bushes if necessary.

RADIUS ARMS

Removal

Proceed as for removal of dampers, adjusting the jack beneath the vertical link (12) until the radius arm attachment bolts (23) and (53) can be easily withdrawn.

If the rubber bushes (45) are perished, worn or cut, use a press to remove them, and press in new bushes. If the radius arm chassis attachment brackets (52) are removed, ensure that on re-assembly the same number of shims (51) are refitted.

Refitting

Refit the radius arm (44), tighten the attachment bolts and nuts (23 and 25), (53 and 46), remove the jack from the vertical link, fit the road wheel, remove the chassis stands, tighten the wheel nuts and fit the nave plate.

Rear Wheel Alignment

Check, and if necessary, adjust the rear wheel alignment. The method of checking rear wheel alignment is similar to that described on Page 4·201. Removing an equal number of shims from both sides (51) Fig. 44, increases the rear wheel toe-in and addition of shims decreases the rear wheel toe-in.

VERTICAL LINK ASSEMBLY

To Renew Trunnion Housing Bushes

1. Jack up under the vertical link to relieve the damper of load as shown on Fig. 51.

2. Disconnect :
   — the brake hose (63) from its steel pipe and chassis bracket ;
   — the handbrake cable (60) from the back-plate lever, and return spring (61). Fig. 54 ;

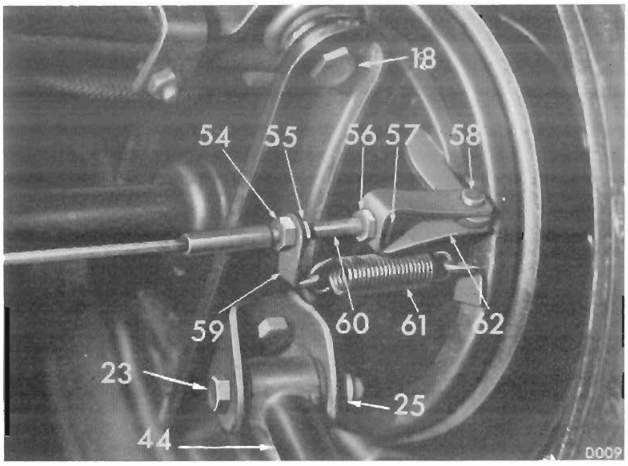


Fig. 54. Handbrake cable attachments

   — the axle shaft coupling, Fig. 55 ;
   — the radius arm from the vertical link.

3. Remove the damper (11), lower and remove the jack.

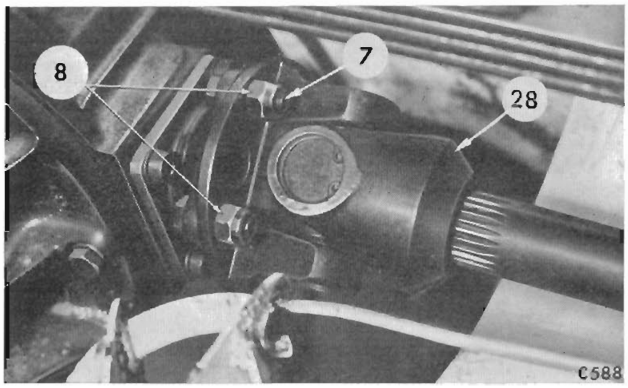


Fig. 55. Axle shaft universal coupling attachments

4. Supporting the brake assembly, remove the bolt (18) from the road spring eye Fig. 56. Place brake/axle shaft assembly on a clean bench.

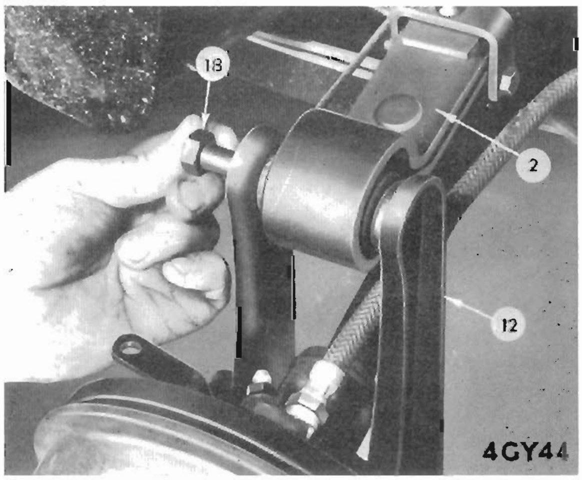


Fig. 56. Removing spring eye bolt

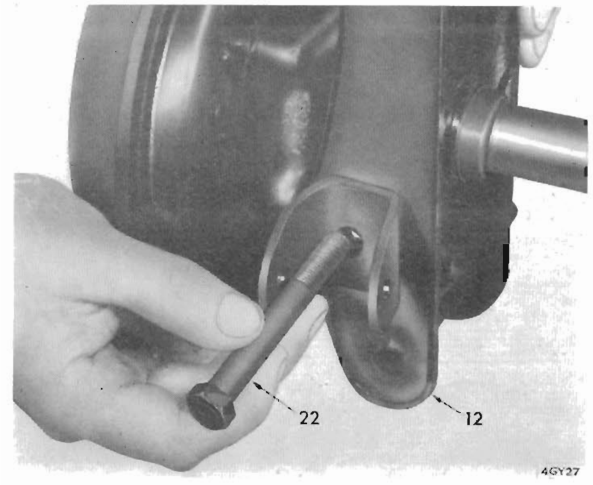


Fig. 57. Removing trunnion housing pivot bolt

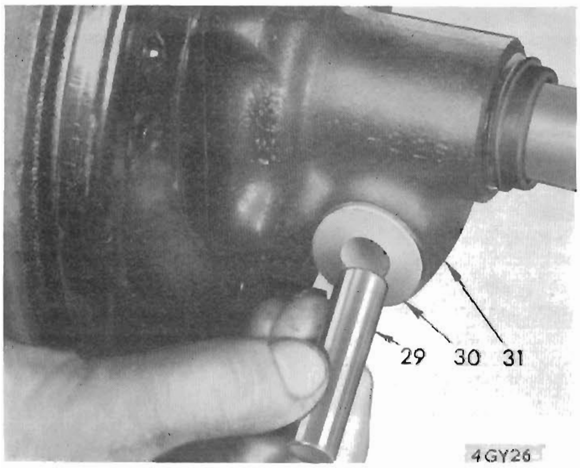


Fig. 58. Removing steel bush from nylon bushes in trunnion housing

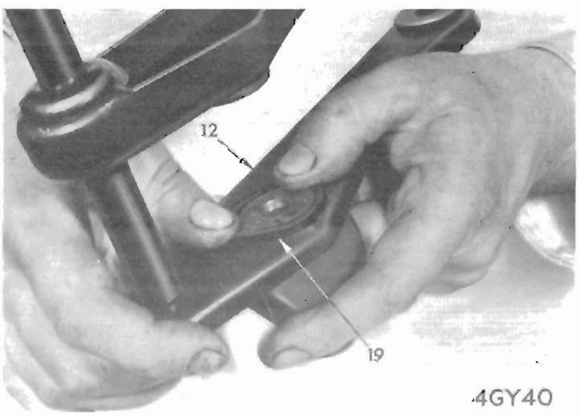


Fig. 59. Fitting new sealing rings to vertical link

With assembly on bench, proceed as follows:

5. Remove the bolt (22), Fig. 57, and withdraw the vertical link (12) from the trunnion housing (31). Remove the steel bush (29), Fig. 58.

6. Remove the nylon bushes (30), press in new ones, insert the steel sleeve (29) into the bushes (30), and fit new rubber sealing rings (19) to the vertical link assembly, Fig. 59.

---

1. Fit the vertical link assembly (12) to the trunnion housing (31) and to the road spring eye bush (1). Do not, at this stage, fully tighten the spring eye bolt (18).

2. Jack up beneath the vertical link and fit the damper (11), radius arm (44) and the axle shaft coupling (28).

3. Place a trolley jack under the differential casing, remove the chassis stands and, with the vertical link supported at its running height, load the car and lower its rear end until the axle shaft assumes its static laden operating position. This is to allow the rubber bushes to assume their correct working position before tightening the nuts (15), (14), (54) and (25).

4. Connect the brake hose and handbrake cable. Adjust and bleed the brakes.

ASSESSMENT OF ACCIDENTAL DAMAGE

The following dimensioned illustrations assist in the assessment of accidental damage.
It is suggested that any components which have sustained damage or are suspect in any way, should first be removed from the vehicle as instructed, then cleaned and accurately measured on a surface table.
The measurements obtained should then be compared with those given in the appropriate illustration and the serviceability of the components determined.

Dimension	Ins.	
1	5·19	131·8 mm.
2	1·88	47·75 ,,
3	10·13	254·33 ,,
4	5·88	149·35 ,,
5	1·5	38·1 ,,

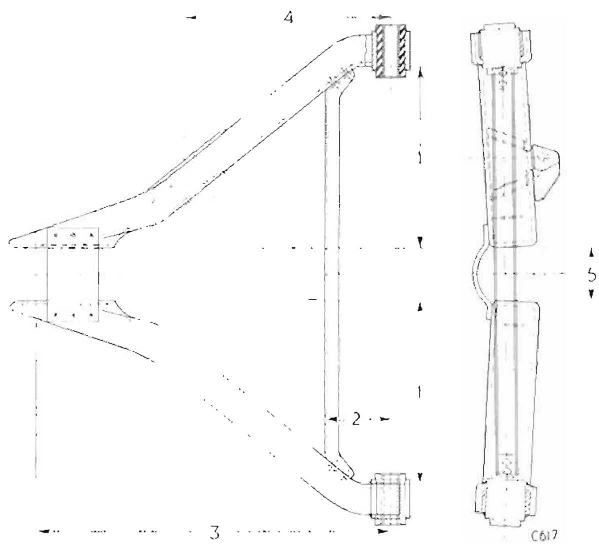


Fig. 60. Lower wishbone arm assembly

Dimension	Ins.	
1	1·5	38·1 mm.
2	7	177·8 ,,
3	2·13	54·1 ,,

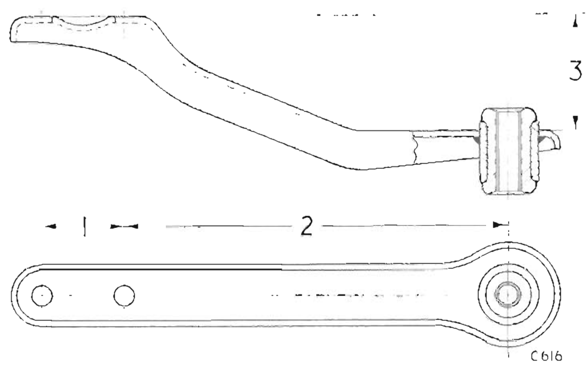
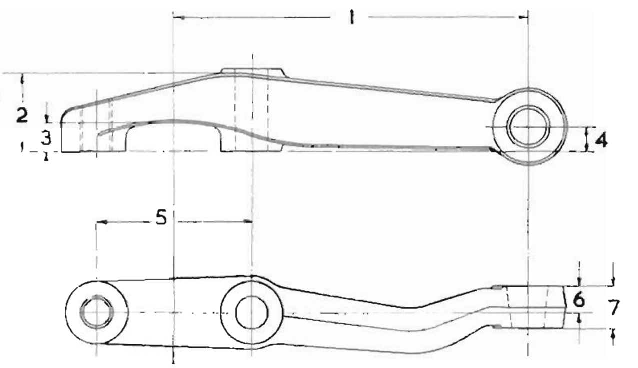


Fig. 61. Upper wishbone arm



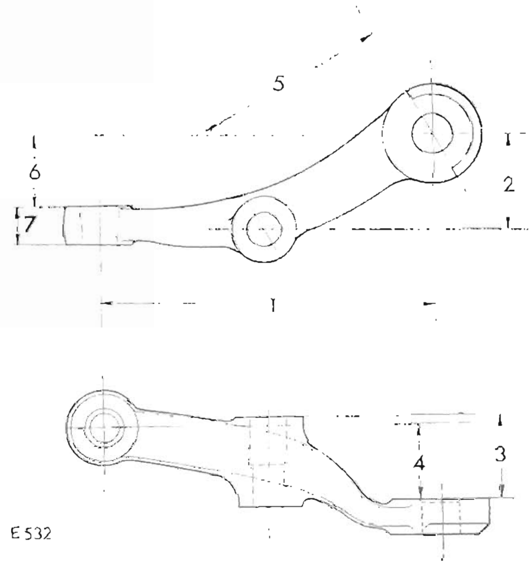
Up to and including the following commission numbers:–

Spitfire	.. ..	FC 15575
Herald 1200..	..	GA 127238
12/50..	.. ..	GD 12253

4 GY8

Dimension	Ins.	mm.
1	4·375	111·13
2	0·99	25·14
3	0·39	85·32
4	0·367	9·32
	0·377	9·57
5	1·936	49·17
	1·94	49·28
6	0·31	7·87
7	0·5	12·7

Fig. 62. Right-hand steering lever (early type, now used on Vitesse only)



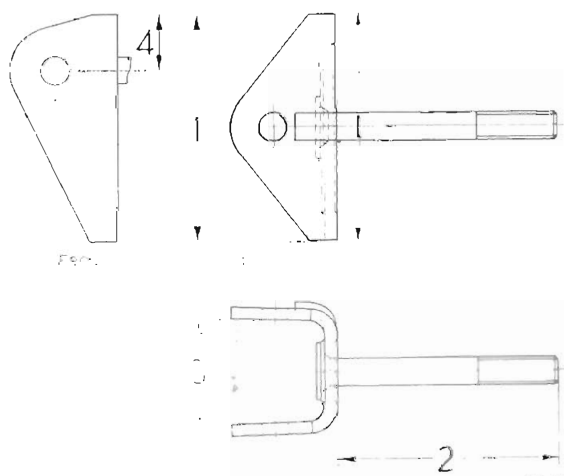
E 532

Dimension	Ins.	mm.
1	4·375	111·13
2	1·26	32
3	1·107	28·12
	1·117	28·37
4	0·955	24·26
	0·965	24·51
5	2·543	64·59
	2·553	64·84
6	0·914	23·2
7	0·5	12·7

Fig. 63. Right-hand steering lever (late type)

Fitted from the following commission numbers (inclusive):–

Spitfire	..	FC 15576
Herald 1200..	..	GA 127239
Herald 12/50	..	GD 12254



C 615

Dimension	Ins.	mm.
1	3·25	82·5
2	3·13	79·5
3	1·445	36·7
	1·460	37·1
4	0·74	18·8

Fig. 64. Lower wishbone fulcrum bracket

Dimension	Ins.	mm.
1	1·83	46·48
2	0·335	8·51
	0·345	8·76
3	0·875	22·2
4	0·245	6·22
	0·255	6·48
5	5·44	138·18
6	0·963	24·46
	0·973	24·7
7	0·9995	25·387
	1·0005	25·413
8	0·13	3·3
9	2·25	57·15
10	4·44	112·8
11	3·12	79·25
	3·13	79·5
12	1·936	49·17
	1·940	49·28
13	9 degrees	
14	2 degrees	

For Vitesse, dimension 7 is 1·062/1·063 in. (26·975/27·000 mm.).

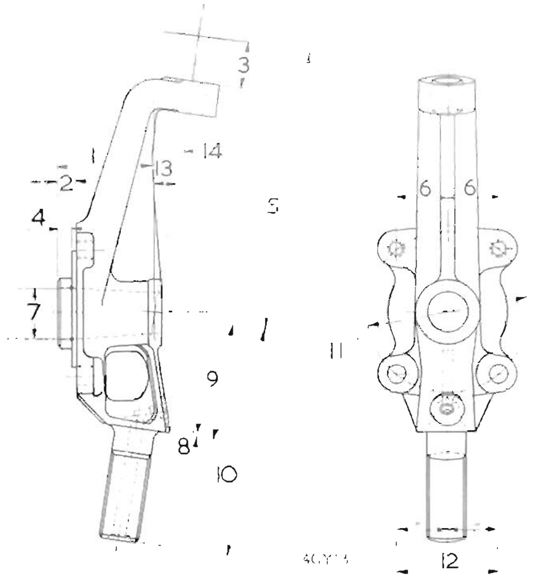


Fig. 65. Vertical link (early Herald type, now used on Vitesse only)

Dimension	Ins.	mm.
1	1·83	46 48
	0·825	20·955
2	0·815	20·701
3	0·875	22·2
4	0·245	6·22
	0·255	6·48
5	5·44	138·18
6	1·6257	41·293
	1·6242	41·255
7	0·9995	25·387
	1·0005	25·413
8	1·94	49·28
9	2·25	57·15
10	4·44	112·8
11	3·2515	82·588
	3·2485	82·512
12	1·964	49·88
	1·960	49·78
13	9 degrees	
14	2 degrees	

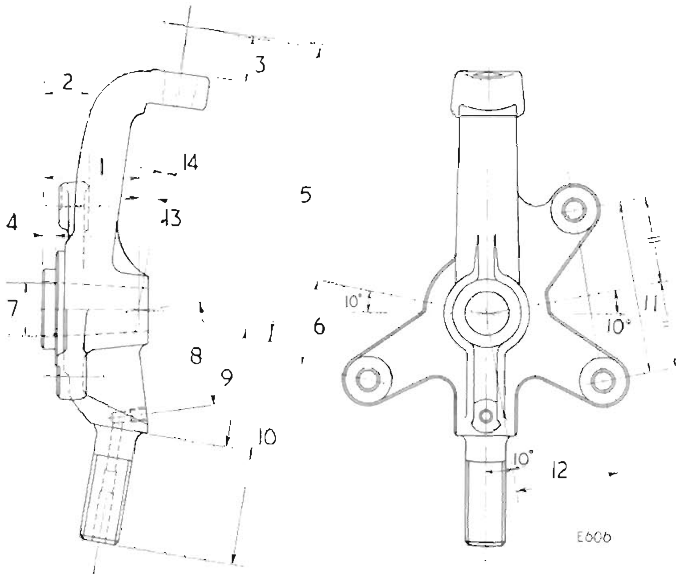


Fig. 66. Vertical link (late type)

Dimension	Ins.	
1	12·5	317·5 mm.

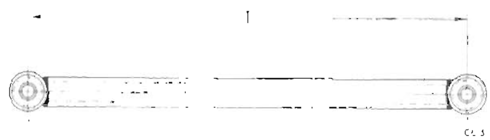
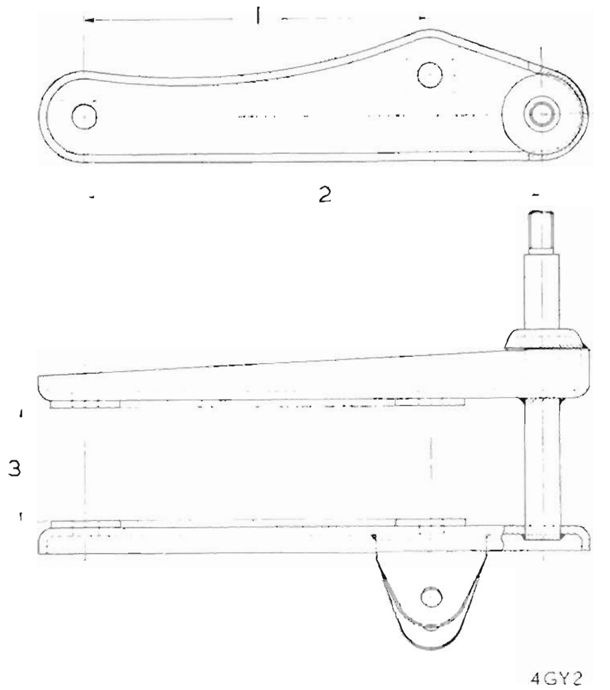


Fig. 67 Spitfire Rear suspension radius rod.

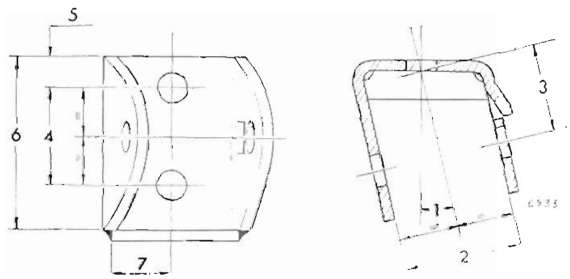
Dimension	Ins.	
1	15·88	403·3 mm.

Fig. 68. Herald 1200, 12/50 and Vitesse rear suspension radius rod



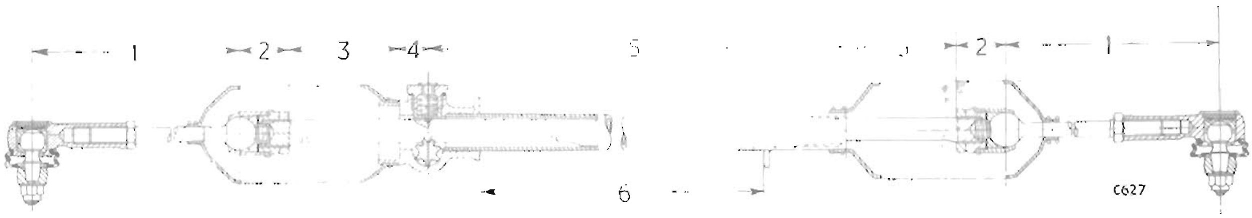
Dimension	Ins.	mm.
1	6·185	157·1
	to 6·195	to 157·35
2	8·185	207·9
	to 8·195	to 208·15
3	2	50·8

Fig. 69. Rear suspension vertical link plate assembly



Dimension	Ins.	mm.
1	14 degrees	
2	1·44	36·58
3	1·06	26·92
4	1·182	30·02
	1·192	30·28
5	0·38	9·65
6	2·13	54·1
7	0·75	19·05

Fig. 70. Rear suspension radius rod chassis bracket



1	8·715" (221·36 mm.)	3	3·325" (84·45 mm)	5	16·875" (428·63 mm.)
2	1·42" (36·07 mm.)	4	0·875" (22·23 mm.)	6	12·78" (324·62 mm.)

Fig. 1. Steering unit dimensions

STEERING MEASUREMENTS AND ADJUSTMENTS

Before carrying out measurements and adjustments on the front suspension and steering, inflate the tyres to the correct pressures and position the vehicle on a smooth, level surface. Place a load of 150 lb. (68 kg.) on each seat.

A. Checking Steering Locks

NOTE : The back and front lock angles are equal to each other only when the wheels are set at 20° from the straight-ahead position.

Position the front wheels on Weaver or similar wheel turning gauges, and place wood blocks of equivalent thickness to that of each gauge under the rear wheels.

Set the front wheels straight ahead and zero the gauges. Turn each wheel to 20° front lock and read the opposite gauge. Repeat the procedure with 20° back lock. If the front and back lock angles do not conform to 20°, damage to suspension components must be assumed.

B. Lock Stop Adjustment

Limitation of the steering lock is controlled by the locknut (33) Fig. 4, contacting the rack tube. Thus dimension (3) Fig. 1 is particularly important. Providing that this dimension is accurate and the steering unit is centrally mounted on the chassis, correct steering locks should result.

C. Track Adjustment (Figs. 2, 3 and 4)

Centralize the steering unit and measure the front wheel alignment, using Dunlop or similar wheel alignment equipment. If adjustment is required, slacken the locknuts (43) Fig. 4, the clips (42) and rotate the tie-rods (38) until alignment is correct. Note the reading. Roll the vehicle forward to rotate the wheels 180°, and take a second reading. Adjust the tie-rods to a mean of the two readings thus allowing for wheel rim run-out.

Tighten the tie-rod locknuts and gaiter clips.

Fig. 2. Using Dunlop optical wheel alignment gauge

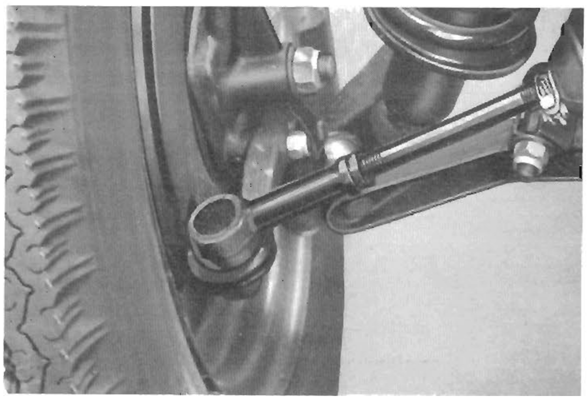


Fig. 3. Tie-rod end locknut and gaiter clip

EXPLODED STEERING UNIT

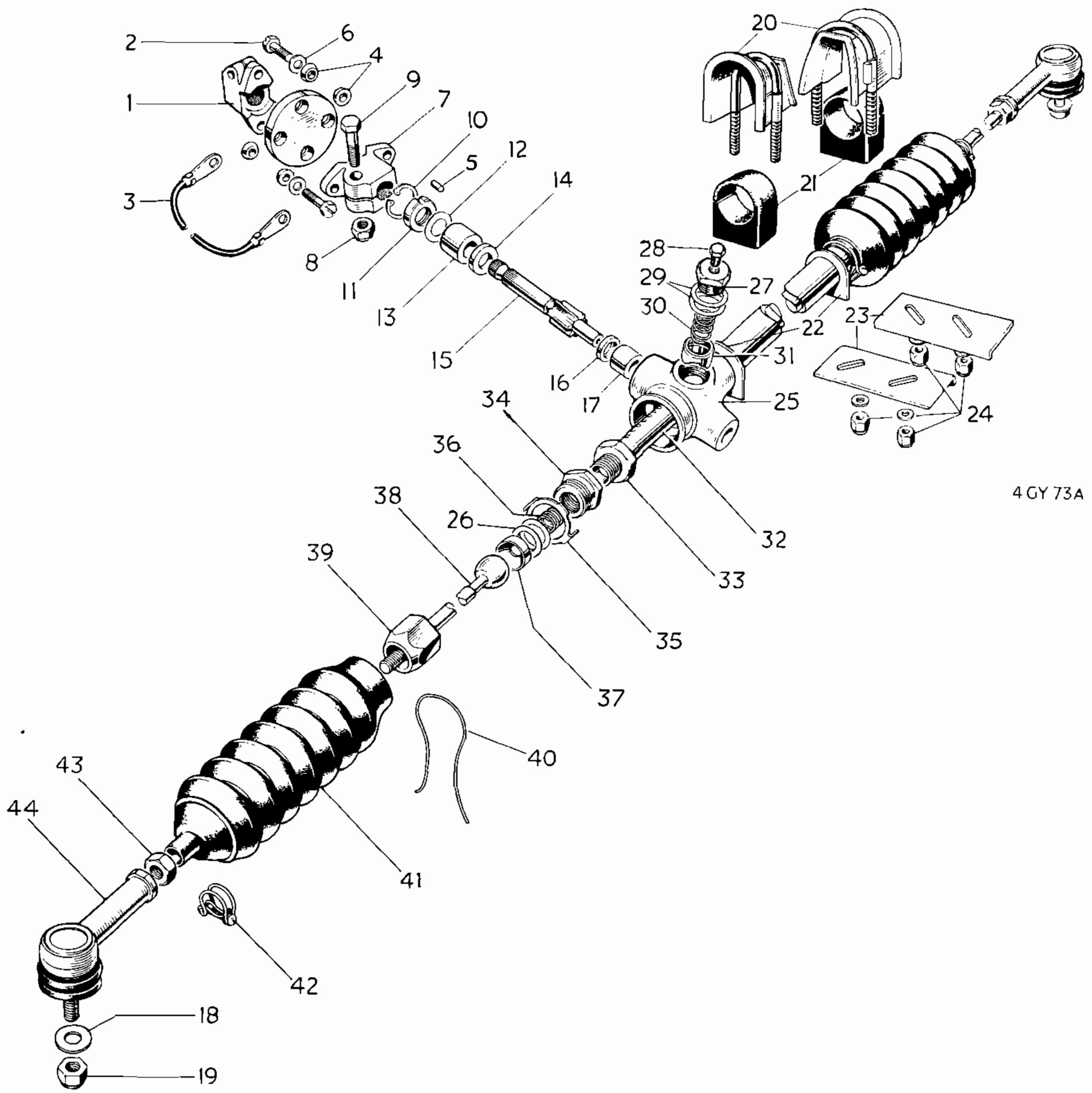


Fig. 4. Exploded steering unit

Key to Fig. 4

1	Steering coupling (upper)	23	Locating plates
2	Bolt	24	Nyloc nuts
3	Earth cable	25	Rack assembly
4	Rubber bushes	26	Shims
5	Dowel	27	Cap
6	Washer	28	Grease plug
7	Steering coupling (lower)	29	Shims
8	Nyloc nut	30	Spring
9	Pinch bolt	31	Plunger
10	Circlip	32	Rack
11	Retaining ring	33	Locknut
12	Shims	34	Sleeve nut
13	Bush	35	Lock tab
14	Thrust washer	36	Spring
15	Pinion shaft	37	Cup
16	Thrust washer	38	Tie-rod
17	Bush	39	Cup nut
18	Washer	40	Locking wire
19	Nyloc nut	41	Rubber gaiter
20	"U" bolts	42	Clip
21	Rubber bushes	43	Locknut
22	Abutment plates	44	Tie-rod end

Castor and Camber Measurement

The following instructions for measuring castor and camber are applicable to the Weaver instrument.

Run the front wheels on to Weaver or similar wheel turning radius gauges as shown on Fig. 5 and place wood blocks of equivalent thickness to that of each gauge under the rear wheels. Zero the gauges with the front wheels in the straight ahead position.

Remove the hub cap from the hub.

Ensuring that the split pin does not foul it. place the spacer washer (4), Fig. 5, with flange outwards, and engage the claws of the adaptor (3) on the stub axle thread between two of the nut slots. Secure the spirit level unit (1) to the adaptor and tighten the knurled nut (2).

With the wheels in the straight ahead position, measure the camber from the L.H. Scale.

Turn the wheel to 20° back lock and zero the bubble on the R.H. scale.

Turn the wheel to 20° front lock and read the castor angle from the R.H. scale.

Repeat the operations on the opposite wheel. Compare the camber and castor angles with those given on page 4·102. Appreciable differences indicate distorted suspension components, worn suspension bushes or settled front springs.

Castor and Camber Adjustments

Adjustment of camber and castor angles is accomplished by altering the number of shims assembled between the chassis and the lower inner fulcrum brackets.

Before adjustments are made, jack up under the spring to relieve side loading on the fulcrum brackets. Loosen the bracket from the chassis to permit manipulation of the shims.

After each adjustment is made, tighten the brackets to the chassis, remove the jack and measure the angles.

Castor Angles

To decrease, add shims to the front bracket or remove shims from the rear.
To increase, reverse the procedure.

Camber Angles

To decrease, add an equal number of shims to both brackets.
To increase, reverse the procedure.

1 Spirit level
2 Knurled nut
3 Adaptor
4 Spacer washer
5 Hub cap
6 Turning gauge

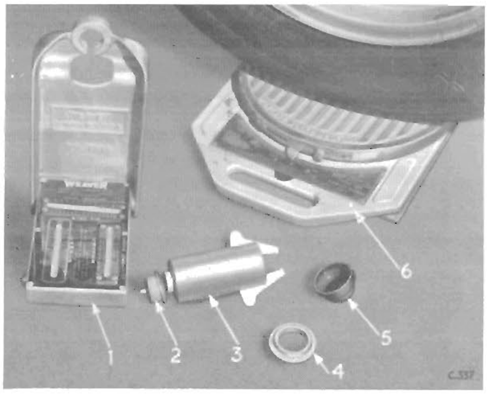


Fig. 5. Weaver Measuring Equipment

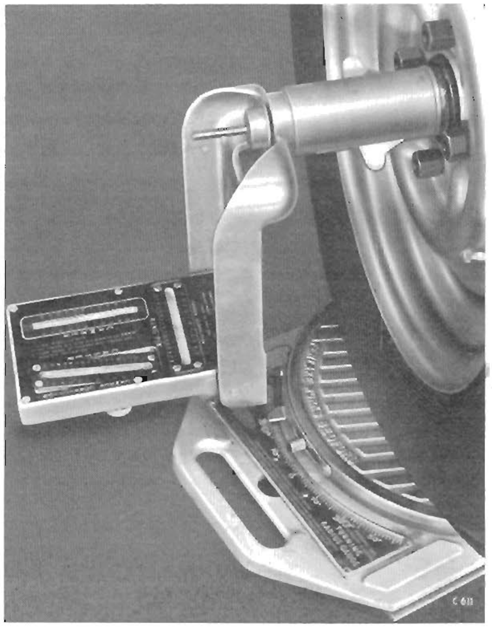


Fig. 6. Using Weaver equipment to measure castor angle

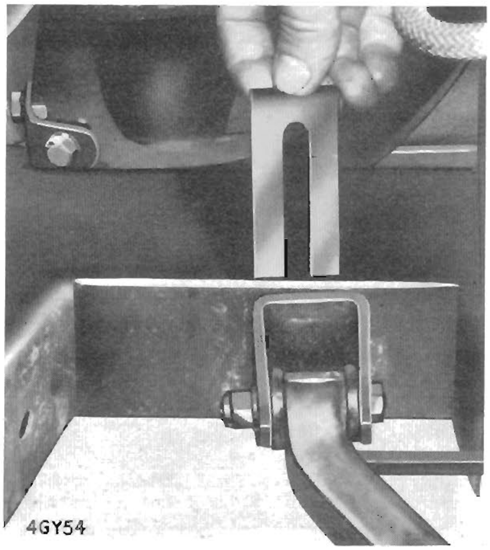


Fig. 7. Positioning of shims between fulcrum bracket and frame

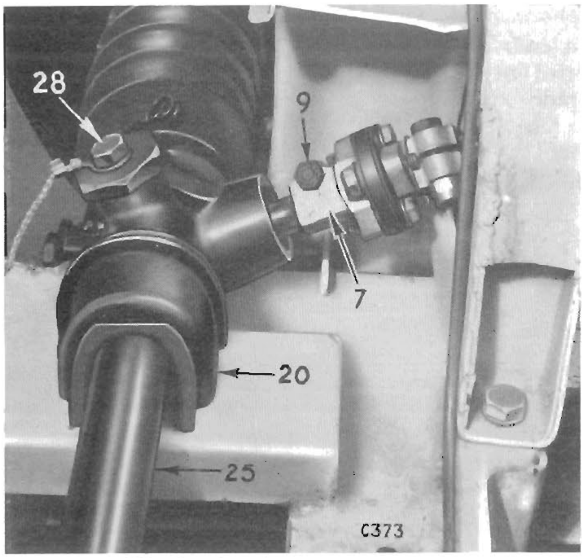


Fig. 8. Steering unit attachments

Steering Unit

Removal (Fig. 8)

1. Remove item (9) from the coupling (7). Disconnect the earth strap, secured by item (28) at one end, from the bolt securing it to the chassis frame.

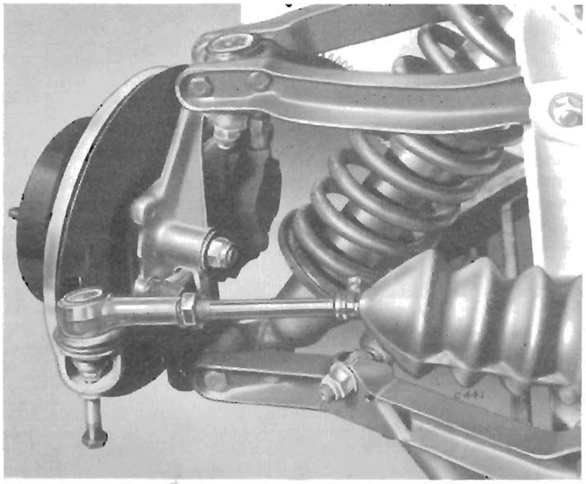


Fig. 9. Releasing tie-rod end with tool No. S.160

2. Referring to Fig. 9, extract the tie-rod ends from the steering arms, after removing the securing nuts and washers.

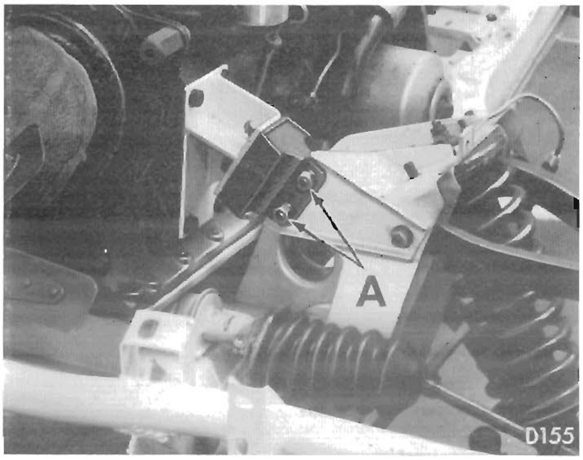
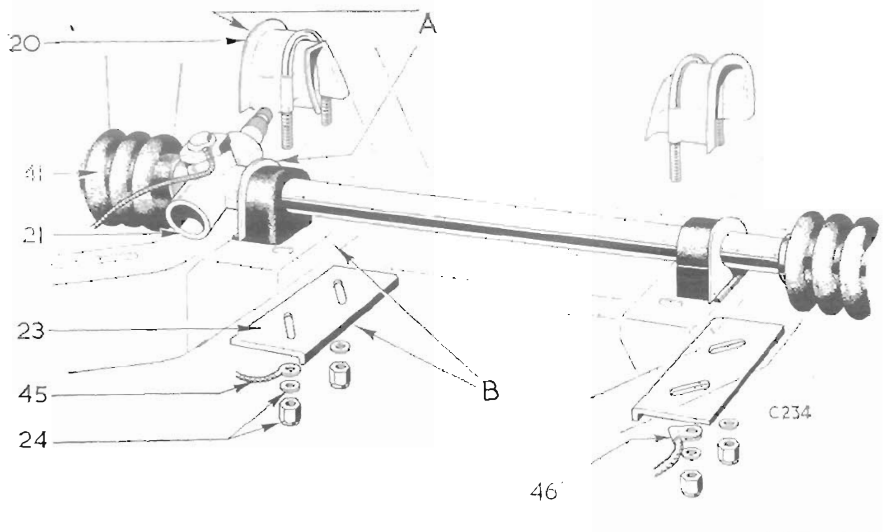


Fig. 10. Engine mounting bolts "A"

3. Referring to Fig. 4, remove in the following order, items (24), (23), (20) and (21).

4. Using a sling and hoist, relieve the vehicle of the weight of the engine, and remove the bolts (A) Fig. 10; then raise the engine approximately ¾" (19 mm.) (Vitesse only).

5. Move the steering unit forward to disengage the coupling from the steering column, and manoeuvre the unit from the vehicle, via the valance aperture on the driver's side.



A Distance between flanges must be ⅛" (3·17 mm.)

B Flange of item (23) must contact innermost flange of frame.

20 "U" bolt

21 Rubber bush

23 Locating plates

24 Nyloc nuts

41 Rubber gaiter

45 Steering column earth cables

46 Engine earth cable

Fig. 11. Steering unit attachments

Refitting

1. Referring to Figs. 1 and 11, ensure that the steering unit is assembled to the dimensions given.
2. Rotate the pinion shaft from lock to lock, counting the number of revolutions. Turn the pinion shaft back half this number of rotations; thus centralizing the rack in relation to the pinion.
3. Position the steering wheel in the straight ahead position, *i.e.*, with the spokes horizontal and beneath the wheel boss centre.
4. Manoeuvre the steering unit through the wing valance aperture on the driver's side of the vehicle (Herald and Vitesse) and engage the steering column in the flexible coupling.
5. Fit the rubber bushes (21) to the steering unit. Assemble the "U" bolts (20) as shown on Fig. 11 and loosely secure them with the plates (23) and nyloc nuts (24).
6. Push the "U" bolt assemblies outwards until a ⅛" (3·175 mm.) clearance exists between the flange plates welded on the rack tube and the retainers welded to the "U" bolts.
7. Hold the "U" bolts in the position achieved in (6), whilst an assistant slides the plates (23) inwards to abut their flanged faces against the chassis frame flange. Tighten the nuts.
8. Fit the nyloc nut (8) and bolt (9) to the steering coupling (7).
9. Re-connect the earth strap from the steering unit to the chassis frame.
10. Refit the tie-rod ends (44) to the steering arms and secure with plain washers (18) and nyloc nuts (19).
11. Check the front wheel alignment as described on page 4·201.

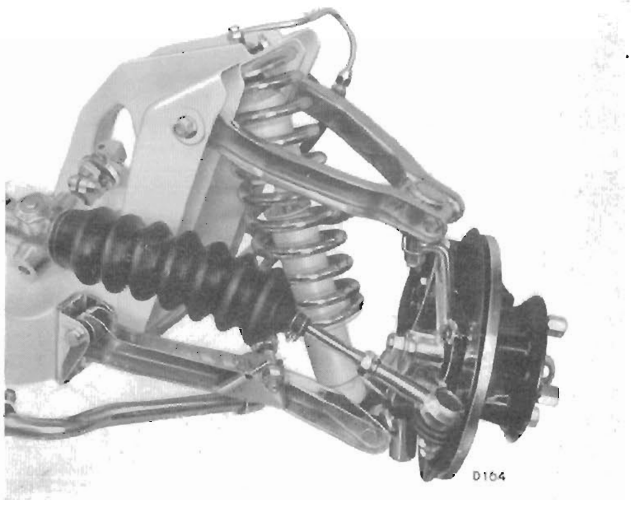


Fig. 12. Tie-rod attachments

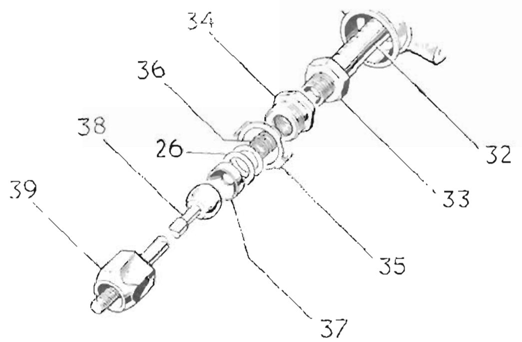


Fig. 13. Tie-rod inner ball joints

Steering Unit (Fig. 4)

Dismantle

Release the clips (42) and (40), and slide both bellows towards the outer ball joints. Slacken the locknuts (33) and unscrew both outer tie rod assemblies from the rack (32). Withdraw the coil spring (36) from each end of the rack.

Release the tabwasher (35), unscrew the sleeve nut (34) and remove the tabwasher (35), shims (26) and cup (37). Slacken the locknuts (43) and unscrew the outer ball joint assemblies (44) from the tie rods (38).

Remove the locknuts (43), rubber bellows (41), clips (42) and cup nut (39) from each outer tie-rod (38).

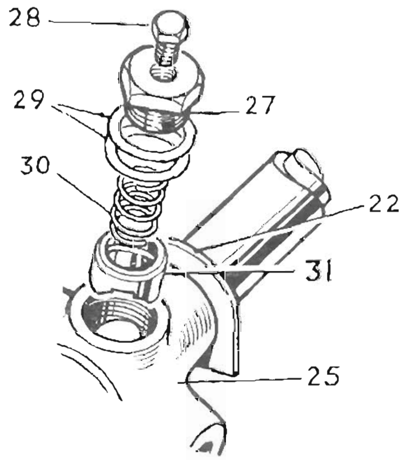


Fig. 14. Pinion thrust pad assembly

Remove the locknuts (33) from the ends of the rack. Unscrew the cap (27) and remove the shims (29), spring (30) and pressure pad (31) from the housing.

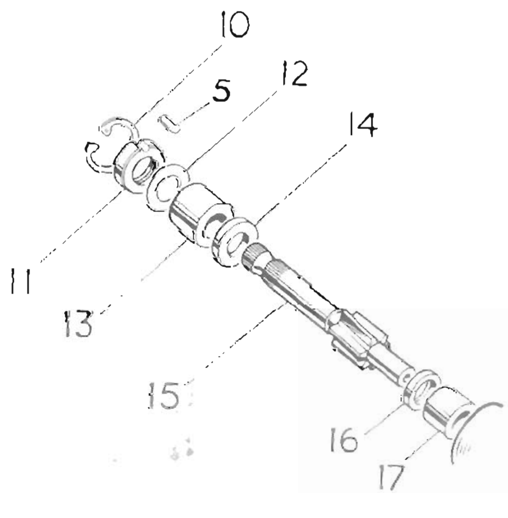


Fig. 15. Pinion assembly

Remove the circlip (10) and withdraw the pinion assembly, taking care not to lose the dowel peg (5). Remove the retaining ring (11), shims (12), bush (13) and thrust washer (14). Detach the rubber "O" ring from the annular groove in the retaining ring (11).

Withdraw the rack (32) from the tube (25) and remove the thrust washer (16) and bush (17) from the pinion housing.

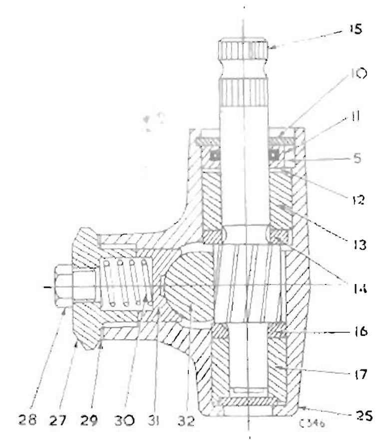
Assembly

Insert the rack (32) into the tube (25) and place the bush (17) and thrust washer (16) into the pinion housing.

Adjust the pinion end float as follows:—

1. Assemble the thrust washer (14), bush (13) and retaining ring (11) to the pinion (15). Insert the assembly into the pinion housing and secure the pinion with the circlip (10).
2. Mount a dial gauge on the tube as shown on Fig. 17. Push the pinion down to its limit and zero the dial gauge. Lift the shaft until the retaining ring contacts the circlip and note the dial reading. This represents the total pinion shaft end float. Remove the circlip (10) and withdraw the pinion shaft assembly. Remove the retaining ring (11) and renew its rubber "O" ring.
3. Make up a shim pack to give minimum end float consistent with free rotation of the pinion shaft. Shims are available in 0·004" (0·102 mm.) and 0·010" (0·254 mm.) thickness.
4. Assemble the shim pack (12) and retainer ring (11) to the pinion. Re-insert the assembly into the housing and finally secure it by fitting the dowel (5) and circlip (10).

Fig. 16. Cross-section through steering unit



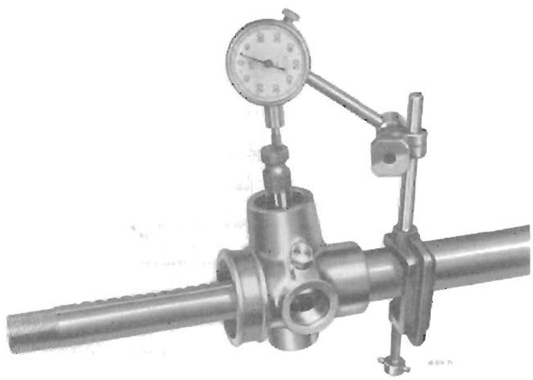


Fig. 17. Measuring pinion end float

Adjust the pinion pressure pad as follows:—

5. Fit the plunger (31) and cap nut (27) to the rack tube (25). Tighten the nut to eliminate all end float and, using feeler gauges, measure the clearance between the nut and the rack tube faces as shown on Fig. 18. Remove the cap nut (27) and plunger (31).
6. Make up a shim pack equal to the cap housing clearance plus 0·004" (0·1 mm.) nominal end float.
7. Pack the unit with grease and assemble the cap nut (27), shim pack (29), spring (30) and plunger (31) to the housing (25) and tighten the cap nut.
8. When the unit is correctly adjusted, a force of 2 lb. (0·91 kg.) is required to rotate the pinion shaft at a radius of 7·9" (20·3 cm.) see Fig. 19. Check and re-adjust the unit, if necessary, by adding or subtracting shims from beneath the cap nut (27).

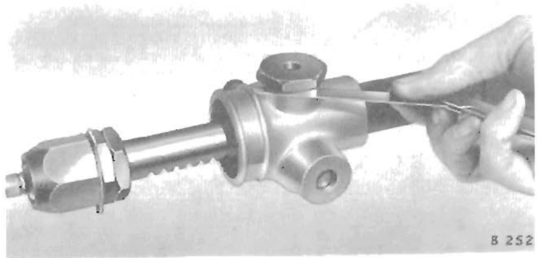


Fig. 18. Using feeler gauge to determine shim thickness required under cap nut

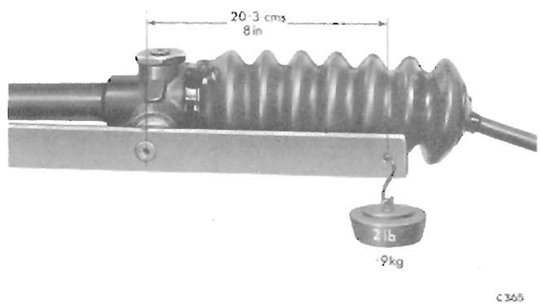


Fig. 19. Measuring load required to rotate pinion

EXPLODED ARRANGEMENT OF STEERING COLUMN

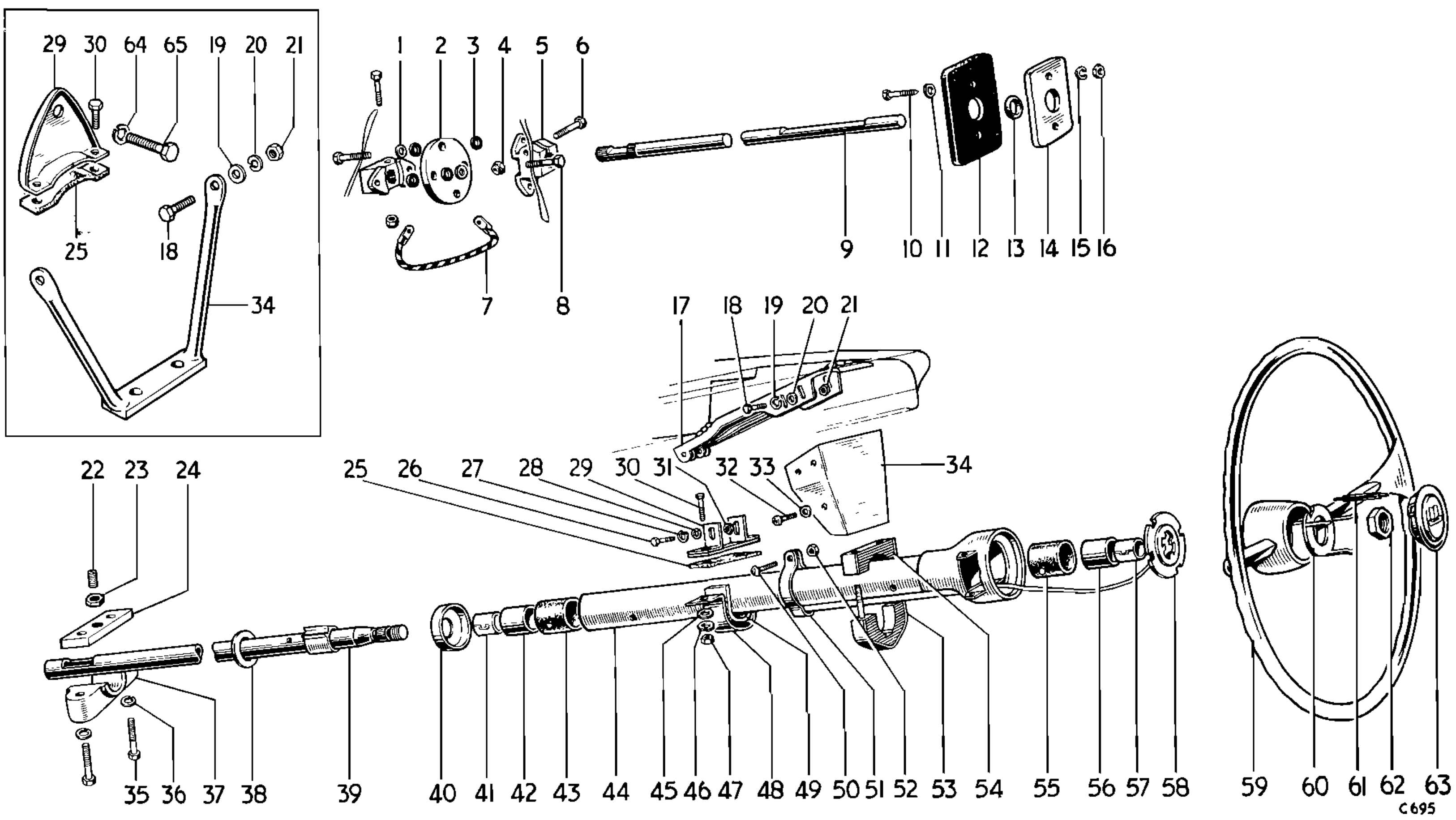


Fig. 20. Exploded arrangement of steering column

Key to Fig. 20

1	Washer	33	Washer
2	Disc	34	Bracket
3	Rubber washer	35	Bolt
4	Nyloc nut	36	Spring washer
5	Adaptor	37	Clamp
6	Pinch bolt	38	Nylon washer
7	Earth cable	39	Upper inner steering column
8	Bolt	40	End cap
9	Lower steering column	41	Nylon bush
10	Bolt	42	Steel bush
11	Washer	43	Rubber bush
12	Rubber seal	44	Outer upper column
13	Washer	45	Washer
14	Retaining plate	46	Spring washer
15	Spring washer	47	Nut
16	Nut	48	Lower outer column clamp
17	Support bracket	49	Felt pad
18	Bolt	50	Screw
19	Spring washer	51	Cable trough clip
20	Washer	52	Nut
21	Nut	53	Upper clamp (lower half)
22	Socket screw	54	Upper clamp (upper half)
23	Nut	55	Rubber bush
24	Clamp plate	56	Steel bush
25	Felt pad	57	Nylon bush
26	Bolt	58	Horn contact ring
27	Spring washer	59	Steering wheel
28	Washer	60	Clip
29	Bracket	61	Horn contact brush
30	Bolt	62	Nut
31	Nut	63	Horn push
32	Screw	64	Spring washer
		65	Bolt

Inset shows upper outer column clamp attachment on Herald 1200, 12/50 and Vitesse.

Assembling and Adjusting Tie-rod Inner Ball Joints

1. Slide the cup nut (39) over the tie-rod (38) and insert the cup (37) into the cup nut (39).

2. Position the lock tab (35) over the sleeve nut (34) and screw this fully into the cup nut (39). With the cup nut held in a vice, move the tie-rod (38) axially to determine the approximate shim pack thickness required. Remove the assembly from the vice and remove sleeve nut (34).

3. Prepare a shim pack (26) in excess of the estimated ball end movement and insert this in the cup nut behind the cup (37).

4. Screw the sleeve nut (34) with lock tab (35) fully into the cup nut (39).

5. Using feeler gauges, measure the gap between the sleeve nut flange, lock tab (35) and cup nut face (39). This dimension, plus 0·002″ (0·05 mm.) is the amount by which the trial shim pack must be reduced to give correct ball end movement.

6. Dismantle the ball joint and re-assemble it with the correct shim pack determined in (5). Test adjustment by applying a load of 1½ lb. (0·681 kg.) at the outer end of the tie-rod (38), when the tie-rod should articulate freely. If necessary, adjust the shim pack until correct operation is obtained. Shims are obtainable in 0·002″ (0·05 mm.) and 0·010″ (0·254 mm.) thickness.

7. When adjustment is correct, lock the assembly by bending the lock tab (35) over the sleeve nut (34) and cup nut (39).

Refitting Ball Joint to Steering Rack

1. Screw the locknut (33) on to the end of the rack (32) so that its position corresponds with dimensions 3 + 4 + 5 + 3 on Fig. 1, *i.e.*, 24·40″ (619·76 mm.) between inner locknut faces.

2. Insert the spring (36) into the end of the rack and screw the ball joint assembly as far as possible up to the locknut (33).

3. Repack the bellows (41) with grease (¼ oz. Retinax "A" from dry) before securing them in position with clips (42) and wire (40).

4. Fit the locknuts (43) and outer tie-rod ends (44) to the tie-rods (38), adjusting them so that they correspond with dimensions 1 + 2, Fig. 1, *i.e.*, 10·13″ (257·43 mm.).

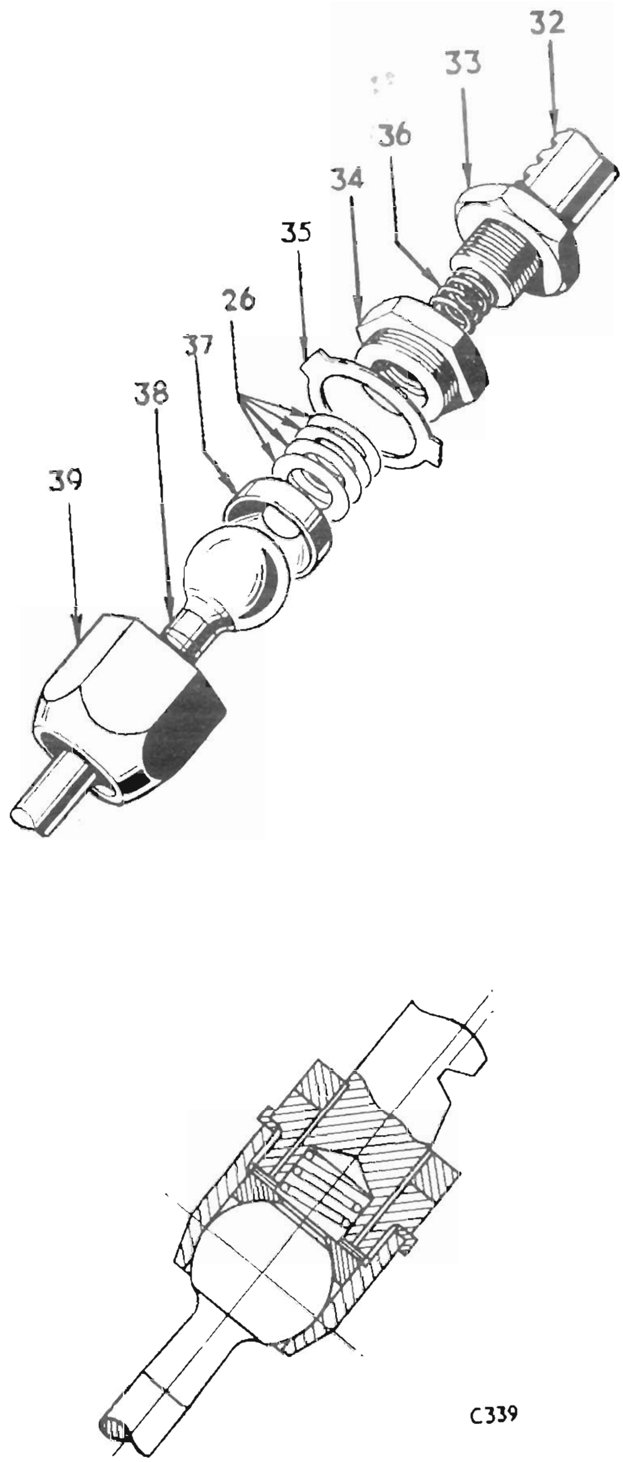


Fig. 21. Tie-rod coupling details

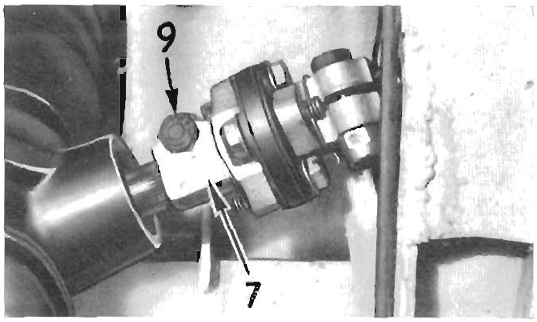


Fig. 22. **Steering column lower coupling**

STEERING COLUMN

Removal

1. Remove the bolt (9) from the steering coupling (7), Fig. 22.

2. Disconnect the steering head cables at their snap connectors beneath the facia, and note the colours to facilitate re-assembly.

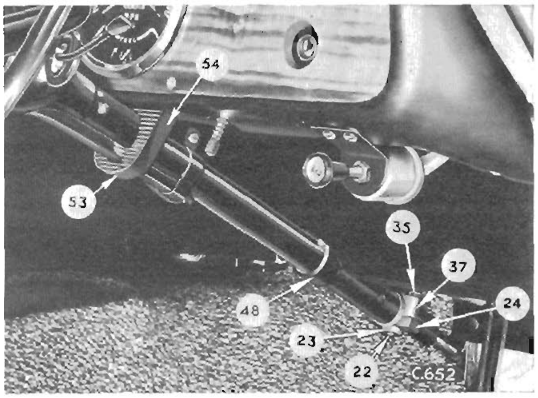


Fig. 23. Steering column attachments
(HERALD 1200, 12/50 AND VITESSE)

3. Referring to Figs. 20 and 23, remove the outer column support clamp (48) (lower) and the lower portion of the steering column upper clamp (53).

   NOTE : On Spitfire models remove the driver's side glove box to obtain access to the nuts.

4. Withdraw the steering column assembly from the vehicle.

To Dismantle

1. Remove the cable trough (51).

2. Prise the horn push assembly (63) from the steering wheel boss and withdraw the contact brush (61).

3. Remove the switch covers and detach each switch from the column (Fig. 24).

4. Remove the bolts (35), spring washers (36), and detach the halves of the impact clamp (37) and (24). Withdraw the lower column (9) downwards and detach the nylon washer (38). Remove the upper inner column (39) with the steering wheel (59) in an upwards direction.

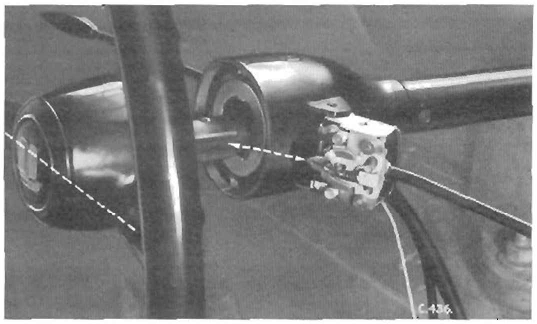


Fig. 24. Removing flasher and lighting switches

5. Hold the column (39) in the protected jaws of a vice and remove the nut (62) and spring clip (60). Use an extractor as shown on Fig. 25 to remove the wheel from the column.

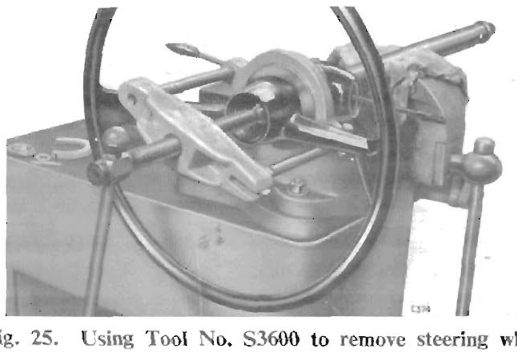


Fig. 25. **Using Tool No. S3600 to remove steering wheel**

[illegible] Remove the end cap (40) and depress the protrusions on the rubber bushes (43) and (55) as shown on Fig. 26. Using a length of bar, eject the bushes from the outer column (44). Remove the metal inserts (42) and nylon bushes (41) from the rubber bushes.

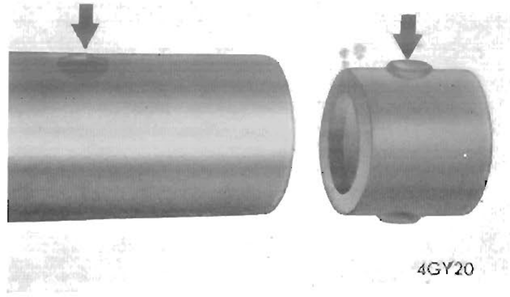


Fig. 26. Protrusions on rubber bushes and corresponding holes in steering column

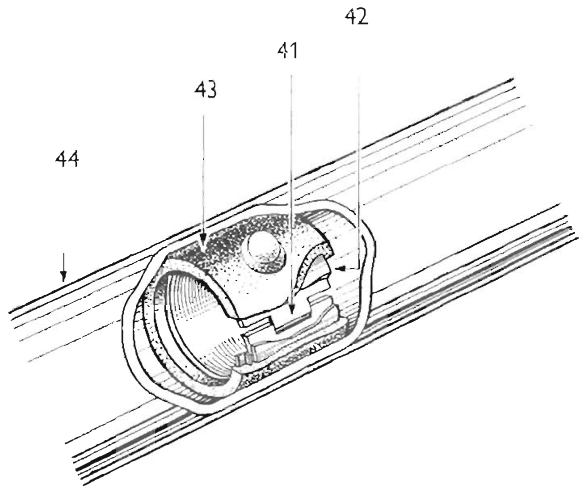


Fig. 27. Steering column bush assembly

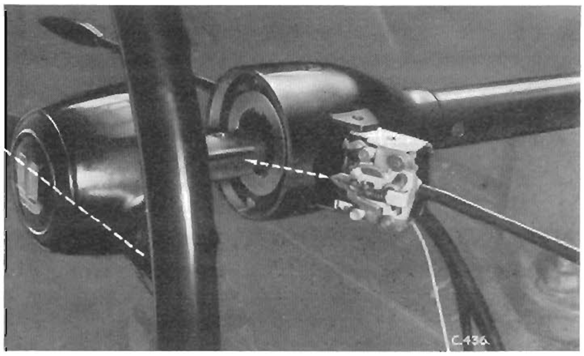


Fig. 28. Position of direction indicator cancelling lugs in relation to the steering wheel

Re-Assembly

1. Assemble the nylon bush (41) and steel sleeve (42) to each rubber bush (43) and push the assembly into the bottom of the outer column (44) engaging the locating lugs with the holes as shown on Fig. 27. Ensure that the metal reinforcement ring at the end of the bush is positioned towards the lower end of the column. Repeat the procedure with the upper bush assembly.
2. Fit the end cap (40) to the lower end of the column (44).
3. Fit the steering wheel to the inner column (39), aligning the direction indicator cancelling lugs on the column to correspond with the steering wheel spokes as shown on Fig. 28. Fit the clip (60) and secure with the nut (62). Peen the metal of the nut to the inner column to prevent it unscrewing.

   NOTE : When replacing an old flasher switch with a new switch, the new cancellation clip and setscrew must also be fitted.
4. Insert the inner column (39) into the outer column (44), taking care not to dislodge the bushes.
5. Pass the cables of the direction indicator and lighting switches through the apertures in the upper end of the outer column, and fit the switches and covers.
6. Insert the horn contact plunger (61) into the steering wheel boss and fit the horn button assembly (63).
7. Fit the lower column (9) and assemble the impact clamp (37), leaving the bolts (35) slack at this stage.

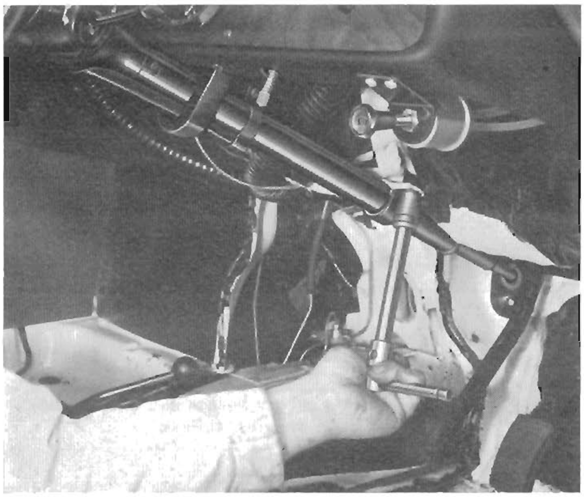


Fig. 29. Tightening lower column clamp nuts

Fig. 30. Reconnecting cables at snap connectors

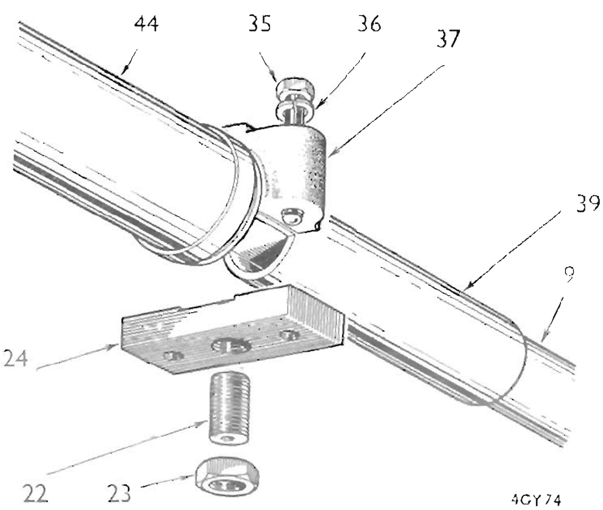


Fig. 31. Exploded view of steering column impact clamp

To Refit the Column Assembly

1. Fit the steering column assembly to the vehicle, passing the column through the rubber grommet in the bulkhead.
2. Fit the cable trough and the lower half of the upper support clamp (53).
3. Fit the lower clamp (48) with felt (49) and secure with nuts (47) and washers (45) and (46).
4. Position the steering wheel at the desired height and tighten the clamps (53) and (48).
5. With the steering wheel and road wheels in the straight ahead position, engage the lower column (9) with the steering coupling and secure with the pinch bolt (6) and nut (4).
6. Re-tighten the bolts (35) on the impact clamp (37). Using a socket key tighten the screw (22), Fig. 31, by hand as much as possible without bending the wrench. Tighten the locknut (23).

   NOTE: The column will be unable to telescope if adjusted to its lowest position.
7. Re-connect the horn, traffic indicator and lighting cables at the snap connectors and re-clip the cables beneath the facia.
8. Refit the driver's side glove box, if previously removed.

COLUMN ALIGNMENT
SPITFIRE ONLY

To align the steering column in relation to body mounting, limited adjustment is permitted by slots in items (17) and (29), Fig. 20.

STEERING

Steering Geometry and Suspension Geometry

The term "steering geometry" refers to the layout of the steering mechanism and any of its dimensions, linear or angular, which contribute to the required behaviour of the steering system. The steering system is always designed to comply with the specification of the front suspension, in order that the best possible steering behaviour is obtained under all conditions.

For example, Toe-in and Camber are classed as suspension geometry; K.P.I. and Castor are classed as steering geometry.

Departure from any steering/suspension dimensions may result in unsatisfactory steering and/or abnormal wear of tyres, steering and suspension components.

NOTE : Poor steering and tyre wear is often caused by unbalance of the tyres themselves.

To avoid using jigs for rear wheel alignment, it is recommended that optical equipment (*e.g.*, Optiline, Optoflex, etc.) be used, enabling the front and rear wheels to be aligned simultaneously. This equipment projects a beam of light in a plane at right angles to each individual wheel axle, on to a graduated screen. The various angles and dimensions may be read directly and accurately off the screens.

Steering Axis Inclination (Fig. 32)

This is the angle in front elevation between the steering axis "A" and the vertical line "B". The steering axis is the continuation of the lower trunnion centre line through the centre point of the upper ball swivel, and it is about this axis that the wheel pivots as it is turned for control of vehicle direction.

Camber (Fig. 32)

Positive camber is the amount in degrees that the front wheels are tilted outwards at the top "C", from the vertical line "B".

Castor (Fig. 33)

Castor is the angle in side elevation between the steering axis "A" and the vertical line "B". It is considered positive when the steering axis is inclined rearwards.

Wheel Alignment

To ensure parallel tracking when the vehicle is moving, the recommended static setting is parallel to $\frac{1}{16}$" (1·6 mm.) toe-in.

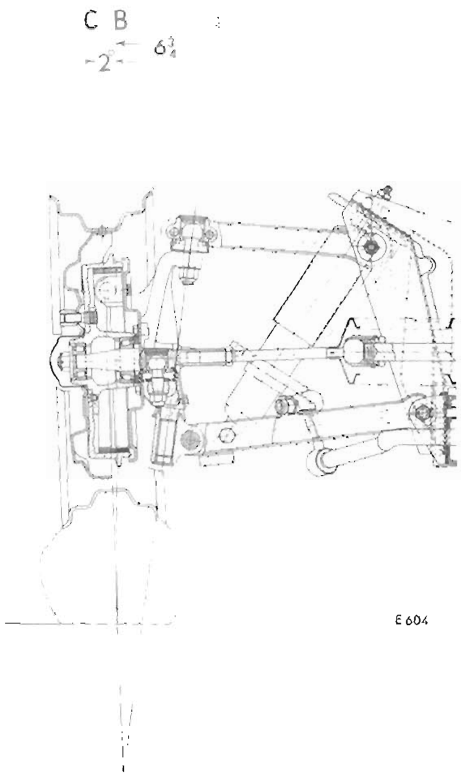


Fig. 32. Steering axis inclination and camber angle

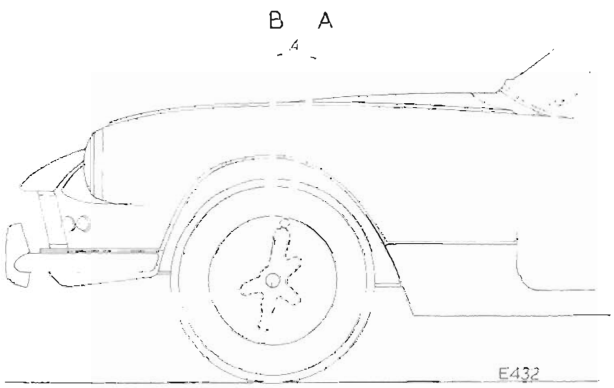


Fig. 33. Castor angle

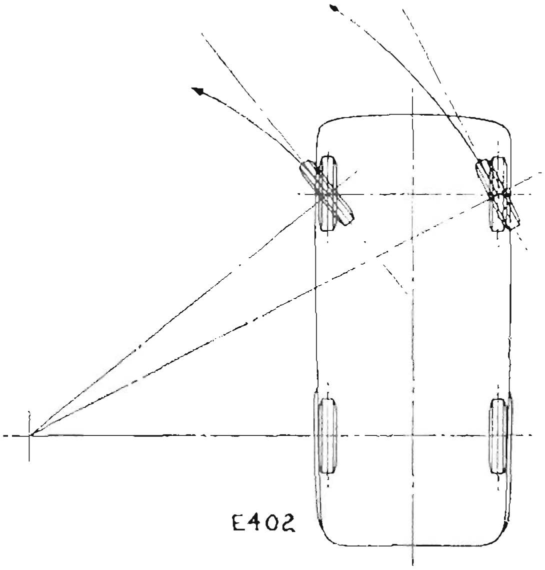


Fig. 34. Showing the relative angles of the front wheels when making a turn

Turning Radius Angles

Inside Wheel	Outside Wheel
20 degrees 48 max.	20 degrees 50 30′ max.

Toe-out on Turns (Fig. 34)

This is the alignment of the front wheels relative to each other as they are turned to the left or right.

To eliminate scuffing when the vehicle is making a turn, each front wheel must be at right angles to the radius from its point of contact with the road to the centre of the turning circle. Thus the inner wheel toes-out relative to the outer wheel.

Unfortunately, using simple steering mechanisms, it is not possible to obtain the exact toe-out at every position through the complete turn from straight-ahead to full lock. However, scuffing can be minimised by careful positioning of the steering components.

Static Laden

The steering dimensions illustrated on Figs. 32 and 33 apply to a vehicle when static laden.

This condition is obtained by placing a 150 lb. (68 kg.) weight on each front seat and two similar weights on the rear seat.

OPTICAL ALIGNMENT EQUIPMENT

General Recommendations

To obtain the greatest accuracy from optical alignment equipment, it is necessary to comply with the following instructions:—

(a) Assemble the equipment in accordance with the manufacturer's instructions.

(b) Set the screen parallel and at right angles to a level floor.

(c) Set the car square to the screen with the centre of the front wheels 5 ft. 7 in. from the face of the screen.

(d) Adjust the tyre pressures and load the vehicle to the static laden condition.

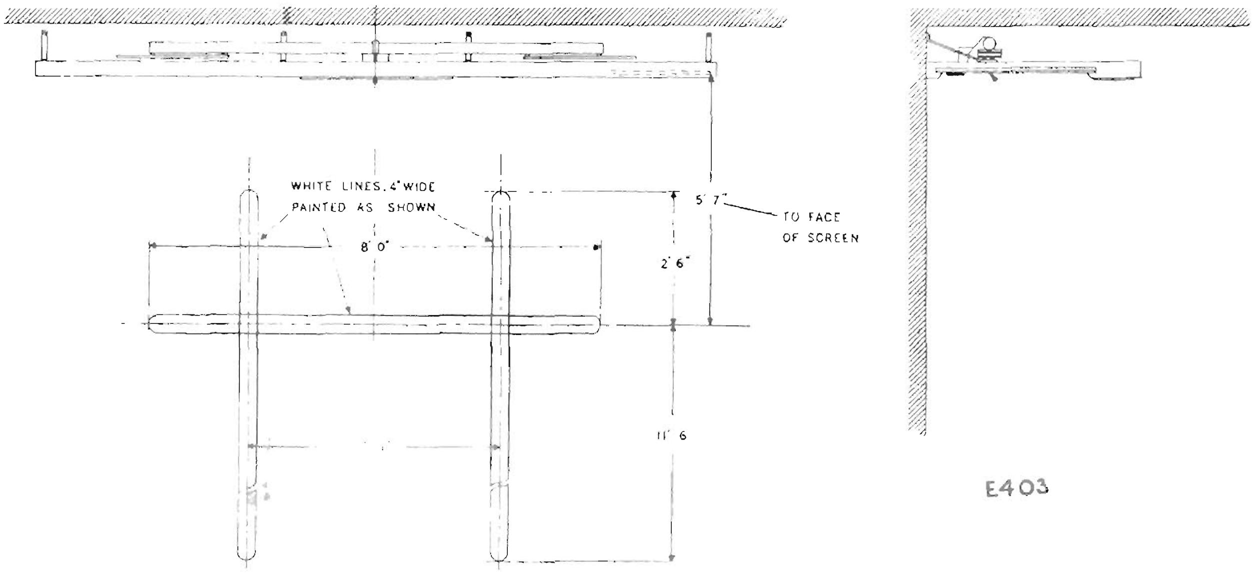


Fig. 35. Suggested floor markings relative to the optical screen face

Attaching the Projectors

Attach the wheel clamps by resting the lower support (6) on the edge of the wheel rim and pushing the upper support (4) until the cut-screws touch the inside of the upper wheel rim. Whilst pressing the upper support against the wheel rim edge, turn the cam lock (3) to secure the clamp.

Jack up the front wheels and ensure that the wheel clamp is clear of obstructions when rotating the wheel. Loosen the projector cam lock (5) centre the projector pivot (7) on the rods and retighten the cam lock (5). Slide the projector on to its pivot and tighten the clamping bolt (9). Repeat the procedure on the opposite front wheel.

Compensating for Wheel Run-out

The projector pivot mountings are provided with three large diameter milled edged compensating screws (2) for adjusting the projector beams to the true axis of the road wheels. Compensation for wheel run-out is effected as follows:—

Connect the projectors to the control panel and, by sliding the telescopic projector lens (8) backwards or forwards, focus the light beam on the vertical line trueing scale immediately above the mirror hole in the screen.

Slacken the projector clamp screw (9) and, holding the projector (10) to keep the light image within the trueing scale, slowly rotate the road wheel. Note the extent of movement made by the light image across the scale and stop turning the wheel when the image reaches one extreme position.

Adjust the rearmost compensating screw (2) to bring the image to the centre of its movement. If two screws point to the rear, adjust both evenly. Repeat as necessary until the light image remains laterally stationary during wheel rotation.

Lower the wheels on to the centre of the turntables and apply the brake pedal depressor. Take hold of the bumper and jolt the car up and down a few more times. Unlock the turntables and jolt the car a few more times.

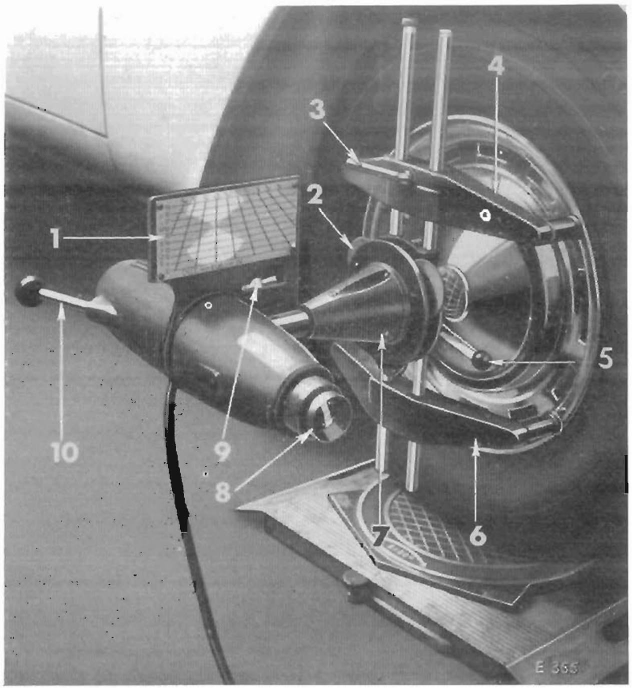


Fig. 36. Projector attachment

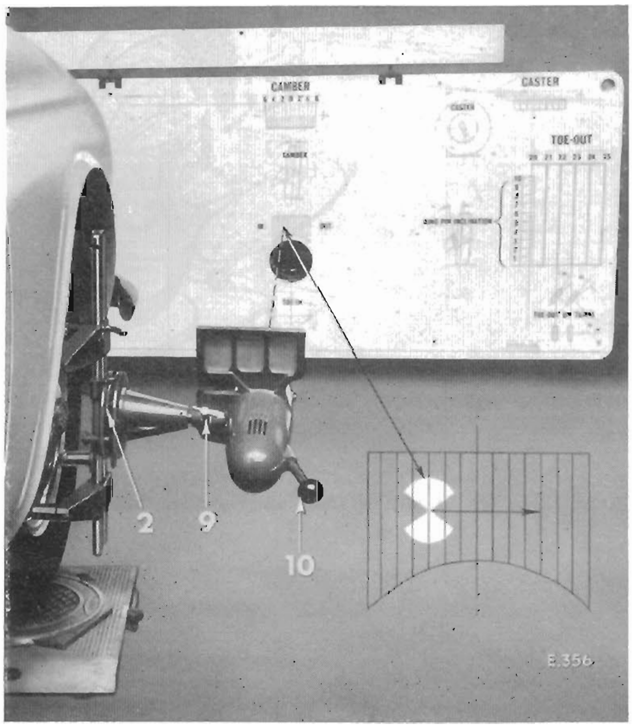


Fig. 37. Checking wheel run-out

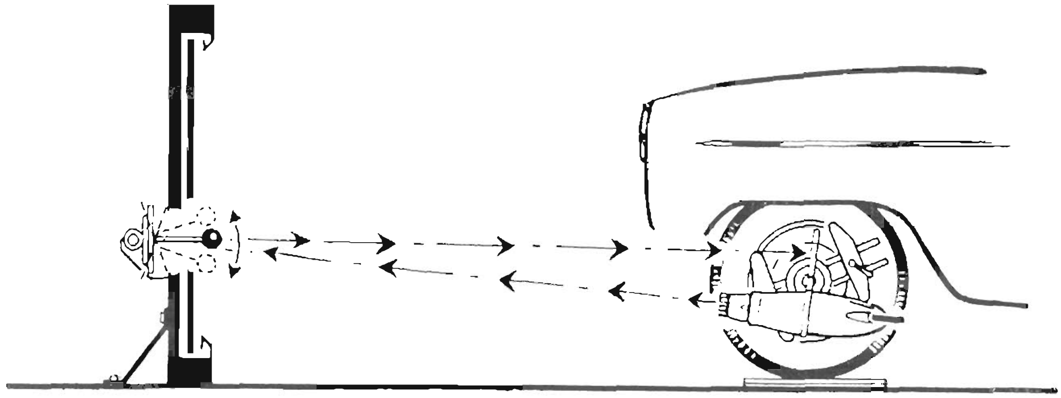


Fig. 38. Aligning mirrors to re-direct light image to the toe-in scale

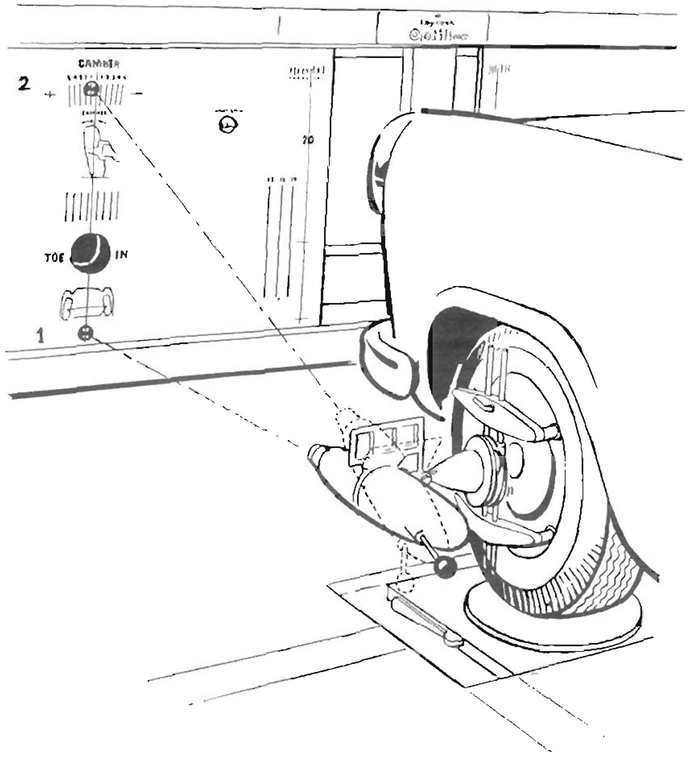


Fig. 39. Checking front wheel camber angle

TAKE CARE TO ENSURE THAT THE SCREENS REMAIN IN THIS POSITION FOR ALL FURTHER OPERATIONS.

Toe-in

To check toe-in condition, aim the light image at the centre of the mirror and, by tilting the mirror up or down, re-direct and focus the image on to the toe-in scale (1), Fig. 36, attached to the top of the projector. Turn the steering to align the light image with the zero line on the scale. In this position the road wheel is at right angles to the mirror.

Aim the opposite projector at the centre of its mirror and focus the reflected image on the toe-in scale. A direct reading of the toe-in condition can now be read from this scale.

Centre Steering

When toe-in checks have been completed, turn the steering to equalize the readings on both projector toe-in scales and check the position of the steering wheel spokes. These should be perfectly horizontal.

Camber — Straight ahead position

IMPORTANT: Before taking a camber reading it is essential that the wheel is in the straight-ahead position (this applies for both L.H. and R.H. front wheels).

To check the camber of either front wheel, aim the light image at the centre of the mirror and, by tilting the mirror up or down, re-direct and focus the image on to the toe-in scale attached to the top of the projector. Turn the steering to align the light image with the zero line on the scale. In this position the road wheel is at right angles to the mirror.

By traversing the screen horizontally and tilting the projector, aim and refocus the light image on the measuring cross below the mirror. Tilt the projector to bring the image into the camber scale and note the reading.

Repeat the procedure on the opposite wheel.

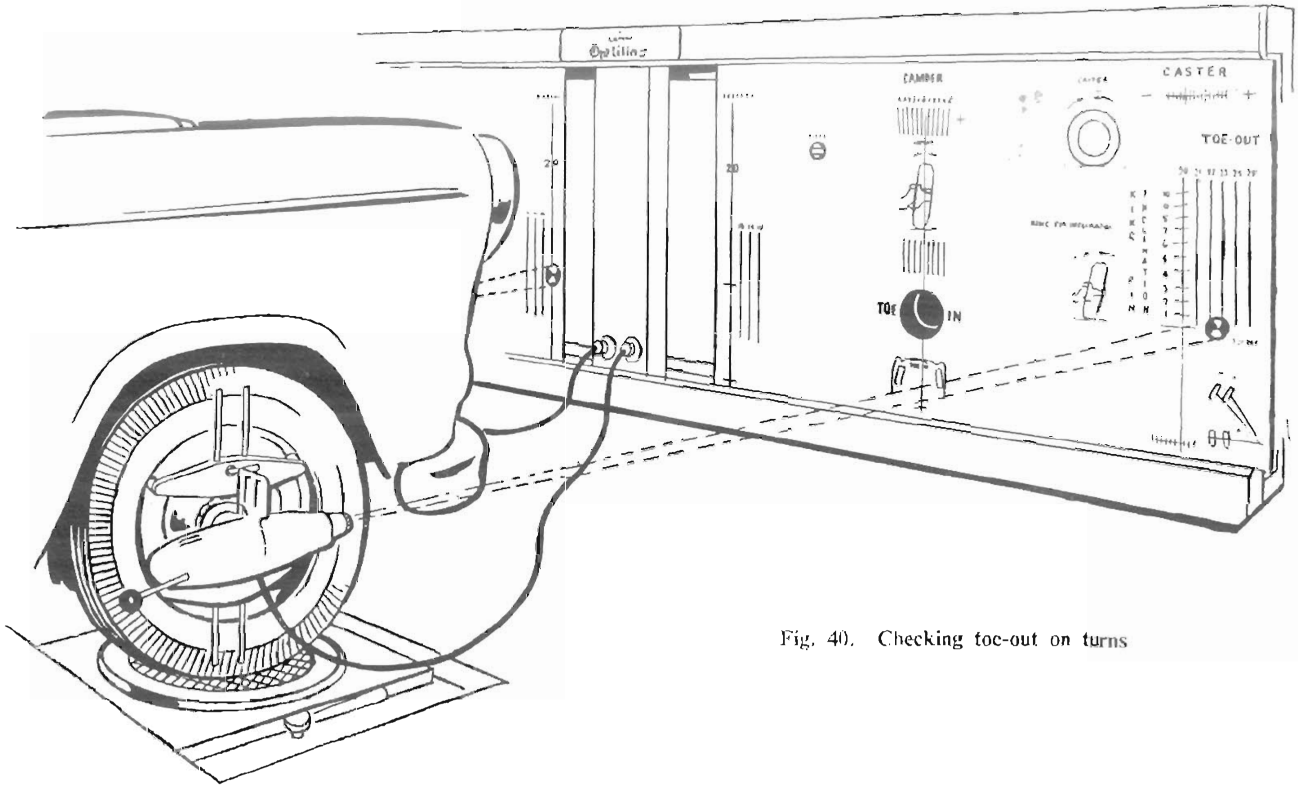


Fig. 40. Checking toe-out on turns

King Pin Inclination and Castor (Fig. 41)

Turn the wheel inwards and tilt the projector to focus the light image on the lower measuring cross (Position 1). Tilt the projector to bring the image into Position 2 **and note the reading on the Castor index scale.**

Tilt the projector to focus the image on the measuring cross (Position 3) and tighten the projector clamping screw. Turn the wheel 20° outwards and **note the reading on the K.P.I. scale** (Position 4).

Slacken the projector clamping screw and, by turning the road wheels and tilting the projector as necessary, focus the light image on the lower Castor index scale (Position 5) to the same value noted in Position 2.

Tilt the projector to bring the image into Position 4 and **note the reading on the Castor scale.**

Toe-out on Turns (Fig. 40)

Turn the L.H. wheel inwards and focus the light image on the mean measuring cross on the 20° line nearest the inner edge of the L.H. screen. Tilt the projector on the opposite wheel and focus the light image on the base line of the Toe-out scale, nearest to the outer edge of the R.H. screen. **This will indicate R.H. wheel toe-out on turns.**

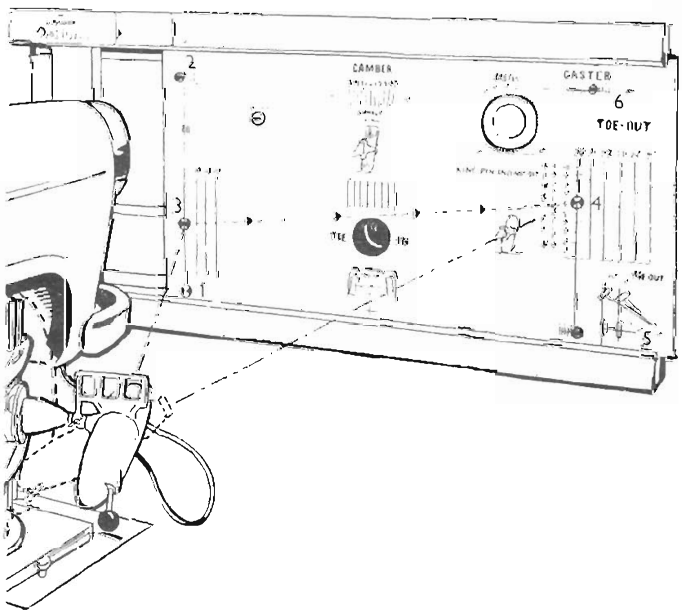


Fig. 41. Measuring castor and king pin inclination

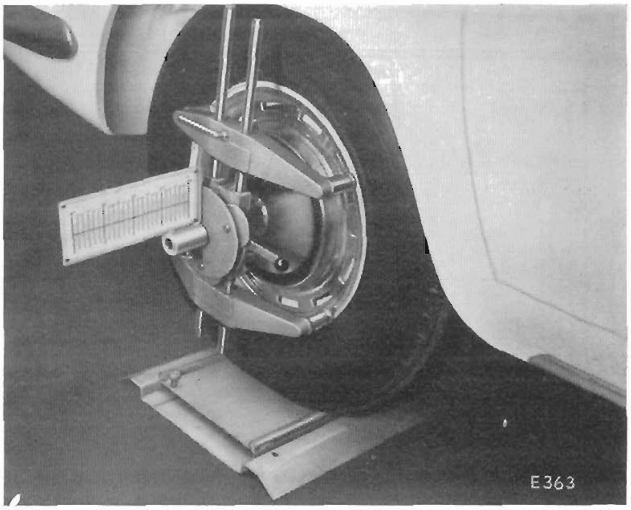


Fig. 42. Scales fitted to the rear wheels

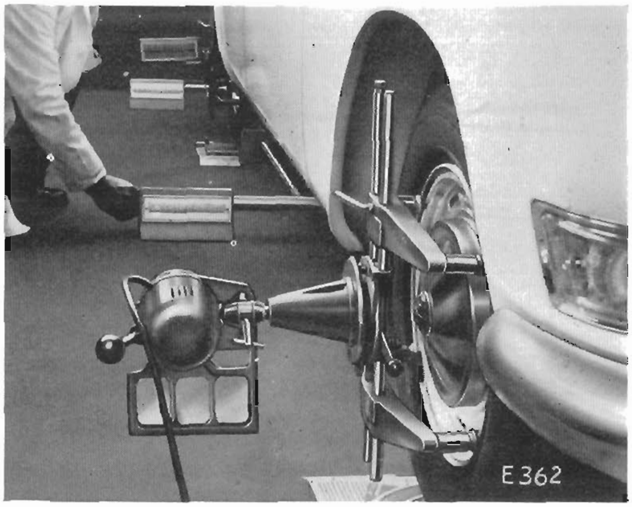


Fig. 43. Centralising the front measuring rod

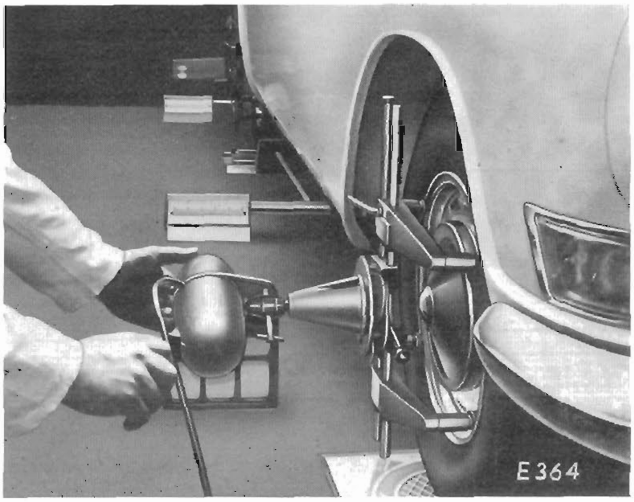


Fig. 44. Centralising the rear measuring rod

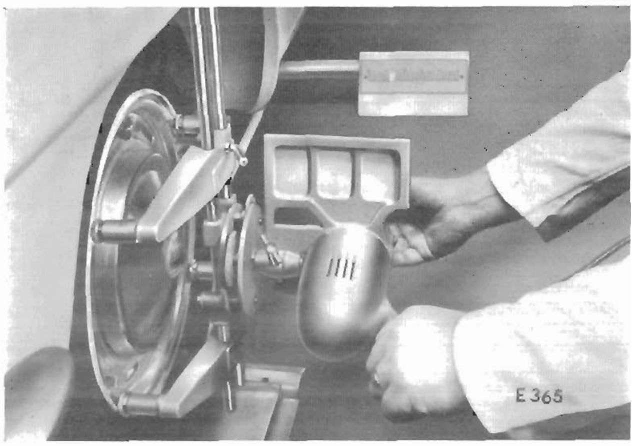


Fig. 45. Checking rear wheel toe-in

Rear Wheel Toe-in

Attach wheel clamps and scales to the rear wheels by following the procedure on page 4·215, for "attaching the projectors", but substituting scales for projectors.

Turn the projectors on the front holders through 180° until the beams of light appear on the scales mounted on the rear holders. Turn the steering wheel until the same reading is obtained on both right and left rear wheel scales.

Mount the distance rods onto the measuring rods; place the assemblies on the floor in front and behind the rear axle with the distance rod plates resting against the wheels.

Focus both beams of light onto the front measuring rod scales, move measuring rods sideways until the same reading is obtained on the right- and left-hand scales; repeat this operation for setting the rear measuring rod.

Remove the projectors from the front holders and fit them in place of the rear wheel scales on the rear holders. Focus the beam of light on both front and rear measuring rods in turn, taking note of the readings obtained; by subtracting one from the other a toe-in value is obtained for each rear wheel.

Rear Wheel Camber (Fig. 46)

1. With the projectors mounted on the rear holders, focus the beam of light onto the main screens and, by traversing the screens horizontally, focus the light image on the measuring cross (Position 1).

2. Tilt the projector to bring the image into the camber scale (Position 2) and note the reading. Repeat the procedure on the opposite side.

Chassis Alignment

When the rear end check is completed, check chassis alignment by placing the wheel indicator scales on the front holders (without disturbing the wheels, as they are set in the straight-ahead position). Readings taken direct from the wheel indicator scales will give an indication of the chassis and axle condition.

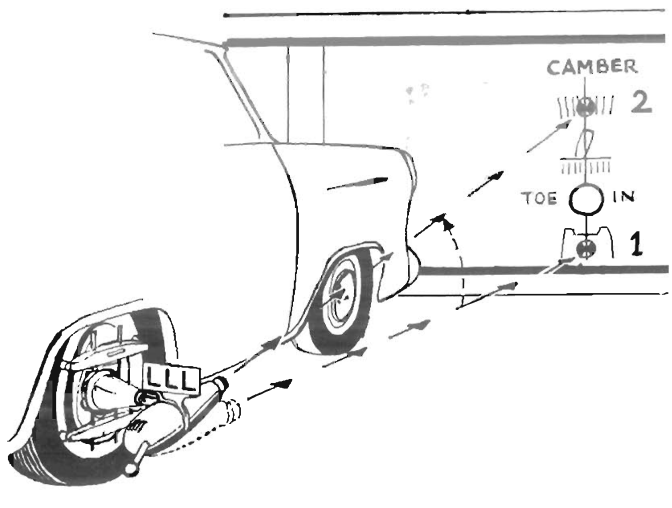


Fig. 46. Checking rear wheel camber

TRIUMPH

HERALD 1200, 12/50, VITESSE
AND
SPITFIRE

WORKSHOP MANUAL

GROUP 5

Comprising:

GROUP 5

TRIUMPH
HERALD 1200, 12/50, VITESSE
and
SPITFIRE MODELS

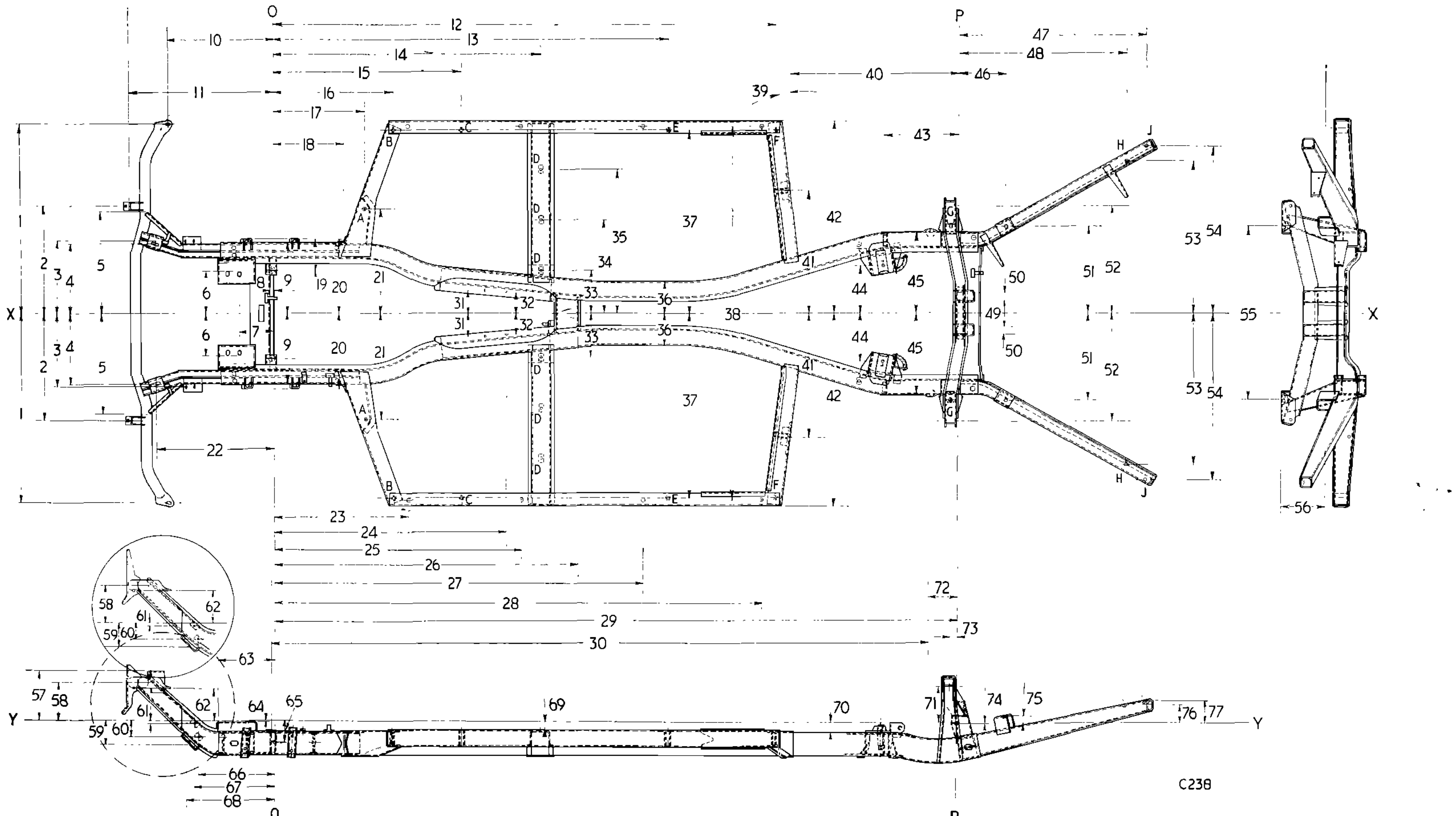
GROUP 5

CONTENTS

CHASSIS FRAME DIMENSIONS

HERALD 1200, 12/50 AND VITESSE

	Inches	Centimetres
1	26·09	66·27
2	14·75	37·47
3	10·07	25·58
	9·94	25·25
†4	9·78	24·84
	9·72	24·69
5	13·50	34·29
	13·38	33·99
6	5·53	14·05
	5·50	13·97
7	4·82	12·24
	4·76	12·09
8	0·50	1·27
9	9·78	24·84
	9·72	24·69
10	14·70	37·34
11	20·06	50·95
	19·94	50·65
12	70·00	177·80
13	55·00	139·70
14	37·37	94·92
	37·25	94·62
15	26·10	66·29
16	16·81	42·69
	16·69	42·39
17	12·78	32·46
	12·72	32·31
18	9·81	24·92
19	4·32	10·97
	4·30	10·92
20	10·32	26·21
21	14·52	36·88
	14·49	38·81
†22	16·56	42·06
	16·44	41·76
23	18·75	47·63
24	32·64	82·91
	32·48	82·49
25	34·50	87·63
26	42·19	107·16
	41·94	106·53
27	51·50	130·81
28	68·00	172·72
29	95·69	243·05
	95·44	242·42
30	91·76	233·07
31	3·23	8·20
	3·21	8·15
32	2·92	7·42
	2·89	7·34
33	6·03	15·32
	5·97	15·16
34	13·00	33·02
35	20·00	50·80
36	4·25	10·79
37	25·35	64·39
	25·28	64·21
38	51·63	131·14
39	7° 27′	7° 27′
40	23·54	59·79



	Inches	Centimetres
	23·42	59·49
41	16·91	42·95
	16·85	42·79
42	26·50	67·31
43	10·70	27·18
	10·65	27·03
44	6·64	16·87
	6·61	16·79
45	11·28	28·65
	11·22	28·49
46	6·44	16·36
47	25·94	65·89
48	23·30	59·18
	23·18	58·88
49	3·25	8·26
	3·22	8·18
50	1·51	3·84
51	12·00	30·48

	Inches	Centimetres
52	14·75	37·47
53	21·07	53·52
	20·94	53·19
54	23·08	58·62
55	24·00	60·96
56	6·22	15·79
†57	7·03	17·86
	6·97	17·70
58	5·50	13·97
59	3·00	7·62
	2·88	7·32
60	1·94	4·93
61	0·25	0·64
62	4·81	12·22
	4·69	11·91
63	7·44	18·89
64	0·20	0·51
	0·18	0·46

	Inches	Centimetres
65	2·63	6·68
66	10·19	25·88
67	10·78	27·38
68	12·06	30·63
	11·94	30·33
69	1·03	2·62
	0·97	2·46
70	1·13	2·87
71	5·00	12·70
	4·88	12·39
72	4·06	10·31
73	1·12	2·85
	1·00	2·54
74	0·15	0·38
75	1·19	3·02
76	2·97	7·54
	2·85	7·24
77	3·47	8·81

Fig. 1. Herald 1200, 12/50 and Vitesse chassis frame dimensions (Herald condition shown inset)

† Vitesse only

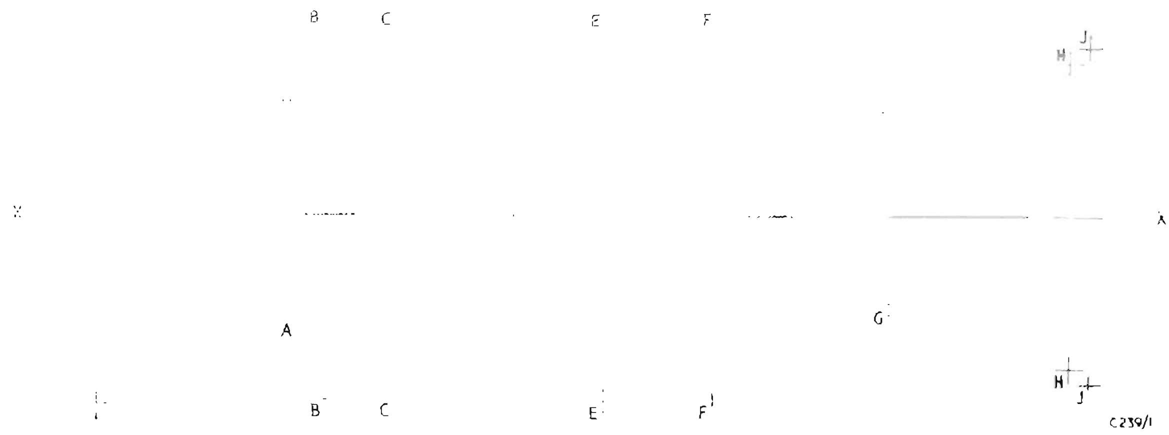


Fig. 2. Chassis checking diagram (Herald 1200, 12/50 and Vitesse)

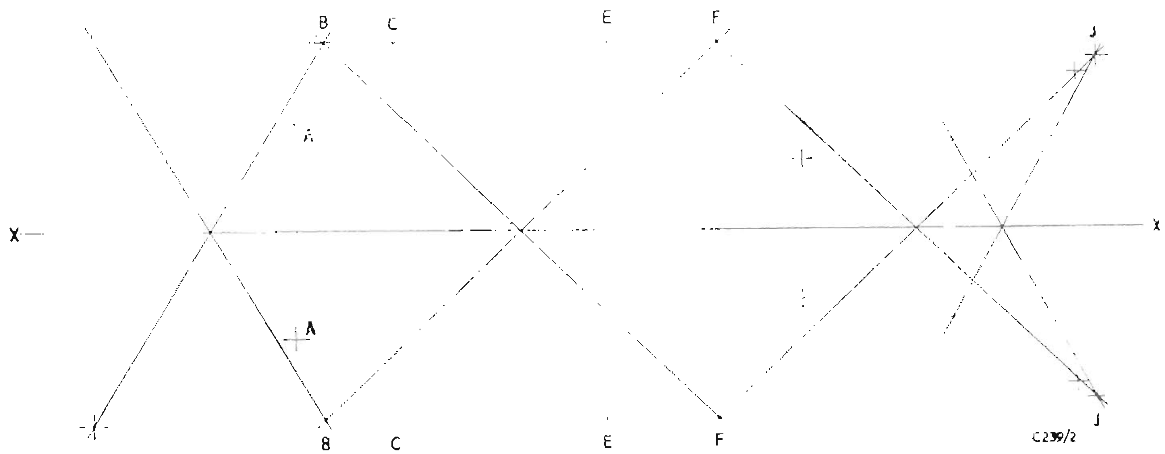


Fig. 3. Checking for squareness (Herald 1200, 12/50 and Vitesse)

Checking for Squareness

Reference to Fig. 1, a plan view of chassis, shows the location of body mounting, spring and shock absorber points. Using a plumb-bob and line, transfer these points to the floor and letter them as shown in Fig. 2. Connect the letters in pairs, *e.g.*, AA, BB together by drawing a line between them using a straight edge.

Measure from each point in turn to the centre and join up all centres, thus producing the centre datum line X X. The diagram on the floor should be similar to that shown in Fig. 2.

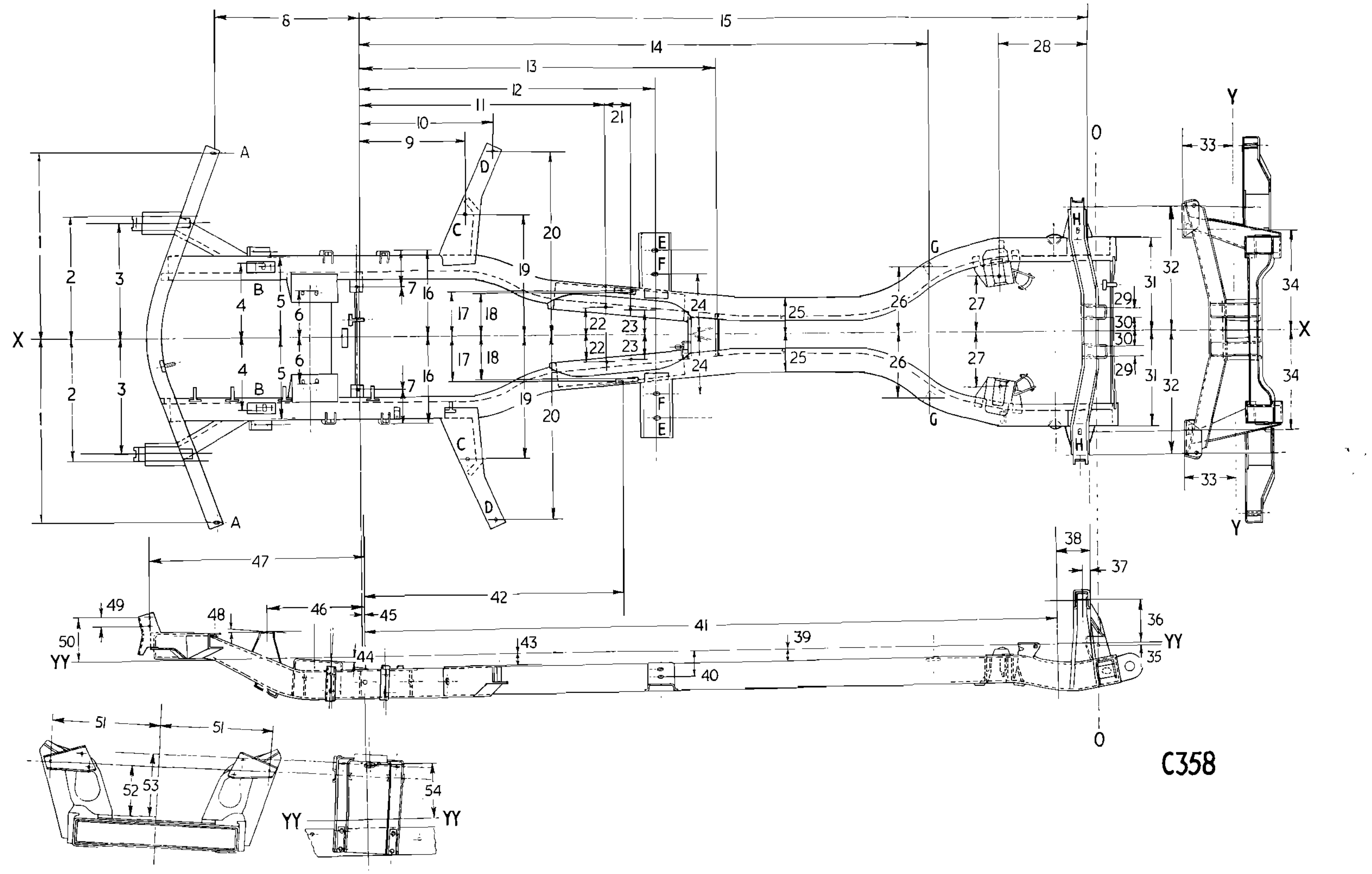
A further check for squareness must be made by joining up all the diagonals as shown on Fig. 3. The length of diagonal lines must be equal and bisect each other on the datum line.

In general, chassis distortion is assessed by the amount and direction of any transverse or diagonal lines from the datum line. All dimensions not within the tolerances shown in Fig. 1 must be rectified.

CHASSIS FRAME DIMENSIONS

SPITFIRE 4

	Inches	Centimetres
1	22·15	59·69
	22·10	58·42
2	14·56	36·98
3	13·78	35·00
	13·72	34·85
4	8·64	21·89
5	9·78	24·84
	9·72	24·69
6	5·55	14·05
	5·50	13·97
7	4·32	10·97
	4·30	10·92
8	17·37	52·58
	17·25	43·82
9	12·78	32·36
	12·72	32·31
10	16·09	40·87
	16·03	40)72
11	29·62	75·13
	29·50	74·77
12	36·56	92·86
	36·44	92·56
13	42·19	107·16
	41·94	104·83
14	68·22	173·28
	68·10	172·97
15	87·19	221·46
	86·93	220·80
16	10·32	26·21
17	5·39	13·69
	5·36	13·61
18	5·23	13·28
	5·20	13·20
19	14·51	36·86
	14·48	36·78
20	21·03	53·39
	20·97	53·26
21	3·02	7·67
	2·98	7·56
22	3·23	8·20
	3·12	8·15
23	2·91	7·37
	2·89	7·24
24	7·19	18·26
	7·13	18·11
25	4·25	10·80
26	7·83	19·86
	7·80	19·81
27	6·64	16·87
	6·61	16·79
28	10·70	27·18
	10·65	27·05
29	1·51	3·83
30	1·63	4·14
	1·61	4·09
31	11;78	29·92
	11°72	29·77
32	14·75	37·46



	Inches	Centimetres
33	6·22	15·80
34	12·00	30·48
35	0·15	0·38
36	1·12	2·87
	1·00	2·54
37	4·06	10·31
38	5·00	12·70
	4·88	12·40
39	1·13	2·87
40	2·80	7·11

	Inches	Centimetres
41	83·26	211·48
42	31·45	79·88
	31·39	77·73
43	1·06	2·69
44	4½°	4½°
45	0·26	0·66
46	11·69	29·69
	11·56	28·36
47	25·59	65·00
	25·47	64·69

	Inches	Centimetres
48	4½°	4½°
49	1·00	2·54
50	5·32	12·76
	5·26	12·77
51	13·06	33·17
	12·94	32·87
52	5·91	15·01
53	7·31	18·50
54	6·29	15·97
	6·17	15·67

Fig. 4. Spitfire 4 chassis frame dimensions

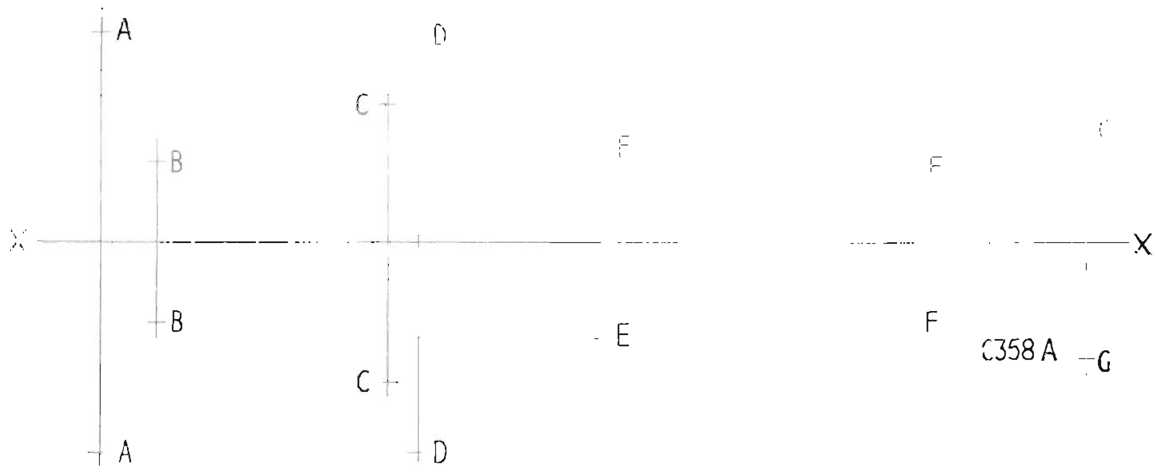


Fig. 5. Chassis checking diagram (Spitfire)

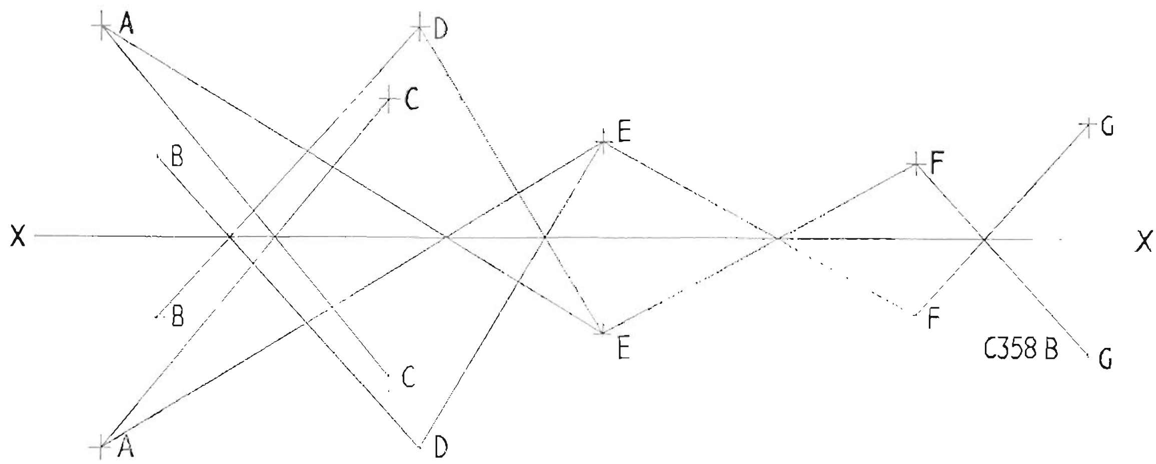


Fig. 6. Checking for squareness (Spitfire)

Checking Side Elevation Dimensions

Herald 1200, 12·50 and Vitesse jacking points are shown at "B" and "F" on Fig. 1. The Spitfire front jacking point is shown at "D" on Fig. 4. and the rear jacking point (not shown) is located under the safety harness eyebolt fixing under the body. Using bottle jacks under these points, raise or lower the vehicle to establish a datum line "YY" (Figs. 1 or 4) parallel with and at a convenient height from the floor.

For example, reference to Fig. 1 shows that dimension 65 at the front is 2·63″ (6·68 cm.) below the datum line, and dimension 71 at the rear is 5·0″ (12·7 cm.) above the datum line. Therefore, to establish the datum parallel at 10″ (25·4 cm.) from the ground, adjust the jacks to give a front dimension of 10″ minus 2·63″ (25·4 cm. minus 6·68 cm.) and a rear dimension of 10″ plus 5″ (25·4 cm. plus 12·7 cm.) from the ground. Once this level has been established, it becomes a simple matter to check all dimensions in relation to the datum line.

Any other dimension may be substituted for the 10″ (25·4 cm.) dimension quoted in the example, provided that this new dimension is used in all subsequent calculations.

BODY MOUNTINGS

(HERALD 1200, 12/50, VITESSE AND SPITFIRE)

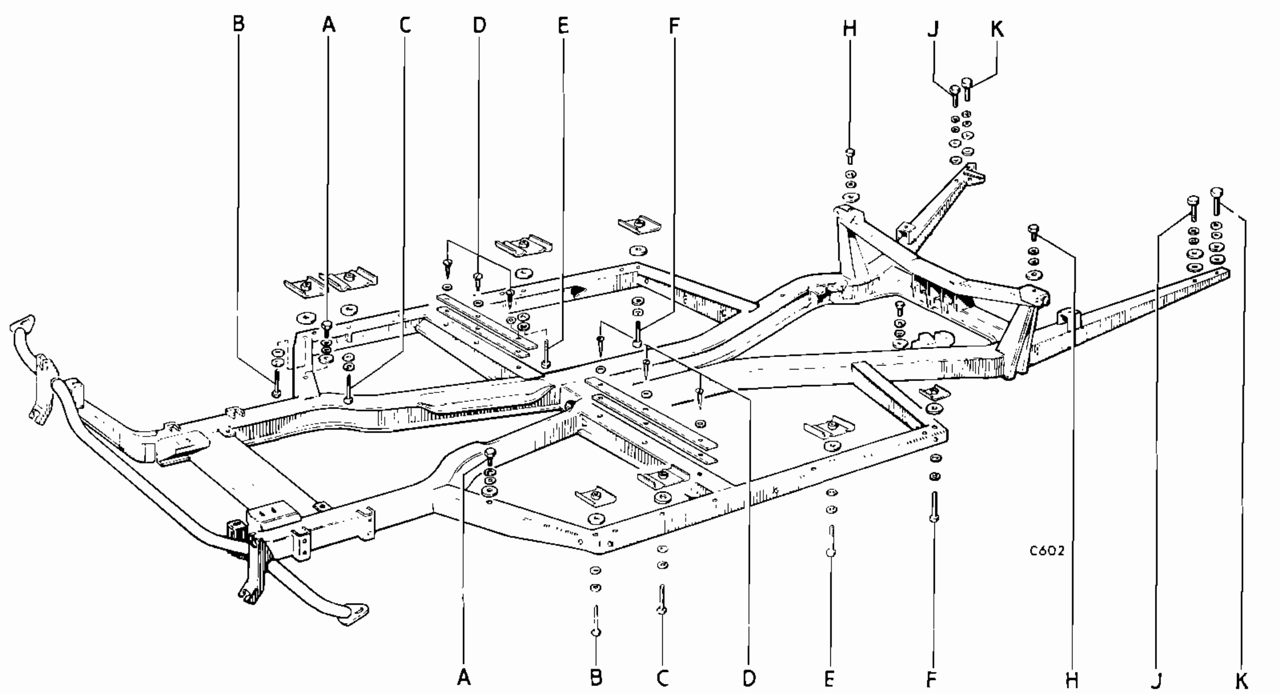


Fig. 7. Body mounting points (Herald 1200, 12/50 and Vitesse). Jacking points are at "B" and "F"

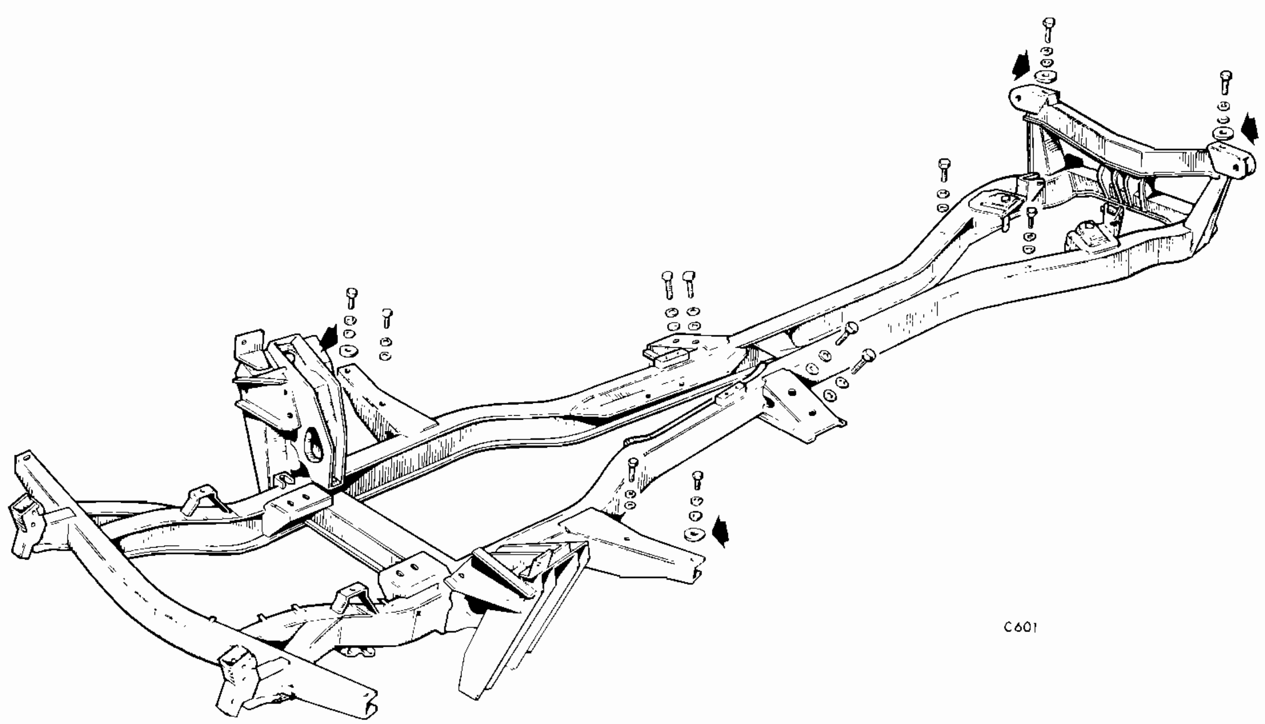


Fig. 8. Body mounting points (Spitfire)

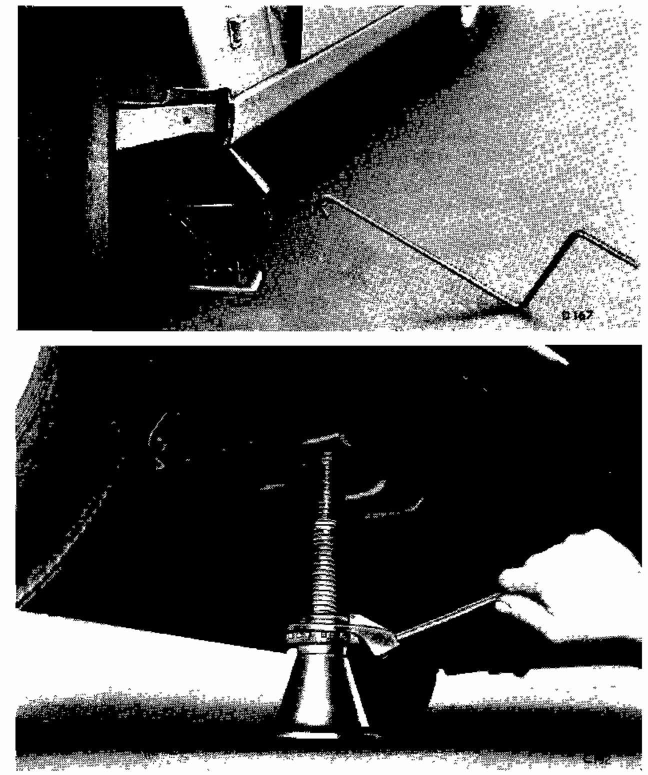


Fig. 9. Jacking points (Herald 1200, 12/50 and Vitesse)

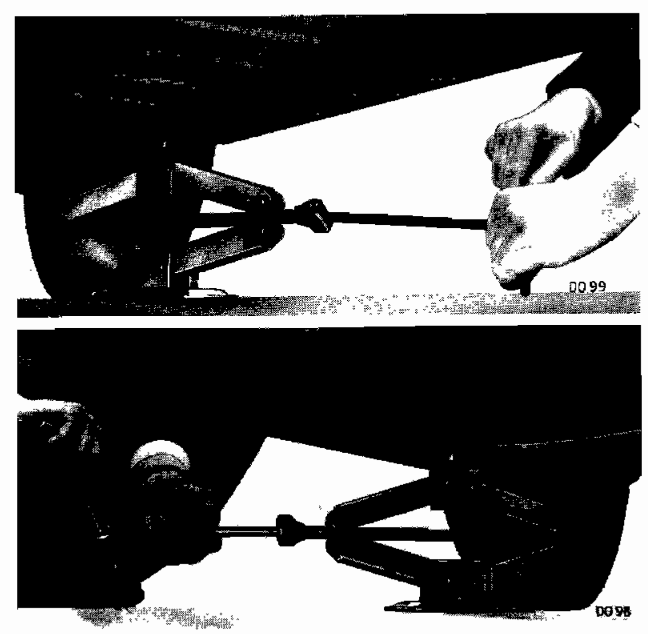


Fig. 10. Jacking points (Spitfire)

BODY AND UNDERFRAME

CHASSIS FRAME

Description

Each vehicle described in this section has a separate frame unit from which the body may be lifted without prior removal of other major components.

Four reinforced jacking points are provided, shown and indicated at the front and at the rear on Fig. 7.

Assessment of Damage

In nearly all cases of accident, severe damage to the chassis frame is readily apparent. There are cases, however, where damage of a less serious nature may cause distortion of the frame, which may not be readily detected visually.

Even when a vehicle has suffered only superficial damage, it is possible that the frame members have been displaced, which will result in the road wheels failing to track correctly.

It is recommended that a check is made on the alignment of the front and rear suspension attachment points. This preliminary examination should include a check on wheelbase dimensions and castor and wheel camber angles.

A decision may then be taken as to whether the frame can be repaired in situ, or whether body removal is necessary to permit full examination.

Figs. 1 and 4 are plan and side elevation views of the chassis frames giving all required dimensions for carrying out chassis repairs and alignment. Figs. 2, 3, 5 and 6 are chassis checking diagrams.

Access to some checking points may necessitate removal of components, including front and rear suspension units.

It is essential that all checks for distortion are carried out on a level floor.

BODY REMOVAL

HERALD 1200, 12/50 AND VITESSE

The body may be removed from the frame as a unit or by removing individual sections as described in the following pages.

To remove the complete unit, the procedure is as follows:—

Remove the battery, drain the cooling system and disconnect the water hoses from the heater.

Disconnect:

The cables from the front end lighting, horns and stop lamp switch.

Fuel pipe from the tank.

Starter motor cable from the solenoid.

Cables from the temperature gauge transmitter, distributor and oil pressure switch. Unclip the cable harness from the chassis frame.

Hydraulic pipes from the master cylinders.

Speedometer drive cable from the rear of the instrument panel and pull the cable into the engine compartment.

Remove:

Air cleaner and release the accelerator and choke controls from the carburettor.

Both sill panels and fit the reinforcement plate (Fig. 2), using four ¼" bolts with nuts and washers. In this example, the plates were made from 1" (25 mm.) angle iron.

The rear handbrake cable from the compensator (Fig. 3).

Clamp bolt from the steering coupling and pull the inner column clear of the coupling.

Carpets and seats.

Knob from the gear change lever and remove the gearbox cover (see page 2·205).

Bolts securing the body to the chassis.

The location of the bolts is shown on Fig. 7.

The body is now free to be lifted off the frame.

The method of lifting the body will be determined by the equipment available.

Fig. 1 shows two hoists in use. The hooks under the rear wheel arches are padded to prevent damage to the paintwork.

To refit—reverse the removal procedure.

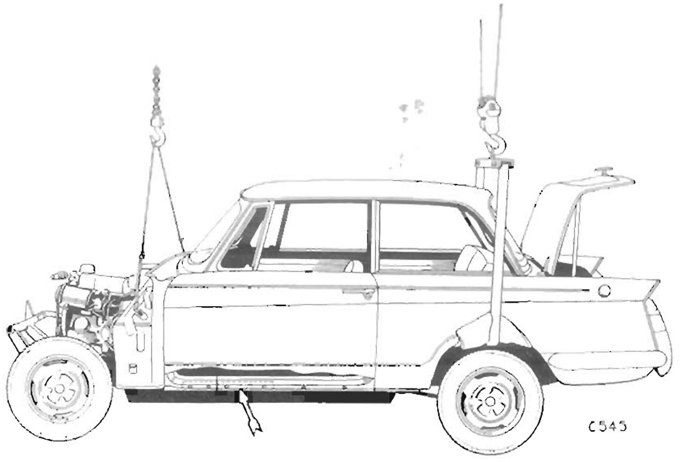


Fig. 1. Lifting the body

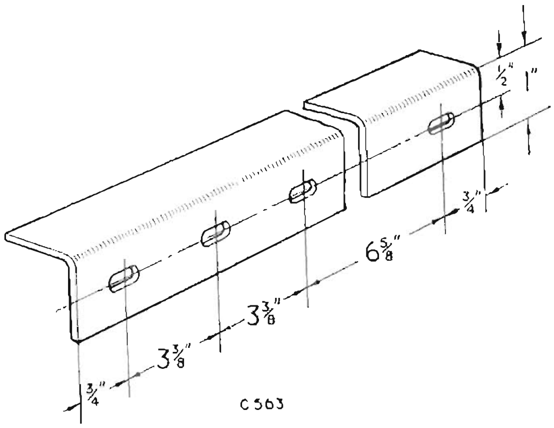


Fig. 2. Sill reinforcement plate dimensions

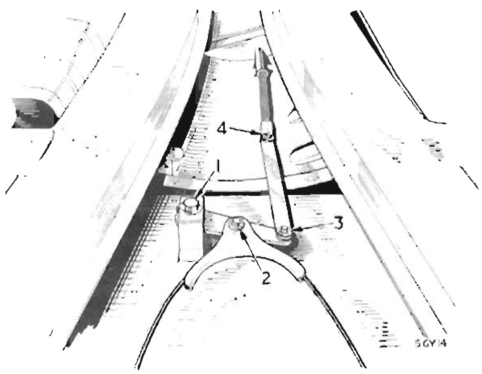


Fig. 3. Handbrake cable attachment

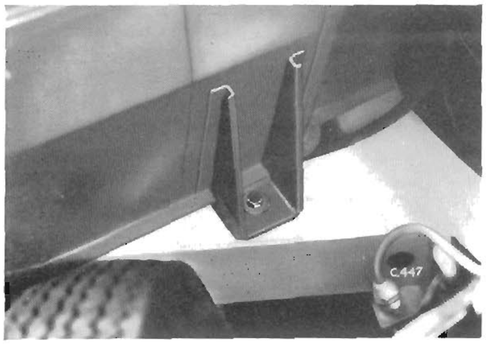


Fig. 4.
Body mounting bolt (C)

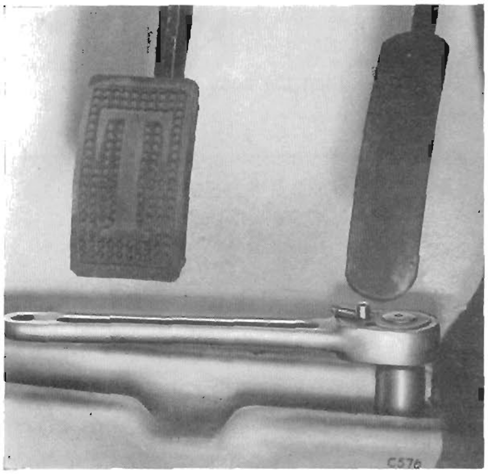


Fig. 5.
Body mounting bolt (D)

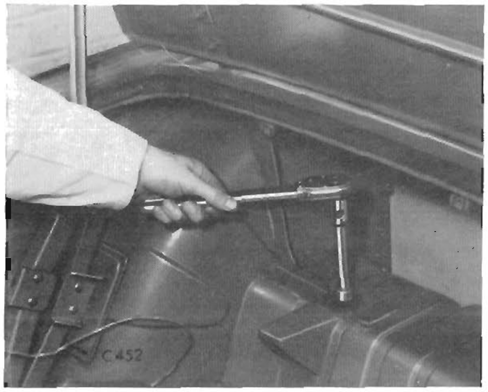


Fig. 6.
Mounting bolt (H)

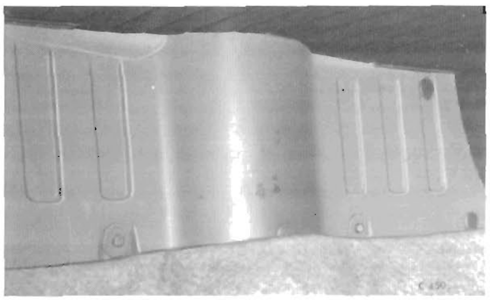


Fig. 7.
Mounting bolts (G)

BODY REMOVAL

SPITFIRE "4"

Disconnect the battery cables, remove the battery and disconnect the following cables and controls:—

Cable from oil pressure switch ;
Front end lighting cable at the snap connectors on top of the air duct ;
H.T. and L.T. cables from the coil ;
Both cables from the generator ;
Cables from the temperature transmitter ;
Earthing cable from the engine ;
Tachometer drive cable from the distributor ;
Choke and accelerator controls at the carburettor ;
Hydraulic pipe at the connection between the brake master cylinder and three-way connector adjacent to the front suspension on the left-hand side of the car ;
Handbrake cable ;
Accelerator relay lever (1 mills pin and split pin with washers).

Remove:—

Bonnet (four bolts), see page 5·205 ;
Both seats ;
Four bolts securing the facia support bracket to the floor, see page 2·205 ;
Floor covering ,
Spare wheel ;
Fuel tank, see page 5·244.

Release all clips securing the cable loom to the chassis.

Pass the cable loom under the outer left-hand side tie rod and withdraw the loom clear of the engine.

Release the clamp bolt from the lower steering coupling and push the inner column upwards, clear of front suspension.

NOTE : The illustrations 4 to 9 inclusive cross refer with Fig. 4 (Page 5·104).

Disconnect the radius arms from the body (one bolt in each). See Group 4.

Remove 12 bolts securing the body to the floor. The bolts are located as follows:—

One each side, accessible from engine compartment, Fig. 4 ;

One each side of the front toe board, Fig. 5 ;

Two each side of the body in line with front end of propeller shaft, Fig. 8 ;

One each side of front end of rear seat pan, Fig. 7 ;

One each side spring access cover, Fig. 6, the bolts are concealed by rubber grommets.

Make up two lifting brackets to the dimensions shown in Fig. 9.

Remove the bonnet catch bracket and secure the lifting brackets to the body.

Protecting the body against chafing, attach lifting tackle to the lifting brackets and to the safety harness eyebolts adjacent to the rear wheel arches. Lift the body clear of the chassis.

To Refit

Reverse the removal procedure.

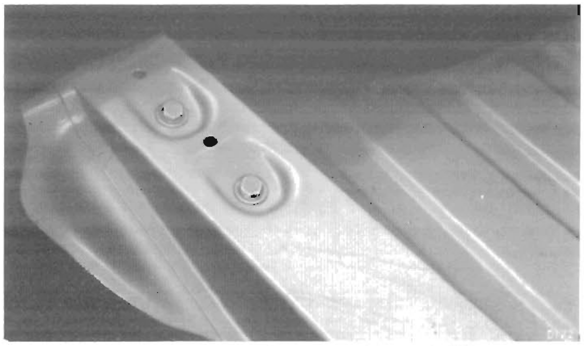
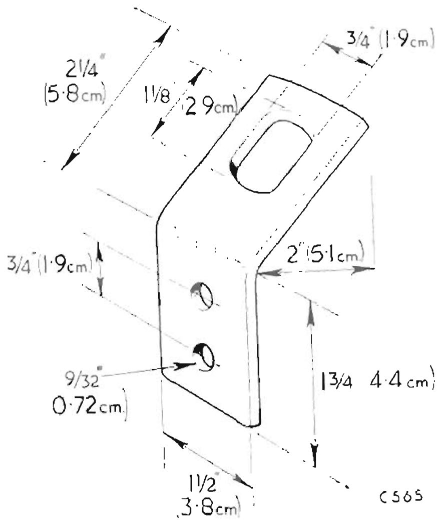


Fig. 8. Mounting bolts (E) and (F)

Fig. 9. Lifting bracket dimensions



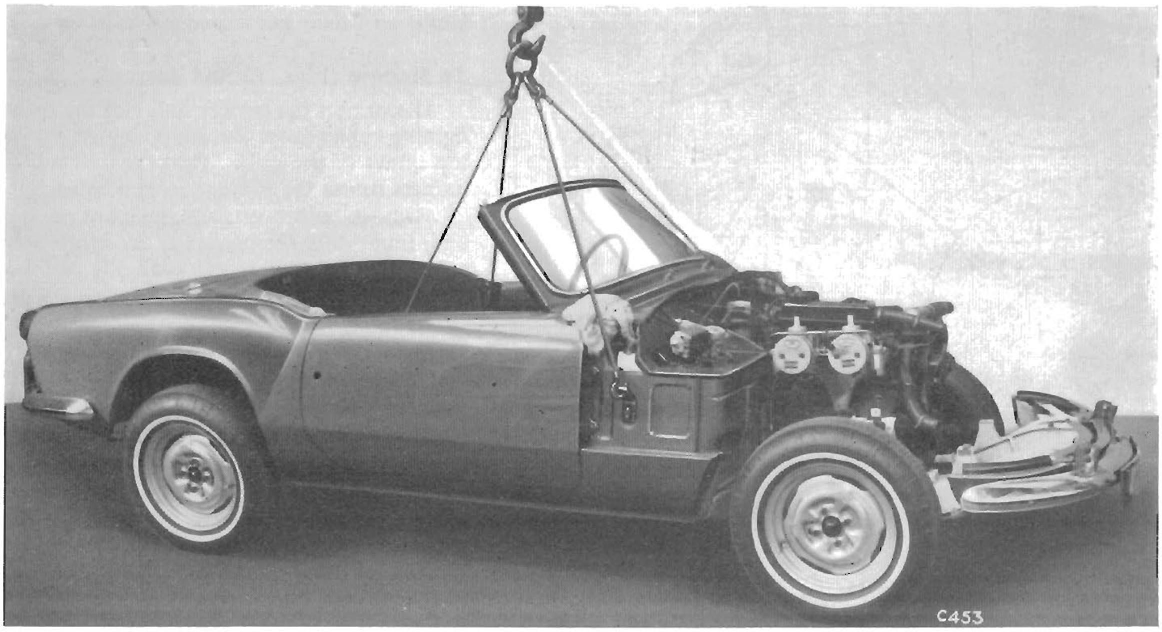
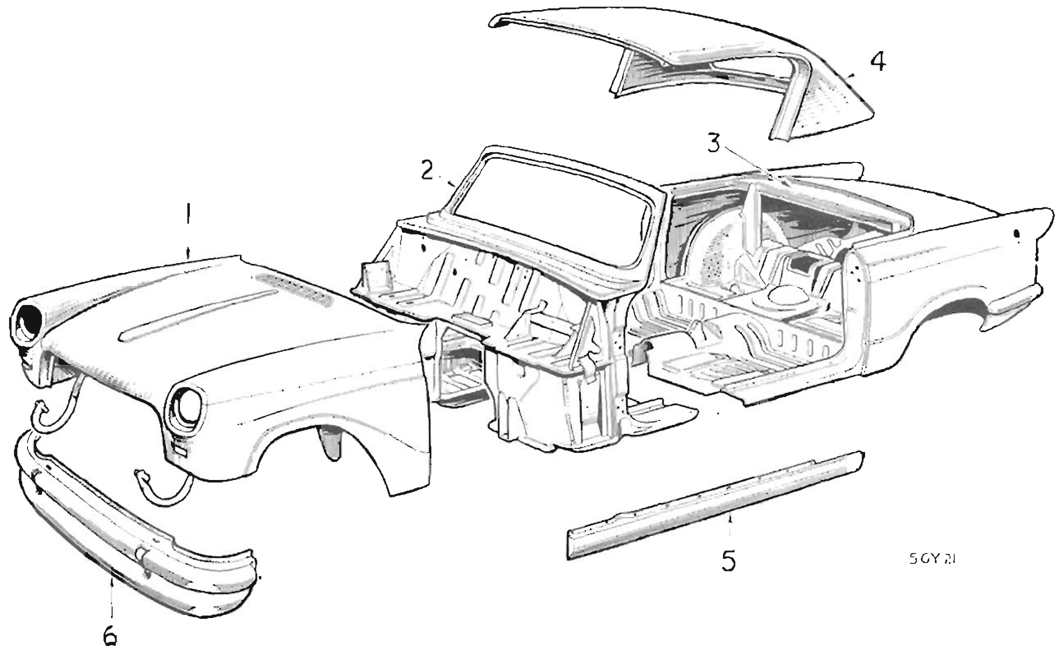


Fig. 10. Removing the Spitfire body



1	Front end	3	Rear end section	5	Sill panels
2	Centre section	4	Roof panel	6	Front valance

Fig. 11. **Body sub-assemblies**

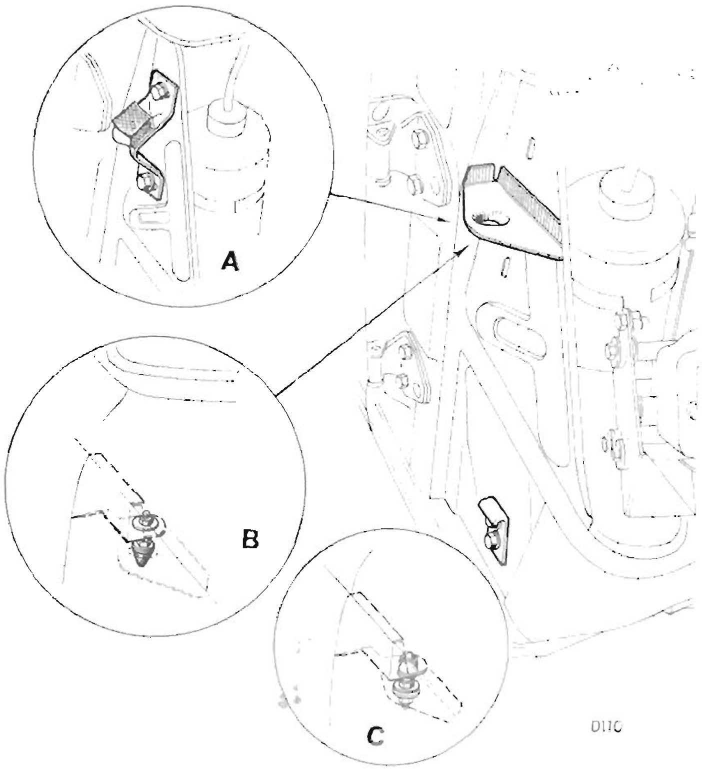


Fig. 12. Bonnet height adjusters (all models)

REMOVAL OF SUB-ASSEMBLIES

Front End (Bonnet) Assembly

The bonnet assembly may be removed and refitted as an assembly complete with head, side (parking) and flashing direction indicator lamps and their associated cable harness.

To Remove (Figs. 13 and 14)

Disconnect the battery and pull the front end lighting cables from the snap connectors on the top centre of the grille. Pass the free end of the harness round the tubular crossmember.

Remove both overriders, take out the bolt (9) and, supporting the bonnet as the hinge bolts (7) and (8) are being withdrawn, lift the bonnet assembly clear.

To Refit

Reverse the instructions for removal.

Horizontal Adjustment

If only slight adjustment is required to achieve a parallel clearance of $\frac{3}{16}$" (5 mm) between the bonnet and scuttle, slacken the locknuts (2) and turn the sleeve nut (1) on either side, as necessary.

Appreciable horizontal or vertical movement will necessitate the removal of both overriders (see page 5·234) and slackening the link bolts (7) and (8).

Vertical Adjustment

Lift or lower the front of the bonnet until parallel clearance between the bonnet and door is obtained. Tighten the link bolts (7) and (8). During this movement, the rear of the bonnet will pivot on the bracket shown arrowed on Fig. 12.

Height Adjustment (Fig. 12).

Condition "A"

Slacken two screws securing the bonnet stop to the scuttle and raise or lower the stop to achieve the requisite height. Retighten the screws.

Re-adjust the bonnet fastener brackets on the scuttle accordingly.

Condition "B"

Slacken the locknut securing the cone-shaped buffer to the bonnet. Screw the buffer in or out to lower or raise the bonnet rear edge.

Retighten the locknut.

Re-adjust the bonnet fastener brackets on the scuttle accordingly.

Condition "C"

The instructions for adjusting the height on cars with the condition (C) are identical to those given for (B).

SPITFIRE

Bonnet Removal (Fig. 15)

Disconnect the battery and pull the front end lighting cables from snap connectors located at the top centre of the grille.

Remove both overriders and release the check arm from the bonnet.

Take out the bolts, item (2), and lift the bonnet away.

To Refit

Reverse removal instructions.

Horizontal Adjustment

Slacken bolts (1) and (2) and move the bonnet forward or rearward to achieve a parallel gap of $\frac{3}{16}$" (5 mm.) between bonnet, scuttle and doors.

Height Adjustment (Front Edge)

Slacken the bolt (1) and raise the bonnet to obtain a parallel gap between the rear edge of the bonnet and doors.

Height Adjustment (Rear Edge)

Slacken the locknut securing the cone-shaped buffer to the bonnet. Screw the buffer in or out to lower or raise the bonnet rear edge. Retighten the locknut.

Re-adjust the bonnet fastener brackets on the scuttle and refit the overriders.

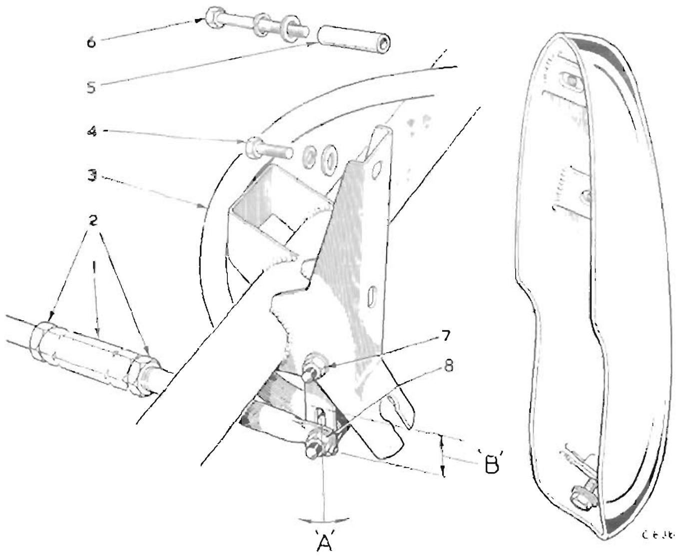


Fig. 13. Bonnet adjusting points (Herald 1200, 12/50 and Vitesse)

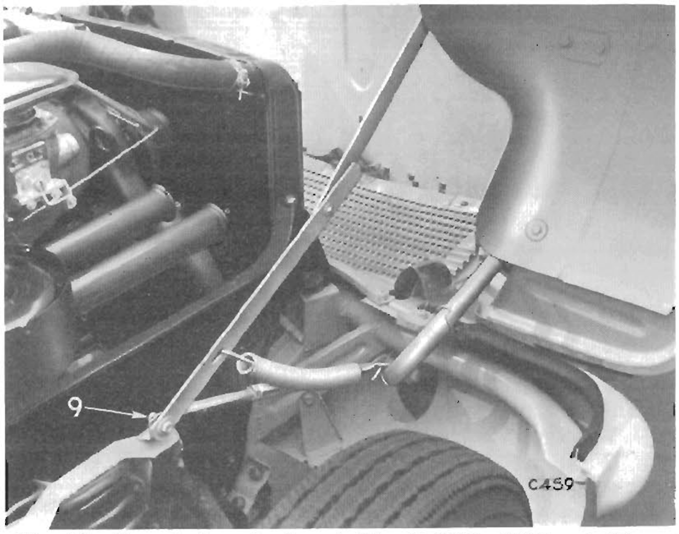


Fig. 14. Bonnet stay attachment (Herald 1200, 12/50 and Vitesse)

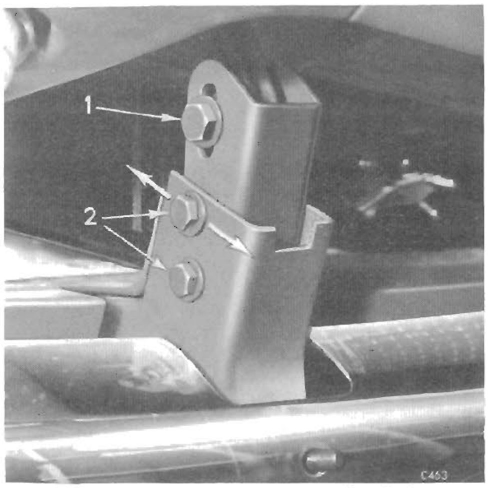
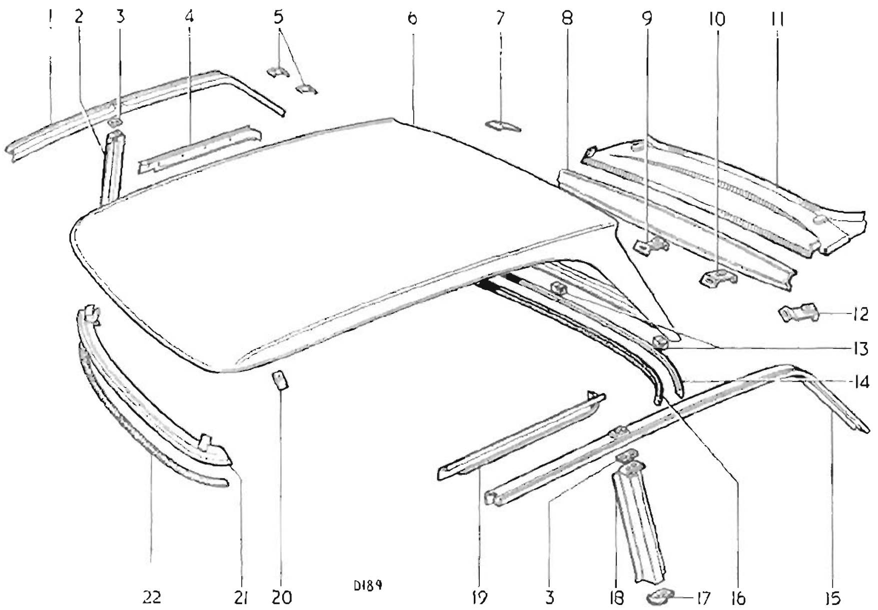


Fig. 15. Bonnet hinge details (Spitfire)



1 Cantrail
2 "B" post
3 Sealing rubber
*4 Waist rail
5 Reinforcement
6 Roof panel
7 Reinforcement
8 Reinforcement
9 Reinforcement
10 Reinforcement
11 Rear deck
12 Reinforcement
13 Distance piece
14 Moulding
15 Cantrail
16 Weatherstrip
17 Sealing rubber
18 "B" post
*19 Waist rail
20 Bracket
21 Header panel
22 Weatherstrip

Fig. 16. Roof panel details, saloon

* Vitesse only

1 Cantrail assembly
2 Roof panel assembly
3 Waist rail
4 Waist rail
5 Rear deck bracket
6 Side reinforcement
7 Rear deck assembly
8 Channel reinforcement
9 Side reinforcement
10 Waist rail
11 Cantrail assembly
12 Roof to deck sealing rubber
13 Side reinforcement
14 Backlight aperture tieplate
15 Roof panel reinforcement
16 Rail mounting listing bracket
17 Side reinforcement
18 Header panel

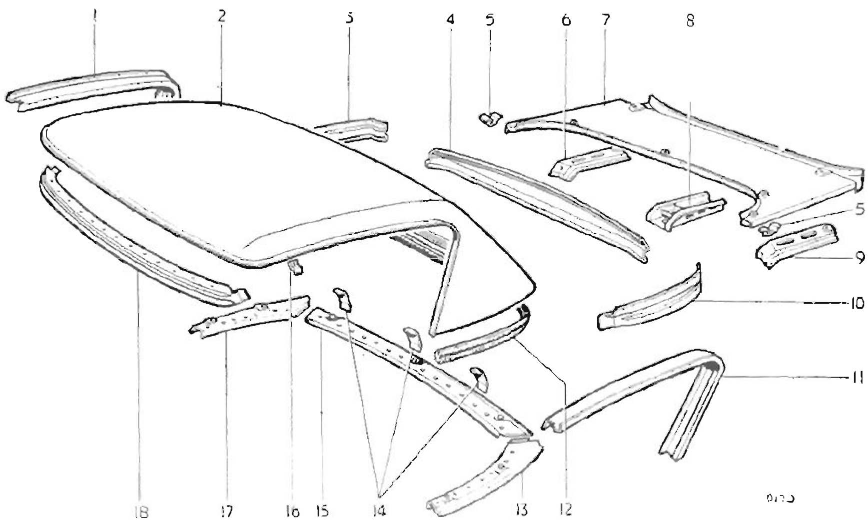


Fig. 17. Roof panel details, coupé

ROOF PANEL

To Remove

Disconnect the battery cables and remove the sun visors. Take out two bolts securing the roof panel to the header rail (Fig. 18) and remove the draught welt from both door apertures.

Coupé only

Remove occasional seat, if fitted, and take out the rear trim panel (6 screws). Remove the quarter trim panel by inserting a screwdriver between the forward edge of the trim panel and the body. Gently prise the retaining clips from the body and grip the lower edge of the trim panel, pulling the panel clear of the retaining flange at its upper edge.

Remove four nuts (two at each side) shown on Fig. 19 (inset A), and three nuts with clip washers (inset B). These are accessible from inside the luggage locker.

Lift the roof clear and note the position of blocks between the roof and body side panels.

Saloon

Remove the side and rear windows, referring to pages 5·227 and 5·230 respectively. Detach the trim from the centre pillar and release the roof panel by removing two screws and three nuts shown on inset A, Fig. 19, securing the rear lower edge of the roof to the body.

Vitesse only

Disconnect the purple and purple with white cables from the roof lamp at the snap connector located adjacent to the upper forward edge of the fuel tank.

As the roof panel is lifted, withdraw the roof lamp cables from the luggage locker. Note the three rubber blocks between the rear edge of the roof and the body.

Estate Car and Courier Van

The procedure for roof removal and refitting is identical for Estate Cars and Courier Vans, except that the centre pillars and side windows on the Estate Car are replaced by side panels welded to the roof. A roof lining is not fitted on the van.

Procedure

Remove:

- tail gate (see page 5·231),
- side windows (Estate Cars) see page 5·230,
- trim from centre pillar,
- roof lining,
- rear quarter trim panels and disconnect the cables from the tail lamp at the snap connectors located adjacent to the lamps,
- 14 bolts (7 at each side) securing the lower edge of side panels to the body (Van only),
- four nuts (two at each side) with washers which secure the rear pillars to the body.

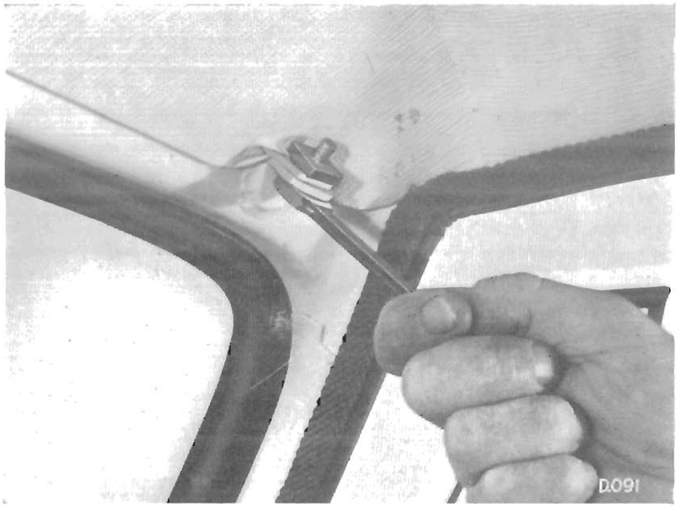


Fig. 18. Roof to header panel bolts

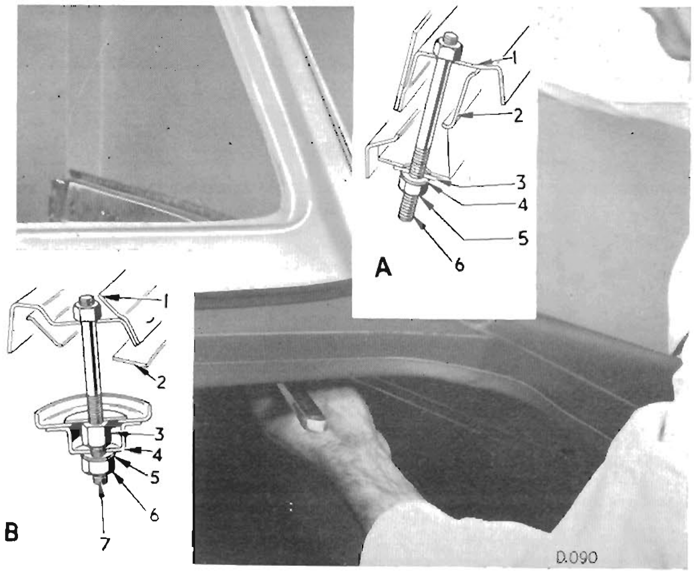


Fig. 19. Roof to body bolt details

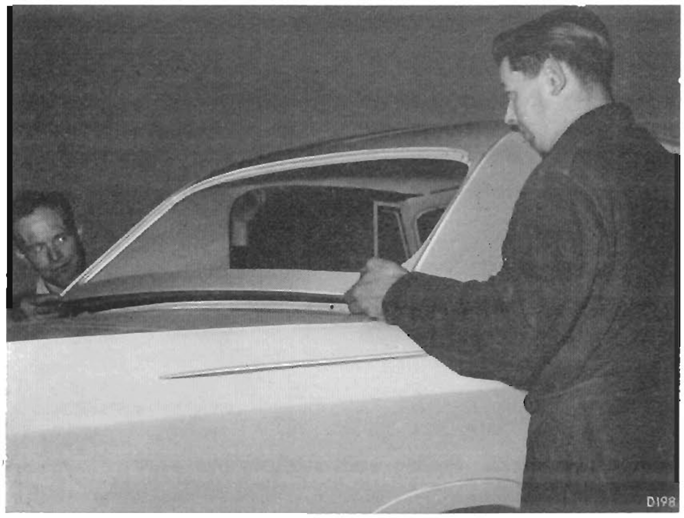


Fig. 20. Lifting roof panel

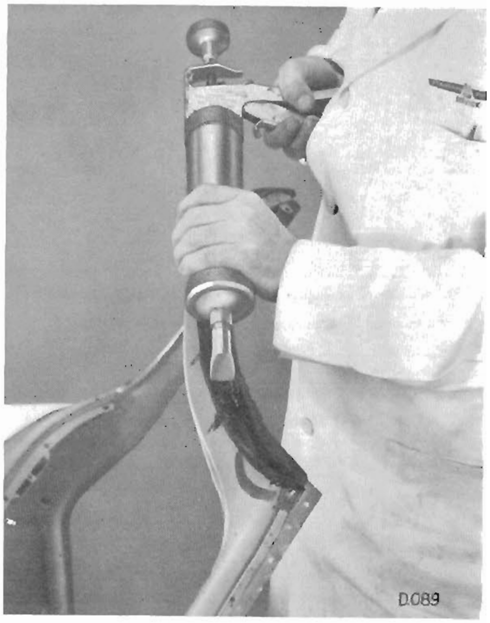


Fig. 21. Applying sealing compound

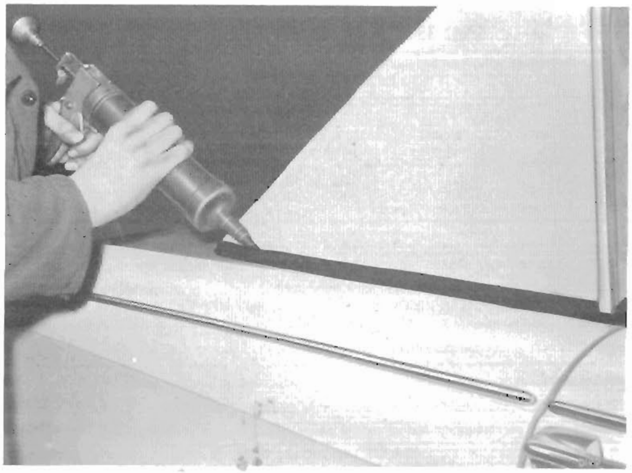


Fig. 22. Sealing weatherstrip to roof panel

Lift the roof away and as it is being lifted, the cables which pass up the rear pillars and above the tailgate to connect the tail lamps, will be withdrawn.

Note the position of the rubber seals and washers between the lower ends of the rear pillar and the body, and the seal between the roof and windscreen header rail.

To Refit

Clean off the old sealing compound from the roof panel, windscreen header rail and rubber weatherstrips. Examine the rubber and renew as required.

Liberally coat the upper edge of the header rail with Seelastik. Attach the rubber weatherstrip and apply Seelastik to the upper surface of the rubber.

Coupé only

Apply adhesive to the lower flange of the roof panel and to the rubber weatherstrip channel. When tacky, fit the rubber to the roof panel.

Placing the wide end of each spacer block towards the front, and the chamfered edge face downward with the narrow side nearer to the centre of the car, apply Seelastik to the lower block face and attach it to the body side panel, between the stud holes. Attach the roof panel, align the roof and body flanges and loosely secure the panel at the rear centre position.

Refit the two rear outer bolts and two bolts securing the roof panel to the header rail. Refit the nuts and washers to the roof-to-body side panel fixing studs and fully tighten.

Turn the adjusting nuts on each of the studs across the rear of the car until the nut contacts the body. Refit the cup washers and fully tighten. Refit the sun visors and trim panels.

Use Seelastik to seal roof to rubber and rubber to body.

Saloon Models

Position the sealing rubbers at the base of the roof rear pillar and seal with Seelastik.

Apply adhesive to the lower rear edge of the roof panel and to the rubber weatherstrip channel. When tacky, refit the weatherstrip.

Apply Seelastik to the contact faces and assemble a small rubber block over each of the three studs on the rear of the roof. Place the roof in position and secure it to the header rail by refitting the two outer bolts.

Lift the rear end of the roof panel, attach a rubber seal to the top of each centre pillar and, for Vitesse only, pass the cables from the rear lamp through the rear deck into the luggage locker.

Lower the roof and secure the rear end with three nuts. Align the top of each centre pillar and secure it to the roof with 2 screws.

Refit the side and rear windows—see pages 5·230 and 5·227. Reconnect the roof lamp cables (Vitesse only).

Estate Car and Courier Van

The following instructions relating to the Estate Car may, by deleting reference to the centre pillar and roof lining, be applied to the Courier Van.

Coat both sides of a rubber seal with Seelastik and attach it to the upper end of the centre pillar.

Apply Seelastik to the upper surface of the rear pillar sealing rubbers.

Assemble the rubber to the base of each pillar. This operation is facilitated by placing the rubber on black adhesive tape which is then used to hold the rubber in position on the pillar, Figs. 23 and 24.

Place the roof into position and loosely secure it to the windscreen header rail. Raise the rear end of the roof and pass the cables into the body. Applying Seelastik to the contacting surfaces of the rubber and body, lower the roof and fully tighten the roof to windscreen header rail securing bolts.

Refit nuts and washers to the rear pillar studs and fully tighten. Refit two bolts to each centre pillar and seal the screw located inside the channel with MR roofing compound. Plug the front and rear lower corners of the side window apertures with MR roofing compound (Fig. 26).

Refit 14 bolts (seven on each side) and secure the roof and side panels to the body (Vans only).

Refit the tail gate, roof lining and side windows. Reconnect the tail lamps and refit the trim panels.

Cut off the surplus black tape (Fig. 25) flush with the sealing rubber to provide a neat appearance.

SPITFIRE

Hard Top Removal

Remove two dome-headed bolts securing the hard top to the windscreen header rail.

Remove two bolts from the underside of the hoodstick sockets.

Remove the rear trim panel (2 Dzus fasteners).

Remove two dome-headed bolts securing the hard top to the rear deck. Remove the tapped plates, rubber washers, lock washers, plain washers and finishers.

Lift the hard top clear.

To refit, reverse the above procedure.

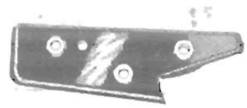


Fig. 23. Place sealing rubbers on tape

Fig. 24. Sealing rubber secured by tape to rear pillar

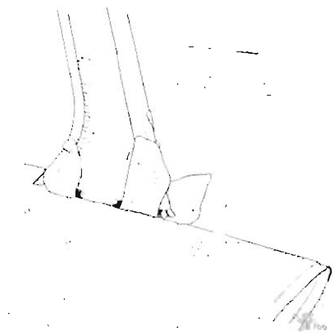


Fig. 25. Rear Pillar Seal

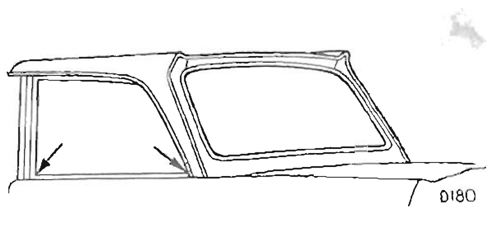
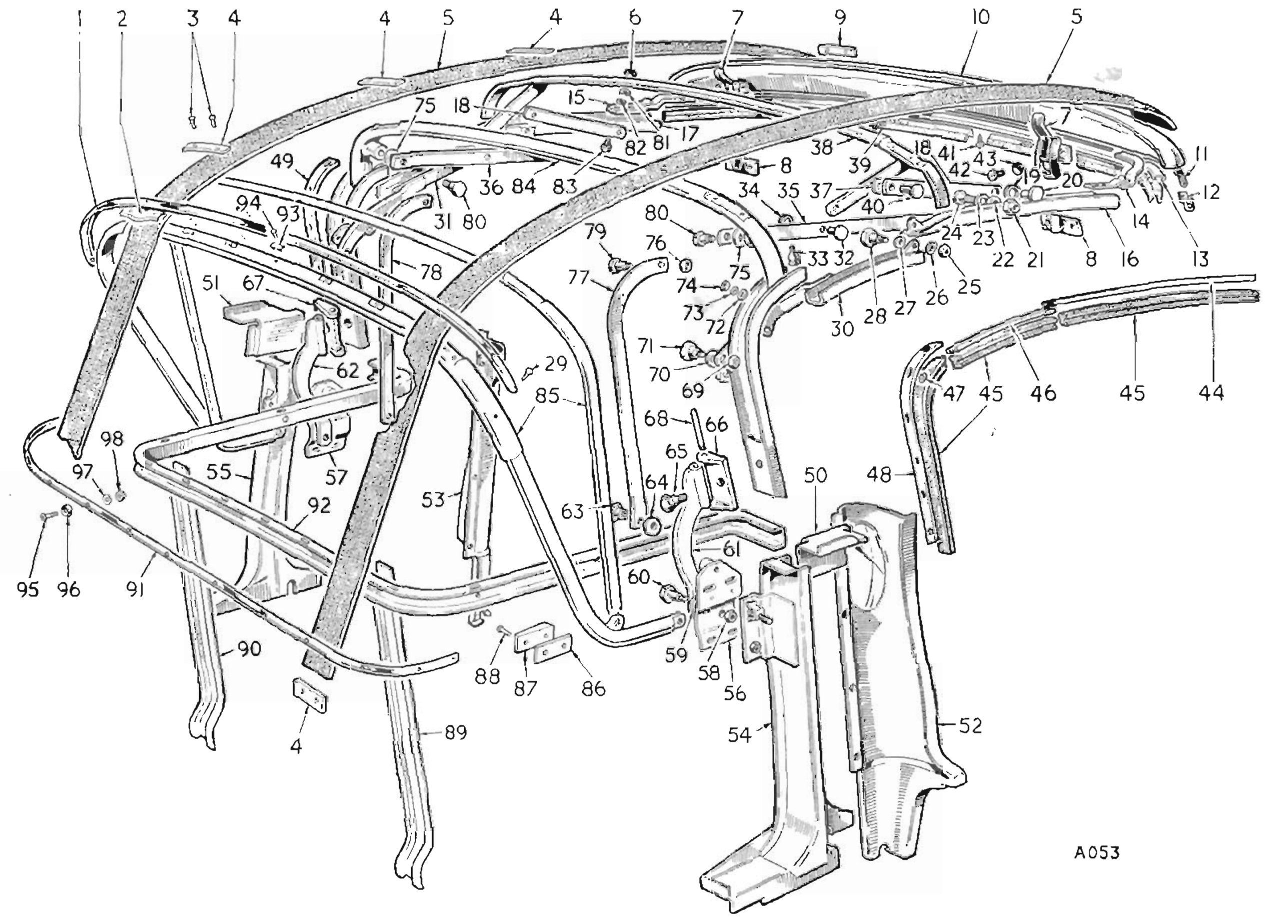


Fig. 26. Plugging corners



1 Finishing strip—rear hood stick
2 Webbing retaining plate
3 Rivets
4 Webbing retaining plate
5 Webbing
6 Nut
7 Head catch assembly front hood stick
8 Head catch assembly—screen header
9 Webbing retaining plate
10 Front stick assembly
11 Roof header finisher
12 Front hood stick end finisher
13 Weather strip retainer
14 Pivot bracket assembly—R.H.
15 Pivot bracket assembly—L.H.
16 Cantrail assembly—R.H.
17 Cantrail assembly—L.H.
18 Front cantrail link
19 Plain washer
20 Rivet
21 Nyloc nut
22 Nut
23 Plain washer
24 Shoulder bolt
25 Nut
26 Plain washer
27 Plain washer
28 Shouldered bolt
29 Finisher strip retaining screw
30 Cantrail rear assy.—R.H.
31 Cantrail rear assy.—L.H.
32 Rivet
33 Rubber buffer
34 Plain washer
35 Front cantrail link—R.H.
36 Front cantrail link—L.H.
37 Plain washer
38 Front intermediate hood stick assembly
39 Front hood stick weather strip
40 Rivet
41 Screw
42 Screw
43 Washer
44 Front cantrail weather strip retainer
45 Weather strip
46 Rear cantrail weather strip retainer
47 Screw
48 "B" post—upper—R.H.
49 "B" post—upper—L.H.
50 "B" post filler panel—R.H.
51 "B" post filler panel—L.H.
52 "B" post closing panel—R.H.
53 "B" post closing panel—L.H.
54 "B" post inner panel assembly—R.H.
55 "B" post inner panel assembly—L.H.
56 Pivot mounting bracket—R.H.
57 Pivot mounting bracket—L.H.
58 Nut
59 Plain washer
60 Shouldered bolt
61 Hinge link—R.H.
62 Hinge link—L.H.
63 Shouldered bolt
64 Plain washer
65 Shouldered bolt
66 "B" post hinge—R.H.
67 "B" post hinge—L.H.
68 Pivot pin
69 Nut
70 Plain washer
71 Shouldered bolt
72 Plain washer
73 Shakeproof washer
74 Nut
75 Plain washer
76 Plain washer
77 Rear cantrail control link—R.H.
78 Rear cantrail control link—L.H.
79 Shouldered bolt
80 Shouldered bolt
81 Spring washer
82 Plain washer
83 Bolt
84 Intermediate hood and "B" post upper
85 Rear hood stick and mediate stick assemb
86 Packing piece
87 Nylon guide block
88 Rivet
89 Tonneau support strut—R.H.
90 Tonneau support strut—L.H.
91 Head cloth finishing strip
92 Tonneau support rail
93 Finishing strip retaining clips
94 Rivet
95 Screw
96 Snap fastener
97 Rubber washer
98 Nut

Fig. 27. Soft-top frame details

CONVERTIBLE HOOD ASSEMBLY

To Remove

Remove the screws (95), snap fasteners (96), rubber washers (97) and nuts (98). Detach the finisher strip (91), release the hood material from the body and drill out two rivets retaining the plates (4) and the webbing (5) to the rear deck flange.

Release two toggle fasteners on the screen rail and two snap-on clips securing the hood to the body side flanges.

Remove the quarter trim panels to gain access to the pivot mounting brackets (56) and (57). Release the bracket by removing its four securing bolts.

Lift the hood assembly from the body.

To Refit

Reverse the removal procedure and make adjustments as required in accordance with the conditions listed on page 5·212.

SLIDING ROOF ASSEMBLY

To Remove (Fig. 29)

With the sliding roof in the half-open position, hold one side steady and pull the other side forwards. This releases the nylon sliders from the metal runners. Repeat the operation until all of the sliders are clear. Remove four screws (1) and lift clear.

To Refit

Reverse the above procedure.

Adjustment

The four screws (1) pass through elongated holes so that the fabric may be slackened or tensioned as necessary.

Any stiffness in the sliding action may be relieved by applying Ambersil Silicone Formula 1 spray to the runners.

Should it be necessary to service the catch mechanism, remove the sliding roof assembly complete. Pull the ends of the front listing rail clear of the fabric, pull the fabric clear of the front box-section, remove two screws and lift the metal section clear.

To re-assemble, reverse the above procedure.

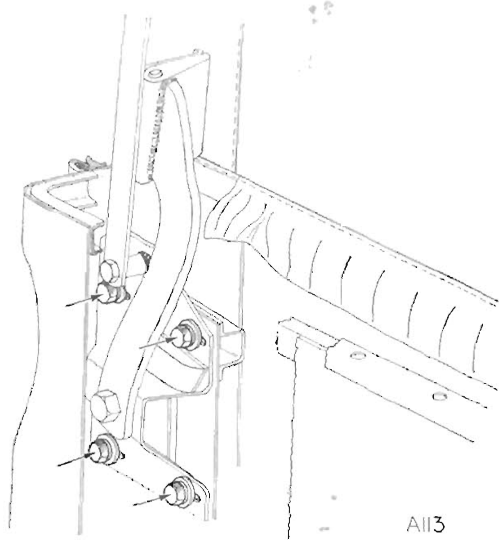


Fig. 28. Soft-top pivot mounting

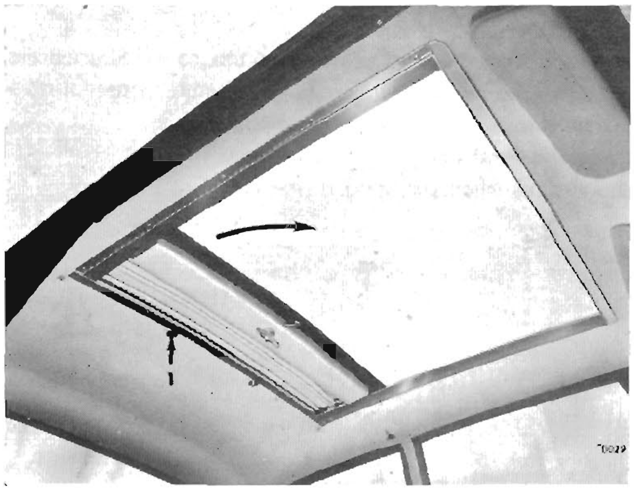


Fig. 29. Sliding roof

SOFT TOP ADJUSTMENTS

VITESSE AND HERALD 1200 CONVERTIBLE MODELS ONLY

The items with numbers in brackets are illustrated on Fig. 27.

CONDITION	ADJUSTMENT
Cantrail low in the centre causing it to foul the door glass.	Remove and re-set the curved section of the rear cantrail assembly (30 & 31).
Upper edge of door glass fouls the cantrail	Adjust door glass stop until satisfactory clearance is obtained.
Rear corner of door glass fouls curved section of rear cantrail assembly.	Remove pivot mounting bracket (56 & 57) and elongate the holes to provide sufficient vertical adjustment. Use oversize washers when refitting the securing screws.
"B" post weatherstrip does not form an effective seal at the rear edge of door glass.	Two adjustments are available: 1. Slacken the pivot bracket (30 & 31) securing bolts and move the bracket forward. If hood material between the "B" post and rear deck is now subject to undue stress, remove the "B" post weatherstrip and release the hood material as necessary. 2. Remove the weatherstrip and hood material from "B" post. Insert suitable packing between the hood material and "B" post. Refit the hood material and weatherstrip.
Hood stitching broken away at the base of the "B" post.	Remove the bolts securing the pivot mounting bracket (30 & 31) to the body and insert suitable packing between the bracket and body to obtain a clearance of approximately ¼" (6·3 mm.) between the hoodsticks and the body outer panel.
Small holes in hood 4" to 6" (10·16 cm. to 15·24 cm.) above the body outer panel and to the rear of the "B" post are caused by the hood material being trapped between the hoodsticks when the hood is lowered.	Shorten the bolts securing the weatherstrip to the "B" post. Remove the fourth bolt, counting from the bottom, and discard it.

HOOD FASTENER ADJUSTMENTS

CONDITION	ADJUSTMENT
Hood peak rail out of line with windscreen header rail.	Slacken the screws securing the clamps (7) to the peak rail and centralize. Re-tighten the screws.
Incorrect tension on hood fasteners	Slacken the screws plate (8) to the windscreen header rail and raise or lower the plate to obtain correct tension. Re-tighten the screws.

ROOF LINING

Maintenance

Maintenance is restricted to cleaning the material with warm soapy water. Obstinate grease marks may be removed using a cloth moistened in trichlorethylene. The edges of the lining are secured to the roof panel with a rubber solution, and in consequence, damage may result from the use of petrol or other adhesive solvents.

To Remove (Saloon and Coupé only)

Remove the roof panel assembly as described on page 5·207. Release the edges of the lining from the panel, taking care as the edges are released if the lining is to be subsequently refitted.

Press the ends of the listing rails inward to release them from the locations in the cantrails. Withdraw the rails from the lining.

To Refit

Using trichlorethylene, remove all trace of adhesive from the flange of the roof panel and lining.

Assemble the listing rails to the lining and ensure that they are correctly located by referring to the following code.

The rail locations are numbered from the front of the vehicle and each rail is identified by a colour painted on its ends. The colour code is as follows:—

Coupé (2-seater): No. 1 Red, No. 2 Yellow, No. 3 Blue.

Saloon (4-seater): No. 1 Green, No. 2 White, No. 3 Black, No. 4 Grey, No. 5 double section—no colour.

Apply a fresh coating of adhesive to the roof flange and lining.

Starting at the rear, assemble the rails to the roof panel. Secure the front rail behind two retaining clips. Gently pull the lining to the rear and lightly secure it to the roof flange only.

Lightly secure the lining to the front edge of the roof panel.

Working outwards from the centre of the lining, smooth out all wrinkles and attach the edge of the roof panel. If a new lining is being fitted, cut the edges to within $\frac{1}{8}$" (3 mm.) of the turnover. The cuts should be approximately $\frac{1}{2}$" (13 mm.) apart.

Estate Car only

The instructions for renewing the roof lining is basically similar to those given for saloon and coupé models. The lining, however. is fitted after the roof panel is fitted to the car.

The colour coding of the listing rails is as follows:—

1 Green, 2 White, 3 Brown, 4 Orange, 5 Purple, 6 double rail—no colour.

Fig. 30. Assembly No. 1 listing rail to retaining clips

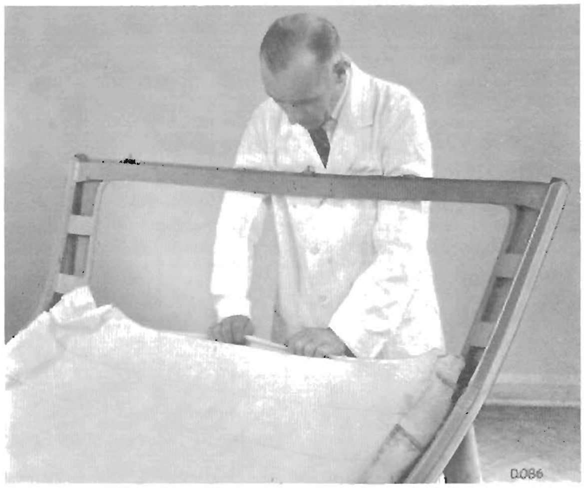


Fig. 31. Securing rear edge of lining

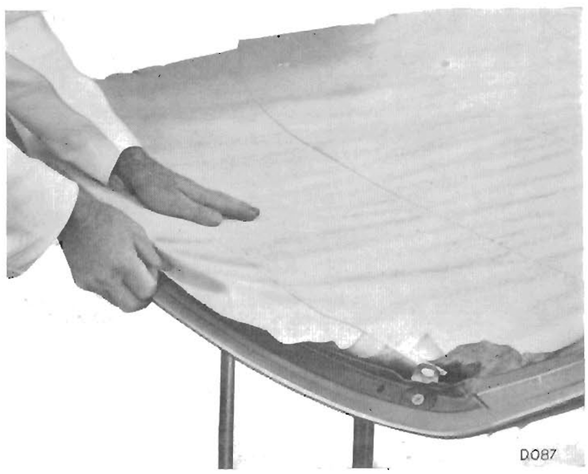


Fig. 32. Fitting front edge of lining

PANEL DETAILS

(VITESSE AND SPITFIRE)

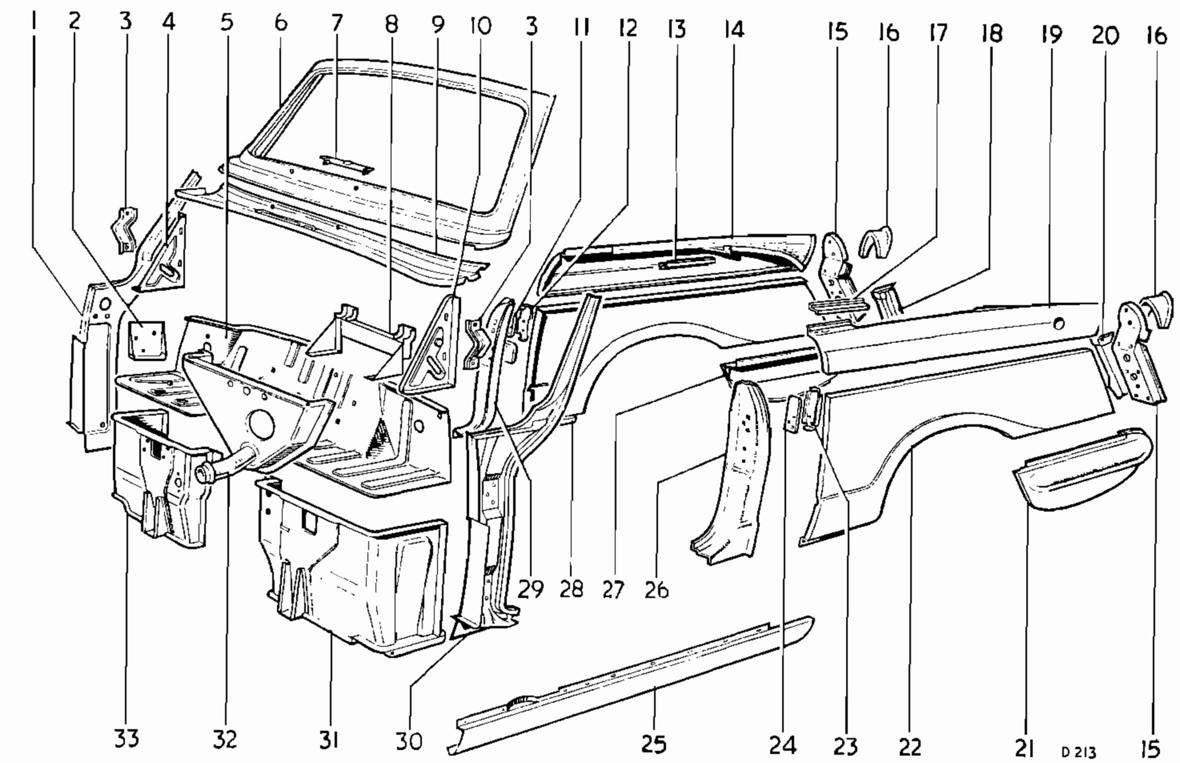


Fig. 33. Panel details (Vitesse)

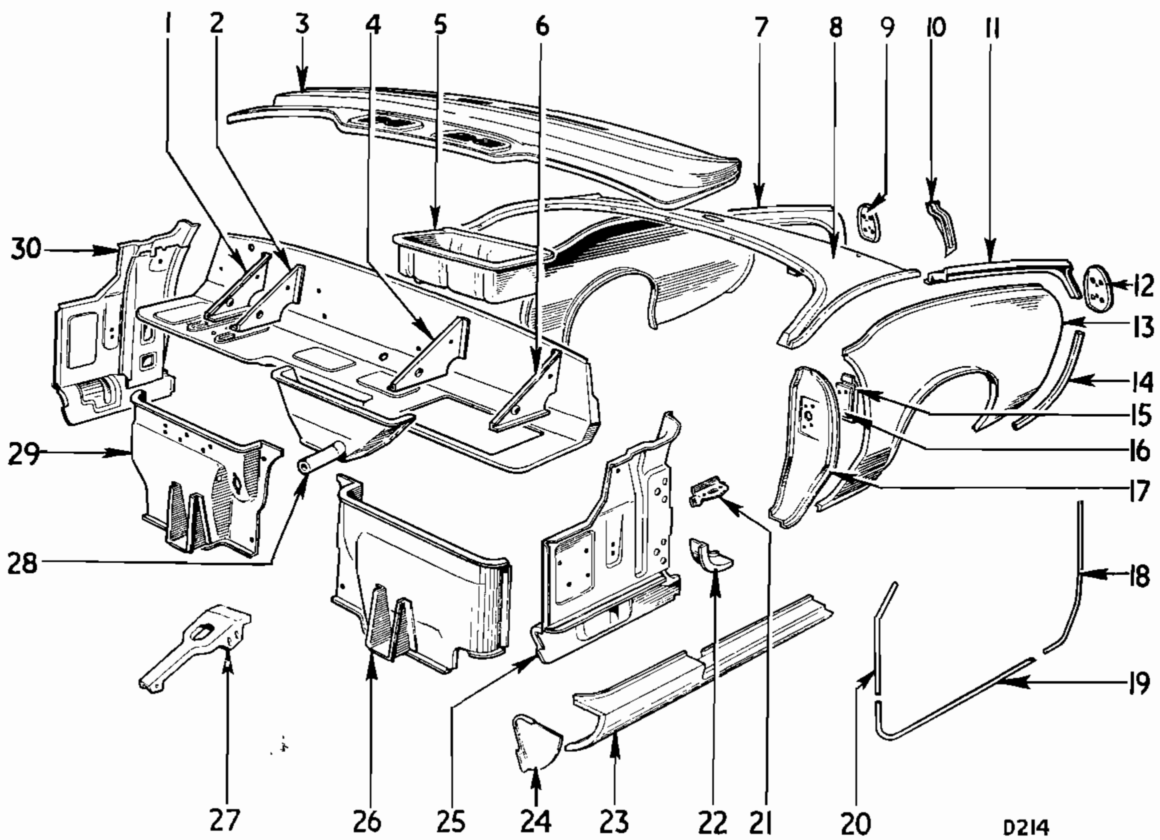


Fig. 34. Panel details (Spitfire)

Key to Fig. 33

1	"A" post	17	Retainer
2	Bracket	18	Side panel
3	Bonnet stop	19	Tonneau upper side
4	Gusset panel	20	Side panel
5	Dash shelf	21	Quarter valance
6	Screen surround	22	Tonneau lower side
7	Bracket	23	Tonneau side
8	Bracket	24	Tapped plate
9	Front deck	25	Sill panel
10	Gusset panel	26	Outer "B" post
11	Retainer	27	Quarter valance
12	Tonneau side	28	Tonneau lower side
13	Tapped plate	29	"B" post
14	Tonneau upper side	30	"A" post
15	Closing panel	31	Dash side
16	Closing panel	32	Plenum
		33	Dash side

Key to Fig. 34

1	Gusset	16	Retainer
2	Gusset	17	"B" post
3	Front deck	18	Weatherstrip retainer
4	Gusset	19	Weatherstrip retainer
5	Battery box	20	Weatherstrip retainer
6	Gusset	21	Bracket
7	Rear wing inner	22	"A" post
8	Rear deck	23	Sill
9	Closing panel	24	Filler panel
10	Support	25	"A" post
11	Rear wing inner	26	Dash panel
12	Closing panel	27	Bracket
13	Rear wing outer	28	Plenum
14	Moulding	29	Dash panel
15	Tapped plate	30	"A" post

REAR END SECTION

(HERALD 1200, 12/50 AND VITESSE)

To Remove

Disconnect the cables from the battery and release the accelerator cable from the carburettor and pedal. Lift out the floor covering from the luggage locker and take out the spare wheel.

Remove the scuttle trim panel from the left-hand side of the car (6 screws) and disconnect the cables to the rear of the vehicle at the snap connector under the facia.

Take off the knob from the change speed lever and remove the gearbox cover. This is secured to the floor and scuttle with 11 screws. Eight of the screws (4 at each side) are accessible from the driving compartment, the remaining three are located below the heater unit in the engine compartment.

Remove both sill panels.
Remove the luggage locker lid.
Drain and remove the fuel tank.
Disconnect the rear brake cable.

Release the rear end section from the chassis frame by referring to Page 5·102 and remove eight bolts (D) positioned transversely across the vehicle in front of the seat runners, two bolts (G) located rear of the seatpan. Four bolts (H) (J) accessible when the luggage locker lid is raised and four bolts (B), (C), (E) and (F) located beneath the frame side members.

Lift the rear end section and note the location of mounting pads between the body and the chassis frame, and strips between the Centre and Rear sections.

Fig 37 shows the rear end section being lifted from the chassis. The rope slings are passed through the outer cut-outs in the rear bulkhead.

To Refit

Remove the old sealing compound from the rear and centre section joint faces and apply new lengths of Everseal to the joint face of the centre section.

Position and secure the mounting pads to the chassis, using Bostik 1261. The pads are ¼" (6·3 mm.) thick. In some cases, however, two pads ⅛" (3 mm.) are used in place of a single pad.

Refit the rear end section by reversing the removal procedure. Referring to page 5·217, adjust the rear end section to obtain an even clearance of the doors, coupled with an easy closing action.

Use Seelastik to seal the joint between the centre and rear end sections.

Refit the roof panel and reconnect the electrical system and the handbrake mechanism.

Refit the seats, carpets and remaining components.

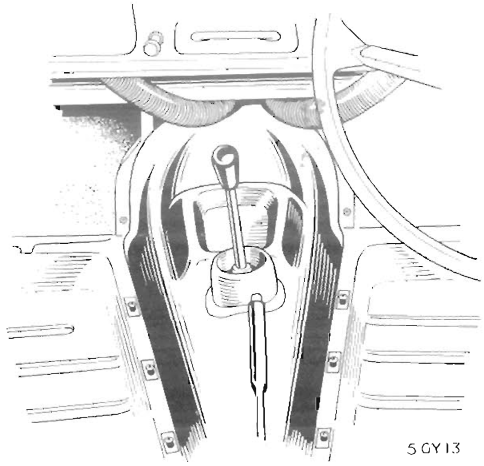


Fig. 35. Location of gearbox cover

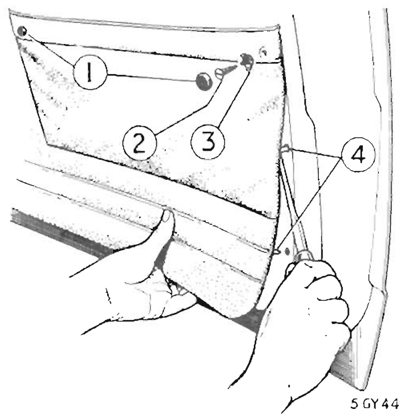


Fig. 36. Removing trim panel

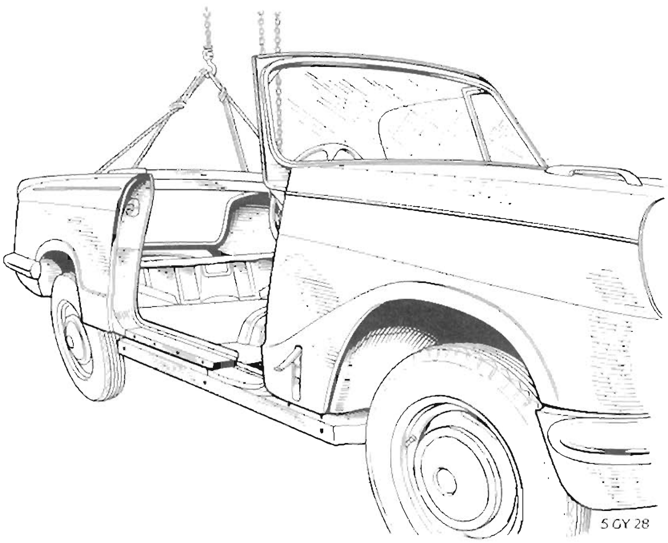


Fig. 37. Lifting rear end section

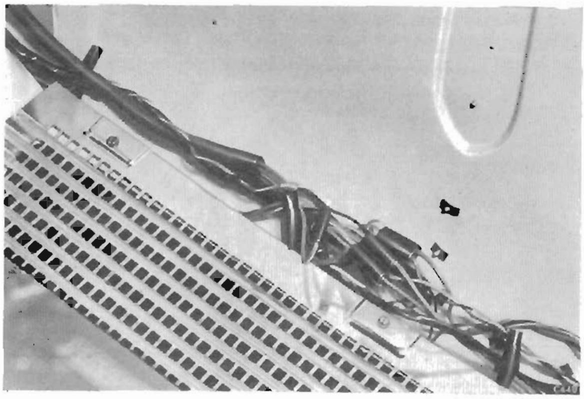


Fig. 38. Front lighting cable snap connectors

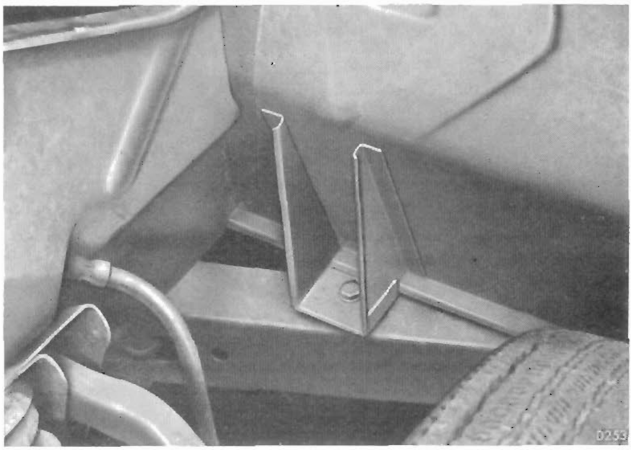


Fig. 39. Centre section to crossmember body mounting bolts.

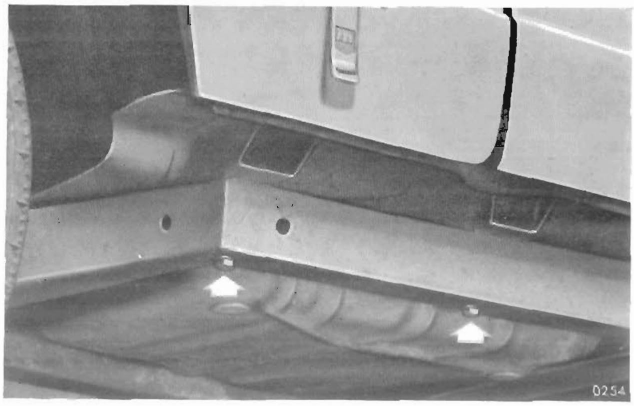


Fig. 40 Centre section to outrigger body mounting bolts.

CENTRE SECTION

To Remove

Remove the battery, drain the cooling system and disconnect both water hoses from the heater unit.

Remove the roof panel (see page 5·207).

Remove the rear end section (see page 5·215).

Disconnect the front lighting cables at a group of connectors located at the top centre of the grille surround (Fig. 38) and unclip the cable harness from the chassis frame.

Disconnect the starter cable from the solenoid and the H.T. cable from the coil.

Disconnect the cables from the temperature gauge transmitter, generator, distributor and stop lamp switch.

Remove the steering column (see Group 4).

Drain the clutch and brake hydraulic system and disconnect the pipes from the master cylinders. Disconnect the speedometer drive from the rear of the instrument and pull the cable into the engine compartment.

Remove six body mounting bolts securing the centre section to the chassis, and lift the section clear.

To Refit

Use Bostik 1261 to attach all the body mounting pads to the centre and rear sections.

Lift the centre section into position and secure it with six bolts.

Refit sill panels.

Reconnect the hydraulic and electrical systems.

Refit the rear end section as described on page 5·215.

Bleed the brake and clutch systems and road test the car.

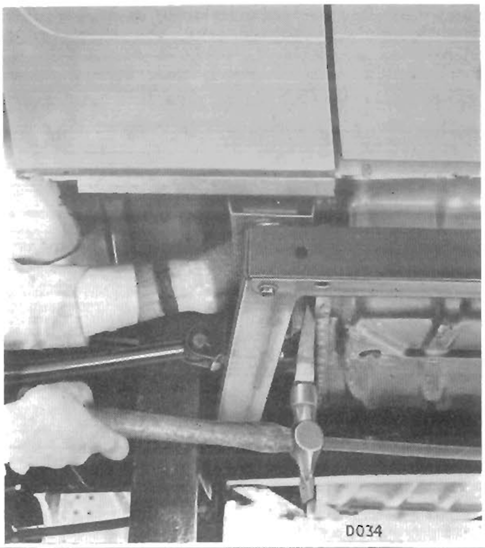


Fig. 41.
Inserting wedges to reduce gap

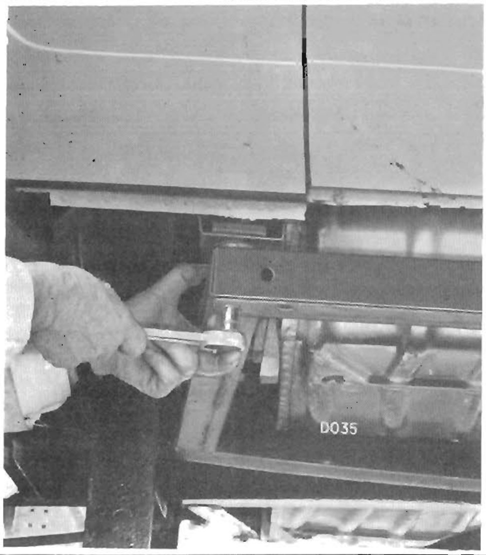


Fig. 42.
Re-tightening body bolts

Fig. 43.
Inserting wedges to increase gap

BODY ADJUSTMENTS

A uniform clearance of approximately $\frac{3}{16}$" (5 mm.) should exist between the centre section, bonnet, door and rear section.

Bonnet adjustments are given on page 5·204.

Should normal door adjustment fail to produce a satisfactory clearance, move the rear section of the body as required. Limited movement without disturbance to the roof or side windows is effected as follows:

Gap too wide (Fig. 42)

Remove the sill from the side of the car requiring adjustment and slacken the body mounting bolts D, E, F, H, J and K (Page 5·102). Insert two hardwood wedges between the frame and the rear floor at approximately 2" (5·1 cm.) inward of body mounting point "F". Gently hammer the wedges in as shown until satisfactory clearance is obtained.

Retighten body mounting bolts.

Remove the wedges, recheck the clearance and refit the sill.

Insufficient clearance (Fig. 43)

Remove the sill from the side requiring adjustment and slacken the body mounting bolts D, E, F, G, H and J (Fig. 1).

Insert a hardwood wedge between the shut face of the door and the rear section as shown. Close the door to spread the sections sufficiently to produce a satisfactory clearance.

Re-tighten all body mounting bolts.

Remove the wedge and re-check the clearance.

EXPLODED DOOR

(HERALD 1200, 12/50 AND VITESSE)

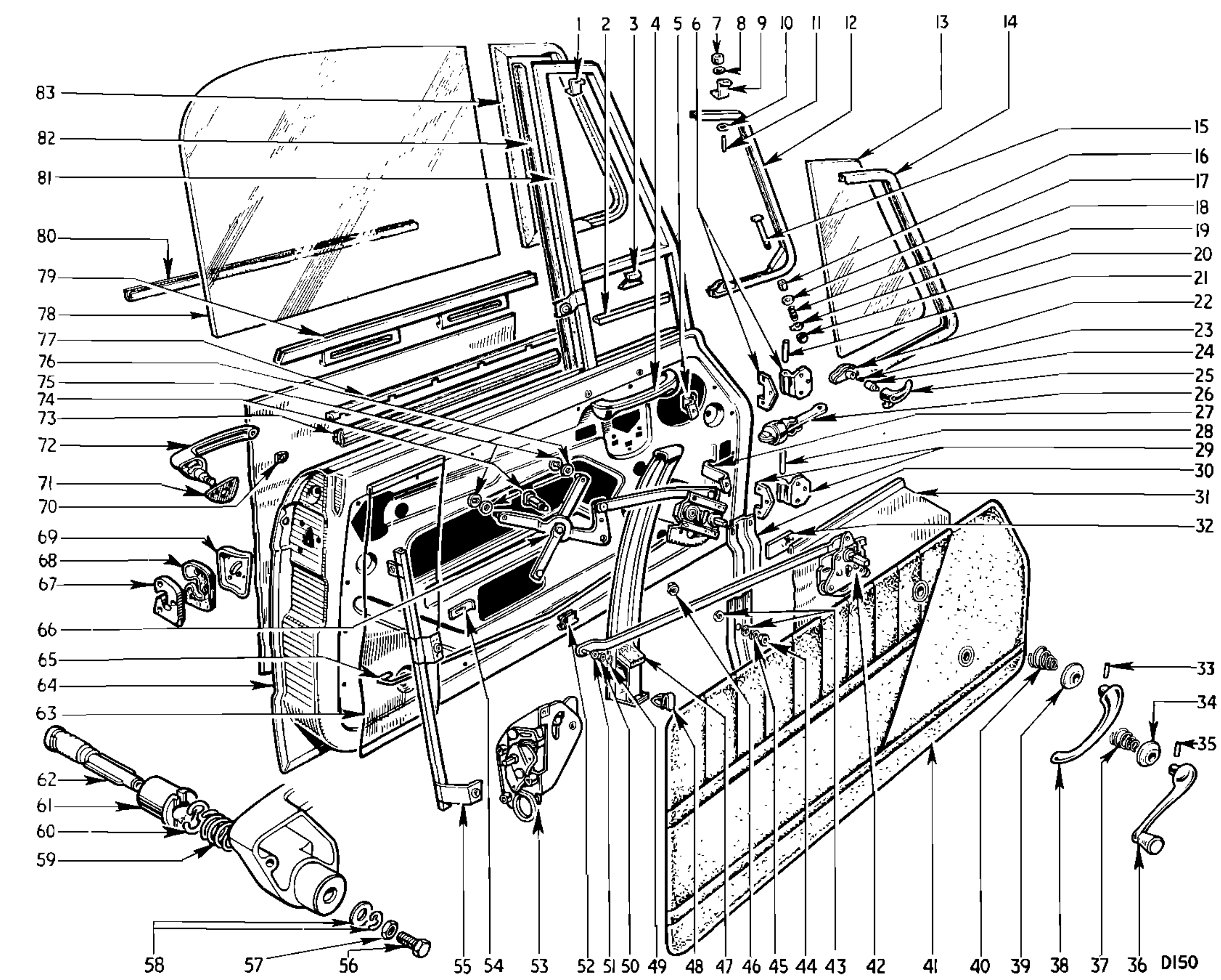


Fig. 44. Herald 1200, 12/50 and Vitesse door arrangement

Key to Fig. 44

1	Ventilator hinge	29	Hinge	57	Nut
2	Finisher	30	Reinforcement	58	Washers
3	Plate	31	Deflector panel	59	Spring
4	Pull handle	32	Pad	60	Washer
5	Bracket	33	Pin	61	Push button
6	Hinge	34	Escutcheon	62	Lock barrel
7	Spacer	35	Pin	63	Deflector panel
8	Washer	36	Handle	64	Door assembly
9	Hinge	37	Spring	65	Restrainer
10	Washer	38	Handle	66	Regulator
11	Rivet	39	Escutcheon	67	Striker
12	Frame	40	Spring	68	Sealing rubber
13	Glass	41	Trim pad	69	Lock cam
14	Weatherstrip	42	Remote control	70	Gasket
15	Pivot	43	Washers	71	Gasket
16	Spacer	44	Nut	72	Exterior handle
17	Washer	45	Washer	73	Weatherstrip
18	Spring	46	Washer	74	Pivot
19	Lockwasher	47	Reinforcement	75	Clip
20	Nut	48	Clip	76	Washers
21	Hinge pin	49	Clip	77	Weatherstrip
22	Lock	50	Washer	78	Glass
23	Spring	51	Washer	79	Channel
24	Pivot	52	Clip	80	Weatherstrip
25	Handle	53	Lock	81	Ventilator
26	Check arm	54	Bracket	82	Felt
27	Bracket	55	Run channel	83	Weatherstrip
28	Hinge pin	56	Bolt		

DOORS

HERALD 1200, 12/50 AND VITESSE

General

Access to the window regulator mechanism, door locks or any part of the door interior will necessitate prior removal of the interior handles and the door trim. The procedure is as follows:—

Interior Handles—To Remove

Using a broad-bladed screwdriver, press the escutcheon of the remote control handle firmly against the trim panel, push out the retaining pin and remove the handle and escutcheon.

Remove the window regulator handle by adopting a similar procedure.

To Refit

Place the escutcheon and handle on the remote control spindle, positioning the lever downwards and rearwards. Press the handle firmly against the trim panel until the holes in the handle and spindle coincide. Push the pin into position and allow the escutcheon to cover the holes.

With both windows raised, match the positions of window regulator handles and secure them by repeating the previous instruction.

Trim Panel—To Remove

Remove the interior handles and the walnut cappings (two screws).

Insert a screwdriver between the trim panel and the door and gently lever the panel retaining springs from the door. Remove the coil springs from the spindles.

To Refit

Position the springs on to the spindles, placing the smaller coil against the door panel and using the heavier gauge spring on the regulator spindle.

Fit the trim panel over the spindles and secure it by pressing the retaining springs into corresponding holes in the door panel.

Door—To Remove Complete

Remove the rivet securing the check arm to the "A" post. Remove three bolts securing each hinge to the "A" post and lift the door away. Each hinge is secured to the door with two bolts and one screw.

To Refit

Reverse the dismantling instructions.

Adjustments

Loose tapped plates in the "A" post permit limited vertical and fore and aft adjustment of the door. The door may be moved in or out by slackening the hinge to door bolts.

1 Bonnet stop bracket

2 Hinge to scuttle bolts

3 Hinge to door bolts

4 Bonnet fastener bracket

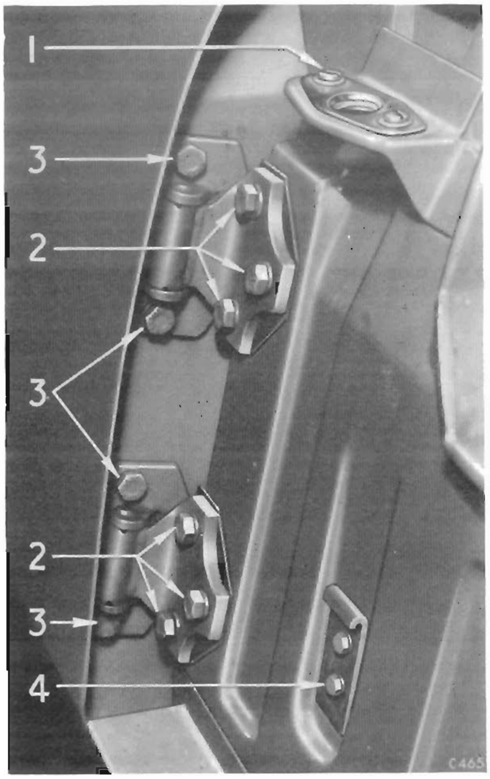


Fig. 45. Door hinge attachments

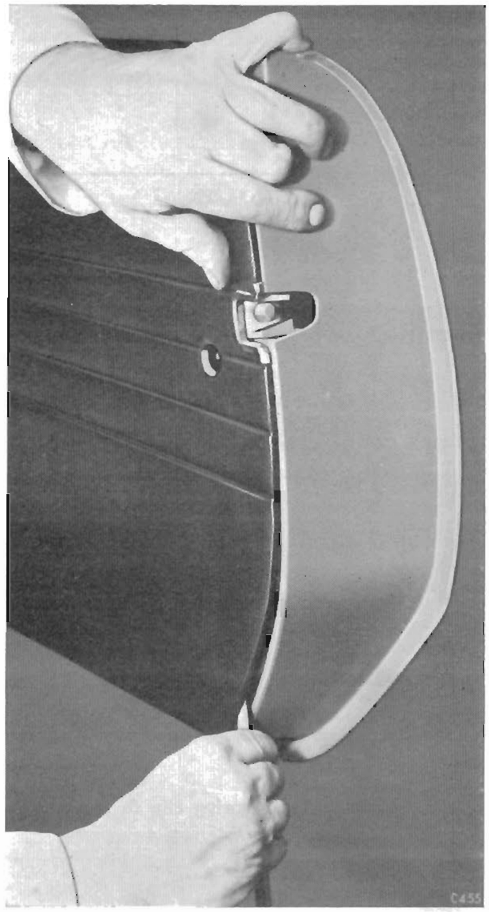
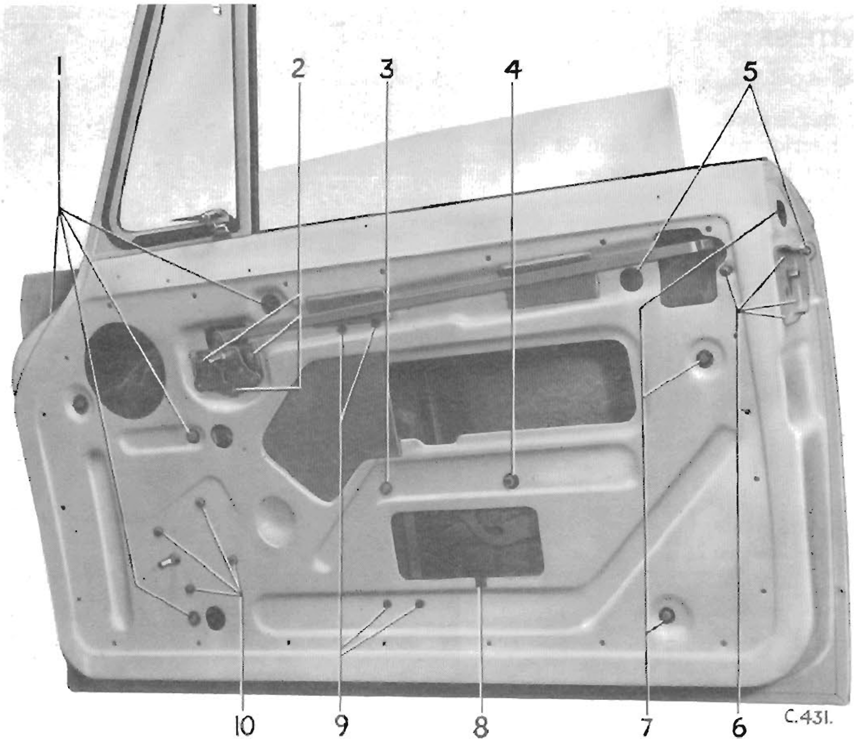


Fig. 46. Removing trim panel



1 Ventilator

2 Remote control mechanism

3 Regulator stop bracket

4 Regulator pivot

5 Exterior handle

6 Lock

7 Glass run channel

8 Clip

9 Reinforcement

10 Regulator

Fig. 47. Location of door component fixings (Herald 1200, 12/50 and Vitesse)

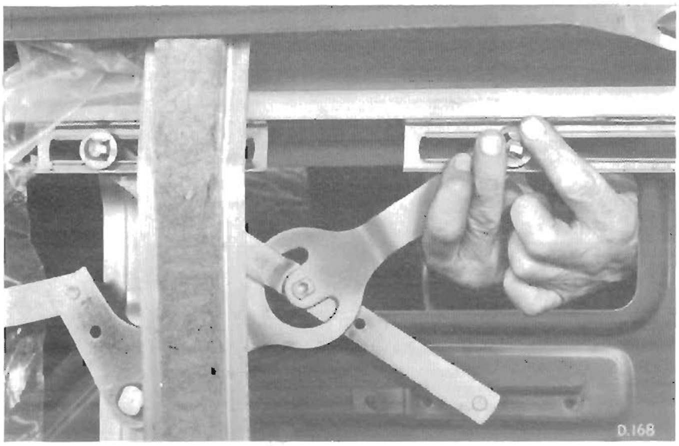


Fig. 48. Fitting spring clip to regulating mechanism

HERALD 1200, 12/50 AND VITESSE (Fig. 44)

Window Regulator Mechanism—To Remove

Raise the window, remove the spring clips (75) and leather washers (76) and spring the arms clear of the channel (79). Lift the glass to its highest position.

Remove the nut (44) and spring washers securing the regulator pivot (74) to the inner panel. Remove the pivot (74) and the double coil spring washer (46) which is fitted between the regulator and the inner panel of the door.

Referring to Fig. 47 take out four screws (9) and remove the inner panel reinforcement (47), Fig. 44, from the door.

Take out five screws (1) and lift the ventilator approximately 2" (50 mm.). The lowest screw also secures the channel tension wire.

Remove four screws (10), pass the regulator into the door casing and remove the assembly through the large cut-out.

To Refit

Reverse the above instructions and apply grease to all moving parts during assembly.

Door Glass

A plastic screen is fitted to the operating channel at bottom of the glass to protect the regulating mechanism from water which may seep between the glass and the outer weatherstrip.

The glass and regulating mechanism may be renewed independently of each other.

To Remove (Fig. 47)

Remove the stop platform from the bottom of the door (two screws).

Loosely refit the regulating handle and raise the glass until the operating arms are accessible through the large aperture in the door inner panel.

Take out the three screws (7) and remove the glass run channel. Note the position of tensioning wire.

Remove the spring clips (75), Fig. 44, and leather washers. Disconnect the arms from the operating channel at the base of the glass and lower the glass into the bottom of the door.

Remove the inner weatherstrip (77), Fig. 44, by pressing it down into the door. The weatherstrip is retained by six clips.

Remove five screws (1) and lift the ventilator approximately 1½" (3·8 cm.).

The glass is now free to be removed through the aperture in which it normally operates.

Note the position of the plastic deflector screens.

To Refit

An easily made tool, details of which are given on Fig. 50 is required for refitting the inner weatherstrip.

Place the plastic screen flat against the outer side of the glass and lower the assembly into the bottom of the door.

Refit the inner weatherstrip from inside the door casing as follows:—

Hold the weatherstrip in position with hand or a piece of bent wire.

Hook the tool (Fig. 49) under each of the clips on the weatherstrip and pull the clips firmly on to the flange of the door.

Lift the glass upward and engage the operating arms into the glass operating channel.

Refit the washers and spring clips.

Raise the window and refit the glass run channel, the tension wire, and the bottom stop.

Push the no-draught ventilator into position and secure it with five screws.

Partially close the window and adjust the rear glass rear channel to permit free movement without side play.

Fig. 49. Fitting deflector panel

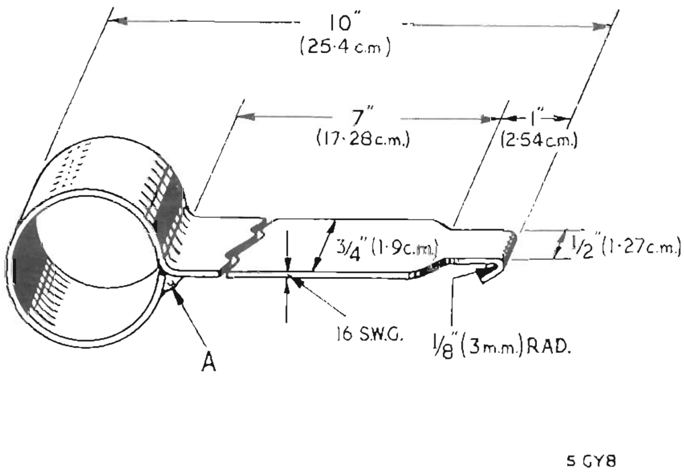


Fig. 50. Details of special tool

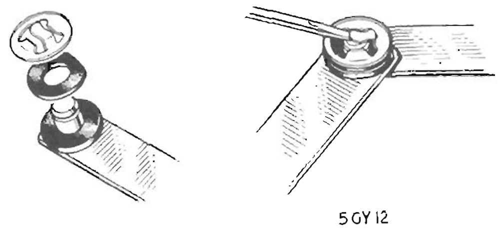


Fig. 51. Removing spring clip from regulating mechanism

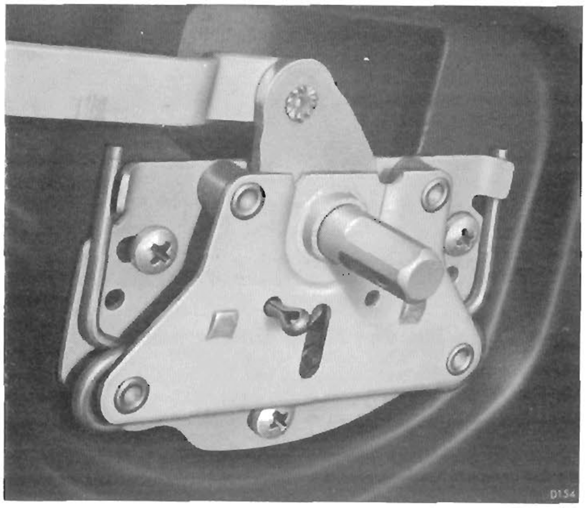


Fig. 52. Position of retaining pin

Door Lock—To Remove (Fig. 47)

Fully raise the window. Remove three screws (7) with washers securing the glass run rear channel and lower the channel into the bottom of the door.

Loosely refit the remote control handle. Move the handle to the open position and lock it in this condition by inserting a pin through the hole as shown on Fig. 52.

Remove the circlip and waved washer securing the remote control link (Fig. 57). Disconnect the link.

Remove four screws (6) securing the lock and dovetail plate to the door. Press the lock inwards and downwards until the latch and push button can be passed inside the door.

Turn the lock until the latch mechanism is underneath and the side of the lock is between the window support channel and the lower edge of the small aperture in the door inner panel, as shown on Figs. 54 and 55.

Push the lock downward and remove it from the door, through the large aperture.

To Refit

Insert the lock into the door with the latch mechanism nearer to the door inner panel and the push button inclined downward (see Fig. 54).

Push the lock upwards and turn it until the push button is compressed against the door outer panel and the latch is underneath, Fig. 55. In this position the side of the lock will be between the window support channel and the lower edge of the small aperture in the door inner panel. Continue to push the lock upwards until it is clear of the support channel where it can be turned into its correct position with the latch and push button projecting through their respective apertures in the door.

1 Control mechanism
2 Pin in locked condition
3 Lock lever
4 Spring clip
5 Screw
6 Packing piece
7 Exterior handle
8 Packing piece
9 Screw
10 Striker securing screws
11 Lock securing screws
12 Lock lever
13 Lock stop
14 Remote control securing screws
15 Pin
16 Interior handle

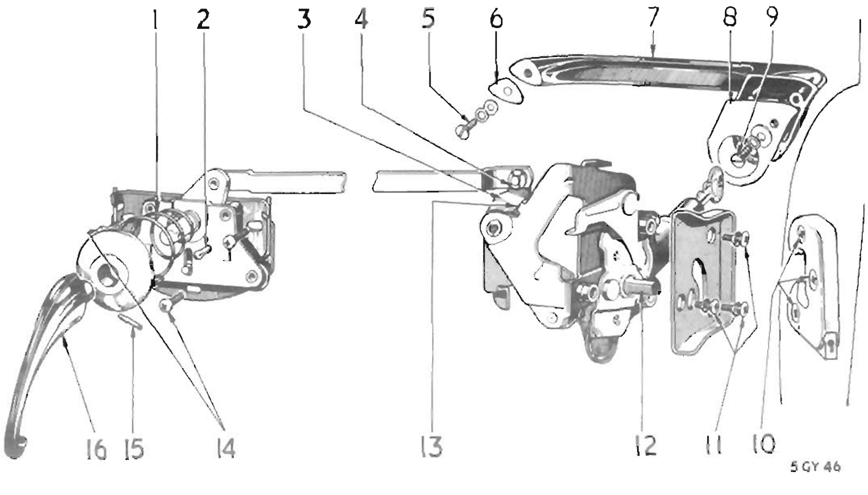


Fig. 53. Door lock details

Refit the dovetail plate and secure the lock (three screws) (Fig. 56).

Loosely refit glass run channel and fully tighten the upper screws. Lower the window and adjust the channel until the glass is free to slide without undue side movement. Refit the restrainer (65) and fully tighten the two remaining screws.

Refit the trim panel and interior handles.

Remote Control Mechanism

The remote control mechanism may be removed and refitted without dismantling the lock or window regulator.

To Remove

Move the handle into the door open position and lock it in this condition by inserting a retaining pin through the hole as shown on Fig. 52.

Remove the circlip (Fig. 57) and waved washers. Disconnect the link from the lever and remove three screws securing the remote control mechanism to the door (Fig. 52).

To Refit

The remote control mechanism must be fitted with lock latch down and the mechanism locked with a pin, as shown on Fig. 52.

Loosely secure the mechanism to the door panel with three screws and temporarily connect the link to the lock lever.

Move the mechanism towards the lock until the lock lever is in contact with its stop and tighten the securing screws.

Remove the pin, move the handle into the open position and replace the pin.

Disconnect the link, fit one waved washer on the lock lever and re-connect the link.

Fit one waved washer on the lever, secure the link to the lever using the circlip and remove the small pin.

Refit trim panel and interior handles.

Lubrication

Before refitting the trim panel ensure that all moving parts are adequately greased.

After assembly introduce a few drops of thin oil into the latch and key slots and wipe off all surplus oil.

Under no circumstances is it permissible to lubricate the lock cylinder with grease.

Striker Adjustment

The striker is secured to the "B" post with three screws which permit limited adjustment.

The correct position of a striker is determined by a process of trial and error, resulting in an easy closing action. Freedom from lift, fall or rattle is essential. Close the door gently and try to feel for faults during the last part of travel.

Ensure that the striker is in the horizontal plane relative to the axis of door movement and that the screws are fully tightened.

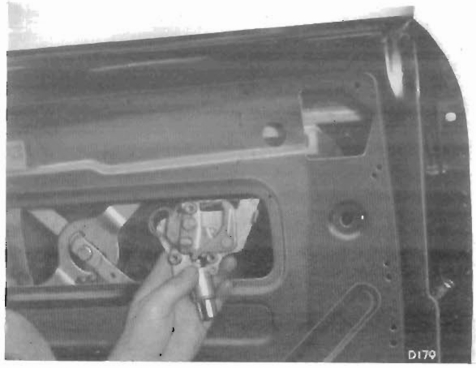


Fig. 54. Fitting lock to door, 1st stage

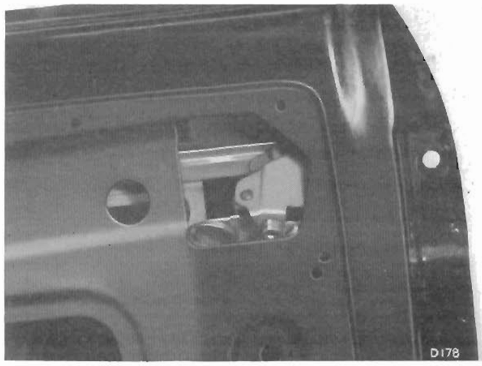


Fig. 55. Fitting lock to door, 2nd stage

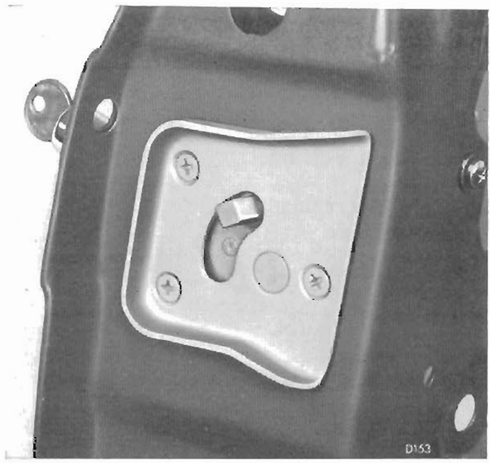


Fig. 56. Lock retaining screws

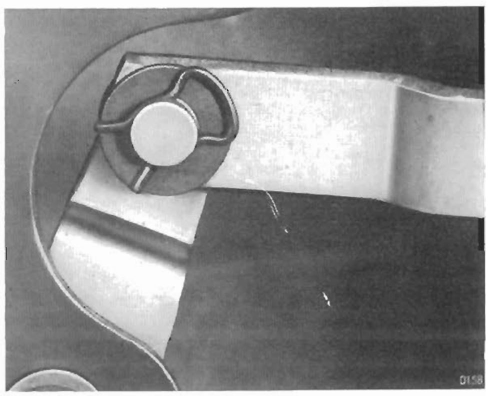
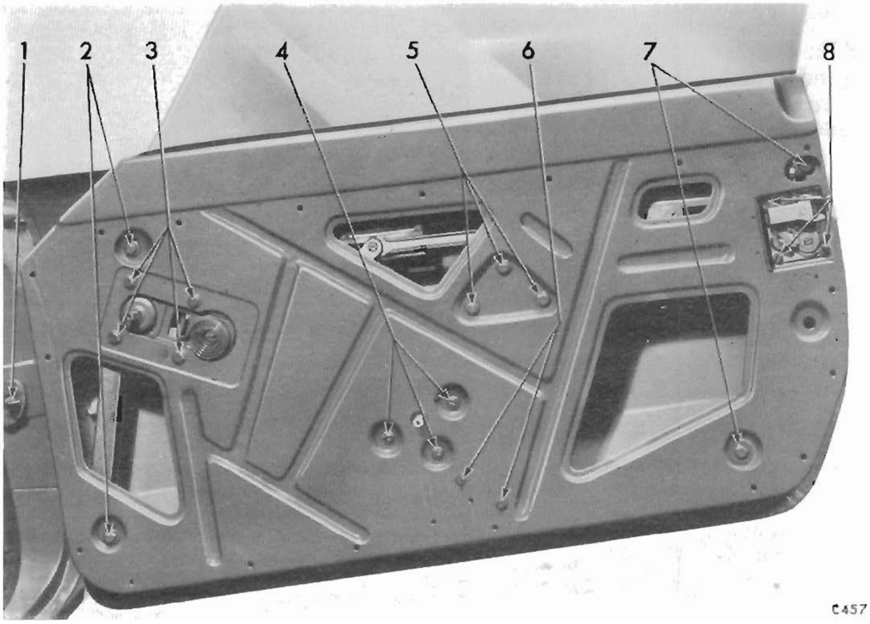


Fig. 57. Location of spring clip



1 Check arm
2 Glass run channel
3 Window regulator mechanism
4 Remote control
5 Window regulator pivot
6 Bottom stop bracket
7 Glass run channel
8 Lock

Fig. 58. Location of component fixings (Spitfire)

9 Glass run channel
10 Window regulator mechanism
11 Operating channel
12 Remote control mechanism
13 Bottom stop
14 Glass
15 Interconnecting link
16 Guide packing
17 Run channel
18 Lock

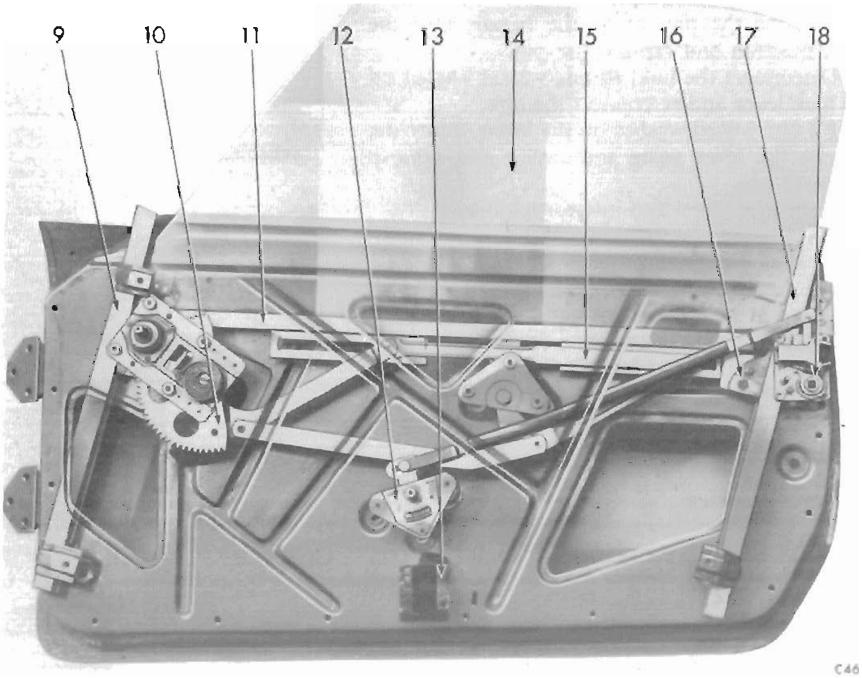


Fig. 59. Location of door components (Spitfire)

SPITFIRE 4

Door Glass

To Remove (Figs. 59 and 60)

Remove the interior handles and trim panel. Temporarily refit the regulating handles and lower the glass.

Remove the inner weatherstrip by pushing it downward into the door. Take out the guide packing piece (16) from the lower end of the glass frame (one bolt) and partially raise the glass. Remove the clips and leather washers securing the regulator arms to the frame and lift the glass from the door.

To Refit

Lower the glass into the door and, using the special tool shown on Fig. 50, refit the inner weatherstrip. Refit the packing piece (16) and reconnect the regulator arms to the frame.

Replacing the narrow end of the spring on the regulator spindle adjacent to the door panel, refit the trim panel.

Window Regulating Mechanism

To Remove (Fig. 58 and 59)

Remove the interior handles, trim panel, spring clips and leather washers. Disconnect the regulator arms from the channel at the base of the glass and remove the inter-connecting link (15).

Lift the glass to its highest position and, retaining it with a small rubber wedge, take out four screws (3) and three screws (5). Remove the regulating mechanism from the door.

To Refit

Assemble the regulating mechanism to the door and loosely refit the securing screws. Refit the link (15), attach both regulator arms to the glass channel, and secure them with leather washers and spring clips.

Remove the rubber wedge. Fully tighten the securing screws and refit the trim panel and interior handles.

Glass Run Channel

To Remove

Remove the door glass and take out four bolts (2) and (7) (two in each) securing the glass guides. Lower the channel to the bottom of the guides. Lower the guides to the bottom of the door and remove them through the large cut-out in the door inner panel.

To Refit

Reverse the dismantling instructions.

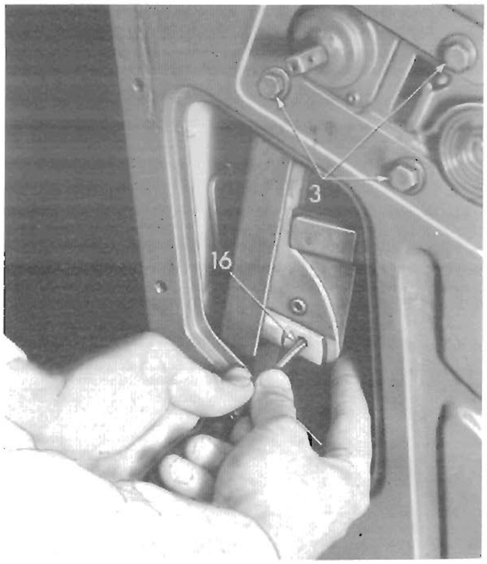


Fig. 60. Removing glass guide

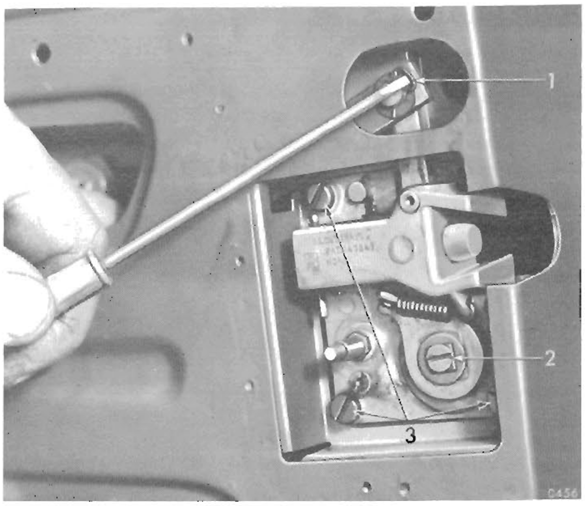


Fig. 61. Removing spring clip

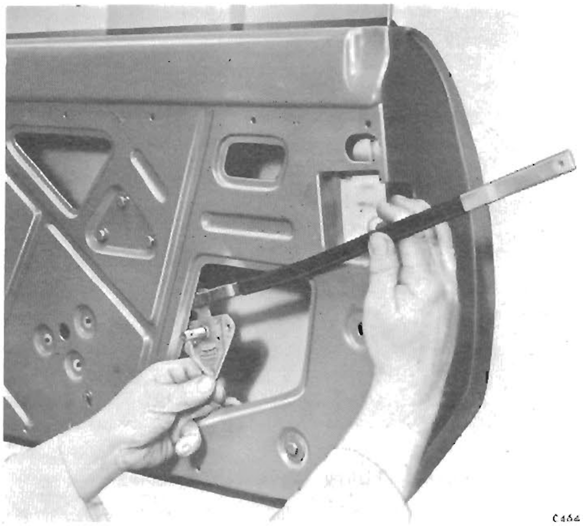


Fig. 62. Removing remote control from door

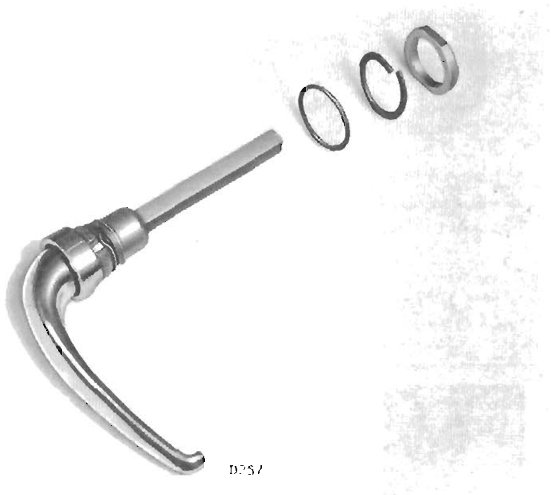


Fig. 63. Door locking handle (Spitfire)

DOOR LOCKS (SPITFIRE)

Remote Control Removal (Figs. 61 and 62)

The remote control may be removed and refitted independent of other components.

Remove the interior handles and trim panel. Release the circlip (1) and disconnect the remote control link from the lock.

Take out three screws and remove the remote control mechanism from the door.

To Refit

Reverse the removal instruction.
No adjustment is required.

Door Lock Removal (SPITFIRE)

Remove the interior handles and trim panel. Release the circlip (1), waved washer and disconnect the remote control link from the door.

Take out the screws (2) and (3) and lift the lock away.

To Refit

Reverse the removal instructions.
No adjustment is provided.

Exterior Handle Removal

Fully raise the window and remove the interior handles and trim panel. Take out the screw (2), Fig. 61, from the centre of the spindle.

(Passenger door only.) Unscrew the large nut, Fig. 63, which is accessible from inside the door. Withdraw the handle, noting the rubber sealing ring between the escutcheon and the door outer panel.

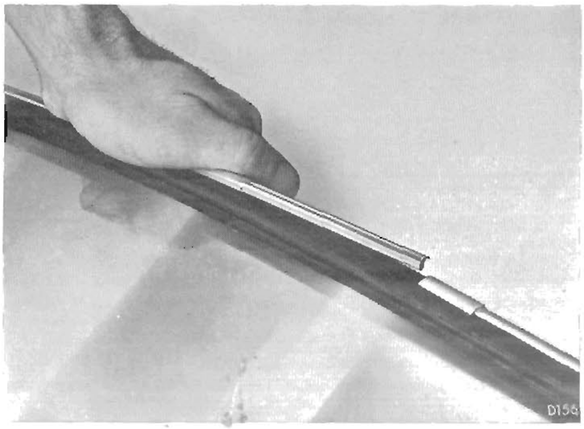


Fig. 64. Fitting windscreen mouldings

WINDSCREEN AND BACKLIGHT

Windscreen Removal

Remove both windscreen wiper arms, sun visors and rear view mirror assembly where fitted.

Using a small screwdriver from which all sharp edges have been removed, break the sealing between the rubber weatherstrip and body flange. Avoid damage to the surrounding paintwork by keeping the tool pressed firmly under the lip of the rubber while breaking the seal.

Commencing at one of the lower corners, apply hand pressure from inside the car and force the windscreen outward, whilst a second operator, working outside the car, takes the weight of the glass as it is released.

Release the moulding by sliding the upper and lower cover plates to one side and remove both sections from the rubber.

To Refit (All models except Coupé)

Remove all trace of old sealing compound from the glass and weatherstrip. Assemble the weatherstrip to the glass and re-seal with Seelastik.

Using a small screwdriver, clear all obstructions from the channel in the weatherstrip, into which the moulding is to be fitted.

Press both sections of the moulding into place and secure them by sliding the cover plates over the ends of the moulding. (Fig. 62)

Coupé only

Installation of the moulding to the weatherstrip requires the use of a small tool detailed on Fig. 72.

Assemble the weatherstrip to the glass and re-seal with Seelastik.

Using the rounded end of the tool, clear all obstructions and burrs from the lip of the moulding channel. Apply a solution of soft soap and water.

Position the moulding on the weatherstrip as shown on Fig. 73. Dip the hooked end of the tool in the soapy solution, push it under the moulding and lift up the lip of the channel. Draw the tool around the moulding, simultaneously keeping it pressed firmly into the channel. Refit the cover plates to the moulding.

All Models

Insert a length of strong cord into the inner channel of the rubber, positioning the loose ends at the lower centre of the glass (Fig. 65).

Apply a coating of Seelastik to the outer channel of the weatherstrip and to the outer flange of the aperture.

Passing the ends of the cord into the vehicle, press the windscreen assembly into the aperture from outside the car (Fig. 67).

Pull the ends of the cord to turn the lip of the rubber over the body flange until the cord is completely removed and the flange covered by the rubber lip. Firm pressure coupled with sharp blows with a rubber-faced hammer may be necessary during this operation.

Press the outside of the weatherstrip firmly against the body and, using a cloth moistened in white spirit, remove surplus compound squeezed from the joint. Do not saturate the cloth otherwise surplus liquid may soak into the joint and destroy the bond.

Backlight

To Remove and Refit

Instructions for removing and refitting the backlight are identical to those given for the windscreen.

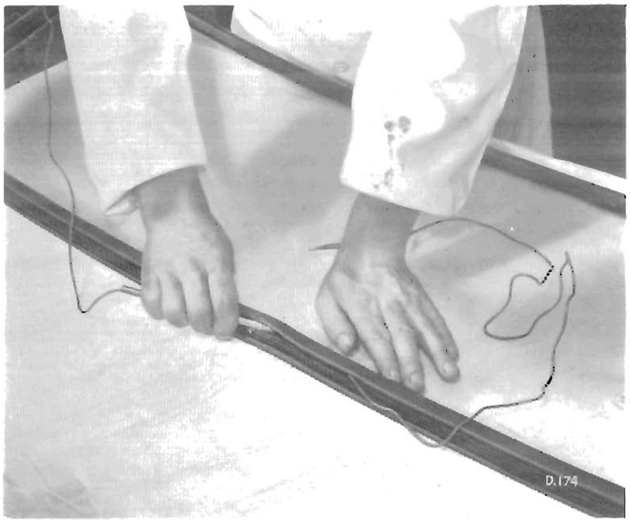


Fig. 65. Inserting cord into the weatherstrip channel

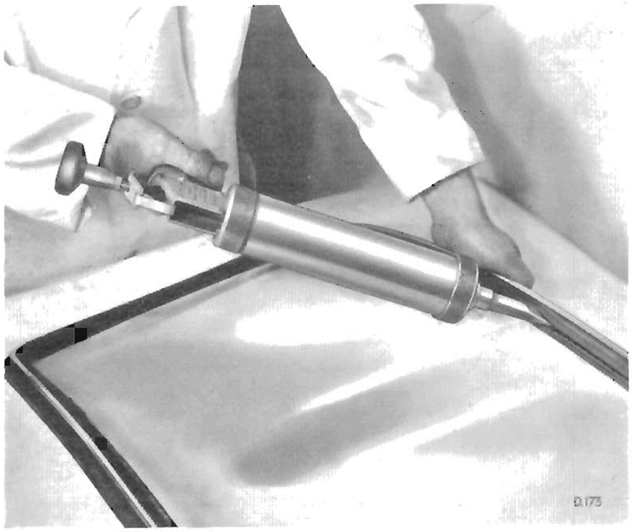


Fig. 66. Sealing window rubber

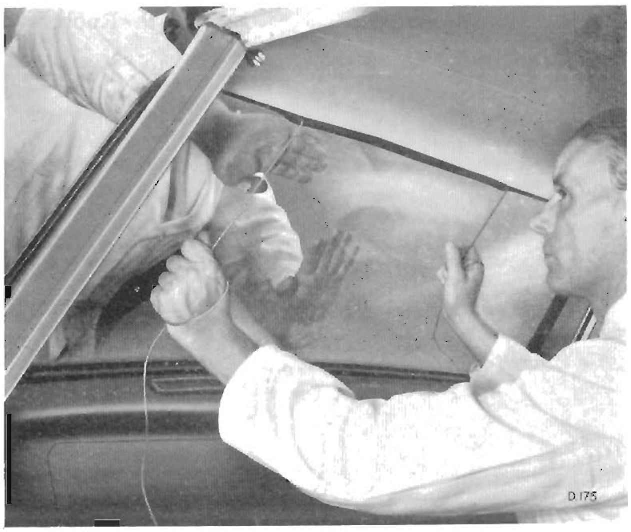
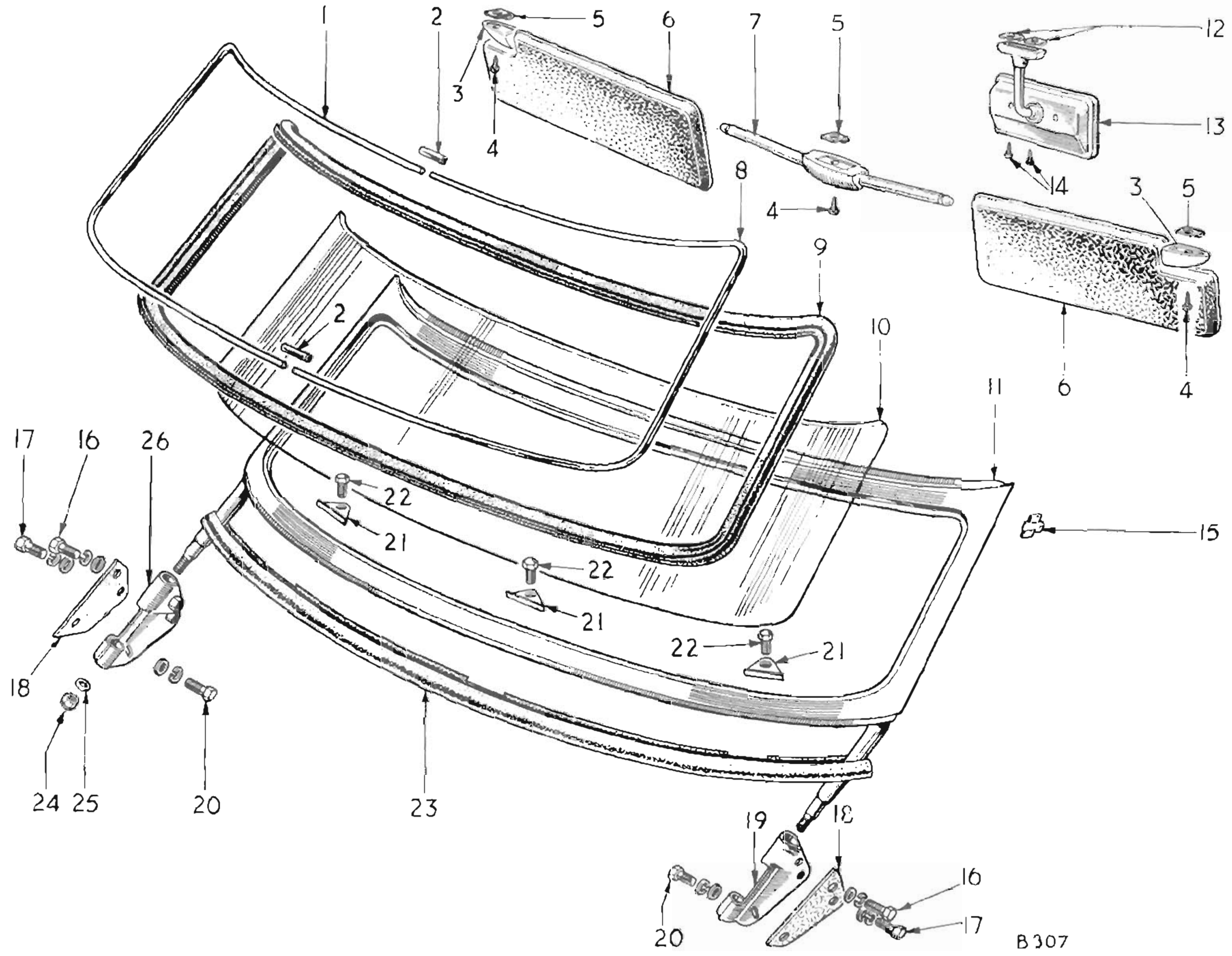


Fig. 67. Pulling the cord to turn the lip of the rubber over the body flange



1 Moulding
2 Cover plate
3 Mounting
4 Screw
5 Spirefix
6 Visor
7 Mounting
8 Moulding
9 Rubber weather strip
10 Windscreen glass
11 Frame
12 Packing piece
13 Mirror
14 Screws
15 Bracket
16 Bolt
17 Bolt
18 Packing piece
19 Mounting bracket
20 Bolt
21 Cover plate
22 Bolt
23 Seal
24 Nut
25 Washer
26 Mounting bracket

Fig. 68. Exploded arrangement of Spitfire windscreen

SPITFIRE

Windscreen (Fig. 68)

To Remove

Pull off the draught welting from the screen pillars.

Remove three bolts (22) with cover plates (21), one nut (24) with washer (25) from the bottom of each screen pillar (11). These nuts are accessible under the facia, Fig. 69.

Slacken bolts (16) and (17) which are accessible when the door is opened.

Lift out the windscreen assembly (11).

Remove the rubber weatherstrip (23) from the back of the windscreen assembly.

To Refit

Remove old sealing compound from the contacting surfaces of the windscreen weatherstrip and the scuttle panel.

Apply a fresh piece of Seal-a-strip along the underside of the rubber and refit the windscreen assembly.

There is provision for limited adjustment between the windscreen frame and door glass.

If adjustment is required, slacken the bolts (16), (17) and (20) on both sides of the car, raise both door glasses, and move the top of the windscreen to provide a uniform clearance between the glass and the windscreen. Re-tighten the bolts.

Seal the windscreen frame to the rubber with Seelastik.

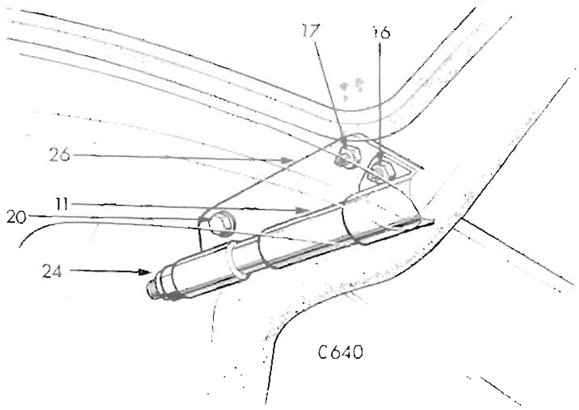


Fig. 69. Screen pillar fixing

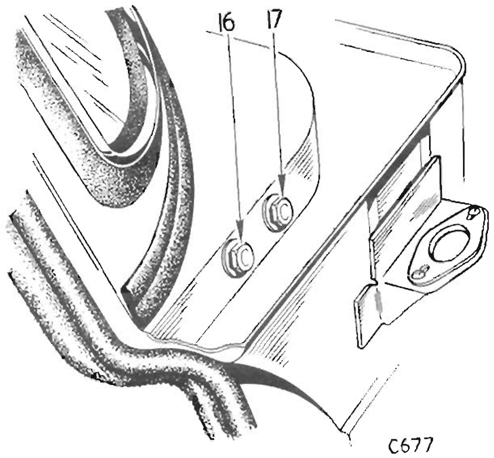


Fig. 70. Screen pillar upper fixing

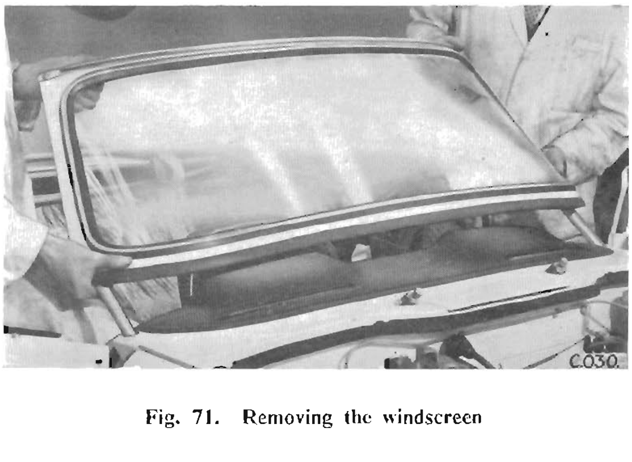


Fig. 71. Removing the windscreen

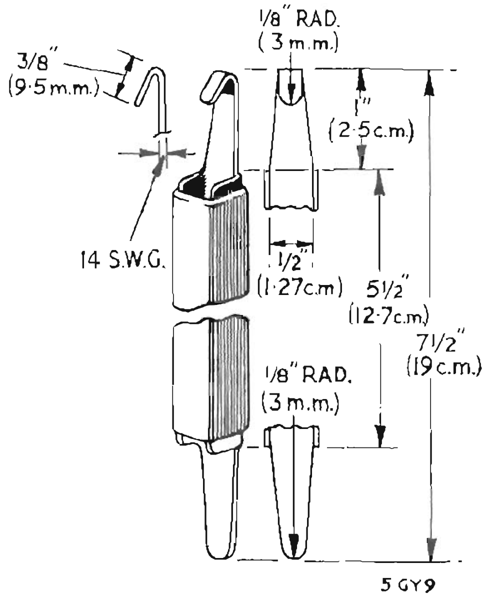


Fig. 72. Special tool details

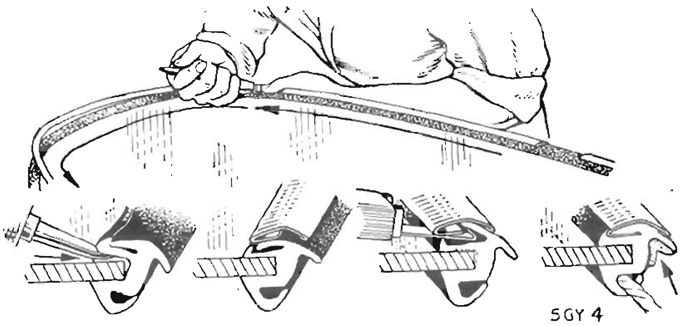


Fig. 73. Fitting mouldings to coupé windscreen

Fig. 74. Fitting side window

SIDE WINDOWS

(HERALD 1200 AND VITESSE)

To Remove

Break the seal between the rubber and body and, starting at the rear lower corner, force the window outward.

A second operator will be required to take the weight of the window as it is pushed out.

Remove the moulding and weatherstrip.

To Refit

Use petrol or white spirit to remove the old sealing compound from the glass, weatherstrip and body flanges. Examine the rubber for cracks or other defects and renew if necessary.

Plug the gaps between the lower edge of the rear pillar and the body, and at a corresponding position at the base of the centre pillar.

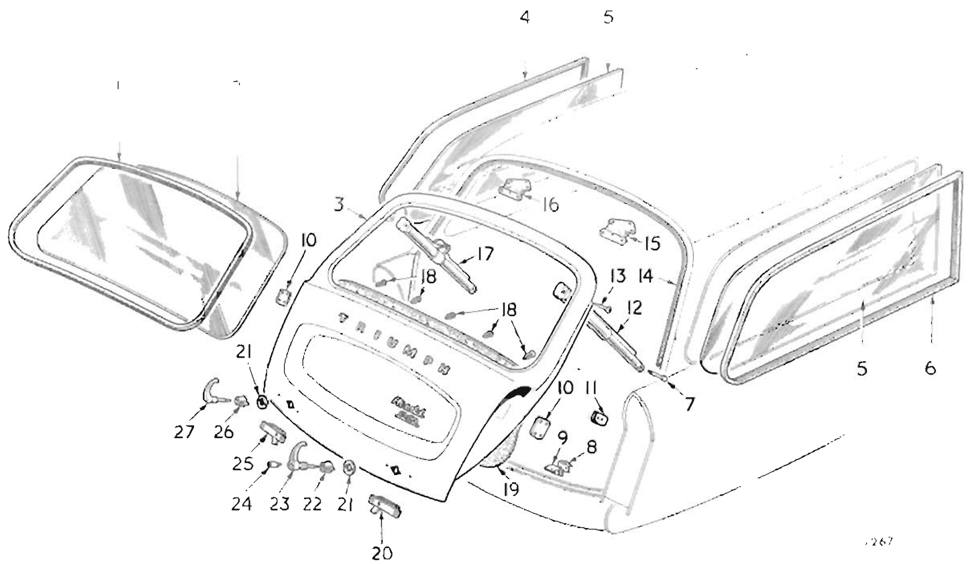
Fit the weatherseal to the glass, insert the moulding and use Seelastik to seal the rubber to the glass.

Place a length of strong cord into the inner channel around the periphery of the weatherstrip and, as the window is offered up to the body, pass the free ends of the cord into the car.

Maintain firm pressure on the glass, particularly at the corners, as a second operator, working inside the car, withdraws the cord to turn the lip of the rubber over the body flange.

If necessary, gently strike the glass with a rubber mallet or the palm of the hand as near as possible to its edge.

Seal the rubber to the body with Seelastik.



1	Weatherstrip	10	Plate	19	Tail gate trim panel
2	Rear window	11	Dovetail rubber	20	Lock
3	Tail gate	12	Tail gate stay	21	Sealing washer
4	Weatherstrip	13	Bolt	22	Escutcheon
5	Side windows	14	Weatherstrip	23	Locking handle
6	Weatherstrip	15	Hinge	24	Lock barrel
7	Bolt	16	Hinge	25	Lock
8	Striker	17	Tail gate stay	26	Escutcheon
9	Plate	18	Retainer	27	Handle

Fig. 75. Tail gate details

TAIL GATE

Tail Gate Window

The method of removing and refitting the tail gate window is identical to that described for side windows. No moulding is fitted.

Tail Gate

The tail gate is hinged at its upper end and is supported in the open condition by two spring-loaded check arms. A cam-operated stop is incorporated in the left-hand side check arm.

To Remove

Disconnect the battery. Open the tail gate and remove the number plate and the trim panel.

Disconnect the cables from the number plate lamp and withdraw the cables from the tail gate.

Exercising caution, remove the upper pivot from each support. The right-hand stay is in three separate sections, which will spring apart when released. Using a second operator to support the tail gate, take out three screws from each hinge and remove the gate. Finally, remove the hinges from the body.

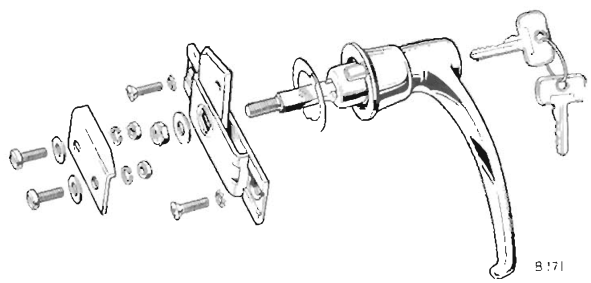
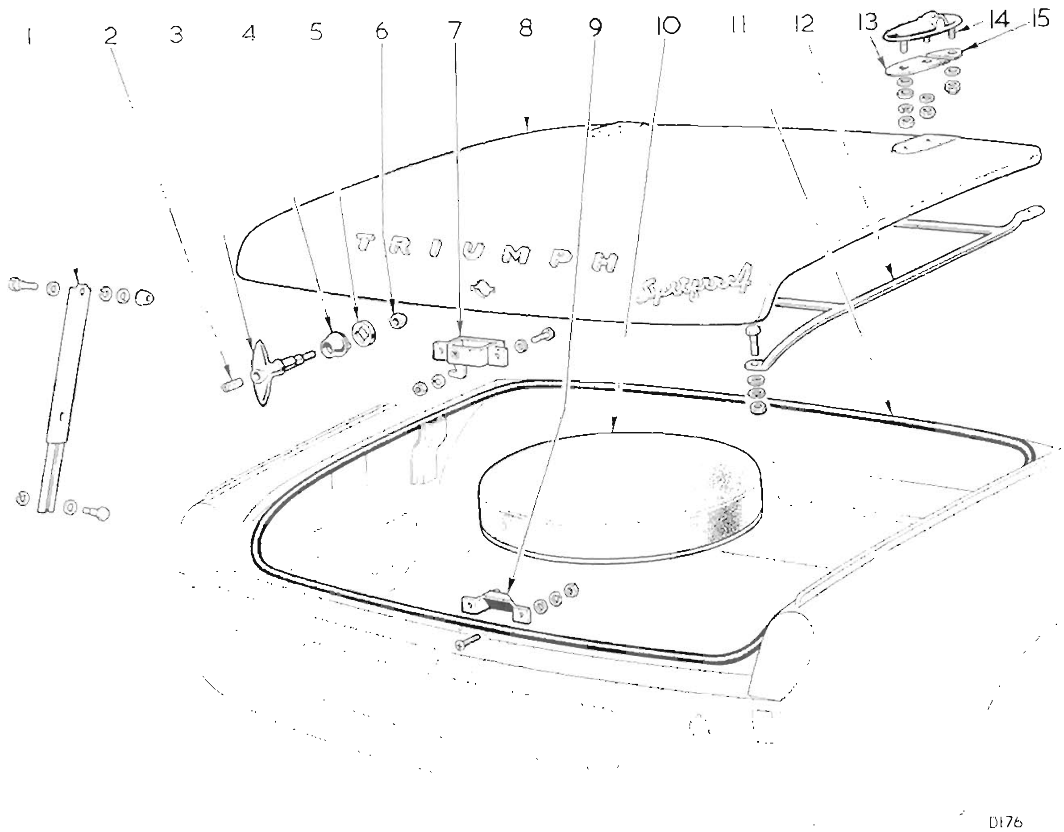


Fig. 76. Lock details



1 Stay
2 Lock barrel
3 Handle
4 Escutcheon
5 Seal
6 Nut
7 Lock
8 Locker lid
9 Striker
10 Spare wheel cover
11 Weatherstrip
12 Reinforcement tube
13 Packing
14 Hinge
15 Packing

Fig. 77. Luggage locker components (Spitfire)

To Refit

Clean off the old sealing compound from the body, hinges and tail gate.

Apply Seelastik to the contacting surfaces and attach the hinges to body, and tail gate to hinges.

Limited adjustment between the hinges and body is sufficient to effect correct positioning of the tail gate.

Pass the cables through the grommet in the top edge of the gate and reconnect the plate illumination lamp.

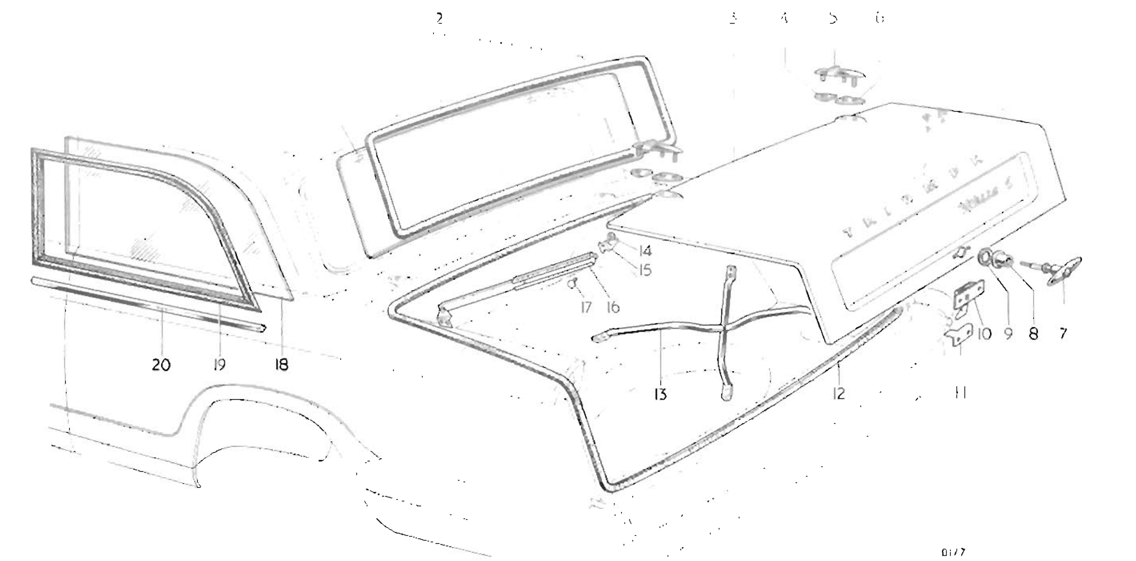
Refit the upper pivot bolt to the left-hand side support stay and body.

Assemble the spring and upper section of the right-hand stay to the lower section of the stay. Compress the spring and refit the pivot bolt.

Refit the tail gate trim panel and number plate.

Tail Gate

Two handles, one of which incorporates a locking barrel, secure the tail gate in the closed condition. The method of removing and refitting the handles is identical. An exploded arrangement of the locking handle is shown on Fig. 4.



LUGGAGE LOCKER

The luggage locker houses the fuel tank, spare wheel and tools. The lid is hinged at its forward edge and is supported when in the open position by a telescopic stay. The lid may be secured in the closed position by a lockable handle. Sealing against the ingress of dust and water is effected by a rubber seal secured to the edge of the locker aperture.

Locker Lid Removal

Support the lid in the open position and release the upper end of the stay (16) from the bracket (15). Remove the securing nut from the forward stud of each hinge and lift the lid, complete with hinges, from the body.

If required, release the hinges (5) from the lid and note the position of the sealing washers (4) and (6).

To Refit

Reverse the above instruction, leaving the hinge nuts semi-tight. Oversize holes permit limited adjustment. Move the locker lid as required to effect a close fit and finally tighten the hinge nuts.

1 Back window glass
2 Weatherstrip
3 Trunk lid
4 Gasket
5 Hinge
6 Gasket
7 Locking handle
8 Escutcheon
9 Seal
10 Lock
11 Striker
12 Weatherstrip
13 Lid reinforcement
14 Clip
15 Bracket
16 Support
17 Pivot
18 Side window
19 Weatherstrip
20 Moulding

Fig. 78. Back and side windows and locker components (Herald 1200 and Vitesse)

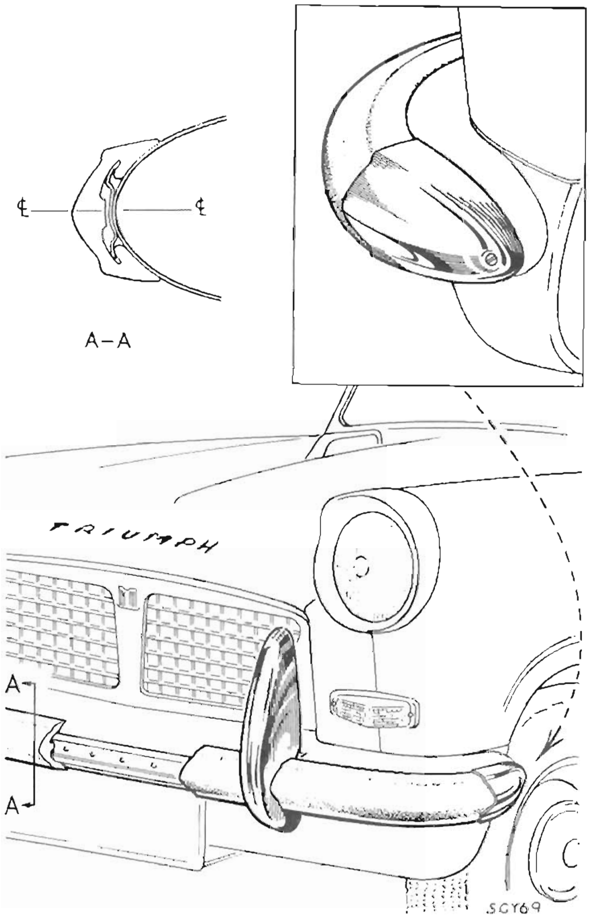


Fig. 79. Bumper rubber attachment

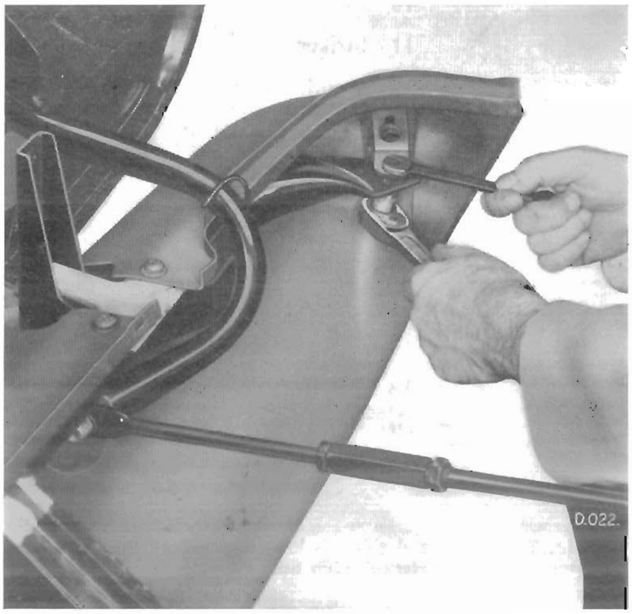


Fig. 80. Fitting front valance

Lock Removal

Raise the luggage lid, remove the nut from the inner end of the handle (7) and withdraw the handle from the lock (10). Release the lock (10) by removing two securing screws.

To Refit

Reverse the above instructions.

Striker

Oversize holes in the striker plate (11) permit limited adjustment.

OVERRIDERS

To Remove

Front (HERALD 1200, 12/50)

Open the bonnet, remove the overrider upper attachment bolt, slacken the lower bolt and remove the overrider. The lower overrider fixing is slotted.

Front (VITESSE)

Open the bonnet, slacken the upper bolt, remove the lower bolt and remove the overrider. The upper overrider fixing is slotted.

Rear (HERALD 1200, 12/50 AND VITESSE)

Remove the fuel tank as described on page 5·247 (left-hand side only).

Release each overrider from the body by removing two bolts. The upper bolt is also used as an earthing terminal for the tail lamps.

To Refit

Reverse the removal procedure.

BUMPER RUBBERS

All HERALD models excluding COURIER

The bumper rubbers are self-supporting on metal flanges welded to the valances. The outer end of each rubber is held by a cover plate which is secured to the valance by a single screw.

To Remove — Front and Rear

Take off the cover plates. Pull the lower edge of the rubber sufficiently to release it from the metal flange.

To Refit

Apply soapy solution on the inner flanges of the rubber. Enter the lower flange of the rubber over the lower edge of the retainer and bend the rubber outwards sufficiently to permit its upper edge to fit the retainer.

BUMPER FINISHERS

VITESSE

The front and rear bumper finishers each comprise three sections.

To Remove

Using a $\frac{1}{8}$" (3 mm.) diameter drill, remove two rivets from each of the front sections and three rivets from each of the rear.

To Refit

Secure the sections with $\frac{1}{8}$" (3 mm.) pop rivets.

FRONT VALANCE

To Remove

Disconnect the battery, remove the grille assembly and take off both overriders.

Remove two bolts with nuts and washers (two at each side) securing the outer ends of the valance to the chassis frame front crossmember.

Remove four screws (two at each side) securing the valance to the support bracket and remove the valance.

To Refit

Reverse the dismantling instructions. Limited adjustment is available at the outer edges of the valance.

REAR AND QUARTER VALANCES

(HERALD 1200, 12/50 AND VITESSE)

Rear Valance — To Remove (Fig. 81)

Remove the lens from the stop/tail lamps.
- — fuel tank (Vitesse only) (Page 5·247) ;
- — both overriders ;
- — lock striker plate ;
- — valance.

To Refit

Reverse the above procedure.

Quarter Valance — To Remove (Fig. 82)

Remove the lens from the stop/tail lamp ;
- — fuel tank (left-hand side valance only) ;
- — overriders ;
- — quarter valance.

To Refit

Reverse the above procedure.

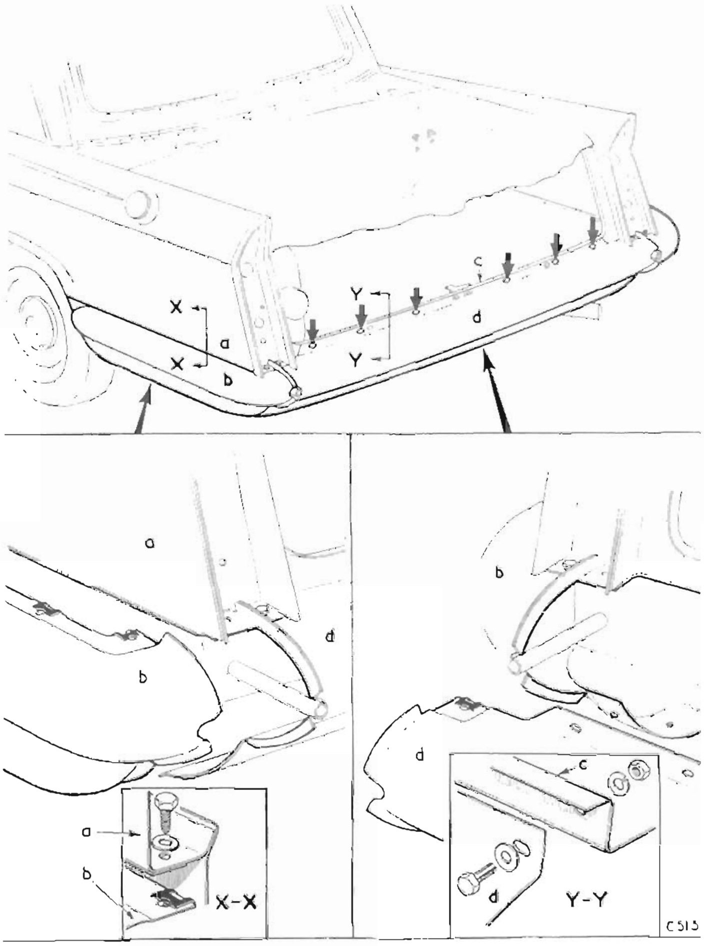
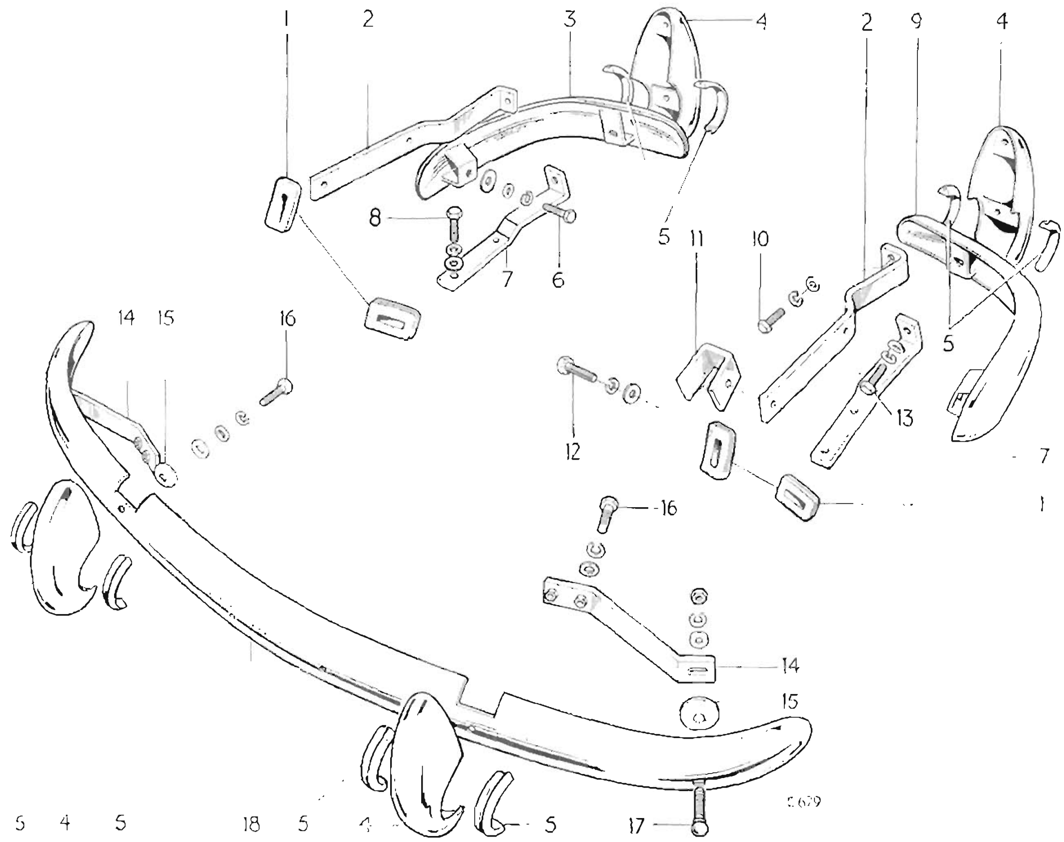


Fig. 81. Valance panel attachment

Fig. 82. Fitting rear quarter panel



1	Grommet	7	Bumper support bracket	13	Bolt
2	Overrider support bracket	8	Bolt	14	Bumper support bracket
3	Rear bumper	9	Rear bumper	15	Distance washer
4	Overrider	10	Bolt	16	Bolt
5	Sealing strips	11	Stowage bracket	17	Bolt
6	Bolt	12	Bolt	18	Front bumper

Fig. 83. Spitfire bumper details

BUMPERS (SPITFIRE)

Front (Fig. 83)

To Remove

Release the overriders (4) by removing the bolts (16). Remove the bolts (17) and lift the bumper (18) clear. Release the support brackets (14) by removing the bolts (16).

To Refit

Reverse the removal instructions and when refitting the washer (15) between the bumper and support bracket, ensure that its spherical face is adjacent to the bumper.

Rear (Fig. 83)

To Remove

Release the overriders (4) by removing the bolts (10) and (13). Take out the bolt (6) from inside the luggage compartment to release each rear bumper.

Remove the bumper and overrider brackets (7) and (2) by taking out the bolts (8) and (12).

To Refit

Reverse the removal instructions.

FRONT VALANCE (SPITFIRE)

To Remove (Fig. 84)

Take out the bolts (1), (2) and (3) from each side. Pull the valance forward and lower it clear of the body.

To Refit

Reverse the removal procedure.

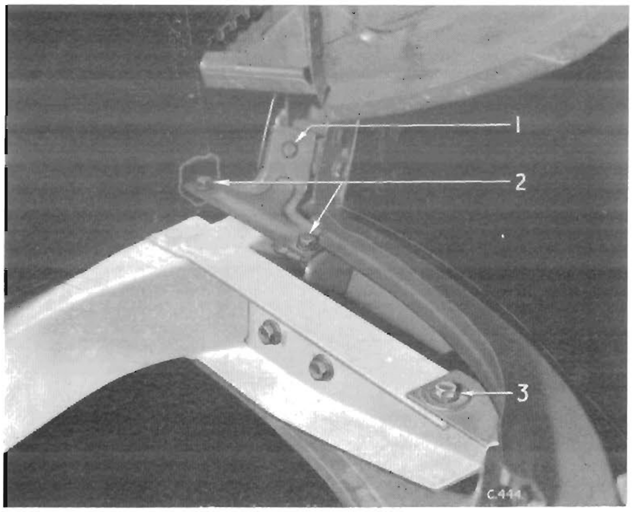


Fig. 84. Front valance attachments

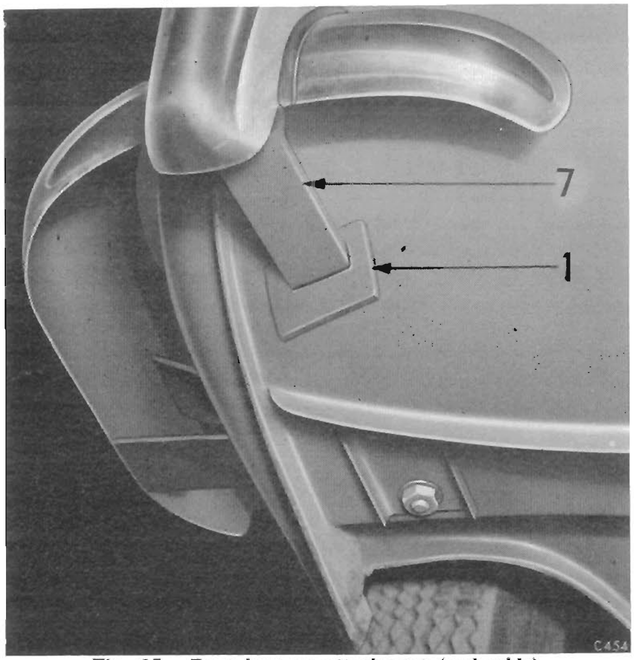


Fig. 85. Rear bumper attachment (underside)

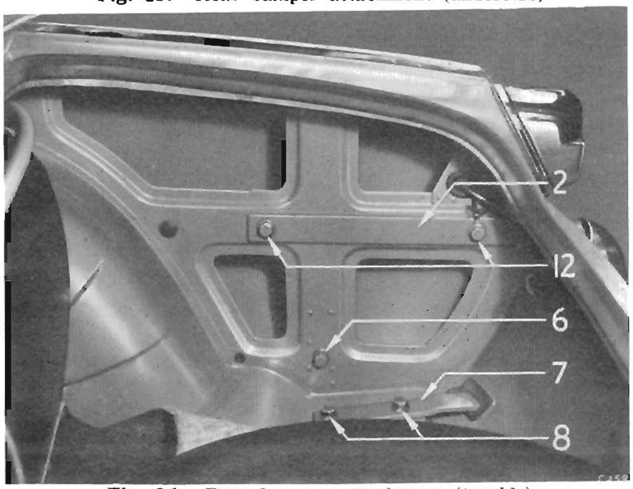
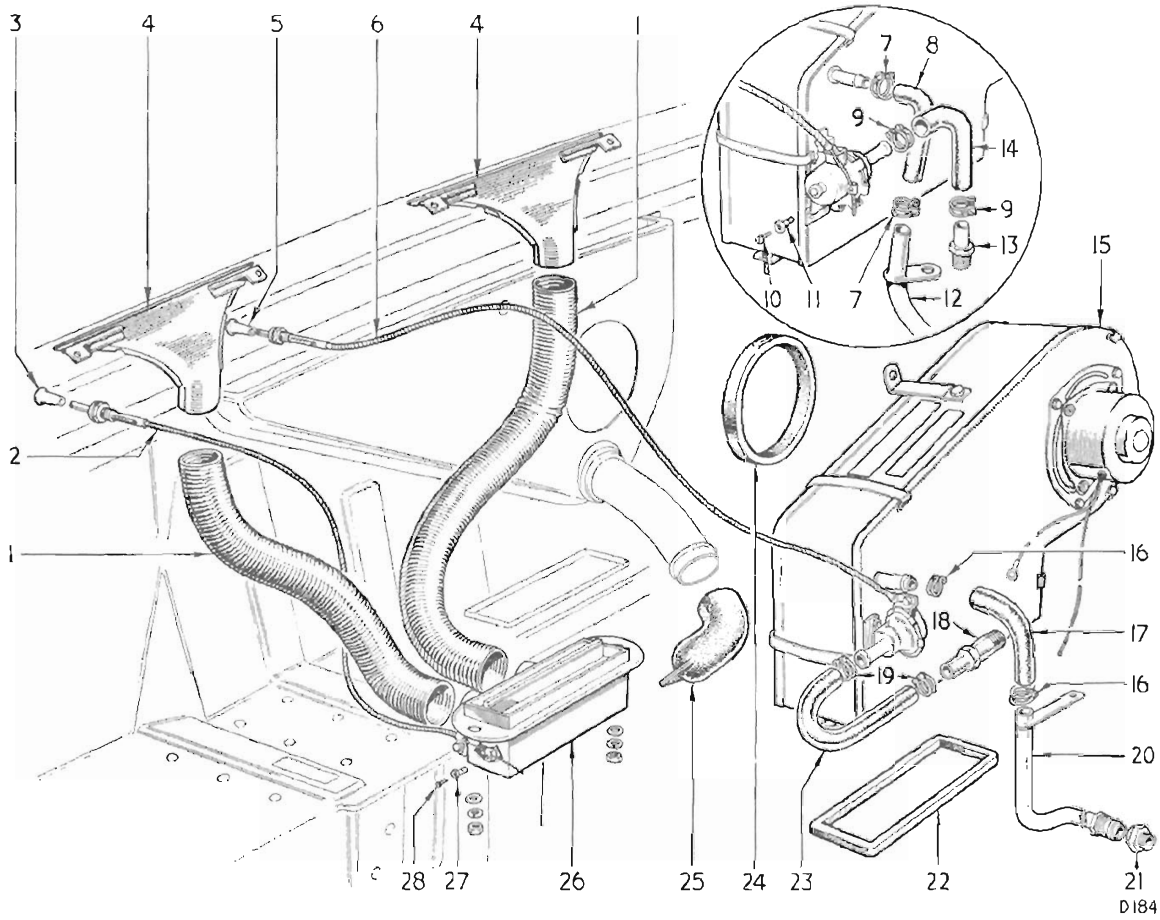


Fig. 86. Rear bumper attachment (topside)



1 Demister hose	11 Trunnion	20 Water pipe
2 Air distribution control cable	12 Water pipe	21 Adaptor
3 Control knob	13 Adaptor	22 Seal
4 Demister nozzle	14 Hose	23 Hose
5 Control knob	15 Heater unit	24 Seal
6 Heat control cable	16 Hose clip	25 Plenum drain
7 Hose clip	17 Hose	26 Air distribution box
8 Hose	18 Adaptor	27 Trunnion
9 Hose clip	19 Hose clip	28 Screw
10 Screw		

(Inset shows Herald 1200, 12/50 condition)

Fig. 87. Heater arrangement (Herald 1200, 12/50 and Vitesse)

HEATING AND VENTILATING SYSTEM

HERALD 1200, 12/50 AND VITESSE

Heater Unit Removal

Drain the cooling system, disconnect the battery and blower motor, and remove both hoses from the heater unit.

Release the control cables from the water valve and take out the screw securing a bracket at the top centre of the heater unit to the dash panel.

Working inside the car, release the air distributor control cables from the valve shown on Fig. 90. Take out six screws to release the trim panel under the facia.

Disconnect the demister hoses from the air distribution box and remove two nuts to release the box from the heater unit. Remove the heater unit and air distribution box.

To Refit

Remove the old sealing compound, and liberally coat with Seelastik the areas of contact between the heater, gasket and dash panel.

Position the gasket on the base of the heater unit, assemble the unit to the panel and secure the top centre bracket with one screw. Secure the air distribution box to studs on the heater unit with two nuts and washers.

Reconnect the demister hoses, the air distribution control cable, and the water valve control cable.

Viewed from the right-hand side of the car, adjust the controls as follows:—

Push the control knobs to the fully "In" position.

Slacken the trunnions securing the inner cables.

Turn the water control valve fully clockwise and tighten the trunnion.

Turn the air distribution control fully counter-clockwise and tighten the screw.

Reconnect the battery, blower motor, water hoses and refill the cooling system. Refit the trim panel.

Start the engine and check for water leaks.

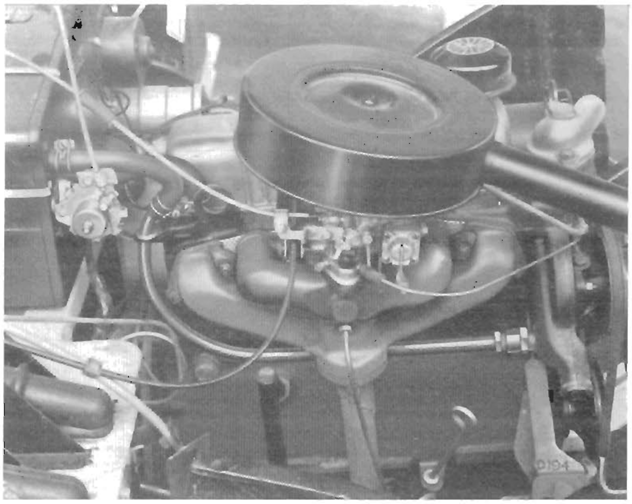


Fig. 88. Heater hose arrangement (Herald 1200, 12/50)

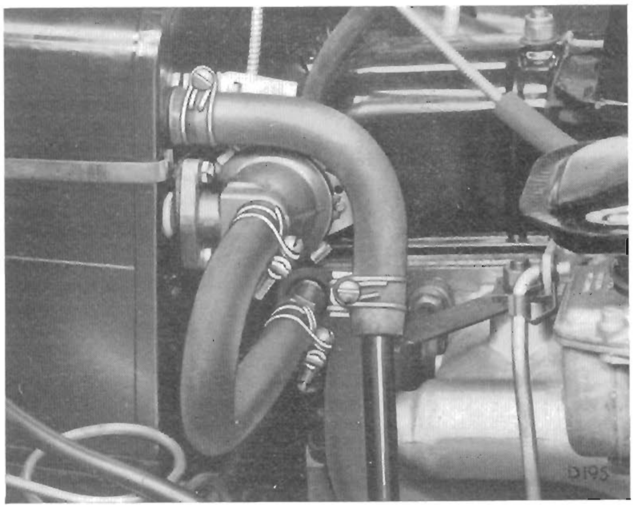


Fig. 89. Heater hose arrangement (Vitesse)

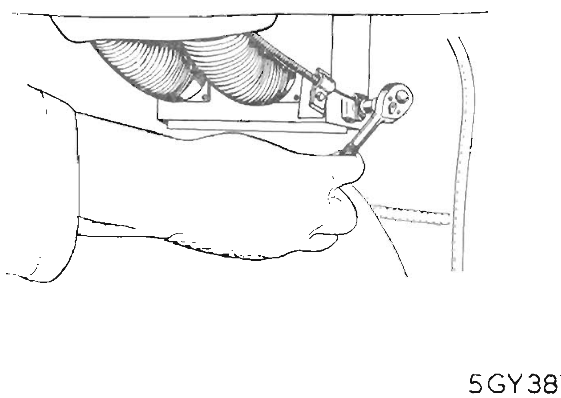
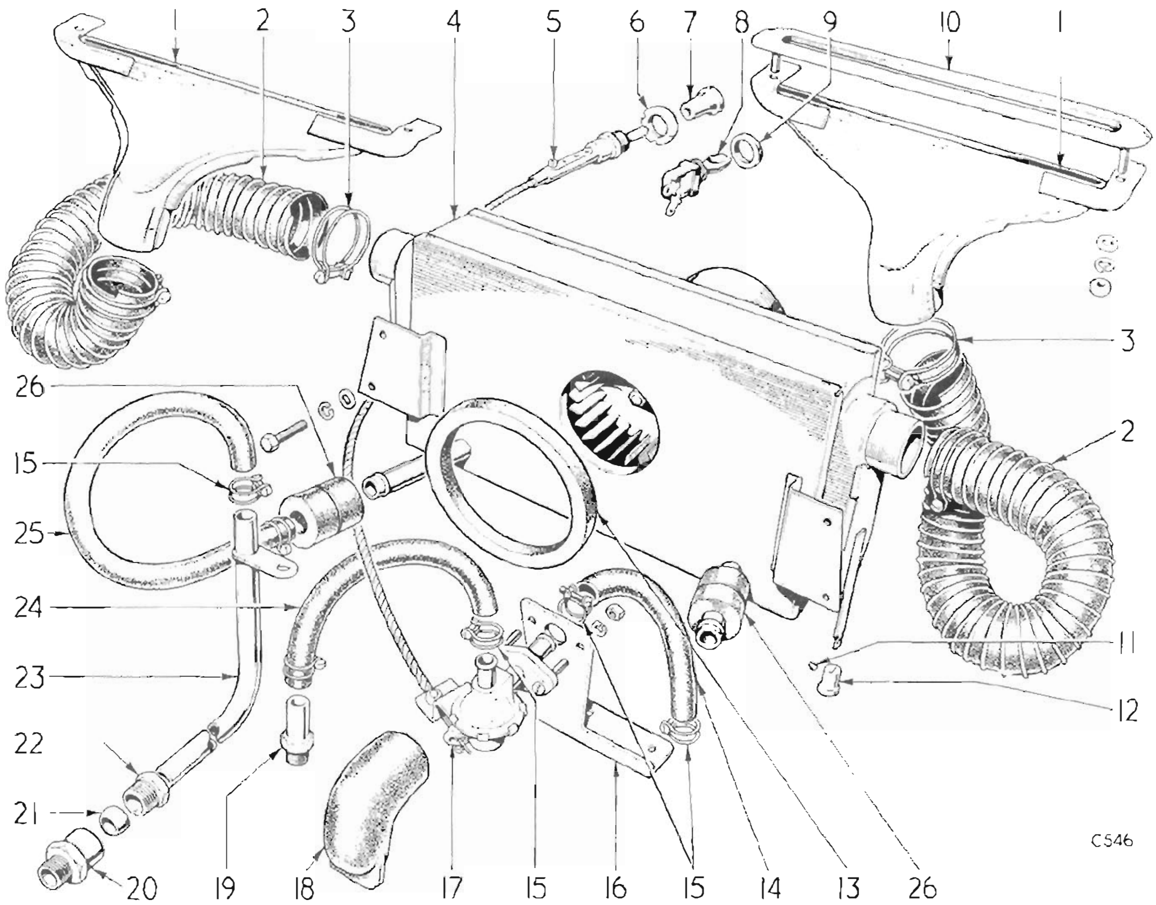


Fig. 90. Disconnecting air distribution control



1 Demister nozzle
2 Air hose
3 Clip
4 Heater unit
5 Heat control
6 Bezel
7 Knob
8 Switch
9 Bezel
10 Finisher
11 Screw
12 Knob
13 Sealing ring
14 Clip
15 Bracket
16 Water hose
17 Valve
18 Plenum drain
19 Adaptor
20 Adaptor
21 Olive
22 Nut
23 Water pipe
24 Water hose
25 Water hose
26 Rubber seals

Fig. 91. Exploded arrangement of heater components

HEATER UNIT

SPITFIRE 4

Fitting Instructions

Disconnect the battery and drain the cooling system.

Remove the square headed plug from the rear of the water pump. Apply sealing compound to the threads of the adaptor and screw it into the pump. Remove the rearmost cylinder head nut from the right-hand side of engine.

Assemble the nut (22) and olive (21) to the water pipe (23). Pass the pipe under the manifold and connect it to the adaptor on the pump. Attach the rear end of the pipe to the rear cylinder head stud and refit the nut.

Remove the squared plug (18) from the rear of the cylinder head. Apply sealing compound to the threads of the adaptor (19) and screw it into the cylinder head.

Assemble the water valve (17) to the bracket (16) and attach the water hoses (24) and (14).

Remove the screws securing the ignition coil. Apply Seelastik to the underside of bracket (16) and fit the bracket between the coil and the bulkhead.

Working underneath the facia, remove and discard the circular blanking plate (4 screws).

Attach the demister hoses (2) to the heater unit (4).

Remove the nuts and washers securing the finishers (10) to the top of facia panel. Using the same nuts, secure the demister outlet nozzles to the underside of the panel.

Remove six rubber plugs from the engine side of the dash panel. The plugs are located as follows: two each side of plenum chamber, one at the rear edge of coil and one at the left-hand side of the windscreen washer reservoir.

Assemble the sealing rubbers (26) to the heater unit (4) and liberally coat the sealing ring (13) with Seelastik. Secure the heater to the dash panel using four bolts and eight washers supplied with the heater unit. The earthing cable from the motor is fitted between the heater unit and dash panel at the lower bolt on the passenger side of the car.

Using a long screwdriver, connect the water hoses (14) and (25) to the heater unit, the opposite end of hose (25) to water pipe (23), the free end of hose (24) to the adaptor (19) and the demister hoses (2) to the demister nozzles (1).

Remove the two blanking plugs from the switch panel. Fit the switch in the centre position with the "ON" nearest to the steering wheel.

Connect the spare green cable in harness loom to the straight terminal on the switch and the cable from the heater blower to the angled terminal.

Pass the end of the heat control cable (5) through the dash panel using the same grommet as the windscreen washer tubing and fit the control to the switch panel.

Push the control cable (5) fully in and assemble it to the water valve. Turn the valve to the "OFF" position and tighten the trunnion nut.

Refill the cooling system.

Reconnect the battery, start the engine and check for water leaks.

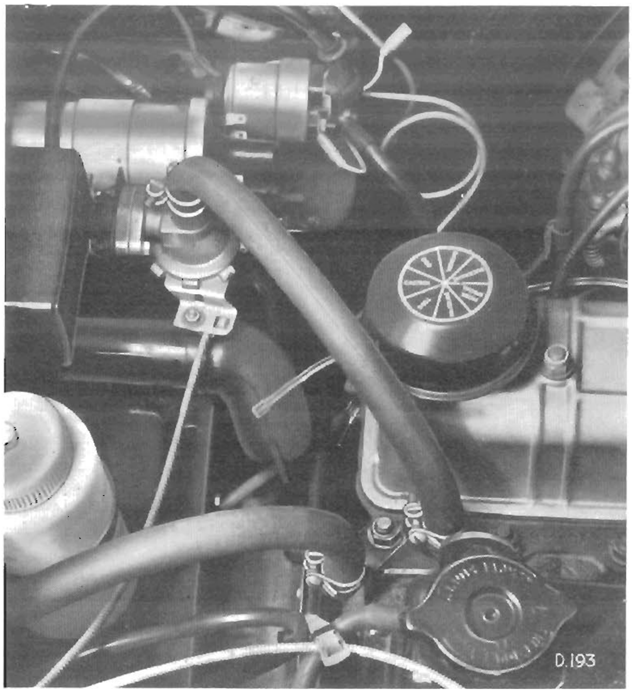


Fig. 92. Heat control valve (Spitfire)

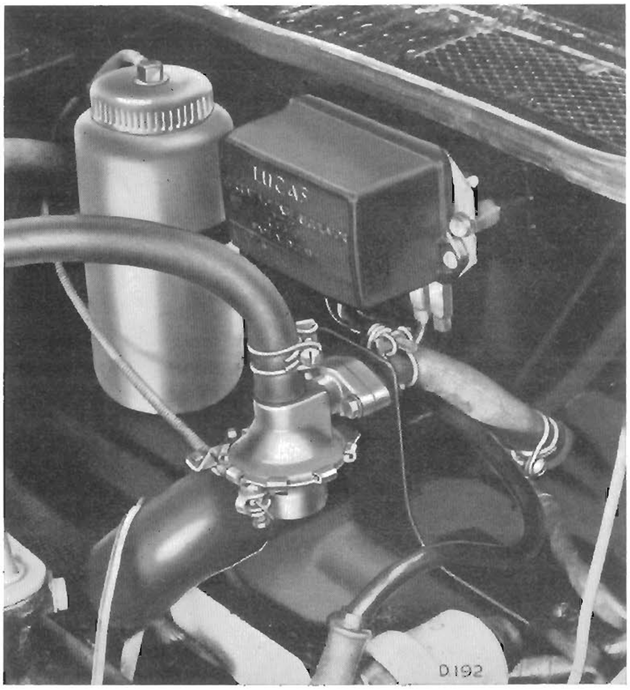
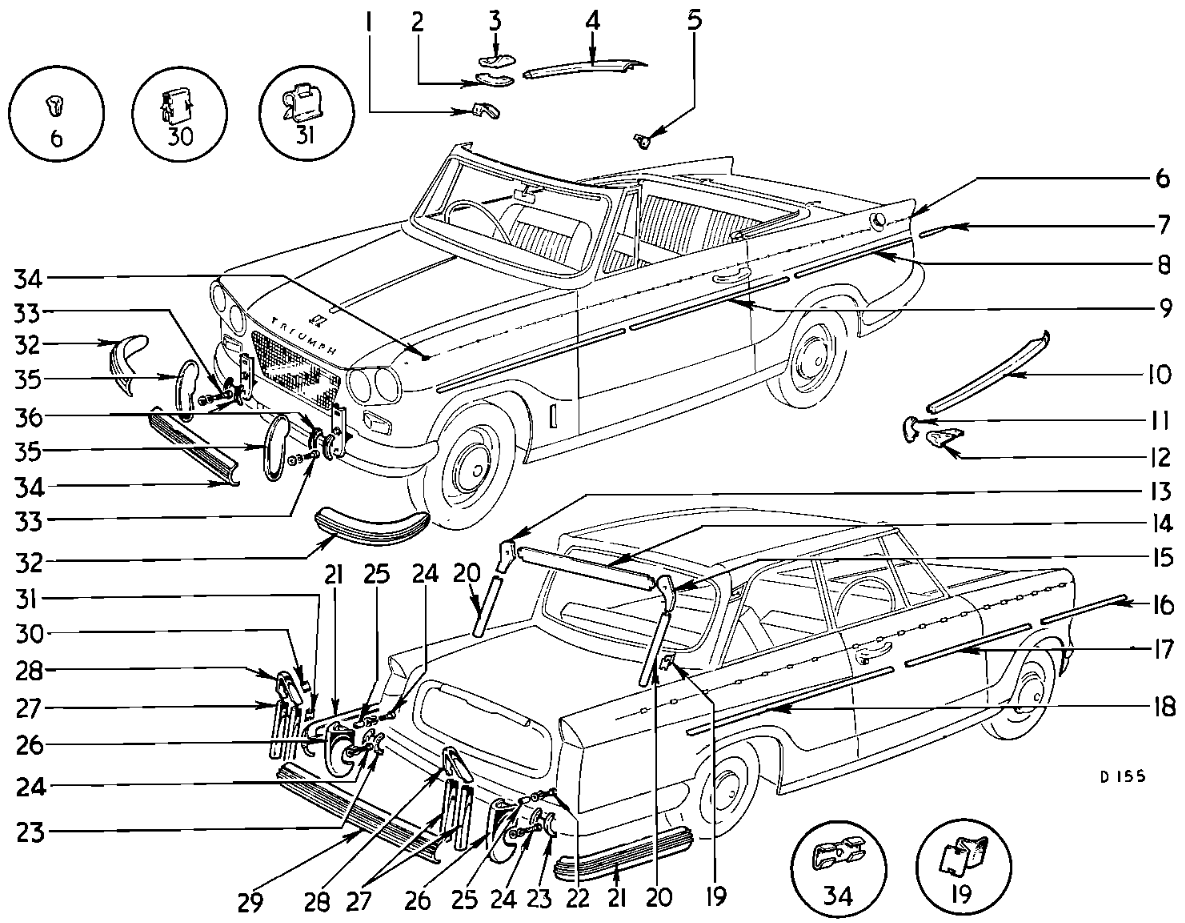


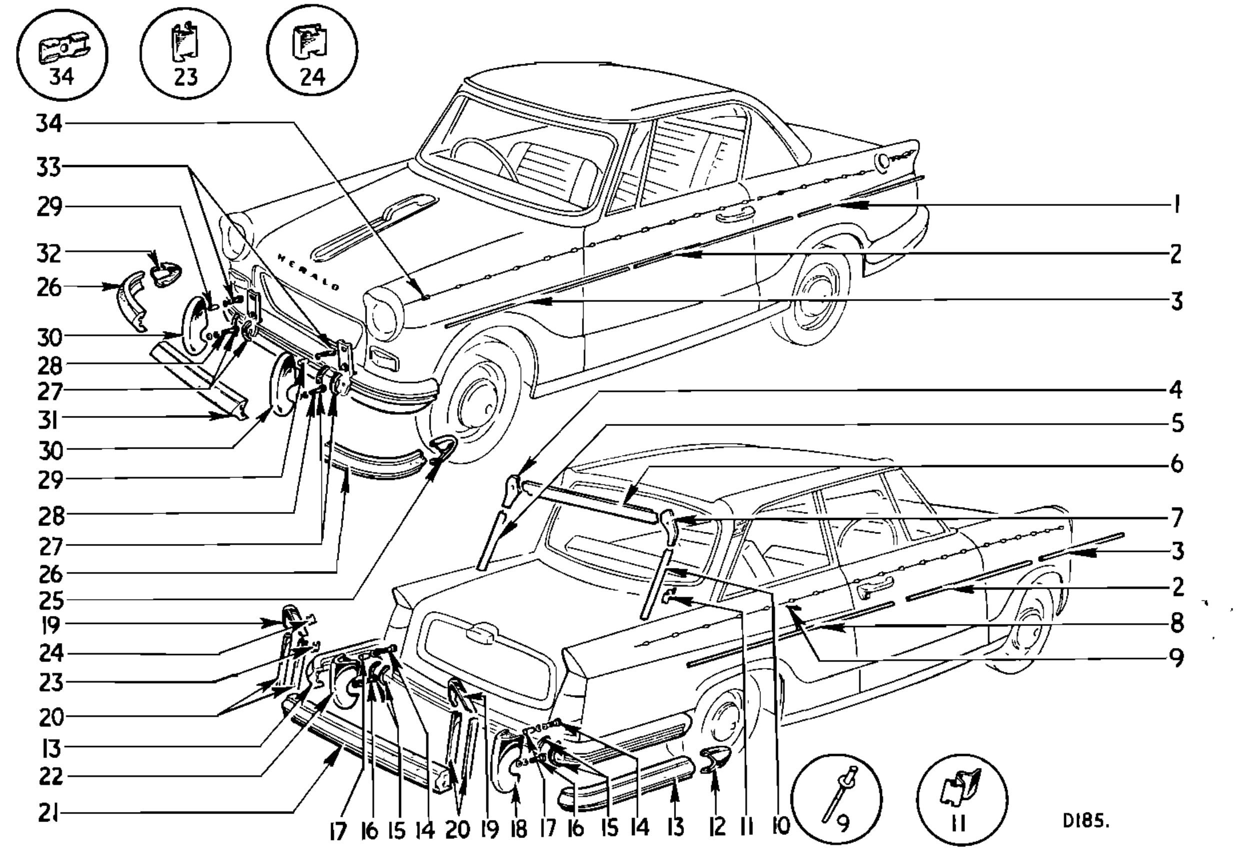
Fig. 93. Heater hose arrangement (Spitfire)

FINISHERS AND MOULDINGS



1 "A" post
2 "B" post front
3 "B" post rear
4 Squab rail
5 "A" post
6 Retainer
7 Tonneau side
8 Tonneau side
9 Door
10 Waist rail
11 "B" post front
12 "B" post rear
13 Backlight corner
14 Backlight upper
15 Backlight corner
16 Front wing
17 Door
18 Tonneau side
19 Clip
20 Backlight side
21 Bumper
22 Bolt
23 Sealing strip
24 Bolt
25 Distance piece
26 Overrider
27 Tail lamp sides
28 Tail lamp upper
29 Bumper
30 Clip
31 Clip
32 Bumper
33 Bolt
34 Clip
35 Overrider
36 Sealing strips

Fig. 94. Finishers and mouldings (Vitesse)



1 Rear quarter
2 Door
3 Wing
4 Backlight corner
5 Backlight side
6 Backlight upper
7 Backlight corner
8 Tonneau side
9 Rivet
10 Backlight side
11 Clip
12 Finisher
13 Bumper rubber
14 Bolt
15 Sealing strip
16 Bolt
17 Distance piece
18 Overrider
19 Tail lamp upper
20 Tail lamp side
21 Bumper rubber
22 Overrider
23 Clip
24 Clip
25 Finisher
26 Bumper rubber
27 Sealing strip
28 Bolt
29 Distance piece
30 Overrider
31 Bumper rubber
32 Finisher
33 Bolt
34 Clip

Fig. 95. Finishers and mouldings (Herald 1200, 12/50)

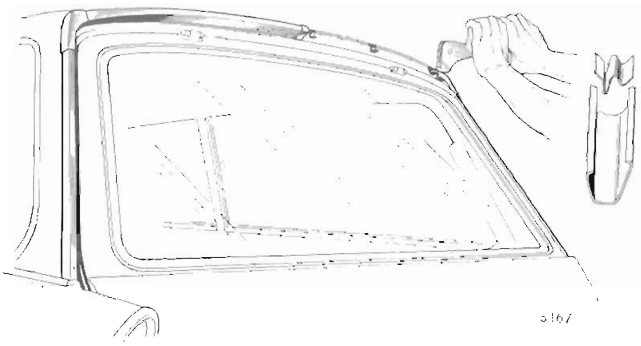


Fig. 96. Fitting corner mouldings on Estate car

Fig. 97. Fitting wing moulding

FINISHER MOULDINGS

HERALD 1200, 12/50 AND VITESSE

The waistline mouldings are retained by clips riveted to the panels.

The mouldings may be removed by gently levering them from the panel and replaced by snapping them into position.

Stop/Tail Lamp Surround

The stop/tail lamp surround comprises three sections, which are retained by barbed clips. The clips are forced into position with light blows from a mallet and the surround pushed on to the clips.

Backlight Surround (Saloon only)

To Remove

Take out one screw from each corner section and three screws from the upper section. Using a piece of hardwood as a drift, remove both side sections, and note the position of clips in the channel.

To Refit

Using a hide mallet, force the side section into position. Apply Seelastik to five screw holes along the top and refit the upper and corner sections.

Backlight Surround (Estate Car and Van)

To Remove

Using a piece of hardwood, drift the cover plate, which is located at the top centre of the surround, to one side.

Remove both halves of the upper section by using a hardwood drift and a small hammer. Note the position of the clips in the channel.

Drill out one rivet from each corner section and remove both sections.

Remove both side sections as described above for the upper sections.

To Refit

Space the clips evenly along each side section and, using a hide mallet, force the sections into position. Refit the corner sections and secure them with pop rivets, Fig. 96.

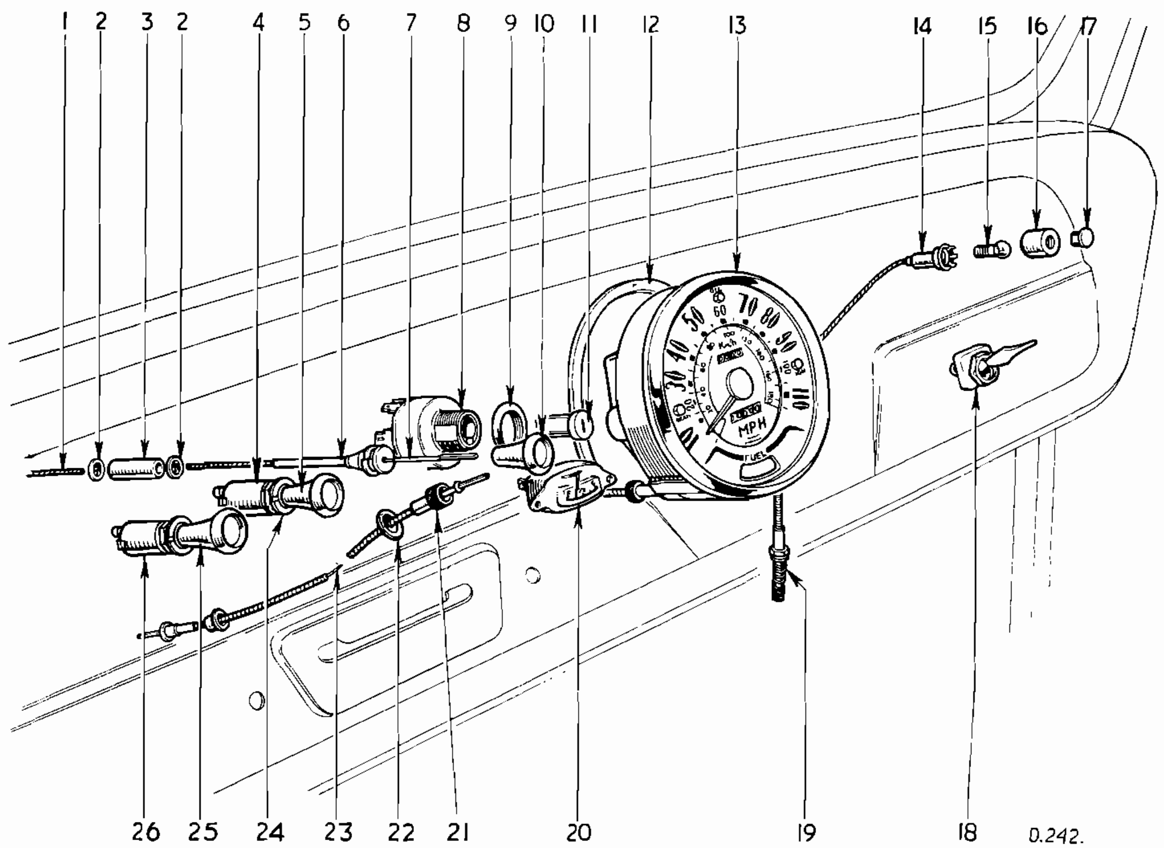
Refit the upper sections.

SPITFIRE

Wing Mouldings (Fig. 97)

The wing mouldings are retained by small spring clips. The clips are first pushed over the wing joints and the mouldings sprung over the clips.

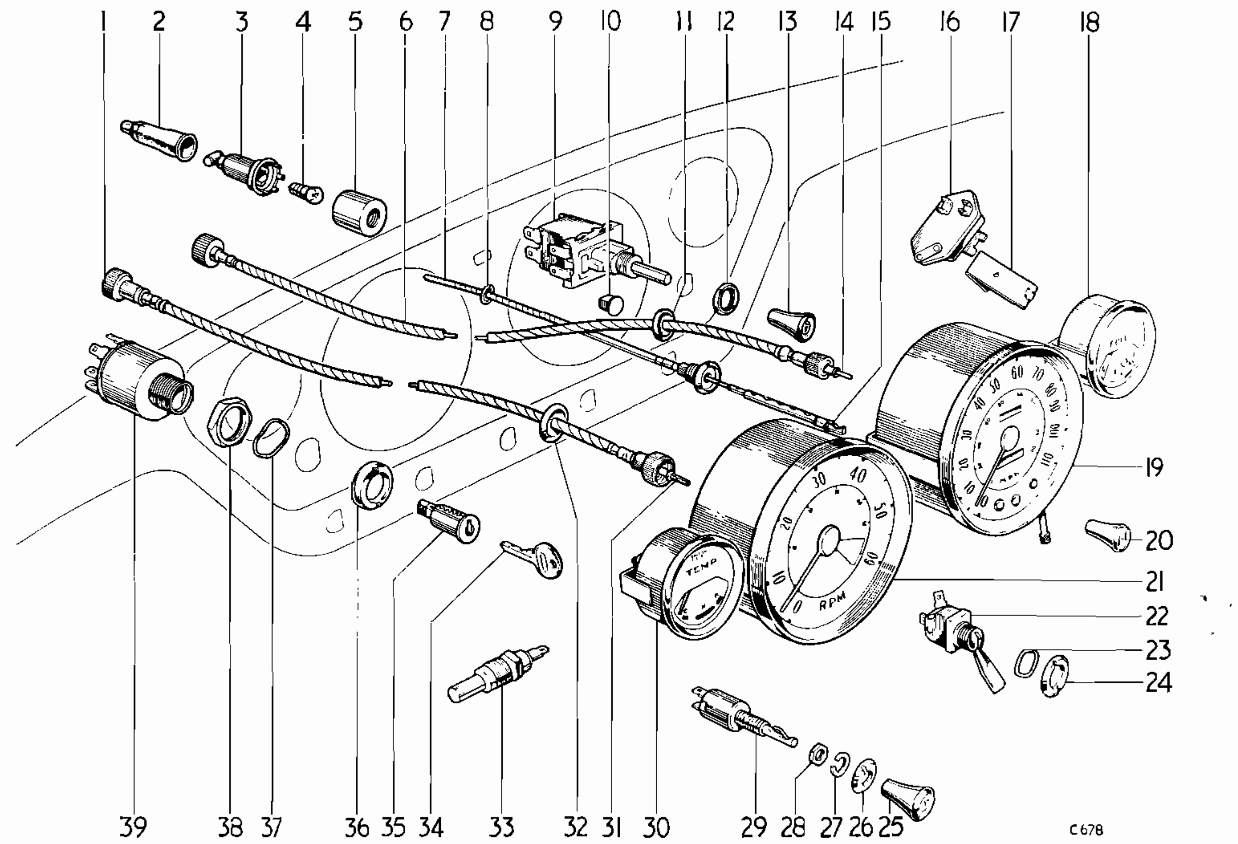
SWITCHES AND INSTRUMENTS



1 Choke control outer cable
2 Clip
3 Sleeve
4 Switch
5 Knob
6 Choke control outer cable
7 Choke control inner cable
8 Starter/ignition switch
9 Bezel
10 Knob
11 Lock barrel
12 Reinforcement ring
13 Speedometer
14 Bulb holder
15 Bulb
16 Lamp housing
17 Lens
18 Switch
19 Trip cancelling cable
20 Fuel gauge
21 Speedometer drive outer cable
22 Grommet
23 Speedometer drive inner cable
24 Bezel
25 Knob
26 Switch

Fig. 98. Switches and instruments (Herald 1200, 12/50 and Vitesse).

From Commission No. HB.15001, Vitesse has a tachometer and separate temperature and fuel gauges



1 Tachometer drive outer cable
2 Sleeve
3 Bulb holder
4 Bulb
5 Lamp body
6 Speedometer drive outer cable
7 Choke control outer cable
8 Grommet
9 Switch
10 Lens
11 Grommet
12 Bezel
13 Knob
14 Speedometer drive inner cable
15 Choke control inner cable
16 Voltage stabilizer
17 Bracket
18 Fuel gauge
19 Speedometer
20 Knob
21 Tachometer
22 Switch
23 Washer
24 Bezel
25 Knob
26 Bezel
27 Washer
28 Nut
29 Switch
30 Temperature gauge
31 Tachometer drive inner cable
32 Grommet
33 Transmitter
34 Ignition key
35 Lock barrel
36 Bezel
37 Washer
38 Nut
39 Ignition/starter switch

Fig. 99. Switches and instruments (Spitfire)

FACIA

HERALD 1200, 12/50

Removing Veneered Facia Panel

Disconnect battery positive terminal. Remove six facia retaining screws, taking care to collect nuts from top centre screw and outermost screws. Remove two screws from cubby box latch to release top of facia. Working behind dash, undo two finger nuts and remove two speedometer clamps. Note that one electrical connector (two black wires) is attached to the lower screw.

Undo speedometer trip control finger nut and speedometer cable. Remove clamp pressure ring from back of speedometer and pull clear of dash. It may be necessary to twist the speedometer slightly. Unplug warning light bulbs and detach three Lucar connectors from back of speedometer body (green and black on single connector—white on double connector). Remove ignition switch from wooden facia. Disconnect choke cable at carburettor and remove anti-rattle rubber and clips from outer cable. Disconnect green and yellow cable from blower switch on extreme right of facia. Remove heater control knob and air distribution control knob by inserting nail in hole in bottom of knob and pressing in spring-loaded retainer. Remove bezels and rubber washers from both the above controls. Remove windscreen wiper switch knob and lighting switch knob, and also unscrew bezels. Remove ash tray. Withdraw wooden facia.

Fitting Facia Panel

Assemble new facia panel by refitting blower switch, turn signal monitor and choke cable. Feed cable back through hole in scuttle. On re-assembly, reverse removal procedure sequence.

VITESSE

Procedure is similar to above; in addition remove the tachometer and remove the windscreen washer pump by unscrewing the knob. Consult the wiring diagram on re-assembly.

To Remove Complete Facia

Disconnect the battery. Release the steering column from the facia and disconnect the control cable from the water valve on the side of the heater unit.

Release the choke control cable from the carburettor and the air distribution cable from the control flap lever. Disconnect the speedometer drive cable and the earthing cable from the instrument. Disconnect the electrical cables from the instruments.

Pull the bulb holders from the warning and panel illumination lamps.

Remove the knobs and bezels from the switches and push the switches clear of the facia panel. Take out seven screws from the top edge of the panel and one screw securing the ash tray bracket to the facia support bracket. This screw is accessible from beneath the facia adjacent to the heat control cable.

Remove two screws holding the screen washer pump unit and allow it to hang. Do not separate the tubing from the pump.

Take out four screws (two at each side) securing the facia support brackets to the scuttle inner panels, and remove the panel.

To Refit

Reverse the above.

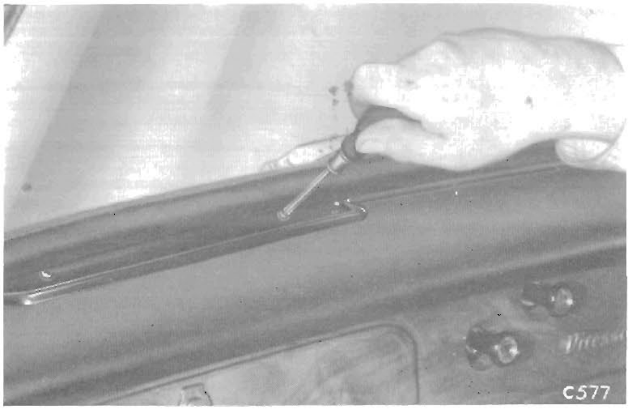


Fig. 100. Facia top attachments

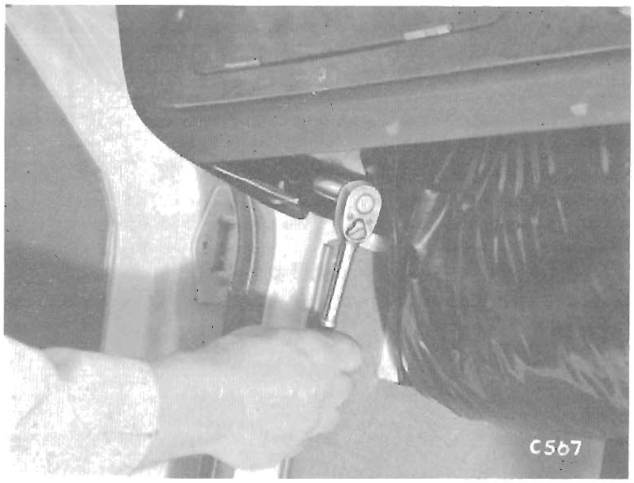
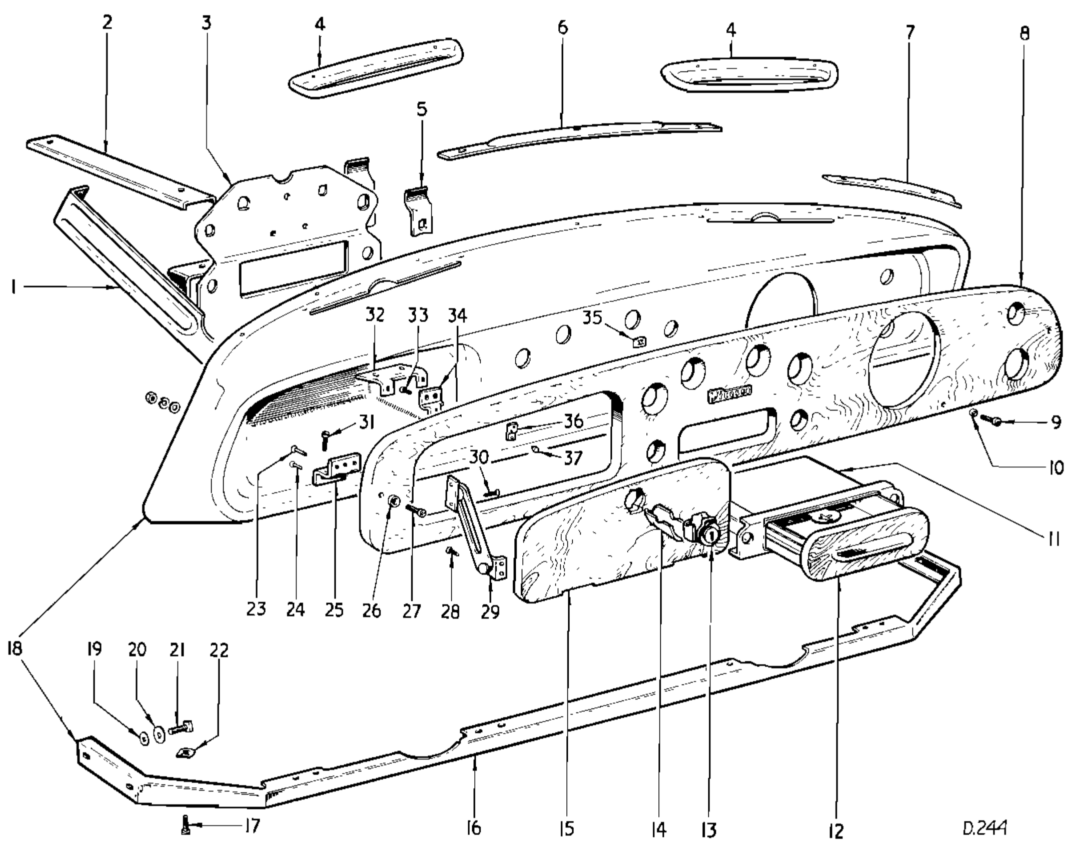


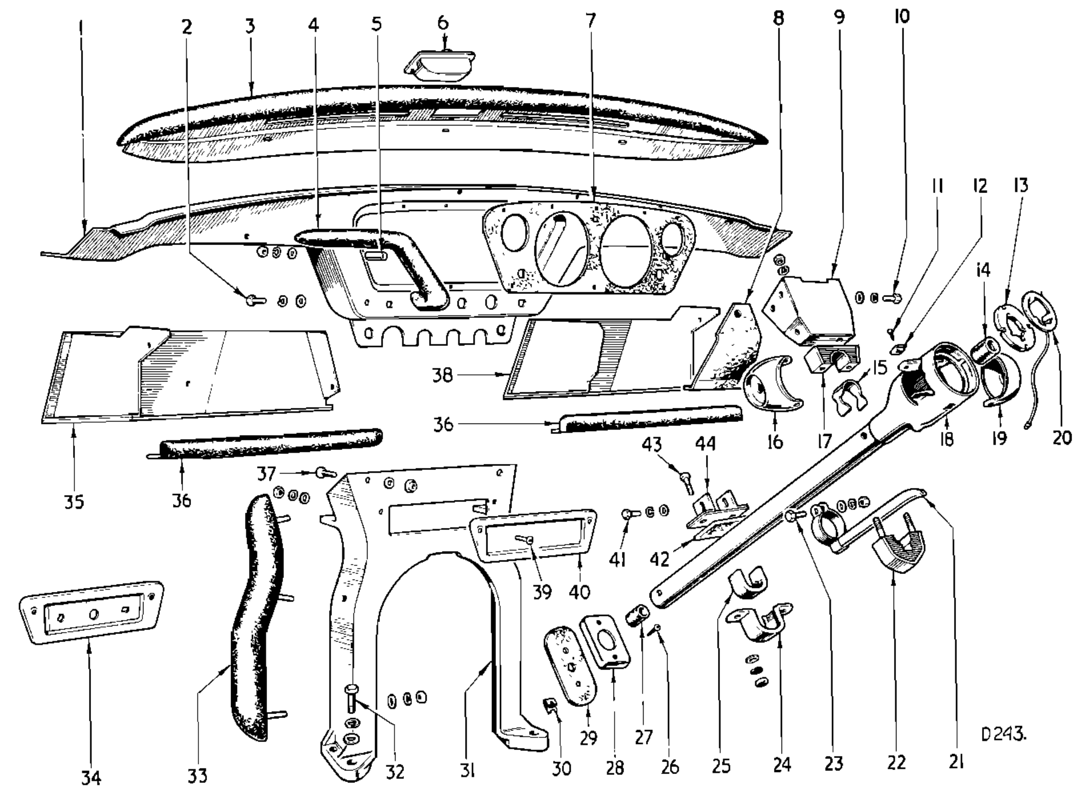
Fig. 101. Lower facia attachments

ARRANGEMENT OF FACIA COMPONENTS



1 Bracket
*2 Bracket
*3 Reinforcement plate
4 Cover
*5 Bracket
6 Finisher
7 Finisher
8 Veneered panel
9 Screw
10 Cup washer
11 Bracket
12 Ash tray
13 Lock
14 Finger pull
15 Lid
16 Reinforcement rail
17 Screw
18 Facia panel assembly
19 Washer
20 Washer
21 Bolt
22 Spirefix
23 Screw
24 Screw
25 Hinge
26 Cup washer
27 Screw
28 Screw
29 Check link
30 Screw
31 Screw
32 Bracket
33 Screw
34 Striker
*35 Spirefix
36 Buffer bracket
37 Buffer rubber

Fig. 102. Arrangement of facia components (Herald 1200, 12/50 and Vitesse)
* Not fitted on later models.



1 Panel assembly
2 Bolt
3 Crash pad
4 Grab handle
5 Distance piece
6 Ash tray
7 Instrument panel
8 Filler panel
9 Bracket
10 Bolt
11 Screw
12 Clip
13 Slip ring
14 Bush
15 Clasp spring
16 Escutcheon
17 Clamp
18 Cowl
19 Escutcheon
20 Slip ring
21 Cover
22 Clamp
23 Bolt
24 Clamp
25 Felt packing
26 Screw
27 Bush
28 Retainer
29 Sealing rubber
30 Clip
31 Support
32 Bolt
33 Trim roll
34 Cover plate
35 Parcel tray
36 Trim roll
37 Bolt
38 Parcel tray
39 Screw
40 Cover plate
41 Bolt
42 Felt packing
43 Bolt
44 Support bracket

Fig. 103. Arrangement of facia components (Spitfire)

FUEL TANK

HERALD 1200, 12/50 AND VITESSE

To Remove

Disconnect the cables from the battery and the fuel gauge at the tank unit. The supply cable (green with black) is connected to a brass terminal on the tank unit.

Drain the fuel tank. The drain plug is accessible from behind the left-hand side of the rear wheel arch.

Disconnect the fuel pipe by pulling the rubber connector from the upper forward corner of the tank.

Take off the filler cap, remove four screws securing the tank to support brackets and lift the tank from the luggage locker.

To Refit

Reverse the above procedure.

ESTATE CAR AND VAN

To Remove

Disconnect the battery, release the clips and detach the filler hose and air relief pipe from the tank.

Remove the spare wheel cover and disconnect the floor extension from the lower edge of the rear seat. Remove seventeen screws and lift the floor panel from the car.

Disconnect the cable from the tank unit. The green cable is connected to the terminal on the unit.

Disconnect the fuel pipe from the underside of the tank and drain the fuel. Take out six screws and lift the tank from the car.

To Refit

Reverse the above procedure.

SPITFIRE

To Remove

Isolate the battery. Working inside the luggage locker, remove the trim panel, disconnect the cables from the tank unit, and remove the fuel filler pipe and hose from the top of the tank (2 clips).

Disconnect the fuel pipe from the base of tank and drain the fuel.

Remove five screws and lift the tank from the locker.

To Refit

Reverse the removal instructions.

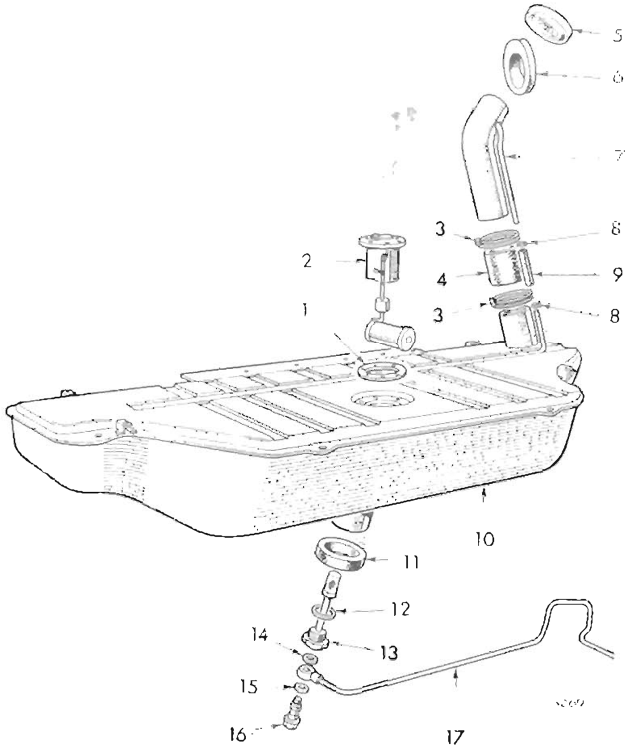


Fig. 104. **Fuel tank details (Estate car and Van)**


Fig. 105. **Removing fuel tank (Estate car and Van)**


Fig. 106. **Spitfire fuel tank**

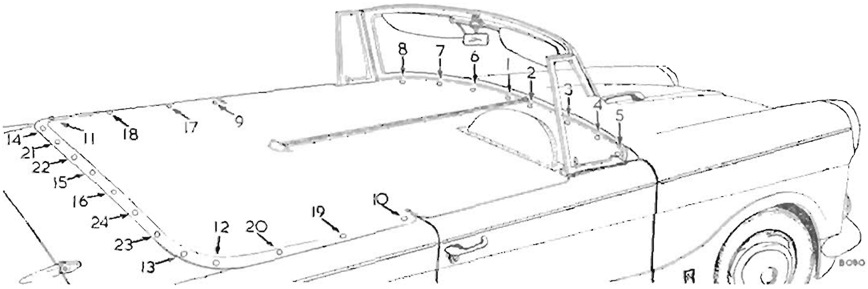


Fig. 107. Tonneau cover attachment points

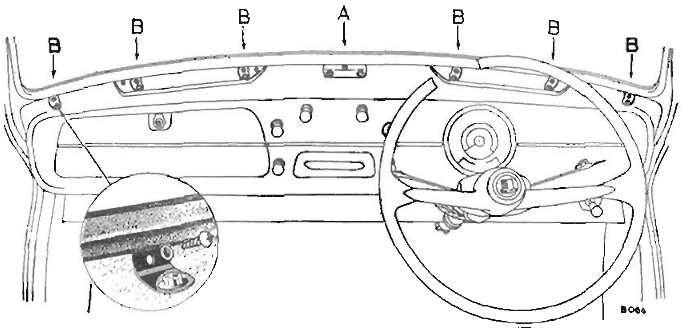


Fig. 108. Front attachment details

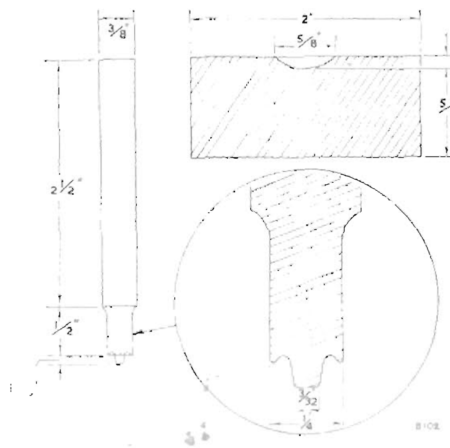


Fig. 109. Details of riveting tool

TONNEAU COVER

HERALD 1200 AND VITESSE

Tonneau cover kits are available in black or white for convertible models. Fasteners are supplied loosely so that they can be fitted to suit individual cars.

To Fit (Figs. 107 and 108)

Remove the screws "A" and fit the double bracket as shown. Remove the screws "B" and fit six single brackets.

Close the zip fastener and place the tonneau cover centrally over the body. Mark the positions for fasteners 1 and 2, and pierce two 1/8" (3 mm.) holes through the fabric.

Insert the stems of the buttons through the fabric, attach the sockets to the underside, and rivet them together.

Attach the press-studs to the double bracket "A" and, pulling the front edge of the cover towards the side of the car, mark the positions for fasteners 3 to 5.

Repeat with the opposite side, and mark the fastener positions 6 to 8. Pierce the holes and rivet the buttons and sockets together.

Fit the front end of the tonneau cover to the car and, with the aid of an assistant, pull the cover over the "B" posts.

Using the same method, fit the remaining fasteners in the sequence shown on Fig. 107.

SPITFIRE IV

To Fit (Figs. 1 and 2)

Remove the centre bolt (1) and the cover (2). This bolt has a loose nut on underside of facia.

Place the double fastener bracket (3) in position and refit the cover and bolt. Repeat with the outer bolts, placing the single fastener brackets as shown.

Attach the tonneau cover to the front fasteners and pull the cover over the rear and sides. Apply chalk to the fasteners on the rear centre of the cover and press the fasteners into contact with the body.

Release the rear end of the cover and drill two ⅛" (3 mm.) diameter holes through the centre of the markings. Fit the fasteners to the body with rivets provided in the kit and attach the tonneau cover to the rear fasteners.

Adopting the same procedure, mark and secure the fasteners to the doors as shown and attach the cover.

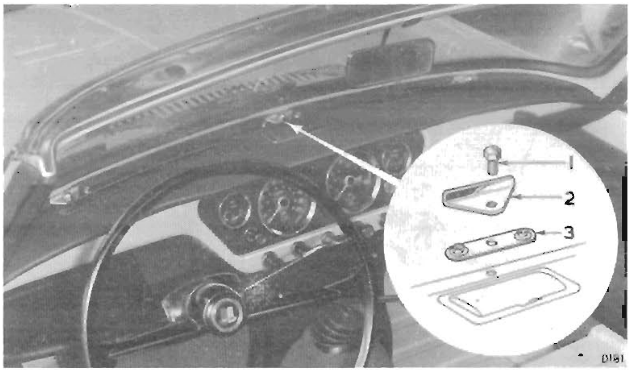


Fig. 110. Tonneau cover front attachments

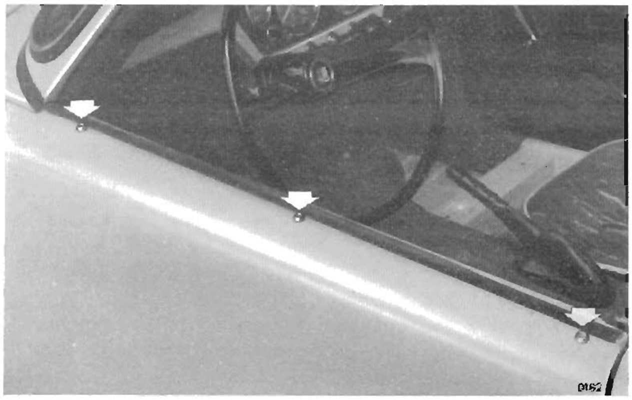


Fig. 111. Tonneau cover side attachments

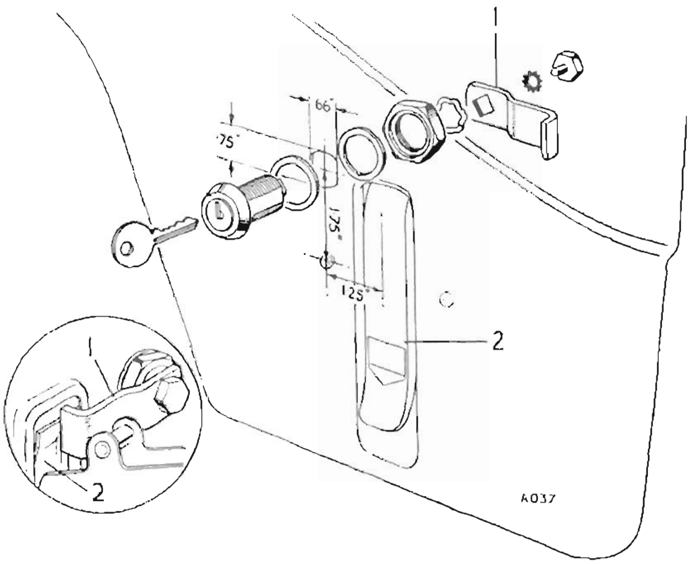


Fig. 112. Exploded arrangement of bonnet lock details

BONNET LOCK

A bonnet lock is available as a special accessory in kit form which comprises two lock assemblies.

Fitting Instructions

Cover the area, forward of the bonnet catch lever, with white masking tape. Use a pencil to mark the position of a hole shown and dimensioned on Fig. 112.

Open out the hole to $\frac{5}{8}$" (15·9 mm.) diameter, and shape the hole as dimensioned. Remove the tape and paint the edge of the metal to prevent rust formation.

Assemble the bonnet lock details in the sequence shown.

DUST AND WATER SEALING
(HERALD 1200, 12/50 AND VITESSE)

LOCATION OF SEALED JOINTS

(HERALD 1200, 12/50 AND VITESSE)

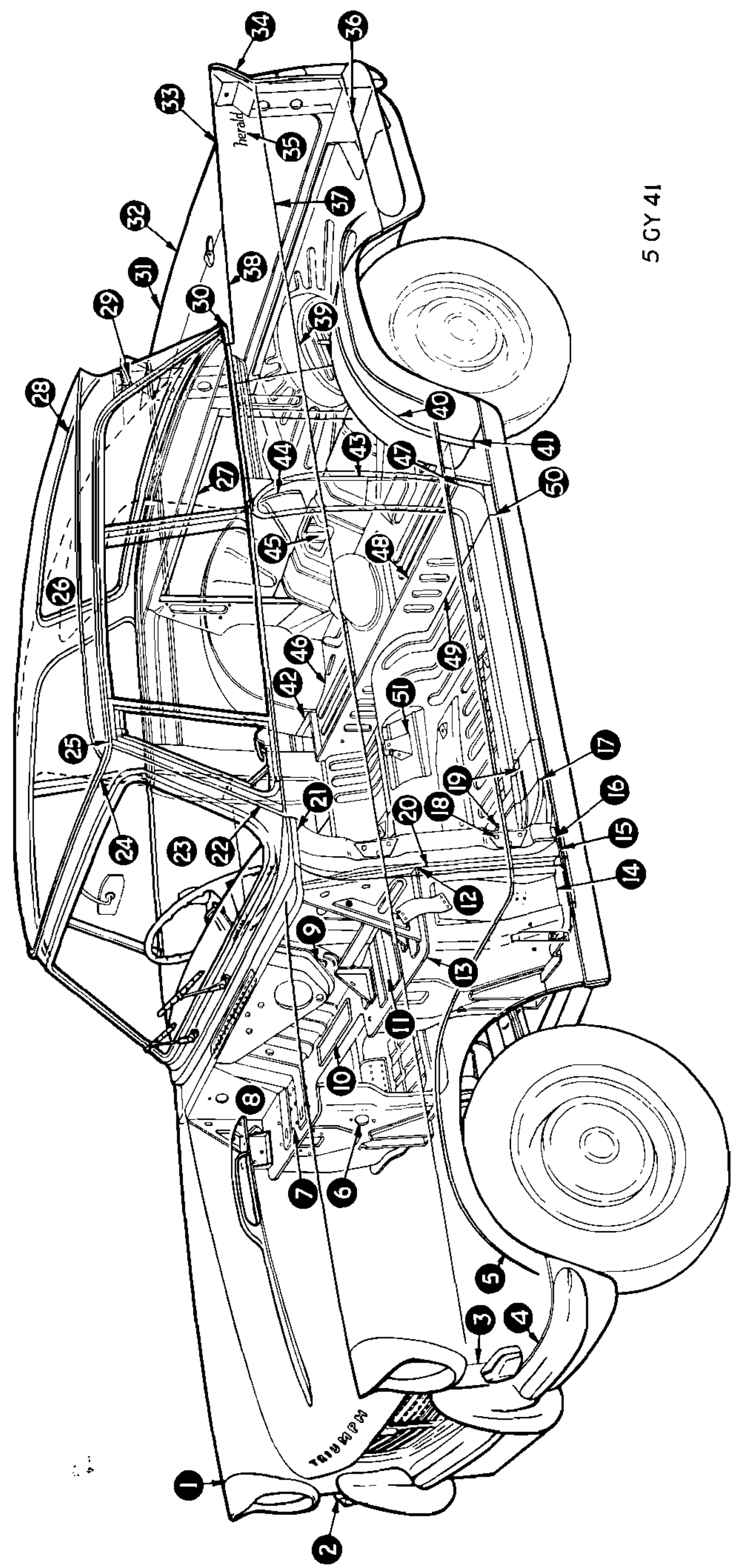


Fig. 1. Location of sealed joints (Herald and Vitesse)

DUST AND WATER SEALING

HERALD 1200, 12/50 AND VITESSE

The following notes on dust and water sealing have been extracted from the production schedules. The notes and illustrations are not instructions but are issued to assist dealers in rectifying any breakdown in the sealing compounds whenever applied to the joints between panels during production.

Due to the construction of welded bodies, some difficulty may be experienced in locating the exact point of water entry. The presence of water at a particular point may have resulted from an indirect source and does not necessarily indicate a breakdown of sealing in the immediate vicinity.

Should the dust and water sealing be suspect, do not attempt rectification before making a careful visual examination and subjecting the vehicle to a thorough water test.

Visual Examination

This examination requires a source of strong light directed on the outside of suspected joints while a visual check is made from inside the vehicle.

Water Test

When carrying out a water test, use a medium pressure hose with a good delivery of water to all the upper parts of body including windscreen, doors and roof drain channels.

A high pressure hose, directed on all joints beneath the vehicle, including front and rear wheel arches, is required for an under floor test.

The successful application of any sealing compound depends upon absolute cleanliness of the joint faces. All dirt, water and loose rust must be removed before applying any compound. If it is necessary to smooth off a fillet of sealing, or remove any excess compound from paintwork, etc., this can be done using a cloth moistened in petrol or white spirits to the fillet area concerned. Cellulose thinners must not be used. Do not saturate the cloth as the excess fluid may seep into the joint and destroy the seal.

A full list of sealing compounds with their applications is given below and on page 5·302.

Reference to the list will show that some of the compounds require heat treatment and in consequence are not suitable for use in service.

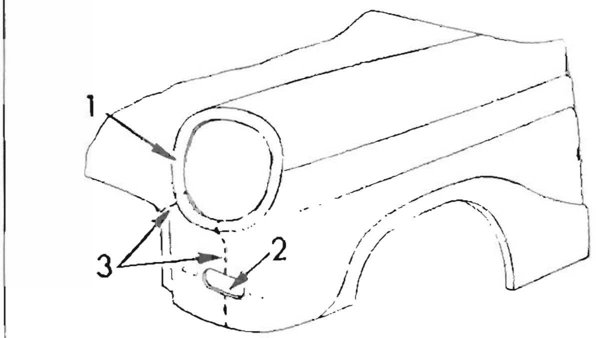
In nearly all cases where the sealing compounds recommended in the list are not available, Hermetal "Double Bond" and Hermetal Plastic Metal filler may be used. Hermetal compounds, however, must not be used for sealing joints between major sub-assemblies such as the Front End and Rear End sections and the roof panel, or where rubber forms part of the seal.

SEALING COMPOUNDS

COMPOUND	MANUFACTURER	COMPOUND	MANUFACTURER
Glasticon Glasticord Kelseal 3/315M.	Kelseal Limited, Vogue House, Hanover Square, London, W.1.	Seelastik Seelastik Auto 'B' Seelastrip.	Expandite Limited, Cunard Road Works, London, N.W.10.
Docker's Compound	Docker's Brothers Ltd. Rotton Park Street, Birmingham, 16.	Boscoseal B.B. Plasticol Putty S.106.46.	B.B. Chemicals Ltd., Ulverscroft Road, Leicester.
Supra Dedseal.	Supra Chemical & Paint Ltd., Hainge Road, Tipton, Staffs.	Hermetal 'Double Bond' Hermetal Plastic Metal Filler.	The Kenilworth Mfg. Co. Ltd., West Drayton, Middlesex.

SEALING COMPOUNDS

	APPLICATION	MATERIAL	CLASSIFICATION
BODY IN WHITE	Spotweld Sealer.	Expandite Seelastik (Natural)	Mastic.
	Plugging. Small Holes.	Expandite Seelastrip LS.105. Alternative Glasticon 303	Strip Sealer.
PAINT SHOP	Plugging. Small Holes.	Glasticon 303. BB Plastisol Putty S.106.46.	Putty. Plastisol.
	Internal Joints.	Expandite Seelastik Auto B.	Gun applied Sealer.
	External Joints.	Expandite Plastisol 53. Alternative Kelseal 3/315M.	Plastisol. Plastisol. Low temperature cure at 300°F. for 30 mins. after application.
	Sound Deadening.	Berry Wiggins Kingsnorth.	
BODY AFTER PAINT (TRIM & FINISH)	Windscreen Sealers—Rubber Weatherstrips, Plugs & Grommets.	Expandite Seelastik SR.51.	Mastic.
	Bolted-Metal to Metal Joints Metal moulding Small Holes Screw Fixings, etc.	Expandite Seelastik M.1.	Mastic.
	Special Purpose Paper to Metal.	Glasticord 400.	Strip Sealer.
	Body Underside Protectors.	Supra-Dedseal Boscoseal 9010.	Solvent based.
AFTER PAINT REPAIRS	External Joints	Hermetal Double Bond. Alternative Dockers Compound.	



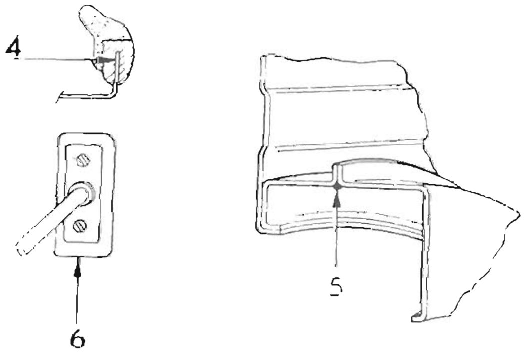
Dust and Water Sealing

The following joints cross-refer to Fig. 1.

1 Headlamp rubber and lamp to bonnet joints (Plastisol 53).

2 Side and flasher lamp rubber and lamp to bonnet (Seelastik).

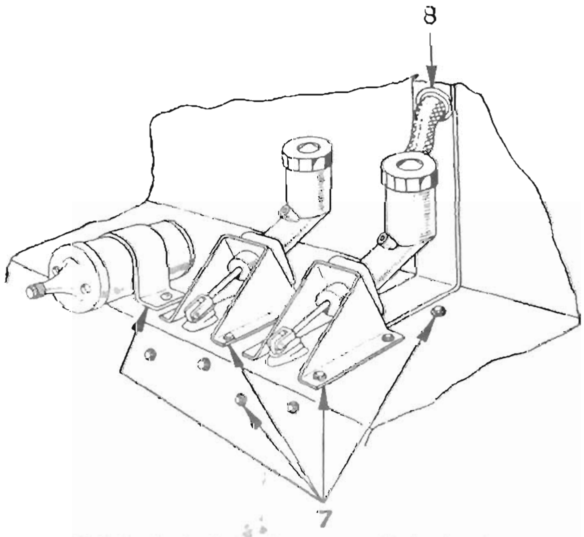
3 Wing side to wing front panels (Plastisol 53).



4 Sealing rubber to front valance (Plus Products 6/63).

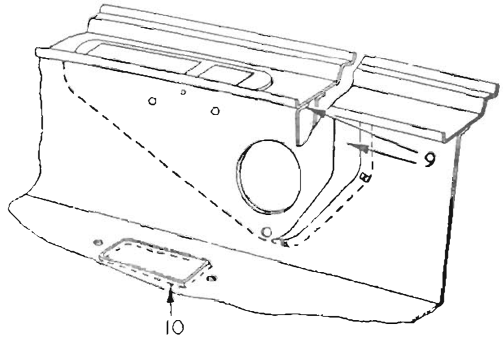
5 Front wheel arch inner to outer panels (Plastisol 53).

6 Steering column to rubber grommet and grommet to dash panel (Seelastik).



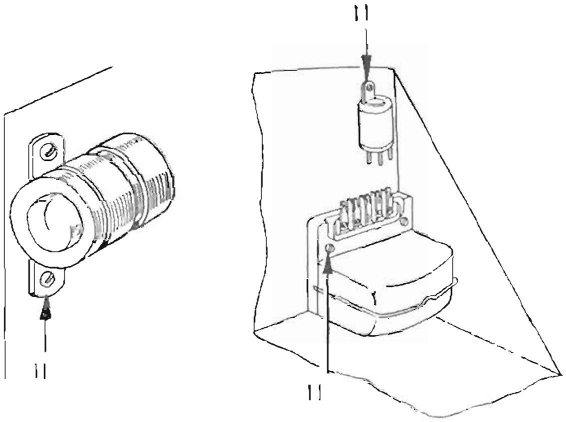
7 Coil, brake and clutch master cylinder brackets to dash panel (Seelastik).

8 All rubber grommets to components attached to dash panel, including those on the inside of the car. (Seelastik)

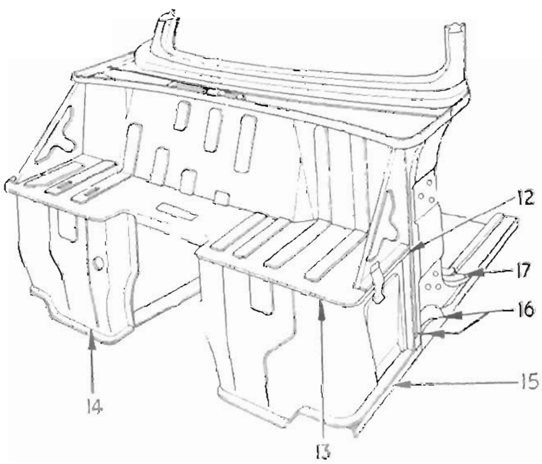


9 Air distribution box to dash panel (Plastisol 53).

10 Heater unit to dash shelf (Seelastik).



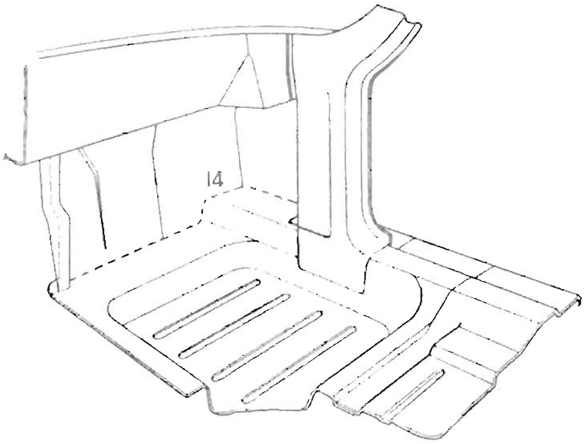
11 Fixing screws of all components to dash panel (Seelastik).

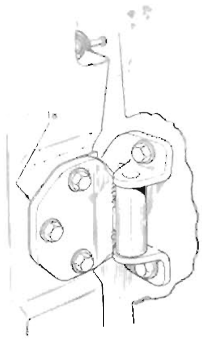


12 Front deck panel to dash shelf panel (Plastisol 53).

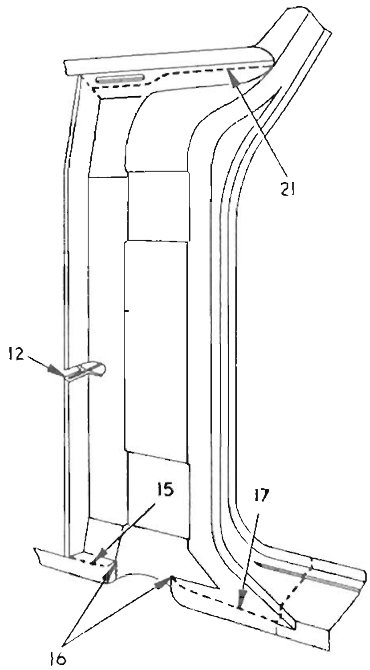
13 Dash shelf to lower dash panel (Seelastik).

14 Front floor to dash panel (Seelastik).





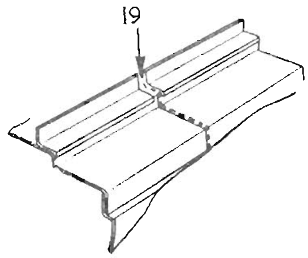
18 Door hinges and courtesy light switches to "A" post (Seelastik).

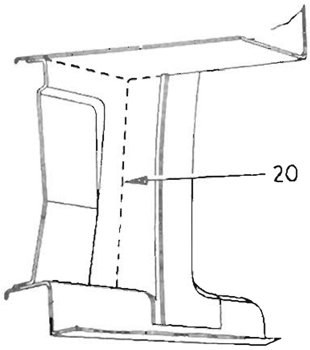


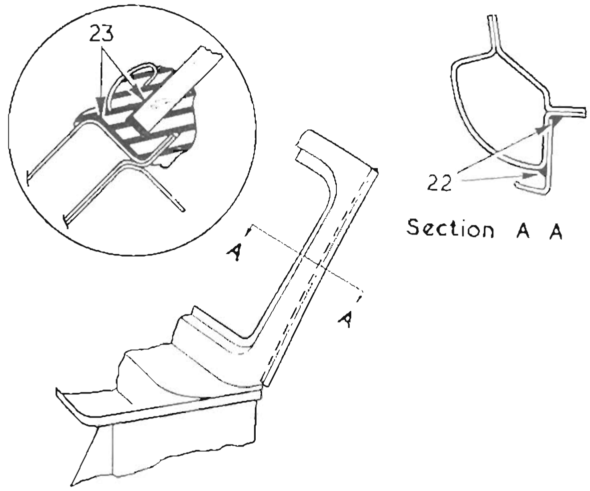
15 Outer "A" post to front floor panels (Plastisol 53).

16 Plug two corner holes at the base of the "A" post (Glasticon).

17 Outer "A" post to front floor (Plastisol 53).







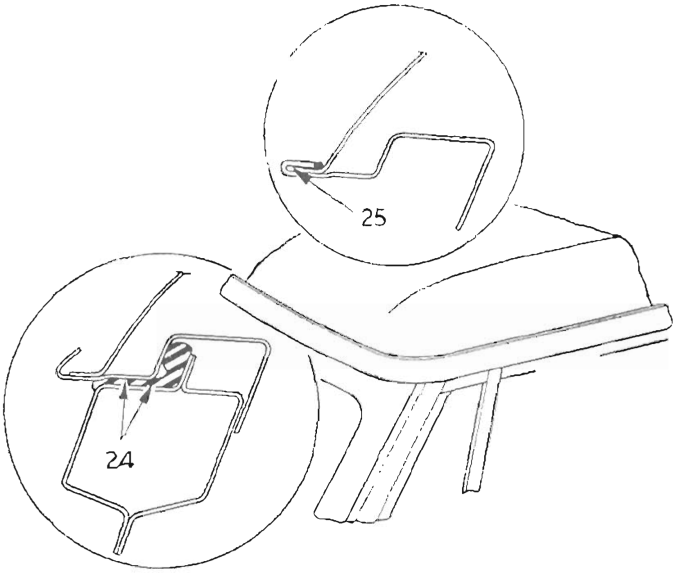
19 Centre section to rear body section and front to rear floor panels (Seelastik)

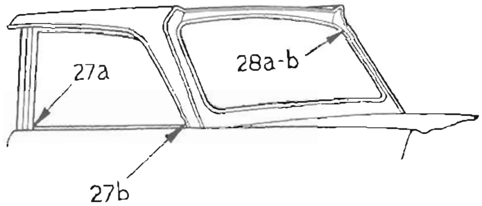
20 "A" post inner panel to dash side panels (Seelastik).

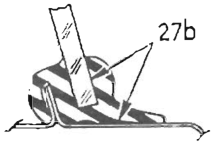
21 Dash shelf panel to front deck panel (Plastisol 53).

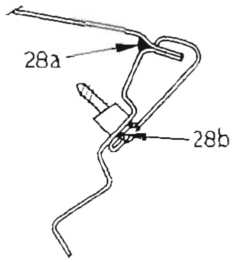
22 "A" post drip channel to screen panel (Plastisol 53).

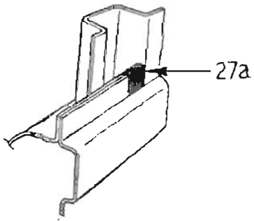
23 Windscreen to glazing rubber and rubber to body (Seelastik).

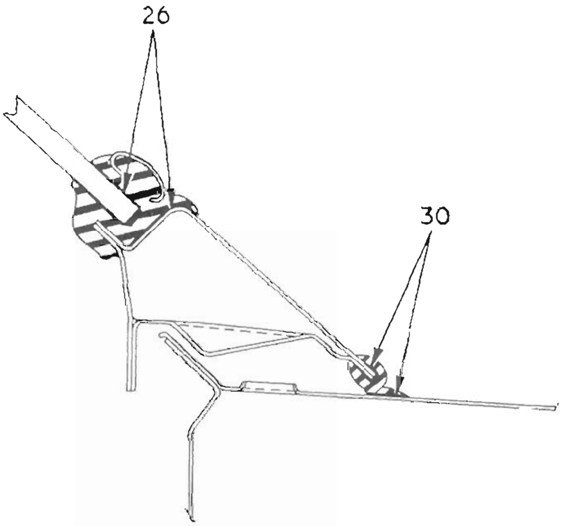


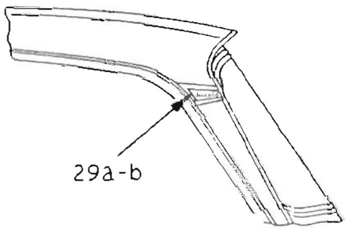












24 Roof panel weatherstrip to screen header rail and roof (Seelastik).

25 Cantrail drip channel to roof panel (Plastisol 53).

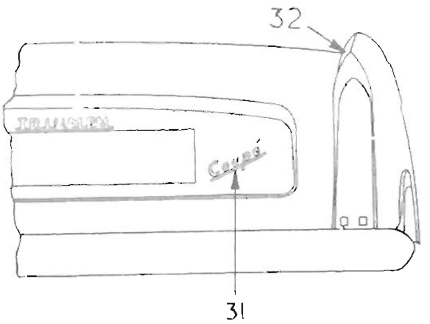
26 Backlight glass to rubber weatherstrip and rubber to roof panel.

27a Seal the lower corners of quarter light aperture prior to fitting the quarter light glass and trim (Glasticon).
b Quarter light glazing rubber to glass and body.

28a Roof top to lower panels prior to fitting the interior trim (Seelastik).
b Roof capping fixings (five places) (Seelastik).

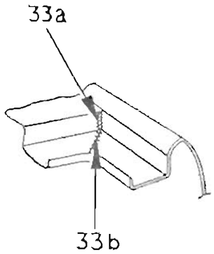
29a Roof top to side panel (Plastisol 53).
b Badge to roof panel (Seelastik).

30 Roof rubber to roof and body panels (Seelastik).



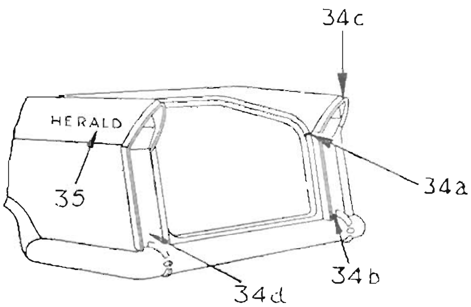
31 Badge to locker lid (Seelastik).

32 Luggage locker weatherstrip to flange (Plus Products 6/63).



33a Tonneau side to rear deck panel (Glasticon).

b Joint between rear valance and the luggage floor (Glasticon).



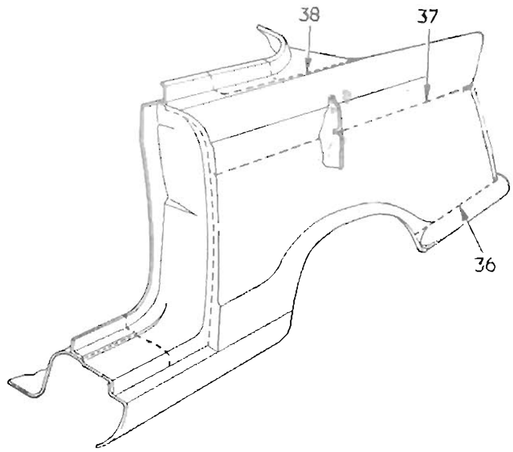
34a All corner joints of tonneau cover plate plugged with Plastisol from inside the locker.

b Corner holes covered with Dalmas Klingfast tape.

c Edge of tail lamp apertures sealed prior to fitting lamp surround (Plastisol 53).

d Lower edge of lamp apertures and valance (Seel-a-strip).

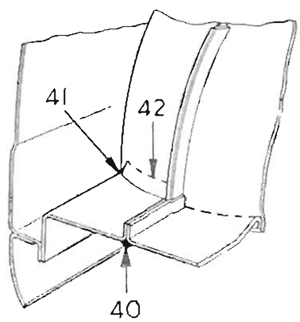
35 Badge to tonneau side panel (Seelastik).

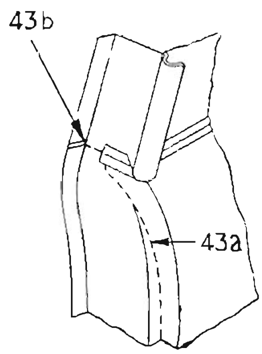


36 Luggage locker to valance fixings (Seelastik).

37 Upper to lower tonneau side panels (Plastisol 53).

38 Tonneau upper panel to rear deck panel (Hermetal "Double Bond").





39 Spare wheel compartment bottom tray to luggage floor panel (Plastisol 53).

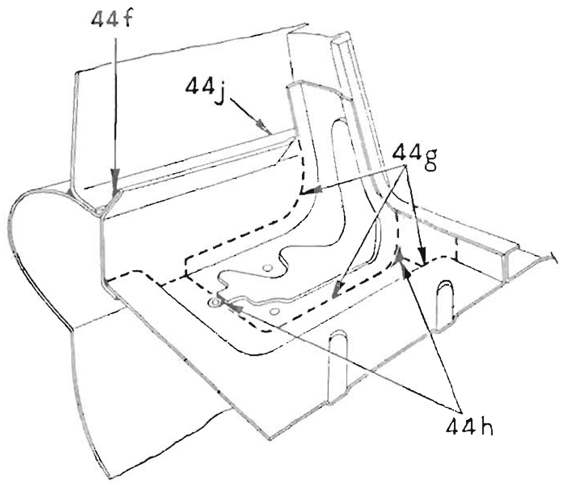
40 Wheel arch inner to outer panels and the inner and outer wheel arch panels to seat pan (Seelastik).

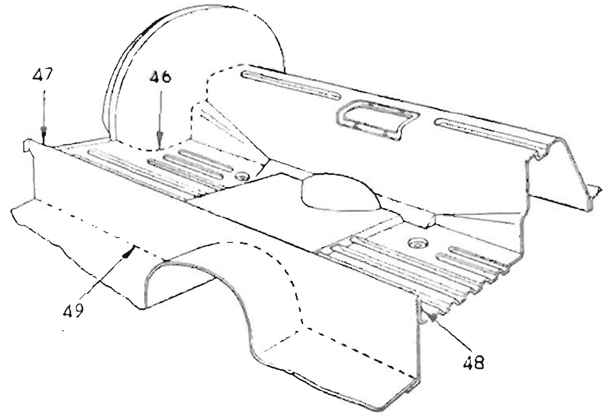
41 Corner holes plugged at the joints between outer wheel arch, tonneau lower side and seat panel (Glasticon 303).

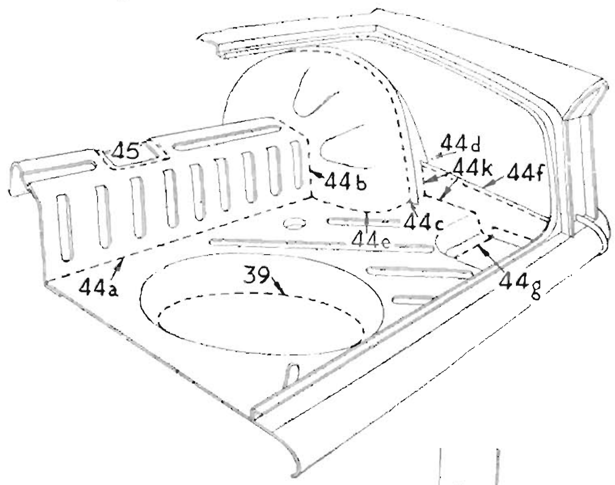
42 Rear seat panel to outer wheel arch (Seelastik).

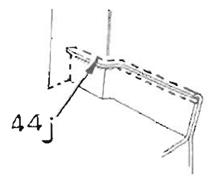
43a "B" post outer panel to the tonneau side panels (Plastisol 53).

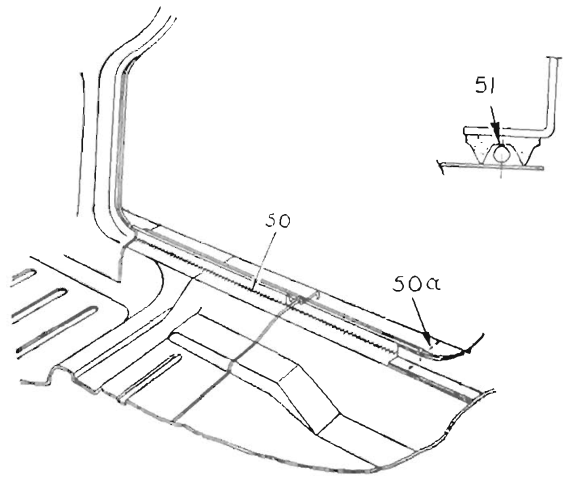
b Gap in the flange between roof and body panels (Prestik).











44a Rear edge of seat pan to luggage floor (Seelastik).

b Seat panel to the inner wheel arch (Seelastik).

c Corner holes between the wheel arch outer panel and luggage floor side panel (Glasticon 303).

d Corner holes between the inner and outer wheel arch panels and the luggage floor (Glasticon 303).

e Inner wheel arch to floor panel (Seelastik).

f Outer wheel arch, tonneau side panel and rear valance side panel (Seelastik).

g Body rear mounting bracket to luggage locker floor and rear valance (Seelastik).

h Corner holes plugged (Glasticon 303).

j Corner holes plugged and joint sealed (Seelastik).

k Wheel arch to luggage floor side panel (Seelastik).

45 Rear spring access cover plate to seat panel (Prestik) and (Seelastik).

46 Seat pan to inner wheel arch panels (Seelastik).

47 Holes at base of "B" post plugged with Glasticon 303 and sealed with Seelastik.

48 Heel board to seat panel (Seelastik).

49 Heel board to floor panel (Seelastik).

50a Floor panel to the base of "B" post (Plastisol 53).

b Floor panel to sill panel (Seelastik).

51 Joints between gearbox turret cover to floor panel. A small fillet of Seelastik is applied inside the sponge rubber seal as indicated.

DUST AND WATER SEALING
(SPITFIRE 4)

LOCATION OF SEALED JOINTS

(SPITFIRE 4)

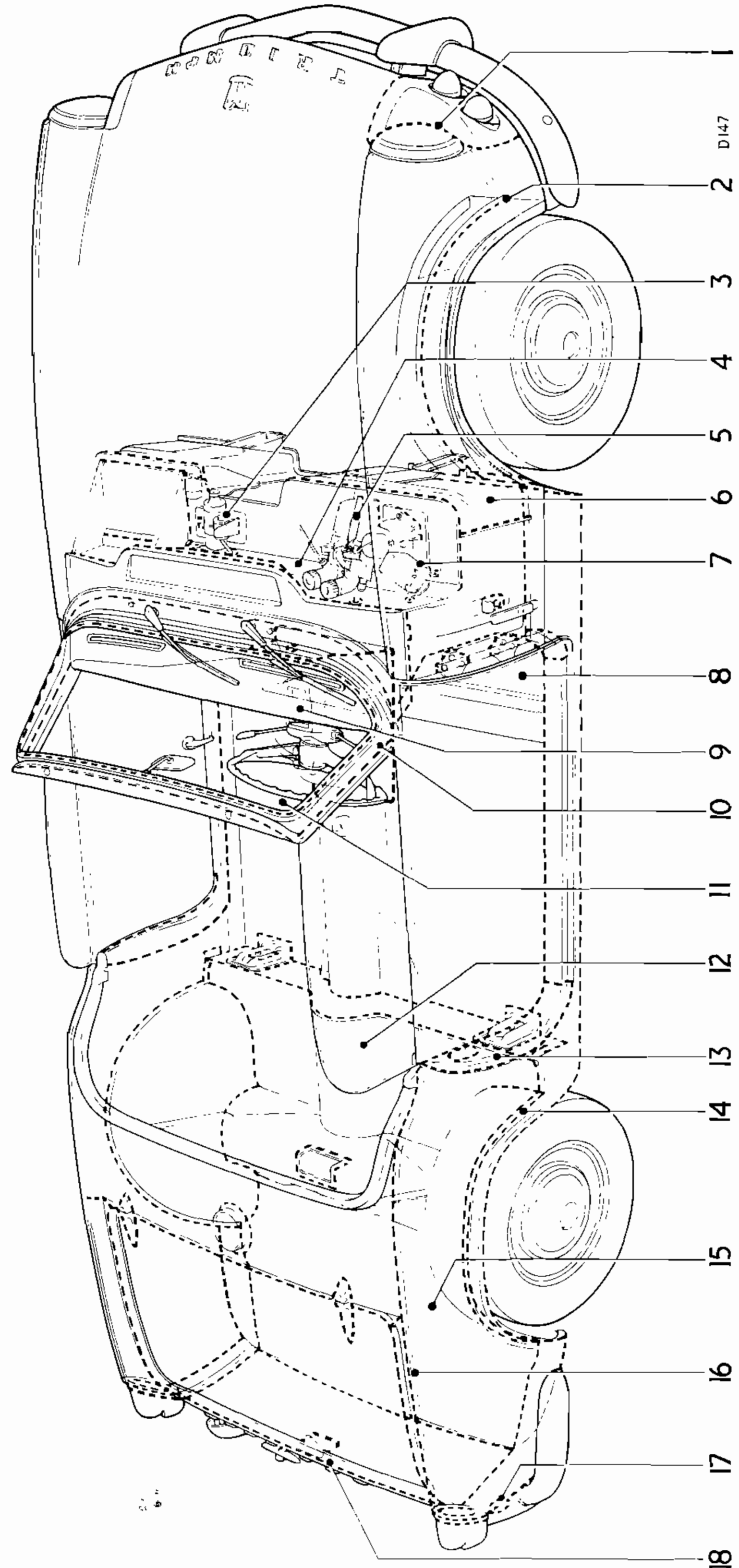
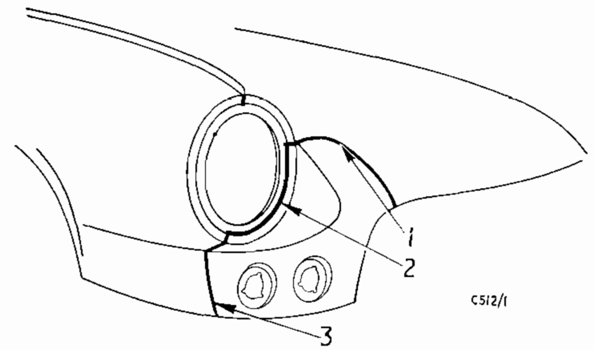


Fig. 2. Location of sealed Joints (Spitfire)

NOTE : The locations numbered above relate to those numbered in the following pages.



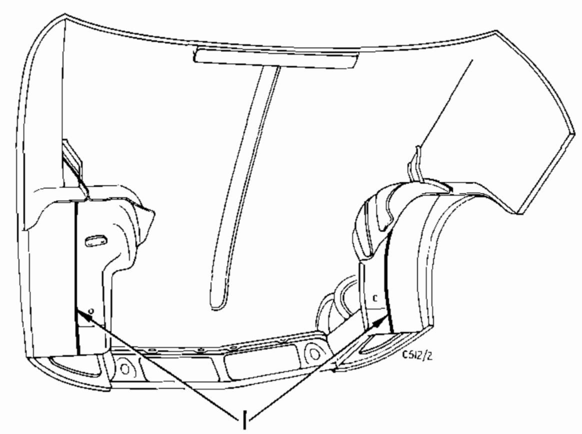
Dust and Water Sealing

Location 1

1 Bonnet top and front panel (Plastisol).

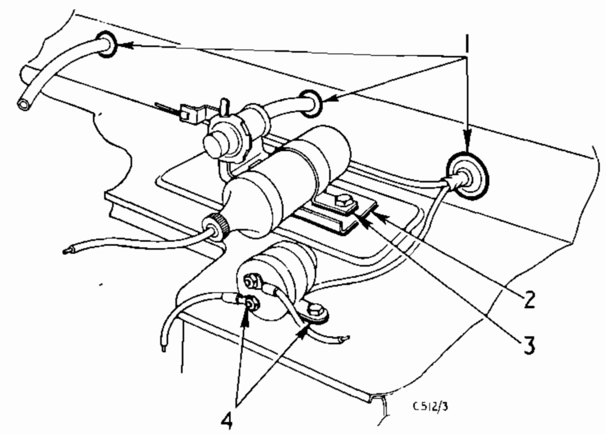
2 Front panel and lamp aperture (Plastisol).

3 Front panel and wing (Plastisol).



Location 2

1 Wheel arch and wing panel (Plastisol).



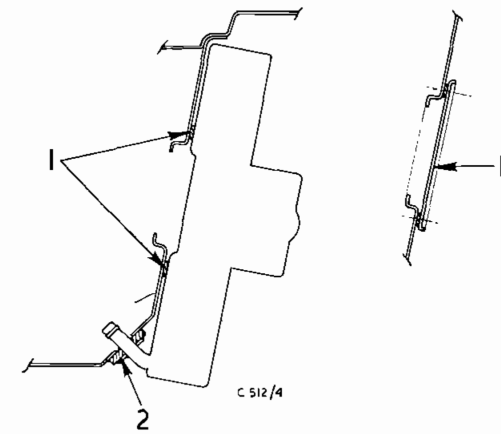
Location 3

1 Grommets and dash panel (Seelastik).

2 Heater water valve mounting bracket and dash panel (if fitted) (Seelastik).

3 Coil mounting and dash panel (if heater is not fitted) (Seelastik).

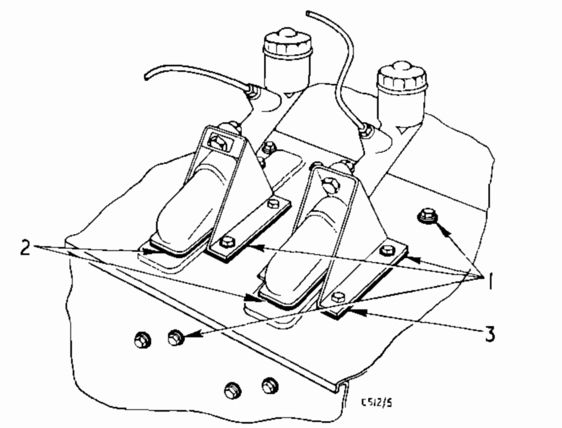
4 Starter solenoid and dash panel (Seelastik).



Location 4

1 Sealing rubber on heater unit or blanking plate and dash panel (Seelastik).

2 Sealing rubber on water pipes or rubber plugs and dash panel (Seelastik).

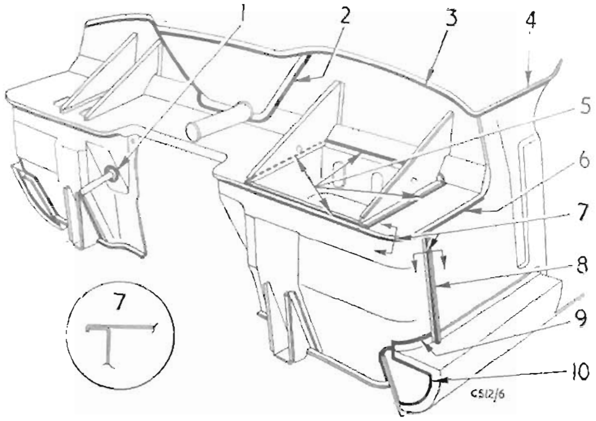


Location 5

1 Master cylinders and pedal fixing bolts (Seelastik).

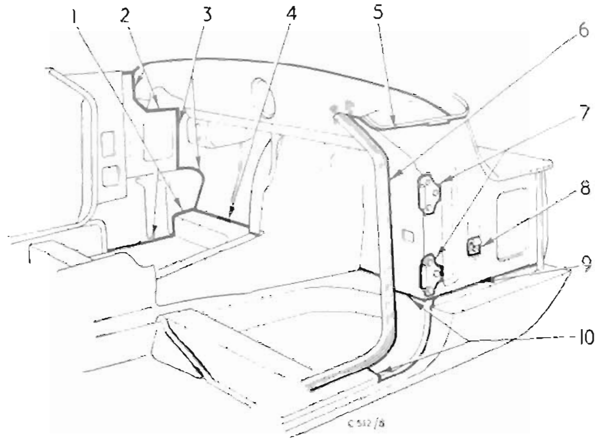
2 Sealing rubbers and mounting bracket (Seelastik).

3 Mounting bracket and dash panel (Seelastik).



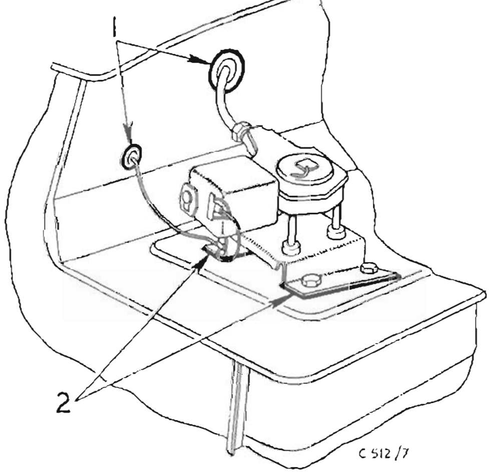
Location 6

1 Steering column grommet and lower dash panel (Seelastik).
2 Air box and upper dash panel (Seelastik).
3 Scuttle and upper dash panel (Seelastik).
4 Scuttle and side dash panel (Seelastik).
5 Battery box and upper dash panel (Seelastik).
6 Dash side and shelf (Plastisol).
7 Dash front and shelf panel (Plastisol).
8 Dash front and side panel (Plastisol).
9 Sill and dash panel (Plastisol).
10 Sill closing panel and sill (Plastisol).



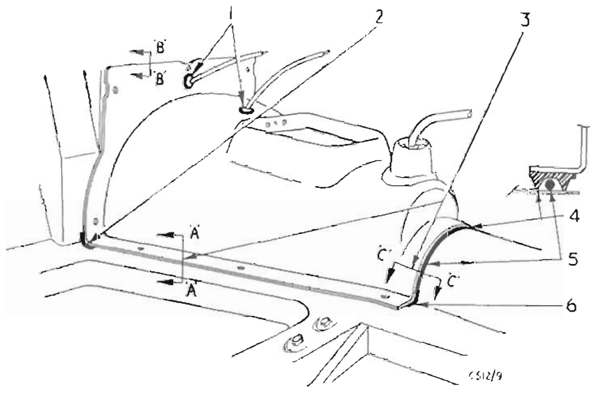
Location 8

1 Floor and dash side panel (Seelastik).
2 Scuttle and dash side (Seelastik).
3 Dash side and dash lower panels (Seelastik).
4 Floor and dash lower panel (Seelastik).
5 Dash side and scuttle (Plastisol 53).
6 Door seal retaining flange and "A" post (Plastisol).
7 Door hinges and "A" post (Seelastik).
8 Bonnet lock catch and dash side (Seelastik).
9 Sill and dash side panel (Plastisol).
10 Sill and "A" post (Plastisol).



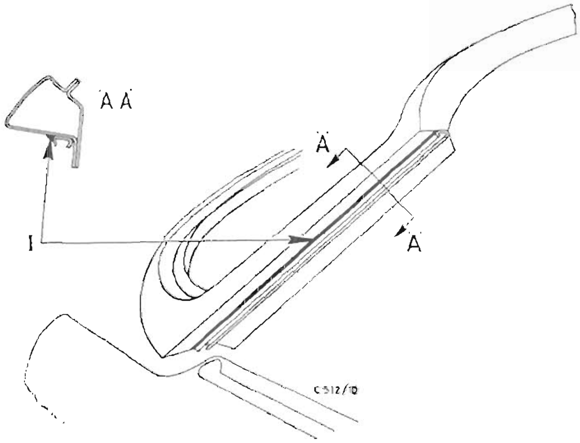
Location 7

1 All grommets and dash panel (Seelastik).
2 Wiper motor mounting bracket and dash panel (Seelastik).



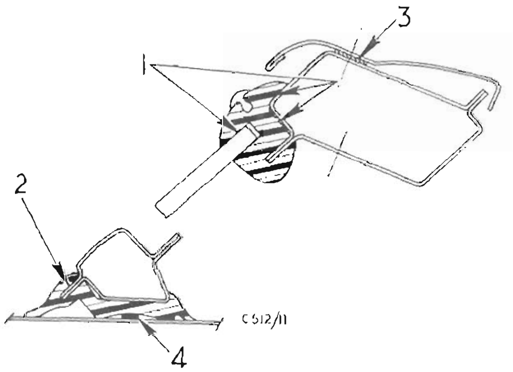
Location 9

1 Grommets and cover (Seelastik).
2 Plug corner (Glasticon).
3 Section through cover.
4 Secure sealing rubber to cover (Bostik 1261).
5 Apply Seelastik in rubber channel.
6 Double application Seelastik at corner and over tunnel.



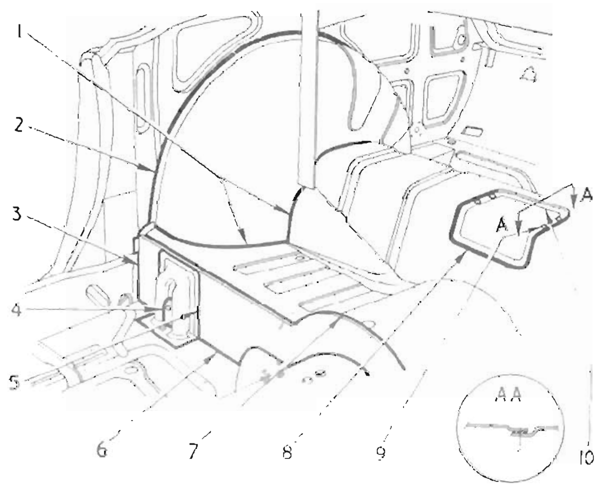
Location 10

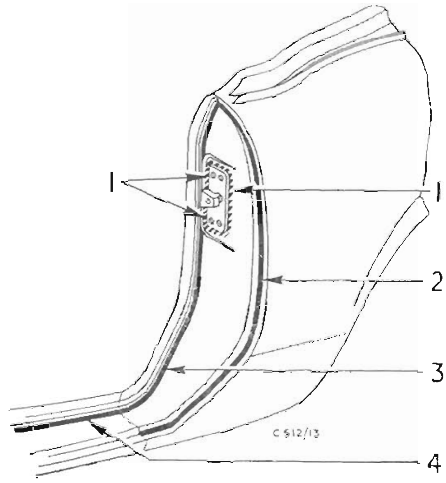
1 Weatherstrip retainer and windscreen pillar (Plastisol).



Location 11

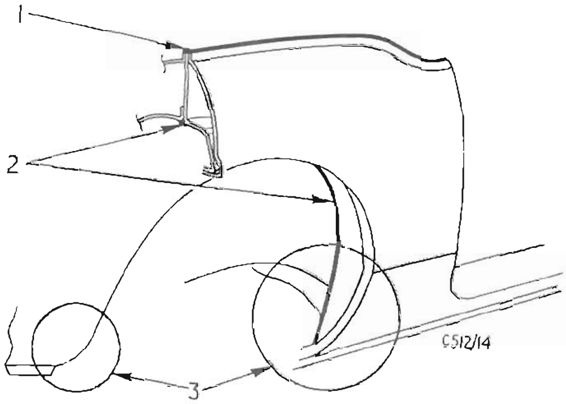
1 Glass and rubber, and rubber frame (Seelastik).
2 Rubber and frame (Seelastik.)
3 Header capping and frame (Seelastik).
4 Rubber and scuttle Seelastik, $\frac{1}{8}$″ dia.





Location 13

1 Lock striker plate and "B" post (Seelastik).
2 Rear wing and "B" post (Plastisol 53).
3 "B" post and inner panel (Plastisol 53).
4 Sill and weatherstrip retainer (Plastisol).

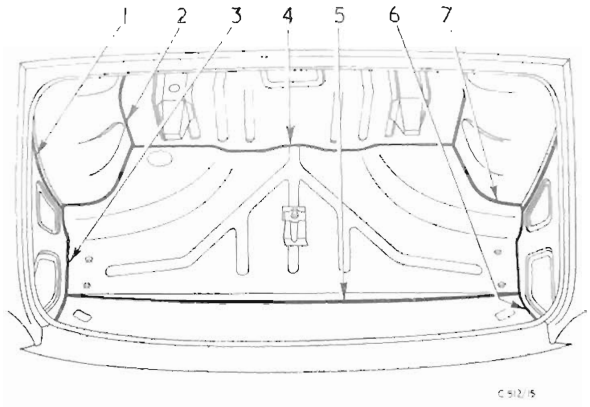


Location 14

1 Rear wing top joint (Plastisol 53).
2 Inner and outer wheel arches (Seelastik).
3 All joints in circles (Seelastik).

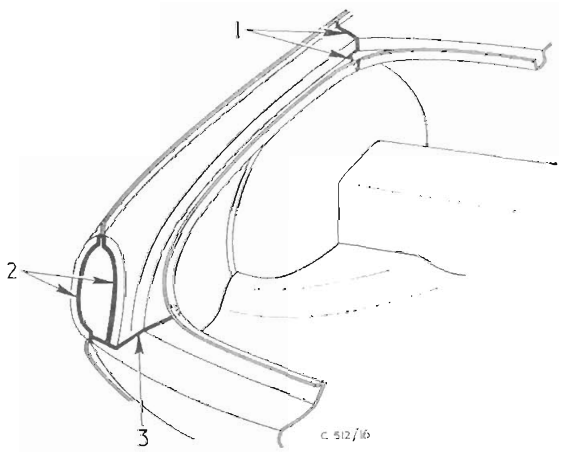
Location 12

1 Wheelarch and seat panel (Plastisol 53).
2 Wheelarch and body side panel (Seelastik).
3 Heelboard and "B" post (Seelastik).
4 Radius arm fixings (Seelastik)
5 Reinforcement bracket and heelboard (Seelastik).
6 Heelboard and floor (Seelastik).
7 Heelboard and seat panel (Seelastik).
8 Spring access panel and seat panel (Seelastik).
9 Spring access fixing bolts (Seelastik).
10 Spring access panel and seat panel (Prestik, $\frac{1}{16}$″ × $\frac{1}{2}$″).



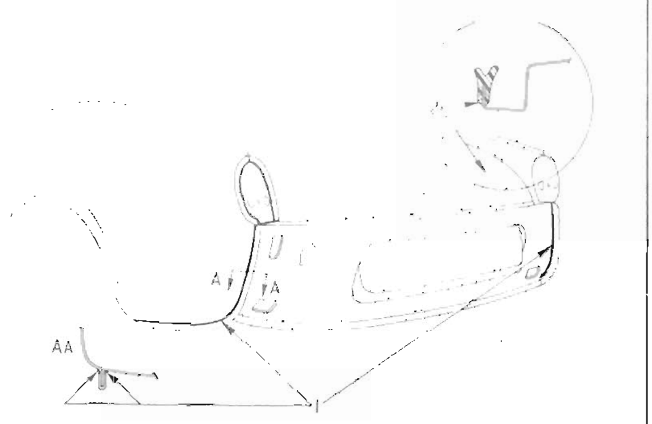
Location 15

1 Inner wheel arch and side panel (Seelastik).
2 Wheel arch and seat panel (Seelastik).
3 Spare wheel pan and side panel (Seelastik).
4 Spare wheel pan and seat panel (Seelastik).
5 Spare wheel and floor (Seelastik).
6 Floor and side panel (Seelastik).
7 Spare wheel pan and wheel arch (Seelastik).



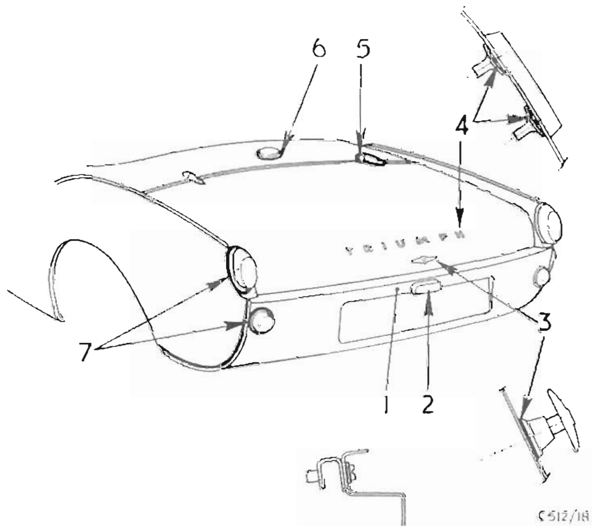
Location 16

1 Drain channel and rear deck (Plastisol).
2 Tail lamp aperture and wing (Plastisol).
3 Tonneau side and valance (Plastisol).



Location 17

1 Wing finisher (Plastisol).
2 Luggage locker weatherstrip (Plus Products 6/63).



Location 18

1 Striker fixings (Seelastik under washer).
2 Lamp fixings and grommet (Seelastik).
3 Handle escutcheon and locker lid (Seelastik).
4 Locker lid and letters (Glasticon).
5 Hinges, locker lid and body (Seelastik).
6 Filler rubber and body (Seelastik).
7 Rubber of stop/tail and twin signal lamps and body (Seelastik).

TRIUMPH

HERALD 1200, 12/50, VITESSE
AND
SPITFIRE

WORKSHOP MANUAL

GROUP 6

Comprising :

Electrical Section

GROUP 6

TRIUMPH
HERALD 1200, 12/50, VITESSE
and
SPITFIRE MODELS

GROUP 6

CONTENTS

SPECIFICATIONS

Battery

Type BT.7A. (Home)	
Supplied dry and uncharged, or filled and charged	Lead acid.
Type BTZ.7A. (Export)	
Supplied dry but with plates charged	Lead acid.
Voltage	12.
Terminal earthed	Positive.
Capacity—at 10 hour rate	38 ampere hours.
—at 20 hour rate	43 ampere hours.
Plates per cell	7.
Electrolyte capacity (per cell)	1 pint imperial ; 1·2 pints U.S.A.; 570 c.c.
Specific gravity charged—Climates below 32°C.	1·270—1·290.
—Climates above 32°C.	1·130—1·150.
Initial charging current for BT.7A.	3·5 amperes.
Recharging current (both types)	5·0 amperes.

Generator

Model	C40—1.
Type	Two brush, two pole, compensated voltage control.
Rotation	Clockwise.
Field resistance	6 ohms. approximately.
Maximum output at 13·5 volts	22 amperes at 2,050—2,250 r.p.m. (connected to a load of 0·61 ohms.).
Brush tension	22—25 ozs. (0·62—0·71 Kgs.).
Minimum brush length	$\frac{11}{32}$" (9 mm.).

Generator (VITESSE ONLY) **C40L**

Type	Two brush, two pole, compensated current voltage control.
Rotation	Clockwise.
Field resistance	5·9 ohms approximately.
Maximum output at 13·5 volts	25 amperes at 2,275 r.p.m. (connected to a load of 0·54 ohm).
Brush tension	30 ozs. (0·85 Kg.) maximum.
Minimum brush length	$\frac{9}{32}$" (7 mm.).

Control Box (HERALD 1200 and COURIER VAN)

Type	RB.106/2.
Cut-in voltage	12·7—13·3.
Drop-off voltage	11—8·5.
Open circuit settings —*Ambient temperatures*	*Open circuit voltages.*
10°C. (50°F.)	16·1—16·7
20°C. (68°F.)	16·0—16·6
30°C. (86°F.)	15·9—16·5
40°C. (104°F.)	15·8—16·4

Control Box (VITESSE AND SPITFIRE)

Type	RB.340.
Cut-in voltage	12·6—13·4.
Drop-off voltage	9·3—11·2.
Contacts resistor	55—65 ohms.
Swamp resistor—measured on unit between centre and base	13·25—14·25 ohms.
Open circuit settings—*Ambient temperatures*	*Open circuit voltages.*
10°C. (50°F.)	14·9—15·5
20°C. (68°F.)	14·7—15·3
30°C. (86°F.)	14·5—15·1
40°C. (104°F.)	14·3—14·9

Electrical Settings of Current Regulator

The current regulator must be set to operate at a current value equal to the maximum rated output of the associated generator.

The nominal setting is stamped on the underside of the 'B-B' terminal plate or on the cover. The maximum rated output of generators is as follows : C40-1. 22 ± 1½ amps.; C40L. 25 ± 1½ amps.

SPECIFICATIONS

Starter Motor

Model	M.35G.
Type	Four pole, four brush, series wound.
Brush tension	32—40 ozs. (0·9—1·1 Kgs.).
Minimum brush length	$\frac{5}{16}$" (8 mm.).

PERFORMANCE DATA

ARMATURE SPEED	TORQUE		CURRENT CONSUMPTION	
	lbs. ft.	Kgms.	Amperes	Volts
Locked	10	1·38	420—440	7·9—7·3
1,000 r.p.m.	5·4	0·75	250—270	9·3—8·9
7,400—8,500 r.p.m.	No load		45	12

IGNITION COIL

Lucas Part Number HA.125195 (Fluid Filled)

FITTED TO HERALD, VITESSE AND SPITFIRE

Primary Resistance (Cold at 20°C)	3·1 to 3·5 ohms.
Polarity of Earth for Test	Positive (+)
Maximum Test Voltage	12·5 volts.

IGNITION DISTRIBUTOR TEST DATA

HERALD 1200, 12/50 and COURIER VAN ENGINES

Distributor Type .. .. .. DM2 (Up to Engine No. GA67436 Low Comp. GA86619 High Comp.)
25.D4 (From Engine No. GA67437 Low Comp. GA86620 High Comp.)

Part Numbers

COMPRESSION RATIO	STANDARD-TRIUMPH PART No.	TYPE	LUCAS SERVICE No.
8 or 8·5 : 1	208968	25.D	40791
7 : 1	208967	25.D	40790
8 or 8·5 : 1	208362	DM2	40743
7 : 1	208460	DM2	40755

Design Data (all types)

Firing angles	0°, 90°, 180°, 270°, ± 1°.
Closed period (dwell angle)	60° ± 3°.
Open period	30° ± 3°.
Contact breaker gap	0·014" to 0·016" (0·36 to 0·41 mm.)
Rotation (viewed on rotor arm)	Counter clockwise.
Contact breaker spring pressure (measured at contacts)	18 to 24 oz.
Condenser capacity	0·18 to 0·25 mfd.

Distributor Test Data

The following r.p.m. figures relate to distributor speed and must be doubled for conversion to crankshaft speed. The angles, given in degrees, also relate to the distributor and must be doubled when converting to flywheel angles. For example: in the following table the distributor speed is quoted at 2,000 r.p.m. giving 8° to 10° distributor advance, this being equivalent to 4,000 crankshaft r.p.m., giving 16° to 20° advance measured around the flywheel or crankshaft pulley.

Centrifugal Timing Advance Tests

Part Nos. 208968 and 208362

8 or 8·5 : 1 Compression Ratio.

1. Set at 0° at a speed of less than 100 r.p.m.
2. Run distributor up to 2,500 r.p.m. advance to be 10° max.
3. Check at the following decelerating speeds:

Speed r.p.m.	Advance Degrees
2,000	8° to 10°
1,500	6° ,, 8°
1,000	4° ,, 6°
500	¾° ,, 3
450	½° ,, 2½

No advance below 120 r.p.m.

Part Nos. 208967 and 208460

7 : 1 Compression Ratio.

1. Set at 0° at a speed of less than 100 r.p.m.
2. Run distributor up to 2,000 r.p.m. advance to be 16° max.
3. Check at the following decelerating speeds:

Speed r.p.m.	Advance Degrees
1,600	14° to 16°
1,050	7 ,, 9°
600	1° ,, 3
450	0° ,, 1°

No advance below 370 r.p.m.

Vacuum Advance Tests

8 or 8·5 : 1 Compression Ratio.

1. Set at zero at a speed of 200 r.p.m.
2. Increase vacuum to 25″ mercury. Advance should be 6° to 8°.
3. Check at the following points with falling vacuum.

LUCAS VACUUM CURVE 3 / 18 / 7

Inches Hg.	Advance Degrees
15″	5½° to 7½°
10″	3½° ,, 5½°
5½″	½° ,, 2½°
2½″	0° ,, ½°

No advance below 1½″ Mercury.

7 : 1 Compression Ratio

1. Set at zero at a speed of 200 r.p.m.
2. Increase vacuum to 18″ mercury. Advance should be 11° to 13°.
3. Check at the following points with falling vacuum.

LUCAS VACUUM CURVE 4 / 13 / 12

Inches Hg.	Advance Degrees
12″	10° to 12½°
8″	6 ,, 8½°
5½″	½ ,, 4°
3½″	0° ,, ½°

No advance below 2″ Mercury.

IGNITION DISTRIBUTOR TEST DATA

VITESSE

Distributor Type .. .. Lucas 25D6 (Up to Engine No. HB15000)
Delco-Remy D200 (From Engine No. HB15001)
,, ,, D202 (From Engine No. HB16302)

Part Numbers

COMPRESSION RATIO	TYPE	LUCAS	DELCO-REMY	STANDARD-TRIUMPH
8·75 : 1	25D6	40865	7953046	208914
8·75 : 1	D200		7953046	211407
8·75 : 1	D202		7953070	211414
7 : 1	25D6	40866		209050

Design Data (Lucas)

Firing angles	0°, 60°, 120°, 180°, 240°, 300°, ± 1°
Closed Period (dwell angle)	35° ± 2°
Open period	25° ± 2°
Contact breaker gap	0·014″ to 0·016″ (0·36 to 0·41 mm.)
Rotation (viewed on rotor arm)	Counter clockwise
Contact breaker spring pressure (measured at contacts)	18 to 24 ozs.
Condenser capacity	0·18 to 0·25 mfd.

Design Data (Delco-Remy)

Firing angles	0°, 60°, 120°, 180°, 240°, 300°, ± 1°
Closed period (dwell angle)	36° ± 1°
Open period	24° ± 1°
Contact breaker gap	0·020″ ± 0·001″ (0·508 mm.)
Rotation (viewed on rotor arm)	Counter clockwise
Contact breaker spring pressure (measured at contacts)	17 to 21 ozs.
Condenser capacity	0·18 to 0·25 mfd.

Distributor Test Data

The following r.p.m. figures relate to distributor speed and must be doubled for conversion to crankshaft speed. The angles, given in degrees, also relate to the distributor and must be doubled when converting to flywheel angles. For example: in the following table the distributor speed is quoted at 2,300 r.p.m. giving 13 to 15 degrees advance this being equivalent to 4,600 crankshaft r.p.m. giving 26 to 30 degrees advance measured around the flywheel or crankshaft pulley.

Centrifugal Timing Advance Tests (Lucas)

Lucas Part No. 40865 (8·75 : 1 Comp. Ratio)

1. Set at 0° at speed less than 200 r.p.m.
2. Run distributor up to 2,700 r.p.m. Advance to be 13° to 15°.
3. Check at the following decelerating speeds.

Speed r.p.m.	Advance Degrees
2300	13° to 15°
1800	11° ,, 13°
1200	9° ,, 11°
1000	6½° ,, 8½°
500	1° ,, 3°
300	0° ,, 1°

No advance below 200 r.p.m.

Lucas Part No. 40866 (7 : 1 Comp. Ratio)

1. Set at 0° at speed less than 225 r.p.m.
2. Run distributor up to 2,700 r.p.m. Advance to be 14° to 16°.
3. Check at the following decelerating speeds.

Speed r.p.m.	Advance Degrees
2000	14° to 16°
1150	12° ,, 14°
500	3° ,, 6°
300	0°

No advance below 225 r.p.m.

Vacuum Advance Tests (Lucas)

8·75 : 1 Compression Ratio

1. Set at zero at a speed of 200 r.p.m.
2. Increase vacuum to 12″ mercury. Advance should be 7° to 9°.
3. Check at the following points with falling vacuum.

LUCAS VACUUM CURVE 3/7/8	
Inches Hg.	Advance Degrees
6″	6° to 9°
5″	3½° ,, 6½°
4″	1° ,, 4°
2½″	0 ,, 1°
No advance below 1½″ Mercury.	

7 : 1 Compression Ratio

1. Set at zero at a speed of 200 r.p.m.
2. Increase vacuum to 18″ mercury. Advance should be 6° to 8°.
3. Check at the following points with falling vacuum.

LUCAS VACUUM CURVE 4/11/7	
Inches Hg.	Advance Degrees
9½″	5° to 7°
4¾″	½° ,, 2½°
2″	0° ,, ½°
No advance below 1″ Mercury.	

Centrifugal Advance Tests (Delco-Remy)

NOTE: At engine number HB.16302 a new cylinder head was introduced having re-shaped combustion chambers, giving quicker combustion. The D202 distributor was then fitted, having appropriately lowered centrifugal and vacuum advance values.

Delco-Remy D200 (8·75 : 1 C.R.)

1 Set at 0° at speed less than 200 r.p.m.
2 Run distributor up to 2,700 r.p.m. Advance to be 13° to 15°.
3 Check at the following decelerating speeds:

Speed r.p.m.	Advance Degrees
2,300	13° – 15°
1,800	11° – 13°
1,200	8½° – 11°
800	4¼° – 6½°
500	1° – 3¼°
400	0 – 2¼°
No advance below 200 r.p.m.	

Delco-Remy D202 (8·75 : 1 C.R.)

1 Set at 0° at speed less than 200 r.p.m.
2 Run distributor up to 2,000 r.p.m. Advance to be 8½° to 10½°.
3 Check at the following decelerating speeds:

Speed r.p.m.	Advance Degrees
1,250	8½° – 10½°
1,150	7¼° – 9¼°
1,000	5½° – 7½°
900	4° – 6°
700	1½° – 3½°
550	0° – 2°
No advance below 400 r.p.m.	

Vacuum Advance Tests (Delco-Remy)

Delco-Remy D200 (8·75 : 1 C.R.)

1 Set at Zero at a speed of 200 r.p.m.
2 Increase vacuum to 12″ mercury. Advance should be 7° to 9°.
3 Check at the following points with falling vacuum:

Inches Hg.	Advance Degrees
7″	7° – 9°
6″	5¾° – 8¼°
5″	3½° – 7°
4″	0° – 5½°
No advance below 2″ Mercury	

Delco-Remy D202 (8·75 : 1 C.R.)

1 Set at Zero at a speed of 200 r.p.m.
2 Increase vacuum to 18″ mercury. Advance should be 5½° to 7½°.
3 Check at the following points with falling vacuum :

Inches Hg.	Advance Degrees
11″	5½° – 7½°
9″	3° – 7½°
8″	2° – 6°
6½″	0° – 4°
No advance below 4″ Mercury	

DISTRIBUTOR

SPITFIRE 4

Part Numbers .. .. Delco Remy, 7952800. Standard-Triumph, 209697

Design Data

Moving contact spring tension	17—21 ozs.
Firing angle	0°, 90°, 180°, 270°.
Closed period	36° ± 1°.
Open period	54° ± 1°.
Contact breaker gap	0·020″ ± 0·001″.
Rotation (viewed on rotor arm)	Counter clockwise.

Centrifugal Timing Tests

1. Set 0° at distributor speed less than 400.
2. Run distributor up to 2,500 r.p.m.—advance to be 11°—13°.
3. Check at following decelerating speeds.

Speed r.p.m.	Advance Degrees
1,450	11 — 13
1,200	9·4 — 11·4
900	7·4 - 9·4
500	0 — 1·5

Vacuum Advance Tests	**Check on Rising**
Inches Hg	Advance Degrees
2	0
2½	1½
3	3
5	3 — 7
6	5¼ — 8
7	7 — 9
8	8 — 10
9	8½ — 10½
10	9 — 11 max.

SPITFIRE 4 Mk. 2

Part Numbers .. .. Delco Remy, 7953166. Standard-Triumph 212500

Speed r.p.m.	Advance Degrees	Inches Hg	Advance Degrees
400	0 to 1¾	5	0 to 1
600	3½ ,, 5½	6	¾ ,, 2½
700	6 ,, 8	7	2½ ,, 4¼
1200	7½ ,, 9½	8	4½ ,, 6
1600	9 ,, 11	9	5¾ ,, 7¼
1800	9½ ,, 11½	10	7½ ,, 9½
2000	10¼ ,, 12¼	11	9¼ ,, 10¼
2200	11 ,, 13¼	12	11 ,, 13
2300	11¼ ,, 13¼	16	11 ,, 13

WINDSCREEN WIPER MOTOR

Lucas Model DR.3A	Shunt wound single speed.
Light running speed	44 to 48 cycles per minute of wiper blades.
Stall current	13—15 amps.
Light running currents	2·7—3·4 amps. (Measured less cable and rack).
Resistance of field winding at 20°C. (68°F.) ..	8·0—9·5 ohms.
Resistance of armature winding at 20°C. (68°F.) ..	0·29—0·352 ohms. (Measured between adjacent commutation segments).
Brush tension	125—140 grammes.
Maximum permissible force to move rack in protective tubing with wiper motor disconnected and wiper arms removed	6 lbs. (2·7 kgs.).

BULBS — 12 VOLTS

HERALD 1200 AND COURIER VAN

	Stanpart No.	Watts.	Cap
Headlamps—Left-hand dip	508349	50/40	B.P.F.
—Right-hand dip	59469	36/36	B.F.F.
—Continental (Duplo)	501475	45/50	U.E.C.
—Vertical dip	60796	35/35	B.P.F.
Side (Parking)	59467	6	M.B.C.
Flashers	502379	21	S.B.C.
Stop/Tail	502387	21/6	S.B.C.
Plate Illumination	501436	6	S.B.C.
Panel Illumination and Warning Lamps	59492	2·2	M.E.S.
Interior Illumination—Amber	508997	6	Festoon
—Estate Car	59897	6	Festoon

VITESSE

	Stanpart No.	Watts.	Cap
Headlamps—Unit 1A (inner)—R.H.D.	305562	37½	3-lug
Unit 2A (outer)—R.H.D.	305569	37½/50	3-lug
—Unit 1A (inner)—U.S.A.	305533	37½	3-lug
—Unit 2A (outer)—U.S.A.	305570	37½/50	3-lug
—Unit 1E—L.H.D.	305564	37½	3-lug
—Unit 2E—L.H.D.	305571	37½/50	3-lug
Side (Parking)	59467	6	S.C.C.
Flashers	502379	21	S.B.C.
Stop/Tail	502387	21/6	S.B.C.
Plate Illumination	59467	6	S.C.C.
Panel Illumination and Warning Lamps	59492	2·2	M.E.S.
Interior Illumination—Panel	59897	6	Festoon
—Roof	59897	6	Festoon

SPITFIRE 4

	Stanpart No.	Watts.	Cap
Headlamps—R.H.D.	500482	50/40	B.P.F.
—L.H.D.	59469	36/36	B.F.F.
—L.H.D.	501475	45/50	U.E.C.
—L.H.D.	510218	45/50	B.P.F.
—L.H.D.	510219	45/40	B.P.F.
—L.H.D.	60796	35/35	B.P.F.
Side (Parking)	57591	6	~~S.B.C.~~ SCC
Flashers	502379	21	S.B.C.
Stop/Tail	502287	21/6	S.B.C.
Plate Illumination	501436	4	S.C.C.
— U.S.A. only	59467	6	S.C.C.
Instrument Illumination and Warning Lamps	59492	2·2	M.E.S.

Sealed Beam Lamps—U.S.A.	508574	3-lug
—Continental	506373	3-lug

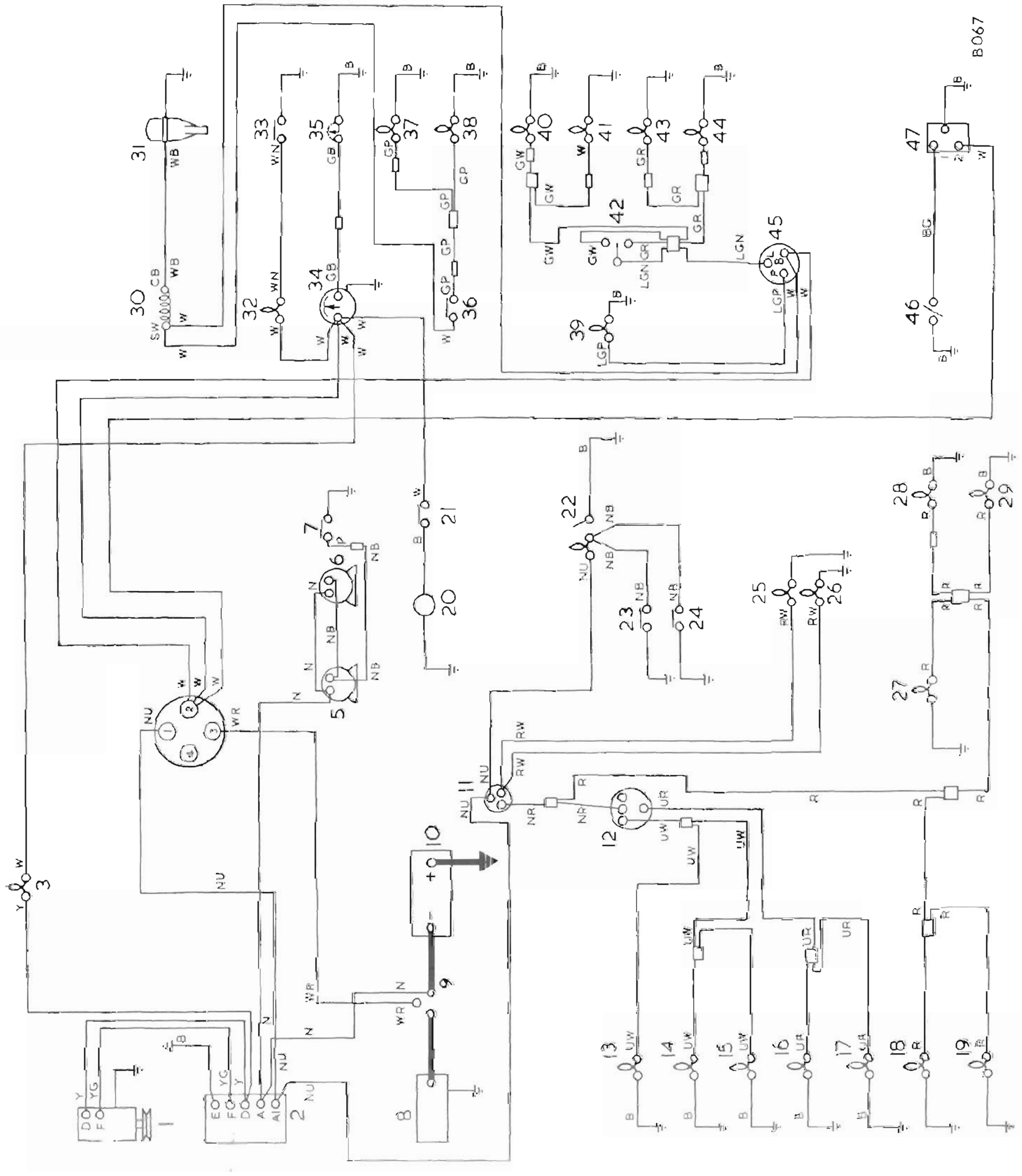


Fig. 1. Circuit diagram for Herald 1200 Saloon, Coupé and Convertible

Key to Fig. 1

1 Generator
2 Control box
3 Ignition warning light
4 Ignition/start switch
5 Horn
6 Horn
7 Horn push
8 Starter motor
9 Starter solenoid switch
10 Battery
11 Master lighting switch
12 Column switch
13 Main beam warning light
14 R.H. headlamp main beam
15 L.H. headlamp main beam
16 R.H. headlamp dip beam
17 L.H. headlamp dip beam
18 L.H. side lamp
19 R.H. side lamp
20 Heater motor
21 Heater switch
22 Interior light and switch
23 R.H. courtesy light switch
24 L.H. courtesy light switch
25 Panel illumination
26 Panel illumination
27 Number plate lamp
28 R.H. tail lamp
29 L.H. tail lamp
30 Ignition coil
31 Distributor
32 Oil pressure warning light
33 Oil pressure switch
34 Fuel gauge
35 Fuel tank unit
36 Stop lamp switch
37 R.H. stop lamp
38 L.H. stop lamp
39 Flasher warning light
40 R.H. rear flasher
41 R.H. front flasher
42 Flasher switch
43 L.H. front flasher
44 L.H. rear flasher
45 Flasher unit
46 Screen wiper switch
47 Screen wiper motor

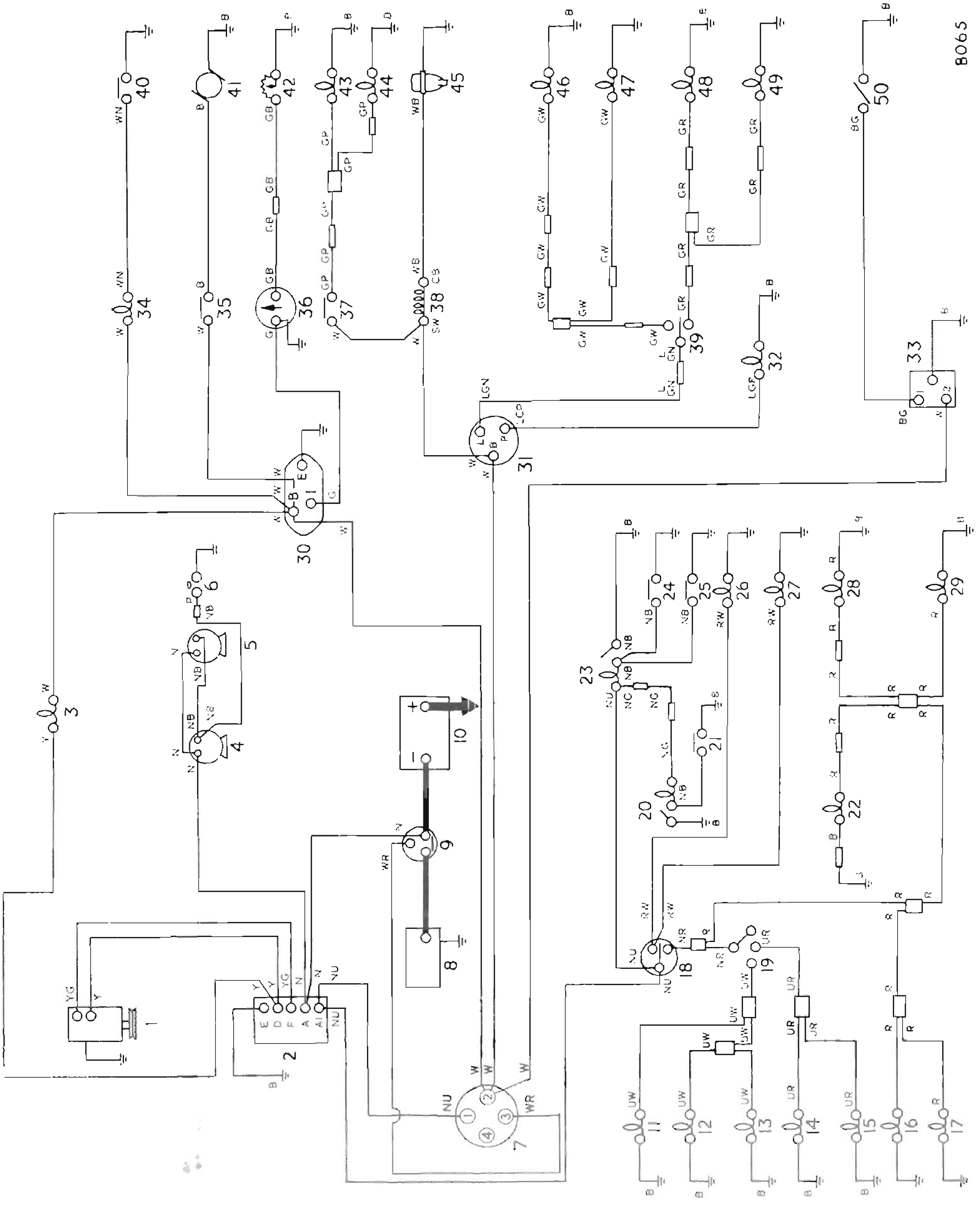


Fig. 2. Circuit diagram for Herald 1200 Estate and Courier Van

Key to Fig. 2

1 Generator
2 Control box
3 Ignition warning light
4 Horn
5 Horn
6 Horn push
7 Ignition/start switch
8 Starter motor
9 Starter solenoid
10 Battery
11 Main beam warning light
12 R.H. headlamp main beam
13 L.H. headlamp main beam
14 R.H. headlamp dip beam
15 L.H. headlamp dip beam
16 L.H. side lamp
17 R.H. side lamp
18 Master light switch
19 Column light switch
20 Tail gate light and switch
21 Tail gate switch
22 Number plate lamp
23 Interior light and switch
24 R.H. courtesy light switch
25 L.H. courtesy light switch
26 Panel illumination
27 Panel illumination
28 R.H. tail lamp
29 L.H. tail lamp
30 Voltage stabilizer
31 Flasher unit
32 Flasher warning light
33 Wiper motor
34 Oil pressure warning light
35 Heater switch
36 Fuel gauge
37 Stop lamp switch
38 Ignition coil
39 Flasher switch
40 Oil pressure switch
41 Heater motor
42 Tank unit
43 L.H. stop light
44 R.H. stop light
45 Distributor
46 R.H. rear flasher
47 R.H. front flasher
48 L.H. rear flasher
49 L.H. front flasher
50 Wiper switch

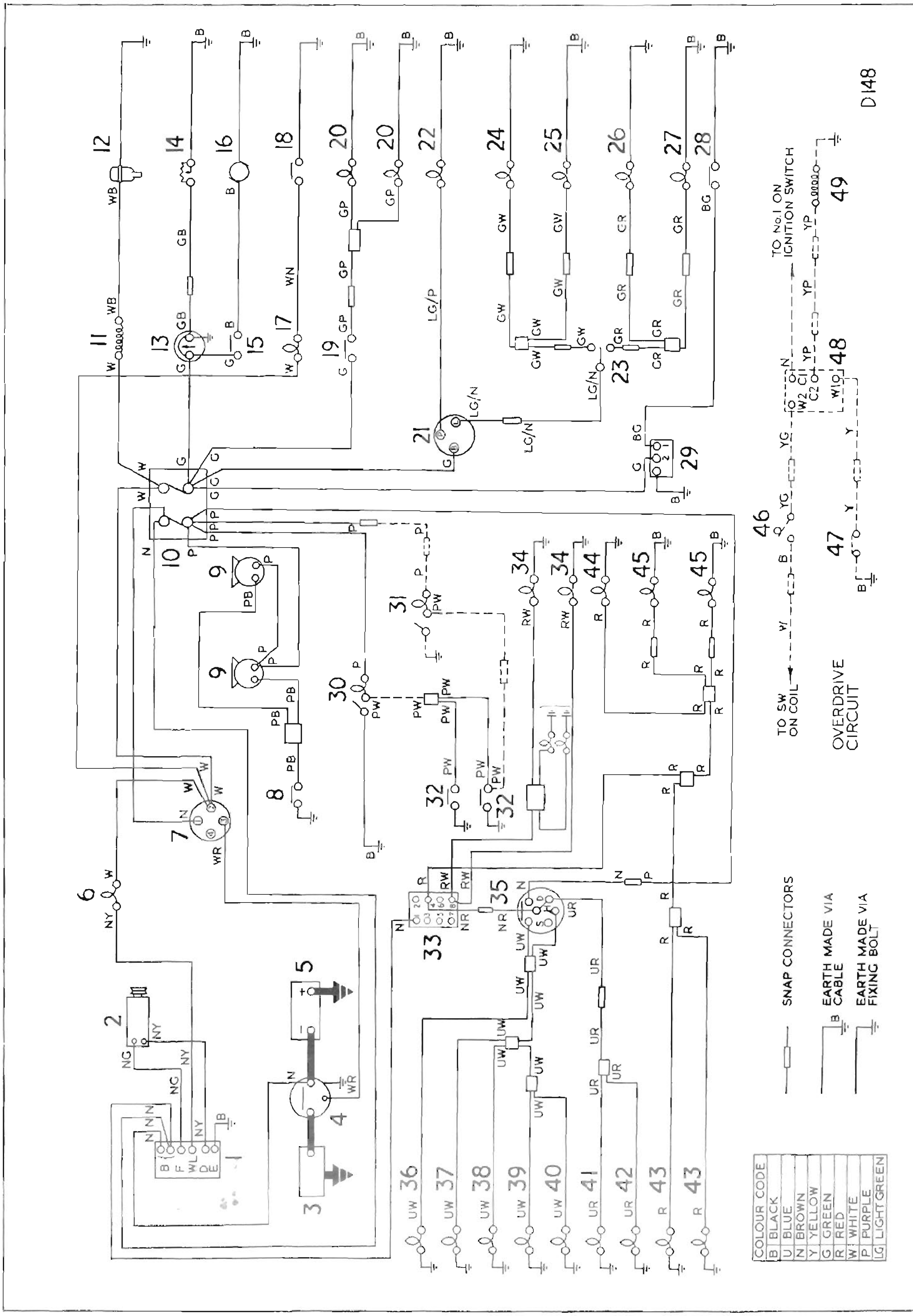


Fig. 3. Circuit diagram for Vitesse

The facia lamp (30) is operated from the courtesy switches (32), on Convertible models. On Saloon models, these switches operate the roof lamp (31) (which is not fitted to Convertible models) and the facia lamp is independently controlled.

Key to Fig. 3

1 Regulator
2 Generator
3 Starter motor
4 Starter solenoid
5 Battery
6 Ignition warning light
7 Ignition/start/accessory switch
8 Horn push
9 Twin horns
10 Fuse box
11 Coil
12 Distributor
13 Fuel gauge
14 Tank unit
15 Heater switch*
16 Heater motor*
17 Oil pressure warning light
18 Oil pressure switch
19 Stop lamp switch
20 Stop lamps
21 Flasher unit
22 Flasher warning lights
23 Flasher switch
24 R.H. front flasher
25 R.H. rear flasher
26 L.H. front flasher
27 L.H. rear flasher
28 Wiper switch
29 Wiper motor
30 Facia lamp
31 Roof lamp
32 Courtesy switch
33 Master lighting switch
34 Panel light
35 Column lighting and headlamp flasher switch
36 Main beam warning light
37 L.H. outer main beam
38 L.H. inner main beam
39 R.H. outer main beam
40 R.H. inner main beam
41 L.H. dip beam
42 R.H. dip beam
43 L.H. side lamp
R.H. side lamp
44 Number plate illumination lamp
45 R.H. tail lamp
L.H. tail lamp
46 Overdrive switch
47 Gearbox switch
48 Relay
49 Solenoid

* Special Order.

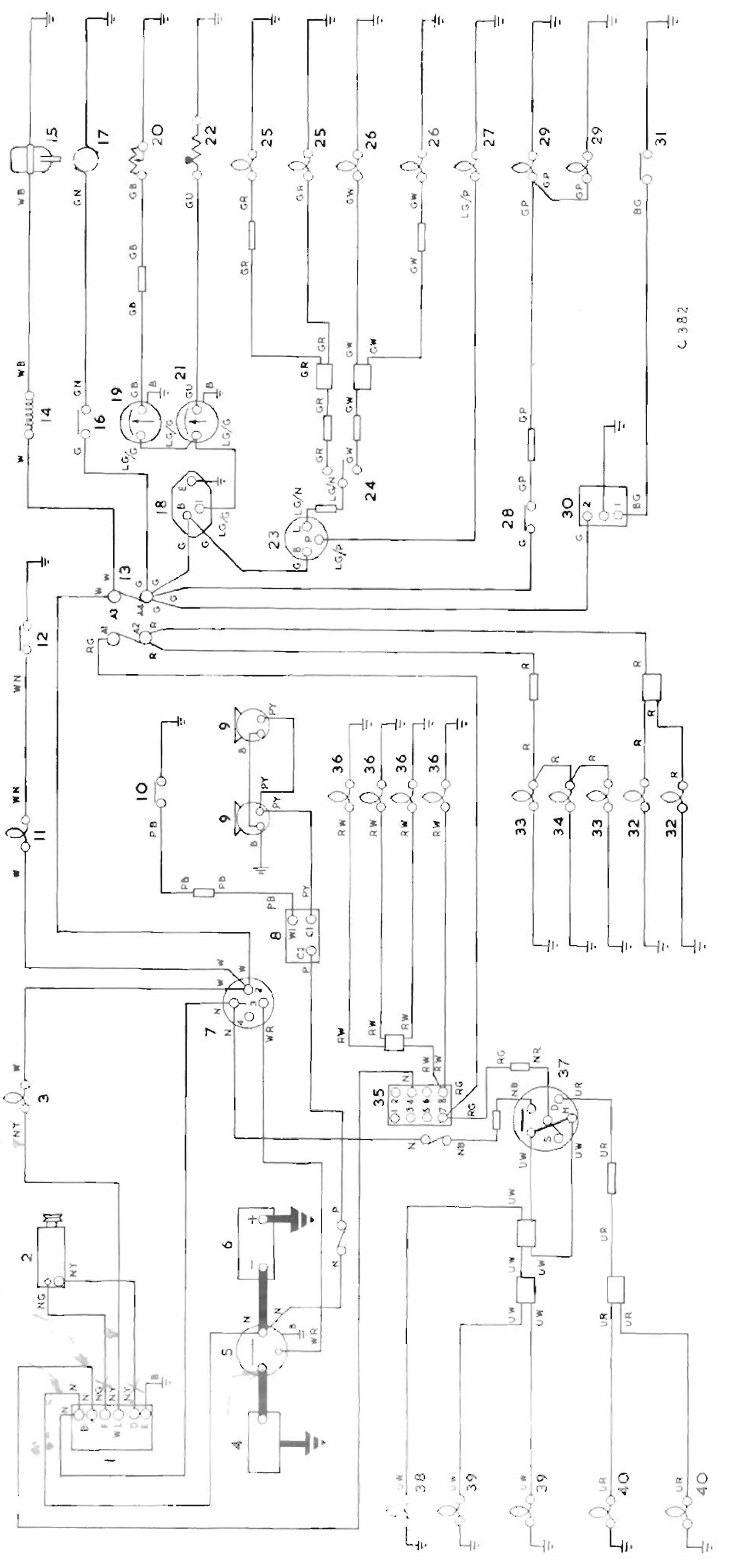


Fig. 4. Circuit diagram for Spitfire 4

Key to Fig. 4

1 Control box
2 Generator
3 Ignition warning lamp
4 Starter motor
5 Starter solenoid
6 Battery
7 Ignition/starter switch
8 Horn fuse
9 Horns
10 Horn push
11 Oil warning lamp
12 Oil pressure switch
13 Fuse unit
14 Ignition coil
15 Distributor
*16 Heater blower switch
*17 Heater blower motor
18 Voltage stabilizer
19 Fuel indicator
20 Fuel tank unit
21 Temperature indicator
22 Temperature transmitter
23 Flasher unit
24 Turn signal switch
25 Turn signal lamps, left-hand side
26 Turn signal lamps, right-hand side
27 Turn signal monitor
28 Brake/stop lamp switch
29 Brake/stop lamps
30 Windscreen wiper motor
31 Wiper motor switch
32 Front parking lamps
33 Tail lamps
34 Plate illumination lamps
35 Master lighting switch
36 Instrument illumination
37 Steering column light switch
38 Main beam warning lamp
39 Headlamp main beams
40 Headlamp dipped beams

* SPECIAL ACCESSORY

CABLE COLOUR CODE

B Black	**G Green**	**L Light**	**N Brown**	**R Red**	**U Blue**	**Y Yellow**
D Dark	**K Pink**	**M Medium**	**P Purple**	**S Slate**	**W White**	

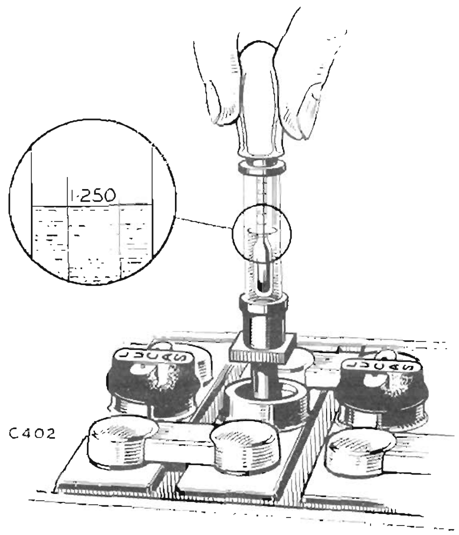


Fig. 5. Using a hydrometer to measure the specific gravity

TABLE 1. SPECIFIC GRAVITY OF ELECTROLYTE

Battery Condition	Climates below 90°F. (32°C.)	Climates over 90°F. (32°C.)
Fully charged	1·270 – 1·290	1·210 – 1·230
Half discharged ..	1·190 - 1·210	1·130 1·150
Completely discharged	1·110 1·130	1·050 - 1·070

TABLE 2.
SPECIFIC GRAVITY OF ACID REQUIRED FOR FILLING

Quantity to half-fill each 2-volt cell	Specific gravity of electrolyte corrected to 60°F. (15·5°C.)	
	Climates below 90°F. (32°C.)	Climates over 90°F. (32°C.)
½ Pint	1·270 (30·83° Baume)	1·210 (25·16° Baume)

TABLE 3. PROPORTIONS OF ACID AND WATER

To obtain specific gravity when cooled to 60°F. (15·5°C.)	Add one part by volume of Acid (1·835 S.G.) to distilled water by volume as below.
1·210	4·0 parts
1·215	3·9 ,,
1·260	3·1 ,,
1·270	2·9 ,,
1·275	2·8 ,,
1·290	2·7 ,,
1·320	2·3 ,,
1·340	2·0 ,,

BATTERY

If the battery is subjected to long periods of discharge without suitable opportunities for re-charging, a low state of charge can be expected. A defect in the charging system can also result in a discharged battery.

There are two reliable methods of assessing battery conditions. (1) Checking the specific gravity of the electrolyte, and (2) high rate discharge test.

1. Hydrometer Test

The specific gravity of the electrolyte varies with battery conditions (see table 1), and also with temperature, which should be corrected to the standard of 60°F. (15·6°C.) as outlined in table 4.

If it is necessary to top up the electrolyte, do not attempt to take a reading until the battery has been on charge for at least one hour. There should be little variation in the specific gravity readings between one cell and another of a battery in reasonably good condition.

A large variation, which is not the result of electrolyte loss, is probably an indication of an internal short circuit. If the electrolyte is very dirty, or contains small particles in suspension, it is possible that the plates are in bad condition.

2. Discharge Test

The high rate discharge test gives an indication of the condition and capacity of the battery. On test, the battery should maintain 100 amp. flow for 10 seconds with no appreciable fall in voltage.

Where a hand instrument (incorporating a low resistance device) is used for checking the individual cells of a battery, the actual reading obtained will depend upon the exact type of instrument used, but the cell voltage on a 5 to 6 seconds test should remain steady between 1·2 and 1·7 volts.

Variations in individual cell readings can indicate faults, but if all cells in any one battery fall below standard, recharge and again test before rejecting the battery.

Never make a high rate discharge test on a battery known to be low in charge.

Re-Charging from and external supply

If the above tests indicate that the battery is merely discharged and is otherwise in a good conditions, it should be re-charged until the specific gravity and voltage show no increase over three successive hourly readings.

Preparing New, Unfilled, Uncharged Batteries

Batteries should not be filled with electrolyte until required for initial charging. Approximately one pint (570 c.c.) of electrolyte is needed for each cell.

Electrolyte of the specific gravity is prepared by mixing distilled water and concentrated sulphuric acid, usually of 1·835 S.G. either in a lead-lined tank or in suitable glass or earthenware vessel. Slowly add the acid to the water, stirring with a glass rod. Never add the water to the acid, as the resulting chemical reaction causes violent and dangerous spurting of the concentrated acid.

The approximate proportions of acid and water are indicated in table 3.

Heat is produced by the mixture of acid and water. Allow the electrolyte to cool before taking hydrometer readings, or pouring it into the battery.

Filling the Cells

The temperature of the electrolyte, battery and filling room must not be below 32°F. (0°C.) freezing.

Break the seals in the filling holes or remove the moulded pegs from the vent plugs and half-fill each cell with electrolyte of the appropriate specific gravity. Allow the battery to stand for six hours and fill to the top of the separators. Allow to stand for a further two hours and then proceed with the initial charge.

Initial Charge

Charge at a constant 3·5 amperes for 40 to 80 hours until the voltage and specific gravity readings show no increase over five successive hourly readings.

If the temperature of any cell rises 20°F. (11·1°C.) above the ambient temperature, interrupt the charge until the temperature has fallen at least 10°F. (5·6°C.) below that figure. Keep the electrolyte level with the top of the separator guard by adding electrolyte of the same specific gravity as the original filling. Continue the charge until specific gravity and voltage readings remain constant for five successive hourly readings.

At the end of the charge, check and if necessary, adjust the specific gravity in each cell when corrected to 60°F. (15·6°C.). To adjust, siphon off some of the electrolyte and replace it either by distilled water or by electrolyte of the strength originally used for filling. Continue the charge for an hour or so to ensure adequate mixing of the electrolyte.

Preparing New, Dry-Charged Batteries

Break the seals in the filling holes and fill each cell with electrolyte of correct specific gravity to the top of the separators. The temperature of the filling room, battery and acid should be maintained at between 60°F. (15·6°C.) and 120°F. (48·8°C.). If the battery has been stored in a cool place, allow it to warm up to room temperature before filling.

Batteries filled in this way are up to 90 per cent. charged. When time permits, a freshening charge may be given at normal charging rate of 5 amps. for not more than 4 hours. Check the specific gravity of the electrolyte at the end of the charge; if 1·270 electrolyte was used, the specific gravity should now be between 1·270 and 1·290; if 1·210 electrolyte between 1·210 and 1·230.

TABLE 4.
SPECIFIC GRAVITY TEMPERATURE CORRECTION

Electrolyte Temperature		Correction required to obtain true specific gravity at 60°F. (15·5°C.).
Degrees F.	Degrees C.	
50	10·0	Deduct ·004 from observed reading
55	12·7	,, ·002 ,, ,, ,,
60	15·5	Normal
65	18·3	Add ·002 to ,, ,,
70	21·1	,, ·004 ,, ,, ,,
75	23·8	,, ·006 ,, ,, ,,
80	26·6	,, ·008 ,, ,, ,,
85	29·4	,, ·010 ,, ,, ,,
90	32·2	,, ·012 ,, ,, ,,
95	35·0	,, ·014 ,, ,, ,,
100	37·7	,, ·016 ,, ,, ,,
110	43·3	,, ·020 ,, ,, ,,
120	48·8	,, ·024 ,, ,, ,,

TABLE 5. MAXIMUM PERMISSIBLE ELECTROLYTE TEMPERATURE DURING CHARGING

Climates below 80°F. (26·6°C.)	Climates between 80–100°F. (26·6 – 37·7°C.)	Climates above 100°F. (37·7°C.)
100°F. (37·7°C.)	110°F. (43·3°C.)	120°F. (48·8°C.)

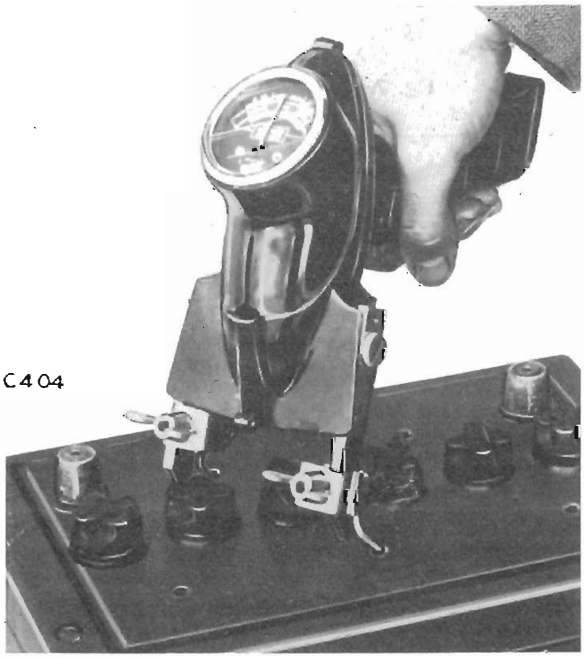
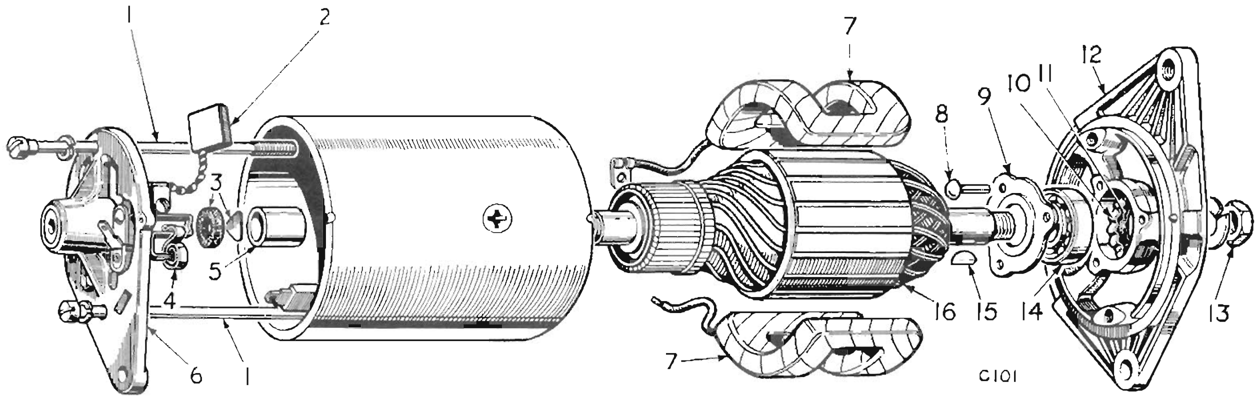

C404

Fig. 6. Using a heavy discharge tester



1 Bolts
2 Brush
3 Felt ring and aluminium sealing disc
4 Brush spring
5 Bearing bush
6 Commutator end bracket
7 Field coils
8 Rivet
9 Bearing retainer plate
10 Corrugated washer
11 Felt washer
12 Driving end bracket
13 Pulley retainer nut
14 Bearing
15 Woodruff key
16 Armature

Fig. 7. Dismantled generator

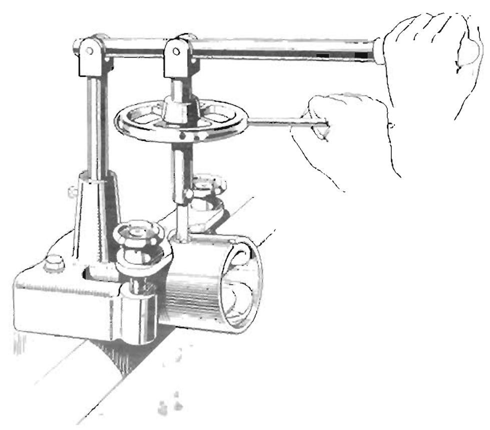


Fig. 8. Removing the pole pieces from the yoke

GENERATOR

To Dismantle

Remove the generator from the engine, extract the driving pulley and take out the woodruff key (15). Remove two bolts and withdraw the commutator end bracket (6) from the yoke. Note the fibre thrust washer adjacent to the commutator.

Withdraw the armature (16) and drive end bracket (12) complete with bearing. Support the bearing retaining plate (9) and press the shaft from the drive end bracket.

Field Coils

Renew as follows:—

1. Drill out the rivet securing the field terminal assembly to the yoke and unsolder the field coil connections.
2. Remove the insulation piece which prevents the junction of field coils from contacting the yoke.
3. Mark the yoke and pole shoes so that they can be refitted to their original positions.
4. Unscrew the pole shoe retaining screws, remove the pole shoes and lift off the coils.
5. Fit the new field coils over the pole shoes and re-position them inside the yoke.
6. Locate the pole shoes and field coils by lightly tightening the retaining screws; fully tighten them by using a wheel operated screwdriver. Lock the screws by caulking.
7. Replace the insulation piece between the field coil connections and the yoke.
8. Re-solder the field coil connections to the field coil terminal tags and rivet the assembly to the yoke.

Commutator

Burned commutator segments may be caused by an open-circuit in the armature windings. If armature testing facilities are not available, test the armature by substitution.

The commutator should be smooth and free from pits or burned spots. Slight burning may be rectified by careful polishing with a strip of fine glasspaper while rotating the armature. To remedy a badly worn commutator, mount the armature, with or without the drive end bracket, in a lathe. Rotate the armature at high speed and take a light cut with a very sharp tool, removing as little metal as is necessary to clean up the commutator. Polish the commutator with very fine glasspaper and undercut the insulators between segments to a depth of 1/32" (0·8 mm.), using a hacksaw blade ground to the thickness of the insulator (Fig. 9).

Brushes

Check that the brushes move freely in their holders, by holding back the tension springs and pulling gently on the flexible connectors. If a brush is inclined to stick, remove it from its holder and clean its sides with a petrol-moistened cloth.

Replace the brushes in their original position or renew those which are less than 11/32" (8·7 mm.) in length.

Test the brush spring tension using a spring scale. Fit new springs if the tension is below 15 ozs.

Bearings

Replace the bearing bush in a commutator end bracket as follows:—

Remove the old bearing bush from the end bracket by screwing a 5/8" tap squarely into the bush for a few turns and pulling out the bush with the tap.

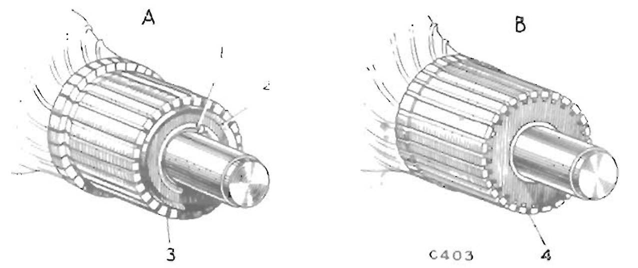
Insert the felt ring and aluminium disc (3) in the bearing housing and using a shouldered mandrel press the new bearing bush into the end bracket until the bearing is flush with the inner face of the bracket.

Replace the ball bearing at the driving end as follows:—

1. Drill out the rivets (8) and remove the plate (9).
2. Press the bearing (14) from the end bracket (12) and remove the corrugated washer (10), felt washer (11) and oil retaining washer.
3. Clean and pack the replacement bearing with high melting point grease, such as Energrease RBB.3 or equivalent.
4. Place the oil retaining washer, felt washer and corrugated washer in the bearing housing and press in the bearing housing and press in the bearing.
5. Fit and rivet the retaining plate to the end bracket.

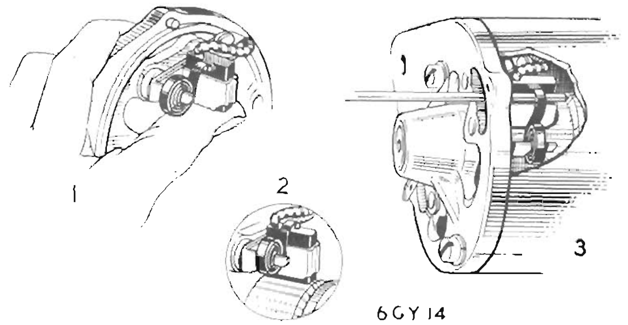
Re-assembly

1. Supporting the inner journal of the bearing to prevent damage, press the armature through the bearing assembled in the drive end bracket.
2. Assemble the armature and end bracket to the yoke.
3. Hold the brushes up by positioning each brush spring at the side of its brush.
4. Fit the commutator end bracket on the armature shaft until the brush boxes are partly over the commutator. Press each brush down on the commutator and move its spring to the operating position.
5. Fit the commutator end bracket to the yoke and refit the bolts (1).



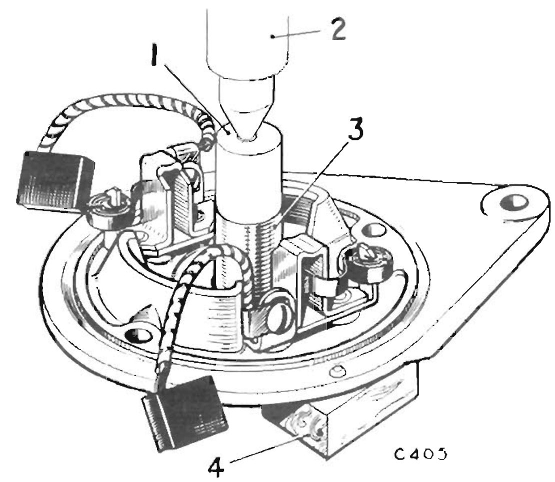
A. Fabricated commutator. B. Moulded commutator.
1 Metal roll-over
2 Insulating cone
3 Slot depth—0·032" (0·81 mm.) maximum
4 Slot depth 0·02" to 0·035" (0·508 to 0·89 mm.).

Fig. 9. Commutator details



1 Method of trapping brush in raised position with spring
2 Normal working position
3 Method of releasing brush on to commutator

Fig. 10. Fitting commutator end bracket to "windowless" yoke generator



1 Mandrel
2 Press
3 Bush
4 Wood blocks

Fig. 11. Fitting a new bearing to the commutator end bracket

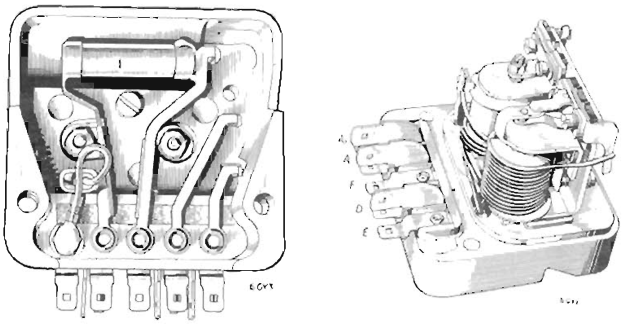
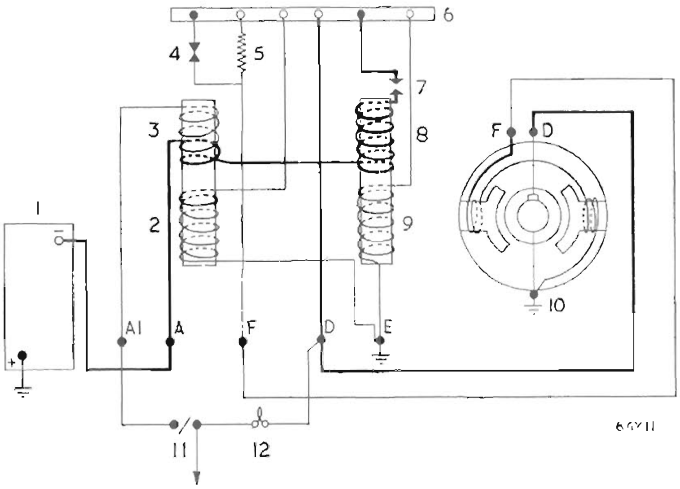


Fig. 12. The voltage regulator and cut-out



1 Battery
2 Voltage regulator relay coil
3 Split series coil
4 Voltage regulator contacts
5 Resistor
6 Main frame
7 Cut-out contacts
8 Series winding
9 Cut-out relay coil
10 Generator
11 Ignition switch
12 Ignition warning lamp

Nos. 2 to 9 are incorporated in the control box.

Fig. 13. Circuit diagram of generating system (Herald)

CONTROL BOX (HERALD 1200)

The control box shown in Fig. 12 contains two units — a voltage regulator and a cut-out. Although combined structurally, the regulator and cut-out are electrically separate.

The regulator is set to maintain the generator terminal voltage between close limits at all speeds above the regulating point, the field strength being controlled by the automatic insertion and withdrawal of a resistor in the generator field circuit.

Cleaning Contacts

(i) Regulator Contacts — use fine carborundum stone or silicon carbide paper.

(ii) Cut-out Relay Contacts — use a strip of fine glasspaper — never carborundum stone or emery cloth.

Voltage Regulator — Electrical Setting

It is important that only a good quality MOVING COIL VOLTMETER (0·20 volts) is used when checking the regulator.

Remove the cover and insert a thin piece of cardboard between the armature and the core face of the cut-out to prevent the contacts from closing.

Start the engine and slowly increase its speed until the generator reaches 3,000 r.p.m., when the open circuit voltage reading should be between the appropriate limits given on page 6·101, according to the ambient temperature.

If the voltage, at which the reading becomes steady, occurs outside these limits, adjust the regulator by turning the adjusting screw clockwise to raise the voltage or counter clockwise to lower.

Adjustment of regulator open-circuit voltage should be completed within 30 seconds otherwise heating of the shunt windings will cause false settings to be made.

Remove the cardboard.

Voltage Regulator — Mechanical Setting

A copper separator, in the form of a disc or square, is welded to the core face of the voltage regulator, and affects the gap setting between the core-face and the underside of the armature as follows:—

Where a round separator is used, the air gap should be 0·015″ (0·38 mm.).

Where a square separator is used, the air gap should be 0·021″ (0·53 mm.).

To adjust the air gap:—

Slacken the fixed contact locking nut and unscrew the contact screw until it is well clear of the armature moving contact.

Slacken the voltage adjustment spring-loaded screw until it is well clear of the armature tension spring.

Slacken the two armature assembly securing screws.

Insert a gauge of sufficient width to cover the core face, and of the appropriate thickness, between the armature and copper separator.

Press the armature squarely down against the gauge and re-tighten the two armature assembly securing screws. Without removing the gauge, screw in the fixed contact adjustment screw until it just touches the armature contact. Re-tighten the locking nut.

Re-check the electrical setting of the regulator.

CUT-OUT

Electrical Setting

If the regulator is correctly set but the battery is still not being charged, the cut-out may be out of adjustment. To check the voltage at which the cut-out operates, remove the control box cover and connect the voltmeter between the terminals D and E. Start the engine and slowly increase its speed until the cut-out contacts are seen to close, noting the voltage at which this occurs. This should be 12·7 - 13·3 volts.

If operation of the cut-out takes place outside these limits, it will be necessary to adjust. To do this, turn the adjusting screw in a clockwise direction to raise the voltage setting or in a counter clockwise direction to reduce the setting. Turn the screw only a fraction of a turn at a time and test after each adjustment by increasing the engine speed and noting the voltmeter readings at the instant of contact closure. Electrical settings of the cut-out, like the regulator, must be made as quickly as possible, because of temperature rise effects. Tighten the locknut after making the adjustment. If the cut-out does not operate, there may be an open circuit in the wiring of the cut-out and regulator unit, in which case the unit should be removed for examination or replacement.

Cut-out Relay

Slacken the adjustment screw until it is well clear of the armature tension spring.

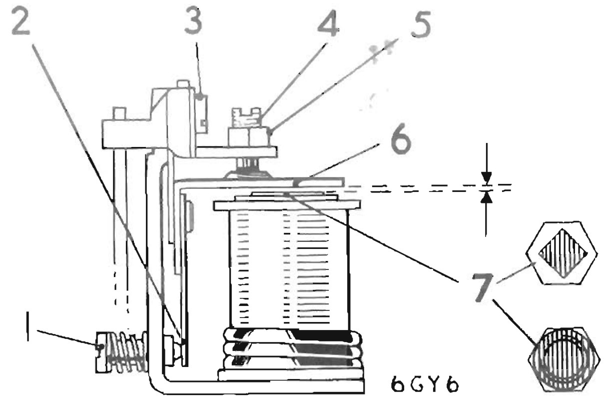
Slacken the two armature securing screws.

Press the armature squarely down against the core face (copper sprayed in some units, fitted with a square of copper in others) and re-tighten the armature securing screws. No gauge is necessary.

With the armature still pressed against the core face, adjust the gap between the armature stop arm and the armature tongue to 0·032" (0·81 mm.) by bending the stop arm.

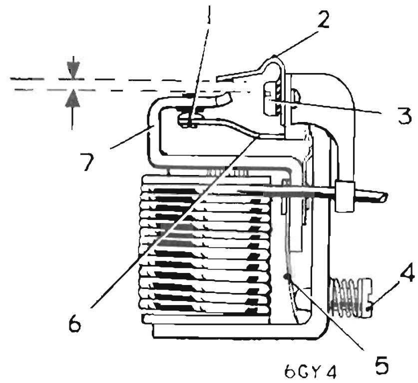
Adjust the fixed contact blade so that it is deflected 0·015" (0·38 mm.) by the armature moving contact when the armature is pressed against the core face.

Re-check the electrical setting of the cut-out.



1 Voltage adjusting screw
2 Armature tension spring
3 Armature securing screws
4 Fixed contact adjustment screw
5 Locknut
6 Armature
7 Core face and shim

Fig. 14. Regulator air-gap settings



1 Follow through 0·010" to 0·020" (0·254 to 0·508 mm.)
2 Stop arm
3 Armature securing screws
4 Cut-out adjusting screw
5 Armature tension spring
6 Fixed contact blade
7 Armature tongue and moving contact

Fig. 15. Cut-out air gap settings

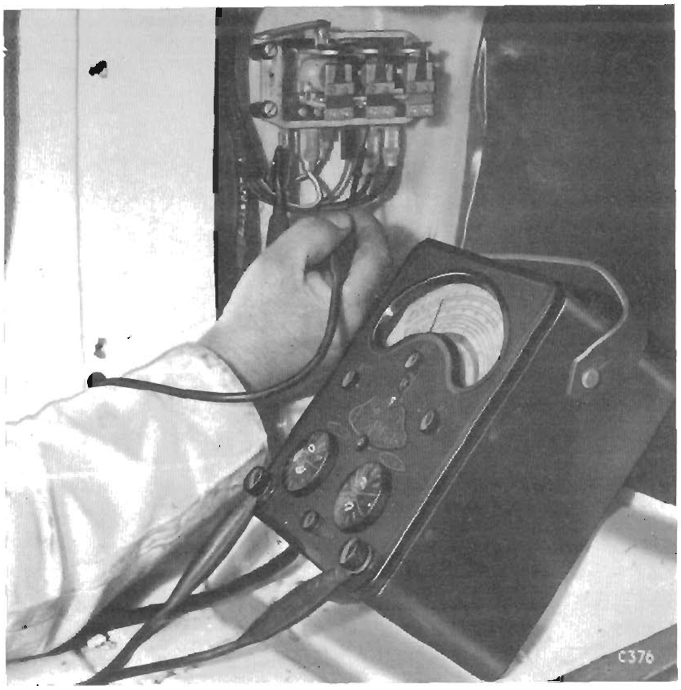


Fig. 16. Vitesse control box located behind left-hand side kick pad

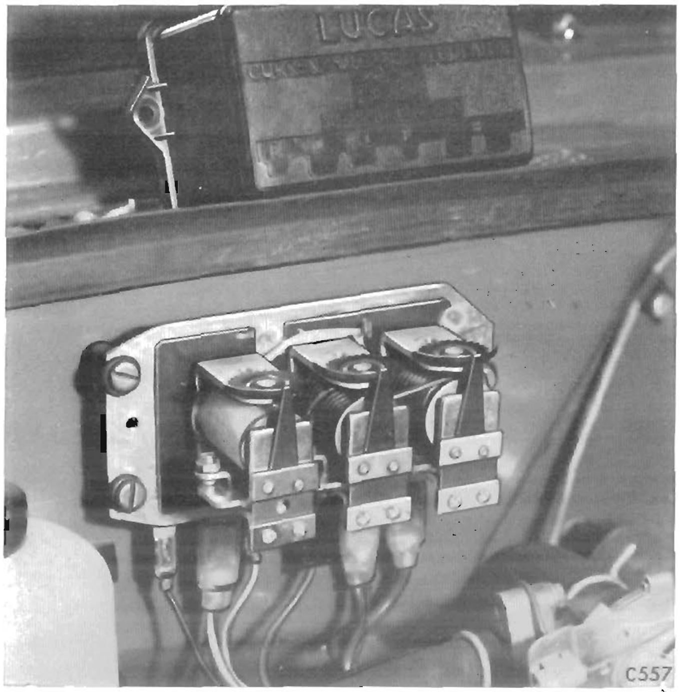


Fig. 17. Spitfire control box on dash panel

CONTROL BOX

VITESSE AND SPITFIRE

Control box Model RB.340, is an electro-magnetically operated three-bobbin unit, operating on the current-voltage system of generator output regulation.

The control box comprises two separate vibrating armature type single contact regulators and a cut-out relay on a rubber mounted base plate. One regulator is responsive to changes in current and the other to voltage.

Electrical and Mechanical Settings

Except for adjustment of the cut-out relay drop-off voltage, which is effected by bending the fixed contact bracket, electrical settings are made by turning the toothed adjustment cam on the front of each frame. A special tool is available for this purpose. Rotation of the cam varies the spring tension acting on the associated armature.

The back air gaps are non-adjustable and the mechanical settings are restricted to the armature-to-bobbin core air gaps.

All bench settings in service must be made with the control box mounted as on the vehicle. Such settings should be made using a generator of the same model as that normally associated with the unit on the vehicle.

Temperature Compensation

The resistance of the coils in the cut-out and regulator rises and falls with temperature changes, and is caused by the ambient working conditions and the passage of the operating current through the coils.

The bi-metal strip on the cut-out suspension and voltage regulator springs, offsets the effect of temperature fluctuation on control box settings. This temperature effect is further minimised by the swamp resistors connected in series with the two shunt coils, which permit coils of lower resistance to be used.

The current regulator is not compensated, since the resistance of its coil is too low to vary significantly with temperature changes.

Figures for checking and setting of open circuit voltages are specified in Table 6.

Table 6

Ambient Temperature		Open Circuit Voltage SETTING
10°C. (50°F.)		14·9 — 15·5
20°C. (68°F.)	..	14·7 — 15·3
30°C. (86°F.)	..	14·5 — 15·1
40°C. (104°F.)	..	14·3 — 14·9

1 Swamp resistors
2 Cut-out relay coil
3 Cut-out relay current coil
4 Cut-out relay contacts
5 Current/control relay contacts
6 Current control relay coil
7 Contacts resistor
8 Voltage control relay contacts
9 Voltage control relay coil
10 Battery
11 Generator field coils
12 Generator armature

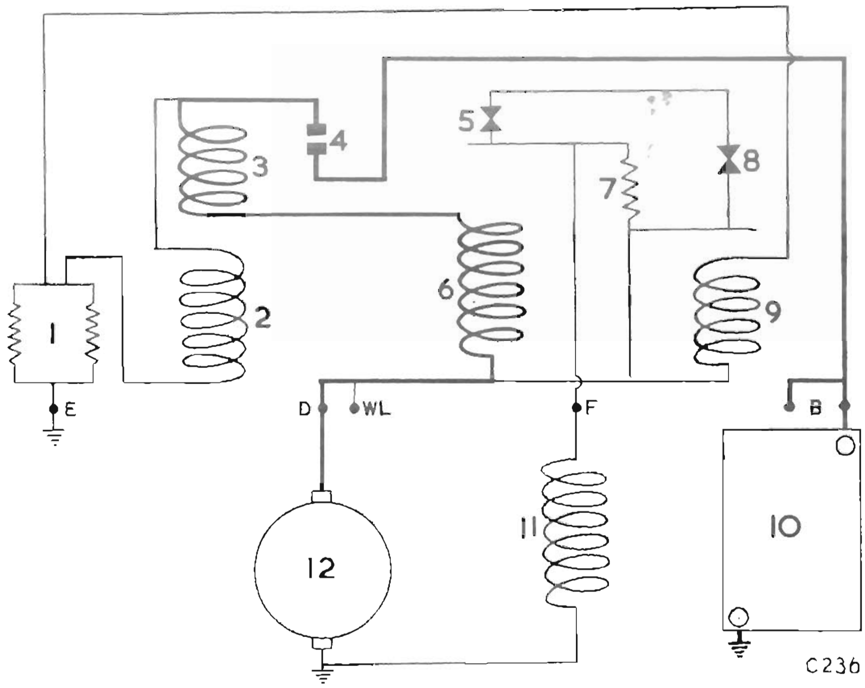


Fig. 18. Changing circuit diagram for Vitesse and Spitfire

Checking Charging Circuit

Before disturbing electrical or mechanical adjustments examine as described below to ensure that the fault does not lie outside the control box:—

In the event of reported undercharging, ascertain that this is not due to low mileage.

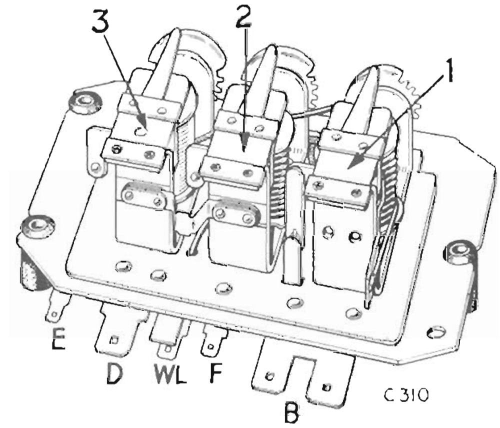
Check the battery by substitution or with an hydrometer and a heavy discharge tester.

Inspect the generator driving belt. This should be just taut enough to drive without slipping.

Inspect the wiring of the charging circuit and carry out continuity tests between the generator and control box.

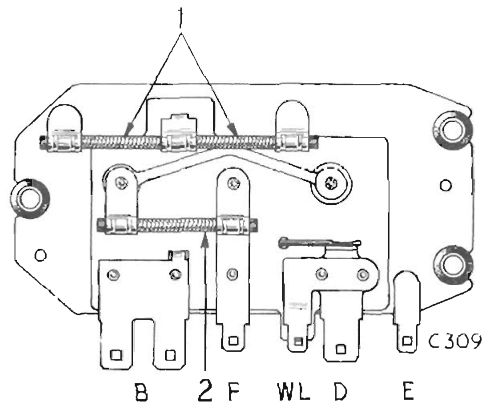
Check earth connections, particularly that of the control box.

When making electrical and mechanical adjustments, always aim for the nominal setting.



1 Cut out
2 Current regulator
3 Voltage regulator

Fig. 19. Top side view of RB340 control box



1 Ballast resistors 2 Field resistor

Fig. 20. Underside view of RB340 regulator

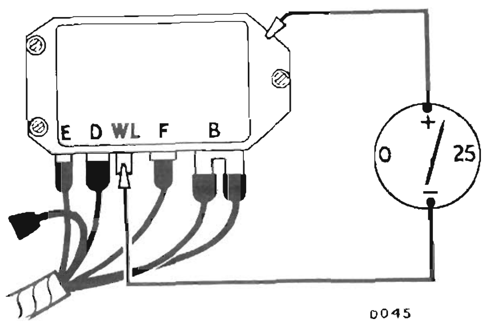
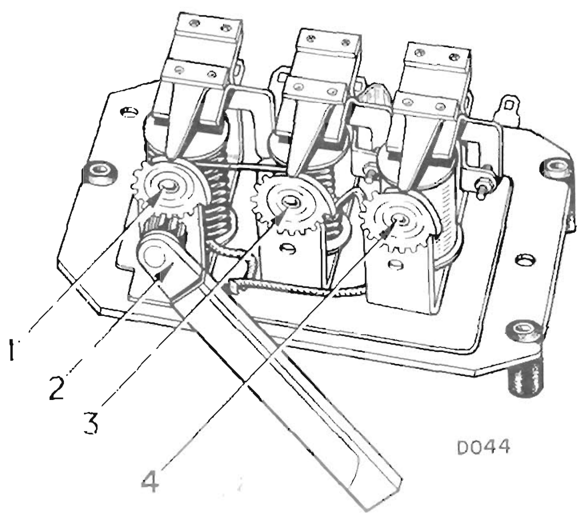


Fig. 21. Checking cut-in voltage



1 Cut-out 3 Current regulator
2 Special tool 4 Voltage regulator

Fig. 22. Adjusting cut-out

Voltage Regulator Open Circuit Setting

Complete the checks and adjustments as rapidly as possible to avoid errors arising from over-heating of the operating coil.

Remove the cover and insert a piece of cardboard between the armature and core of the cut-out to prevent the contacts closing.

Connect a first-grade 0-20 volt moving-coil voltmeter between control box terminal 'D' and a good earthing point.

NOTE: A convenient method of making this connection is to withdraw the ignition warning light cable from terminal 'WL' and clip the voltmeter negative cable to the exposed small terminal blade. This terminal is electrically common with terminal 'D'.

Start the engine and run the generator at 3,000 r.p.m.

Observe the voltmeter reading. This should be between the limits given in Table 6, according to the temperature.

An unsteady reading (*i.e.*, one fluctuating more than ± 0·3 volt) may be due to unclean contacts. If the reading is steady but occurs outside the appropriate limits, adjust as follows:—

Using the special tool, turn the voltage adjustment cam until the correct setting is obtained by turning the tool clockwise to raise the setting or counter clockwise to lower it.

Check the setting by stopping the engine and then again raising the generator speed to 3,000 r.p.m.

Restore the original connection and remove the cardboard.

Cut-out Relay Electrical Settings

Checking and Adjusting Cut-in Voltage

Complete the checks and adjustments as rapidly as possible to avoid errors arising from over-heating of the operating coil.

Connect a first-grade moving-coil voltmeter between control box terminal 'WL' and a good earthing point.

Switch on an electrical load, such as the headlamps. Start the engine and slowly increasing its speed, observe the voltmeter reading.

The voltage should rise steadily and then drop slightly at the instant of contact closure. The cut-in voltage is that which is indicated immediately before the pointer drops back. It should occur between the limits given in table 6.

If the cut-in occurs outside these limits, reduce the engine speed to below the cut-in value and adjust as follows:—

Using the special tool, turn the cut-out relay adjustment cam clockwise to raise the setting or counter clockwise to lower it.

Switch off the engine, restore the original connections and refit the cover.

Checking and Adjusting Drop-off Voltage

Disconnect the cables from terminal 'B-B' and connect the 'S.W.' terminal on the coil to the battery. Connect a first-grade moving-coil voltmeter between control box terminal 'B-B' and earth.

Start the engine and run up to approximately 3,000 r.p.m. Slowly decelerate, and observe the voltmeter reading.

Opening of the contacts is indicated when the voltmeter pointer drops to zero. This should occur between the limits given in Table 6. If the drop-off occurs outside these limits, adjust as follows: —

Stop the engine and remove the control box cover.

Adjust the drop-off voltage by carefully bending the fixed contact bracket. Reducing the contact gap will raise the drop-off voltage; increasing the gap will lower the drop-off voltage.

NOTE : This should result in a contact "follow through" or blade deflection of 0·010" to 0·020" (0·25 to 0·51 mm.).

Restore the original connections and refit the cover.

Current Regulator Maximum Load Setting

The generator must be developing its maximum rated output at the time of setting.

Remove the control box cover.

Insert a piece of cardboard between the armature and core face of the voltage regulator to prevent the contacts of the regulator opening.

Withdraw the cables from the control box terminal blades 'B-B' and connect the cables from terminals 'B-B' to the load side of a first-grade 0 to 40 ampere moving-coil ammeter.
NOTE : Ensure that terminal 'B' carries only this one connection.

Switch on all lights and equipment. Run the engine at approximately 3,000 r.p.m. and observe the ammeter reading, which should be steady and indicate the maximum rated output of the generator.

An unsteady reading (*i.e.*, one fluctuating more than ± 1 ampere) may be due to unclean contacts. If the reading is too high or too low, adjust as follows:—

Using the special tool, turn the current adjustment cam clockwise to raise the setting and counter clockwise to lower it.

Switch off the engine and restore the original connections.

Remove the cardboard and refit the control box cover.

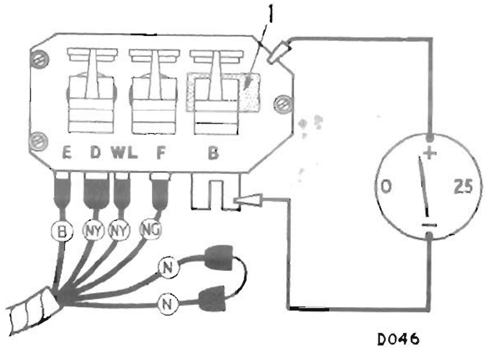
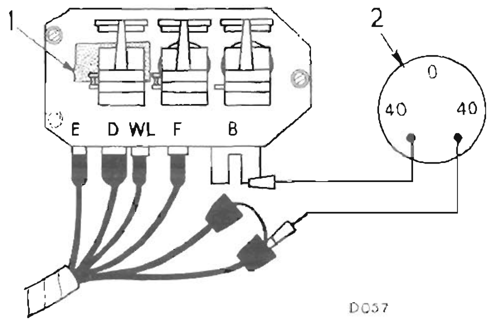
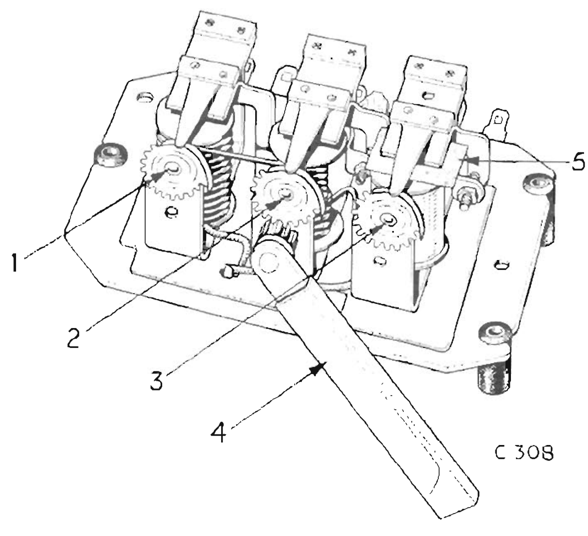


Fig. 23. Checking drop off voltage



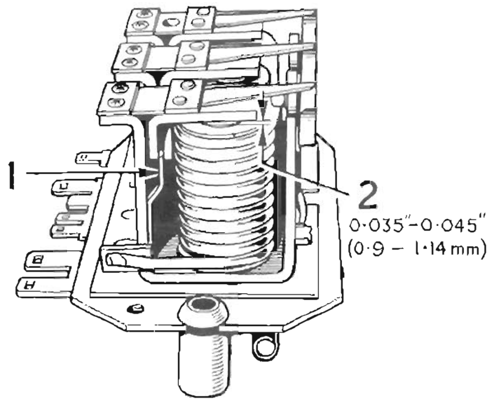
1 Cardboard under cut-out armature
2 0 - 40 ammeter

Fig. 24. Checking current setting



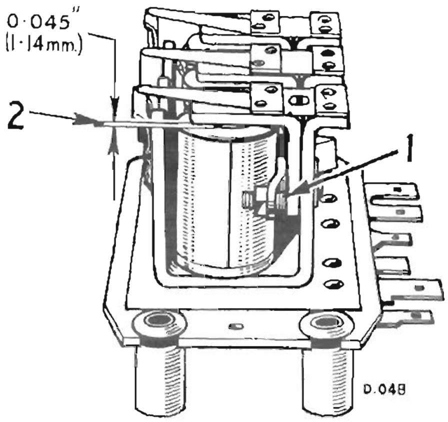
1 Cut-out cam
2 Current control cam
3 Voltage regulator cam
4 Special adjusting current control
5 Cardboard under voltage regulator

Fig. 25. Adjust current control cam



1 Voltage regulator contacts
2 Airgap setting

Fig. 26. Voltage regulator airgap setting



1 Backstop adjustment
2 Airgap settings

Fig. 27. Cut-out airgap settings

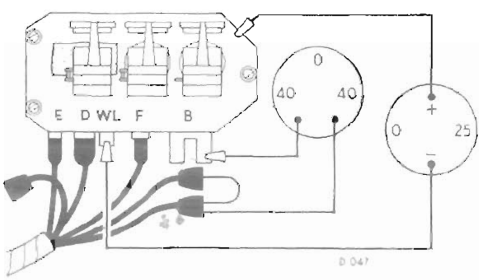


Fig. 28. Control box stability test

Adjustment of Air Gap Settings

Air gap settings on the control box may be reset as follows:—

Armature-to-Bobbin Core Gaps of Voltage and Current Regulators

Using the special tool, turn the adjustment cam counter clockwise for minimum lift of the armature tensioning spring.

Slacken the adjustable contact locking nut and screw back the adjustable contact. Insert a flat steel feeler gauge of 0·045" (0·04 mm.) thickness between the armature and the copper separator on the core face, taking care not to turn up or damage the copper. The gauge should be inserted as far back as the two rivet heads on the underside of the armature.

Retaining the gauge in position, press squarely down on the armature and screw in the adjustable contact until it just touches the armature contact.

Readjust the electrical settings.

Contact "Follow-through" and Armature-to-Bobbin Core Gap of Cut-out Relay

Press the armature squarely down against the copper separation on the core face.

Adjust the fixed contact bracket to give 0·010" to 0·020" (0·25 to 0·51 mm.) "follow-through" or blade deflection of the moving contact.

Release the armature and adjust the armature back stop to give a core gap of 0·035" to 0·045" (0·9 to 1·04 mm.).

Check the cut-in and drop-off voltage settings.

Cleaning Contacts
Regulator Contacts

To clean the voltage or current regulator contacts use fine carborundum stone or silicon carbide paper followed by methylated spirits (denatured alcohol).

Cut-out Relay Contacts

To clean the cut-out relay contacts use a strip of fine glass paper—carborundum stone or emery cloth must not be used.

Control Box Stability Test

Connect a voltmeter as described in Voltage Regulator Open Circuit Setting and an ammeter as in Current Regulator maximum load setting.

Run the generator at 4,500 r.p.m.

Switch on and off a lamp load equivalent to 75 per cent. of the maximum output of the generator.

Assuming the generator and external circuits to be in good order, instability (*i.e.* violent fluctuations of the voltage and current reactions to the conditions imposed) could be due to:—

Air gap settings too narrow.
Foreign matter in air gaps.
Faulty internal connections causing intermittent open circuit.

TEMPERATURE INDICATOR

The temperature indicator, comprising a temperature transmitter and a gauge unit, operates on a 10 volts system which is controlled by a voltage stabilizer.

Temperature Transmitter

The temperature transmitter which is mounted in the right-hand side of the thermostat housing, consists of a temperature sensitive resistance element contained within a brass sleeve. The resistance element is a semi-conductor which has a high negative temperature co-efficient of resistance and its electrical resistance therefore decreases rapidly with an increase in temperature. As the temperature of the engine coolant increases, the decreasing resistance of the semi-conductor increases the flow of current through the indicator, similarly a decrease in coolant temperature will reverse the procedure.

Gauge unit

The gauge unit comprises a heater winding round a bi-metal strip which is linked to the pointer of the gauge unit. The flow of current through the heater winding is controlled by the temperature transmitter which reacts to any change in engine coolant temperature by varying the current drawn through the heater windings. This affects the bi-metal strip which in turn causes the pointer to indicate the temperature of the coolant. The slow movement of the pointer is caused by the time taken to heat or cool the bi-metal strip.

Voltage Stabilizer

The voltage stabilizer is a small sealed unit, located under the facia, and is used to provide a constant current of 10 volts for the operation of the fuel contents gauge and the Temperature Indicator.

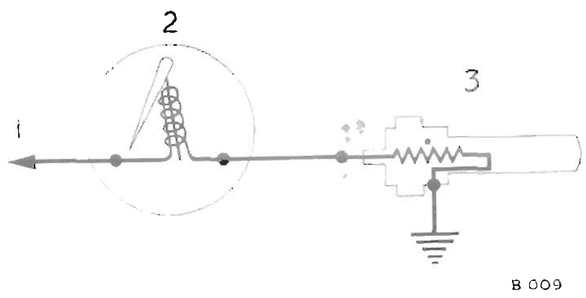
The stabilizer is fitted adjacent to the ignition/starter switch on Herald Estate and Van models and adjacent to the fuse unit on Spitfire cars.

Since it is not possible to repair any of the units described above, a defective unit must, therefore, be renewed.

Testing

To establish which unit is defective, test for circuit continuity using an Ohmmeter or by substituting a known unit.

Do not connect any unit direct to the battery.



1 To "B" terminal on voltage stabilizer
2 Gauge unit
3 Transmitter

Fig. 29. Circuit diagram of temperature indicator

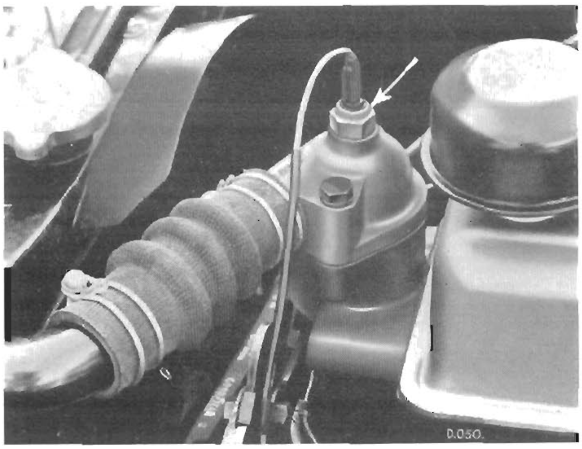
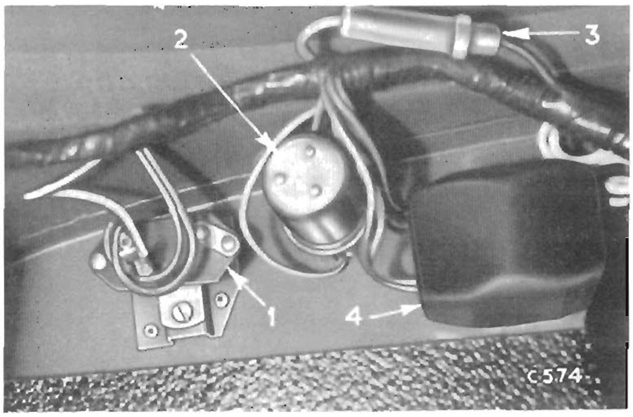
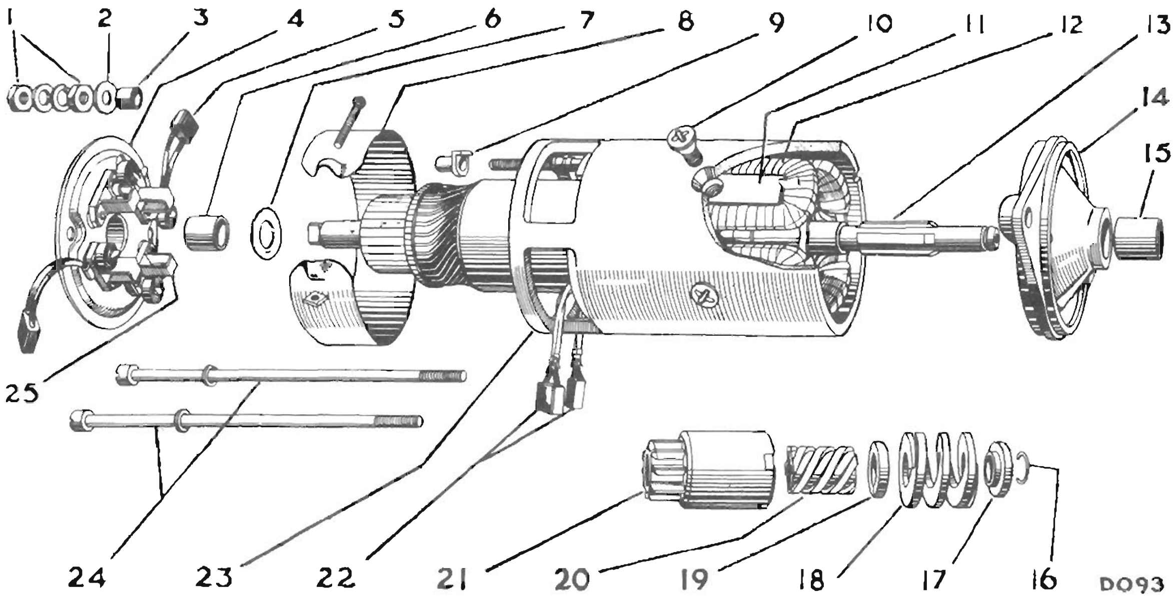


Fig. 30. Location of temperature transmitter



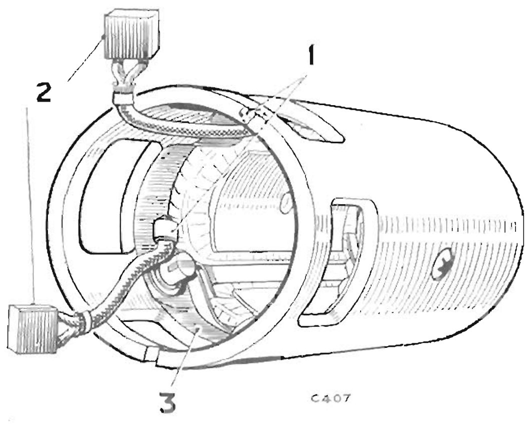
1 Voltage stabilizer (18)	3 Linefuse (8)
2 Flasher unit (23)	4 Fuse unit (13)

Fig. 31. Location on electrical components under the facia (Spitfire)



1 Terminal nuts and washers
2 Insulating washer
3 Insulating bush
4 End plate
5 Brush
6 Bush
7 Thrust washer
8 Cover band
9 Insulating bush
10 Pole securing screw
11 Pole piece
12 Field coil
13 Shaft
14 End bracket
15 Bush
16 Jump ring
17 Retainer
18 Main spring
19 Thrust washer
20 Sleeve
21 Pinion and barrel assembly
22 Brushes
23 Yoke
24 Through bolts
25 Brush box

Fig. 32. Dismantled starting motor



1 Field coil connections
2 Brushes
3 Yoke

Fig. 33. Brush connections

STARTER MOTOR

To Remove

Disconnect the cables from the battery and the starter motor terminals, remove the two starter securing bolts and withdraw the starter motor upwards.

To Refit

Measure the distance from the pinion side of the flywheel ring gear to the mounting face for the starter and measure the distance from the pinion end to the face of the starter.

Fit packing to obtain end clearance between the stationary starter pinion and the flywheel ring gear of $\frac{3}{32}''$ to $\frac{5}{32}''$; this is usually called "out of mesh clearance".

Packing pieces and shims are available in 0·4", 0·5" and 0·016" thicknesses.

Re-connect the cables to the starter motor terminals and finally to the battery.

Dismantling

Remove the starter drive as follows:—

Using a hand press with suitable adaptors, support the end plate (4), and press down the retainer (17). Remove the jump ring (16) and lift off items 18 to 20. The pinion and barrel assembly (21) and screwed sleeve (20) should not be renewed independent of each other.

Loosen the brush cover screw and slide the cover (8) from the unit. Lift the brush springs (4) and withdraw the brushes (5) and (22) from their holders.

Unscrew the terminal nuts, the two bolts (24) and remove the end bracket (4). Withdraw the drive end bracket (14) and armature from the yoke (23).

Field Coils

To Renew:—

Unscrew the four pole-shoe retaining screws, using a wheel-operated screwdriver and pole expander tool for obstinate cases.

Mark the yoke and pole-shoes so that they can be refitted to their original positions.

Take out the pole-shoes, lift off the coils and unsolder the field coil tappings from the terminal post.

Fit new field coils by reversing the procedure, and replace the insulating pieces used to prevent the inter coil connectors from contacting the yoke.

To Re-assemble

Reverse the dismantling procedure.

Bearings

To Renew

Using a shouldered mandrel of the same diameter as the shaft, drive out the old bush and press the new bearing bush into the end bracket.

The bronze bushes are porous and must not be opened out after fitting, otherwise the porosity of the bush may be impaired.

Commutator

A commutator in good condition is clean, smooth and free from pits or burned spots. If cleaning with a petrol-moistened cloth is ineffective, carefully polish the commutator with very fine glasspaper while the armature is rotating. Do not use emery cloth.

To rectify a badly worn commutator, mount the armature in a lathe, rotate at a high speed and take a light cut with a sharp tool, removing the minimum of metal to obtain a clean finish. Finally, polish with very fine glasspaper.

NOTE : Do not undercut the mica insulators between segments.

Brushes

Check that the brushes move freely on their holders by holding back the brush springs and pulling gently on the flexible connectors. If a brush is inclined to stick, remove it from its holder and relieve its sides with a smooth file.

Replace the brushes in their original positions or renew excessively worn brushes as follows:—

Cut off the original brush flex $\frac{1}{8}$″ (3 mm.) approximately from the aluminium and tin the brazed joint. Open out the loop, taking care not to allow solder to run towards the brush.

Place the original joint within the loop, squeeze up and solder. The brushes are preformed so that bedding to the commutator is unnecessary.

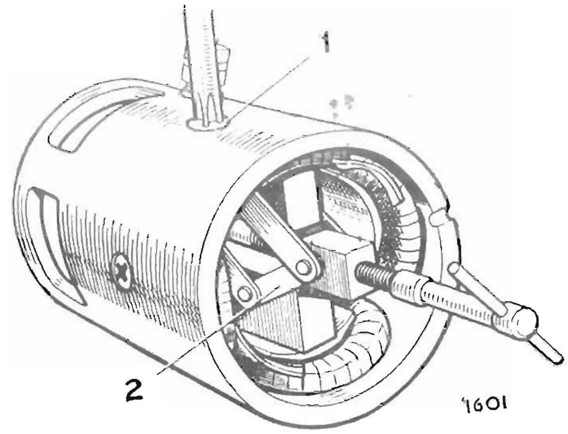
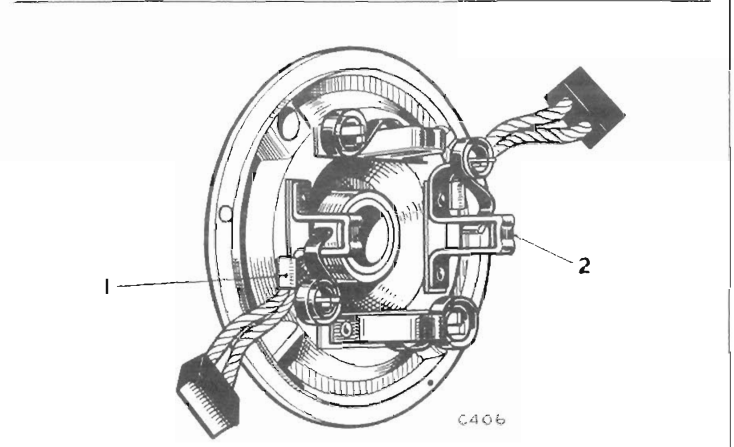


Fig. 34. Using a pole shoe expander to refit the field coils and retainer screws



1 Brush connections 2 Brush boxes

Fig. 35. Commutator end bracket

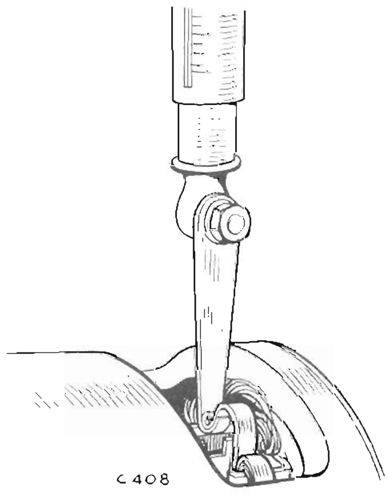


Fig. 36. Using a spring scale to test the brush spring tension

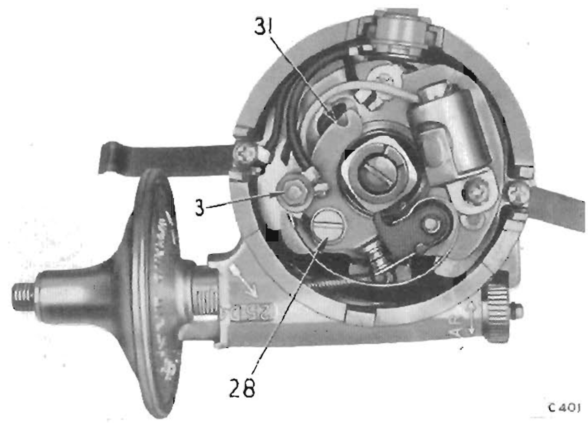


Fig. 37. Distributor contacts

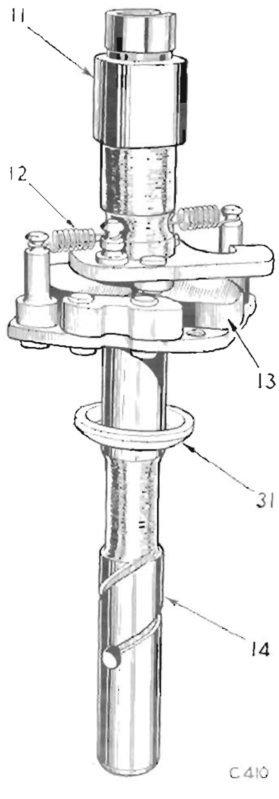


Fig. 38. Assembly of centrifugal weights and springs to the action plate

IGNITION DISTRIBUTOR

Contact Breaker Adjustment (Fig. 37)

Take off the distributor cap, remove the rotor arm and turn the engine until the contact breaker heel is on the highest point of the cam.

Slacken the screw (28), insert the blade of a screwdriver into the slots (31), and twist the screwdriver to adjust the gap between the contact breaker points, which should be 0·014" – 0·016" (0·356 - 0·406 mm.) measured with a feeler gauge.

Tighten the locking screw (28), re-check the gap and, if satisfactory, refit the rotor arm and cap.

Contact Breaker Renewal

Slight pitting or discolouration of the points may be rectified by use of a fine carborundum stone. Do not use emery cloth unless the points are removed first and thoroughly cleaned before re-assembly. Renew burned or deeply pitted contacts as follows:—

1. Remove the nut (3), insulating sleeve (2) and lift the black and green cables from the terminal pillar.
2. Lift the spring contact (1) from the pivot post and remove the fibre washers (29) and (30).
3. Take out the lock screw (28) and lift off the fixed contact (27).

To Refit

Reverse the above instructions and adjust the gap between the contact breaker points.

Distributor Capacitor

A short circuit, resulting from the breakdown of the dielectric between the electrodes of the capacitor, which is parallel connected across the contact breaker points, will prevent the interruption of the low tension circuit and cause ignition failure.

An open circuit in the capacitor may be suspected when the points are excessively burnt and difficult starting is experienced.

Renew the capacitor, as follows:—

1. Remove the distributor cap and rotor arm, unscrew the nut (3) from the spring contact terminal post, and lift off the capacitor lead.
2. Take out the capacitor retainer screw and remove the capacitor.
3. Secure the new capacitor in place, reconnect the lead to the terminal post and refit the nut (3). Refit the rotor arm and distributor cap.

Overhauling the Distributor

To Remove

Disconnect the high and low tension cables from the distributor and release the high tension cables from the spark plugs.

Uncouple the vacuum pipe from the distributor, unscrew two nuts at the base of the distributor and lift it from the engine.

To Dismantle

Remove the distributor cover and rotor arm. Disconnect the vacuum control (26) from the contact plate (7), take out two screws (8) and remove the contact breaker assembly.

Release the circlip (19) and remove the adjusting nut (18) and spring (17), taking care not to lose the ratchet spring (16). Withdraw the vacuum control unit (25) from the distributor body.

Release both springs (12) from the base of the cam (11) and the action plate (14). Take out the screw (10) and lift the cam (11) from the shaft (14).

At this stage, check the shaft (14) for end float which should not exceed $\frac{1}{32}$ (0·8 mm.). Drive out the pin (21), take off the driving dog (22) and the washer (23), and withdraw the shaft (14) from the distributor body.

Substituting a new shaft, or a test bar of 0·490″ (12·45 mm.) diameter, check the bearing sleeve (24) for wear, and renew the sleeve if required.

To reduce excessive end float, renew the nylon spacer beneath the action plate (14), and the washer (23) between the driving dog and distributor body.

To Re-assemble

Refit the nylon spacer under the action plate (14), reassemble the weights (13), spring (12) and cam (11) to the action plate (14) and secure the cam with the screw (10). Lubricate the shaft and insert the assembly into the distributor body.

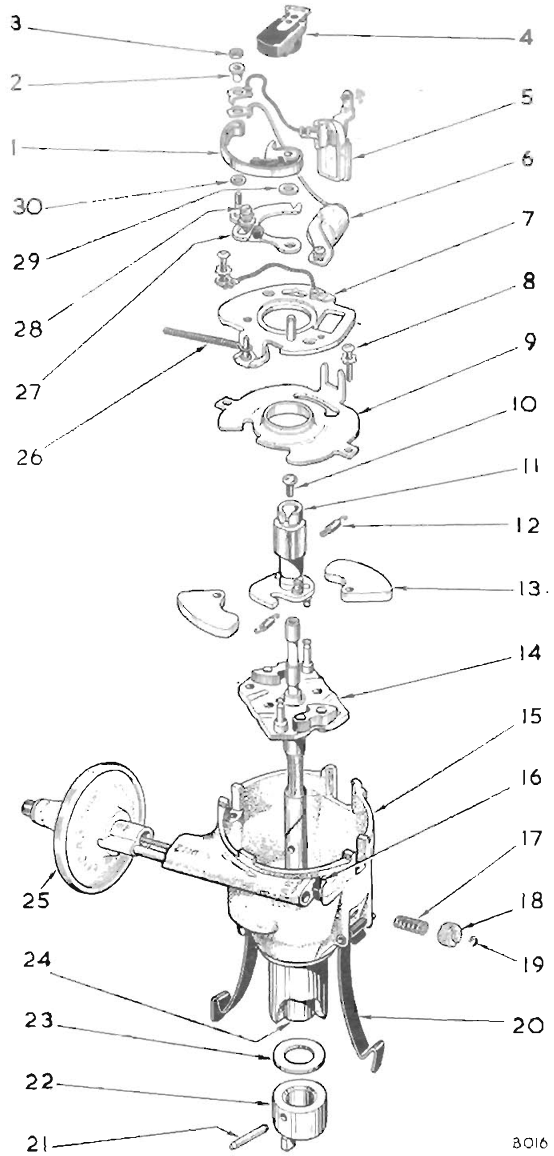
Refit the washer (23) and, placing the offset driving dog (22) as shown on Fig. 39, secure the dog by inserting and swelling the ends of the pin (21).

Assemble the contact plate (7) to the fixed base plate (9) by springing the spring clip over the base plate slot edge, inserting the peg of the contact plate into a slot in the base plate and moving it slightly clockwise. Secure the assembly to the distributor body, using two screws (8).

Insert the vacuum unit (25) into the distributor body and assemble the ratchet spring (16), the coiled spring (17), adjusting nut (18) and the circlip (19). Hook the vacuum connecting spring (26) on to the pin attached to a cranked lug on the contact plate.

Assemble the capacitor and the contact breaker to the contact plate (7) and adjust the contact breaker points as described previously.

Refit the complete distributor to the engine, re-connect the vacuum pipe, the high and low tension cables, and re-adjust the ignition timing.



1 Spring contact
2 Insulating sleeve
3 Nut
4 Rotor arm
5 L.T. terminal
6 Capacitor
7 Contact plate
8 Screw
9 Base plate
10 Screw
11 Cam
12 Centrifugal spring
13 Centrifugal weights
14 Action plate and shaft assembly
15 Distributor body
16 Ratchet spring
17 Coiled spring
18 Adjusting nut
19 Circlip
20 Cap retainer
21 Pin
22 Driving dog
23 Washer
24 Bearing sleeve
25 Vacuum unit
26 Vacuum connecting spring
27 Fixed contact
28 Screw
29 Insulating washer
30 Insulating washer

Fig. 39. Dismantled ignition distributor

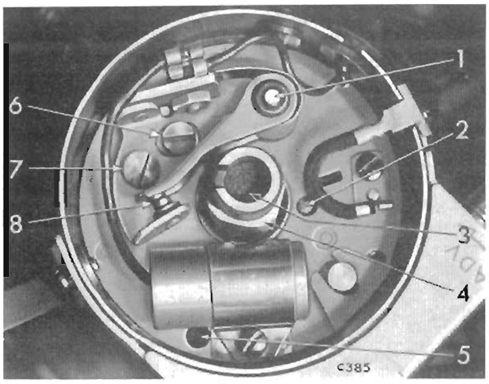


Fig. 40. Adjustments and lubrication

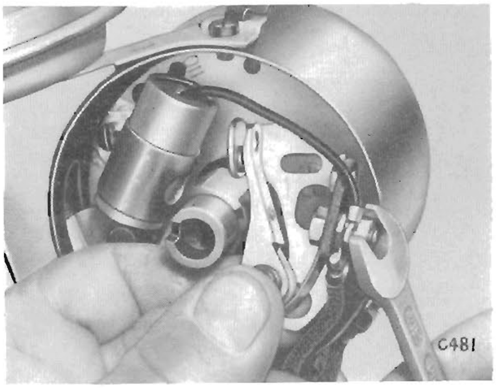


Fig. 41. Renewing contacts

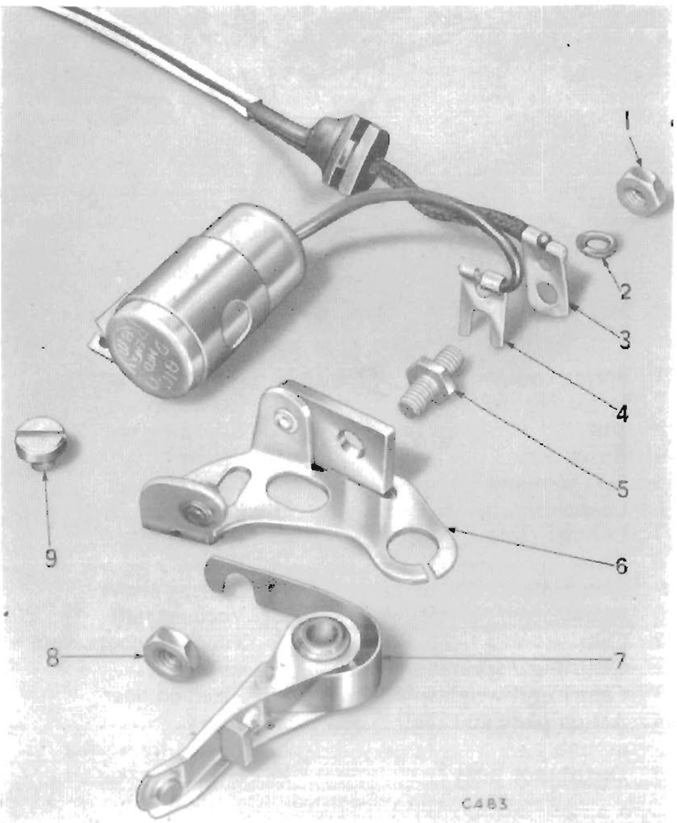


Fig. 42. Exploded arrangement of contact breaker

DISTRIBUTOR (A.C. Delco Type D200)

SPITFIRE

Lubrication (Fig. 40)

Release the clips and remove the distributor cap and rotor arm. Apply a few drops of thin oil to points (1), (2) and (3). Lightly grease the cam surface (4) and inject approximately 5 c.c. (one teaspoonful) of engine oil through the hole (5).

Contact Breaker Adjustment (Fig. 40)

Turn the engine until the moving contact is on the highest point of the cam lobe, *i.e.*, gap at its widest.

Having made sure that the contacts (8) are perfectly clean, slacken the fixed contact screw (7) and turn the eccentric screw (6) to obtain a gap of 0·015" (0·04 mm.), measured with a feeler gauge, between the contact faces. Retighten the screw (7).

Contact Breaker Renewal (Figs. 41, 42 and 44)

Disconnect the L.T. cable from the CB terminal on the coil. Remove the distributor cap and rotor arm. Take out the fixed contact screw (9) and lift the contact breaker assembly sufficiently to gain access to the terminal nut (1). Remove the nut (1), washer (2) and take off the L.T. cable (3) and capacitor (4) from the terminal stud (5). Lift off the contacts (6) and (7). Remove the nut (8), the terminal stud (5) and discard the old contacts.

Fit new contacts by reversing the removal instructions.

Distributor—To Remove

Disconnect the L.T. cable from CB terminal on the coil; H.T. cables from the plugs and coil; tachometer drive cable from the distributor.

Remove the distributor cap and note the position of the rotor arm relative to the engine. Take out the bolt securing the clamp plate to the engine and withdraw the distributor assembly.

NOTE: Do not slacken the clamp bolt (22) as this will alter the ignition timing.

DISTRIBUTOR (A.C. Delco Type D200)

VITESSE (From Engine No. HB 15,001)

This is similar to the above Spitfire distributor except that the vacuum unit has no micro adjustment for static advance.

Type D202 (From Engine No. HB 16,302)

This is similar to D200 except that the vacuum advance unit is attached differently and the eccentric screw adjuster (6), Fig. 40, is not fitted.

To Dismantle

Take off the vacuum advance unit (13) and lift out the contact breaker base plate assembly (11).

Obtain a silver steel bar of $\frac{7}{32}$" diameter and turn down one end to 0·15" diameter × $\frac{1}{8}$". Insert this spigot into the end of the tachometer gear and drive out the gear (24), thrust washer (23) and end cover (25).

Note that the teeth on the driving dog (20) are offset to the left when facing the slot which engages the rotor arm at the top of the shaft. Remove the rivet (21), driving dog (20) and spacer (19). Withdraw the shaft assembly (12) from the distributor body (17) and remove the spacer (14) from the shaft. Release the clip (16) and lift out the oil retaining felt (15).

To Re-assemble

Clean and dry all components. Soak the oil retaining felt (15) in clean engine oil and shake off the surplus oil. Refit the oil retaining felt and secure it with the spring clip (16).

Assemble the spacer washer (14) to the shaft (12) and the shaft to the body (17). Refit the spacer washer (19) and, with its teeth offset to the left when facing the rotor arm slot, rivet the driving dog (20) to the shaft.

Assemble the thrust washer (23) to the shaft of the tachometer drive gear (24). Lightly cover the entire drive gear and its shaft with petroleum jelly, and push the gear into position. Fit a new end cover (25) and peen over the body in four places to retain it in position.

Refit the contact breaker base plate assembly (11) and the vacuum advance unit (13). Check the contact breaker adjustment, fit the sealing ring (18), and install the distributor.

Key to Figs. 42 and 44

1	Nut	16	Felt retaining clip
2	Lockwasher	17	Distributor body
3	Low tension cable	18	Oil seal ring
4	Capacitor	19	Spacer
5	Terminal stud	20	Driving dog
6	Fixed contact	21	Rivet
7	Moving contact	22	Clamp plate & bolt.
8	Nut	23	Thrust washer
9	Screw (fixed contact)	24	Tacho. gear
10	Rotor arm	25	End cover
11	Contact base plate	26	Spring
12	Centrifugal action plate	27	Felt plug
13	Vacuum advance unit	28	Cap
14	Spacer	29	Screw
15	Oil retaining felt	30	Cap clip
		31	Setscrew

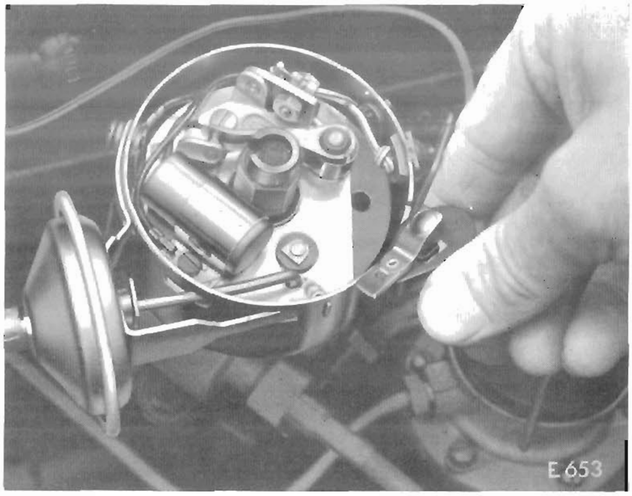


Fig. 43. Type D202 Delco distributor (Vitesse)

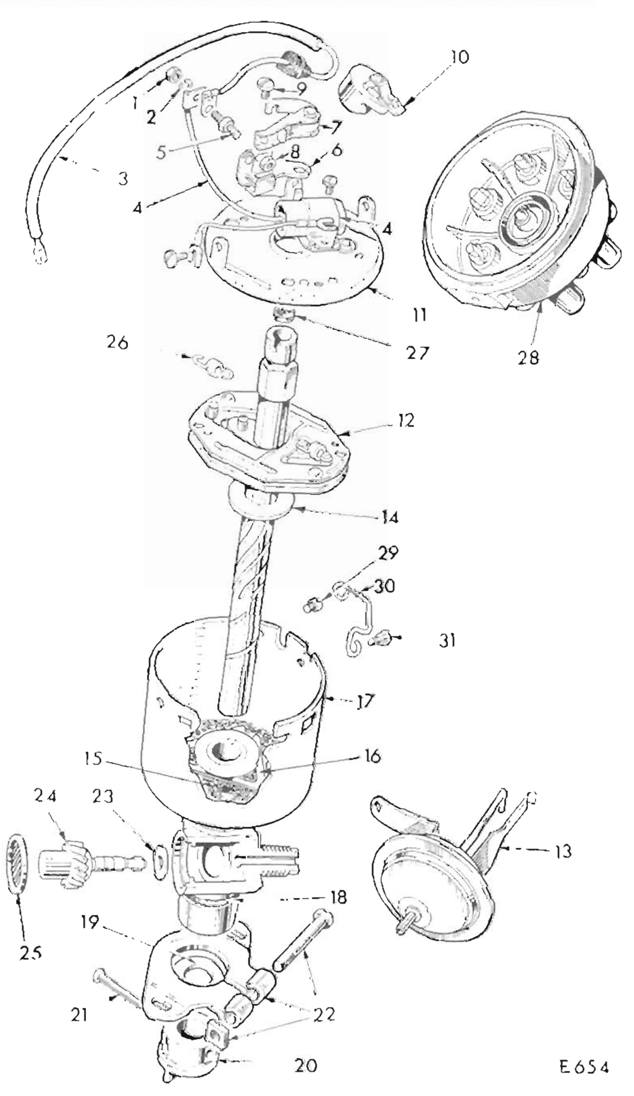


Fig. 44. Exploded arrangement of Vitesse distributor (A.C. Delco Type D202)

EXPLODED HEADLAMP ARRANGEMENT
HERALD, SPITFIRE AND VITESSE

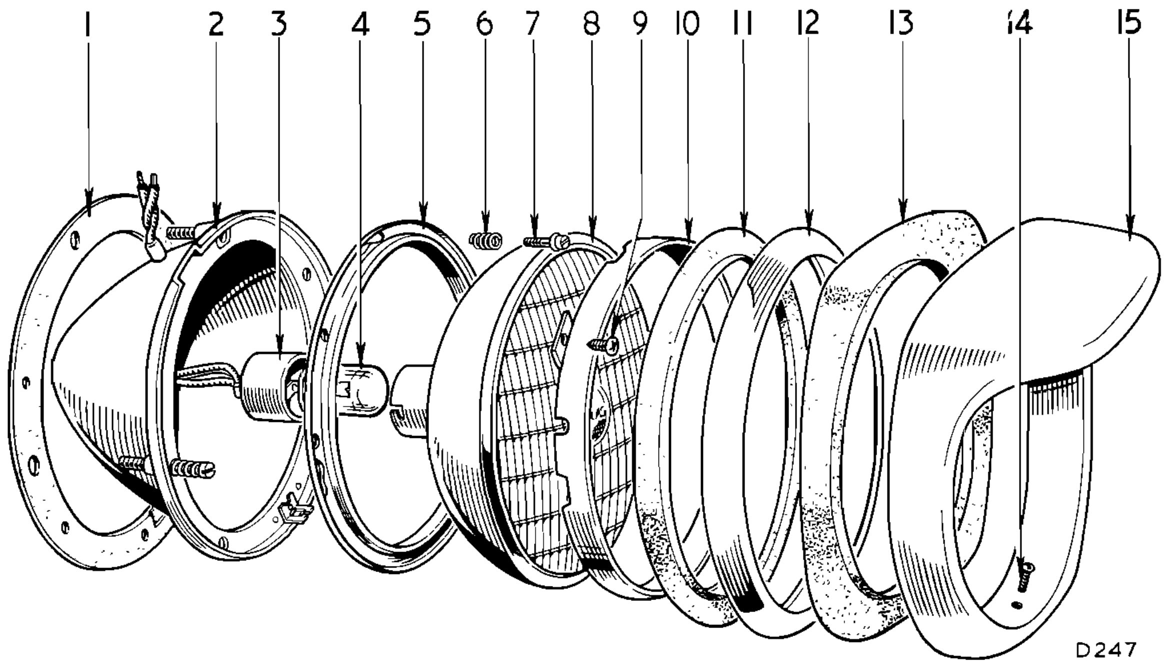


Fig. 45. Exploded arrangement of Herald 1200 and Spitfire headlamps

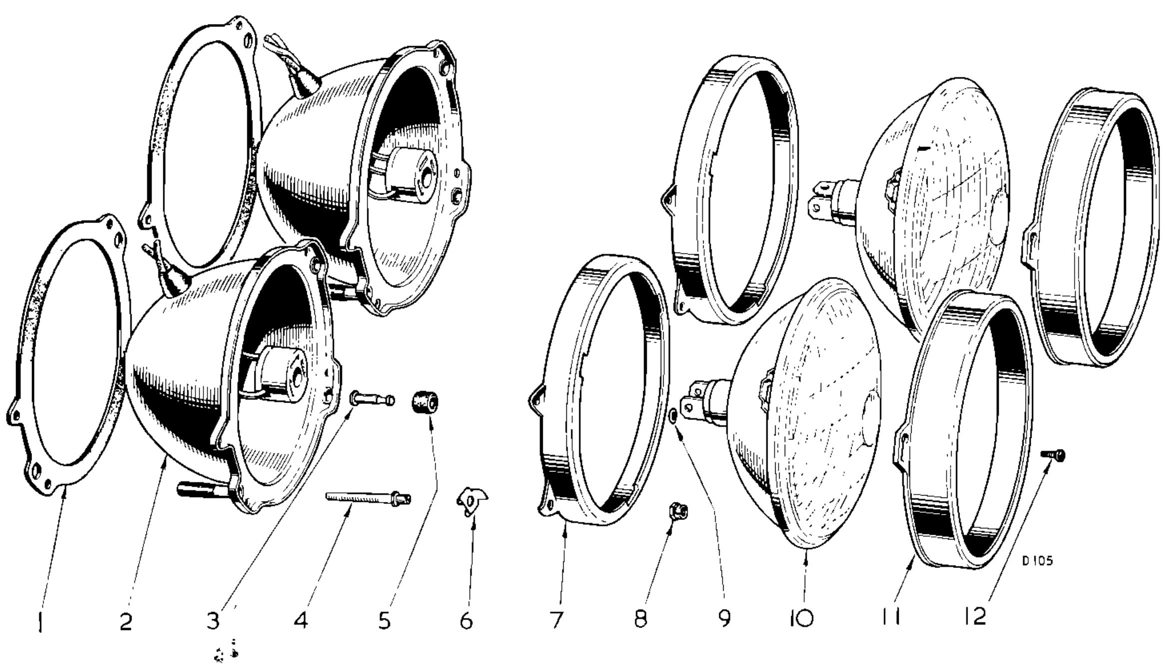


Fig. 46. Exploded arrangement of Vitesse headlamps

Key to Fig. 45

1	Rubber seal	9	Screw
2	Housing	10	Outer rim
3	Adaptor	*11	Sealing rubber
4	Bulb	*12	Snap-on rim
5	Inner rim	†13	Sealing rubber
6	Spring	†14	Screw
7	Screw	†15	Rim
8	Light unit		

*Spitfire only. †Herald only.

Key to Fig. 46

1	Seal	7	Adaptor
2	Housing	8	Locknut
3	Pivot	9	Clip
4	Adjuster	10	Light unit
5	Bush	11	Rim
6	Clip	12	Screws

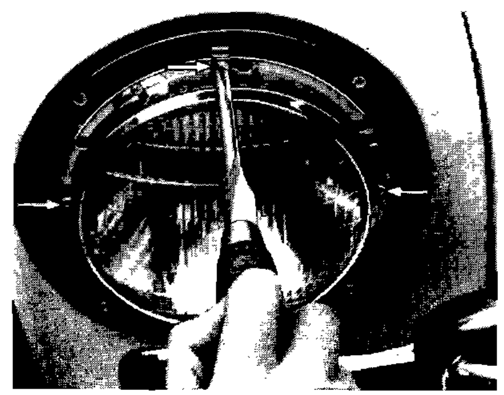


Fig. 47. Adjusting main beam, Herald 1200 and Spitfire

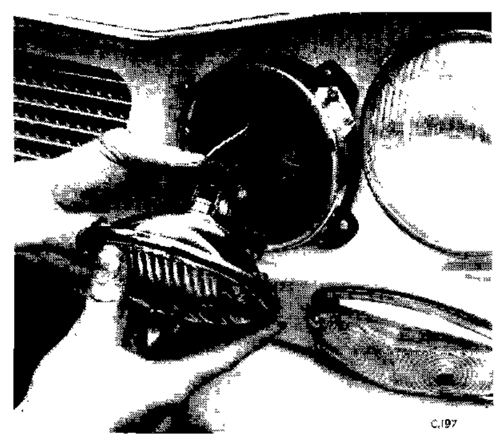


Fig. 48. Renewing light unit, Vitesse

LAMPS

Headlamp Bulb Replacement (Spitfire)

Remove the Snap-on rim shown on Fig. 45 by inserting the end of the special tool (provided in the kit) behind the lower edge of the rim and levering sideways. Press in the lamp unit against the tension of the adjusting screw springs and turn in an anti-clockwise direction until the key-slot holes in the rim line up with the screw heads. The lamp unit can then be drawn off. Do not rotate any of the screws, as this will affect the alignment of the reflector when assembled.

Rotate the adaptor anti-clockwise and pull off, then the headlamp bulb can be removed. Care should be taken to see that the bulb does not drop out.

NOTE : Headlamp bulbs cannot be removed from the sealed beam units fitted to cars which are exported to the U.S.A. Bulb failure will necessitate unit replacement.

Headlamp Unit Replacement

Remove the lamp unit and bulb as described above. Unscrew three screws (9) and separate the inner and outer rims (5) and (10) from the light unit (8).

Fit a new unit by reversing the procedure and ensure that the locating clips at the edge of the light unit fit into corresponding slots in the rim.

Headlamp Alignment

The main beam is aligned in the vertical plane by turning the screw at the top of the lamp and in the horizontal plane by turning the screw on the side. Alignment of the beam on one lamp is best carried out with the other lamp covered.

Maximum illumination is obtained, and discomfort to other road users is prevented, by ensuring that the lamp beams do not project above the horizontal when the vehicle is fully laden.

Where adjustment is required, one of the following methods may be employed, subject to minor variations which may be necessary to meet varying conditions in different countries.

Method 1.

Lucas Beamsetter.

Remove the front rim and dust excluding rubber to gain access to the adjusting screws.

Roll the alignment bar into contact with the front wheels.

Wheel the beamsetter forward so that the two projecting arms butt against the alignment bar.

Adjust the height of the beamsetter unit to the level of the headlamp.

If the vehicle is not carrying its normal complement of passengers the height of the screen at the forward end of the setter may be adjusted to compensate for beam depression. The adjustment is calibrated in degrees and in inches per hundred feet and is effected by moving the lever to the appropriate angle of dip. This angle is dependent on the normal loading of the car. 0·5° = 2 ft. 7 ins. in 100 yards (0·787 metres in 91·44 metres).

Switch on the lamp under test and adjust the screws to bring the beam image between the marker lines on the screen with the highest meter reading.

Method 2.

Wall Chart.

Position the car on level ground with the front facing squarely the screen or wall at a distance of 12½ ft. (3·8 metres) from the screen.

Adjust the spheres (B) ⅞" (22·2 mm.) below the centre line of the lamps and to an equal distance either side of the centre line of the car.

Where the screen is not available, a wall may be marked to correspond with the adjustments given with the screen.

With one lamp covered, adjust the screws on the other lamp to provide the pattern shown in Fig. 50.

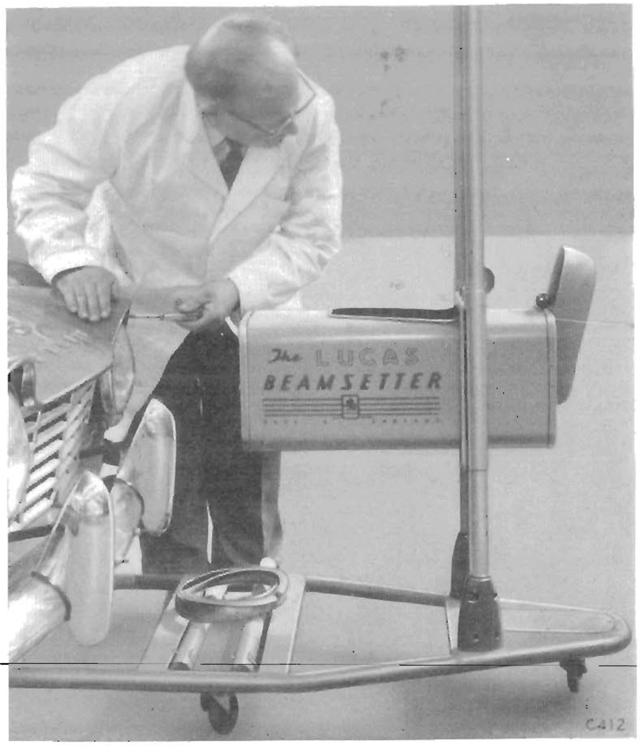


Fig. 49. Using Lucas beamsetters

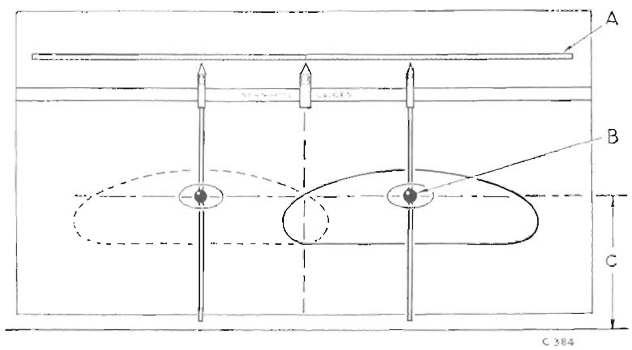


Fig. 50. Showing light pattern projected on new lamps gauge

Fig. 51. Checking floor level

Fig. 52. Setting floor level on Lev-L-Lite unit

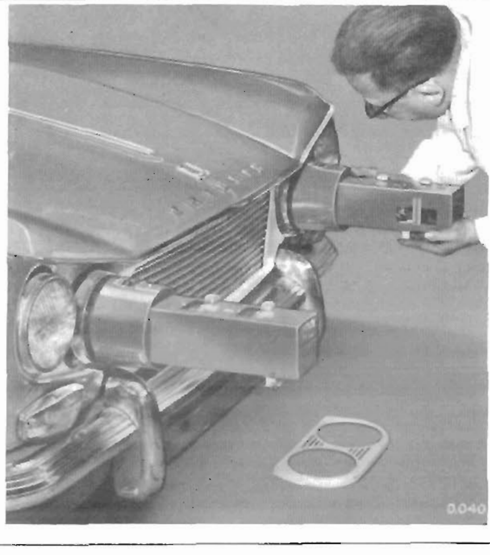


Fig. 53. Fitting Lev-L-Lite units to lamps

HEADLAMP SETTING

VITESSE

The use of a Lucas Lev-L-Lite mechanical aimer will ensure quick and accurate aiming of Vitesse sealed beam light units having aiming pads moulded to their lenses. Lamp aiming can therefore be accomplished by mechanically setting the plane of the pads in fixed relation to the direction of travel, thus dispensing with the need of having the headlamps switched on during adjustment.

Equipment

The complete kit consists of a right- and left-hand aimer, suitable for both 5¾" and 7" light units; a transit and target, for checking floor levels; two adaptor rings, for use with 7" light units; and an instruction chart.

Transit and Target

Based on the split image principle and using a built-in spirit level as a reference, transit and target used together form a floor level indicator which is used as follows:—

The two units face one another on the same side of the vehicle, the target adjacent to the rear wheel and the transit adjacent to the front. After adjusting the transit until a single image is seen in the sights, a dial is turned to balance the spirit level. The reading obtained from here is used as a floor correction figure for both aimers.

The Mechanical Aimer

Here again the spirit level and split image principle is used in the design of the aimer. The complete assembly is held in position on the aiming pads, by a powerful rubber suction cup which engages with the headlamp lens.

When lateral aim is correct a single image should appear in the viewing port. After setting the aimer for the required angle of dip, vertical aim is correct when the spirit level is balanced.

Four Headlamp Adjustment

When aiming sealed beam headlamps with the Lev-L-Lite beam aimers, the following procedure should be adopted:—

Adjust the aimers for floor level as follows:—

Drive the car on to selected area, which need not be level but must be flat. Place the transit at front wheel and the target at the rear wheel, Fig. 51. Turn the transit until target is visible. Adjust screw on back of the transit until the split image is aligned. Turn dial on side of transit until bubble is centred in the level dial. Repeat for the other side of the car. Turn the floor level compensator on each aimer until adjoining dial reads the same as the plus or minus reading on the transit dial.

NOTE : Aimers may be used in additional locations after checking the floor level at each location with the transit and target and painting correction figures on the floor.

Check and, if required, adjust tyre pressures.

Rock the car sideways to equalize springs, and remove the lamp rims.

Clean the lens and attach the beam aimers to the lamps with the split image aperture facing the centre line of the car as follows:—

Place the front of the aimer over the locating pads spaced 120° apart on the lens. Hold the aimer firmly against the lens. Push the rubber cup against the glass using the white handle and then withdraw the handle until the retaining spring is heard to operate.

The aimer is now self-supporting.

Adjusting vertical aim:

Turn the knob at "Up-Down" dial until the pointer is at 2 down. This number indicates the number of inches the beam will drop in 25 ft.

Slacken the locknut and turn the headlamp vertical aim screw (1) counter-clockwise until bubble is off-centre. Then turn screw clockwise until bubble is centred for correct aim. Retighten the locknut.

Repeat the operation on other headlamp.

Adjusting horizontal aim:

Set "Right-Left" dial on zero. Check split image in viewing port. Rotate aimer slightly, if necessary, to locate target on opposite lamp. Slacken the locknut and turn the horizontal adjusting screw (2) on the lamp until the split image is aligned. Retighten the locknut.

Re-check and, if required, adjust vertical aim.

Repeat the above adjustments with opposite headlamp.

Hold the aimer, press the spring catch and push handle towards the headlamp to release aimer.

Repeat the above adjustments on other pair of headlamps.

Refit the rims.

Fig. 54. Checking lamp

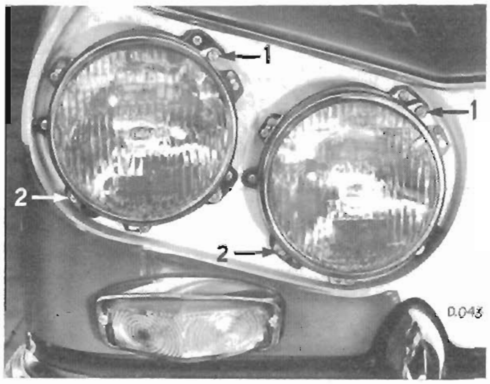


Fig. 55. Beam alignment adjustment screws

1 Vertical adjustment

2 Horizontal adjustment

Fig. 56. Refitting cowl

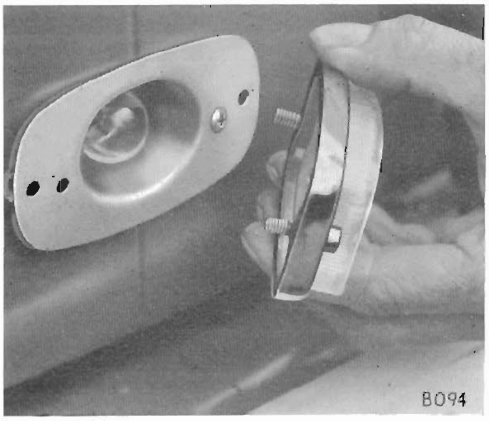


Fig. 57.
Front parking and flasher lamps (Herald)

Front parking and flasher lamps

HERALD 1200 (Fig. 57)

The side and flasher lamp has two filaments incorporated in the same bulb. The bulb is accessible after two screws have been removed from the rim, and the rim and lens lifted away.

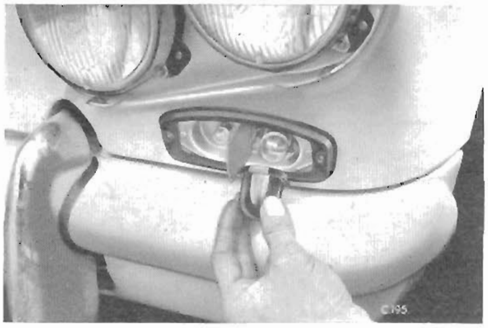


Fig. 58.
Front parking and flasher lamps (Vitesse)

VITESSE (Fig. 58)

The side and flasher lamp has two bulbs incorporated in the same housing. The parking bulb is accessible after two screws have been removed from the rim, and the rim and lens lifted away. To gain access to the flasher bulb, withdraw the amber dome.

Fig. 59.
Front parking and flasher lamps (Spitfire)

SPITFIRE (Fig. 59)

With the aid of a thin screwdriver, turn back the rubber and remove the rim. This will permit the glass lens to be similarly removed to gain access to the bulb. When re-assembling the components, fit the glass lens first.

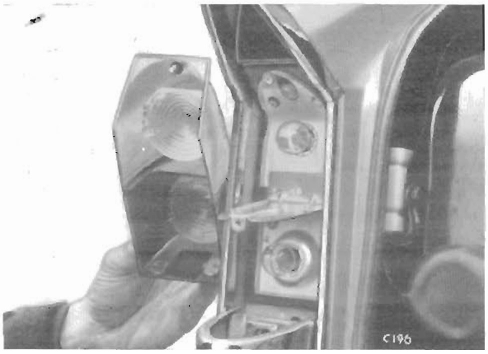


Fig. 60.
Tail/stop and flasher lamps (Herald and Vitesse)

Tail/stop and flasher lamps

HERALD 1200 AND VITESSE (Fig. 60)

The tail/stop and flasher lamp bulbs are incorporated in the same housing. To gain access to the bulbs, remove two screws and take off the lens. The flasher bulb, at the top, has a single filament. The lower bulb for "tail and stop" illumination incorporates twin filaments.

SPITFIRE (Fig. 61)

Take out two screws and remove the lens to gain access to the twin filament "tail and stop" bulb.

With the aid of a thin screwdriver, turn back the rubber and remove the rim. This permits the glass lens to be similarly removed to gain access to the single filament "flasher" bulb.

Fig. 61. Tail/stop and flasher lamps (Spitfire)

Number plate illumination lamp

HERALD 1200

To gain access to the bulb, remove the cover securing screw and lift off the cover and the glass lens.

VITESSE (Fig. 62)

Raise the locker lid to gain access to the bulb.

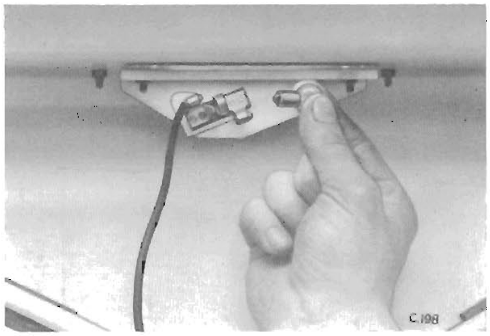


Fig. 62. Number plate illumination lamp (Vitesse)

SPITFIRE (Fig. 63)

To gain access to the bulb, remove the cover securing screw and lift off the cover and the glass lens.

Fig. 63. Number plate illumination lamp (Spitfire)

Instrument panel and warning lamps

HERALD 1200 AND VITESSE

Illumination bulbs are located in the rear of the instrument, which also houses the high beam, ignition and oil warning light bulbs.

The direction indicator monitor bulb is accessible from behind the facia.

Renewal of the facia illuminating bulb can be readily accomplished from the front of the facia.

SPITFIRE

Instrument illumination and warning light bulbs are accessible from behind the facia.

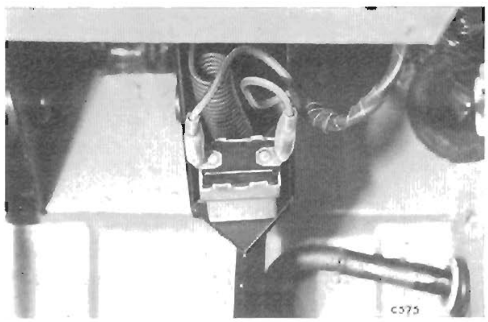
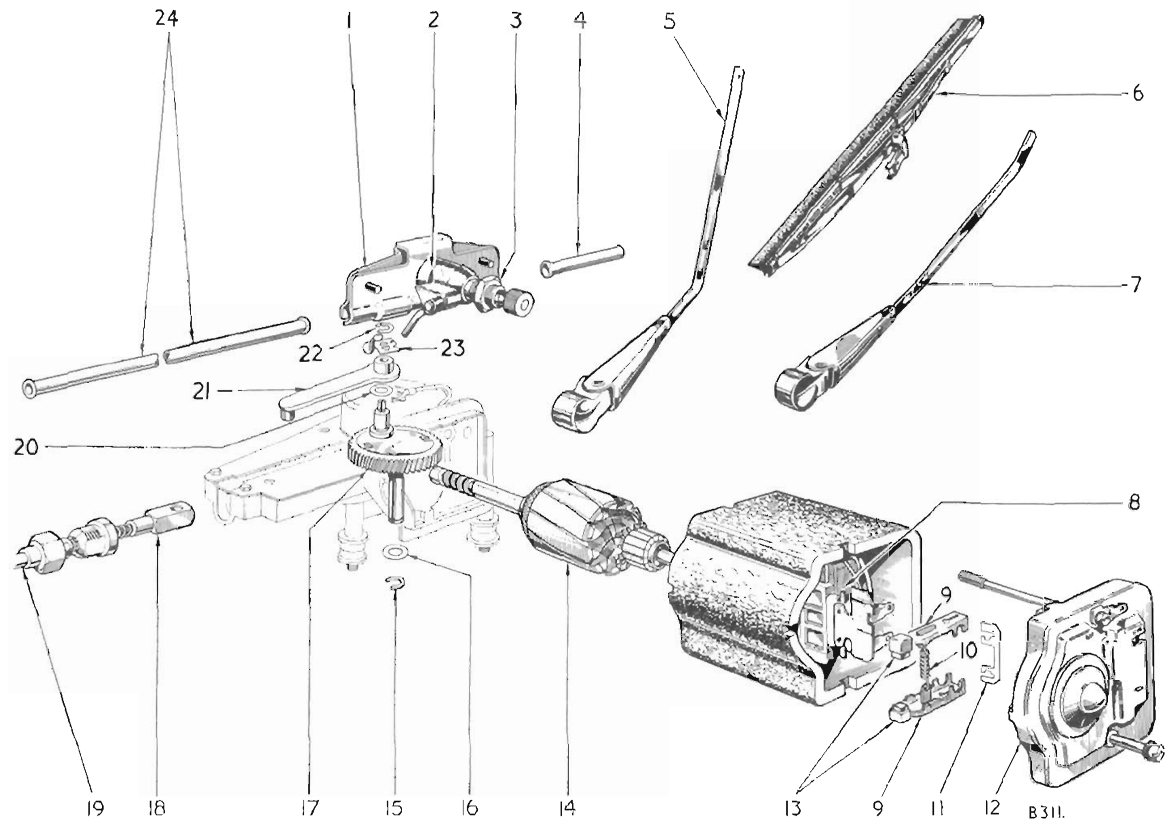


Fig. 64. Stop lamp switch (Spitfire)



1	Wheel box	9	Brushgear	17	Final drive wheel
2	Jet and bush assembly	10	Tension spring and retainers	18	Cable rack
3	Nut	11	Brushgear retainer	19	Rigid tubing—left-hand side
4	Rigid tubing—right-hand side	12	End cover	20	Spacer
5	Wiper arm	13	Brushes	21	Connecting rod
6	Blade	14	Armature	22	Circlip
7	Wiper arm	15	Circlip	23	Parking switch contact
8	Field coil assembly	16	Washer	24	Rigid tubing—centre section

Fig. 65. Exploded arrangement of windscreen wiper mechanism

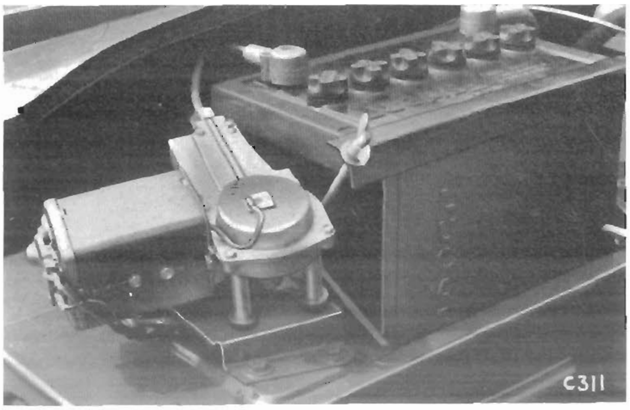


Fig. 66. Location of Herald 1200 windscreen wiper motor

WINDSCREEN WIPER

General

The motor and gearbox unit is mounted on three pillars cast integral with the unit body and is located on the right-hand side of the dash panel in the engine compartment. Rotary motion of the motor armature is converted to a reciprocating movement by a single stage worm and nylon gear to which a connecting rod is attached. This actuates the cable rack which consists of a flexible core of steel wire wound with a wire helix to engage with a gear in each wheelbox for transmitting the reciprocating motion to the wiper arm spindles.

A parking switch is incorporated in the domed cover of the gearbox. On switching off at the wiper control switch, the motor continues to run until the moving contact of the parking switch reaches the insulated sector portion and so interrupts the earth return circuit and stops the motor. The domed cover is adjustable to give the correct park position of the wiper blades.

Removal

Remove the wiper arms and blades.

Unscrew the large nut securing the outer tubing (19) to the gearbox.

Remove three bolts securing the motor mounting bracket to the dash panel and withdraw the motor complete with inner cable rack.

Dismantling

Mark the dome limit switch cover in relation to the gearbox lid, and remove the lid (four screws).

Release the circlip (22) and lift off the limit switch wiper (23).

Lift off the connecting rod (21) and cable rack (18). Note the spacer (20) between the connecting rod (21) and final drive wheel (17).

Remove two bolts and lift off the end cover (12).

Lift out the brushgear retainer (11) and remove the brushgear (9).

Remove the body complete with field coil; the red earth cable is long enough to permit the body to be lifted clear of the armature.

Remove the armature.

If further dismantling is required, remove the circlip (15) and washer (16). Use a fine file to remove any burrs from around the circlip groove and remove the final drive wheel (17).

Clean all parts and examine them for wear or damage.

Mark the yoke and field coil relative to each other. Remove two screws and withdraw the field coil pole piece and field coil.

Re-assembly

To re-assemble, reverse the dismantling procedure and note the following:—

Check brush tension. This should be between 125 and 140 grammes.

The adjusting screw in the side of the gearbox should be set and firmly locked to permit 0·008" to 0·012" (0·203 to 0·305 mm.) end play of the armature. Before re-connecting the inner rack, push the rack back into the tubing and wheelboxes and withdraw the rack from the tubing using a spring balance. The force required should not exceed 6 lbs.

Lubrication

The commutator and brush gear must be free of oil or grease. Apply Oilene, B.B.B. or engine oil to the bearings of the final drive wheel and armature.

If the gearbox has been washed clean, use 25 to 35 cubic centimetres of Ragosine Listate grease to refill.

Fig. 67. Location of Vitesse windscreen wiper motor

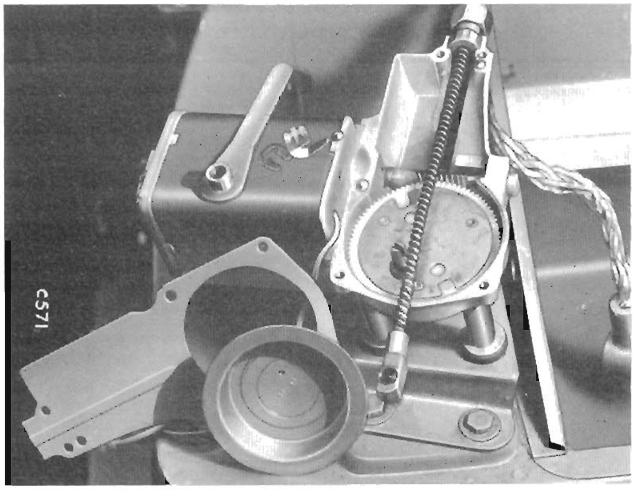


Fig. 68. Top cover removed

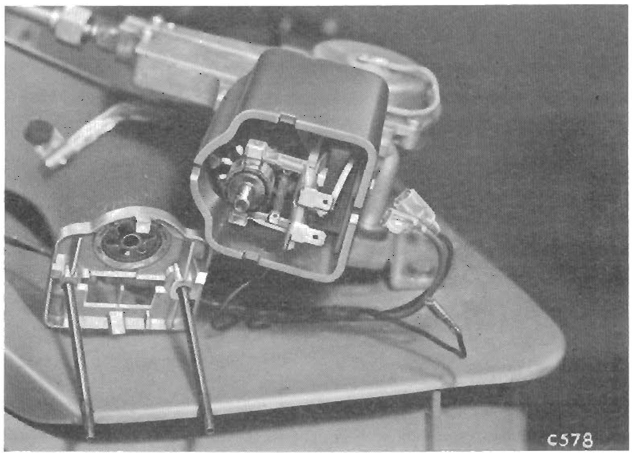


Fig. 69. End cover removed to show brush gear

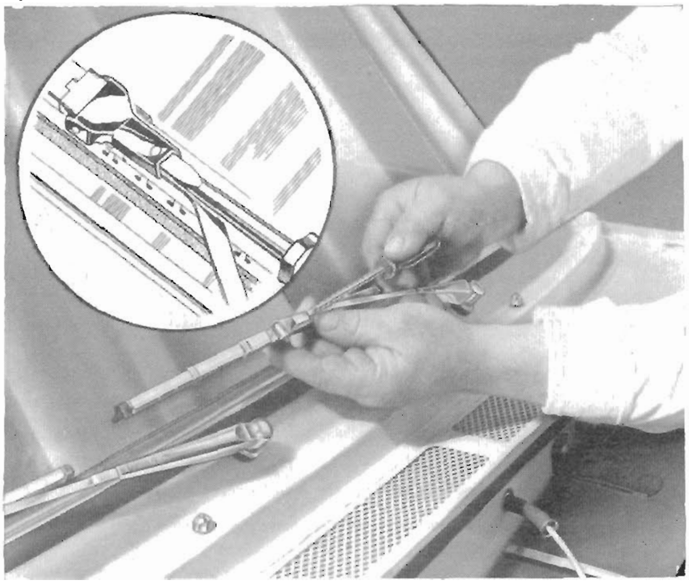


Fig. 70. Removing wiper blades

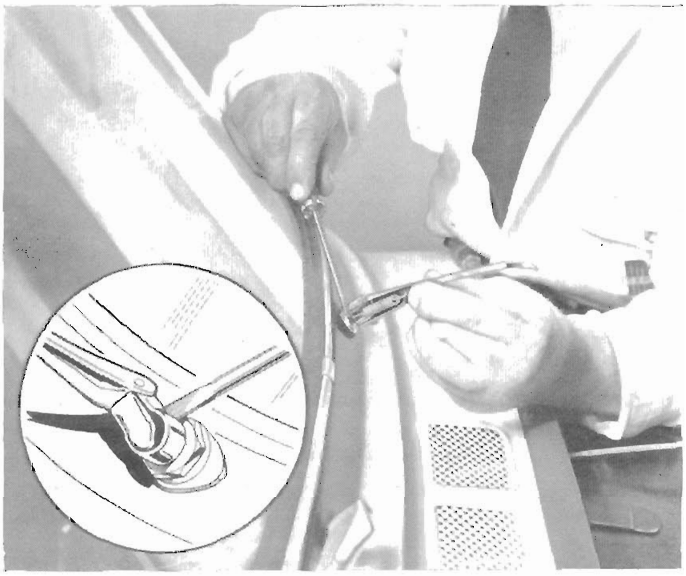


Fig. 71. Removing wiper arms

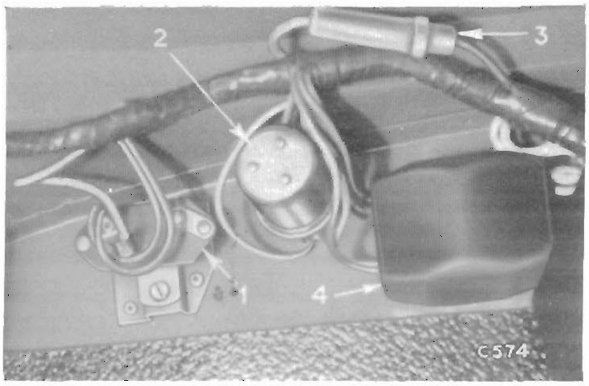


Fig. 72. Location of flasher unit (1) under the facia (Spitfire)

Wiper Wheel Boxes

To Remove

Disconnect the cables from the battery and wiper motor. Note the cable colours relative to the motor terminals.

Take off the wiper arms, complete with blades, and remove the wiper motor.

Remove the nut and rubber bush securing each wiper box to the lower windscreen rail and push the boxes into the car.

Working from inside the car, withdraw the boxes sufficiently to permit removal of the screws securing the tubing to the wheel box and withdraw the box.

To Refit

Reverse the above.

FLASHER UNIT DIRECTION-INDICATOR MODEL FL.5

Housed in a small cylindrical container, the FL.5 Flasher Unit incorporates an actuating wire which heats and cools alternately to operate the main armature and associated pair of contacts in the flasher lamp supply circuit. Simultaneously a secondary armature operates the pilot contacts which cause a warning light to flash when the system is functioning correctly.

Defective Flasher Units cannot be dismantled for subsequent reassembly and must therefore be renewed. Handle the Flasher Unit with care, otherwise the delicate setting may be disturbed and the unit rendered unserviceable.

Trace the cause of faulty operation as follows:—

(i) Check the bulbs for broken filaments.
(ii) Check all flasher circuit connections.
(iii) Switch on the ignition and check the voltage at terminal 'B' (12 volts).
(iv) Connect terminals 'B' and 'L' together and operate the direction-indicator switch. If the flasher lamps light, the Flasher Unit is defective. If the flasher lamps do not light, check the direction-indicator switch.

FUEL CONTENTS GAUGE

The fuel indicator gauge on Spitfire and Estate cars, operates on a stabilized 10 volts in conjunction with a Tank Unit and Stabilizer.

The Herald 1200 and Vitesse fuel indicator gauge operates on 12 volts in conjunction with a Tank Unit only. The indicator gauge, tank unit and stabilizer are sealed units which cannot be repaired but each may be renewed independently of each other.

Fault Finding

1. No reading on fuel indicator.
   - (a) Check the fuse between A3 and A4.
   - (b) Check the input and output voltages at the stabilizer. These should be at battery voltage and 10 volts respectively. If the input voltage is correct then the cable between the fuse unit and stabilizer is in order.
     If an incorrect or no-volts reading is obtained at the output terminal "T" on the stabilizer then the stabilizer is faulty and must be renewed.
   - (c) Remove the tank unit and test by substituting it with a "known" unit.
2. High or low reading on fuel indicator.
   - (a) Check the voltage stabilizer as described in 1 (b) above.
   - (b) Check the instrument by substituting "known" components.
   - (c) Check condition of insulation of interconnecting cables between the units for lead to earth.
3. Intermittent reading.
   - (a) Check for loose connections.
   - (b) Substitute voltage stabilizer.
   - (c) Substitute indicator and tank unit in turn with similar type.

To Renew

Disconnect the cables from the battery and tank unit.

HERALD 1200 AND VITESSE

Take out six screws and remove the old unit from the tank, noting the position of the arm and float.

Remove the cork seal and all trace of the old sealing compound.

Liberally coat the contacting surfaces of the new cork seal and tank unit with sealing compound. Enter the float and arm of the new unit into the tank aperture and, taking care not to bend or distort the arm, secure the unit with six screws.

Reconnect the cables to the unit and battery.

SPITFIRE

Using a screwdriver, turn the retaining ring (see Fig. 75) to release the tank unit. Withdraw the unit from the tank and replace it with a new unit. No sealing compound is required.

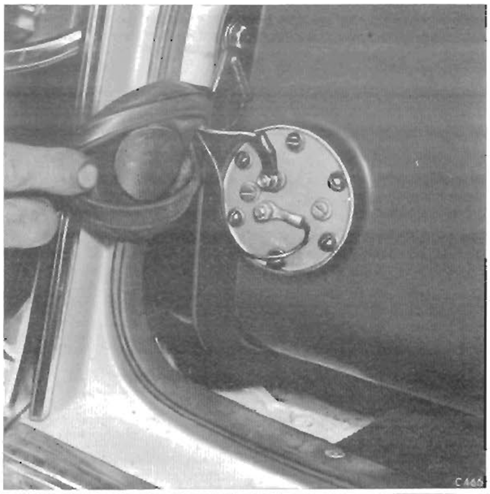


Fig. 73. Location of tank unit (Herald and Vitesse)

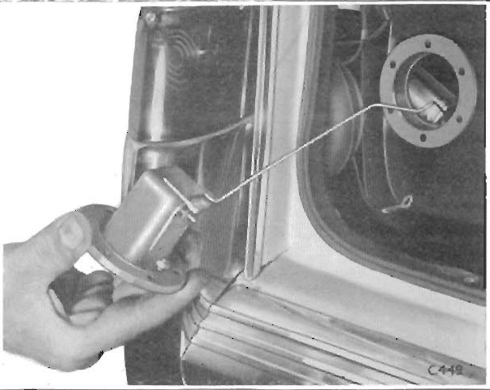


Fig. 74. Removing tank unit (Herald and Vitesse)

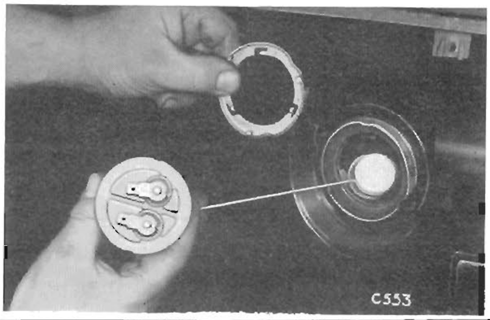


Fig. 75. Removing tank unit (Spitfire)

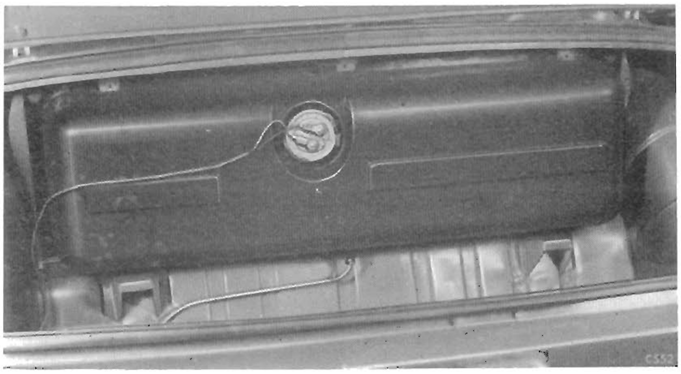


Fig. 76. Location of tank unit (Spitfire)

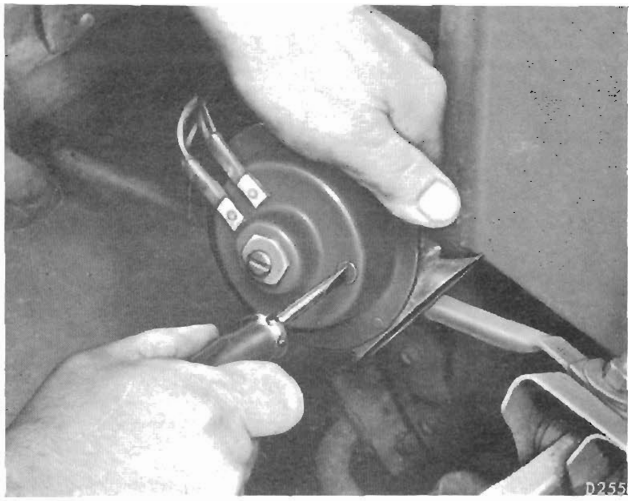


Fig. 77. Adjusting the horn

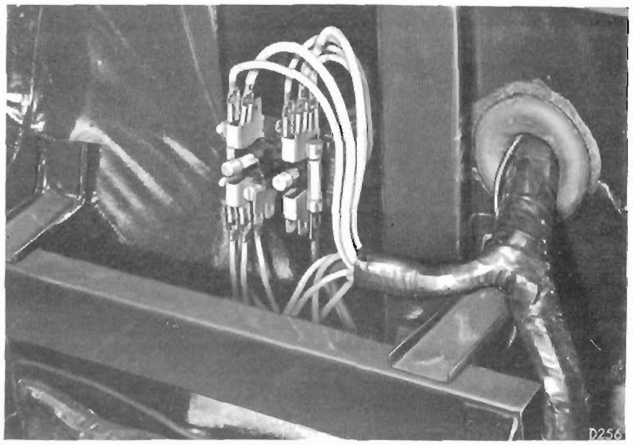
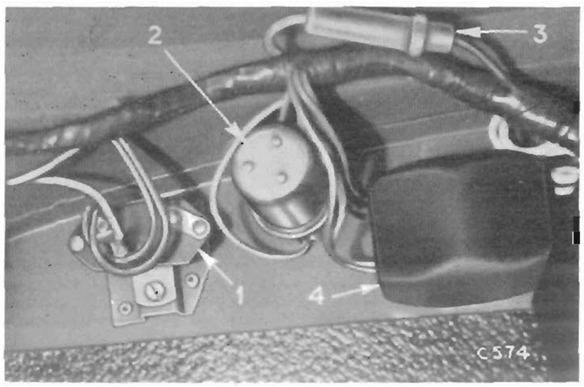


Fig. 78. Vitesse fuse unit (cover removed)



1. Voltage stabilizer
2. Flasher unit
3. Line Fuse
4. Fuse Unit

Fig. 79. Location of Spitfire fuses

WIND TONE HORNS MODEL 9H

Maintenance

If a horn fails to sound or its performance is unsatisfactory, check the following and rectify as necessary :—

1. Battery condition.
2. Loose or broken connection in the horn circuit.
3. Loose fixing bolts.

If the above points are in order, adjust the horn as follows :—

Adjustment

Adjustment does not alter the pitch of the note but merely takes up the wear of moving parts.

Disconnect one horn whilst adjusting the other, and take care to avoid earthing disconnected live wires. Connect a first grade moving-coil 0-10A ammeter in series with the horn and adjust the small serrated adjustment screw on the side of the horn at which the cables terminate.

Turn the adjusting screw clockwise to increase the current, or anti-clockwise to decrease it, until the best performance is obtained with the least current.

If adjustment is being made without an ammeter, turn the adjusting screws anti-clockwise until the horn just fails to sound; then turn it back one quarter of a turn.

WARNING

Do not disturb the central slotted stem and locking nut.

FUSES

A Lucas Type 4FJ fuse unit housing two 35 ampere fuses is fitted on Vitesse and Spitfire cars.

VITESSE

The fuse unit fitted to the Vitesse is located behind the battery or the clutch and brake master cylinders. One fuse, fed by a brown input cable, protects the horn, courtesy light and headlamp flasher circuits.

A second fuse, fed by a white cable from the ignition switch, protects the instruments and ancillary equipment.

SPITFIRE

The fuse unit fitted to the Spitfire is located adjacent to the flasher unit under the facia panel on the left-hand side of the car. One fuse, fed by a red/green cable from the master lighting switch, protects the front parking and tail lamp circuits.

A second fuse, fed by a white cable from the ignition switch, protects the instruments and ancillary equipment.

The horns and headlamp flasher circuits are protected by an "in line" fuse, located near the fuse unit.

HERALD

None of the circuits are protected by fuses.

CABLE CONNECTORS

Servicing

Connectors which are similar in design to those fitted in production are available as service replacements. The new connectors may be fitted as shown in Fig. 80.

1. Push the rubber sleeve clear of the end of the cable and strip the insulation from the conductor for approximately $\frac{5}{16}$" (8 mm.) for 12 ampere connector or $\frac{7}{16}$" (11 mm.) for 35 ampere connector.
2. Pass the conductor through the aperture and secure the cables with the tags.
3. Bend the conductors back over the connector and spread flat.
4. Solder the conductors neatly to the connector. Do not allow the solder to run freely through the aperture. Re-tighten the rubber insulating sleeve.

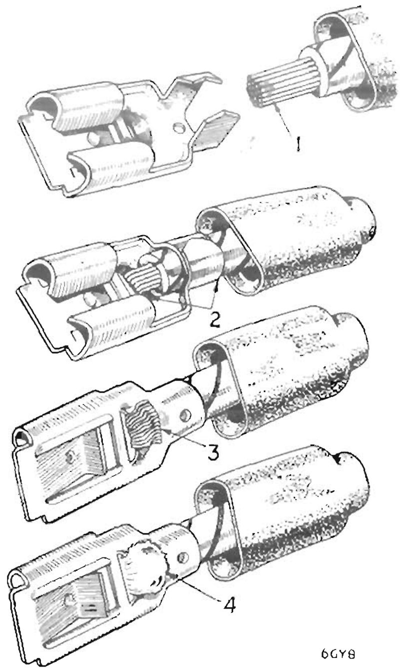


Fig. 80. Lucar connectors

High Tension Cables

The 7 mm. neoprene covered H.T. cables are of the resistive type having resistance of approximately 420 ohms per inch (2·5 cm.).

Suppression of ignition interference to radio and television is effected by a conductor composed of carbon impregnated nylon or cotton cords.

A serviceable cable should measure between 3,000 and 12,000 ohms.

These resistive cables must not be replaced with cables having tinned copper conductors.

SPITFIRE

The loom, which extends from the top centre of the grille to the rear lamps, is secured to left-hand side of the chassis frame with clips welded to the frame.

The front end of the loom terminates with the group of snap connectors for the front end lighting. Branches for the horns, generator, oil pressure switch and temperature gauge, leave the loom before it passes through the dash panel to the instrument panel where branches re-enter the engine compartment at two places. The first is adjacent to the coil with connections for the starter solenoid control box and coil. The second branch is on the right-hand side of car with connections for the wiper motor.

The loom passes from the instrument panel to the fuse unit, voltage stabilizer and flasher unit located under the left-hand side of the facia, with a branch for the brake stop lamp switch, along the floor to the rear of the car, to the tank unit and rear end lighting.

HERALD AND VITESSE

A two section harness loom joined by a group of snap connectors located under the left-hand side of the facia is employed.

The run of the loom which commences with a group of connectors for the front end lighting at the front end of the bonnet, is secured to the left-hand side of the chassis frame. Branches for the horns, generator, oil pressure switch, and brake stop lamps (and the fuse unit on Vitesse only) leave the harness before passing through the dash panel to the switches, facia and the snap connectors referred to above. The harness re-enters the engine compartment on the right-hand side of the car with connections for the wiper motor.

The loom passes along the left-hand side of the floor, to the rear of the door. At this point it passes behind the trim panel to the rear of the fuel tank and terminates with connectors for the rear end lighting.

DIAGNOSIS OF FAULTS, TEST EQUIPMENT AND SPECIFICATIONS

Diagnosis of Faults, Test Equipment and Specification.

To those familar with the use of test equipment the following section will require little explanation. The use of test equipment in a logical sequence has proved the most satisfactory method of detecting defects and mal-adjustments which affect the performance of the engine. For test purposes there are five main "areas".

1.	The Starting System	Battery, starter motor and circuit.
2.	The Charging System	Battery, generator, regulator and circuit.
3.	The Ignition System	Spark plugs, distributor, coil, condenser and circuit.
4.	The Fuel System	Fuel pump, carburettors, air cleaners, fuel filters and delivery pipes.
5.	Compression and Induction	Valves, pistons and rings, head gasket, inlet manifold and flanges.

This division is only made for convenience. Obviously the performance of the engine as a whole is dependent on the relation between all its working parts as well as their individual behaviour.

Equipment suitable for detailed testing of these areas or systems is commercially available, and the following are representative and suitable.

1. Battery-starter tester and slow/fast battery charger.

2. Volt amp. tester with generator field control and load control.

3, 4 and 5.
Console type tester including oscilloscope, voltmeter, ammeter, combustion analyser, fuel pump tester, vacuum tester, tachometer, timing stroboscope and various accessories.

Fig. 1. Crypton "Motorscope" analyser

The Ignition Oscilloscope

This is an adaptation of a laboratory instrument which has been used for many years in the electrical and electronic fields. It displays the operation of the ignition system **as a whole.** Its chief advantage is that it enables any departures from normal operation to be seen very quickly. It is not, however, a specific fault finder. It displays the ionisation or firing voltage developed by the coil before current flows across the spark plug electrodes and forms the spark, and the steady voltage at which the current flow occurs. Both these are valuable in determining spark plug condition, especially under "snap acceleration". However, the firing voltage is of extremely short duration and is, in fact, altered by the very process of measuring it. For this reason it is necessary to use the equipment manufacturers' manual when interpreting the results obtained, since different manufacturers use different methods of obtaining these measurements.

The graphical picture of the voltage changes occurring in the coil windings does enable the presence of ignition faults to be detected very quickly and the electrical nature of these faults can be seen. Specific test instruments such as the ohmeter, voltmeter, coil tester and condenser tester can then be used to "pin-point" the actual cause of the trouble.

NOTE: The manufacturers of the test equipment shown provide instruction and training in its use, and this is not part of the function of this manual.

The test procedures shown, form a sequence, and might be called a "Quality Control Quick Check", either to determine the exact service needs of the vehicle (which might include further testing), or as an inspection procedure to establish that the vehicle is correctly adjusted and has no defective components. The time normally taken by an experienced tester would be 10 minutes approximately.

It is essential that the test procedure is adhered to, and that the very minimum of adjustments are actually made until the whole picture has been obtained.

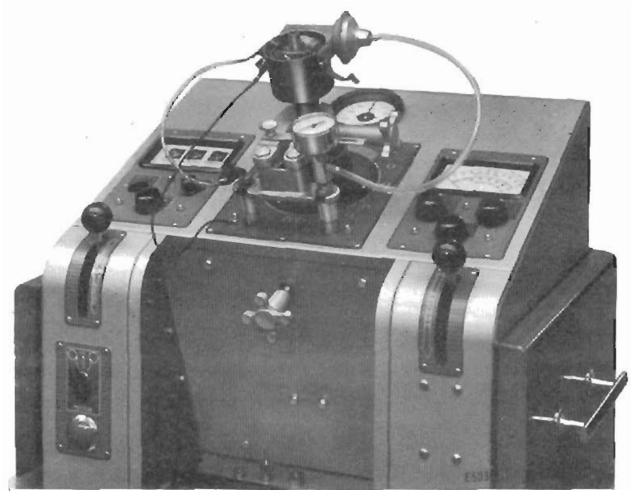


Fig. 2. Distributor tester

Fig. 3. Volt/Amp. tester

Fig. 4. Battery tester and charger

Startability

NOTE: Connect to the switch side of any ballast resistance on coil.

STATIC. With the ignition switch "ON" the current flows from the battery through the voltage regulator series winding, through the ammeter (if fitted), through the ignition switch to the auxiliary circuit and coil "SW" terminal. Note: "CB" terminal on coil must be connected to earth when making this test. The circuit and all connections are good if 11·5 volts or more are shown at the coil "SW" terminal.

Cranking

With the "CB" terminal still earthed. This test further confirms the STATIC test and also checks the following items—the battery under full starter load, the action of the starter switch, the starter motor, the flywheel ring gear, also the connections to the battery and chassis earths. The result is good if 10 volts or better are recorded when the engine is warm.

Charging

Remove "CB" earth. Start the engine and speed up to about 2,000 r.p.m. to make the generator charge the battery. Between 13 volts and 14 volts should be recorded at coil "SW" terminal. If reading is under 13 volts the fan belt may be slipping or the regulator set low. If more than 14 volts are recorded there is a risk of the light bulbs failing due to excessive voltage. Check for a high regulator setting.

Volt Drop Through Distributor

With the engine stationary, the ignition switched on and the distributor contact points closed, a reading at the coil "CB" terminal of 0·2 volt or less should be obtained on Lucas systems and 0·1 volt or less on other systems. This test proves that the circuit from the coil to the distributor, through the distributor internal connections, and the ignition points to earth is satisfactory.

Distributor Points Dwell

This test indicates any difference in timing between cylinders. It can be caused by slack in the chain or gears driving the camshaft, also the skew gears driving the oil pump and distributor, or the dog coupling to the distributor where this is used. It may be an indication of trouble in the distributor. The overlap should not exceed 3 . This represents 6 at the crankshaft and so could be the cause of an engine running rough, particularly on high compression sports type engines.

Spark Plug Minimum and Spark Plug Maximum

All cylinders should indicate within about 2 KV of each other. The actual value obtained depends on a number of factors, some of these being: the compression ratio, rich or weak carburettor setting, radio suppressors or suppressed leads, the distributor rotor gap or the type of H.T. cable harness used, *e.g.*, long bunched leads or short spaced leads. The behaviour of the oscilloscope on different types of vehicle is quickly learnt with practice. In general, the average plug voltage should not exceed half the available coil H.T. with engine running light or two thirds of the available coil H.T. when under load.

Rotor Gap

By shorting various spark plugs to earth in turn it is possible to see the KV required to bridge the rotor gap. This should not exceed 5 KV or be less than 2 KV. If too high a rotor gap KV is shown the engine may miss at high speed or under load, whilst low rotor gap KV can result in misfiring due to the lack of the spark intensifying action needed to fire sooted or oiled spark plugs.

Coil H.T. Output

The coil output is established by removing the H.T. lead from any convenient spark plug. When the rotor is opposite this distributor cap segment there will be no path for the H.T. current to earth; the oscilloscope will therefore indicate the voltage available at the coil. Voltages between 10 KV and 24 KV can be expected according to the type of coil and vehicles. Link this H.T. KV reading with the spark plug KV readings previously obtained—the reserve KV available is what matters.

NOTE: Always test at exactly 1,000 r.p.m. so that a standard coil input voltage is maintained. Also remember that if a "sports" or very high voltage coil which is not a standard unit is fitted, it is possible for the spark to jump to earth inside the distributor cap so limiting the coil KV shown. This can usually be heard.

Power Check r.p.m. Drop

In this test each spark plug in turn is prevented from firing. If the cylinder compressions are equal, the tappet adjustment correct, there is no air leak on the induction pipe and multi-carburettors (when fitted) are in synchronisation, there should be an equal drop of engine r.p.m. on each cylinder.

Set Idle to the r.p.m. figure shown in data.

Timing at Idle should be noted.

Some makers give a stroboscopic timing figure but where a static timing figure only is given it is usually in order to add 2° to this figure to make up for any backlash which exists in the distributor drive and any movement of the advance weights. It is important to establish that the timing marks indicate either Top Dead Centre or are Firing Marks, otherwise serious errors in ignition timing will result. Our published data gives this information.

Air/Fuel Ratio at Idle

Should be recorded and used as a guide if carburettor adjustment proves necessary.

Timing Without Vacuum Advance at 3,000 r.p.m.

This is beyond doubt the most important test in the entire sequence. A serious error of timing at this speed could destroy the engine. Our published data shows the advance which should be obtained. Where limits are given, the higher figure will usually give the best performance these figures should never be exceeded. If it is not possible to obtain correct timing at idle and 3,000 r.p.m. remove and test the distributor. Where it is not possible to service the distributor as required, it may be better to set the ignition timing at 3,000 r.p.m. and let any error that exists occur at the idle speed. Poor idling may result from this action but there is less risk of the engine being damaged until proper servicing takes place.

Timing with Vacuum Advance

With the engine still running at 3,000 r.p.m., the vacuum pipe should be replaced on the distributor and the additional ignition advance observed with the timing light. Not all vehicles have a vacuum advance unit, for this is an economy device, very valuable on touring vehicles, but not always capable of the precise timing needed on very high performance engines. Faults which may exist include: vacuum take-off on the carburettor not drilled, or incorrectly located, drilling blocked by gum or carbon, pipe to the distributor may be blocked or leaking, the vacuum diaphragm may be punctured or the movement inside the distributor restricted mechanically.

Air/Fuel Ratio at 3,000 r.p.m. should be recorded.

It is at this speed that a dirty or otherwise restricted air filter on the carburettor intake will show up. Some engines will not run correctly with the air silencer unit removed or with the filter element left out. Locate cause of an unusual reading.

Final Idle Speed

Set to the maker's suggested speed. Modern engines cannot be expected to run as slowly as was once possible. It is better to have the engine turning over easily and without the risk of stalling.

NOTE : Most manufacturers of cars and test equipment quote air/fuel ratios when testing carburettors and exhaust gases. Where exceptions to this exist a percentage figure is given. Fig. 5 shows the relationship of one to another.

WORK STUDY ON SIX CYLINDER ENGINE

QUALITY CONTROL QUICK CHECK

(Average of three timed checks)

			Secs.
1. Startability			
Lift Bonnet, Connect Test Leads			41·7
Volts at coil switch terminal	a.	Static	18·3
	b.	Cranking	12·3
	c.	Charging	17·0
Volt drop through distributor	d.		21·3
2. At 1000 r.p.m.			
Distributor points dwell		Degrees	49·3
Distributor dwell overlap		Degrees	
Spark plugs minimum		KV	13·3
Spark plugs maximum		KV	
Rotor gap		KV	28·3
Coil H.T. output		KV	
Power check r.p.m. drop		1 ... 2 ... 3 ... 4 ... / 5 ... 6 ... 7 ... 8 ...	93·7
3. At Engine Idle Speed			
Idle set to		r.p.m.	32·7
Timing at idle		° B.T.D.C.	42·3
Air/fuel ratio		/1	
Engine at 3000 r.p.m.			
Timing without vacuum advance		° B.T.D.C.	58·3
Timing with vacuum advance		° B.T.D.C.	
Air/fuel ratio		/1	8
Final Idle Speed			
In neutral		R.P.M.	28·0
In drive		R.P.M.	16·7
Remove the test leads, close bonnet			36·7

Job No. .... Car No. .... Tested by .... Date ....

Times include completing record card .. .. .. **Total 8 min. 38 secs.**

The Quality Control Quick Check report card reproduced above indicates the comprehensive nature of the engine testing this method makes possible.

STANDARD-TRIUMPH 1964/5 MODELS

QUALITY CONTROL QUICK CHECK — PASS READINGS (ENGINE WARM)

TEST	HERALD 1200	HERALD 12/50	SPITFIRE 4	SPITFIRE 4 MK. 2	VITESSE
Startability—volts at coil, "switch" ignition on: (C.B. earthed)					
Engine Static	11·5 min.	11·5 min.	11·5 min.	As Spitfire	11·5 min.
Starter Cranking ..	10·0 min.	10·0 min.	10·0 min.		10·0 min.
Generator Charging ..	13 to 14 V.	13 to 14 V.	13 to 14 V.		13 to 14 V.
Volt-drop through distributor, ignition on, engine static, distributor points closed	0·2 max.	0·2 max.	0·1 max. Delco Distributor	As Spitfire	0·1 max. Delco Distributor
Engine running at 1000 r.p.m.					
Distributor points dwell	60° ± 3°	60° ± 3°	36° ± 1°	As Spitfire	36° ± 1
Spark plugs, min. ..	5 KV	5 KV	5 KV		5 KV
Spark plugs, max. ..	7 KV	7 KV	10 KV		10 KV
Rotor gap KV	5 max.	5 max.	5 max.		5 max.
Coil H.T. output ..	14 to 15 KV	14 to 15 KV	18 to 20 KV		18 to 20 KV
Engine idle speed	600 r.p.m.	600 r.p.m.	700 r.p.m.	700 r.p.m.	600 r.p.m.
Stroboscopic timing at idle	17° B.T.D.C.	17° B.T.D.C.	15° B.T.D.C.	17° B.T.D.C.	12° B.T.D.C.
Air/fuel ratio at idle ..	12·8/1 to 13·0/1	12·8/1 to 13·0/1	12·8/1 to 13·0/1	12·4/1 to 12·8/1	12·8/1 to 13·0/1
Stroboscopic timing without vacuum advance	35° ± 2°	35° ± 2°	39° ± 2°	42° ± 2°	30° ± 2°
Stroboscopic timing with vacuum advance ..	50° ± 4°	50° ± 4°	59° ± 4°	53° ± 4°	43° ± 4°
Engine running at 3000 r.p.m. Air/fuel ratio ..	13·2/1 to 13·4/1	13·2/1 to 13·4/1	13·5/1 to 13·7/1	12·6/1 to 13·0/1	13·5/1 to 13·7/1

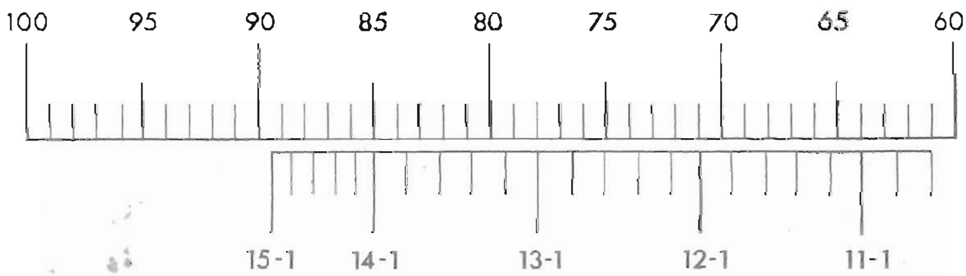
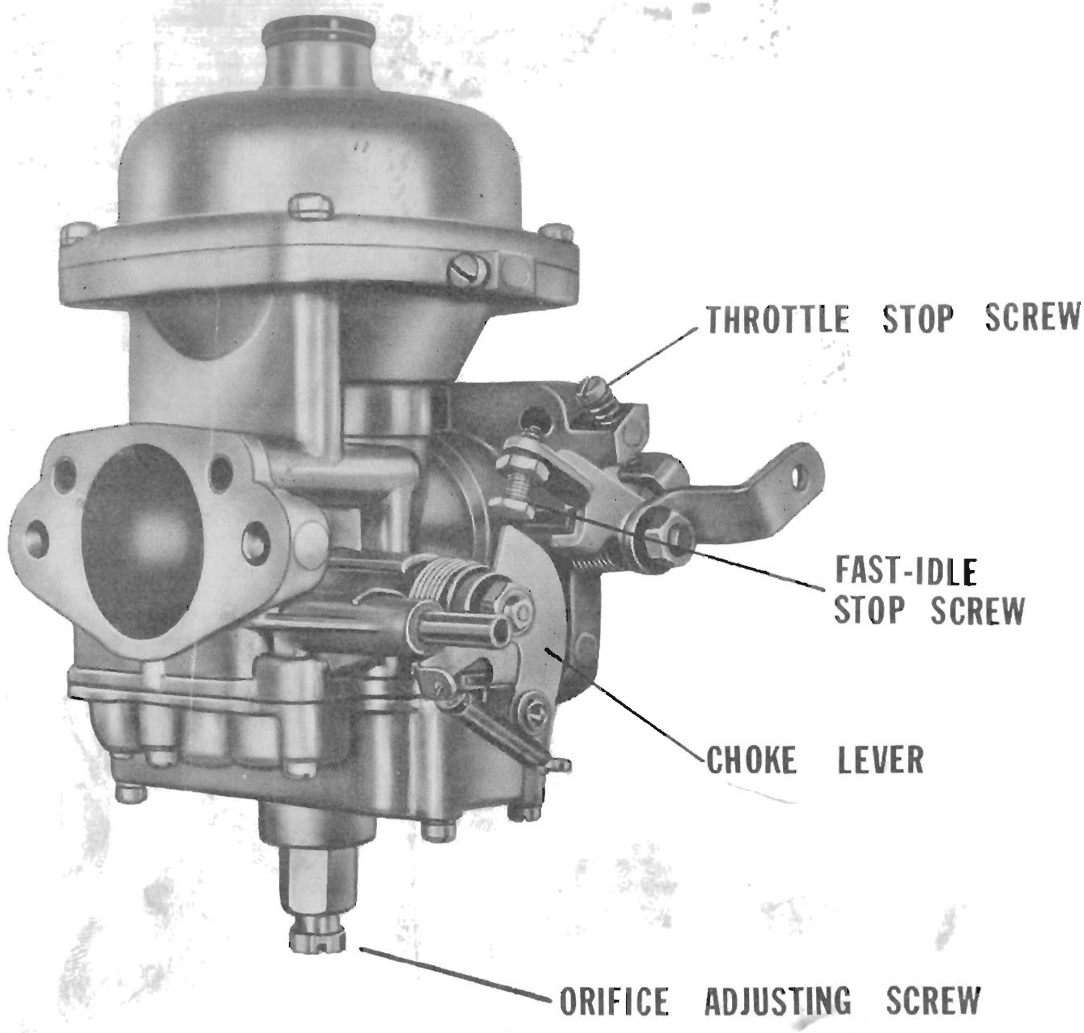


Fig. 5. Air/Fuel Ratio

ZENITH® CARBURETTERS
SERVICE BULLETIN

SERIES STROMBERG®
C D
Constant Vacuum



PRINCIPAL FEATURES

This Stromberg "CD" or constant depression instrument is different from previous carburetters we have manufactured of fixed choke tube design. It operates on the "constant vacuum" principle, the choke area and the jet orifice varying according to the degree of throttle opening and the speed of the engine which will alter according to the load.

It is a simple, compact and dustproof instrument with concentric floatchamber surrounding the jet orifice with its attendant advantages over the more orthodox out-rigged floatchamber some distance away from the jet.

Three principal die-cast aluminium castings are used in the construction, the main body, suction chamber cover and the floatchamber. The air valve body and housing for the jet assembly are also castings resulting in an extremely light-weight carburetter relative to bore size and air flow.

The "CD" carburetter is suitable for installation between horizontal and semi-downdraught, the features which permit this inclination are the concentric floatchamber and a central jet orifice which gives a very steep flooding angle, ensuring good operation and stable idling in hilly terrain with no tendency to cut out on fast cornering.

The carburetter has a cold start device interconnected with the throttle to provide for a specific degree of throttle opening to ensure a suitable fast-idle as necessary when the motor is cold.

PRINCIPLE OF OPERATION

The petrol inlet 1, a parallel tube to accommodate a flexible fuel pipe is at the side of the main body. From here fuel passes into the floatchamber via the needle seating 5 where the flow is controlled by the needle 8 and the twin expanded rubber floats on a common arm 7. As the petrol level rises the float lifts and, by means of the float arm and tag, closes the needle on its seating when the correct level has been attained. With the engine running, petrol is drawn from the floatchamber, the float descends and more fuel is then admitted through the needle seating. In this manner, the correct level is automatically maintained the whole of the time the carburetter is in action.

The fuel from the floatchamber will rise in the jet orifice 19 via holes 21 and 22 in the jet assembly, the fuel in the jet orifice being maintained at the same level as that in the floatchamber.

If care is exercised in setting each throttle open the same extent, then lifting each air valve in turn will give similar re-action as outlined under the instruction "Setting the Idle" and any final setting of the jet adjusting screw can be made to ensure idle speed remains constant or falls slightly on lifting the valve.

Finally, adjust fast-idle stop screw in accordance with setting details for the particular application and **lock securely** with lock nut.

Note: Remember that the idle quality depends to a large extent upon the general engine condition and such points as tappet adjustment, spark plugs and ignition timing should be inspected if idling is not stable. It is also important to eliminate any leaks at manifold joints. There will come a time when the wear of throttle spindle and bearings in the carburetter will effect idle and it will be advisable to replace the spindle. Later, when a new spindle is not effective by reason of the degree of wear in bearings in the unit it will be necessary to fit a new carburetter.

Float Level

When correctly set and with the carburetter inverted measure to the highest point of the floats above the face of the main body with the fuel inlet needle on its seating. The correct measurement is indicated on our Parts Schedule for the appropriate application.

Great care must be taken not to twist or distort the float arms, to ensure a constant fuel level.

Should it be necessary to reset the float level, this can be carried out by bending the tag which contacts the end of the needle 8. Care should be taken to maintain the tag at right angles to the needle in the closed position.

Note: An additional washer under the needle seating assembly will lower the level and is a simpler method of effecting a small change than bending the tag on the float.

Jet Centralisation

The efficient operation of the carburetter depends on free movement of the air valve and needle in the jet orifice. In the Stromberg there is annular clearance around the orifice bush 23 which permits the lateral positioning of the bush and jet. Thus it may be clamped up in such a position that the metering needle 29 moves freely in the orifice 19.

When the carburetter leaves the factory the orifice bush is in the correct position and this can be checked by lifting the air valve by means of the spring loaded pin 9 and noting that the valve falls freely.

If for any reason, the jet assembly is removed, it must be re-centred.

Procedure

1. Lift the air valve 18 and tighten the jet assembly 12 fully.
2. Screw up the orifice adjuster until the top of the orifice 19 is just above the bridge 28.
3. Slacken off the whole jet assembly 12 approximately half-a-turn to release the orifice bush 23.
4. Allow the air valve 18 to fall; the needle will then enter the orifice and thus automatically centralise it. If necessary, assist the air valve drop by inserting a soft metal rod in the dashpot after unscrewing the damper.
5. Tighten the assembly 12 slowly, checking frequently that the needle remains free in the orifice. Check by raising the air valve approximately $\frac{1}{4}$" and allowing it to fall freely. The piston should then stop firmly on the bridge.
6. Reset idle as outlined earlier.

Sticking of the air valve can be explained by dirt or carbon on the outside diameter of the air valve and the bore in which the air valve moves or if the metering needle is bent.

To remove the air valve assembly take off the top cover by undoing the screws 2 when the assembly with diaphragm can be lifted out of the main body.

The outside of the air valve and the bore can be wiped clean with a rag that is moistened with paraffin or petrol but if the diaphragm has expanded one will have to allow it to dry for a few minutes before it will fit on the bead and recess for the locating tab. If it is necessary to clean the diaphragm, use only clean rag.

In common with other products made from rubber compounds any contact of the diaphragm with volatile cleaners such as trichloroethylene should be avoided.

If examination of the needle indicates it is bent it should be replaced with a new one bearing the specified marking as detailed in the specification for the particular make and model of engine.

In replacing or fitting a new metering needle the shoulder must line up with the lower face of the air valve and the locking screw 10 tightened fully.

The needle is machined to very close limits and should be handled with care.

Air Valve/Diaphragm Assembly

A bead and locating tab is moulded to both the inner and outer radii of the diaphragm to ensure correct positioning of this item.

The diaphragm is secured to the air valve by a ring and screws with lockwashers and it is very necessary to ensure the bead is correctly located and the screws tightened fully.

Location for the bead and tab on the outer radii of the diaphragm is provided by a location channel at the top of the main body.

It is important that location beads and tabs are accurately positioned.

When refitting the suction chamber cover, place it accurately so that the screw holes line up with those in the main body, this will prevent any disturbance of the located diaphragm.

Air Valve Rod and Guide

The air valve rod and guide must be kept clean and should not be handled unduly to avoid corrosion. A few drops of light oil should be applied to the rod before refitting.

Floatchamber Removal

To prevent the leakage of petrol from the floatchamber, a rubber "O" ring 11 is situated between the jet assembly and the floatchamber spigot boss.

Care should be taken when removing the floatchamber to avoid damage to the faces and floats.

A CARBURETTER IS AN ACCURATE AND DELICATE INSTRUMENT, IT WILL ONLY GIVE OF ITS BEST IF TREATED AS SUCH.

THE

ZENITH

CARBURETTER CO. LTD.

Manufacturers of Zenith, Solex and Stromberg Carburetters

HONEYPOT LANE, STANMORE

MIDDLESEX.

Telegrams: Zenicarbur, Norphone, London. Telex No. 23571 Telephone: 01-907 4343 (12 lines)