

Instruction Manual

for the



Midget

(Series "T")

Price 10/-

THE Instruction Manual

for the



MIDGET

SERIES "T"

Foreword.

The object of this Instruction Book is to place the owner in possession of as much detailed information as possible for the maintenance of the M.G. Midget "T" Series.

Details are provided regarding running-in, and separate chapters deal with the various items of the car, such as chassis, engine, carburetters, brakes, etc. Each section contains more detailed information than is needed for ordinary maintenance, which it is hoped will prove of interest to owners, and of assistance to service stations.

The time arises when a part of the car has to be dismantled, and it is then that reference to the detailed instructions can be of considerable value, both to the owner and repair shops, unacquainted with the construction of the car.

Should the owner fail to find the particular information he requires in the Instruction Book, it is hoped he will not hesitate to communicate with the Service Department at Abingdon (being sure always to quote the car's chassis and engine numbers, and body number when the body is concerned), who will always be only too ready to afford any assistance they can at any time.

We cannot stress too highly the danger of fitting non-genuine parts to M.G. cars.

Unfortunately cases have come to our notice where accidents have actually been caused by this practice, and we strongly advise all M.G. owners to insist and see that for all repairs and replacements only genuine M.G. parts are fitted.

M.G. parts are specially designed and manufactured to withstand the stresses imposed by a high-speed sports car, and we would warn all owners that the fitting of non-genuine parts renders the guarantee *null and void*.

POSTAGE AND PACKING CHARGES. The prices quoted in the Spare Parts List are net at the Distributors' or Dealers' premises, but in the event of parts having to be forwarded, packing and posting charges will of course be extra. Except in the case of those who have opened approved accounts, all parts that can be will be forwarded C.O.D.

The prices of M.G. spare parts are naturally subject to an increase in overseas markets to cover freight, insurance, duty, etc.

G.K. — G.T.

October, 1936.

February, 1937 (Reprinted).

April, 1938 (Reprinted).

**SEE PAGE 9 FOR POSITION OF CHASSIS, ENGINE
AND BODY NUMBERS**

TELEGRAMS:
"EMGEE"
ABINGDON

THE  CAR
COMPANY LTD
ABINGDON-ON-THAMES
BERKSHIRE

TELEPHONE:
251 (4 LINES)
ABINGDON -
ON-THAMES

MISCELLANEOUS HINTS

- Do** read this *Manual* thoroughly and carefully, and follow out the instructions laid down.
- Do** always quote model, year, engine and chassis numbers (and body number if necessary) when writing. **This is very important.**
- Do** free the engine by hand when very cold before using the starter.
- Do** remember to keep the radiator filled.
- Do** carefully run-in a new engine ; restraint during the first 2000 miles will be handsomely repaid.
- Do** remove the oil filter element and replace with a new one at the end of the first 1000 miles, and subsequently every 10,000 miles.
- Do** change the engine oil after the first 500 miles and every 1200—1500 miles thereafter.
- Do** use the gears freely, particularly on hills and when accelerating after corners, in traffic, etc.
- Do** specify the genuine M.G. parts when ordering spares, the use of "pirate" parts is certain to lead to serious breakdowns, and renders the guarantee null and void.
- Do** check the tyre pressure every week, and inflate to the pressure recommended.
- Do** avoid "harsh" driving, particularly when braking ; the M.G. brakes are smooth and powerful and need never be "stamped on."
- Do** study the maintenance chart at the back of the book and attend to the chassis, etc., at the periods stated.
- Do** write to us or come and see us (by appointment, please) when in any difficulty.
- Do not** under any circumstances allow the oil level to fall below half full ; it is best to keep it always up to three-quarters at least.
- Do not** mix different brands of oil in the sump.
- Do not** pull out the starter button and let go immediately. Overcoming engine inertia is a big drain on the battery. Once the engine is spinning much less current is being consumed, so keep the starter switch in contact a reasonable time to give the engine time to fire and take hold.
- Do not** race the engine when it is cold ; this will shorten considerably the life of pistons and bearings, and may even result in piston seizure. At the same time do not allow it to idle, this is equally injurious. The best warming-up speed is between 1200—1500 r.p.m.
- Do not** allow the engine to labour.
- Do not** run the engine with the mixture control in the rich position longer than necessary.
- Do not** slip the clutch except when actually starting off or changing gear.
- Do not** leave the headlamps alight when the car is stationary at night ; this drains the battery unnecessarily and is very discourteous to other road users.
- Do not** forget to top-up the battery with distilled water regularly.
- Do not** lean on open doors.
- Do not** subject the tyres to glancing blows from the kerb when drawing up beside the pavement ; this may interfere with wheel alignment and have a serious effect on steering and tyre life.

INDEX

	Page		Page
Air Cleaner	37—39	Engine gaskets	52
Ammeter	69	Engine lubrication system	36
Axle (front), removal	12	Engine number	9
Axle (rear), dismantling	15	Engine removal... ..	47
Axle (rear), lubricants	8	Engine, refitting	47
Axle (rear), removal	13	Engine, running in	6, 7
		Engine, warming up	6
Batteries	68	Export variations	87
Bearings, connecting rod big-end	47		
Body, care of	83, 84	Filter, oil	8—36
Body number	9	Foglamp	72
Body remounting	86	Fume excluders	85
BRAKE SECTION	19—27	Fusebox	71
Brake adjustment	23		
Brake dismantling	24—26	Gaskets, engine	52
Brake master cylinder	22	GEARBOX SECTION	61, 62
Brake supply tank	21	Gearbox removal	62
Brake trouble location	27	Gearbox reassembly	62
Brake wheel cylinders	24	Gearbox synchromesh mechanism	62
Camshaft removal	48	Headlamps	71
Camshaft replacement... ..	49	Hints, miscellaneous	2
CARBURETTER SECTION	53—56	Hood	85
Carburetter adjustments	56	Horn	73
Carburetter silencer	37—39	H.T. cable	75
Carburetter synchronising	55		
Carburetter troubles	54	Ignition timing	49, 51
CHASSIS MAINTENANCE SECTION	10—18a	Ignition warning light	75
Chassis number	9	Illustrations, alphabetical list of	3b
Chromium plating	84	Instrument panel	5, 70
Clutch	65—66		
Coachwork	83—84	King pins	13
Coil	74—75		
Controls, position of	6	Lamps	71, 72
Cooling system	4, 8	Lamps, Export	87
Cut-out and fusebox	71	Lubrication, chassis	8
Cut-out switch	70	Lubrication, distributor	74
Cylinder head, removal	39, 41	Lubrication, engine	36
Cylinder head, refitting	43	Lubrication, first 500 miles	8
		Lubrication, hubs	8
Data sheet	4	Lubrication, rear axle... ..	8
Decarbonising	39—41	Lubrication, road springs	16
Differential adjustment	15	Lubrication, steering gear	30
Differential, dismantling	15	Lucas service stations... ..	92
Differential, reassembling	15		
Distributor	75, 76	MAINTENANCE SECTION	5
Draglink	13		
Draught excluders	85	Oil filter	8—36
		Oils recommended and approved	7, 8
ELECTRICAL SECTION	67—81		
ENGINE SECTION	33—52	Petrol pump	57, 59
Engine, decarbonising	39—41	Pistons, removal	44
Engine, decarbonising, final adjust- ments	44	Pistons, refitting	45
Engine, description	34	Piston rings	45, 47
		Propeller shaft	17

INDEX—continued

	Page		Page
Radiator removal	47	Timing, camshaft	49
Radiator repairs	93—94	Timing, ignition	49—51
Re-fuelling	7	Timing, valve	51
Running-in	6	Tool kit	9
		Trafficators	73
		Tyres	18
Seat adjustment	84		
Shock absorbers	17—18	Universal joint, propeller shaft ...	17
Side-curtains	85	Upholstery	84
Sidelamps	72		
Sparking plugs	44	Valve grinding	41, 42
Speeds in gears	66	Valve timing	51
Spring shackle pins	16		
Spring trunnions	16	Warming up	6
Starter	70	Water impeller... ..	37
STEERING GEAR SECTION	29—31	Water system	8
Steering ball joints	13	Wheels	18a
Steering cam adjustment	30	Wheel bearings	12
Steering drop arm	30, 31	Windscreen	84
Steering gear reassembly	30	Windscreen wiper	73
Steering lubrication	30	Wiring system	76—81
Steering rocker-shaft	30		
Sump	44		

ALPHABETICAL LIST OF ILLUSTRATIONS

	Page		Page
Air cleaner, carburetter	37	Gaskets, engine	52
Bearings, camshaft	48	Gearbox constant mesh locking device	64
Bearings, crankshaft	45	Gearbox dismantled	63
Brake flexible hose	23	Gearbox selectors	63
Brake layout	20, 21	Headlamps, Export	88
Brake master cylinder	22	Headlamp front removal	72
Brake-shoes, front	12	Headlamp switch	79
Brake-shoes, rear	14	High-tension cable	75
Brake-shoe adjustment	25	Hood, folding of	85
Brake system, bleeding of	26	Hub, front	12
Brake wheel cylinder, front and rear	24	Hub, rear	14
Camshaft	48	Instrument panel layout	5
Camshaft bearings	48	Junction box	71
Camshaft timing	50	Oil filter... ..	38
Carburetter	53	Oil pump	38, 48
Carburetter air cleaner	37	Petrol pump	57
Chassis frame, dimensional drawing ...	11	Pistons	46
Clutch dismantled	64	Power unit, off-side and near-side views	35
Coachwork	83	Pushrod removal	39
Coil	67	Rear axle dismantled	14
Connecting rods	46	Rings, piston	46
Controls	5	Rocker gear assembly	40
Crankshaft bearings	45	Shock absorber dismantled	17
Crankshaft T.D.C.	50	Side-curtain storage	85
Cut-out and fuse unit	71	Speeds on gears	66
Cylinder head nuts, order of tightening	43	Steering gear	29
Differential dismantled	14	Timing chain	50
Distributor	74	Tool kit	9
Dynamo brush gear	69	Trafficators	73
Electrical system	81	Valve gear	40
Engine, off-side and near-side views	35	Valves in cylinder head	40
Engine gaskets	52	Valve timing	51
Engine mounting, front	50	Wiring diagram	81
Export headlamps	88		
Facia board layout	5		
Filter, oil	38		
Frame dimensional drawing	11		
Fuses	71		

GENERAL DATA

THE M.G. MIDGET "T" SERIES

Bore	-	-	-	-	-	-	-	63.5 mm.
Stroke	-	-	-	-	-	-	-	102 mm.
Capacity	-	-	-	-	-	-	-	1292 c.c.
Horse-power (R.A.C. rating)	-	-	-	-	-	-	-	10
Sump capacity	-	-	-	-	-	-	-	1 $\frac{3}{8}$ gallons (approx.)
Firing order	-	-	-	-	-	-	-	1, 3, 4, 2
Sparking plugs	-	-	-	-	-	-	-	Champion L.10 (14 mm.)
Capacity of water system	-	-	-	-	-	-	-	1 $\frac{7}{8}$ gallons
" " gearbox	-	-	-	-	-	-	-	2 pints
" " rear axle	-	-	-	-	-	-	-	2 pints
" " petrol tank	-	-	-	-	-	-	-	15 gallons (approx.)

DIMENSIONS (TWO-SEATER) :—

Overall length	-	-	-	-	-	-	-	11' 7 $\frac{1}{2}$ "
" width	-	-	-	-	-	-	-	4' 8"
" height (hood up)	-	-	-	-	-	-	-	4' 5"
Wheelbase	-	-	-	-	-	-	-	7' 10"
Track	-	-	-	-	-	-	-	3' 9"
Weight	-	-	-	-	-	-	-	15 $\frac{3}{4}$ cwt.

Tyre pressures (front tyres)	-	-	-	-	-	-	-	24 lb.
" " (rear tyres)	-	-	-	-	-	-	-	26 lb.

Gear Ratios	Overall ratios.				Speeds at 1000 r.p.m.			
TOP	-	-	-	4.875 to 1	-	-	-	16.67 m.p.h.
THIRD	-	-	-	6.92 to 1	-	-	-	11.73 m.p.h.
SECOND	-	-	-	10.73 to 1	-	-	-	7.58 m.p.h.
BOTTOM	-	-	-	18.1 to 1	-	-	-	4.49 m.p.h.

N.B.—The above ratios apply only to the gearboxes fitted to earlier cars and cease at Engine No. MPJG683, after which the following ratios were fitted, commencing at Engine No. MPJG684 :—

Gears.	Overall ratios.				Speeds at 1000 r.p.m.			
TOP	-	-	-	4.875 to 1	-	-	-	16.67 m.p.h.
THIRD	-	-	-	6.44 to 1	-	-	-	12.62 m.p.h.
SECOND	-	-	-	9.95 to 1	-	-	-	8.17 m.p.h.
FIRST	-	-	-	16.84 to 1	-	-	-	4.83 m.p.h.
REAR AXLE RATIO	-	-	-	-	-	-	-	4.875 to 1

(See chart of speeds on gears against engine revolutions on page 66.)

VALVE TIMING :—

Inlet opens 11° before T.D.C. Closes 59° after B.D.C.
 Exhaust opens 56° before B.D.C. Closes 24° after T.D.C.
 Tappet clearance .015" when hot.
 Contact breaker points .010"/.012".
 Ignition timing T.D.C.

SECTION A

MAINTENANCE DETAILS

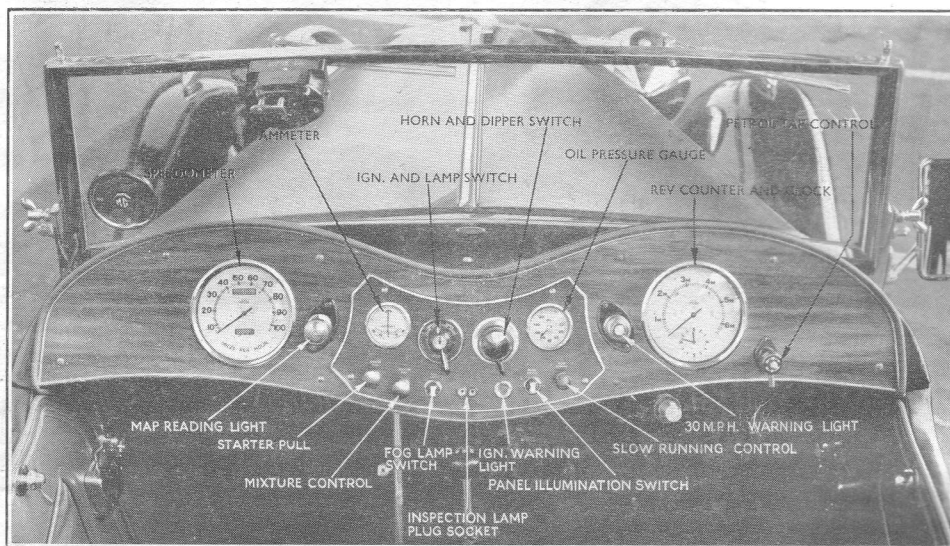


Illustration No. 1. The facia board layout.

Controls, Switches, etc.

General Information on the Function of the M.G.
Midget and Points to Watch during the First
Few Thousand Miles

Chassis Lubrication

Chassis Maintenance Chart is at the back of the book

Index is on Page 3

How the Controls and Switches are placed.—The accelerator on the M.G. Midget is on the extreme right with the foot brake to the left of it and the clutch of course to the left of the brake pedal. The gear positions of the four-speed gearbox are plainly marked on the top of the gear lever. The press button operating the horn is in the centre of the dash close to the steering wheel, and the switch which controls the dipping of the near-side headlamp and cutting out the off-side headlamp is immediately below it and incorporated in the same control.

The 30 m.p.h. warning light is placed between the instrument panel and revolution counter. It operates automatically between 20/30 m.p.h. (This fitment does not apply to Export cars.)

The complete set of instruments, etc., on the facia are as follows, reading from the left :—

1. 5" speedometer, with total mileage reading at the top and "trip" reading below : the trip reading is returned to zero by a winder below the instrument behind the facia.
2. Map reading lamp, turn to switch on.
3. Ammeter.
4. Lamp and ignition switches with positions marked.
5. Horn button and dipper switch.
6. Oil pressure gauge.
7. 30 m.p.h. warning lamp. (For Export, map lamp as 2.)
8. Revolution counter and clock.
9. Petrol tap control.

The instruments, switches, etc., in the centre panel, reading from the left are as follows :—

1. Starter switch (pull outwards).
2. Mixture control or choke. The choke control has a number of notches which are disengaged by turning the knob in a clockwise direction. Pull out and re-engage notches by turning knob anti-clockwise. There are eight progressively rich positions—always be sure to return control to the "right-in" position as soon as possible.
3. Foglamp switch.
4. Twin plug for inspection lamp or battery charging leads.
5. Ignition warning light.
6. Switch for panel lights (turn clockwise to switch "on").
7. Throttle set (turn anti-clockwise to speed up the engine).

Warming Up.—We advocate warming the engine to its normal running temperature before starting out. Apart from a warm engine being far more pleasurable to drive, the initial warming up gives the oil a chance to become thoroughly fluid.

It is important that the engine should not be allowed to idle, the best warming up speed being between 1200 and 1500 r.p.m.

Running-in.—It must not be taken for granted that the engine is run in at the time of delivery ; in fact 2000 miles of steady running are advised, keeping down to the speeds printed on the running-in instruction label, and which are repeated here for convenience in case it is desired to remove the label :—

FOR THE FIRST 500 MILES	-	-	-	-	2400 r.p.m.	40 m.p.h.
FROM 501 TO 1000	-	-	-	-	3000 r.p.m.	50 m.p.h.
FROM 1001 TO 2000	-	-	-	-	3600 r.p.m.	60 m.p.h.

It is difficult to recommend the exact procedure for running-in, but the points of importance are that the engine should never be allowed to labour or pull hard on a high gear. It is far preferable to let the engine rev. at a reasonable speed, and no damage will be caused provided it is "run light." Also ease the foot off the accelerator at frequent intervals—this allows the oil to come up the cylinder bores.

Although it is not essential, upper cylinder lubricant (excluding those having a graphite content) is beneficial during the running-in period. We do not, however, advise the use of anything other than an upper cylinder lubricant, added to the fuel in the proportion recommended by the makers.

Re-fuelling.—Re-fuelling will probably be the next point on which information is sought.

The petrol tank on the M.G. Midget is at the rear and holds 15 gallons (3 gallons reserve), the filler is placed on top of the tank on the near-side. To open the quick lift filler cap press the catch below the cap, it will then fly open. To close simply shut down the cap, it will click when closed.

Although M.G. engines can be run satisfactorily on all the well-known brands of No. 1 petrol, there is a tendency to "pink," owing to the compression ratio employed, especially if the engine requires decarbonising. Because of this we recommend, without preference, alcohol blends, benzole mixtures, or Ethylised fuels, particularly as such anti-knock fuels are obtainable from the pumps practically throughout the country.

The use of No. 3, or cheap commercial fuels, is deprecated.

Important.—**Don't forget to see that the petrol tap is turned to main position when refuelling as this ensures a margin of 3 gallons reserve, which cannot be used until the tap is placed in that position.**

The oil level in the sump can be determined by means of the dipstick which will be found just below the distributor on the near-side. The oil filler is placed in a convenient position on the valve cover, and access to it is obtained by lifting the bonnet on the near-side.

Recommended and Approved Lubricants.—Engine. The sump holds 1 $\frac{3}{4}$ gallons of oil, and before the car leaves the Works it has been filled with Duckham's AERO N.P.5 (Summer), AERO N.P.3 (Winter), which is the engine oil recommended by The M.G. Car Company Ltd. The following, however, is a list of those also approved :—

				Summer.	Winter.
Duckham's	-	-	-	Morrisol Engine	Morrisol Engine
Essolube	-	-	-	50	40
Filtrate	-	-	-	Super	Ex. Hy.
Mobiloil	-	-	-	D	BB
Price's Motorine	-	-	-	"C" de luxe	M
Shell	-	-	-	Triple	Double
Sternol	-	-	-	WW Med. Hy.	WW Med.
Wakefield	-	-	-	Patent Castrol XL	Patent Castrol XL

Included in the car's equipment is a quart tin of AERO N.P. for emergency topping-up.

It is very essential that the sump is drained and refilled with new oil at the intervals specified on page 8.

Don't forget to change the oil filter element after the first 1000 miles and then every 10,000 miles.

Recommended by the Company for general lubrication through the car are the following :—

Gearbox (Synchromesh).

Recommended : Duckham's : Adcol "S" Synchro-Gear Oil.

Approved : Duckham's : Morrisol Synchro-Gear Oil.

Essolube : Gear Oil Medium.

Filtrate : Synchromesh Filtrate.

Mobiloil : C.W.

Price's : Motorine Amber A.

Shell : Golden.

Sternol : Liquid Ambroleum SG.

Wakefield's : Castrol Swanshot.

Rear Axle (The oil level plug is on the opposite side of the axle casing to the filler).

Recommended : Duckham's : Adcol XS-Press Oil.

Approved : Essoleum Expee 110.

Shell : E.P. Spirax.

Filtrate : E.P. Gear Oil.

Wakefield's : Castrol Hi-press.

Mobiloil : E.P. Gear Oil.

Chassis Lubrication.

Duckham's Gear Oil "N."

Hubs and Water Pump : Duckham's H.B.B.

On later models the water pump is lubricated with engine oil.

(See chassis diagram at end of book.)

The Water System.—The water system holds $1\frac{7}{8}$ gallons of water. It is desirable, if possible, to fill up with soft water. The water is circulated through the engine by means of an impeller, and the engine temperature is maintained at the best running heat by means of a thermostat control which is automatic in operation.

Care should be exercised in the selection of anti-freezing mixture, if its use is found necessary on account of frost, as some have an immediate effect on hose connections. "Bluecol" has been approved, but in case of doubt, please write to our Technical Department.

Change the Oil after 500 Miles.—The engine lubrication is pressure throughout by gear type pump which sucks oil from the sump float through an internal gauze, and feeds it via a Tecalemit oil filter to the main and big-end bearings and the valve gear.

After the first 500 miles the engine oil should be drained and the sump refilled with new oil. The oil should again be changed after the first 1000 miles have been covered, and the Tecalemit filter element should be renewed.

Engine oil should afterwards be changed every 1200 to 1500 miles, the Tecalemit oil filter element need not, however, be renewed more often than every 10,000 miles.

Under no circumstances should paraffin be used to wash out the lubricating system of the engine. More detailed instruction on lubrication will be found on pages 36 and 37, dealing with the complete travel of the oil from the sump to the pump, thence through the various pipes and passages in the engine to the main and big-end bearings and to the overhead valve gear.

Chassis Lubrication.—All lubricating points are fitted with nipples to which the oilgun supplied with the car is applied. A lubrication chart is provided at the end of the book, indicating all the points and how often they need attention.

All the flexible control cables (starter switch control, slow-running control, mixture control, revolution counter and speedometer cables) require lubrication every 10,000 miles, when they should be removed and greased with Duckham's H.B.B. grease.

It is advisable periodically to hoist the car so that the load is taken off the springs, and after first thoroughly cleaning them to lubricate the spring leaves with penetrating oil. The steering head pins, the track rod and other steering ball socket joints are lubricated separately. Use Duckham's gear oil. See page 8.

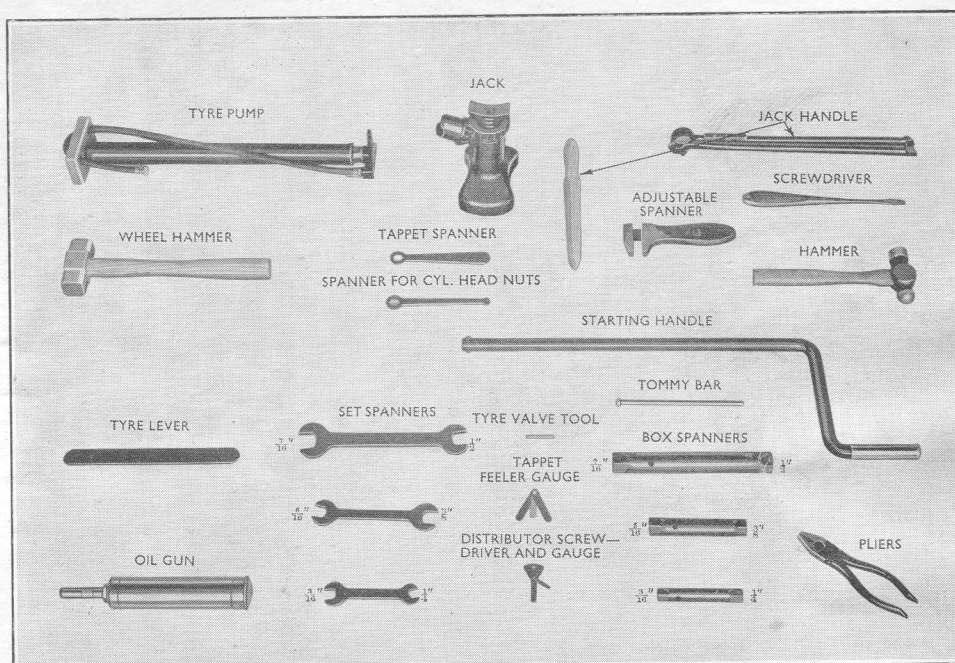


Illustration No. 2.—The complete tool equipment on the M.G. Midget Series "T."

Should it be necessary to refer to the serial numbers stamped on the frame, engine unit and body, they are to be found as follows :—

Chassis Number.—Immediately behind the near-side front dumb-iron on the side of the chassis frame.

Engine Number.—On the circular disc fixed to the off-side of the cylinder block (see Illustration No. 18). On export cars the number is also stamped on the near-side of the cylinder block.

N.B.—These numbers are for convenience duplicated on the guarantee plate attached to the side of the toolbox.

Body Number.—Will be found on a body serial plate secured to the near-side body pillar under the scuttle by the passenger's feet.



SECTION B

CHASSIS



Axles

Road Springs

Propeller Shaft

Shock Absorbers

Wheels and Tyres

Index is on Page 3

CHASSIS DIMENSIONAL DIAGRAM

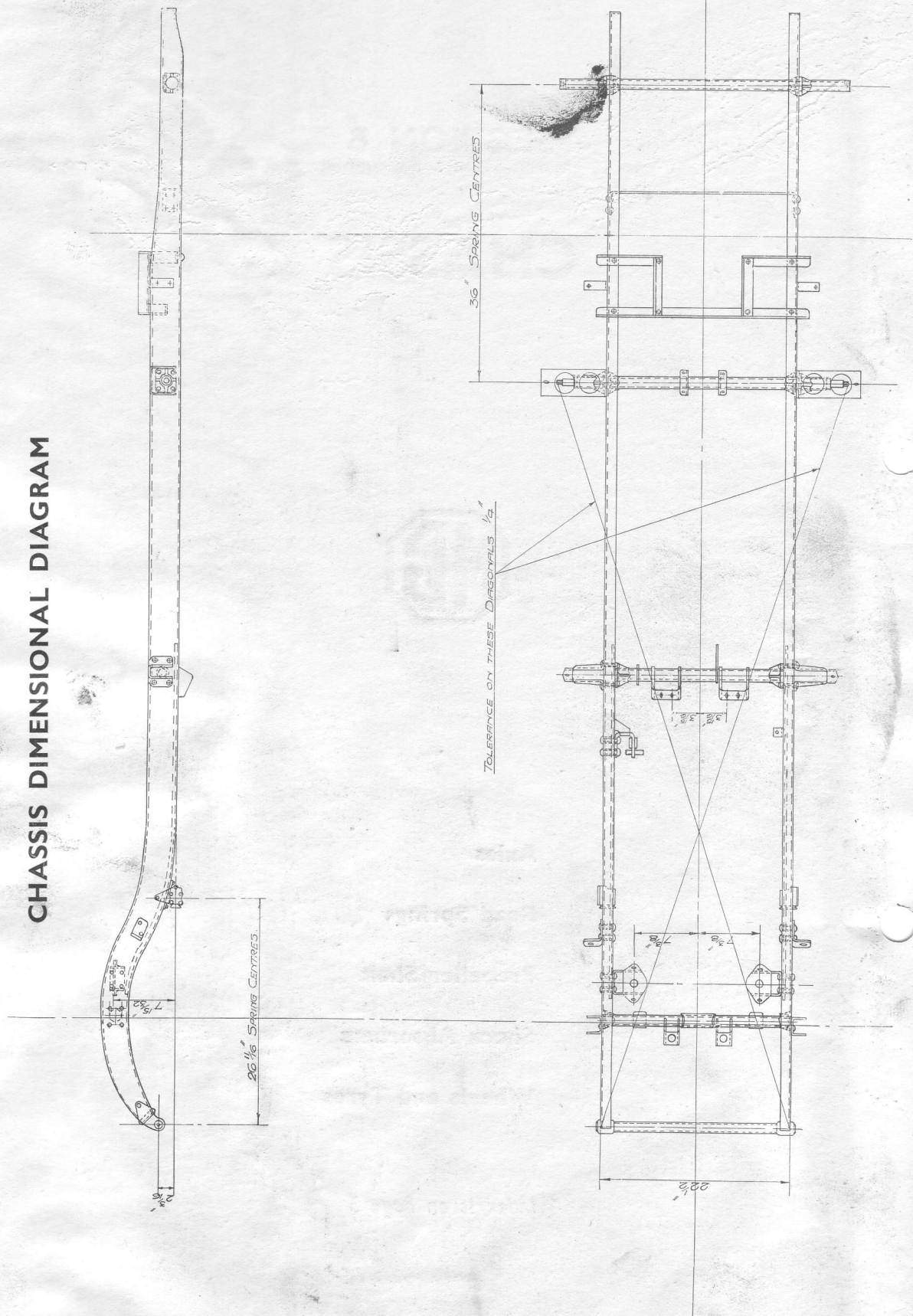


Illustration No. 3.—With the aid of this drawing the chassis frame can be checked for alignment. Should a frame need repair, due to accidental damage, it is advisable to return it to the Factory for repair.

Removing Front Axle complete.—First block up the car under the chassis ; the correct height is with the tyres just touching the ground when the car is resting on its blocks.

Undo the spring shackles at the front end after disconnecting the Lockheed brake pipes where the flexible hose is connected to the copper pipe on the chassis. Before disconnecting the brake pipes, reference should be made to the brake section, not only to prevent loss of brake fluid due to incorrect dismantling but also damage to the flexible hose connection.

Disconnect the draglink at the axle end. The axle complete with springs can then be drawn clear from the car.

Front Wheel Bearings.—Having removed a lock nut and wheel, take the grease from inside the hub. There is a hole in the hub where it is splined covered with a steel plug. Removal of the plug gives access to the split pin locking the castellated nut which can be withdrawn through the hole. Remove the hub nut with a box spanner. The hub can then be withdrawn complete with bearings with the aid of a suitable puller.

The outer ball race is smaller than the inner one and can easily be withdrawn from the housing, but before the inner one can be removed from the other end of the housing, the oil seal will have to be removed.

On reassembling, the bearings and distance piece will go together without any difficulty, but it is well, on tightening the castellated nut, to spin the hub to make sure it rotates freely. Finally, do not forget to replace the split pin, the steel plug, the grease inside the hub, and to smear with hub grease and a little graphite the splines on the outside of the hub.

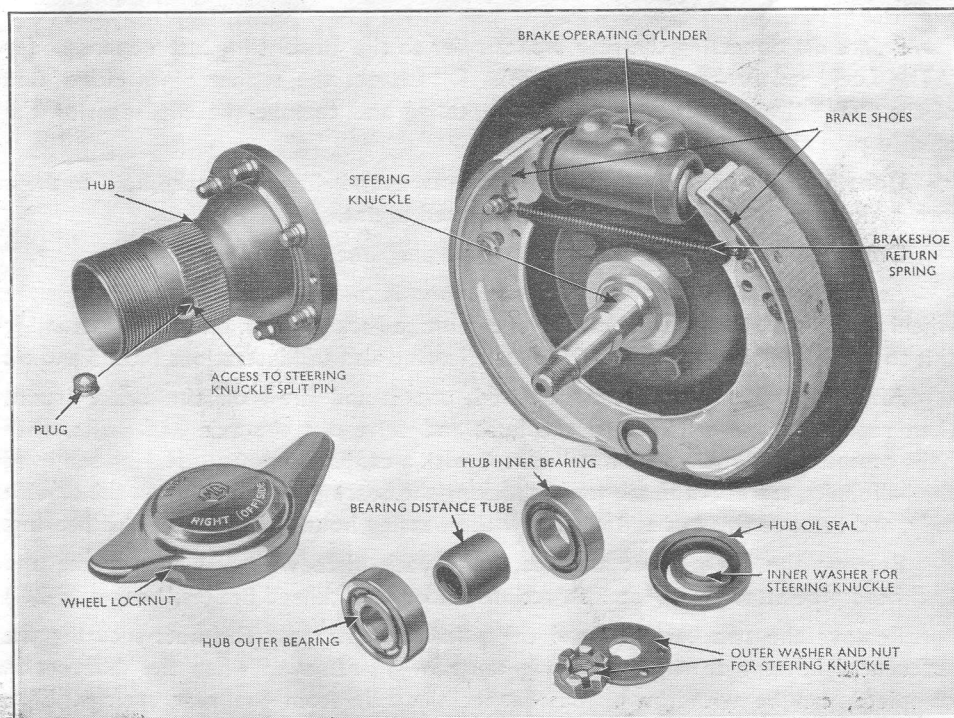


Illustration No. 4.—The front hub dismantled.

Removing King Pin.—First dismantle the hub as previously described, then take off the brake back plate complete with shoes. The king pin is held in place with a small cotter, when this has been removed the king pin can be withdrawn.

Renewing King Pin Bushes.—When the old bushes have been pressed out from the steering knuckles, and new bushes pressed in, it is necessary to reamer them with a reamer of sufficient length to do the two at once, thus ensuring that they are in line with one another. Do not fit a king pin too tightly, it should be just possible to press it in without the use of tools.

When assembled there should be just sufficient vertical free movement to feel between the steering knuckle and the axle beam eye. If measured with a feeler, the clearance should not exceed .004" between the steel thrust washer and the flange of the brass bush.

Steering Ball Joints (Draglink).—These will need periodic inspection and cleaning. If they are dismantled, be extremely careful to reassemble all parts in the same order. When readjusting, the slotted end plug should be screwed up tightly and then released half a turn and the split pin replaced. After reassembling, it is necessary thoroughly to re-lubricate.

In case the order of the springs and ball seats in the draglink is lost when dismantling, the following details will give the necessary information for correct re-assembly: ball seat, ball, ball seat, spring, plug and split pin.

Removing Rear Axle.—After removing the seats and seat squab uncouple the propeller shaft rear flange (refer to the special instructions on page 17). Uncouple the hand brake cables from the hand brake cross shaft and their supports from the chassis frame.

Before disconnecting the rear brakes refer to the dismantling instructions under "The Lockheed Brakes" (pages 19-28). Disconnect the copper pipes either side of the "Tee" piece secured to the axle casing and remove the clip securing the off-side pipe to the axle casing.

Unbolt the "Tee" piece from the axle casing and allow the brake fluid to drain into a clean receptacle (so that it may be used again).

Drain the rear axle oil by removing the plug under the differential housing.

As the rear axle is above the chassis frame it must be withdrawn through the wheel arch, necessitating the removal of the brake back plate on one side. Assuming this to be the off-side proceed as follows, referring also to Illustrations Nos. 5 and 6 :

After the wheels have been removed, unbolt and draw off the brake-drums, then replace the wheel nuts on the hubs and drive out the axle half shafts, with hubs complete, by hitting the nut "ears" with a copper hammer. Having removed the half shafts, tap back the tab washer locking the bearing securing nut on the off-side only, and remove this nut and withdraw the bearing housing complete with bearing.

Remove the brake-shoes and the brake back plate with the hand brake and Lockheed pipe attached. (See instructions under "Lockheed Brakes," pages 19-28.)

Remove the two batteries and the axle check straps. The nuts securing the differential housing to the axle casing can now be removed when the differential, complete, can be withdrawn. Disconnect the axle from the rear springs. The remainder of the rear axle can then be withdrawn through the body through the near-side wheel arch.

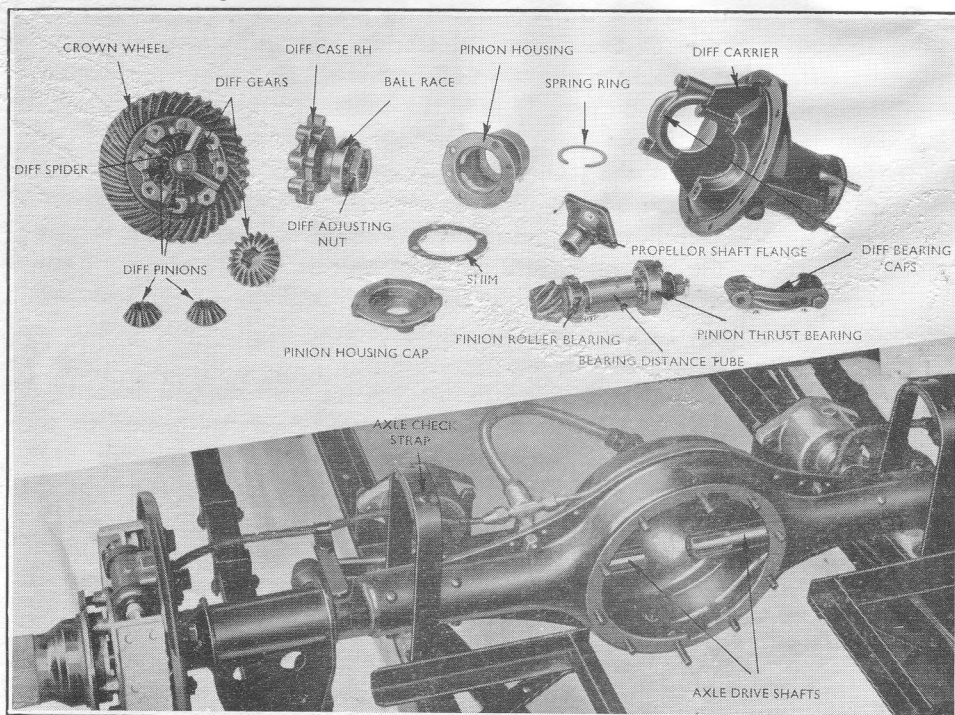


Illustration No. 5.—The differential unit dismantled.

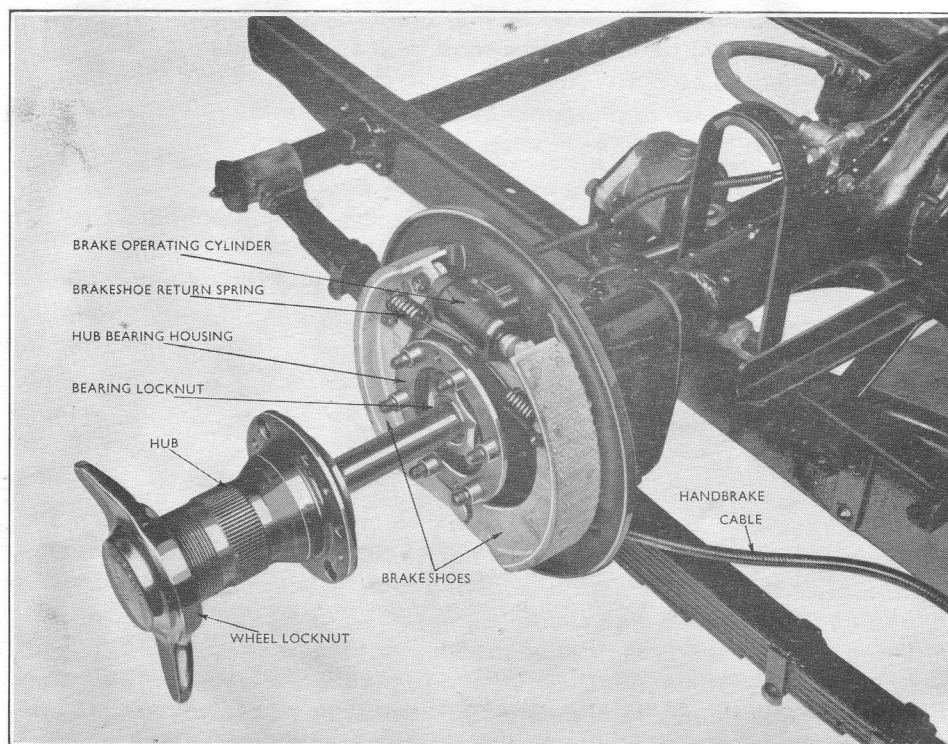


Illustration No. 6.—The rear brake and wheel bearing mechanism.

Dismantling Differential Unit.—Remove the four nuts securing the pinion bearing housing assembly to the differential carrier, when this assembly can be withdrawn. The shims should then be taken off from the studs. After the propeller shaft flange (see instructions on page 17) and the countersunk screws securing the cap are removed, the pinion can be withdrawn from its housing complete with ball race and the inner portion of the roller race. The outer track of the roller race can now be taken away from the housing after the retaining circlip has been removed.

The crown wheel and differential unit should then be removed from its carrier ; it is held in place by the two caps. It is necessary to remove only the eight bolts which secure the crown wheel to the differential housing for this unit to be dismantled completely. To reassemble the differential unit, reverse the operation described above, watching the three following points :—

1. That the shims for adjusting the bevel pinion are clean and undamaged.
2. That the eight bolts securing the crown wheel and pinion to the differential assembly are tight and split-pinned (do not over-tighten).
3. That the differential ball bearings are against the shoulders in the differential carrier caps.

Adjustment of Crown Wheel and Pinion.—Two adjustments are provided :—

1. Of the bevel pinion to or from the crown wheel, by means of the shims between the pinion housing and the differential carrier.
2. Of the crown wheel, across the car, by means of the two nuts on the outside of the differential ball bearings.

As it is very essential that the ball race centre tracks are against the shoulders machined in the differential housing caps, before tightening the bolts securing these caps, using the soft punch, tap the ball race outer track against the shoulder.

After tightening the cap bolts adjust the ball race nuts so that they just pinch the ball race inner track, at the same time bringing the nut locking screw in line with one of the serrations in the locking washer, after which the off-side adjusting nut must be tightened one further serration to obtain a slight pre-load, which is necessary to prevent any slackness in the races when the axle is under load.

It is of interest to note that each crown wheel is lapped with its pinion during their manufacture to ensure perfect tooth contact. The necessity for meshing the gears in exactly the same relative position will be understood.

The best method of obtaining this position is as follows :—

1. As a starting point, insert .017" thickness of shims behind the pinion housing.
2. Adjust the differential assembly to give .007" to .010" clearance between the teeth of the crown wheel and pinion, not forgetting to adjust the differential thrust races as previously described.
3. Cover the teeth of the crown wheel with a mixture of red lead and oil, mixed into a fairly stiff paste. A short bristle brush will ensure even distribution.
4. The differential must then be revolved in both directions. A handle will be required for this, which can easily be made up from round bar ; two collars are required to fit into either side of the differential casing. One must be secured to the handle and the other end must be loose on the shaft, the whole being locked up with a nut.

When the gears have been revolved in both directions the tooth mating markings can be seen on the crown wheel. These markings must be identical on both sides of the teeth and in the centre of each tooth. It must be noted, however, that the tooth markings should only extend for half the length of the tooth, but under load will extend for the full length.

Too much backlash between the gears is indicated by a very narrow tooth marking, and insufficient backlash is indicated by the tooth rooting or bottoming.

The red lead marking must then be removed from the gears.

If further adjustment is necessary when the car is on test, shims can be removed from behind the pinion housing, not exceeding .004", or alternatively additional shims inserted, also not exceeding .004".

Where adjustment as described is not satisfactory, before the gears are condemned all bearings should carefully be inspected for slackness, particularly the pinion rear roller race, which must be renewed if a feeler of .0015" thick could be inserted between the roller and the outer track.

Examination of Rear Wheel Bearings.—Naturally, it is necessary first to jack up the rear of the car and remove the wheel attached to the hub which is to be examined. Undo the ring of bolts securing the brake-drum to the hub, remove brake-drum (first be sure the hand brake is "off"), now replace the wheel lock nut and withdraw the half shaft by tapping the back of the lock nut ears with a copper hammer. Having removed the half shaft tap back the tab washer locking the bearing securing nut, undo the nut, the bearing housing can then be withdrawn complete with bearing; the assistance of a suitable drawer will in all probability be required. When reassembling, smear the ball race with grease.

Whilst the wheel bearing is removed, it is advisable to examine the oil retaining seal behind the bearing. The reverse operation to dismantling follows for re-assembly, the most important point to watch is that the bearing lock nut is really tight and the tab washer turned on to it to lock it.

Lubricating Road Springs.—It is necessary to jack up the car by the chassis, thus removing the weight from the spring leaves. Now undo the spring clips and part the leaves by inserting a screwdriver or similar instrument which will allow sufficient room to apply the grease, either with a knife blade or one of the special tools which are manufactured for the purpose. A simpler method nowadays is to take the car to a service station specialising in chassis lubrication service, who will spray the springs with penetrating oil. This, however, should be done fairly frequently.

Replacement of Shackle Pin Bushes.—Brass bushes are fitted only to the front ends of the front springs and after replacement will have to be reamed to suit the shackle pin. The front ends of the rear springs are fitted with silent bloc bushes.

Adjustment and Replacement of Spring Trunnion Rollers.—At the rear end of both front and rear springs brass trunnion rollers are employed.

These will need adjustment when wear has taken place which allows the spring to move sideways.

It will generally be sufficient to remove the outer portion of the trunnion roller, and with the aid of a lathe, or file if very great care is taken, remove an amount of metal from the split or inner end of the trunnion, slightly less than the movement the spring had sideways, and replace.

If, however, it is considered that the side movement of the spring is such that too much metal would have to be removed from one half of the trunnion roller, then the spring complete must be removed to enable the inner half to be removed.

The only instruction necessary for the replacement of these rollers is to see that the new ones allow the spring to slide freely (without play) on the working portion of the main leaf. If it is necessary to ease them slightly this should be carried out by the aid of a very fine file, or some very fine emery cloth, so that a good bearing surface is obtained.

Universal Joint and Propeller Shaft.—The needle bearing type of Hardy Spicer propeller shaft is fitted. This is light in construction and is designed so that no periodic lubrication is required for the universal joints ; each joint is filled with lubricant when assembled and no further attention is required unless the joints are dismantled. Should this become necessary it can be accomplished by pinching together the ends of the retainer locking rings or circlips with a pair of pliers, and having removed them from their grooves the bearings themselves can be tapped out from either side. When reassembling the universal joints, the bearings must be refilled with Duckham's Adcol "S" Synchro-Gear Oil.

Before disconnecting the propeller shaft from the gearbox and rear axle flanges, it is a matter of some importance to mark the adjacent flanges in order to ensure that on reassembling, the propeller shaft retains its original relative position.

Should it be necessary to remove either the gearbox flange or the rear axle flanges, it will also be necessary to mark these in relation to the primary shaft and pinion shaft, respectively, before removal.

In addition, when removing these flanges, great care is necessary, as careless removal can so easily distort them, which completely destroys the concentricity of the propeller shaft.

An ideal puller, therefore, is one which will grip as large an area as close to the hubs as possible.

There is one point on the propeller shaft which requires lubrication every 500 miles, and this is the splined shaft at the forward end. Access to it is by way of a hole in the propeller shaft tunnel, and gear oil should be applied.

Luvax Shock Absorbers.—The Luvax shock absorbers fitted to the M.G. Midget are of the hydraulic type and are designed to control the road springs both on compression and on recoil.

The shock absorbers incorporate constant pressure valves arranged to operate at a pre-determined pressure. These valves prevent the resistance of the shock absorbers rising too far, and they are situated in either the reacting block or the rotor. They are accurately set in the factory when being assembled and should not require further adjustment.

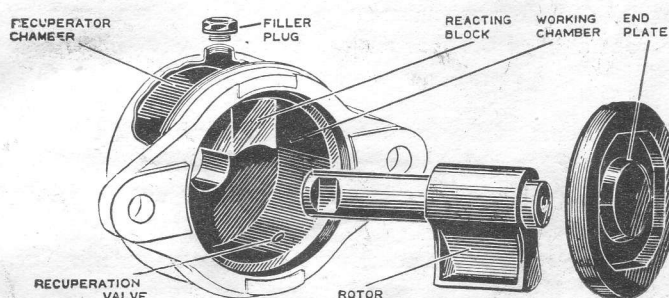


Illustration No. 7.—
Showing a Luvax shock absorber dismantled.

In order to ensure the proper functioning of this instrument, it is essential that the working chamber should always be completely full of fluid. The whole of the mechanism is therefore enclosed in another cylindrical chamber, or reservoir, in which is maintained a reserve supply of fluid. Any shortage of fluid in the working chamber is automatically made good through valves in the lower wall of the cylinder, and similarly any air which may be present is expelled through a special air duct in the top of the reaction block.

The oil valves fall automatically on to their seats when the shock absorber is doing no work, thus preventing loss of fluid or entry of air into the working cylinder.

Adjustment of Absorbers.—If, to cater for unforeseen circumstances, it is desired to increase the amount of damping and tighten the shock absorber, the regulator screw beneath the filler plug must be turned to the right, thus closing the valve. To decrease the amount of damping the screw is turned to the left, opening the valve and permitting a more free flow of fluid. A very fine degree of adjustment can be obtained, and it is sufficient to turn the regulator screw a quarter turn (one flat) at a time and ascertain, by road tests, if sufficient adjustment has been made. Be careful to make identical adjustments to both shock absorbers (front or rear).

The Connecting Links.—Tilting bearings are used in the connecting links between the lever arm and the spring. These bearings consist of round blocks of rubber which grip the bearing portion of the connecting link and obviate the use of ball joints. With this construction they do not require attention such as lubrication, etc.

Replenishment.—Every 10,000 miles the recuperator chamber should be inspected by removing the filler plug on the top of the case, and the fluid replenished if necessary.

It is essential to use only Luvax Official Hydraulic Shock Absorber Fluid. This is a special grade of fluid whose properties have been carefully selected in order to comply with the conditions necessary for efficient working at all times.

It can be obtained from any M.G. Distributors or Dealers, all reputable garages, or any Lucas Service Depot, in sealed one-pint tins with a special pouring spout.

The recuperator chamber must not on any account be allowed to become empty. Under these conditions, air will find its way into the working chamber and destroy the action of the shock absorber. At the same time it should not be overfilled. When the recuperator is three-quarters full there is an ample supply of fluid.

Tyres.—The tyres, being one of the most expensive items in the upkeep of a car, should have special attention that they may give the utmost service.

The most important factor is the maintenance of the correct air pressure, and all five tyres should be checked with a reliable pressure gauge once every week, whether the car is used or not. Remember that it is the air that carries the load.

Dunlop tyres are fitted, and the makers' recommended pressures are as follows:—

Tyre size.	Inflation Pressures (lb. per square inch).	
	Front Tyres.	Rear Tyres.
4.50"—19" ("90")	24	26

If the car is driven hard it is permissible slightly to increase the above pressure.

Oil and Grease.—Tyres should never be allowed to stand in a pool of oil, grease or petrol, as these substances are detrimental in their effects on rubber. Any oil or grease should be removed from the tyre as soon as it is noticed by the use of a rag and a very little petrol.

To remove Tyre.—First deflate by removing all the valve parts and push both cover edges into the well of the rim at the part diametrically opposite the valve, then lever the cover edges near the valve over the rim edge. No force is required to do this, but the edges of the cover opposite the valve must be in the well of the rim.

To fit Tyre.—Push one edge of the cover over the edge of the rim. It will go quite easily if the part first put on is pushed right down into the well of the rim.

Very slightly inflate the inner tube, do not distend it, place it in the cover with the valve through the hole in the rim. Fit the second edge of the cover, starting at a point diametrically opposite the valve and pushing the edge down into the well of the rim. If this is done the last few inches can be fitted without difficulty.

If levers are used do not use force, as this may damage the beads of the tyre. When inflating see that the edges of the cover are seated evenly round the rim. This can be checked by the line provided on the cover.

It is a good practice to change tyres round, including the spare, at intervals of approximately 2000 miles, thus securing even distribution of wear and preventing the spare being kept out of service too long.

THE DUNLOP CENTRE LOCK WHEEL, built on the Rudge-Whitworth system, provides the most rapid method of changing road wheels. Like all mechanical devices, it must be properly treated in order to give 100 per cent. service. Observation of the following quite simple hints will ensure complete satisfaction :—

(a) **When the car is new.**—After the first long run, or after fifty miles of short runs, jack up each wheel and hammer nuts to ensure that they are tight.

(b) **When wheels are replaced**, cover both conical surfaces and the serrations in the hub, also the coned surface and threads in the lock nut, with a light coating of grease mixed with some graphite. Hammer tight and repeat as when car is new.

(c) **When a forced change is made on the road**, remove and grease the hub as soon as convenient.

(d) **Once in twelve months** remove wheels for examination and re-greasing.

(e) **When changing wheels** wipe the serrations and cones on hub, wheel and lock nut to remove any foreign matter that would prevent the wheel from properly seating. Rust and dirt are the enemies of all mechanical devices.

(f) **After general overhaul** of car, which may involve stripping of axle, the inscription on the lock nuts should be checked to see that it corresponds with the side of the car on which it is applied.

GENERAL.—Always hammer the lock nuts tight. Lift car on jack before using the hammer. The lock nuts are designed for self-locking ; but should not on that account be permitted to run untightened, because there is, in such case, a possibility of damaging the splines.

SECTION C

THE LOCKHEED HYDRAULIC BRAKING SYSTEM



Index is on Page 3

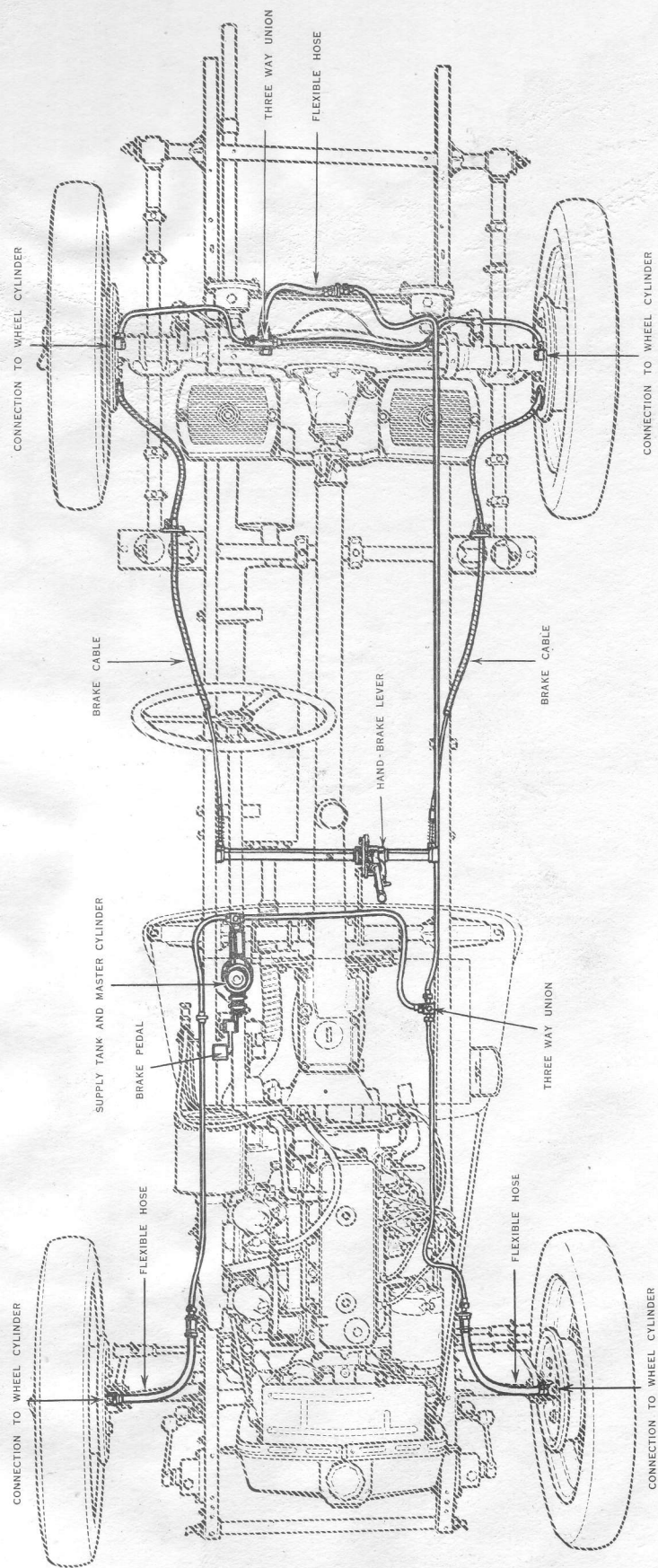


Illustration No. 8.—The brake layout.

Lockheed Brakes.—In the Lockheed Fluid Brake the effort from the foot pedal is conveyed to the brake-shoes by means of a column of fluid, which is incompressible. This **special fluid** has been developed as a result of many years' research, and for Lockheed Fluid Brakes to function satisfactorily and remain efficient genuine "**Lockheed Brake Fluid Orange**" must be used exclusively.

The Lockheed Fluid Brake consists of a master cylinder in which the hydraulic pressure is generated ; wheel cylinders operating the brake-shoes ; a supply or reserve tank by which the system is maintained full of fluid ; and the "line" consisting of copper tubing, flexible hoses and unions interposed between the master cylinder and wheel cylinders.

The master cylinder is fitted with a piston, and the wheel cylinders are each fitted with opposed pistons, all of which are provided with cup washers which act as a seal to maintain pressures and prevent any loss of fluid. When pressure is applied to the foot pedal, the piston within the master cylinder is forced forward, and causes the fluid to flow through the copper tubing and flexible hose connections into the wheel cylinders (Illustration No. 9).

The brake fluid enters each of the wheel cylinders between the opposed pistons, causing the latter to move outwardly against the brake-shoes, thus bringing the shoes into contact with the drums.

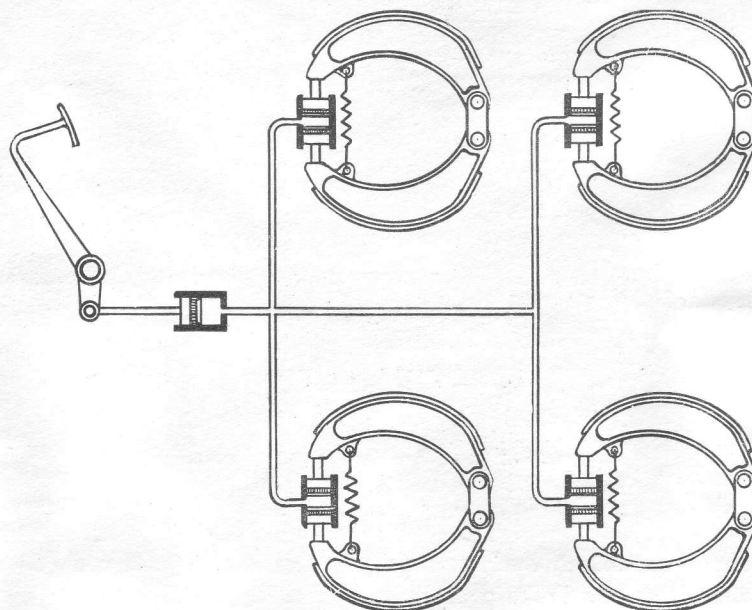


Illustration No. 9.—Diagrammatic view of brake layout.

The pressure generated in the master cylinder is transmitted to each wheel cylinder "with equal and undiminished force," providing perfect equalisation with the maximum of efficiency, thus obtaining infinitely longer wear of the shoe linings.

While equal pressure is applied to all wheel cylinders provision is made to allow a greater pressure to be applied to the front brake-shoes than that applied to the rear brake-shoes, this is necessary to ensure an even braking on all wheels. The front brake cylinders are therefore larger than the rear cylinders.

When the pressure on the foot pedal is released, the brake-shoe return springs force the wheel cylinder pistons to their normal "off" position, and the fluid is forced back through the pipe line into the master cylinder.

The Supply Tank.—The supply tank containing the reserve supply of brake fluid is built as a complete unit with the master cylinder, and is situated immediately behind the brake pedal underneath the floorboards.

Examine fluid level at least every month, and keep topped up to within one inch of the cap with **genuine "Lockheed Brake Fluid Orange."**

Examine vent hole in filler cap periodically and keep free from obstruction.

The Master Cylinder (Combination Barrel Type).—The Combination Barrel Type Compensating Master Cylinder provides automatic compensation for expansion or contraction of the fluid due to temperature changes.

Within the master cylinder is a piston (K) and a cupped washer (I) normally held in the "off" position by a coiled spring (H). Immediately in front of the cup washer, with the piston in the "off" position, is a by-pass port hole connecting the cylinder interior with the supply tank. With any rise in temperature causing the fluid to expand in the system the fluid is allowed to pass through the port into the supply tank. With any drop in temperature causing the fluid to contract, the fluid flows back through the port. Thus a constant volume of fluid is maintained in the system.

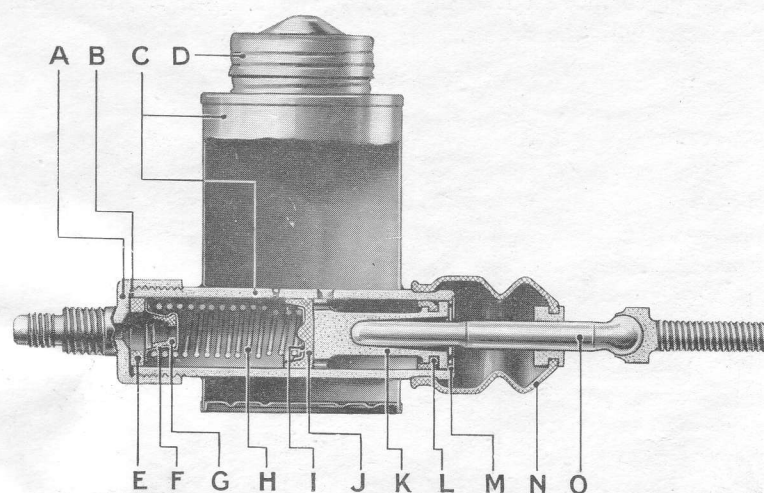


Illustration No. 10.—The master cylinder.

Pressure is applied to the piston (K) by means of a push rod (O) which is attached directly to the brake pedal.

The open end of the master cylinder is fitted with a rubber boot (N) to prevent the ingress of dirt.

In the head of the master cylinder is a combination inlet and outlet check valve (F, G), which is held in place by the return spring (H). The function of this valve is to cut off the return to the master cylinder of fluid pumped into the pipe line during the "bleeding" operation, thus ensuring a fresh charge of fluid being delivered at the next stroke of the pedal.

When the brakes are applied the master cylinder piston is pushed forward and fluid is forced through holes in the metal valve body, deflecting the walls of the rubber cup and so passing into the system. When the pedal is released the master cylinder return spring forces the piston back to its "off" position against its stop (M). At the same time the pistons in the wheel cylinders, as a result of the action of the brake-shoe return springs, are forcing back fluid and so lifting the whole valve assembly off its seat, until the fluid pressure balances with the effort of the master cylinder return spring, and the inlet valve closes.

Leading from the interior of the supply tank to the annular space formed by the reduced skirt of the piston (K) is a large port. Through this port the annular space is at all times kept full of fluid from the supply tank, leakage at the rear of the piston being prevented by the secondary cup (L).

If, for any reason, the return of fluid from the pipe line is insufficient to equal the displacement caused by the return of the master piston, a vacuum is created in the master cylinder sufficient to cause the master piston cup (I) to turn in at the lip and allow the fluid to by-pass from the annular space through the small holes in the piston head, into the master cylinder.

Any excess fluid thus introduced into the system will pass freely into the supply tank through the by-pass port, when the master cylinder piston returns to its "off" position.

The Proper Adjustment of the Brake Pedal.—It is important that the push rod (O) should have a slight clearance where it seats in piston (K) when in the "off" position. Should the push rod be adjusted tightly against the piston the by-pass port will be covered by the cup washer (I), thus preventing the compensating action of the master cylinder and causing binding brakes.

Lack of free movement may be due to pedal fouling floorboard or mat, thus preventing complete return after brake application.

To Remove the Master Cylinder from the Chassis.—Drain the supply tank. To do this conveniently, disconnect the pipe connection at the cylinder head, depress the brake pedal slowly by hand, allowing the fluid expelled to flow into a clean container. Repeat the performance until the tank is drained. Detach the push rod from the foot pedal and, having removed the nut holding the cylinder to the chassis, withdraw the cylinder.

To Dismantle Master Cylinder.—Remove the rubber boot and the piston retaining spring clip and draw the piston from the barrel. The cup, spring and valve are then removable.

Cleaning after dismantling.—ANY NECESSARY CLEANING MUST BE CARRIED OUT WITH LOCKHEED BRAKE FLUID. NEVER USE PETROL, PARAFFIN OR OIL.

To Reassemble the Master Cylinder.—Dip all parts in **Lockheed Brake Fluid**.

Insert valve body and cup assembly in end of spring and drop into cylinder, which should be held vertically to ensure valve seats properly. Insert master cylinder cup, pressing it firmly on to end of spring and replace the piston and secondary cup assembly.

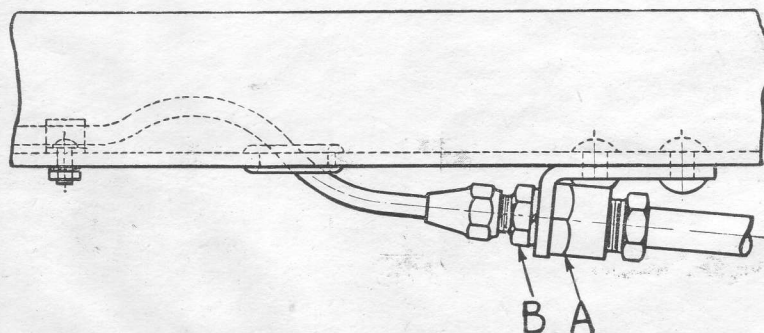


Illustration No. 11.—The patent flexible hose connection.

The Pipe Line.—The pipe line is composed of special copper tubing, tested to withstand high pressures, and internally clean and free from any scale or dirt. Inspect periodically for loose or misplaced pipe clips to prevent vibration of the tubing and possible fracture.

The Patent Flexible Hose.—The patent flexible hose is specially manufactured and tested to withstand six times the highest pressure ever applied when braking.

The Wheel Cylinder (Internal).—The wheel cylinder (Illustration Nos. 12-13) is mounted rigidly to the brake-shoe back plate, and the opposed pistons act through push rods directly on the tips of the brake-shoes. The ends of the wheel cylinder are fitted with rubber boots to protect the cylinder from dust or dirt. At the uppermost position, and between the opposed pistons, is a bleeder screw, required for expelling all air when filling the system.

DISMANTLING INSTRUCTIONS

Removal of the Front Wheel Cylinder (Internal).—It is advisable not to unscrew the flexible hose at either end. Proceed, therefore, as follows: Disconnect copper tubing from the hose union (A) (Illustration No. 11) at the frame, then remove the nut and lock washer (B), when the hose union may be removed from the bracket. Unhook the brake-shoe return spring. Removal of the two set screws holding the cylinder to the back plate allows the cylinder to be withdrawn with the hose in place.

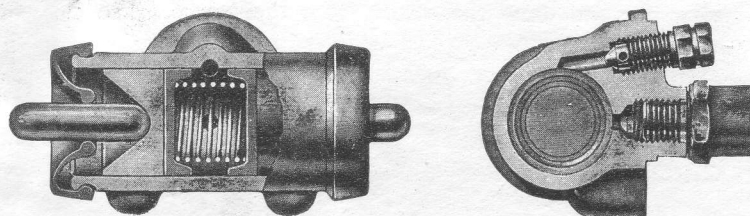


Illustration No. 12.—A front wheel cylinder as viewed from the side and end.

Removal of the Rear Wheel Cylinder (Internal).—Follow the above instructions, except that the copper tubing must be disconnected at the cylinder inlet.

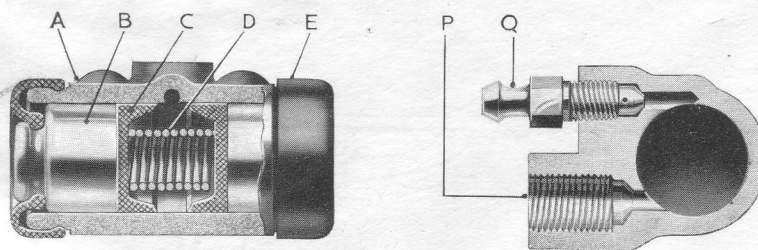


Illustration No. 13.—A rear wheel cylinder as viewed from the side and end.

Removal of Brake-shoes.—Unhook the brake-shoe pull-off spring ; remove split pins and washers on shoe steady pins protruding through webs of shoes ; remove horseshoe circlip retaining shoes on anchor pin, when shoes can be withdrawn.

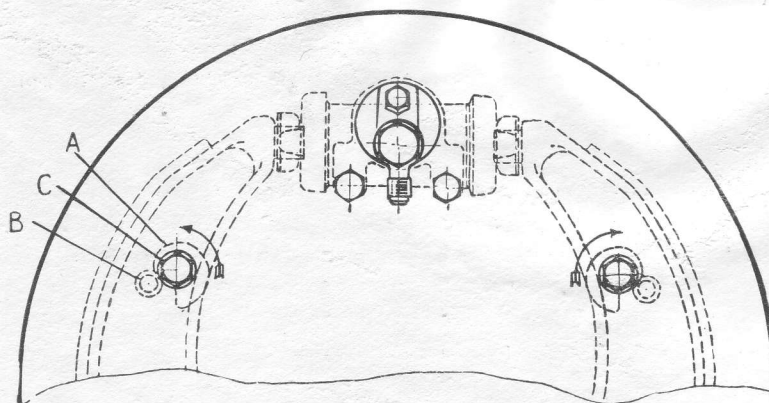


Illustration No. 14.—With reference to individual adjustment of the brake for each wheel.

To Re-line Brakes.—When re-lining brake-shoes, it is important that the same make and quality of lining be used on all four wheels, otherwise the braking on the wheels will be unequal.

To Adjust Brakes (Internal Cylinder).—When lining wear has reached a point where the foot pedal goes almost to the floorboard, it becomes necessary to adjust the brake-shoes into closer relation to the drums. Raise the car on a jack until the wheel is free. Adjustment is made by rotating the adjustment cam (A) (Illustration No. 14) against stop pin (B) on the shoe. Rotate the adjustment nut (C) with a wrench until brake-shoe comes into contact with drum, then back off adjustment slightly until the wheel rotates freely without any appreciable drag.

Special Note.—One complete turn of the adjustment nut (C) is sufficient to take up all lining wear. When adjusting, the nut will only require a **partial turn** before shoes are brought in contact with drum.

Bleeding the Line.—Whenever any part of the system has been disconnected, it is necessary to “bleed” the system in order to expel all air. Fill the supply tank with genuine “**Lockheed Brake Fluid Orange**” before starting this operation, and keep the tank at least half full of fluid during the whole operation.

Front Brakes.—Remove the set screw at A (Illustration Nos. 15 and 12) from end of bleeder screw and screw in the bleeder drain, which is a screwed brass nipple fitted with a rubber tube. Allow the rubber tube to hang into a clean glass container. Unscrew the bleeder screw one turn with the wrench B, and depress the foot pedal quickly, allowing it to return fully without assistance. This gives a pumping action which forces fluid out at the wheel cylinder, carrying with it any air that may be present. No less than ten strokes of the foot pedal will be necessary to bleed each wheel cylinder. Watch the flow of fluid from the bleeder drain, the end of which should be kept below the surface of the fluid, and when all air bubbles cease to appear, close the bleeder screw. The bleeding operation must be repeated on each wheel cylinder, and the supply tank replenished each time. Should the supply tank be drained during the bleeding operation, air will be drawn into the system at this point, necessitating re-bleeding.

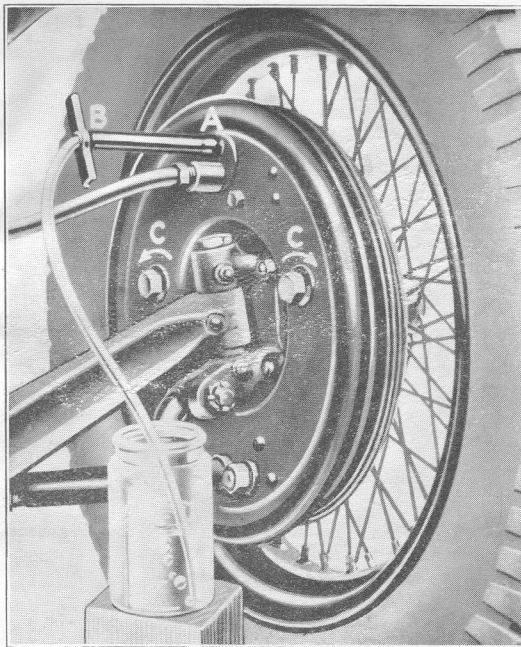


Illustration No. 15.—Bleeding part of the braking system ; note the special tool provided for the job.

Bleeding the Rear Brakes.—The operation differs slightly from that for the front brakes and should be carried out as follows :—

Fit the rubber tube over the nipple (Q in Illustration No. 13) of the bleeding screw and unscrew the bleeding screw one turn.

The operation otherwise is exactly as details given for dealing with the front brakes.

Equalisation of Brakes.—NO ADJUSTMENT IS REQUIRED FOR EQUALISATION.

Adjustment is only necessary to compensate for wear of the brake lining. While the pressure delivered to the brake-shoes will always be equal, yet paint, grease, oil or any foreign substance on the brake lining will so change the coefficient of friction of the lining that the brakes will be unequal. This inequality can only be remedied by first thoroughly cleaning the linings with petrol or methylated spirit, and then scraping them. Should the linings be thoroughly saturated, it will be necessary to re-line the brake-shoes affected.

IN CASES WHERE BRAKES ARE NOT FUNCTIONING PERFECTLY SATISFACTORILY, THE FOLLOWING INFORMATION IS GIVEN WHICH SHOULD ENABLE THE CAUSE OF THE TROUBLE TO BE DIAGNOSED AND REMEDIED.

SOME GENERAL BRAKE TROUBLES AND HOW TO LOCATE THEM

Excessive Pedal Travel (Requires Pumping).

- (a) Brake-shoes require closer adjustment to the drums.
- (b) A leakage in the system—Tighten joints in the line.

Pedal Feels Springy.

- (a) The system requires bleeding, as instructed.
- (b) There is no fluid in the supply tank—Replenish with **genuine Lockheed Brake Fluid**.

Inequalities in Braking.

- (a) The linings are not bedded in—Rectify or re-line.
- (b) Protruding rivets or scored drums—Rectify.
- (c) Grease on linings—Should be re-lined.

Poor Braking.

- (a) Brake-shoe linings worn down or grease-soaked—Re-line brake-shoes with a good quality lining.

Brakes Stay "On" when the Pedal is Released.

- (a) Brake-shoes are too closely adjusted—Readjust.
- (b) Brake-shoes seized or tight on their anchor pins—Remove shoes and pins and ease.
- (c) Brake-shoe return springs weak or broken—Renew.
- (d) No initial clearance on pedal—It is essential to have free pedal play of about half an inch at the pedal pad to allow the piston in the master cylinder to go right back in the "off" position to release excess fluid pumped into the system when the brake is applied. If there is no pedal slack when in the "off" position, it prevents the release of the fluid, thereby keeping the brake-shoes on. A floorboard fouling the pedal may cut out this required pedal slack, or an incorrect adjustment of the pedal link gear may also be the cause. (Refer page 23.)
- (e) The master cylinder cup and/or wheel cylinder cups sticking in the cylinder bores due to the use of spurious fluid—Thoroughly flush out the system with **genuine Lockheed Brake Fluid** and fit new rubber parts.

Brake Drag.

- (a) The shoes adjusted too closely to drums—Readjust.
- (b) Hand brake operating mechanism seized or is fouling some portion of the chassis, etc.—Lubricate and release hand brake gear where necessary.
- (c) Brake-shoes are tight or seized on their anchor pins, or brake-shoe return springs weak or broken—Remedy this as above.
- (d) No initial clearance on pedal—Remedy as above.
- (e) Oil or spurious fluid in system—Remedy as described above.
- (f) Wheel bearings are loose—Adjust or fit new bearings.

Brakes Grab or the Car Pulls to One Side.

- (a) Brake linings not bedded in correctly—Bed linings to drum and chamfer off the ends of linings.
- (b) Brake linings have varying co-efficient of friction (or holding capacities) due to grease, etc.—Clean linings or re-line if necessary.
- (c) Incorrect inflation of tyres—Rectify.
- (d) Back-plate loose on axle or front spring loose at its anchorage—Tighten and rectify.

Do not, under any circumstances, use a substitute for genuine **Lockheed Brake Fluid**. The use of other than genuine **Lockheed Brake Fluid** will nullify **all Guarantees** given by both The M.G. Car Co. Ltd. and the Lockheed Hydraulic Brake Co. Ltd.

If any difficulties are experienced, consult Lockheed Service Station or M.G. Service Dept. for advice.

For Index see Page 3

SECTION D

THE BISHOP CAM STEERING GEAR

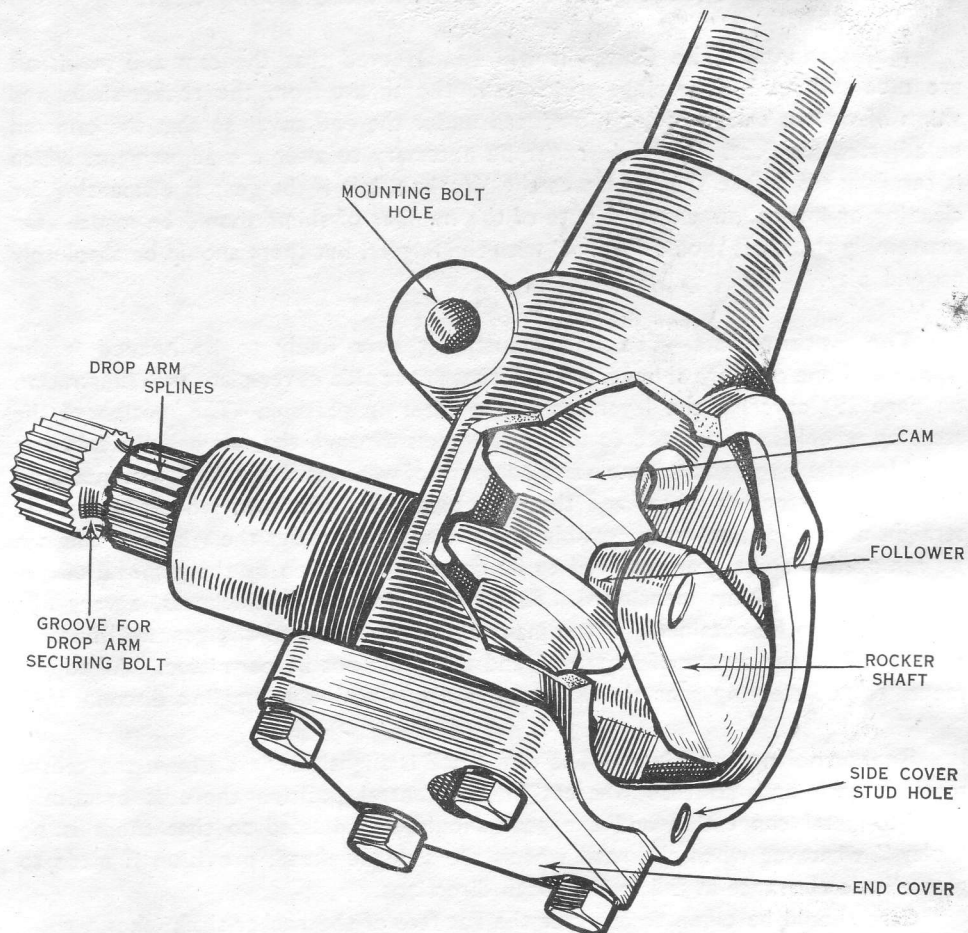


Illustration No. 16.

Steering Lubrication

Steering Adjustments

Removal of Drop Arm

Fitting the Drop Arm

Index is on Page 3

Steering.—The operation of the cam steering gear, which is standard on M.G. Midget "T" Series, is quite straightforward. A cam, in which a spiral groove is cut, is mounted on the shaft carrying the steering wheel. Into this groove is inserted a follower which makes contact with the cam track.

The cam is mounted between special ball bearings expressly designed for the duty they have to perform. The whole mechanism is contained in an oiltight casing and replenishment at intervals is the only attention required.

Lubrication.—Remove the filler cap on the top of box and, if necessary, fill to the top with gear oil ; check every 2000 miles.

On no account must grease be used with the Bishop Gear.

Adjustments. The Cam.—It will be observed that the cam and mainshaft are mounted on ball bearings which take the thrust from the rocker-shaft, and shims of various thickness are introduced under the end cover so that the cam can be adjusted for float. It should never be necessary to alter the adjustment, which is carefully set before the car leaves the Works ; but if the gear is dismantled for cleaning or inspection a careful note of the number of shims should be made. On reassembly this shaft should "spin" with the fingers, but there should be absolutely no end play.

The Rocker-shaft.—The only adjustment ever likely to be needed is the removal of one or more shims from underneath the side cover-plate (see illustration on page 29) covering the lever inside the steering gearbox. The motion of the steering wheel is transmitted to the road wheels through the cam and the follower fitted into the lever, and in time a small amount of wear (as shown by "lost motion" between the steering wheel and the drop arm when the road wheels are in the straight ahead position) may possibly become apparent ; but the whole of this can be removed and the gear restored to its original perfection by the removal of one or more of the shims mentioned. As these shims vary in thickness, a very fine adjustment can be obtained. If too many shims are removed the gear will become a little stiff in the centre of its travel, and this must not be permitted. All adjustments to the steering gear should be carried out with the draglink disconnected.

Reassembling the Gear.—The cam track is slightly relieved from the centre towards each end, so that whereas in the central position there is practically metal-to-metal connection and the gear should be adjusted so that there is no "play" whatever when the road wheels are straight ahead, provision is made to give a little clearance at full lock in both directions.

Care should be taken to see that the flat face of the rocker-shaft takes a good bearing against the hardened side cover-plate, and that the felt washer is properly in place between the top face of the drop arm and the top face of the steering gearbox.

All adjustments to the gear should be made before the unit is filled with oil.

Removal of the Drop Arm.—The drop arm is attached to the rocker-shaft on a splined parallel shaft and secured by a bolt and nut which passes through a groove in the splined shaft. This method of attachment makes the drop arm absolutely secure.

Fitting Drop Arm to Rocker-shaft.—Should it be necessary to remove the drop arm from the rocker-shaft at any time, we recommend that the marks on the end of the rocker-shaft and the boss of the drop arm be noted so that they can be fitted together again afterwards in the same relative position.

In case this marking has been obliterated we give below the correct method of fitting, and we would draw attention to this matter, which is of some importance. Should this operation not be properly carried out, most certainly the available lock will be limited in one direction or the other, and damage may result to the internal mechanism of the gear.

The steering column, complete with steering box, but without the drop arm attached, should (if it has been removed) first be fitted in place in the car, taking care to tighten up all fixings holding the unit to the car, including that on the dashboard, the steering wheel being placed in its final position.

Next, the lower end of the drop arm carrying the ball pin should be fixed correctly to the draglink, but the top end should not yet be connected to the rocker-shaft of the steering box.

Now jack up the front wheels and place them in the straight-ahead position.

If the steering wheel is rotated gently you will find that its movement is limited by internal stops in the steering box at each end of the travel of the internal mechanism of the gear. The number of turns of the steering wheel required to bring the gear from one end of its travel to the other should be counted. Then, commencing from one of these stops, take the wheel back half the complete number of turns available, which will bring the steering mechanism into its central position, when the drop arm can be fitted to the rocker-shaft.

Before tightening up, however, the following check should always be carried out.

The front wheels still being jacked up, with the steering wheel pull the steering right over to lock, either right or left. With the steering wheel and front wheels in this position drop the draglink off the drop arm and see whether you can move the steering wheel any farther in the same direction. If you can, everything is in order, and the same procedure should then be followed on the other lock.

Should further movement of the steering wheel be unobtainable it means the front axle stops are not operating, and some adjustment must be made as follows :—

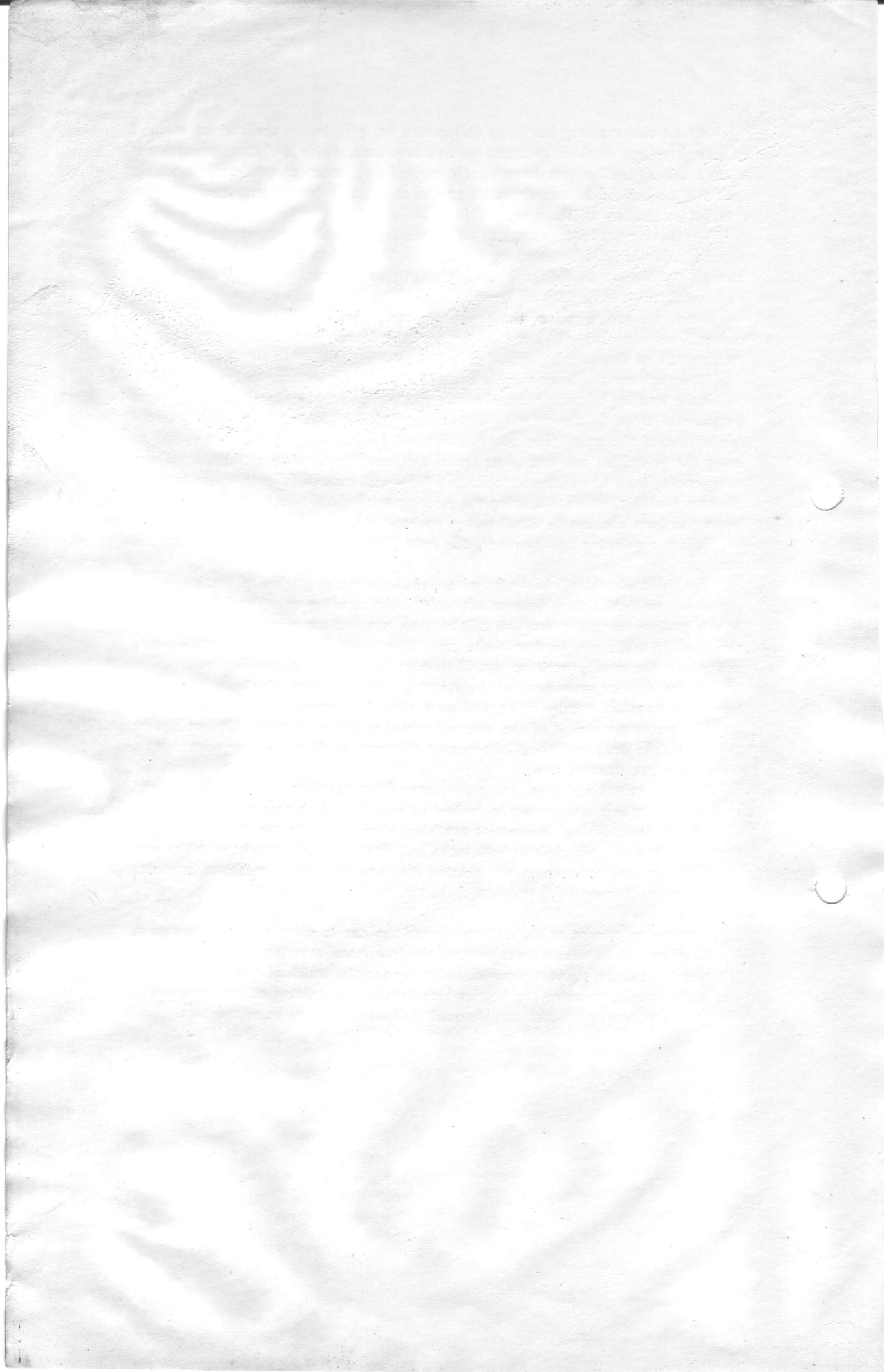
If there is movement of the steering wheel available on one lock, but not on the other, the drop arm should be put on the next serration on the rocker-shaft, which may put matters right.

If no serration will give free movement of the steering wheel at both locks, then the front axle stops must be looked to and altered so that there is.

The amount of free movement available after dropping the draglink off the drop arm should be the same at both locks, and this is the condition at which to aim.

The instructions given in this section may appear complicated, but in reality the operation is one of the simplest character.

Removing the steering column from the car is quite a simple operation. It will, of course, be necessary to remove the foot ramp, steering wheel, disconnect the steering column support bracket under the scuttle, which also means removing the baffle board ; remove the bolts which secure the steering column bracket to the frame, when the column complete with this bracket can be withdrawn.



SECTION E

THE ENGINE



General Layout

Lubrication

Decarbonising

Removal of Sump, Pistons and Big-ends, etc.

Removing Engine from Chassis

Removing Crankshaft and Camshaft

Timing

Index is on Page 3

General Description of the Engine.—In order that the owner may become familiar with all the details of the power unit, illustrations have been prepared showing both sides of the complete engine unit suitably lettered to indicate the various parts. More detailed information regarding each component will be given later. It is sufficient at this stage to become acquainted with the position of the various components.

Dealing with the near-side of the engine first (Illustration No. 17), front to rear.

Water Outlet.—The outlet pipe embodies a thermostat, this pipe leads hot water from the engine to the radiator. **The fan** is driven by an endless belt from the crankshaft. The fan spindle is also the spindle which drives the **water impeller** which assists water circulation throughout the engine. The greaser (later oiler) for the water impeller is just below the water outlet pipe. **Dynamo** which supplies the current for the batteries is driven by the same endless belt which drives the fan and impeller. The revolution counter is driven through a reduction box from the rear end of the dynamo.

The front engine mounting bracket, by which the engine is secured to the frame, incorporates rubber blocks fitted between the bracket and the frame. These allow slight engine movement and prevent engine shocks from being transmitted to the frame. **Valve cover**, which is removable to give access to the valve tappet adjustment points, embodies also the oil filler. The **carburetter air cleaner**—this component serves a dual purpose, besides filtering the air before it enters the carburetters, it serves also as an air silencer. **Distributor**—a full description of this component is given under the electrical section, but note here should be taken of the micrometer adjustments. **Oil dipstick**—this is for determining the amount of oil in the sump and is marked to show the quantity at the time of reading. **The sump or oil container**—this is made from aluminium alloy and is ribbed for cooling purposes. The oil drain plug can be seen just below the body of the oil filter. **Oil filter**—the oil system is so arranged that all the oil delivered from the pump to the bearings and other points of the engine has to pass through it each time it circulates throughout the engine, therefore the lubricant is absolutely filtered before doing its work. **Oil pump** is driven by skew gearing from the camshaft. It draws oil from the sump and delivers it to the filter, already described. Immediately above the oil pump is the **Oil gauge tap**, being connected to the pressure gauge on the dash by a copper pipe. **Overhead valve gear oil feed pipe**—feeding from the oil gallery, this carries lubricant to the overhead valve gear. **Breather pipe**—prevents pressure building up inside the crankcase. The pipe shown in the illustration extends downwards into the air stream under the car. **Rear engine mounting bracket**—the function of this is exactly similar to the one in front already described.

Turning now to the off-side of the engine (Illustration No. 18), commencing at the front as in the previous illustration.

Water inlet pipe connects the bottom water connection in the radiator to the water impeller. **Thermostat by-pass pipe**—this pipe only functions when the engine is cold, it works in conjunction with the thermostat and permits the water to circulate only through the engine when the thermostat valve is closed. **Engine serial number-plate**—this is really self-explanatory and does not interest the owner as the number is duplicated on the guarantee plate. **Exhaust manifold**—this is simply a means of connecting the exhaust ports to the pipe leading down to the silencer. **Carburetters**—nothing further need be said about these at this juncture as a special section is devoted entirely to their maintenance and adjustment. The pipe connecting the two carburetter inlets to the air cleaner is seen immediately in front of the carburetters. **Cylinder block water drain tap**—the tap below the radiator does not entirely empty the water system, hence the necessity for using the tap shown in the illustration. **The starter motor** has a sliding pinion which,

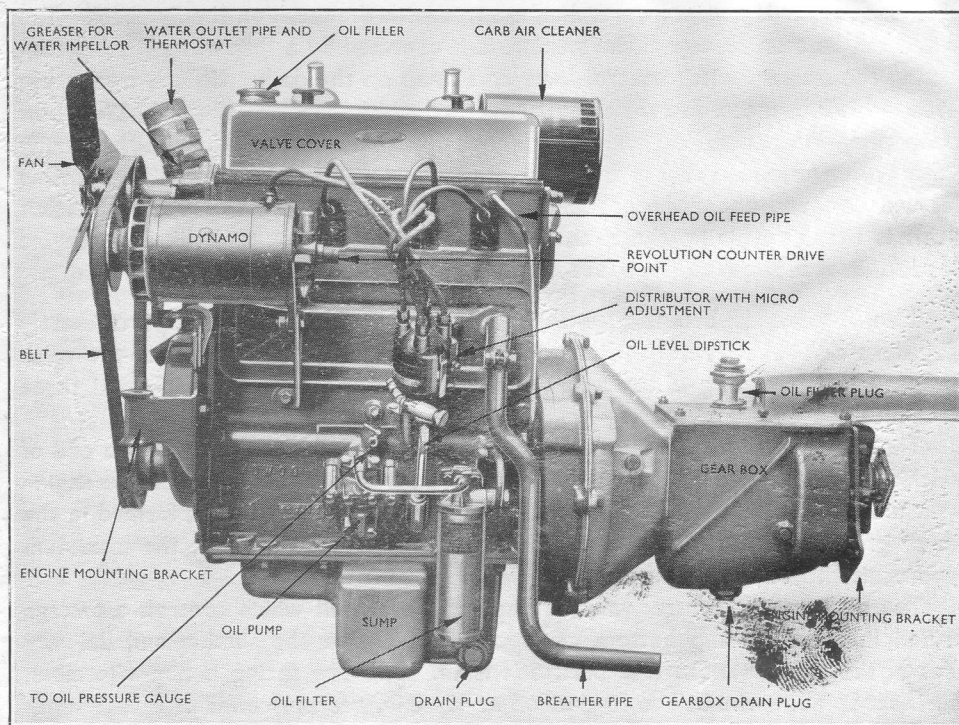


Illustration No. 17.—View of engine, near-side.

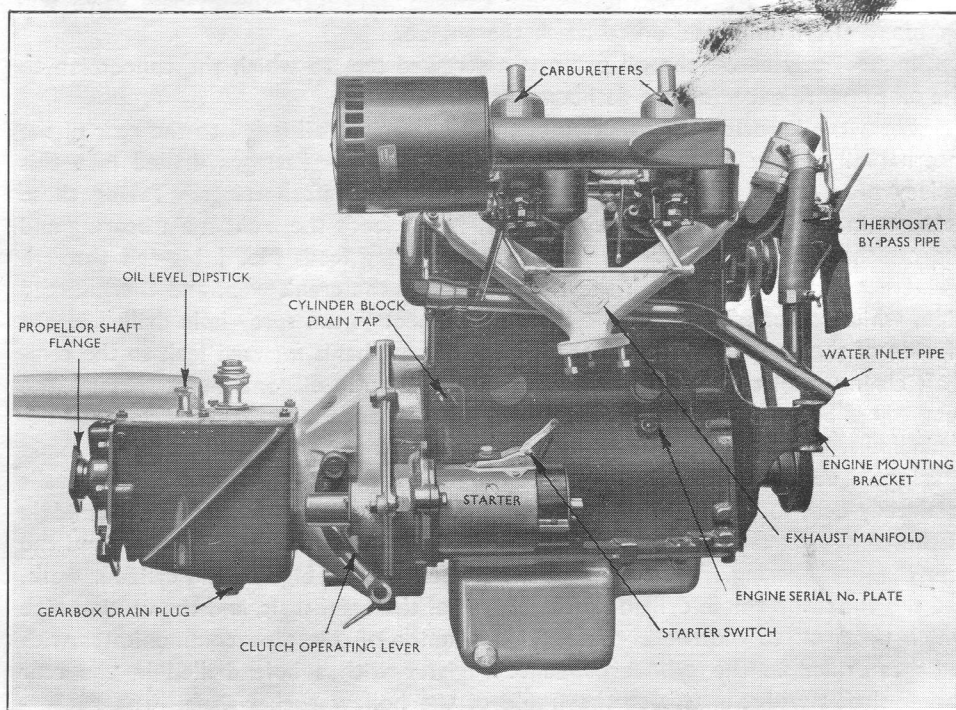


Illustration No. 18.—View of engine, off-side.

when the starter is put into operation, engages with the teeth on the flywheel. The switch can be seen on top of the starter, it is operated by a "Bowden" cable connecting the starter switch control lever to a knob on the dash. **Clutch operating lever**—this is connected to the clutch pedal through the medium of a rod. **Gearbox drain plug**—this is self-explanatory. **Propeller shaft flange**—the needle-bearing Hardy Spicer propeller shaft is connected at this point. Special instructions regarding this will be found under the propeller shaft heading. **Gearbox oil level dipstick**—this is for determining the quantity of oil in the gearbox and, like the engine dipstick, is graduated to show the quantity at the time of reading.

The Engine Lubrication.—The sump, when full, contains approximately $1\frac{3}{8}$ gallons of oil. It is replenished through the filler cap on the top of the valve cover. The drain plug is towards the rear on the near-side. Of this oil three pints must be added before any reading shows on the dipstick.

The oil feed connection to the pump consists of a swinging arm, at the end of which a suction strainer provided with a float ensures that the oil fed to the engine is sucked from the top of that in the sump, thereby giving any sludge formed in the oil, or grit inadvertently introduced or produced by internal wear, the maximum opportunity to settle to the bottom.

The oil pressure control valve is a spring-loaded ball which controls a passage formed in the oil pump bottom cover casting between the suction and delivery sides of the pump pinions (see Illustration No. 20). The spring is non-adjustable, and is set to allow the ball to by-pass oil at 40/60 lb. per square inch.

The oil from the pump next reaches the "Tecalemit" oil filter (see Illustration No. 21). There are two possible ways from the "In" to the "Out" connection of this filter. First, the proper one, through the cleaning element. Second, the emergency path from the inside of the element lifting the spring-loaded plate on top of the element to the outlet connection marked "Out." The spring of the by-pass valve is such that, provided the filter is attended to periodically (renew the element after the first 1000 miles and subsequently every 10,000), the valve remains permanently closed; should it become clogged, however, the by-pass valve will open and allow unfiltered oil to reach the engine.

Immediately above the oil pump is a screwed tap, to which the connection to the oil pressure gauge on the dashboard is fitted.

From the "outlet" connection of the oil filter the oil is led to the rear of the internal oil gallery in the side of the cylinder block. Passages drilled into this gallery pipe lead the oil to the camshaft and crankshaft bearings. Taking these passages in order, counting from the front, No. 1 feeds the front main bearing and the camshaft front bearing. The front main bearing feeds No. 1 big-end through a ring cut in the white metal, the hole drilled up the crank web, and the inserted pipe, which in turn feeds No. 1 cylinder wall through the spray hole drilled in the off-side of the big-end. The camshaft front bearing has a forward leak to the camshaft chain wheel thrust face, and from there are three diagonal holes through the gear wheel boss, to the inside of the wheel rim, whence radial holes take oil to the chain links. Passage No. 2 feeds the camshaft centre bearing and the centre main bearing. The centre main bearing feeds Nos. 2 and 3 big-ends and cylinder walls as already described, and the oil pump driving skew gears, which are in the middle of the centre camshaft bearing. Passage No. 3 feeds the rear main bearing and the rear camshaft bearing. The rear main bearing feeds No. 4 big-end and cylinder walls, and the clutch by a hole drilled up the centre of the crankshaft, and the vertical pipe which takes oil to the rocker-shaft, the top union of this pipe communicates with passages drilled in the cylinder head to register with a hole drilled in the rear rocker-shaft support and so to the inside of the hollow rocker-shaft. The rocker-shaft is drilled at each rocker, and the oil which passes the rocker bushes finally finds its way down the push rod passages to the sump.

The oil which has passed the clutch plates escapes through gauze windows in the clutch spring plate into the clutch housing, where it is picked up by the teeth of the starter motor ring on the flywheel and thrown into a gallery on the near-side of the flywheel housing, whence it drains back to the sump.

Water Impeller.—Should it be found necessary to service the water impeller it is advised that the unit complete is taken off and returned to the Factory and replaced by a service one. Spare parts for the impeller can be supplied, but the replacement system will be found more satisfactory and economical.

Thermostat Control.—This device is situated in the water outlet pipe between the cylinder head and the top tank of the radiator. On starting from cold, it automatically isolates the radiator from the engine and allows only the water in the engine to circulate until a pre-determined temperature is obtained, approximately 80°C . Above this temperature, the thermostat valve opens and allows the entire water system to function. The purpose of the thermostat is to allow the engine to warm up quickly, and as it is entirely automatic in operation, there is no provision for adjustment. The instrument, however, is very simple and unlikely to give trouble.

The Carburetter Air Cleaner and Silencer.—The air cleaner and silencer functions in the following way :—

Air enters the cleaner and passes through the central tube A. Any sound waves produced and passing from the carburetter would also ordinarily pass through this tube into the car ; but in the case of the intake silencer they pass through passages B and B', into resonating chambers C and C', and thus set up counter waves which eliminate or considerably damp the original waves, so that no sound waves pass from the air intake tube A. The filtering medium D is oil-wetted woven mesh to which dust from the incoming air adheres.

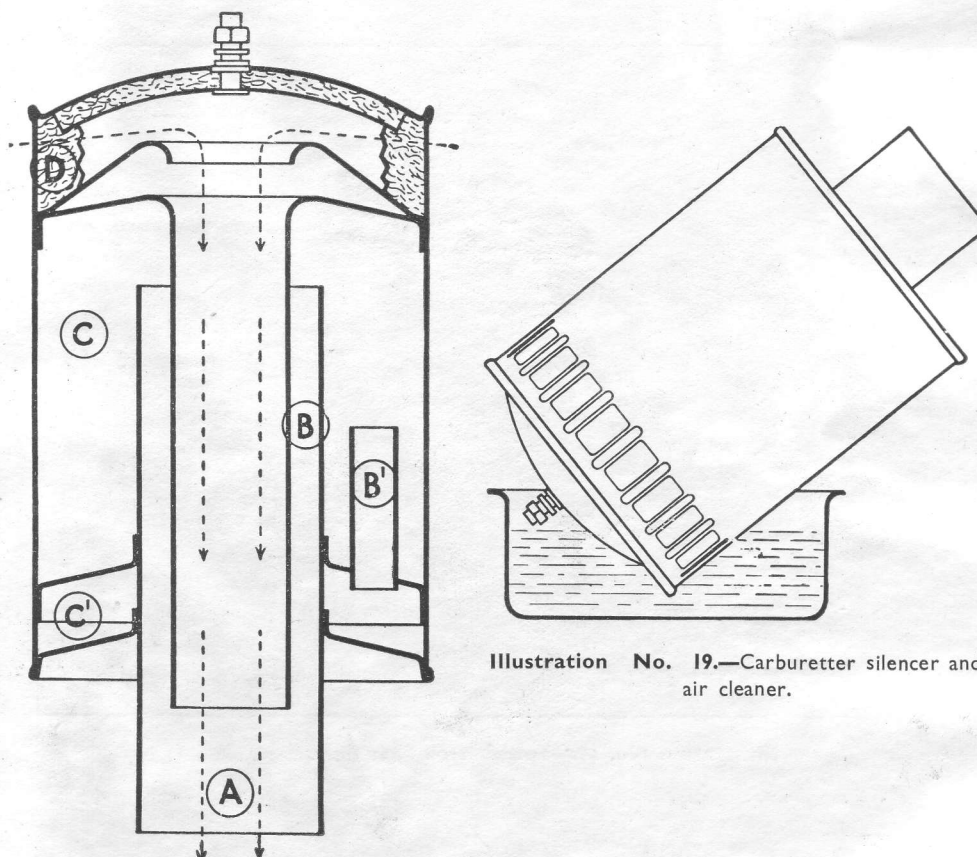


Illustration No. 19.—Carburetter silencer and air cleaner.

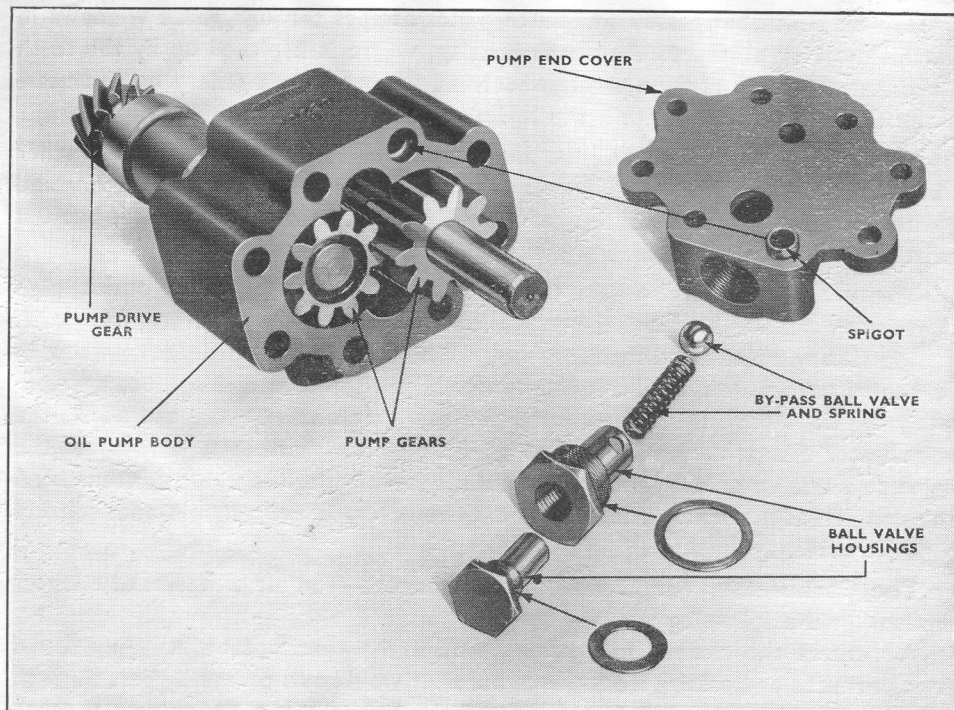


Illustration No. 20.—Oil pump dismantled.

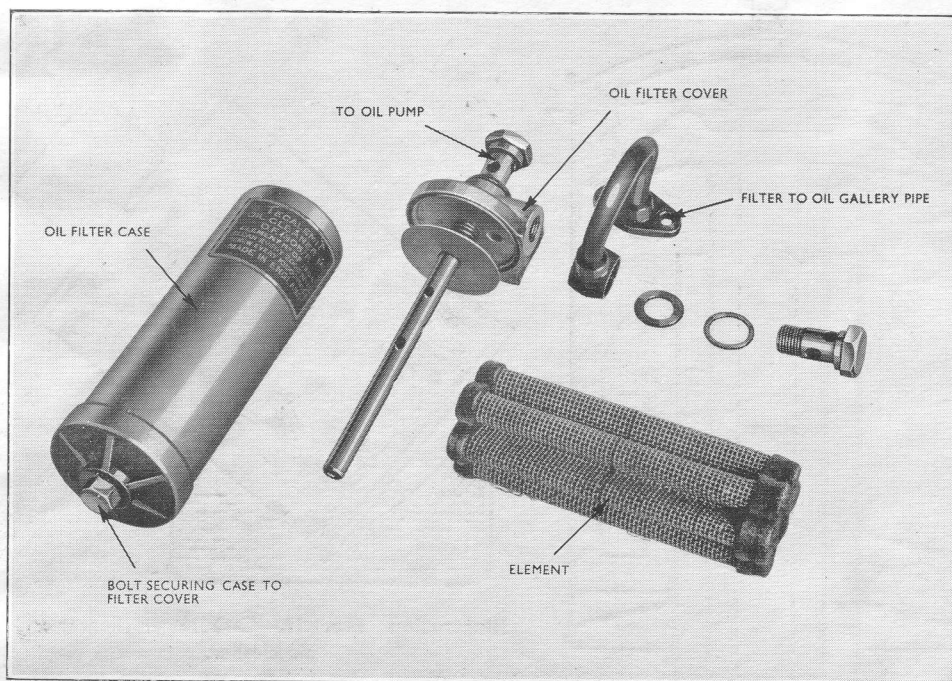


Illustration No. 21.—Tecalemit oil filter dismantled.

Cleaning and Re-oiling.—Every 5000 miles these oil-wetted air cleaners need cleaning and re-oiling. This is best done by swilling the louvred end of the cleaner in a shallow pan of petrol, as shown in Illustration No. 19.

After drying, the filtering mesh should be re-oiled with engine oil, allowing any surplus to drain off before refitting the cleaner to engine.

Decarbonising.—First of all drain the water system by opening the tap at the bottom of the radiator, and the small tap on the off-side of the cylinder block, see Illustration No. 18.

Remove the bonnet altogether after taking out the two screws at the rear end of the bonnet hinge.

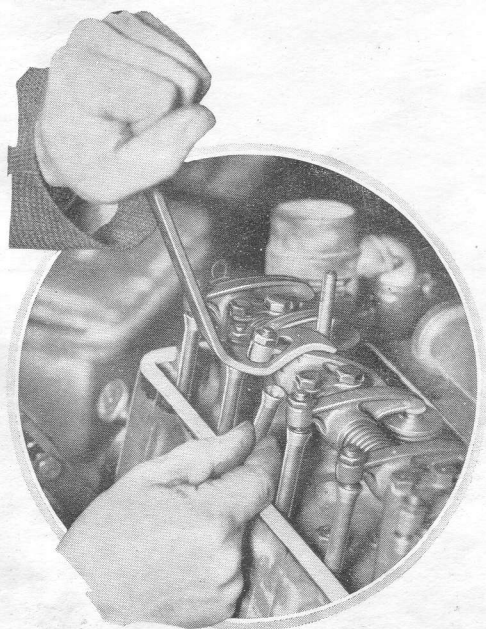
Detach the high-tension cables from the sparking plugs, unclip the distributor head, this permits the high-tension wiring to be taken away complete.

Now take out the sparking plugs, being careful not to break the porcelain centres.

Next remove the petrol pipe, the throttle controls and mixture control, and uncouple the exhaust pipe from its manifold.

Disconnect the petrol pipes from the petrol pump and remove the petrol pump from the toolbox.

Remove the carburetter float-chamber overflow pipes, unbolt the carburetters from the induction manifold, when the induction and exhaust manifolds can then be removed.



Special tool in use when removing the push-rod with the cylinder head intact.

The fan and water pump can be left attached to the cylinder head and need not be detached unless desired.

The radiator must then be removed as follows :—

Remove the bolts securing the headlamp brackets to the radiator, also the radiator stays from the radiator header tank. Slacken the water hoses by loosening one of the clips securing the rubber hose to the cast elbow bolted to the rear of the cylinder head and also the uppermost clips securing the rubber hose above the thermostat. The two nuts securing the radiator to the cross member can then be removed and the radiator lifted clear of the car.

Remove the oil feed pipe to the rocker gear from the cylinder head.

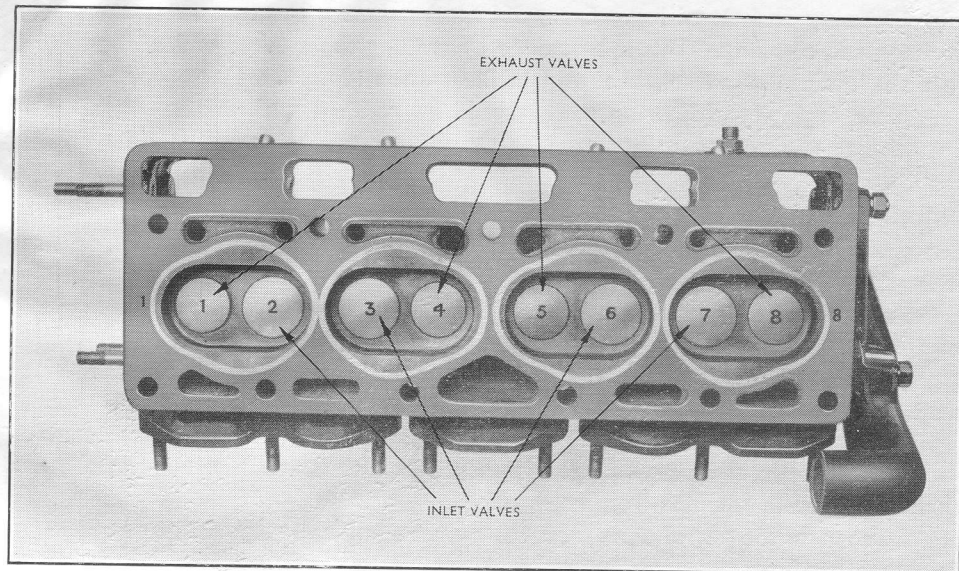


Illustration No. 22.—Showing how the valves are numbered and their positions in the cylinder head.

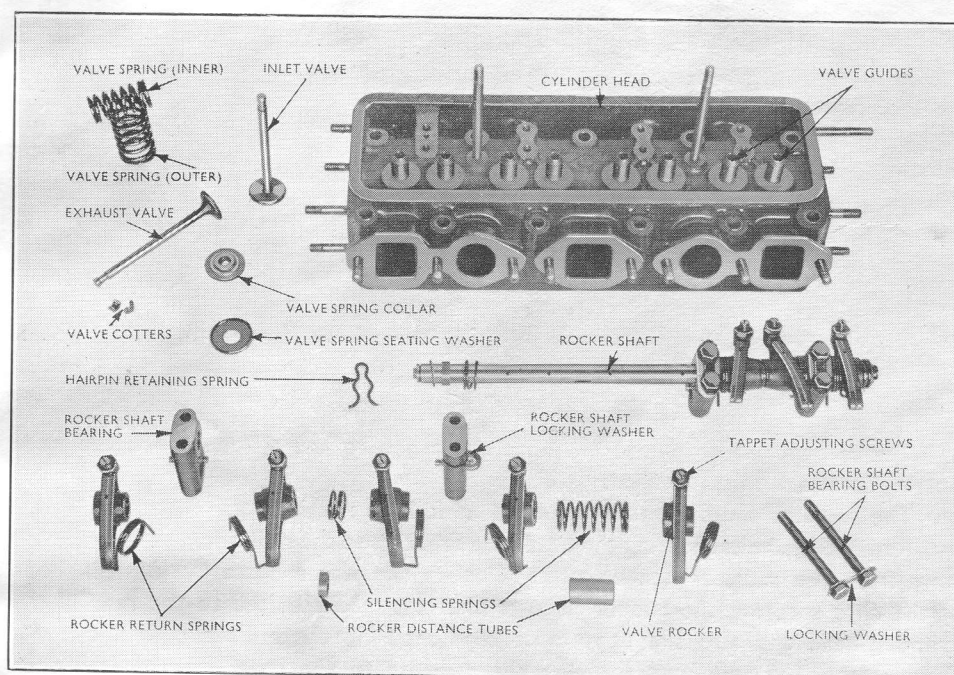


Illustration No. 23.—Showing the relative positions of all the parts contained in the rocker gear.

The cylinder head is now clear of all attachments. Remove the valve cover. The push rods will then have to be removed before proceeding further ; Illustration on page 39 shows a special tool which facilitates this operation.

After removing the cylinder head holding-down nuts with the special spanner provided in the tool kit, the cylinder head can be lifted clear.

Removing the Gasket.—The copper and asbestos gasket is not difficult to remove, providing that it is lifted squarely with the cylinder head studs. If lifted at an angle, it will jam on them. As the copper either side of the asbestos is very thin and soft, it is easily damaged and the gasket rendered useless.

After the cylinder head has been removed, stuff the open ends of the cylinders with clean rag to prevent the possibility of damage to the cylinder walls. The cylinder head can then be dealt with. The valve springs are secured by means of split cotters, and to remove each valve the cylinder head should be placed on a bench, combustion chambers downwards, with a wood block or suitable packing piece which fits in the combustion space below the valves which are being dealt with. By depressing the valve spring from above, the two cotter halves can be removed, and the spring and its cap will then lift away from the valves, which can be withdrawn from below.

Removing Carbon from the Head.—The next operation is thoroughly to clean the head. Remove the carbon with a wide screwdriver or similar blunt tool, taking care not to damage the valve seatings. After washing the complete head thoroughly, it is advisable, if possible, to dry it off by blowing with compressed air rather than wiping over with rag which is inclined to leave particles of fluff on the casting.

Grinding-in the Valves.—Examination of the valves will show that the edges of their mushroom-like heads are bevelled off at an angle to correspond with the similar bevelled edges of the valve ports in the cylinder head and thus provide a gastight joint when they are in contact. Obviously, gastightness is not attained if these bevelled edges are dirty or "pitted," and in order that they make perfect contact over the whole of their surfaces it is necessary to grind them in. When grinding-in the valves the utmost care should be taken to see that they are inserted into the correct port. (See Illustration No. 22.) No. 1 is at the front end of the head.

The grinding-in process consists in coating the bevelled face of the valve with a small quantity of valve-grinding paste—applied on the end of a match-stick—reinserting the valve in its guide and partially rotating it backwards and forwards, using a suitable tool that will grip the valve stem. Here we come to the secret of good valve-grinding. The valve should be raised from its seating every few reciprocations and given a half turn in order that the grinding compound may spread itself evenly over the whole surface. If this is not done there is the possibility that minute circular grooves will be cut into the face of both the valve and its seating, which will absolutely prevent the obtaining of a good gastight fit.

Probably the most convenient way of carrying out this periodic lifting is to obtain a light coil spring (similar to the valve spring, but much lighter) and insert it into the valve port beneath the valve head. When pressure is released from the valve it will pop up, when it can be easily rotated into a fresh position.

It is not necessary to continue grinding the valves once the faces of both valve and seating have assumed a clean, even, matt-surfaced appearance. A polished surface must not be expected and is quite unnecessary. If the engine has been run for a long period without being decarbonised the valve may be badly "pitted"—that is to say, it will have a number of small black spots or depressions on its face.

Should these depressions be at all excessive or deep, it is best to have the valve face trued up on a special machine to an angle of 45° . In extreme cases it may be necessary to treat the valve seats in a similar way. This will prevent needless grinding away of the valve seating in the cylinder head—a matter of importance, as it cannot be renewed. Any valves which are distorted should immediately be replaced by new ones. To attempt to grind them in will only produce extensive damage to the seating.

After each valve is ground-in it should be withdrawn and carefully washed in petrol, and, what is equally important, the valve seating and the surrounding valve port should also be thoroughly cleaned with a rag moistened with petrol. Do not wash out the valve ports with petrol or paraffin or some of the grinding compound will find its way into the valve guides or other working parts, and it is of the utmost importance that it should be prevented from finding its way on to any of the working surfaces of the engine, where extensive damage may be done.

Reassembling the Valves.—When you have satisfied yourself that all trace of the grinding compound has been removed, the valves may be reassembled. Care should again be taken to see that they are in their correct ports. Reassembly of the valve is not a difficult matter. After inserting the valve in its guide and resting its head on the wood packing block, the valve spring may be placed in position with the valve spring cap resting on top of it. Engage a tool on the cap and depress the spring to expose almost the whole of the groove in the upper end of the valve stem, into which insert the two conical cotters (small ends downwards) and gradually release the spring. Make sure that the cotters are properly engaging in their grooves.

The Rocker Gear.—Should it be desired to examine the rocker bushes, the rocker-shaft may be detached complete with its holding brackets by unscrewing the bolts which hold them to the cylinder head. It will be noticed that the two middle holding brackets are slotted and that washers are inserted in these slots to engage with Woodruff keyways in the rocker-shaft to prevent it turning. These washers may be picked or shaken out, and when the “hairpin” retaining springs are removed, the rockers, return springs, silencing springs, distance tubes and holding brackets may be drawn off the rocker-shaft one after the other.

Before reassembling the rocker gear, refer to Illustration No. 23, which shows the correct position of all the components, and will be of great assistance when reassembling.

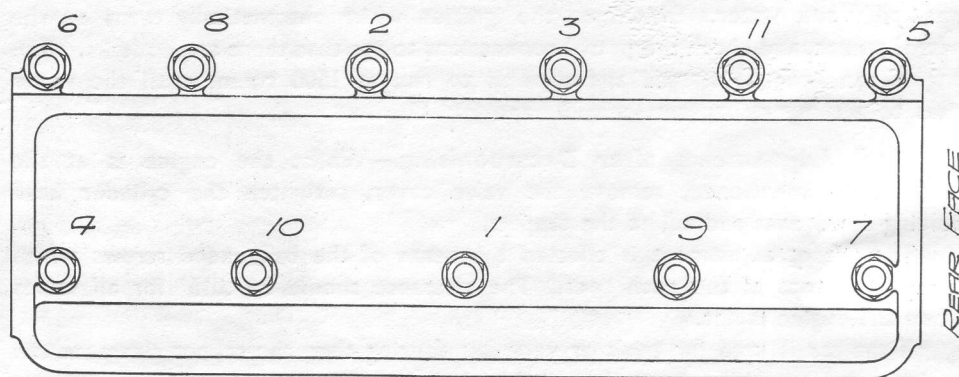
In replacing the rocker-shaft, particular care must be taken of three points. (i) That the correct holding bracket is put on the rear end of the shaft. This bracket has a hole drilled up its centre to convey oil to the hollow rocker-shaft. (ii) That the washers engage properly with the keyways cut in the shaft. (iii) The tab plates which lock the holding-down bolts should be carefully inspected for any sign of cracking where they have been bent up round the bolt heads and straightened out again. If one of the bent-up corners of these plates should break off it is likely to find its way by one of the oil return passages into the sump; and, while the lubrication system is such that it is unlikely to do any damage there, loose pieces of metal inside an engine are to be avoided if possible.

Valve Guides will need renewing periodically. The oiling of plugs is an indication. This should not be undertaken by the owner as the guides need very accurate fitting and we recommend that it be left to an authorised M.G. repairer, as both the removal of the old guides and the fitting of the new ones requires a

special tool and a press to prevent crushing. The correct clearance between the valve guide and valve stem is .003". After new valve guides have been fitted, it will be necessary to true-up the valve seatings to ensure that they are concentric with the new valve guides.

Cleaning the Piston Head.—First of all, turn the engine until the piston to be cleaned is at the top of its stroke. It is important to realise that the pistons are aluminium alloy which is a soft metal. Very great care, therefore, must be taken not to damage them when cleaning. A very blunt instrument and no hard pressure is the best method, and under no circumstances must an abrasive such as emery cloth be used. Carefully remove all particles of carbon and make sure none gets in the water ways or cylinder bores.

Re-fitting the Cylinder Head.—Make sure the surfaces of both the cylinder block and cylinder head are clean ; it is not necessary to use a jointing compound for the gasket, but it may with advantage be smeared with grease. Having slipped the gasket over the studs, next lower the cylinder head into position and fit the cylinder head securing nuts finger tight. Illustration No. 24 shows the correct order for tightening down the securing nuts.



CORRECT SEQUENCE FOR TIGHTENING UP
HOLDING DOWN NUTS.

Illustration No. 24.

The push rods should next be fitted, adopting the reverse method to that described for removal. Since the valves have been ground in, it is necessary to check the tappet adjustments to make sure there is a clearance ; this, of course, will be readjusted after the engine has been completely assembled and run. Now fit the valve cover, not forgetting the cork gasket ; the gasket is not very wide, so be sure that the cover fits squarely on it. It is advantageous to solution the cork gasket to the cylinder head, but not to the valve cover.

The next point to attack is the oil feed pipe to the rocker gear.

Now refit the exhaust and induction manifolds complete with carburetter assembly, if removed. As far as fitting is concerned, this is a quite straightforward operation. The securing nuts holding the manifolds and carburetters should be tightened down evenly. All the major items are now fitted, and attention should be turned to the smaller points—fit the mixture control, throttle controls and exhaust pipe to the manifold. Don't forget the gasket when connecting the exhaust pipe to the exhaust flange, also pull up the three nuts evenly on the flange.

Sparkign Plugs.—The correct sparkign plugs are **Champion L10 (14 mm.)**. We do not advise that the owner dismantles the sparkign plugs, and since it is necessary that the plugs are tested periodically we recommend they are taken to a service station equipped with plug servicing equipment who can be entrusted with this job. When having the job done, specify that the points be checked and, if necessary, adjusted to .018".

Now replace the sparkign plugs into the cylinder head, connect the high-tension leads to the plugs, and replace the top of the high-tension distributor.

If the distributor has been removed from the engine it will be necessary to check the plug leads to ensure them being in their correct positions in the distributor head.

The following information will be of assistance :—

Firing order—1, 3, 4, 2.

Rotation of distributor rotor anti-clockwise, when viewed fitted to engine.

It is possible that the distributor points may need some attention, and full details of this will be found on pages 74 and 75.

Replace the radiator and connect up the headlamp brackets, the radiator stay rods, and also tighten the water hose clips, after which tighten the two nuts securing the radiator to the cross member.

All the components have now been fitted back on the engine, and it remains to close the two taps on the water system and refill the radiator with water, preferably soft water. Switch on the ignition which automatically turns on the petrol pumps, and check the petrol connections to see that there are no leaks. The engine can now be started and allowed to run at 1500 r.p.m. until the water rises to a temperature between 70° and 80° C.

Final Adjustments after Decarbonising.—Whilst the engine is at the temperature mentioned, remove the valve cover, retighten the cylinder head holding-down nuts and adjust the tappets.

The tappet adjustment is effected by means of the ball ended screws which engage the tops of the push rods. The clearance should be .015" for all valves when the engine is hot.

If the car is used for trials or very fast touring then the tappet clearance can be increased to .019" **when the engine is hot**. This may increase the tappet noise slightly when the engine is idling, but the advantage gained is in any case well worth while.

Finally, replace the bonnet, not forgetting the two screws that secure the hinge rod support at the rear end.

Removing Connecting Rods and Pistons.—The first operation is to drain the sump. Then the car should be raised at the front on trestles. The steering box complete with bracket must be disconnected from the chassis frame and the column clip behind the facia board removed: the latter item necessitates the removal of the baffle board. The exhaust pipe must then be disconnected from the exhaust manifold, when the starter can be removed. The sump can then be removed. The next operation is to remove the split pins and nuts from all big-end bolts, when the bottom caps can be withdrawn. Remove the connecting rod and piston complete, taking care before putting on one side to replace the cap in the same position as it was before removal. It is as well also to replace the nuts to ensure that the connecting rod and its cap do not become separated. (See Illustration Nos. 25, 26 and 27.)

Illustration No. 26 shows a connecting rod complete with piston and one piston separately, of the first type, which ceases at Engine No. MPJG696, while Illustration No. 27 shows the second type of piston which commences at Engine No. MPJG697. When separating a piston from its connecting rod, special care will have to be exercised when undoing the pinch bolt in the small-end of the connecting rod. It will

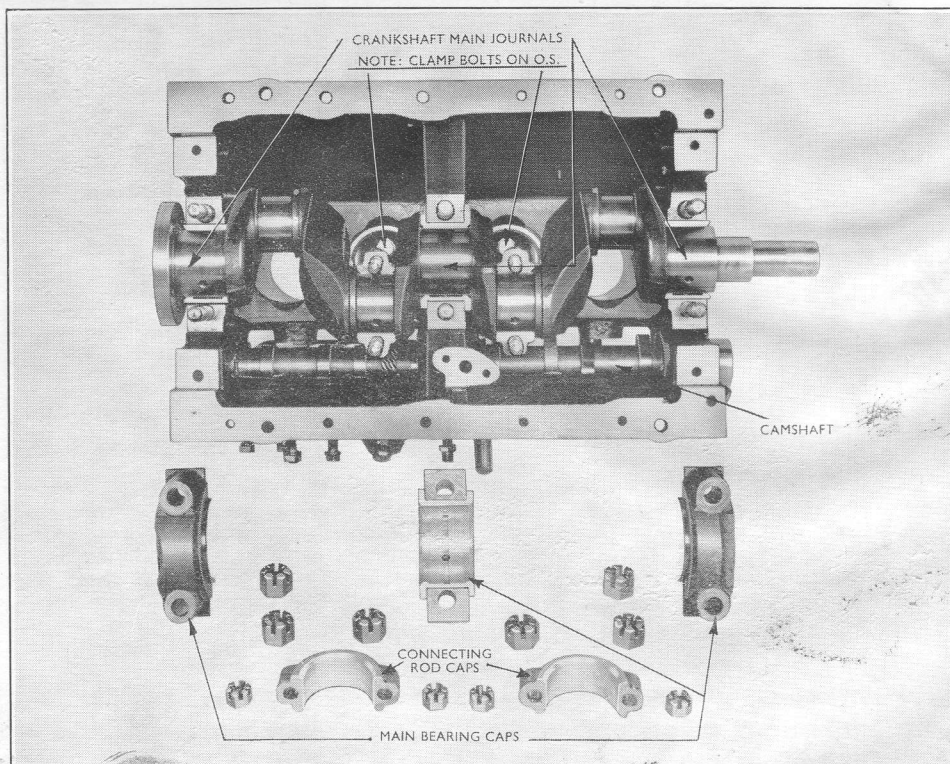


Illustration No. 25.—Interior view of engine partially dismantled.

have to be removed entirely as it fits in a groove in the gudgeon pin. It is inadvisable to hold the connecting rod in a vice while the pinch bolt is undone, as a procedure of this sort is liable to distort the connecting rod. The correct method is to employ end pads which can be inserted into the open ends of the gudgeon pin and which extend beyond the sides of the piston and can be gripped in the vice without fear of damage.

The Fitting of Pistons.—Should it be necessary to replace or refit pistons, the correct clearance between the piston and the cylinder wall below the three top piston rings, and at 90° to the gudgeon pins, is as follows :—

Up to and including Engine No. **MPJG696** :

.10 mm. or its equivalent, .004".

When a new type of piston was fitted commencing at Engine No. **MPJG697** :

.033 mm.—.061 mm. or its equivalent, .0013"—.0024".

Piston Rings (Ceasing Engine No. MPJG696).—Referring again to Illustration No. 26 (this is the original type of piston which ceased at Engine Number as stated) it will be noted that there are four piston rings and three different types: the two top ones are perfectly plain, being simple compression rings; the third one is an oil scraper ring, so also is the fourth one on the skirt of the piston. The two scraper rings are entirely different and must not be changed over.

The bottom scraper ring has square ends instead of angle ends as is the case with the three top rings, the reason for this being that it is pegged in position; care, however, must be exercised when refitting in the cylinder bore to see that this piston ring is not riding over the top of the peg.

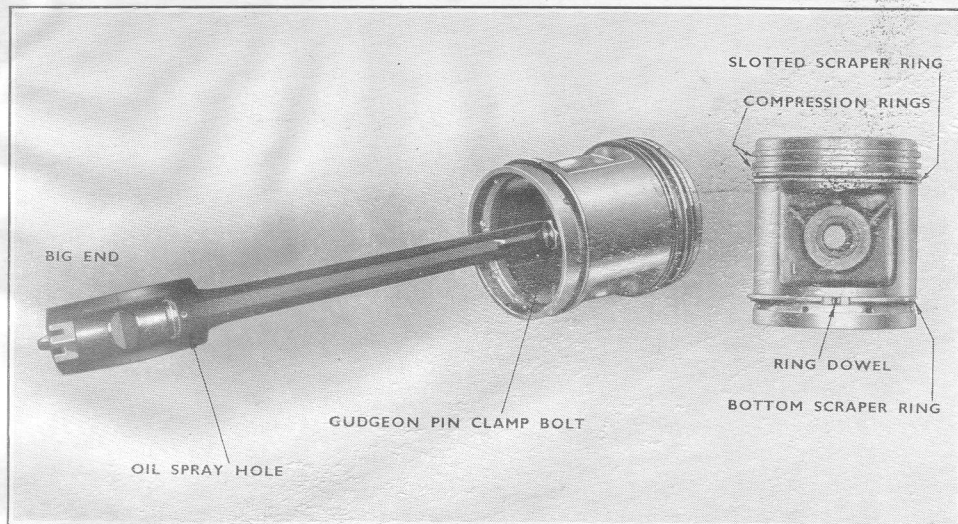


Illustration No. 26.—Piston assembled to connecting rod, also position of piston rings (first type).

Piston Rings (Commencing Engine No. MPJG697).—Referring to Illustration No. 27, which is the latest type of piston, it will be seen that it differs from the earlier type since it has only three rings instead of four. The two top rings are perfectly plain, being simple compression rings ; the third ring is an oil or scraper ring.

When fitting new rings of either type the gap measured when they are compressed in the cylinder (without the piston, of course) should be .004"—.006".

N.B.—It is important when refitting piston rings to see that their gaps are equi-spaced around the diameter of the piston and that no two gaps are opposite one another, thus defeating their effectiveness in preventing oil from travelling straight up into the combustion space.

Before ordering new pistons it is advisable to communicate with the nearest M.G. Service Depot, which will be able to advise on the correct size required.

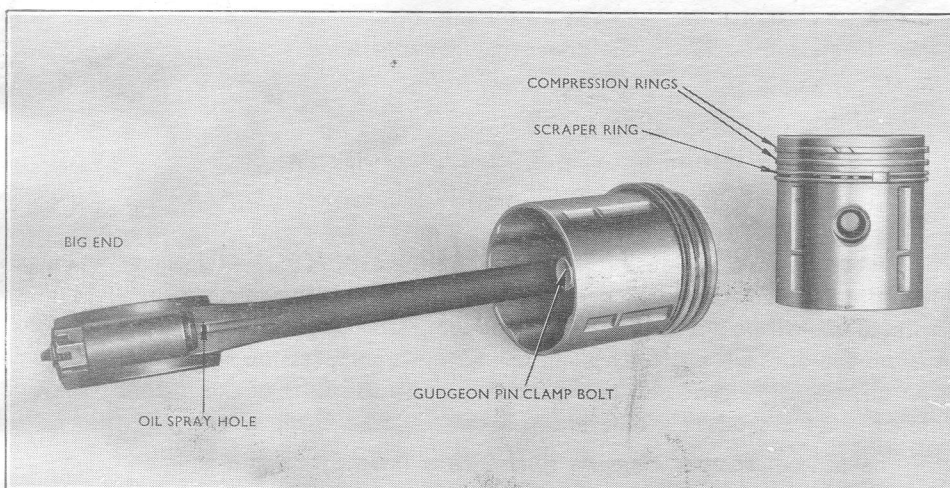


Illustration No. 27.—Piston assembled to connecting rod, also position of piston rings (second type).

Refitting Connecting Rods and Pistons.—Take care when replacing a piston and connecting rod to see that the gudgeon pin pinch bolt is towards the off-side of the engine (see Illustration No. 25), the reason for this being that the oil spray hole above the big-end bearing shown on Illustration Nos. 26 and 27 may be in a position properly to lubricate the cylinder walls.

When tightening the big-end bolts, care should be taken not to overtighten them and stretch the bolts, even so they should be sufficiently tight. Do not forget to replace the split pins.

Fitting Big-end Bearings.—If it is necessary to renew a big-end bearing, the connecting rod must be replaced complete. The Factory will supply a service replacement part which can be installed straight away and without special fitting. Having attended to the big-ends, etc., the refitting of the sump is a perfectly straightforward operation and no instructions are required.

Removing the Radiator.—First take off the bonnet, slacken the water hoses by loosening one of the clips securing the rubber hose to the cast elbow bolted to the rear of the cylinder head, and also the uppermost clips securing the rubber hose about the thermostat. Undo the two fixing nuts under the front cross member, the two lamp brackets where they fix on to the radiator, and the two radiator tie rods. The radiator complete can then be lifted clear.

To Remove Engine and Gearbox complete from Car.—After radiator and bonnet have been removed :—

Remove the seats, carpets, rubber gearbox cover or gearbox carpet and floorboards.

Undo the rubber muff where the steering column passes through the dash, and slide it and its securing plate down the column.

Disconnect the battery and uncouple the harness cables from the ramp plate, also the cables from the dynamo.

Undo the screws which secure the ramp plate to the dash and lift the panel out.

Remove the two leads from the starter motor terminal and the Bowden wire from the starter motor switch.

Uncouple the clutch withdrawal rod from the lever, and leave it hanging on the pedal.

The gearbox top cover with remote control complete can now be taken off.

Finally, uncouple propeller shaft at rear of gearbox, *the flanges must be marked before removal*, as they must go back in the same position (see page 17), and remove all controls, petrol pipes and manifolds as already detailed in instructions for removing cylinder head, also the speedometer and revolution counter cables from the engine.

Place a jack under the gearbox, taking just sufficient weight to enable the four main rear engine bolts (gearbox to rubber mounting) to be removed. After the nuts have been removed from the engine front mounting bolts, together with the rubber washers and retaining cups which are also threaded and therefore must be unscrewed, the bolts can then be unscrewed from the rubber mountings, when the engine can be lifted away from the car.

N.B.—It may be necessary to loosen and turn the dust cover on the starter motor to clear the steering column as the engine is withdrawn.

Replacing Unit with Gearbox.—To replace the unit, reverse removal operations ; refer to the wiring diagram when re-connecting wiring, and leave the bottom securing nuts in the radiator loose so that the position can be adjusted to suit the bonnet.

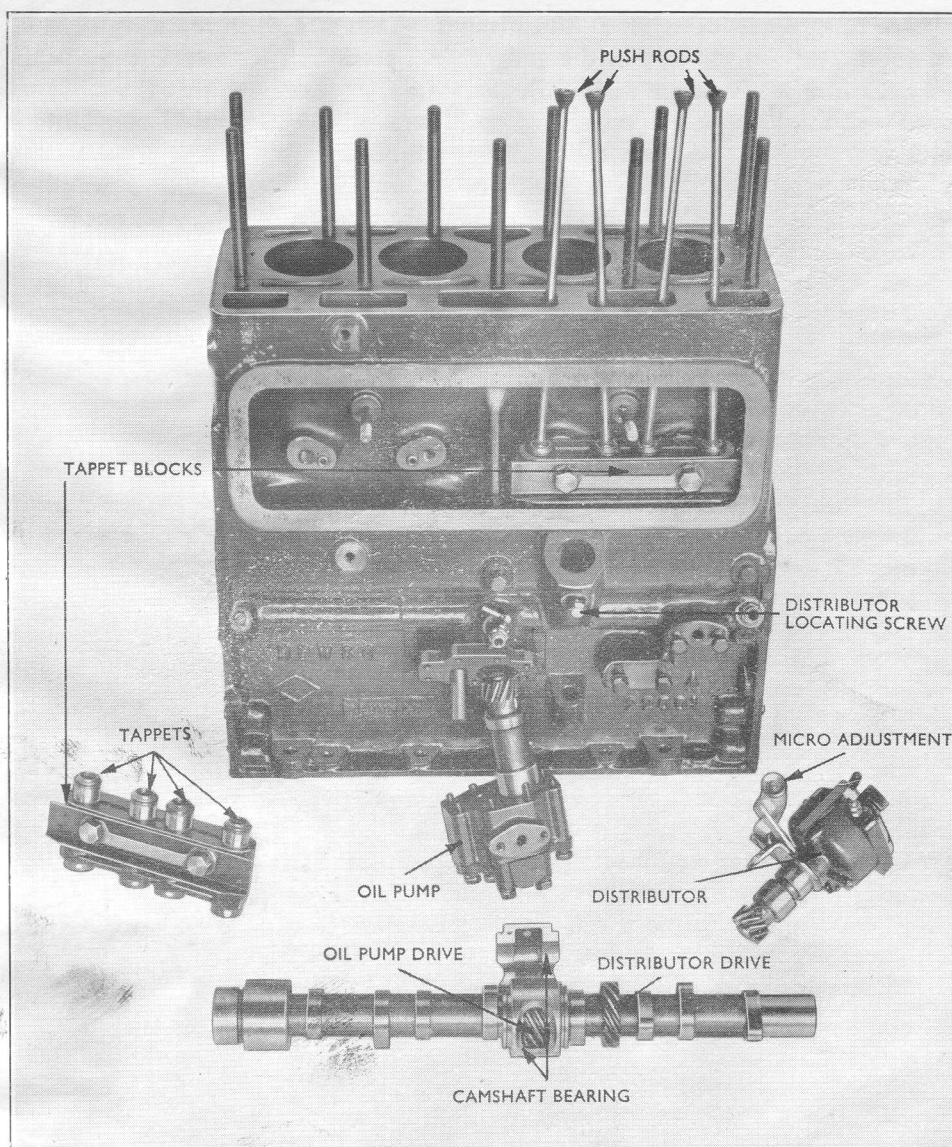


Illustration No. 28.—Showing details of the camshaft and operating gear for the overhead valves.

Removing Camshaft.—If the engine is upside down the tappets can be left in place ; but if it is desired to remove the camshaft with the engine in the frame, or for some other reason it is not desired to turn it upside down, the tappet blocks, complete with tappets, should be removed so that the tappet bases do not catch on the cams as they are drawn underneath. To do this, remove the dynamo and its support bracket, take out the screw which locks the distributor, and remove the distributor. The tappet cover may now be removed and the tappet blocks unbolted and prised off their dowels. They will bring the tappets with them, which are restrained by circlips round their upper ends from falling out of their blocks. Before the camshaft can be removed the oil pump must be taken off (as must the distributor if this has not already been done) so that their skew gears are out of the way. When this has been done, and the timing chain and sprockets taken off, the camshaft can be drawn out forwards. It will pass through its front bearing and pull out of its rear bearing, but it must take its middle bearing part

of the way with it. To permit this the dowel screw which secures this bearing to the engine body must be taken out (see Illustration No. 28, seen just above the oil gauge tap). This bearing has a groove turned round either end, by which it may conveniently be tied or wired to the camshaft to prevent it falling when free of the housing. When the camshaft has been drawn sufficiently to bring the middle bearing free of the housing it may be untied and lifted out, and the withdrawal of the camshaft completed.

To Replace the Camshaft.—The front and rear camshaft bushes being in place and the tappets being clear (either by the engine being upside down or by the tappet blocks removed), the camshaft may be slid in from the front, until it is time to insert the middle bearing. This should be put on its proper place on the shaft, and either tied or wired to it ; when this bearing has entered its housing sufficiently, the tie or wire must be removed, when the shaft is finally pushed home. With the shaft in place the bearing may be moved about until its locating hole is opposite the locking screw hole, using a tool, such as a blunt-ended scriber, to feel that the locking screw will enter properly. The locking screw should now be inserted and wired. Refer to Illustration No. 28.

Removing Crankshaft.—Assuming that the engine is out of the chassis and the sump, clutch, etc., removed as described elsewhere, it remains only to undo the flywheel bolts and pull the flywheel complete with the three studed separator plates and spigot bearing off the crankshaft.

The flywheel housing can be taken off after removing the bolts which secure the flywheel housing to the crankcase, two of which have their heads inside the crank chamber. The connecting rod caps may now be removed and the pistons drawn one at a time, turning the crankshaft as necessary to allow each one to pass. The bridge pieces over the front and rear main bearing caps may now be taken out, after which the three bearing caps may be removed and the crankshaft lifted out.

Camshaft Timing.—The two timing sprockets are secured to the crankshaft and camshaft respectively by single keys ; there is, therefore, only one position in which each can be fitted to its shaft.

It will be noticed that the timing chain has two white links, and each of the sprockets has a tooth marked "T." Between the white links are thirteen black ones on one side of the chain and seventeen black links on the other. The camshaft is correctly timed when each of the "T"-marked teeth is in a white link with the shorter black portion of the chain uppermost. The thirteen black and two white links are clearly shown in Illustration No. 30, which shows one white link of the chain engaged with the "T"-marked tooth of the camshaft sprocket, while the "T"-marked tooth of the crankshaft sprocket has just left the other white link, thirteen black links behind the first one.

The engine must be turned thirty-two times before the links and marked teeth come back to this position again.

Ignition Timing Adjustment.—When the distributor has been removed for any reason, it must be re-timed on replacement. First, set the engine with Nos. 1 and 4 cylinders on top dead centre. This is done by bringing the two tapped holes in the belt pulley in a vertical position in line with the arrow stamped on the chain cover as shown in Illustration No. 29.

Then examine the valves to see which of the previously mentioned cylinders is starting its firing stroke, turn the distributor until the rotor is facing the appropriate segment (i.e. the segment connected to the high-tension cable leading to

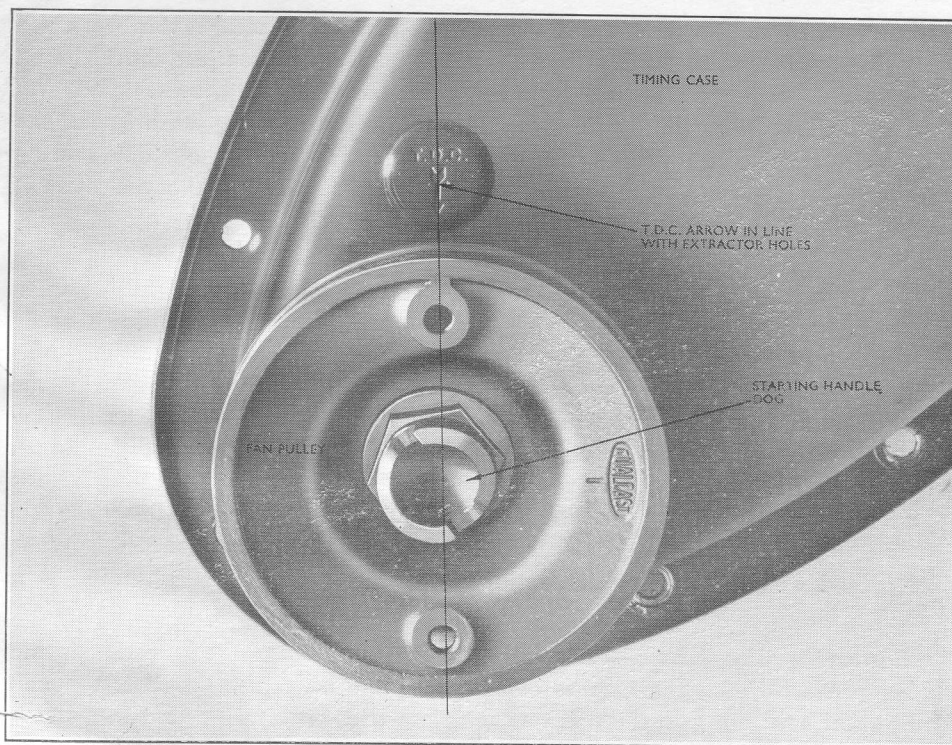


Illustration No. 29.—Showing method of obtaining T.D.C.

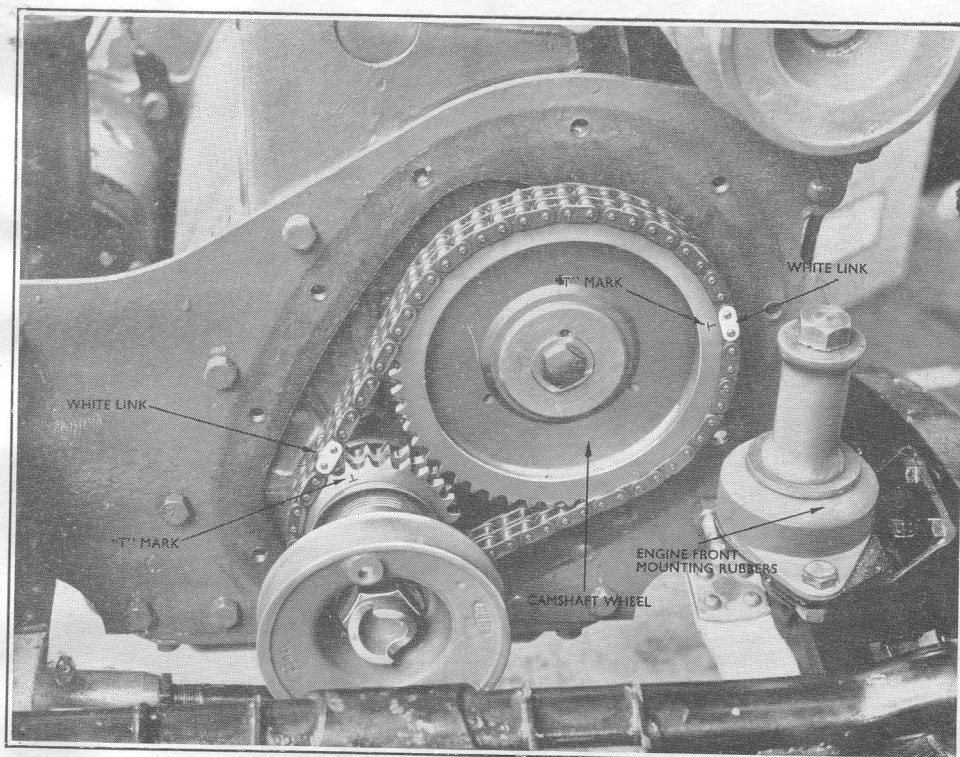


Illustration No. 30.—Timing chain (see page 49).

the same cylinder), and insert the distributor in its housing, "feeling" it in so that the nearest tooth is engaged. Turn the body about until the locking screw will enter, and lock it.

Next (having verified that the point gap is properly set) set the micrometer adjustment in the centre position, slack off the pinch bolt, and turn the head until the points are just breaking.

The correct starting point is points just breaking T.D.C. This, of course, may be varied, but probably not more than 1° either way, to suit the grade of fuel used, or a driver's personal idiosyncrasies. One division on the micrometer scale equals 4° (crankshaft), and each division is again divided into a definite number of "clicks" which are easily felt.

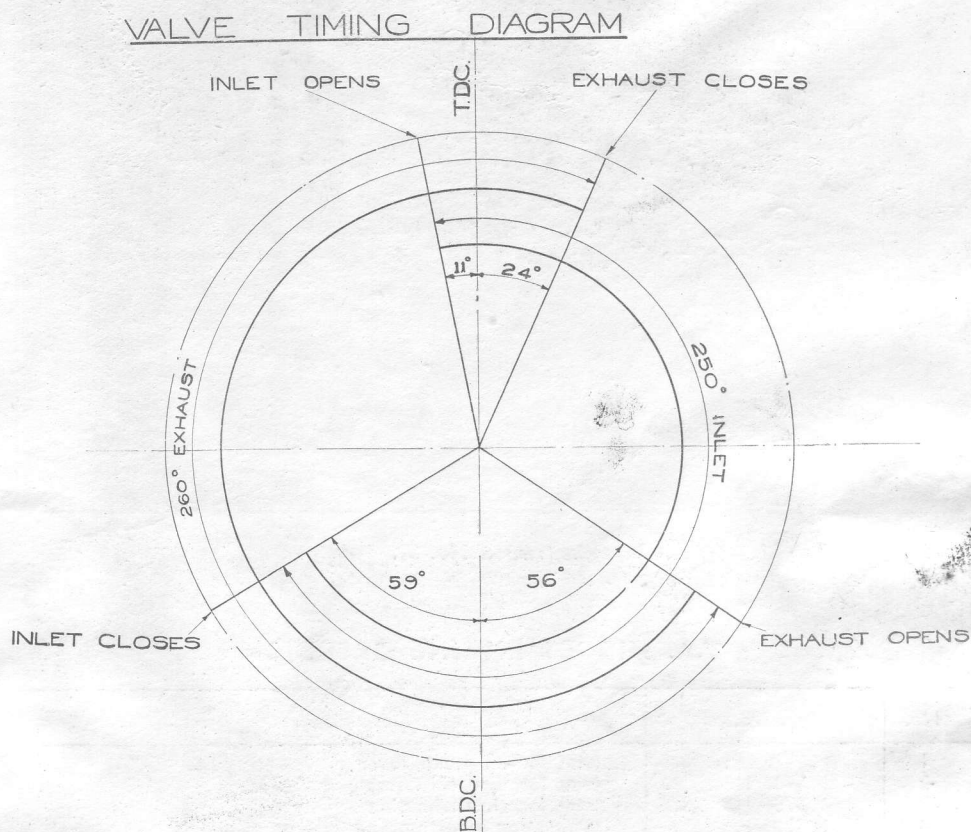


Illustration No. 31.—Valve timing diagram.

Valve Timing.—The valve timing diagram is given above but it may be more convenient to check the valve timing from measurements on the periphery of the flywheel, these measurements being :—

Inlet opens	...	...	27.8 mm. before T.D.C.
Inlet closes	...	...	149.3 mm. after B.D.C.
Exhaust opens	...	...	141.7 mm. before B.D.C.
Exhaust closes	...	...	60.7 mm. after T.D.C.

Note.—Before setting the timing, make sure that the automatic advance and retard mechanism is working properly and is in its fully retarded position while the timing is being set.

THE COMPLETE SET OF GASKETS FOR THE M.G. MIDGET SERIES "T" ENGINE

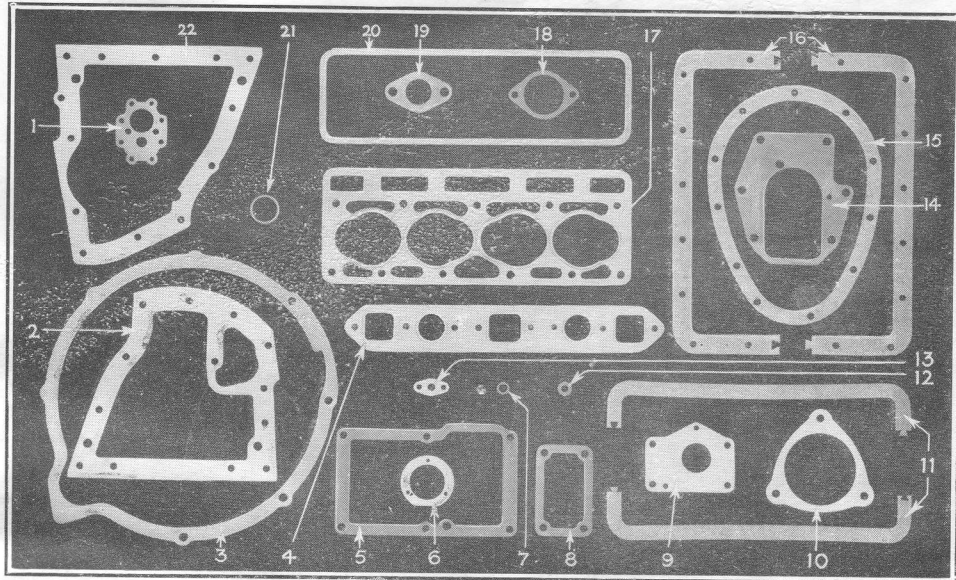


Illustration No. 32.

T.A. MIDGET ENGINE GASKETS

No.	Part No.	Description.
1	MG679/255	Joint for oil pump cover
2	MG706/118	Joint for flywheel housing
3	MG706/119	Joint for clutch housing
4	MG706/106	Gasket for induction and exhaust manifolds
5	MG706/104	Joint for gearbox top cover
6	MG706/104	Joint for starter inspection cover
7	PI51/110	Washer for cylinder block drain tap
8	MG679/185	Joint between water pump and cylinder head
9	MG706/117	Joint between water pump body and rear plate
10	MG706/213	Joint for starter
11	MG706/108	Joint for tappet inspection cover
12	X679/27	Washer for cylinder head cover nut
13	MG679/249	Joint for oil suction pipe
14	MG706/122	Joint for speedometer gear casing (gearbox)
15	MG706/115	Joint for timing chain case
16	MG706/109	Joint for sump
17	MG706/110	Cylinder head gasket
18	MG679/305	Joint for thermostat
19	MG706/111	Joint for carburettor
20	MG706/113	Joint for cylinder head cover
21	X151/44	Washer for gearbox drain plug
22	MG706/114	Joint for front bearer plate

SECTION F

THE S.U. CARBURETTORS AND THE PETROL PUMP

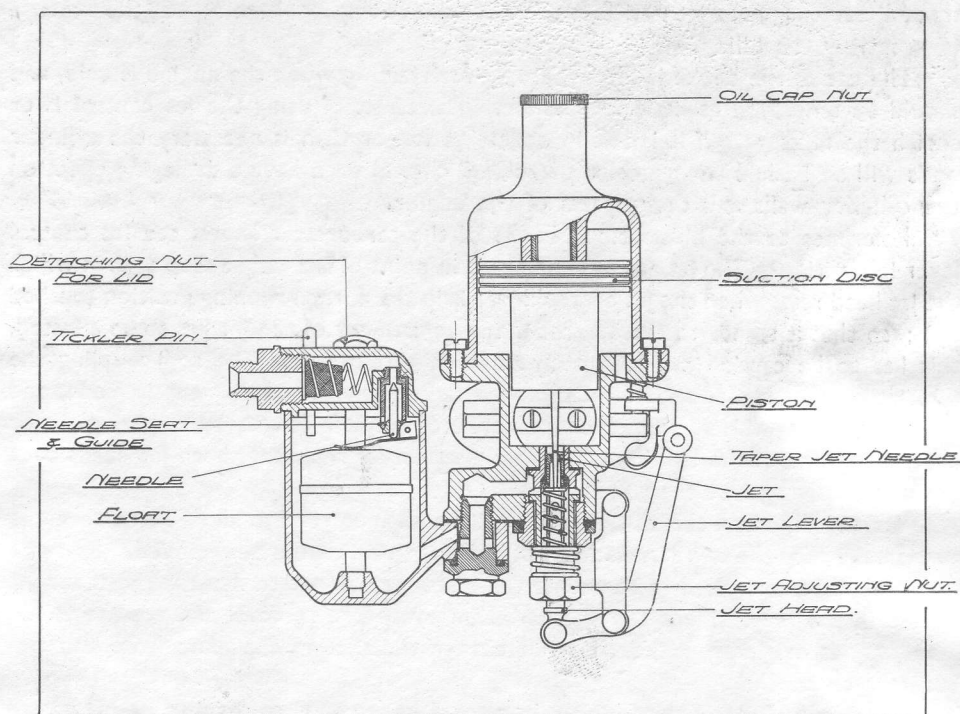


Illustration No. 33.—Sectional view through an S.U. carburettor, showing the taper needle locked into the piston which is caused to rise by the suction of the engine and so increase the orifice of the jet, thereby governing the petrol flow. It will be realised by this illustration that the effect of screwing the jet adjusting nut up or down has actually no effect on the jet itself; it is simply an abutment for the jet head which is controlled by the jet lever. The two screws holding the suction disc outer chamber in position should be removed from time to time, and the suction disc and piston carefully cleaned with a dry rag; under no circumstances should oil be used on the suction disc. The oil cap on the top of the suction disc chamber simply lubricates the spindle which guides the suction disc during its up and down travel.

The steel adjusting screw on the outside of the carburettor is only intended for slow-running adjustment and does not alter the mixture.

Index is on Page 3

Carburetters.—Since the two carburetters are identical, it is necessary, except in the case of synchronising, to describe the construction and maintenance of one instrument only.

A little machine oil should be injected to lubricate the piston guide rod after removing the brass cap on the top of the dashpot (see Illustration No. 33) every thousand miles ; three drops of machine oil or bicycle oil are advised for this purpose.

Under no circumstances should the body of the piston be lubricated.

The jet control nuts are provided solely for the purpose of setting the mixture strength for the purpose of obtaining a good tick-over. Screwing the jet adjusting nut upwards—that is, in a clockwise direction looking from underneath the car—and subsequently pushing in the jet until the jet head abuts against the nut, weakens the mixture. Both jets should be adjusted in this way, so that when the engine is thoroughly warm, the weakest setting is provided which is consistent with a uniform tick-over. When the jets are adjusted in this way, the performance of the carburetters in other respects should be correct. If it is thought that a richer or weaker setting is required for general performance and consumption, the proper course to be adopted is to change the needles ; it cannot be too strongly emphasised that adjustment of the jet positions will not achieve this result, except at the expense of upsetting the idling.

The use of the choke is intended only for starting when the engine is cold, and should be employed as little as possible. The effect of using the jet control is to enrich the mixture. If it is left in operation longer than is necessary the cylinder walls will be bathed with surplus petrol, which will soon have a damaging effect on the cylinder walls and other parts of the engine.

Reference to the Illustration No. 33 of the carburetter shows the jet control lever in position. The jet adjustment nut is in point of fact only a stop against which the jet head rests when the jet control lever is in the normal running position (pushed up) ; so that it stands to reason that if any adjustment of the jet has to be effected, this has to be carried out separately on each carburetter. The rod coupling the two jet control levers should be removed before any jet adjustment is made, and before replacing this it should be rendered of suitable length by screwing up or unscrewing one of the ball joints, so that after finally replacing, both jet heads abut simultaneously against their stop nuts.

Periodically clean the suction disc, suction chamber and guide. To remove the suction chamber the two screws that hold it in position should be removed. Extreme care should be exercised in removing the piston, so as not to damage the taper jet needle in any way. Mark the suction chamber before removal and replace it the same way as originally fitted. Do not change the suction chambers from one carburetter to another.

Wash air cleaner thoroughly in petrol every 5000 miles and re-oil gauze with engine oil. See page 37.

Sources of Trouble.—There are only four troubles which may affect the functioning of the S.U. carburetter.

1. The piston may be sticking, due to dirt on the suction disc or piston, or due to a bent needle.
2. There may be dirt or water in the carburetter.
3. The float mechanism may have become deranged, and the carburetter is in consequence flooding.
4. The carburetters may require synchronising.

Piston Sticking.—The suction piston consists of the piston proper forming the choke ; the suction disc, into which is inserted the hardened and ground piston rod working in a bearing in the suction chamber ; the suction disc formed on the

upper part of the piston and a tapered needle inserted in the piston regulating the jet opening. If the piston is sticking this can easily be ascertained by inserting a finger in the air intake and moving the piston. If the air cleaner has not been removed the piston can be lifted by inserting a match-stick or preferably a small metal rod through the hole in the carburetter body under the piston chamber or dashpot. The piston should move quite freely and return to its seat with a click as soon as it is released. The air cleaner and branch pipe will have to be removed to get access to the carburetter air intake.

A large percentage of the carburetters returned to the Works for correction have had the jet removed and replaced without being correctly centred. On no account should the jet be tampered with.

The needle is easily bent if the piston is removed carelessly, in which case it will bind on the jet and cause the piston to stick. To ascertain if the needle is bent—providing the jet is not out of centre—remove it from the piston, refit the suction chamber on to the body of the carburetter and test for freedom as described above. If the needle is bent the only satisfactory remedy is to replace it by a new one.

Float-chamber Flooding.—This is usually obvious from the quantity of petrol flowing over the float-chamber and out from the vent pipe. Flooding is generally caused by foreign matter finding its way on to the seating of the float-chamber needle. It can sometimes be removed by flooding the carburetter with the tickler pin, thus permitting the incoming petrol stream to wash away the particles of grit. Otherwise access to the needle is obtained by removing the float-chamber top. To take out the needle it is necessary first of all to take out the pin which holds the needle actuating fork in position. After taking away the fork the needle will drop straight out; the seating should on no account be ground in, but if damaged, both the needle and seating replaced.

Do not readjust the petrol level by bending the fork; if there is reason to suspect the petrol level, it is strongly advised to return the car to an M.G. Dealer. The correct level is just below (1 mm.) the top of the jet, when the jet is in the fully rich position.

Synchronisation of Carburetters.—Before attempting to adjust the carburetters, it is advisable to check over the following items.

Set the ignition timing as described on pages 49 and 51. Check and, if necessary, adjust distributor points to .012", plug points to .018", and inlet and exhaust valves to .015" **when hot.**

Having checked these items, remove air cleaner and branch pipe, also the suction chambers from the carburetters, disconnect the jet coupling rod and screw the jet adjusting nuts right up. The petrol level is set before the car leaves the Works and therefore needs no attention, but for checking purposes the following information will be of assistance. With the dashpot and piston removed, the jet in the fully rich position, the petrol level should be 1 mm. below the top of the jet. Next proceed to set the needle in the piston.

The shoulder of the needle should be flush with the face of the piston. Refit the pistons complete with their suction chambers to the carburetters, making sure that, when screwed down tightly, the pistons return to their seatings with a click. If for any reason it is thought advisable to fit new needles, see that they are the same type as before. The marking (AC, in the case of the M.G. Midget) is stamped on the shoulder. Alternative needles are—richer M1, weaker S.

Next unscrew the jet adjusting nuts two complete turns and disconnect slow-running control. Then slacken one of the flexible coupling bolts on the coupling connecting the throttle spindles. The engine can then be started, screwing down

the jet adjusting nuts farther if necessary in order to enable it to run until normal running temperature is attained. The slow-running screws on the throttle spindles should now be unscrewed, and eventually adjusted so that the engine is idling fairly slowly. It is now easily possible, by placing the ear to the mouths of the two carburetters, if the air cleaner and its manifold is removed, to determine whether there is an equal flow of air through them. Adjustment of the slow-running screws should be made until this occurs (that is, until there is an equal "hiss" at the mouth of each carburetter), when the coupling bolt may be retightened.

A fairly good check on the mixture strength can be obtained by idling the engine fairly fast, and lifting each of the pistons in turn with a pencil or similar object a height of about $\frac{1}{32}$ ". This should have the effect of causing a very slight increase in engine speed, the evenness of firing not being upset. If on the other hand this operation has the effect of causing the engine to stop, it is an indication that the carburetter is set too weak. If an appreciable increase occurs and continues to occur when the piston is moved to the extent of, say $\frac{1}{16}$ ", the indication is that the mixture on this carburetter is too strong, and the jet adjusting nut should therefore be screwed up.

Now replace air cleaner and branch pipe, and possibly weaken each carburetter slightly by screwing up both jet nuts one or two flats; before attempting the final adjustment for mixture strength, it is essential that the engine should have maintained its normal working temperature. When this is done the mixture may be judged by the exhaust note. If the engine is running with a regular rhythm but suggestive of there being more work done by one cylinder than the others, this phenomenon being accompanied by signs of black smoke from the exhaust, it may be concluded that the mixture is too strong. One of the jet adjusting nuts should now be screwed up one or two flats, pushing up the jet head to meet it at the same time. If this effects no improvement, return it to its original position and try the same procedure with the other. If, on the other hand, the exhaust note is irregular without any perceptible rhythm, it is probable that the mixture is too weak. In this case, first one and then the other of the jet adjusting nuts should be screwed down. The slow-running adjusting screws should now be turned equally in an anti-clockwise direction until the slowest possible tick-over is obtained consistent with even firing.

Slow-running Control.—The adjustment of the cable leading to the dash control knob is effected by means of a clamp on the end of the slow-running lever on the carburetter butterfly spindle. It is necessary when readjusting this control to make quite sure that the knob on the dash is screwed in as far as it will go and also the carburetter butterfly spindle is resting on the slow-running adjustment screws when the required idling speed is obtained. The inner cable can then be readjusted in the clamp so that all slackness of the cable is removed.

General.—It will be realised from the foregoing that the S.U. carburetter is a very simple instrument and easily managed when understood. On the other hand, considerable damage can be done if it is not treated correctly.

We would emphasise that the four troubles previously outlined are the only ones that can be caused by defects in the carburetter, and if these points are in order the carburetter should on no account be dismantled or altered, since the trouble must lie elsewhere.

DON'T RUN THE ENGINE WITH THE MIXTURE CONTROL IN THE RICH POSITION LONGER THAN NECESSARY.

The Electric Petrol Pumps.—The pump is fitted on the off-side of the dash wall and consists of three main assemblies: the body, the magnet assembly and the contact breaker. Referring to Illustration No. 34, which shows one of the two pumps, it should be noted that the body is composed of a hollow brass stamping (A), into the bottom of which the filter (B) is screwed. The inlet union (C) is screwed in at an angle on one side. The outlet union (D), which is screwed into the top, tightens down on to the delivery valve cage (E), which is clamped between two fibre washers (F) and (G). In the top of the cage is the delivery valve, a thin brass disc (H) held in position by a spring clip (I). Below the delivery valve cage (E) is the suction valve (K), the latter being a similar disc resting on a seating machined in the body. Holes connect the space between the valves to the pumping chamber, which is a shallow depression on the forward face of the body. This space is closed by a diaphragm assembly (L), which is clamped at the outside between the magnet housing (M) and the body, and in the centre between a brass plate (K1) and the steel armature (O). A bronze rod (P) is screwed through the centre of this and passes through the magnet core to the contact breaker which is located at the far end.

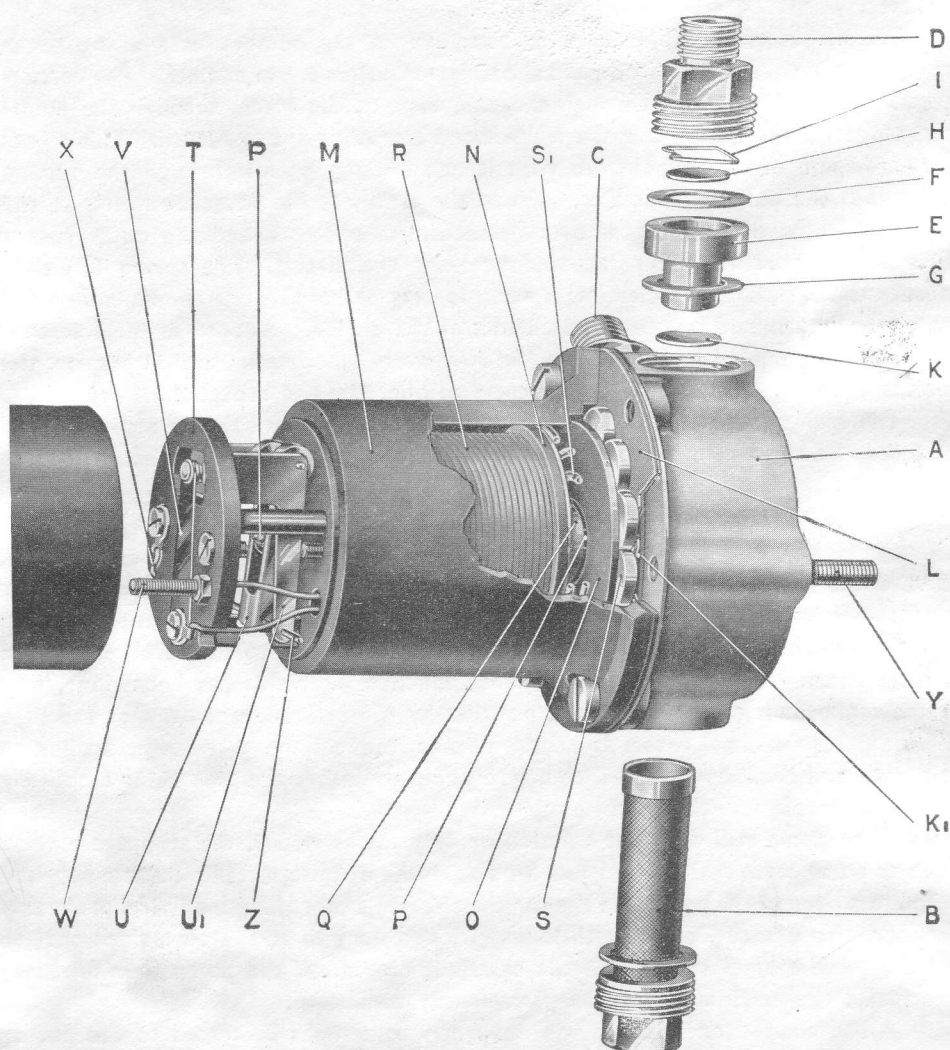


Illustration No. 34.—A view of the S.U. pressure petrol pump with part of the cover cut away to show the magnet. The various letters are referred to in the accompanying text.

The magnet consists of a cast iron pot having an iron core (Q), on which is wound a coil of copper wire which energises the magnet. Between the magnet housing and the armature are fitted eleven spherical edged brass rollers (S). These locate the armature centrally within the magnet at all times and allow absolute freedom of movement in a longitudinal direction.

The contact breaker consists of a small bakelite moulding carrying two rockers (U) and (UI) which are both hinged to the moulding at one end and are connected together at the top end by two small springs arranged to give a "throw over" action. A trunnion is fitted into the centre of the inner rocker, and the bronze rod (P) connected to the armature is screwed into this. The outer rocker (UI) is fitted with a tungsten point which makes contact with a further tungsten point on the spring blade (V). This spring blade is connected to one end of the coil, and the other end of the coil is connected to the terminal (W). A spring (SI) is interposed between the armature and the end plate of the coil.

A short length of flexible wire is connected to the outer rocker and to one of the screws which hold the bakelite moulding on to the magnet housing, in order to ensure a good earth. Two fibre bushes are fitted to one of the spindles of the "throw over" mechanism of all pumps in order to silence the operation on the contact breaker.

The action of the pump is as follows. When the pump is at rest the outer rocker lies in the outer position and the tungsten points are in contact. The current passes from the terminal, through the coil, back to the blade, through the points and to earth, thus energising the magnet and attracting the armature. This comes forward, bringing the diaphragm with it and sucking petrol through the suction valve into the pumping chamber. When the armature has advanced nearly to the end of its stroke the "throw over" mechanism operates, and the outer rocker flies back, separating the points and breaking the circuit. The spring (SI) then pushes the armature and diaphragm back, forcing petrol through the delivery valve at a rate determined by the requirements of the engine. As soon as the armature gets near the end of its stroke the "throw over" mechanism again operates, the points again make contact, and the cycle of operations is repeated.

The spring blade rests against a small projection on the bakelite moulding, and it should be so set that when the points are in contact it is deflected back from the moulding.

Servicing the S.U. Petrol Pumps.—Should pump trouble be suspected, first disconnect the pump union of the pipe from the pump to the carburetter and switch on the engine. If the pump functions the shortage is due either to blockage of the petrol pipe to the carburetter, or possibly to the carburetter float needle sticking up. If the pump will not function after this has been done, first remove the filter, which is held in position by the brass hexagon nut at the base of the pump, and see if this is clear. Then disconnect the petrol pipe leading to the tank and blow down this with a tyre pump to ensure the pipe being absolutely clear, and reconnect the petrol pipe.

If the pump still does not function or only works slowly, the stoppage may be due to a bad earth return. To test for this, make definite metallic contact between the brass body of the pump and the car chassis with a short length of wire, preferably copper. To ensure a good earth it may be necessary to scrape off a small portion of the black enamel with which the chassis is coated. If the pump then functions normally, the earth wire may be permanently connected.

A bad connection in the pump itself may sometimes be traced to the nut on the terminal inside the cover not being screwed down firmly.

Should these points be found in order but the pump still does not work, the trouble is in the pump itself and the cause will be too much tension on the diaphragm

or blackened contact points, the cause of which is the tensioning of the diaphragm. The remedy is to remove the cover from the contact points and pass a piece of thin card between the points when pressed together, so as to effect the necessary cleaning.

To release the tension of the diaphragm, remove the body from the base of the pump by undoing the small screws which hold these two parts together. The diaphragm itself will then be found to be adhered to the body of the pump from which it will have to be separated. A knife will help in this operation, care being taken to prevent the rollers which support the diaphragm, and act as a bearing, from falling out. The body should then be replaced on to the base and the screws put in loosely, but before finally tightening up it is advisable to stretch the diaphragm to its highest possible position. This is effected by switching on the pump and holding the contact points together while tightening the screws well up. This will effect a permanent cure.

When releasing the tension of the diaphragm care should be taken not to alter the adjustment of the pump by unscrewing the armature, which is the steel plate fixed at the back of the diaphragm. Should the position of this be inadvertently altered it will have to be reset, which is done by screwing the diaphragm and armature into such a position that the contact breaker just throws over without the assistance of the contact blade, which should be held away when being set. When this position has been found, the armature will have to be unscrewed to the extent of two-thirds of a turn, when the cast iron pot may again be fixed to the base as per instructions.

Should a pump work intermittently or not start clicking when switched on in the morning, it is an indication that this trouble is occurring, and it should be given immediate attention to obviate final stoppage on the road.

If the pump becomes noisy in operation it is possible that this is being caused by an air leak on the suction side of the pump or dirty suction valves in the pump due to the presence of some foreign matter.

An air leak can be detected by disconnecting the pipe from the carburetter and allowing the pump to deliver petrol into a can. If the end of the pipe is then submerged in the liquid and any bubbles are seen to come through, it will indicate the presence of an air leak on the suction side of the pump. All unions, olives and pipe fittings between the pump and the petrol tank should be tightened and carefully inspected for fracture.

If no air bubbles are apparent but the pump is not delivering an adequate supply, it may be due to dirty valves. These can easily be removed for inspection and if they are clean, but there is some doubt as to their good condition, they should be replaced with new ones.

Guarantee.—The terms of the guarantee on this pump are precisely the same as that of the car to which it is fitted.



SECTION G

**THE FOUR-SPEED GEAR-
BOX AND CLUTCH**



Removal

Dismantling

Reassembly

Speeds on Gears

Index is on Page 3

Removal of Gearbox.—Having removed the ramp plate as described in the instructions for removing the power unit, proceed thus : drain the gearbox, remove the gearbox lid and propeller shaft tunnel. (On the earlier models the rear flange is bolted behind the heel board of the body so that it cannot be removed completely from the car without lifting the body. This however is unnecessary if both front and rear propeller shaft flanges are disconnected and all details securing the shroud removed, when the shroud can be moved over to one side of the body at the front end sufficiently to permit the removal of the gearbox.) Remove the starter motor, uncouple the clutch control rod at its forward end and let it hang on the clutch pedal, uncouple the propeller shaft at the front end (first refer to special instructions on page 17, Section B). The steering box complete with bracket must be unbolted from the frame and the exhaust pipe between the exhaust manifold and the silencer removed.

A jack or blocks must then be placed under the rear end of the engine, when the four bolts securing the gearbox to the rear engine mounting rubbers can be removed.

The clutch operating lever will then have to be removed from the clutch withdrawal shaft after first drawing out the taper pin. The bolts securing the clutch housing to the flywheel housing can then be removed, when the gearbox complete can be withdrawn.

Dismantling Gearbox.—Remove propeller shaft flange ; before doing so mark the flange in relation to the gearbox primary shaft ; this is best done by marking both flange and primary shaft with a centre punch (see page 17). Also remove the gearbox rear cover and the speedometer driven gear and lift out the rear ball race packing washer, when the various gearbox components can be drawn out backwards in their proper order (refer to Illustrations Nos. 35 and 36) as follows : Remove the grub screws which secure the striking forks to their rods, and draw the selector rods out one at a time, taking care at the last stage of withdrawal to catch the detent and interlocking balls as they are freed. Lift out the selector forks, press down the spring-loaded plunger and turn the splined retaining plate (at rear face of third speed double helical gear), see Illustration No. 37, until the gear is free to move on the mainshaft. Then draw out the mainshaft complete with its rear ball race and chip excluding washers, lifting each gear out in turn as it is freed. Remove the countershaft locking grub screw and withdraw the layshaft, allowing the layshaft gear cluster, complete with its roller races and their spacing sleeve, to drop to the bottom of the box. Remove the reverse shaft locking screw and withdraw the reverse shaft, lifting out the reverse gear cluster as soon as it is freed. Remove the clutch housing complete with the front oil seal and lift out the first motion shaft ball bearing packing washer. Remove the first motion shaft retaining circlip in front of the ball bearing, and press out the first motion shaft. The layshaft gear cluster can then be lifted out from the bottom of the box.

Dismantling the Top and Third Synchromesh Mechanism.—The striking dog for top and third gears is retained on the sliding hub by six balls and springs which are spaced 60° apart and housed in the sliding hub ; therefore, the sliding hub can be pushed out from the striking dog when sufficient effort is applied to overcome the springs.

Reassembly of Gearbox.—The reverse operations to that given for dismantling apply, in fact after the dismantling of the gearbox has been carried out the operator will hardly need to refer to the manual.

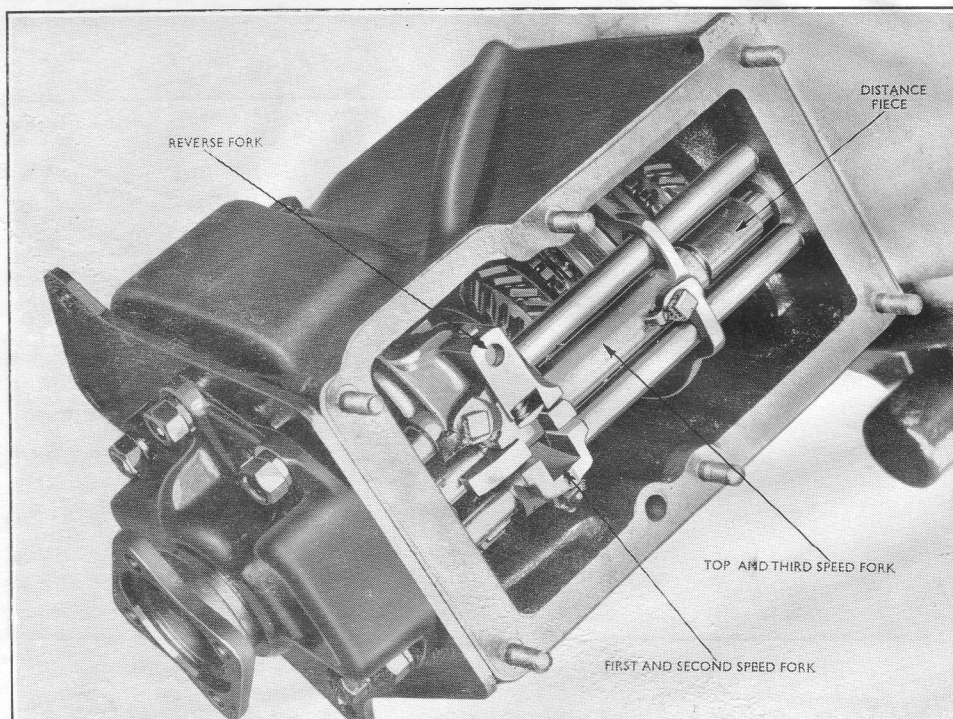


Illustration No. 35.—View of gearbox with remote control housing removed showing selector mechanism.

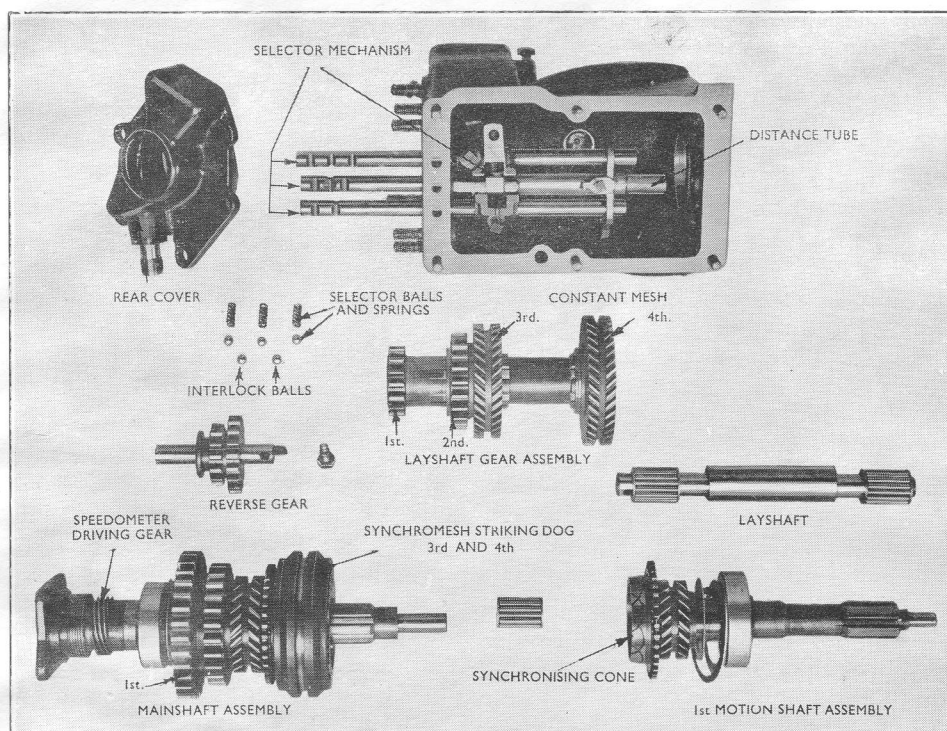


Illustration No. 36.—Gearbox dismantled.

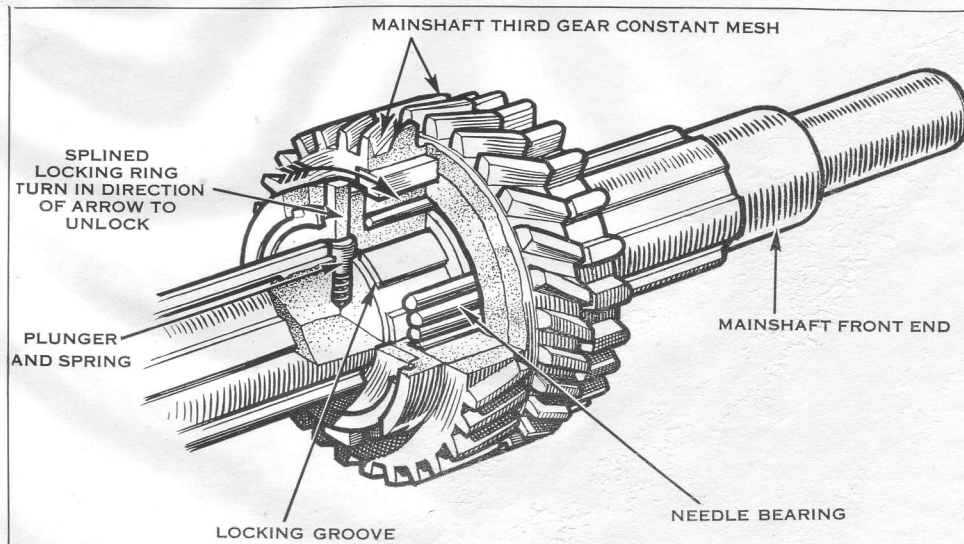


Illustration No. 37.—Third speed constant mesh gear locking device.

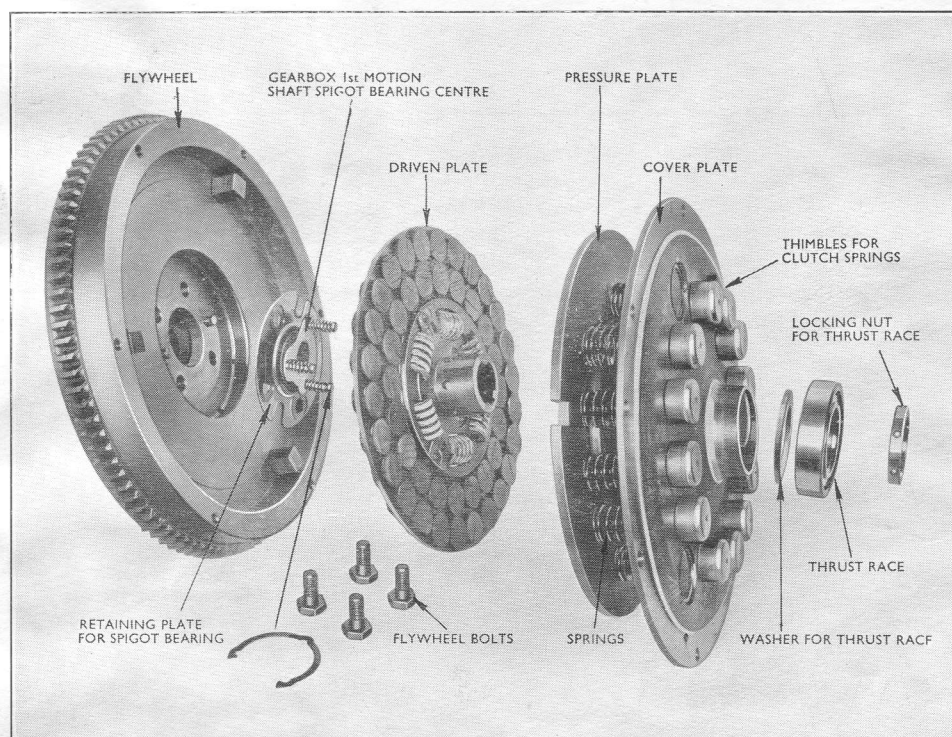


Illustration No. 38.—Clutch dismantled, showing the components in the relative positions.

Reassembly of the Top and Third Synchromesh Mechanism.—The six balls and springs must be fitted in the sliding hub, when the striking dog can be slid over.

No special tool is required to enable the springs and balls to be fitted to the synchromesh mechanism, all that is required is six pieces of steel shim $\frac{3}{8}$ " wide by .015" thick.

The sliding hub is just entered in the striking dog when one spring is fitted into place, and with the aid of one of the pieces of shim the ball is retained in the sliding hub. The shim is then pushed down between the hub and striking dog. After the six balls and springs are held in place in this manner, the sliding hub can be pushed right home, when the balls will click into the indentation ground in the centre of the teeth.

N.B.—Points to remember when reassembling : roller bearings and distance tube to be fitted into layshaft cluster, secure reverse gear shaft by its grub screw, also layshaft, fit plunger and spring into mainshaft, lock the third speed double helical gear by rotating the loose locking plate in its groove in the mainshaft until the plunger engages ; fit three balls and springs underneath the three selector shafts, also one ball between each shaft ; replace propeller shaft flange on mainshaft in original position, refill with lubricant (see Maintenance Chart at end of book).

The Clutch.—Access to the clutch is obtained by removing the gearbox and clutch housing from the flywheel housing (under the heading, "Removal of Gearbox"). The clutch spring plate, the springs and the pressure plate may now be removed as a single unit by undoing the ring of bolts round the outside of the spring plate which secure it to the flywheel. Next remove the "indented C-shaped" circlip from the three studs which project through the cork-faced-driven plate, and lift the driven plate out. (See Illustration No. 38.)

To dismantle the clutch spring plate, the springs and the pressure plate, remove the ring nut from the hub of the pressure plate, when the ball race and washer can be removed, the pressure plate can then be withdrawn from the clutch spring plate. (See Illustration No. 38.)

Adjustment of Clutch Pedal.—It is important that the clutch pedal has 1" minimum free movement before operating the clutch withdrawal mechanism. This is to prevent the clutch thrust race from fouling the operating fork when the cork-lined driven plate wears ; adjustment is at the bottom of the clutch pedal. The maximum pedal travel is controlled by an adjustable stop, and should be so adjusted that the stop comes into contact with the pedal at the same moment the clutch stops spinning.

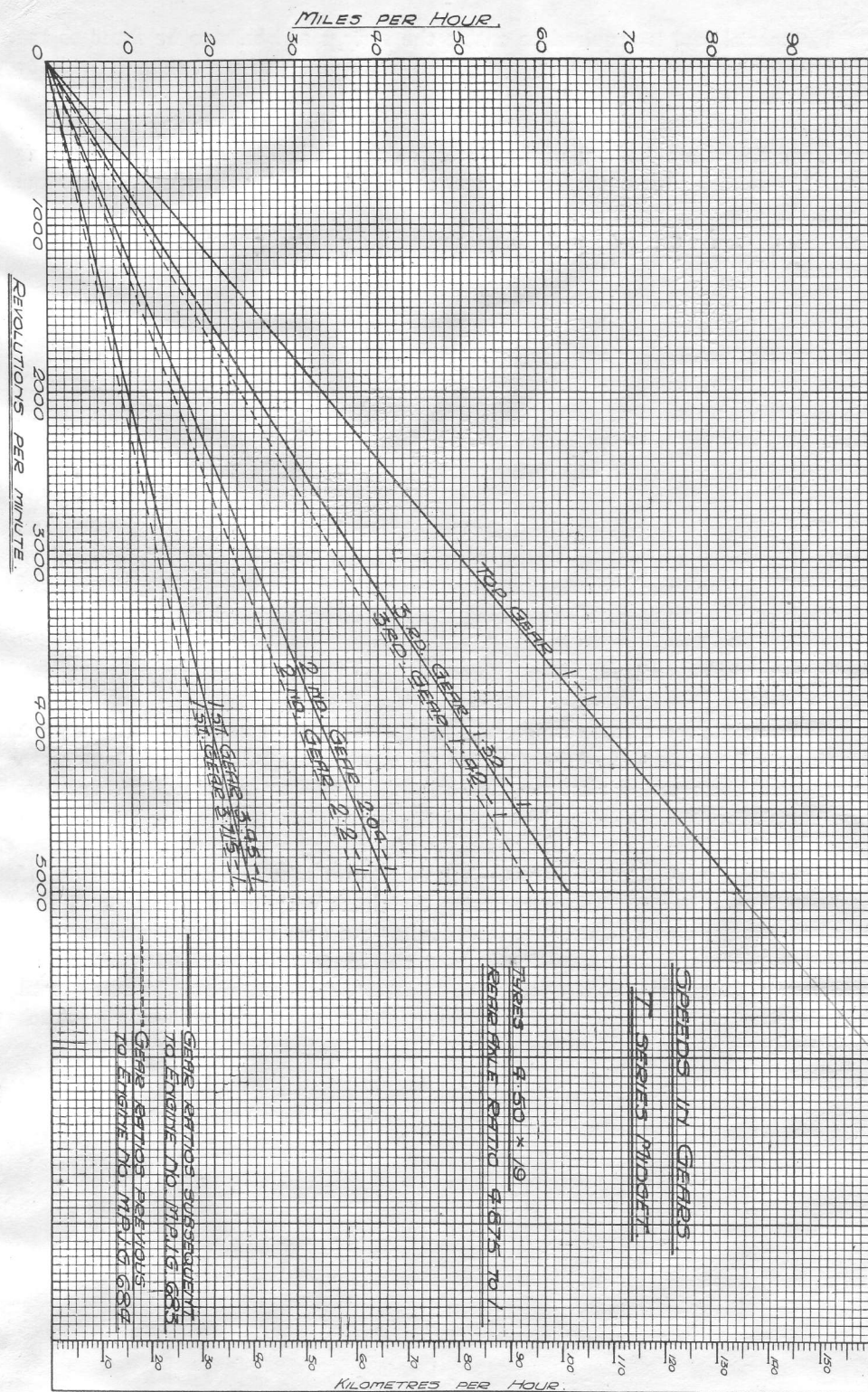


Illustration No. 39.—Chart showing the speeds on each gear and the corresponding engine revolutions.

SECTION H

THE ELECTRICAL AND IGNITION SYSTEMS

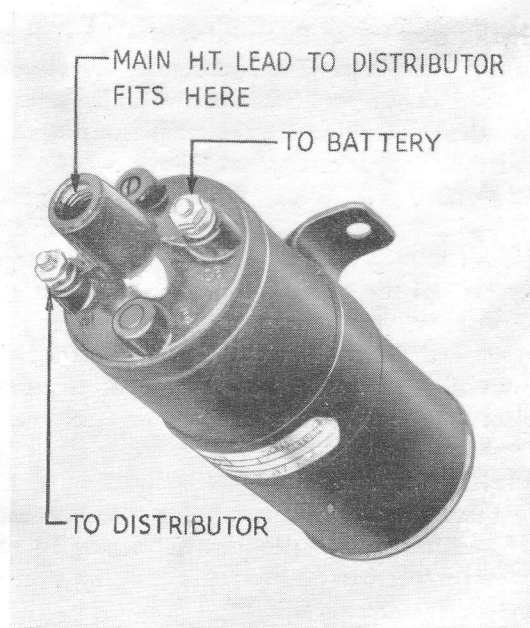


Illustration No. 40.—The ignition coil.

Index is on Page 3

The Batteries.—About once a month unscrew the filler caps and pour a small quantity of distilled water into each of the cells to bring the acid just level with the tops of the separators. This is done to replace acid solution which has been lost by evaporation. If any of the acid solution is spilled it must be replaced by a dilute sulphuric acid solution of the same specific gravity as the electrolyte in the cell to which it is to be added. The batteries must not be allowed to remain with the plates uncovered as they will suffer a chemical change and be irretrievably damaged.

Keep the Terminals and Battery Fixing Bolts Clean and Tight and Smeared with Vaseline.—A smearing of vaseline protects the terminals and fixing bolts from the corrosive action of the acid, which, if allowed to continue, will eventually result in trouble. When inspecting the batteries, put a spanner on the bolt securing the cable end to the chassis in order to make sure that it is quite tight.

Keep the Outside of the Batteries Clean and Dry, particularly the Tops of the Cells.—Water and dirt form a conductor of electricity and if such a path is allowed to form between the positive and negative terminals of the battery or between the negative battery terminal and the chassis, there will be a leakage of current which will eventually cause the battery to run down. Give the cell tops a wipe over regularly and you will avoid this.

Occasionally make a point of Examining the Health of your Batteries by taking Hydrometer Readings.—The hydrometer allows you to take a sample of the acid solution. It contains a graduated float which indicates the specific gravity of the acid solution in the cell from which the sample was taken.

The readings and their indications are as follows :—

1.250—1.300	...	...	Battery fully charged.
1.150—1.250	...	...	Battery about half discharged.
Below 1.150	...	...	Battery fully discharged.

The readings for each of the cells should be approximately the same. If one cell gives a very different reading from the rest it may be that acid has been spilled or has leaked from this particular cell, or there may be a short circuit between the plates. In this case we advise the owner to have his battery examined by a Lucas Service Depot—neglect may mean costly repairs later on.

It must be remembered that you cannot get more energy out of a battery than is put in. If the car is left parked at night with the lights on, or if the starter motor is used excessively with very little daytime running, then the battery may get into a low state of charge—particularly in Winter. This may be remedied either by running the car for longer periods during daytime or by economising in the use of the headlamps and other accessories.

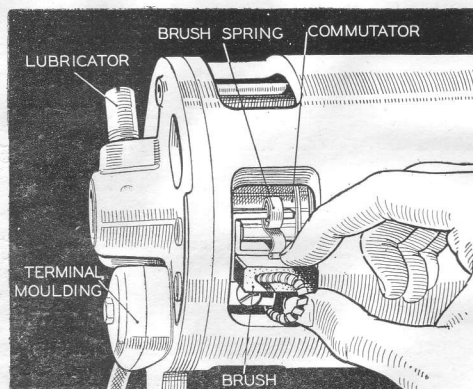
Never leave the Batteries in a Discharged Condition for any length of time.—If the car is to be out of use for any length of time, see that the batteries are fully charged and about every fortnight give them a short refreshing charge to prevent any tendency to permanent sulphation of the plates.

The Dynamo (Lubrication).—All dynamos are sent out from the Works with the bearings packed with grease. This lasts until the car is taken down for a general overhaul, when it is advisable to have the machine dismantled, preferably by a Lucas Service Depot, for cleaning and adjustment and repacking the bearings with grease.

The dynamo is provided with oilers to enable you to give it a little additional lubrication. The oilers should be given several drops of good quality engine oil every 1000 miles. It is of the utmost importance that the oiler on top of the lubricator shown in Illustration No. 41 receives special attention or this bearing will run dry.

Inspection of Commutator and Brushgear.—About once a season remove the metal cover from the dynamo for inspection of the commutator and the carbon contacts, or brushes as they are called. Take care not to lose the nut when removing the cover fixing screw, as the cover is liable to spring open when the screw is released.

Illustration No. 41. — Removing the brushes.



It is essential that the brushes make good firm contact with the commutator. The brushes are held in boxes by means of springs. Hold back the spring, and at the same time move the brush to see that it is free to slide in its holder. If there are any signs of sticking, remove it from its box and clean it with a cloth moistened with petrol.

After removing brushes for cleaning or any other purpose, care must be taken to replace them in their original positions, otherwise they will not "bed" properly on the commutator.

If, after long service, the brushes have become worn to such an extent that they will not "bed" properly on the commutator, they should be replaced. Always fit genuine Lucas brushes, as these are made specifically for work on our machines and will give far the best results and the longest life. We advise you to have the brushes fitted at a Lucas Service Depot, so that they can be properly "bedded" to the commutator.

Next examine the commutator. It should be clean and free from any trace of oil or dirt, and should have a highly polished appearance. The best way to clean a dirty or blackened commutator is by pressing against it a fine dry duster and getting someone to turn the engine over slowly by hand. If the commutator is very dirty, the duster may be moistened with petrol.

Dynamo Field Fuse.—A fuse is provided in the dynamo field circuit and will blow in the event of anything being wrong in the charging circuit, e.g. the battery becoming disconnected from the dynamo due to broken wiring or a loose connection. The fuse is located in the cut-out and fuse unit on the engine side of the dash.

Dynamo Output.—The dynamo output is accurately set before leaving the Works to suit the requirements of the equipment fitted on your car, and in normal service the battery will be kept in good condition. If very special running conditions are encountered, however, you may find that the battery is not kept in a charged condition, or is being excessively overcharged; in which case we advise you to consult your nearest Lucas Service Depot, where any necessary adjustments can be made.

Ammeter Readings.—The ammeter, which forms one of the instruments on the dash, indicates the amount of current passing into or out of the battery. For instance, suppose the dynamo is generating 7 amperes at a particular speed and that some of the lamps are in use, taking, together with the ignition coil, say 5 amperes, then 2 amperes are left for charging the battery—this is the reading given on the ammeter.

The Cut-out—an Automatic Dynamo Switch.—It will be noticed from the ammeter readings that the dynamo does not charge at very low engine speeds. This is because it is not rotating fast enough to generate sufficient energy to charge the battery.

Connected between the dynamo and the battery is the cut-out—an automatic switch which acts as a “valve” allowing the flow of current from the dynamo to the battery only. It closes when the dynamo is running fast enough to charge the battery, and opens when the speed is low or the engine is stationary, thus preventing current from flowing from the battery through the dynamo windings.

The cut-out is located along with the fuses on the engine side of the dash.

The Starter. When Starting.—Observe the following points when starting the engine :—

- (i) Operate the starter switch firmly, and, of course, release it as soon as the engine fires.
- (ii) Never operate the starter when the engine is running. If the engine will not fire at once, allow it to come to rest before pressing the switch again.
- (iii) Do not run the battery down by keeping the starter on when the engine will not start.
- (iv) In cold weather, starting will be facilitated by giving the engine a few turns by the starting handle before using the starter.

Attention needed by the Starter.—Give the commutator and brush gear similar attention to that described for the dynamo.

Occasionally, if dirty, wash over the screwed sleeve on the armature spindle with paraffin and afterwards give it the merest trace of thin machine oil.

Instrument Panel.—The instrument panel houses the combined lighting, charging and ignition switch, ammeter, starter switch control, etc.

How to Use the Charging Switch.—This switch has two positions—“High Charge” and “Low Charge.” The dynamo is arranged to give its maximum output whenever the headlamps are switched on. For cars running under average conditions, keep the switch in the “High Charge” position during Winter, and in the “Low Charge” position during Summer.

In some cases, where exceptional use is made of the lamps and starter in the Summer, causing the battery to be in a low state of charge (hydrometer readings of 1.200 or under), run with the charging switch in the “High Charge” position. On the other hand, if in Winter the car is run regularly during the day, with practically no night running, and the hydrometer readings are always found to be about 1.285, and if the acid level gets unusually low, then it is probable that the battery is being overcharged. In these circumstances, move the charging switch to the “Low Charge” position.

What to do if the Battery does not keep in a Charged Condition.—If the battery is found to be in a half discharged or low state of charge, the charging switch should, if possible, be left in the “High Charge” position for longer periods of running. It should be remembered that the battery will be helped to regain its normal condition if its load is temporarily lessened, as, for instance, by using the side instead of the headlamps. If the condition of the battery does not improve in a reasonable time, it is advisable to have the battery inspected at a Lucas Service Depot.

The battery must never be left in a fully discharged condition, and unless some long runs are to be taken, it is advisable to have the battery charged up from an independent electrical supply.

To Owners of New Cars.—If you have just taken delivery of a new car, we advise you to keep the switch in the “High Charge” position all the time during the running-in period, in order to compensate for the heavy load of the starter motor due to the initial stiffness of the engine.

Cut-out and Fuse Unit.—This unit houses the cut-out and six fuses, and forms a junction box for distributing the cables to the various accessories.

The fuses incorporated in this unit protect the dynamo, the head, side and tail-lamps, the electric horn and the auxiliary accessories (such as the wiper).

A blown fuse will be indicated by the failure of all the units protected by it, and is confirmed by examination of the fuse. If it has blown, the broken ends of the wire will be visible inside the glass tube. Before replacing a blown fuse, inspect the wiring of the units that have failed for evidence of short circuits or other faults that may have caused the fuse to blow, and remedy.

Spare fuses are provided, and it is important to use only the correct replacement fuse—the fusing value is marked on a coloured paper slip inside the glass tube.

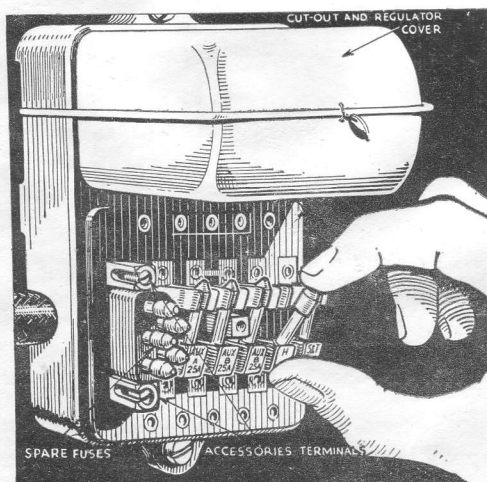


Illustration No. 42.—Cut-out, fuse and junction box.

Lamps. Headlamps.—Removing Lamp Front and Reflector.—To remove the lamp front, slacken the single securing screw and move it downwards from the slot in which it fits. When replacing the front locate the top of the rim first, then press on the bottom and tighten the fixing screw. See Illustration No. 43.

To remove the reflector, turn back the ends of the cork washer at the top of the rim and remove the screw opposite the medallion in the top of the lamp. Turn reflector until markings "O" stamped on the reflector rim and lamp body coincide. The reflector can then be withdrawn. When replacing reflector engage it with the lamp body, then turn it until the screw hole in its rim is opposite to the screw hole on top of lamp body. Secure reflector by means of screw.

Checking the Alignment.—The simplest way of checking the adjustment of the lamps is to take the car on a straight level stretch of road at night and examine the direction of the beams. They should be parallel with the road and with each other. If one appears to be out of alignment, adjust it as follows:—Slacken the single fixing nut at the base of the lamp under the wing and move the lamp on its universal mounting to the required position, finally locking the adjustment by tightening the fixing nut.

Focussing.—For the lamps to give a parallel beam, the filament of the bulb must coincide as nearly as possible with the focal point of the reflector. If the filament of the bulb is behind the focal point of the reflector, the beam will be divergent, while on the other hand, if the filament is in front of the focal point, the beam will be convergent, with a dark area in the centre of the beam. In either case, the lamps will have a poor range and will cause unnecessary dazzle to approaching traffic.

Before lamps are dispatched from the Works, the bulbs are carefully focussed to give the best results. Provided that official Lucas bulbs are fitted as replacements, it should not be necessary to disturb the setting. If for any reason these are not obtainable, and ordinary bulbs have to be fitted, it may be necessary to refocus by moving the bulb backwards or forwards along the axis of the reflector until the best lighting is obtained.

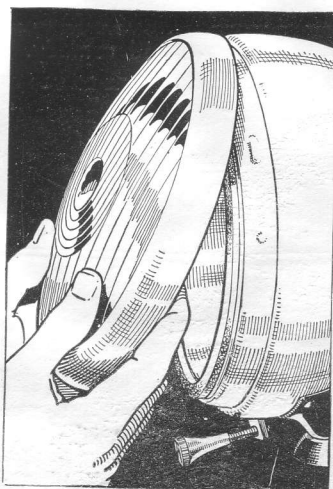


Illustration No. 43.—Showing method of removing headlamp front.

Cover up one lamp while testing the other. If the lamp does not give a uniform long-range beam without any dark centre, the bulb needs adjusting. To do this remove the front and reflector, and slacken the clamping clip at the back of the reflector.

After each adjustment, note the effect with the reflector and front refitted.

When the best position for the bulb holder has been found, see that the clamping screw is tightened.

Sidelamps.—The front of the lamp is removed for bulb replacement when the screw at the top of the lamp is withdrawn. When refitting the front, locate the bottom and secure with the screw.

Stop Tail-lamp.—The lamp front can be removed when the securing screw is withdrawn.

Foglamp.—To remove the lamp front withdraw the screw from the fixing id, which can then be sprung off the lamp. Remove rubber band and lift off np glass. To withdraw the bulb, it is first necessary to remove the shield. The amp can be focussed in the same manner as that described for the headlamps.

Replacement of Bulbs.—When the replacement of a bulb is necessary, it is important not only that the same size bulb is fitted, but that it has a high efficiency and will focus in the reflector. Cheap and inferior replacement bulbs often have the filament of such a shape that it is impossible to focus correctly ; for example, the filament may be to one side of the axis of the bulb, resulting in loss of range and light efficiency.

It always pays you to use Lucas Genuine Spare Bulbs as then these problems will not arise.

Bulbs Fitted.—

Headlamps	...	...	...	Lucas No. 54	12-v. 36 watt
Sidelamps	...	...	...	Lucas No. 207	12-v. 6 watt
Stop tail-lamp	...	...	...	Lucas No. 207	12-v. 6 watt
Foglamp	...	...	...	Lucas No. 2	12-v. 36 watt
Dashlamps	...	...	...	Lucas No. 1224MES	12-v. 2.4 watt
Map lamp	...	...	...	Lucas No. 207	12-v. 6 watt
30 m.p.h. warning light	...	...	...	Lucas No. 207	12-v. 6 watt
Ignition warning light	...	...	...	Lucas No. 252MES	2.5-v. (.2 amp.)
Trafficators (if fitted) (festoon)	...	...	...	Lucas No. 254	12-v. 6 watt

Windscreen Wiper.—The windscreen wiper is carefully adjusted and packed with grease during assembly, and needs no attention.

To start the wiper, pull out the metal handle and turn to disengage it from the switch. Then move the switch to the "on" position. To stop the wiper move the switch to the "off" position, pull out the handle to disengage wiper blade from the gears, and turn end of handle into top of switch control.

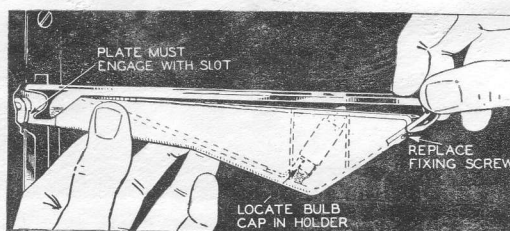


Illustration No. 44.—Replacing "Trafficator" bulb.

Trafficators (if fitted).—Every two to three months, or if the arms become stiff at any time, raise each arm, and by means of a brush, matchstick or similar article apply a drop of thin machine oil, such as sewing machine oil, to the catch pin between the arm and the operating mechanism. Use only the merest drop of oil—any excess may affect the working of the operating mechanism. The "Trafficators" are kept in the closed position by means of a spring. The arms can be pulled out by hand. If any difficulty is experienced, switch the "Trafficator" on and then, supporting the arm in a horizontal position, move the switch to the "off" position.

If at any time the arm fails to light up when in operation, raise the arm in the manner previously described and examine the bulb. If necessary, replace the bulb by a Lucas No. 254 (6 watt festoon type) bulb.

Electric Horn.—The horn will give a long period of service without any attention ; no adjustment is required.

Should the horn become uncertain in its action, giving only a choking sound, or cease to vibrate, it does not follow that the horn has broken down. First ascertain that the trouble is not due to some outside source, e.g. a discharged battery, a loose connection or short circuit in the wiring of the horn, or a blown fuse. It is also possible that the performance of a horn may be upset by the horn becoming loose on its mounting.

If the cause of the trouble cannot be found, do not attempt to dismantle the horn, but return it to a Lucas Service Depot for examination.

Coil Ignition Equipment.—Considering the exacting duties coil ignition has to perform, the attention needed to ensure absolutely reliable service is very small.

After the first 500 miles' running it is usual for the car to be taken to a service station to have various minor adjustments made to the engine. As most of the bedding down of the contacts occurs during this period, at the same time the contact breaker gap of the distributor should be checked and, if necessary, reset to .012" maximum opening, and the cam must be given a smear of engine oil.

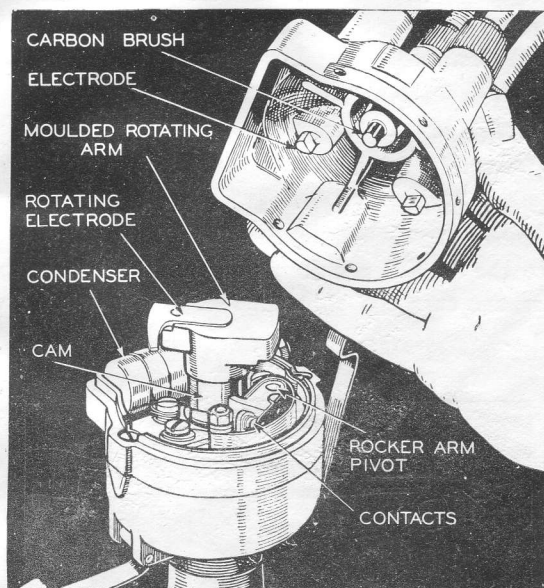


Illustration No. 45.—The distributor with cover removed.

Lubrication.—The following parts of the distributor require lubrication :—

1. *Distributor Shaft* : Add a few drops of thin machine oil through oiler provided about every 1000 miles.

2. *Cam* : After the first 500 miles, give the cam a smear of engine oil every 3000 miles.

3. *Cam Bearing* : About every 3000 miles, withdraw the moulded rotating arm from the top of the spindle by pulling it off, and add a few drops of thin machine oil. Do not remove the screw exposed to view, as there is a clearance between the screw and the inner face of the spindle through which the oil passes to lubricate the cam bearing. Take care to refit the arm correctly and to push it on to the shaft as far as possible, otherwise there is a risk of tracking and burning of the moulding.

4. *Contact Breaker Pivot* : Every 5000 miles place a spot of oil on the pivot on which the contact breaker rocker-arm works.

5. *Automatic Advance Mechanism* : About once every year the moving parts of the automatic timing control must be lubricated with a good grade engine oil. To render the control accessible, remove the distributor moulding and lift off the rotating distributor arm, then remove the contact breaker moulding by withdrawing its two securing screws.

Cleaning.—Keep the outside of the distributor clean, particularly the spaces between the high-tension terminals. Very occasionally remove the moulding by springing aside its two securing spring clips. Wipe the inside clean with a dry cloth, and see that the carbon brush is quite free in its holder. Clean the metal electrodes inside the moulding and also the rotating electrode on the distributor arm ; if necessary, use a cloth moistened with a drop of petrol for this.

Next, examine the contact breaker ; you must keep the contacts free from any grease or oil. If they are burned or blackened, clean them with fine carborundum stone, or, if this is not available, you can use very fine emery cloth. Finish off with a cloth moistened with petrol, and remove all traces of dirt and metal dust. Mis-firing is sometimes caused by dirty contacts.

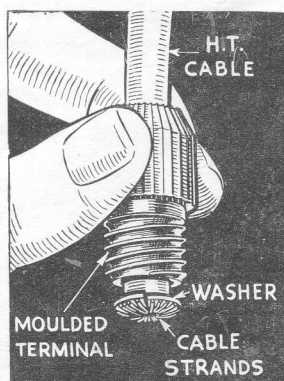
Checking and Adjusting the Contacts.—After the contacts are reset at the end of 500 miles' running they require only occasional adjustment. The chief cause of variation in the gap is wear of the heel of the contact rocker-arm which bears upon the actuating cam. Provided you keep the cam smeared with engine oil, however (see Lubrication Instructions on previous page), the wear on the heel will be negligible and the contact gap setting should only require adjustment at infrequent intervals.

To check the setting turn the engine by hand until the contacts are fully opened. Now insert the gauge provided on the ignition screwdriver between the contacts. The gauge has a thickness of about 12 thousandths of an inch and it should be a sliding fit between the contacts when the gap is correct. We do not advise you to alter the setting unless there is quite an appreciable variation from the gauge. To make the adjustment keep the engine in the position to give maximum opening of the contacts and slacken the two screws securing the contact plate. Then move the plate until the gap is set to the thickness of the gauge. After making the adjustment care must be taken to tighten the locking screws.

Renewing the High-tension Cable.—The high-tension cables are those connecting the coil to the distributor and the distributor to the sparking plugs. When these cables show signs of perishing or cracking they must be replaced by 7 mm. rubber-covered ignition cable.

The method of connecting the cable is to thread the knurled moulded nut over the lead, bare the end of the cable for about $\frac{1}{4}$ " , thread the wire through the brass washer provided and bend back the strands. Finally screw the nut into its respective terminal.

Illustration No. 46.—



Showing method of fixing lead to H.T. terminal of distributor.

The Coil.—The coil requires no attention whatever beyond keeping its exterior clean, particularly between the terminals, and occasionally checking that the terminal connections are quite tight.

Ignition Switch and Warning Light.—The ignition switch, besides forming a means of stopping the engine, is provided for the purpose of preventing the battery being discharged by the current flowing through the coil windings when the engine is stopped. A warning lamp is usually provided in the instrument panel which gives a red light when the ignition is switched on and the car is running very slowly or is stationary, thus reminding you to switch off.

Should the warning lamp bulb burn out, this will not in any way affect the ignition system, but you should replace it as soon as possible in order to safeguard your battery. The bulb used is a No. 252MES.

Micrometer Timing Adjustment.—In order to obtain very fine timing of the ignition to the engine and to allow for altered engine conditions, e.g. state of carbonisation of engine, change of fuel, etc., a micrometer adjustment is provided which allows fine adjustment to be made simply by the movement of a knurled knob.

With a clean engine, and using first grade fuel, the micrometer scale should be at "0" before timing.

The final setting can be made by use of the micrometer adjustment after running the engine. If the firing is found to be slightly too early or too late, adjust the knurled knob until the best engine performance is obtained. The adjustment should not be altered by more than one distributor degree at a time (one division on the scale is equivalent to two distributor degrees or 4° on the crankshaft).

The Wiring System.—Apart from the starter motor, which is a heavy gauge circuit complete in itself, there are twenty-two places where current, either from the battery or from the dynamo, is used. These may be divided into four groups :

1. Those which can be used independently of the ignition switch and are protected by fuses. They are :—
 - The two headlamps.
 - The dipping solenoid.
 - The two sidelamps.
 - The tail-lamp.
 - The stop light.
2. Those which are automatically switched on with the ignition and have no fuse protection. They are :—
 - The ignition.
 - The ignition warning light.
 - The petrol pump.
3. Those which have separate controls, but which can only be used when the ignition is switched on. They are all protected by a fuse, and are :—
 - The horn.
 - The windscreen wiper.
 - The 30 m.p.h. warning lamp (see Section J for export).
 - The foglamp.
 - The map reading lamp.
 - The six panel lamps.
4. The inspection posts are a distinct circuit of their own, as they (apart from the starter motor) constitute the only circuit through which the current can flow without passing through the ammeter.

In addition there are three distinct field circuits, making a total of twenty-six separate electrical circuits for the whole car.

The current leaves the battery negative terminal by the starter wire and returns to the positive terminal by the frame (earth) and earth connection.

These two wires are the only battery connections, excluding of course the loop between the batteries, and the negative wire to the starter carries all current so far. From there it is picked up by a yellow and black wire which goes to the ammeter.

These two wires and the ammeter are the main current connection, along which the current flows one way when the battery is supplying it, and the other way when the dynamo is charging the battery.

When the battery is supplying current it passes through the ammeter and is divided into two channels formed by the two white and purple wires attached to the ammeter output terminal.

One of these wires takes current to the terminal "A" on the back of the switch body (see Illustration No. 47) to serve Groups 1 (with the exception of the stop light), 2 and 3. On early models this wire fed the panel light switch direct, another wire being looped from the panel light switch to the terminal "A" on the back of the switch body.

The other wire goes to the terminal "A" or "A1" on the back of the cut-out box and serves a double purpose.

- (i) It is connected through the fuse marked "AUX.A" to the terminal "A.2" of the cut-out box to serve the stop light, and
- (ii) It is the path by which current flows in the opposite direction when the dynamo is working.

The stop lamp is the only member of Group 1 which is supplied through the fuse "AUX.A," but if it is desired to fit any extra electrical fittings which can be used when the ignition is off and which are fuse protected (in other words, to fit the car with additional members of Group 1) it is to this terminal "A2" of the cut-out box that they should be connected.

The stop lamp circuit is continued by a purple wire from the terminal "A.2" to the one of the terminals (it does not matter which) of the stop lamp switch, which is bolted to the chassis side member just level with the front edge of the dashboard and, when the brake pedal is applied, by a purple and black wire to the stop lamp, where it is completed through the lamp filament to the lamp body, and so to the rear ends of the chassis side members.

When the dynamo is supplying current it comes from the terminal "D" (on the dynamo) by the yellow wire, to the terminal "D" on the cut-out box, and through the cut-out to the terminal "A" on the cut-out box, where it is divided into two channels.

- (i) Through the fuse "AUX.A" to terminal "A.2" to serve the stop light, through the same circuit as previously described, and
- (ii) along the white and purple wire to the output terminal of the ammeter, where it is again split into two channels :
 - (i) By the white and purple wire leading from the output terminal to terminal "A" on the back of the switch body serving Groups 1 (with the exception of the stop lamp), 2 and 3, previously described as one of the channels through which the battery supplies the system.
 - (ii) Through the ammeter to charge the battery.

It will be seen, therefore, that this output terminal of the ammeter, and therefore also the terminal "A" on the back of the switch body, is constantly supplied with current, whether this current is coming through the ammeter from the battery or through the cut-out from the dynamo.

When the ignition switch is turned on, the current which arrived at this terminal "A" goes to the centre terminal (marked "IG") on the back of the switch body, see Illustration No. 47.

There are two white wires attached to this terminal "IG," a short one to the ignition warning light, and another to terminal "A.3" on the cut-out box (it does not matter which, as they are connected by a brass strip).

If the dynamo is not charging, the current can flow through the ignition warning light, thence through a yellow wire to the terminal "D" on the back of the switch body (see Illustration No. 47) and thence by another yellow wire to the terminal "D" on the cut-out box, thence through the yellow wire (by which the dynamo would feed the cut-out if it were charging) to the dynamo brushes and so to earth.

As soon as the dynamo starts to work it begins to oppose this direction of current flow, and by the time it has reached its charging speed, there is an equal voltage on each side of the warning light and so no current passes.

The second white wire which connects the terminal "IG" to the terminal "A.3" on the cut-out box carries all the current (with the exception of the ignition warning light) required for Groups 2 and 3.

Group 2, except the ignition warning light, is served by two white wires attached to the other terminal "A.3" (see Illustration No. 42), one of which takes the current to the terminal "SW" of the coil, from which it passes through the primary winding of the coil out through terminal "CB," thence by a white and brown wire to the contact breaker, and so through the points, when they are closed, to earth.

The other white wire takes current to the terminal marked "12V" on the petrol pump. The current goes through the pump to the terminal on the iron body, and is then taken by a black wire to the terminal "E" on the cut-out box. This terminal "E" is connected by a black wire to a frame bracket (which is also a support for part of the Lockheed brake piping, and is situated under the floorboards just about the passenger's heels), and so serves as a combined earth to all the circuits (of which this is one, and others will be mentioned later) which it is most convenient to finish this way.

The terminals "A.3" are connected through the fuses marked "AUX.B" to the terminals "A.4" and from these terminals the members of Group 3 are served.

The red wire of the twin cable in the black casing which feeds the windscreen wiper is attached to that terminal "A.4" which is nearest the front of the car. The windscreen wiper is thus protected by that "AUX.B" fuse which is nearest the bundle of spare fuses.

The other "AUX.B" fuse protects all the other members of Group 3 and the current which flows through it is picked up by two purple and black wires from the other terminal "A.4."

One of these wires goes to the horn, from which the circuit is continued by a yellow and purple wire to one of the junction posts in the cut-out box, thence by the yellow and purple wire of the triple cable in the glazed black casing to the horn button, and completed (when the button is pressed) by a short piece of green and black wire to the instrument panel which, in turn, is connected by the green and black wire of the triple cable in the glazed black casing to the terminal "E" in the cut-out box (on later models these two wires are black, as shown in the diagram), which is earthed as already described.

The other purple and black wire from the "A.4" terminal of the junction box goes to one of the terminals (it does not matter which) of the fog lamp switch. This terminal acts as a junction post.

- (i) When the fog lamp is switched on, the current is carried by a red and yellow wire to the lamp, and the circuit is completed through the filament to the lamp body to the frame (earth).
- (ii) By a purple and black wire to a terminal (it does not matter which) of the instrument panel light switch (on early models this switch was fed by a white and purple wire direct from the output terminal of the ammeter), and (when this switch is on) through the two looped blue wires to the six panel lamps, and these circuits are completed through the lamp filaments and the looped black wires to the same inspection post and earth return already described.
- (iii) By a plain rubber-covered wire (on later models this wire is white and purple and not purple and black as in diagram) to the map reading lamp, and when the lamp is switched on, this circuit is continued through the filament to the lamp body, where the current is picked up by a black wire which leads it to the longer of the two inspection posts, which is in electrical contact with the instrument panel, so that the circuit is completed by the same earth connection that serves the horn. This wire can also be placed in the same terminal of the panel light switch which is fed by the purple and black wire from the foglamp switch.

- (iv) By another plain rubber-covered wire (on later models this wire is white and purple) from the same terminal of the panel light switch which is fed by the purple and black wire from the foglamp switch to the 30 m.p.h. warning light ; this circuit is continued (if the warning light is switched on) by a red and blue wire to the speedometer, and completed between 25 and 30 m.p.h. through the speedometer body to earth by way of the speedometer driving cable.

In order that the dynamo may work, the field coils must be magnetised by passing a current through them, and the amount of this field current governs the amount of charge the dynamo will produce.

Before the dynamo starts charging, the current which passes through the ignition warning light is used to energise the field coils on its way to earth, and so to help the dynamo to get started, but as soon as the dynamo gets going, part of the current which it produces is led back through the yellow and green wire to terminal "F.2" on the dynamo.

On the Series "T" Midget three different dynamo charging rates are provided, obtained by varying the resistance in the circuit which supplies the current to the field coils.

- (i) When the switch is turned to "Low," current is led from terminal "D" in the cut-out box through a resistance in the back of the box to terminal "F.1," and thence through another resistance in the box to the field fuse (the small yellow fuse, situate horizontally above the others) and thence to terminal "F.2," where it is picked up by the yellow and green wire already mentioned.
- (ii) When the switch is turned to "High" or "Side" the current is led by a yellow wire from terminal "D" of the cut-out box to terminal "D" on the back of the switch body, which is now (by turning off the switch) put into contact with terminal "F.1" on the back of the switch body, whence the current is led by a green wire to terminal "F.1" on the cut-out box, whence it follows the second half of the low charging circuit—thus there is half the resistance opposed to the flow of field current, and the dynamo output is increased from 6 to 7 amps.
- (iii) When the switch is turned to "Head" the terminal "D" on the back of the switch body is put into contact with the terminal "F.2" on the back of the switch body, so the path of the field current now becomes : along the yellow wire from terminal "D" in the cut-out box to terminal "D" on the switch body, thence by a yellow and green wire to terminal "F.2" on the cut-out box, thence by the yellow and green wire which completes the other field circuits.

It will thus be seen that when this circuit is in use, both the resistance and the field fuse are cut out, so that the dynamo must charge at its maximum capacity, whether the field fuse is intact or not, whenever the headlamps are switched on.

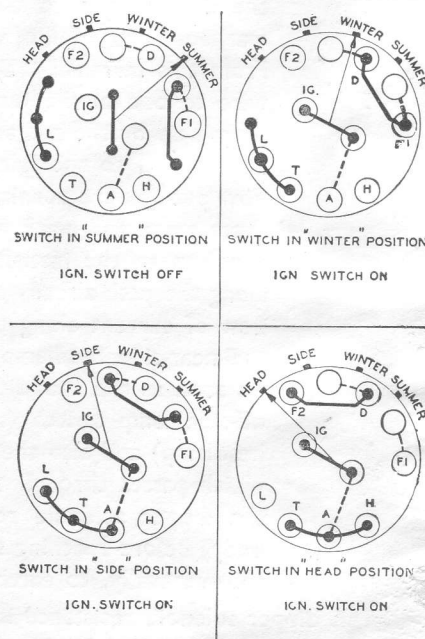


Illustration No. 47.—Internal connections of the lamp switch.

It now only remains to describe the supply of current to those members of Group I not already dealt with—that is to say, the lights controlled by the head and sidelamp switch (see Illustration No. 47) on the instrument panel.

It has already been shown how the current supplied either by the dynamo or the battery arrives at the terminal "A" on the back of the switch body (through a white and purple wire from the output terminal of the ammeter).

When the sidelamps are switched on this terminal "A" is brought into connection with terminal "T," to which a red and white wire is attached. This wire runs to one of the terminals "S" on the cut-out box, thence the current is carried through the fuse marked "S & T" to the other terminal "S" on the cut-out box, where it is picked up by three red wires, one for each sidelamp, and the third for the tail-lamp.

Each of these three circuits is completed through the lamp filament to the lamp body and so to the frame (earth).

When the headlamps are switched on, the terminal "A" on the switch body is put into connection with the terminal "H" as well as the terminal "T." Current is taken from this terminal "H" by a blue and white wire to one of the terminals "H" on the cut-out box, thence through the fuse marked "H" to the other terminal "H" on the cut-out box, thence by a blue wire to terminal "A.1" inside the near-side lamp body, where it is split into two courses:—

- (i) Through the near-side headlamp filament to the lamp body and so to the frame (earth).
- (ii) Along a choice of three paths, according to whether the headlamps are (a) full on, (b) in the act of dipping, (c) dipped:
 - (a) When the dipper switch is at "H" the current passes through the off-side lamp switch, which is inside the near-side headlamp, to the terminal marked "Lamp," where it is picked up by a yellow and blue wire which takes it to the off-side headlamp, where the circuit is completed through the filament to the lamp body, and so to the frame (earth).
 - (b) When the dipper switch is turned to "D," current (as well as going to the off-side headlamp) also passes through the dipper solenoid, the dipper solenoid contacts, and the dipper fuse to the terminal marked "Dip" (all of which are inside the near-side headlamp body). From this terminal "Dip" the current is taken by a red and black wire to one of the junction posts on the cut-out box, where it is picked up by the red and black wire in the triple glazed black casing and carried to the fulcrum terminal of the dipper switch, which is now put (by the turning of the dipper switch) into contact with the short green and black wire (on later models this wire is black) which connects to the instrument panel, whence the circuit is completed along the path already described as completing the horn circuit. The flow of current along this path magnetises the solenoid and so dips the near-side headlamp reflector.
 - (c) As soon as the near-side headlamp reflector is dipped, it breaks the off-side lamp switch (so that no current now goes to the off-side headlamp) and also the dipper solenoid contacts, so that the current which passes through the dipper solenoid now has to pass through the dipper solenoid resistance (also inside the near-side headlamp body) before reaching the dipper fuse, and the terminal "Dip," and so, eventually, to earth by the route described above.

This dipper solenoid resistance is so proportioned that the current which now flows through the dipper solenoid, instead of being enough to pull the lamp reflector down, is now only enough to hold it in its dipped position.

When the dipper switch is turned back to "H" the connection between the red and black and the green and black (the latter is black on later models) wires is broken, so that no current can now flow through the dipper solenoid, which consequently loses its magnetism, with the result that the reflector springs back to its undipped position, and in doing so switches on the off-side headlamp.

The inspection posts circuit is started by a short length of yellow and black wire from the input terminal of the ammeter to the shorter of the two posts, and completed (through whatever is plugged into the posts) by the same earth circuit that serves the panel lights.

N.B.—All the wires in the circuits are described by colours ; where these wires are braided the braiding is woven in colours, but where the wires have coloured rubber coverings and a duo colouring is required, the covering is one colour only and a thimble of another colour is threaded on.

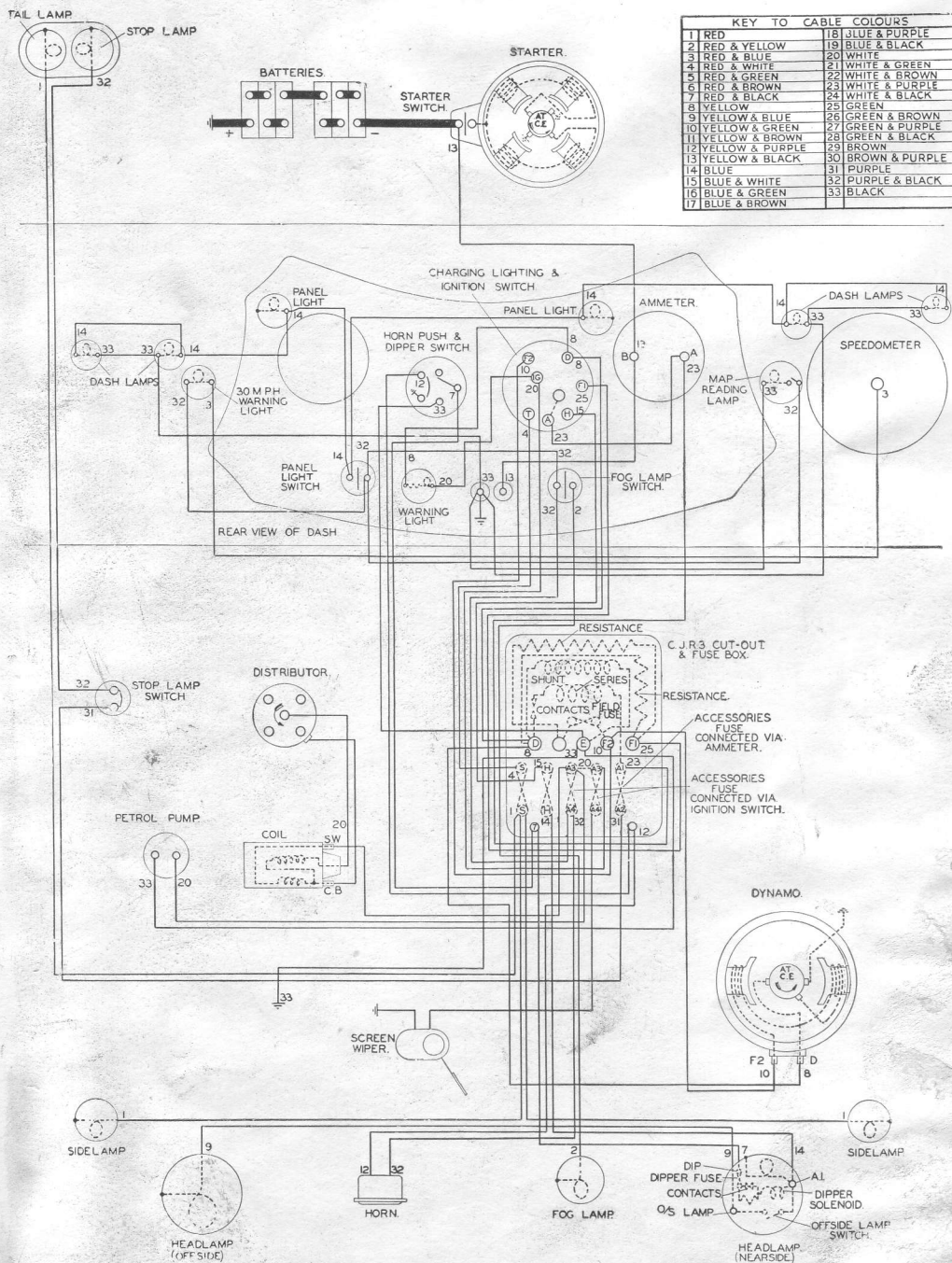
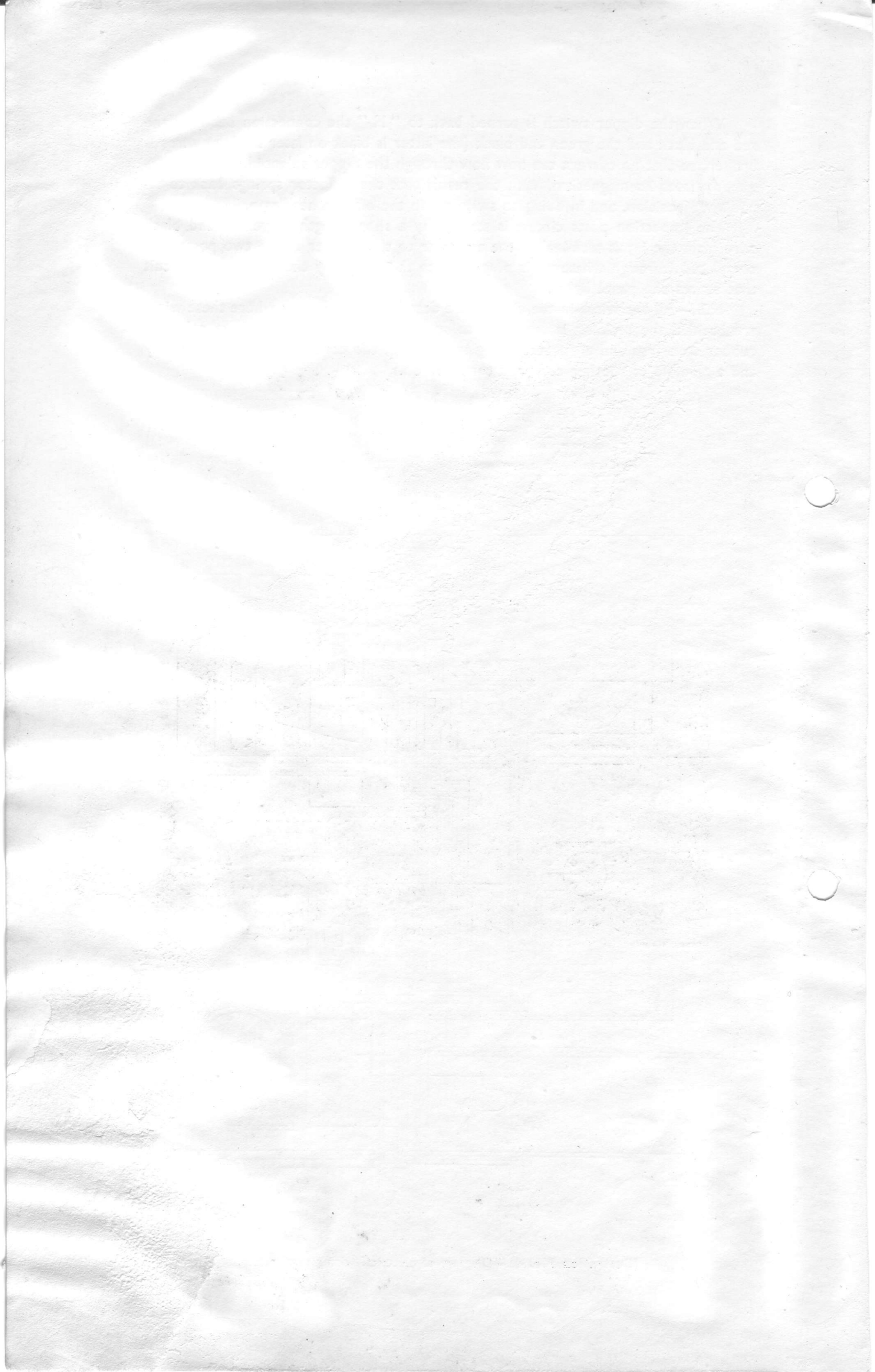


Illustration No. 48.—Diagram of electrical wiring system.



SECTION I

COACHWORK

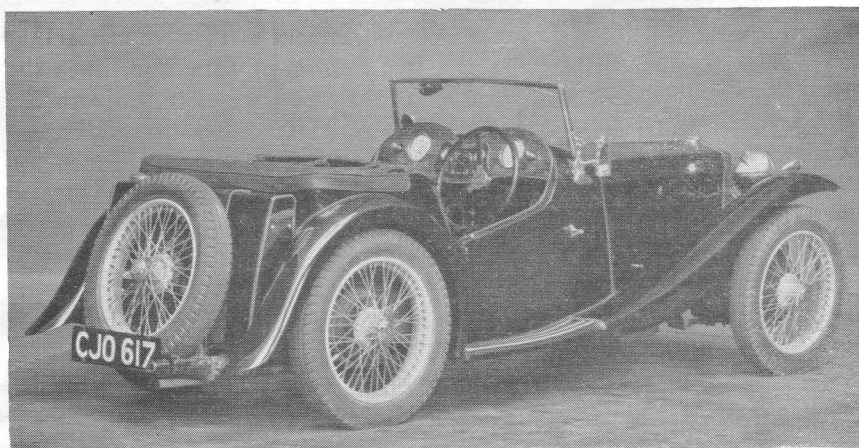


Illustration No. 49.—The M.G. Midget Series "T" Two-seater.

Index is on Page 3

Page

Cleaning and Polishing.—It is best to use a hose for washing the cellulose, but if this is not available use a sponge and plenty of water ; a special wheel brush will be found best for the wire wheels. After washing, the car should be dried thoroughly with a chamois leather. Periodically polish the cellulose with a good quality wax polish. "Nobel" wax polish is to be recommended.

It is wise to test the brakes after washing, as it may be necessary to dry them out before travelling fast : this is done by running slowly with the brakes partly applied for a while.

We are able to supply $\frac{1}{2}$ -pint tins of cellulose to match all M.G. finishes.

Upholstery (Waterproof).—Very occasionally remove the surface dirt with a damp (not wet) cloth. A good quality furniture cream sparingly applied is beneficial, but it must be thoroughly rubbed into the leather, otherwise it will collect the dust.

Carpets.—The loose carpets should be removed from time to time and brushed thoroughly (don't beat them). Grease spots, etc., may be removed with petrol or benzine, used very sparingly.

Tar.—Remove if possible before it is dry with a good tar remover, obtainable at most garages. Do not attempt to use petrol or chemicals likely to have injurious effects on the cellulose.

Chromium Finish.—The introduction of chromium finish has the effect of greatly reducing the labour previously entailed in cleaning the bright portions of the car. The chromium finished parts should on no account be cleaned by the use of metal polishes (all of which contain a certain amount of abrasive matter), but by the simple expedient of washing the parts with plenty of water and, when the dirt has been removed, polishing the surface with a clean dry cloth, or with chamois leather, until bright. In short, chromium finish should be treated in precisely the same way as coachwork. A special chromium polish is obtainable if desired.

All that is necessary to maintain the original brilliance of the chromium finished bright parts is that they should be wiped over once a week with a damp chamois leather. It is recommended that this is regularly carried out.

If the chromium finish has been neglected it may be restored to its original brilliance with soap and water applied with a soft rag.

Windscreen.—The single-panel windscreen fitted to M.G. Midget cars is so designed that it can be folded flat forward on the scuttle after releasing the wing nuts at either side. See that the wire to the screen wiper is in such a position that it is not strained when the screen is folded.

Seat Adjustment.—To obtain the maximum comfort from the pneumatic seat cushions it is essential that they be inflated to the correct pressure.

The air pressure can be adjusted to suit individual requirements by pumping up the cushion through the valve provided with a cycle pump, or releasing the air by unscrewing the valve, as necessary.

A high pressure is not required, and the most comfortable degree of inflation can soon be arrived at by experiment.

Seat adjustment fore and aft is provided, operated by a lever at the near-side of the passenger seat and the off-side of the driver's seat. The seat squab is adjustable for angle and has several fore and aft positions. An adjustable rack behind the squab adjusting the angle and pegs fitted to the bottom of the squab locate in a rack on the floorboards, thus allowing the whole squab to be moved fore and aft.

Sidescreens.—These are stored away neatly in a compartment in the rear panel of the body (see Illustration No. 50), but it is necessary to see that the feet of the front curtains do not scratch the celluloid of the other curtains when being either replaced or removed from the compartment.

Hood.—The hood should not be left folded away underneath its tonneau cover for extended periods, as the creases will eventually ruin the material. It is much wiser to examine from time to time and refold.

The correct method of folding is important (see Illustration No. 50). The centre portion should be pulled away from the hood sticks; the two corners are then folded in at 90°, when the hood can be rolled, as seen in the illustration.

Make certain that no portion of the hood is trapped between the hood sticks or bad cuts will result.

The tonneau cover can then easily be fitted.

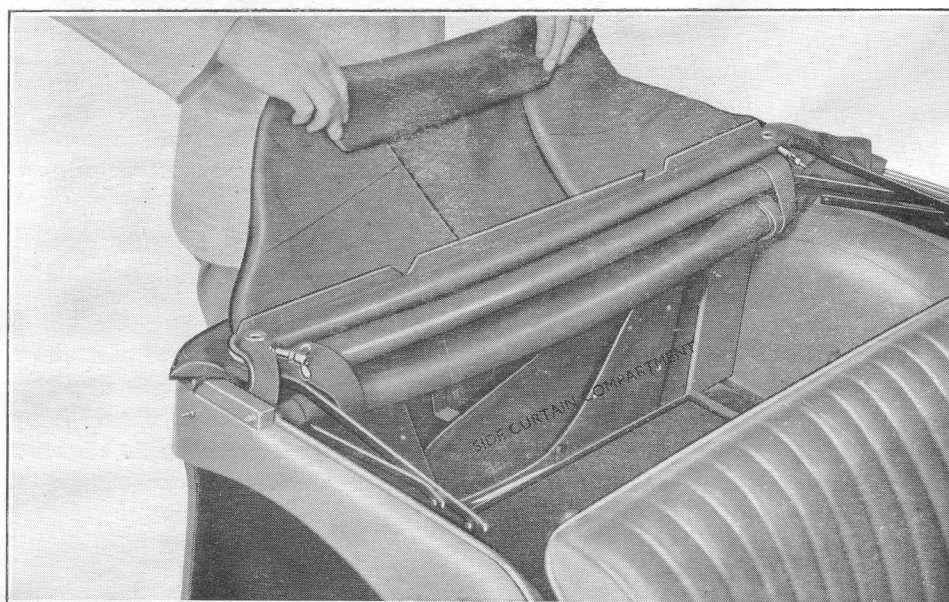


Illustration No. 50.—Correct method of folding the hood and the side-curtains shown in the storage compartment.

Fume and Draught Excluders.—Throughout the car, especially on bulkhead and round the gearbox, are fitted various fume and draught excluders, some are rubber and others leather, laced in position. It is important that they are correctly replaced should any part of the car be dismantled involving removal. In cases where the excluders are of leather, care should be taken that the laces are pulled up really tight. This point is emphasised, as a number of cases have come to our notice in which insufficient care has been taken.

Remounting Body.—If it has been necessary completely to remove the body the following procedure will enable the remounting operation to be carried out so that the bonnet, wings, etc., fit correctly.

- (i) Some insulating material must be placed between all body support brackets secured to the chassis frame and the body, usually this consists of cork or felt pads.
- (ii) Register the body in a central position on the chassis frame.
- (iii) Replace any additional packings in the same positions as they were before the body was removed. If this is not known, then the instructions given under "Adjustments to Doors," items viii and ix, will enable their correct positions to be found.
- (iv) Locate and fit securing bolts, but do not tighten any until all bolts are fitted.
- (v) Tighten all bolts around the scuttle.
- (vi) Tighten all bolts either side of the body.
- (vii) Secure rear end of the body.
- (viii) **Adjustment of Door (door high).**—If the door is high, sufficient packing must be fitted under the front end of the body in front of the door to bring the door into correct position. Naturally, before packing is inserted under the front end of the body forward of the door, it is necessary to slacken all bolts around the scuttle, and also those bolts securing the metal dash to the chassis frame.
- (ix) **Adjustment of Door (door low).**—This operation will necessitate packing under the hinge pillar, which is actually the reverse operation to that required when the door is high.

The packing referred to for adjustment can be either very large flat washers or hard wood strip of suitable thickness.

General.—Freedom from body noises will result from an occasional check of the body securing bolts to ensure that they are tight. It is as well at the same time also to "go over" the hinge fixing screws, the door locks and their stops. A few drops of oil on the hinges or on the metal parts where movement takes place will often eliminate an elusive squeak. Do not forget to lubricate the bonnet hinge and fasteners occasionally.

SECTION J

EXPORT

Deviations to suit Export Regulations

Index is on Page 3

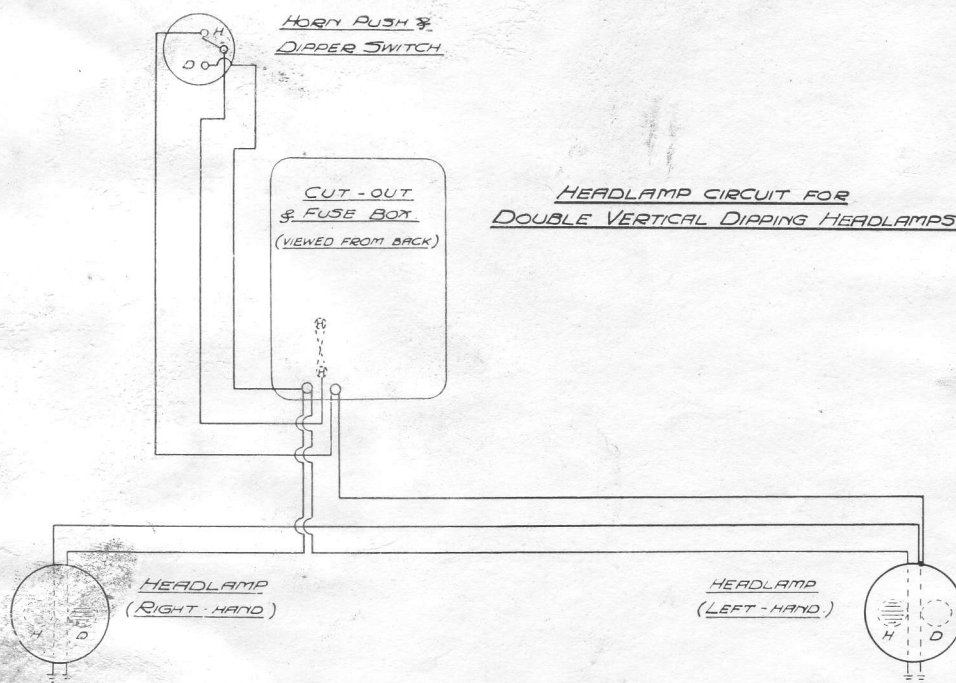
To suit the regulations laid down by the various countries, the equipment of the M.G. Midget Series "T" will vary slightly according to the country to which it is exported.

A complete list of these deviations is unnecessary, but some comment is worth while where such alterations affect the service instructions contained in this *Manual*.

30 m.p.h. Warning Light.—As this fitment is required only in Great Britain a map reading lamp replaces it and matches the map reading lamp fitted on the left-hand side of the instrument panel.

Instead of the first paragraph (iv) on page 79, which gives the connections for the 30 m.p.h. warning light, the paragraph marked (iii) on page 78 immediately preceding it, applies to both the map reading lamps.

Headlamps.—For all countries (except France) where the standard headlamp dipping arrangement (N/S dipping reflector, extinguishing O/S) is not permissible, the Lucas Graves double vertical dipping headlamps are fitted. As this affects only the headlamp circuit, Illustration No. 51 shows the alteration to this circuit, the rest of the system, Illustration No. 48, remaining unaltered. The correct bulbs to be used in these headlamps are Lucas Graves hooded filament, shadow etched, 12-volt, 36-24 watt, Lucas tested bulb No. 81.



on No. 51.—Electrical circuit for double vertical dipping headlamps.

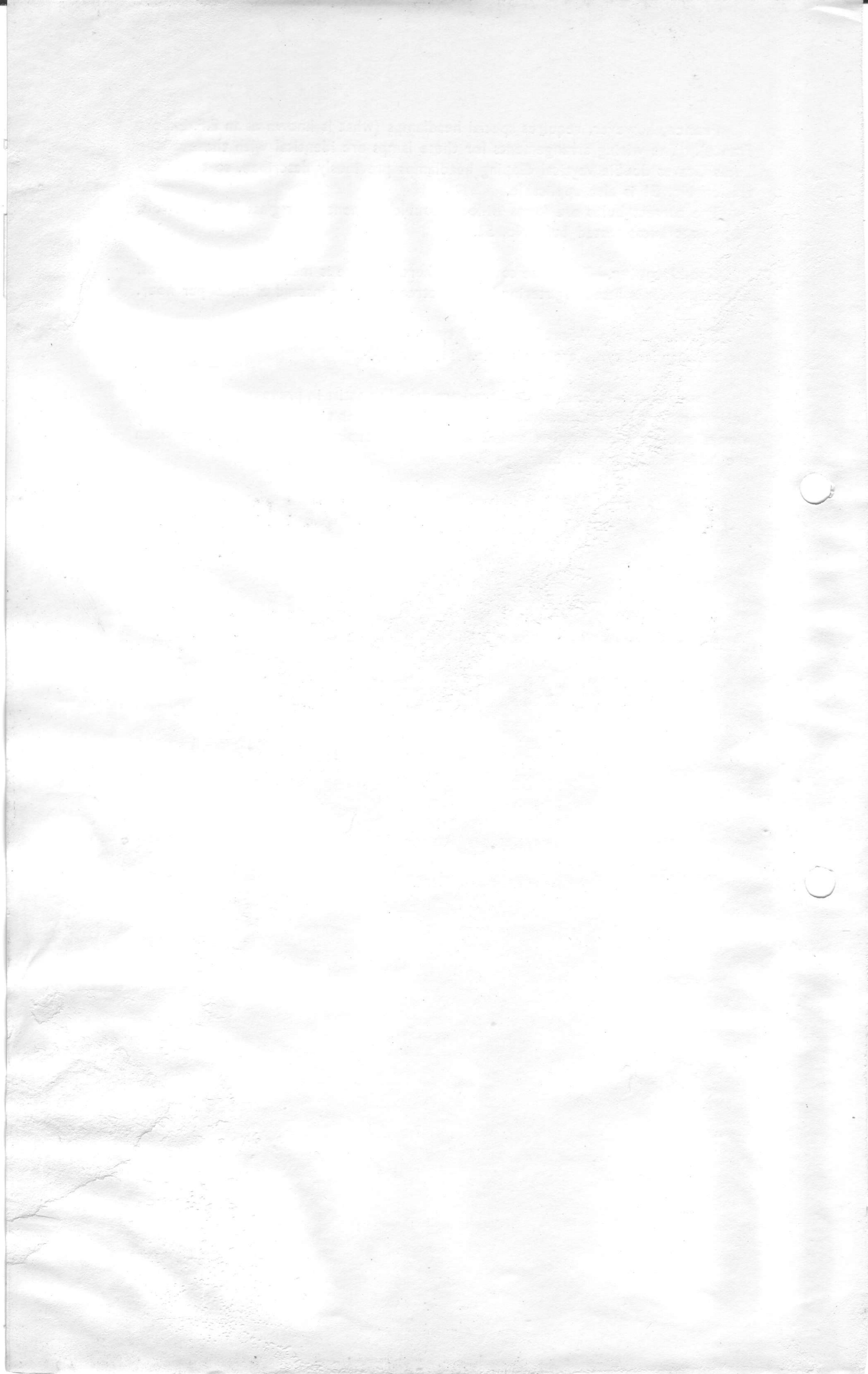
France, however, requires special headlamps (what is known as an E.F. Export France). The wiring arrangements for these lamps are identical with those of the Lucas Graves double vertical dipping headlamps previously described, so that Illustration No. 51 is also applicable.

The correct bulbs are Lucas Bi-focal double filament clear glass bulbs, 12-volt, 36-36 watt Lucas tested bulb No. 52.

Speedometer.—For those countries where distance is measured in kilometres, a speedometer is fitted registering in kilometres per hour instead of miles per hour.

Tyres.—Dunlop "Fort" 19—4.50 tyres are fitted, but the instructions given for the standard tyres are applicable.

Important.—M.G. owners abroad are asked to assist in preventing unnecessary delay regarding the dispatch of accurate information or the correct spare parts by always quoting their **Engine** and **Chassis Numbers** and **Body Numbers** when the body is concerned. See page 9.



SECTION K

RADIATOR REPAIRERS

**LUCAS-C.A.V.-ROTAX
SERVICE DEPOTS**

Lubrication Record

Chassis Maintenance Chart

Index is on Page 3

LUCAS—C.A.V.—ROTAX SERVICE DEPOTS

In the event of any difficulty with any part of the electrical equipment, no matter how trivial, you can be assured of every assistance possible. The best course to adopt is to call at the nearest Lucas Service Depot, the addresses of which are given below, when the equipment can be examined as a whole. The depots are not only at your disposal for repairs, overhauls and adjustments, but to give free advice. When it is necessary, however, to communicate or to order spare parts, always give the type and number of the unit in question, and the make, model and date, etc., of the car concerned.

BELFAST	3-5 Calvin Street, Mount Pottinger Telegrams : " Servdep, Belfast "
Telephone : Belfast 57291 (3 lines)	
BIRMINGHAM, 18	Great Hampton Street Telegrams : " Lucas, Birmingham "
Telephone : Central 8401 (10 lines)	
BRIGHTON, 4	85 Old Shoreham Road, Hove Telegrams : " Luserv, Brighton "
Telephone : Hove 1146-1149	
BRISTOL	345 Bath Road Telegrams : " Kingly, Bristol "
Telephone : Bristol 76001 (4 lines)	
CARDIFF	54a Penarth Road Telegrams : " Lucas, Cardiff "
Telephone : Cardiff 4603 (4 lines)	
COVENTRY	Priory Street Telegrams : " Lucas, Coventry "
Telephone : Coventry 3068	
DUBLIN	Portland St. North, North Circular Road Telegrams : " Luserv, Dublin "
Telephone : Dublin 72601-4	
EDINBURGH, 11	60 Stevenson Road, Gorgie Telegrams : " Luserv, Edinburgh "
Telephone : Edinburgh 62921 (4 lines)	
GLASGOW	Grant Street (St. George's Road) Telegrams : " Lucas, Glasgow "
Telephone : Douglas 3075 (5 lines)	
LEEDS	64 Roseville Road Telegrams : " Luserdep, Leeds "
Telephone : Leeds 28591 (5 lines)	
LIVERPOOL, 13	450-456 Edge Lane Telegrams : " Luserv, Liverpool "
Telephone : Old Swan 1408 (6 lines)	
LONDON—ACTON	Dordrecht Road, Acton Vale, W.3 Telegrams : " Dynomagna, Ealux, London "
Telephone : Shepherd's Bush 3160 (10 lines)	
LONDON—LEYTON	757-759 High Road, Leyton, E.10 Telegrams : " Luserdep, Leystone, London "
Telephone : Leytonstone 3361 (5 lines)	
LONDON—WANDSWORTH	155 Merton Road, Wandsworth, S.W.18 Telegrams : " Luserv, Put, London "
Telephone : Putney 5131 (4 lines)	
MANCHESTER, 3...	Talbot Road, Stretford Telegrams : " Lucas, Stretford "
Telephone : Longford 1101 (5 lines)	
NEWCASTLE-ON-TYNE, 2	64-68 St. Mary's Place Telegrams : " Motolite, Newcastle-on-Tyne "
Telephone : Newcastle 25571 (3 lines)	

In addition there are Lucas—C.A.V.—Rotax Official Battery Service Agents, genuine Spares Stockists and Dealers in important centres throughout the country. Additionally there is a very widespread chain of Lucas—C.A.V.—Rotax Overseas Service Stations and Agents throughout the world. Full lists on application to us or Joseph Lucas Ltd., Birmingham.

M.G. RADIATOR SERVICE STATIONS

1. **BELFAST, N.I.** Serck Radiators Ltd., 49/51 May Street.
Telephone : 26938. Telegrams : "Serckrad, Belfast."
2. **BRISTOL.** A. J. Rees & Son, Bishop Street, Moorfields.
Telephone : 56074/56075.
3. **CARDIFF.** Serck Radiators Ltd., 60a Clive Road, Canton.
Telephone : Central 6124. Telegrams : "Serckrad, Cardiff."
4. **CORK, I.F.S.** J. Gibson & Co., Kyrils Quay.
Telephone : Cork 183.
5. **COVENTRY.** The Coventry Radiator & Presswork Co. Ltd., Hobart Works, Cheylesmore.
Telephone : Coventry 5435. Telegrams : 5435 Coventry.
6. **DUBLIN, I.F.S.** George Pappin & Sons Ltd., 7 Upper Stephen Street.
Telephone : 51607.
7. **LEEDS, 12.** Excelsior Motor Radiator Co. Ltd., Oldfield Lane.
Telephone : Armley 38041/2. Telegrams : "Cooling, Phone, Leeds."
8. **LIVERPOOL.** Liverpool Radiator Co. Ltd., Fontenoy Street.
Telephone : Central 382-3. Telegrams : "Livradco, Liverpool."
9. **LONDON, N.W.10.** Serck Radiators Ltd., Park Royal Road.
Telephone : Willesden 6041-4. Telegrams : "Serckrad, Phone, Harles."
10. **MAIDSTONE.** Serck Radiators Ltd., Palace Avenue.
Telephone : Maidstone 2035. Telegrams : "Serckrad, Maidstone."
11. **NEWCASTLE-ON-TYNE.** Serck Radiators Ltd., Skinnerburn Road.
Telephone : 33863. Telegrams : "Serckrad, Newcastle-on-Tyne."
12. **NOTTINGHAM.** Minerva Motor Radiator Co., Boulevard Works, Radford.
Telephone : 75631. Telegrams : "Motorad, Nottingham."
13. **SHEFFIELD.** The Excelsior Motor Radiator Co. Ltd., Thomas Street.
Telephone : Sheffield 22361/2. Telegrams : "Cooling, Phone, Sheffield."
14. **SOUTHAMPTON.** Serck Radiators Ltd., Firgrove Road, Freemantle.
Telephone : 6251. Telegrams : "Serckrad, Southampton."
15. **STOKE-ON-TRENT.** Coventry Radiator & Presswork Co. Ltd., 56a Ashford St.
16. **SUDBURY, Suffolk.** Serck Radiators Ltd., Meadow Lane.
Telephone : 57. Telegrams : "Serckrad, Sudbury."

M.G. RADIATOR SUB SERVICE STATIONS

1. **ABERDEEN.** Francis Craigmile & Sons, 56 Gordon Street.
Telephone : 3599. Telegrams : "Radiators, Aberdeen."
2. **BIRMINGHAM, 13.** Serck Radiators Ltd., Springfield Road, Moseley.
Telephone : Springfield 1175/6. Telegrams : "Renovation, Birmingham."
3. **BOURNEMOUTH.** Hants & Dorset Sheet Metal Co., 154 Ashley Road.
Telephone : Boscombe 840.
4. **BRIGHTON.** Brighton Motor Sheet Metal Works Ltd., 50a St. James Street.
Telephone : 2191, 2192, 2193.
5. **BRIGHTON.** John Lancaster Radiators Ltd., 56 High Street.
Telephone : Brighton 1256.
6. **BRISTOL.** Perry & Fudge, Globe Works, Horsefair.
Telephone : 22345. Telegrams : "Ventilator, Bristol."
7. **CARLISLE.** Serck Radiators Ltd., Hardwick Circus, Lowther Street.
Telephone : 1119. Telegrams : "Serckrad, Carlisle."
8. **CHESTER.** Serck Radiators Ltd., Kayleyards, Frodsham Street.
Telephone : 878. Telegrams : "Serckrad, Chester."

M.G. RADIATOR SUB SERVICE STATIONS—continued

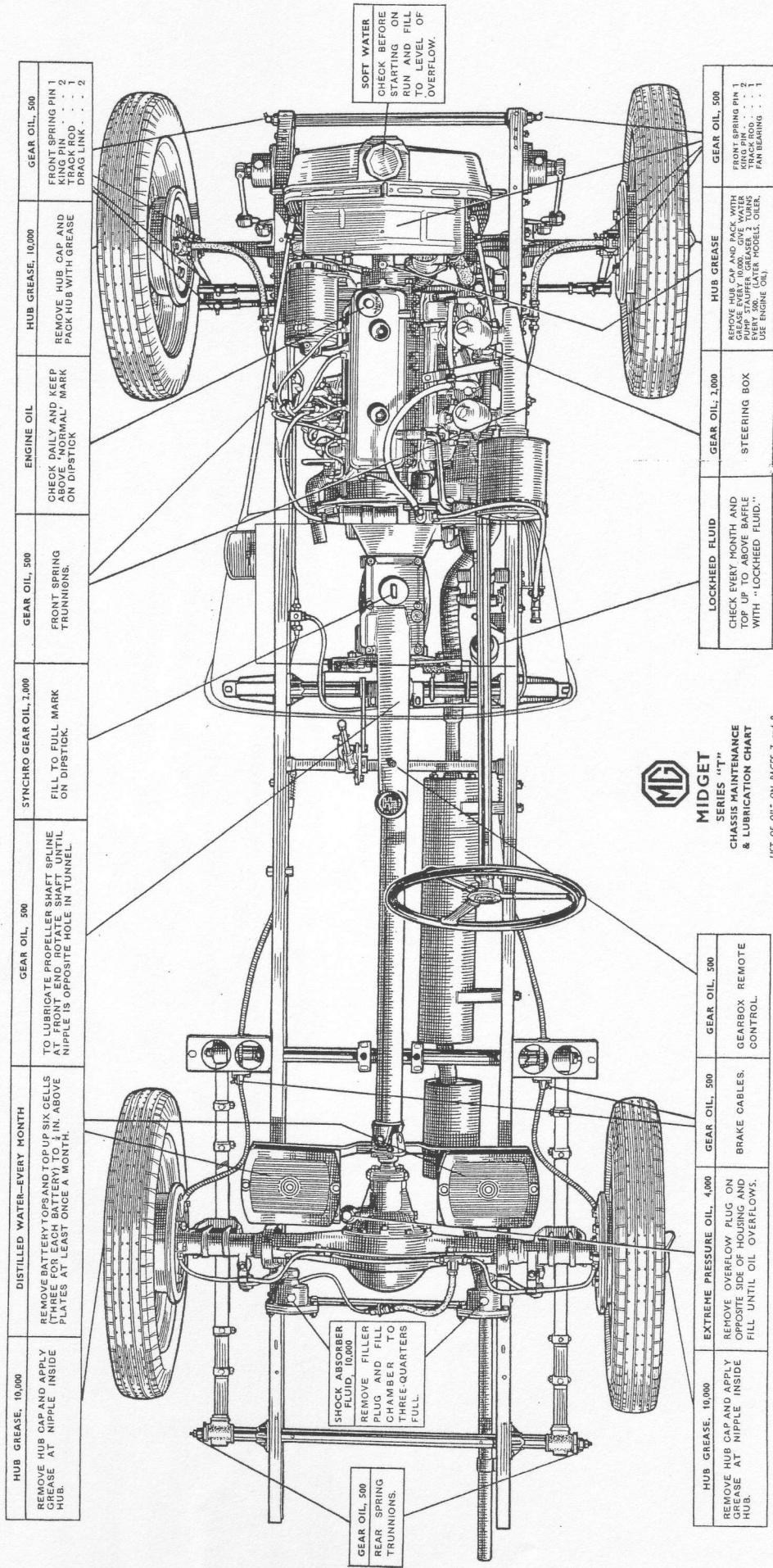
9. **CROYDON.** J. Richards & Sons Ltd., Wellesley Road.
Telephone : 2128/9.
10. **DUNDEE.** Leslie & Murray, 25 Miln Street.
Telephone : 5851.
11. **EDINBURGH.** Alder & Mackay Ltd., Stewart Terrace.
Telephone : 63000. Telegrams : "Alder, Edinburgh."
12. **EXETER.** Saunders & Biss Ltd., 172 Sidwell Street.
Telephone : 3813. Telegrams : "Radiators, Exeter."
13. **GLASGOW, C.4.** Serck Radiators Ltd., 399 Parliamentary Road.
Telephone : Douglas 3062. Telegrams : "Serckrad, Glasgow."
14. **HULL.** The Paragon (Hull) Motor Co. Ltd., Service Depot, Boothferry Road.
Telephone : Central 36842/3. Telegrams : "Benzina, Hull."
15. **INVERNESS.** Francis Craigmile & Sons, Glebe Square.
Telephone : Inverness 680.
16. **KILMARNOCK.** Serck Radiators Ltd., 16 Waterside Street.
Telephone : Kilmarnock 747. Telegrams : "Serckrad, Kilmarnock."
17. **LEICESTER.** Victory Radiator & Welding Works, Woodgate.
Telephone : Leicester 5611 (3 lines).
18. **LEIGH-ON-SEA.** J. Keeling & Sons, 1009-1011 London Road.
Telephone : 75229.
19. **LINCOLN.** E. J. Bowman (Yorks) Ltd., Central Motor Works, St. Rumbold Street.
Telephone : Lincoln 1643.
20. **LIVERPOOL.** W. Watson & Co. (Liverpool) Ltd., Radiator Dept., 9/11 Oldham Street.
Telephone : 5480 Royal (6 lines). Telegrams : "Berliet, Liverpool."
21. **LONDON, N.W.5.** John Lancaster Radiators Ltd., 20 Cathcart Street, Holmes Road, Kentish Town.
Telephone : Gulliver 1178-9.
22. **MANCHESTER.** H. O. Serck Ltd., Lyon Street, Garratt Street, Oldham Road.
Telephone : Collyhurst 1541 (2 lines). Telegrams : "Serckrad, Manchester."
23. **MANCHESTER.** Pendleton Radiator Co., 72a Broad Street, Pendleton.
Telephone : Pendleton 1709. Telegrams : "Necessity, Manchester."
24. **MANCHESTER.** C. W. Scrouther & Co., Talbot Mill, Ellesmere Street, Hulme.
Telephone : BLA. 9452.
25. **NEWCASTLE-ON-TYNE.** Charles G. S. Buist Ltd., St. Mary's Place
Telephone : Kenton 69141/2.
26. **NORTHAMPTON.** Central Sheet Metal Co., St. Michael's Road.
Telephone : 676.
27. **NORWICH.** W. F. Smith & Sons, 90 King Street.
Telephone : Norwich 30.
28. **PERTH.** Leslie & Murray, St. Catherine's Road.
Telephone : 770.
29. **PLYMOUTH.** Edmund Metal Works Ltd., Sutton Road.
Telephone : 2181 (2 lines). Telegrams : "Edmund Metal Works, Plymouth."
30. **PRESTON.** E. Ashwell & Son, 12 Walker Street.
Telephone : 5139 Preston.
31. **SOUTHAMPTON.** John Lancaster Radiators Ltd., 71 Lyon Street, Onslow Road.
Telephone : Southampton 3372.
32. **SWANSEA.** B. T. Rees, 53a Oxford Street.
Telephone : 5484.
33. **WOLVERHAMPTON.** Baggott's Motor Fittings, Steelhouse Lane.
Telephone : 20110.

LUBRICATION RECORD

Delivery date of car.....

[illegible]

[illegible]



**MIDGET
SERIES "T"
CHASSIS MAINTENANCE
& LUBRICATION CHART**

LIST OF OIL ON PAGES 7 and 8

CHANGING OIL :—DRAIN ENGINE AND REFILL WITH NEW OIL EVERY 1,500 MILES.
DRAIN GEARBOX AND REFILL WITH NEW OIL EVERY 2,000 MILES.
DRAIN REAR AXLE AND REFILL WITH NEW OIL EVERY 4,000 MILES.