SECTION S

CHASSIS FRAME REPAIRS

GENERAL DESCRIPTION

This section deals with the repair of the M.G. type box-sectioned chassis frame, damaged in accident, where the facilities used by the frame manufacturers are not available. The manufacturers, naturally, have the benefit of their production equipment, but the methods adopted by them, particularly where the use of assembly jigs and welding equipment is concerned, are outside the scope of the average repair organization.

These instructions will therefore deal mainly with methods of repairing damage to chassis frames without dismantling the component parts, i.e. breaking down welds, more than is absolutely necessary to eliminate torn or badly buckled metal or deformed cross-members which are damaged beyond economic repair.

Repairs carried out in this manner fall into two categories :—

(*a*) Repair of the frame in position in the vehicle, which may be regarded as an emergency repair, and

(*b*) Repair of the frame out of the vehicle, in which complete rectification of the chassis frame is undertaken.

In general, chassis frames with considerable damage may be restored into serviceable units, but the skill and experience of the repairer and the extent of the equipment available will naturally determine whether any particular frame is repairable, bearing in mind that certain fundamental accuracies must be restored, also that the cost of labour and material involved in effecting a complete repair is not economically justified if it exceeds the cost to the user of replacing the entire frame assembly.

Section S.1

CHECKING CHASSIS FRAME ALIGNMENT

Although in most cases of accident the resulting primary damage to the frame is readily apparent, there are cases where the damage may only be slight and is masked by the wings and body structure. In such cases it may be necessary to carry out a complete check of the chassis alignment, including the front suspension and the rear axle, to determine the full extent of the damage.

When checking cars damaged in accident, it is most essential to do the checking on a flat surface large enough to receive the complete car. It is preferable to use a large iron slab, but a concrete slab carefully prepared and hand-surfaced will be suitable. The car may then be checked directly by comparative measurements or the chassis may be suitably blocked up as shown in Fig. K.2, and a centre line dropped down from the front and rear centre of the frame and parallel track lines laid out as in Fig. S.1. From these lines the squareness of the car may easily be checked.

In a further check for distortion, diagonal measurements as shown in Fig. S.2 may be taken without removing the body from the chassis by using a plumb-bob as follows :—

Place the car on a level surface and block up the car equally at each wheel approx. 12 in. (30 cm.) high with all tyres properly inflated.

Perform the measuring with accuracy and care.

Suspend the plumb-bob from various corresponding points on the frame, such as indicated by the diagonal lines in Fig. S.2. The plumb-bob should be suspended slightly above the floor. When the plumb-bob comes to rest, mark the floor directly underneath it. The marks made on the floor will represent the various points of the frame to be checked diagonally.

Measure the diagonal distance between the points ; this distance should agree within $\frac{1}{4}$ in. or $\frac{3}{8}$ in. (6·5 mm. or 10 mm.), as shown in Fig. S.2.

cross-checked at the centre line on which the diagonals should also cross, as detailed in the chassis dimensional drawing, Fig. S.2. The angle of the front cross-member should be 2° but may be given an allowance of $\pm \frac{1}{2}°$. Diagonal measurements quickly determine which section of the frame is bent.

The accuracy of side-members is usually checked with suitable straight-edges, and squareness of side rails is checked with straight-edge and square. Twist is checked visually against straight-edges laid transversely across the frame at suitable points.

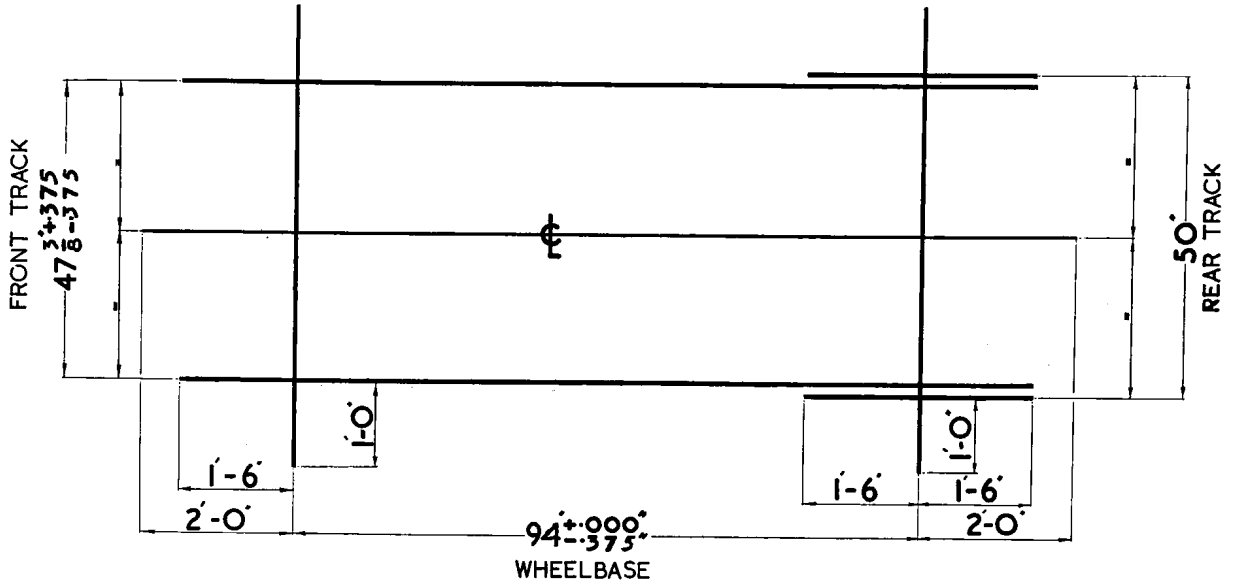


Fig. S.1.
Layout for track and wheelbase lines.

Care must be taken to see that any two diagonals compared represent exactly corresponding points on each side of the frame.

Upon the result of this preliminary investigation a decision can be taken whether the frame can be repaired in position or whether the frame must be stripped out completely. When repairs are undertaken with the frame in position, the damage should be confined to forward of the front engine bulkhead plate.

Damage rearwards of the engine bulkhead plate involves the stripping out of the frame. This also applies to any damage to the rear end of the frame.

Alignment

Checking the alignment of the bare frame is a relatively simple matter, especially if the frame can be set up on a large flat surface or face plate. It involves establishing a datum or centre line, from which all measurements can be taken. Diagonals are checked from suitable fixed locating points, which can be

Section S.2

STRAIGHTENING WITH HEAT

When the frame is heated for straightening, the area affected should be maintained at a cherry-red throughout the entire straightening operation.

When an acetylene torch is used for heating, a " neutral " flame should be employed and played over the entire area to be heated until the metal has reached a uniform cherry-red. Never heat the metal beyond a cherry-red as it will seriously weaken the steel. It is good practice to check the temperature of the heated metal frequently with a dry pine-stick, while it is being worked, to maintain it at the proper state of ductility and avoid burning. Touching a dry pine-stick to metal that has been heated to a cherry-red will cause the stick to glow and char, but not to ignite. The heated area of the frame should be protected from draughts to prevent sudden cooling of the metal.

Section S.3

CHECKING THE FRONT CROSS-MEMBER

When a car has sustained damage to the front suspension, necessitating the dismantling of the assemblies, it is essential that the chassis frame should be checked for correct alignment, especially at the front cross-member. This will avoid excessive tyre wear and steering wander, etc.

A method of making an approximate check is shown in Fig. S.3.

Place the car on a flat surface.

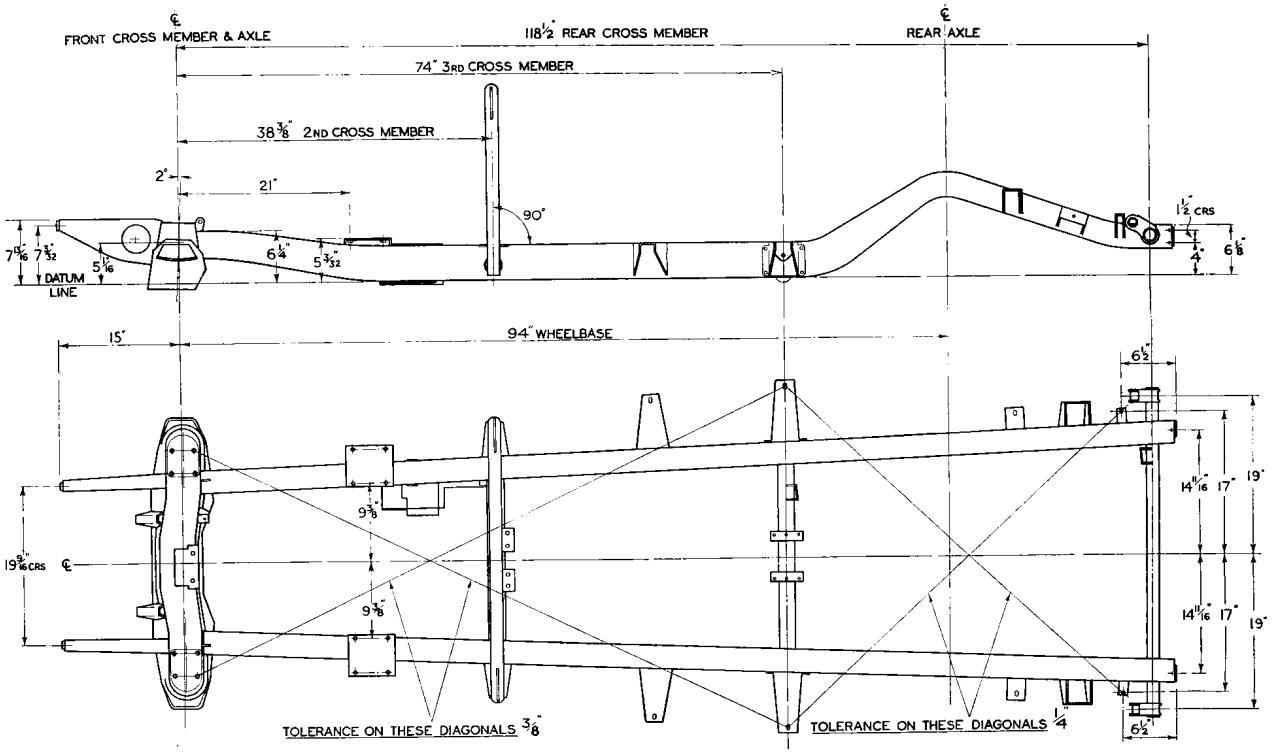


Fig. S.2.
Chassis dimensional diagram.

Remove the front suspension and the rear wheels.

Lower the frame on the three blocks having the dimensions shown in Fig. S.3. These locate the frame in such a position that the front cross-member should run parallel to the ground if not distorted.

Bolt on to the front cross-member the four bars, Tool No. T.125. (See Section Q.)

Parallelism and alignment of these bars can then be checked by measurement and by sighting one rod to the other.

When measured at the points "A," "B," "C," "D" from the flat surface on which the car or frame is placed, all the bars should run parallel to it within a tolerance of $\frac{3}{16}$ in. (4·76 mm.).

The bars should be parallel to each other at the points "E" and "F" within a tolerance of $\frac{3}{16}$ in. (4·76 mm.).

Between the points "G" and "H," or "J" and "K," the bars should also be parallel with a tolerance of $\frac{3}{16}$ in. (4·76 mm.).

If a fore and aft plumb-bob centre line is dropped down from the front and rear centre of the frame and points also dropped down from the bars at each end, the points "L," "M," "N," "P" may be checked to the centre line to ensure the alignment of the bars fore and aft.

If misalignment is found in the top bars only, it may be that this can be corrected by removing the top bar and bolting a similar but stiffer bar to the cross-member, which can be used as a lever to twist slightly the outer end of the cross-member into its correct alignment with the lower bars.

Section S.4

STRAIGHTENING A DAMAGED FRONT END

Correct alignment of the front suspension is of such vital importance that if there is appreciable distortion of this member, it should be renewed, due to the fact

that it is a very difficult operation to re-form it exactly to its original shape.

Note.—*We do not recommend that this operation be carried out by the Distributor or Dealer unless adequate assembly fixtures are available.*

The majority of frames are damaged as a result of oblique frontal impacts, and straightening of the front end section of the frame is carried out as follows. (See Fig. S.4) :—

The first step is to recover the original dimension "AB," by applying a diagonal force between "A" and "B," using a screw or hydraulic jack, at the same time applying heat to the frame side-members at "X" and "Y." Apply the heat evenly over a reasonable area and **do not burn.** The side-members are of light gauge, i.e. 14G (·080 in.) (2·03 mm.) thick. The frame at "X" and "Y" will tend to straighten out as additional force is applied, and care must be taken that excess pressure is not applied, otherwise there may be further distortion set up at the junction of the frame side-members and the front suspension cross-member.

Recovery at "X" and "Y" will be assisted by hammering the metal, which is already heated, in these areas. Use a large wood block between the hammer and the frame to avoid local damage.

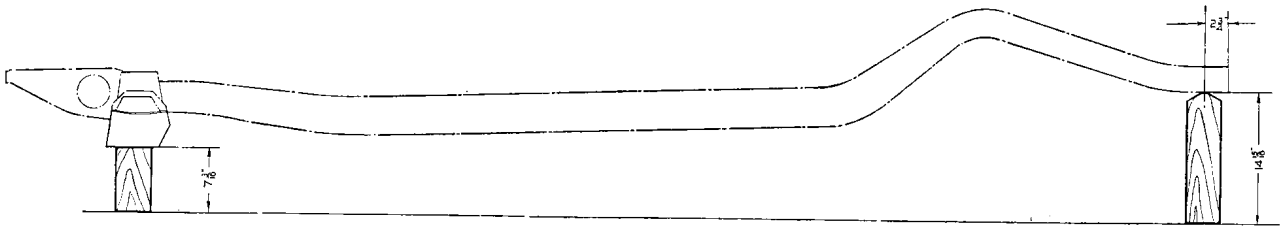
Further straightening at "Z" will probably be required by using a screw jack, abutting on suitable wood packing blocks, at right angles to the frame. (See Fig. S.5.) Similar methods of recovery can be used at any point along the frame.

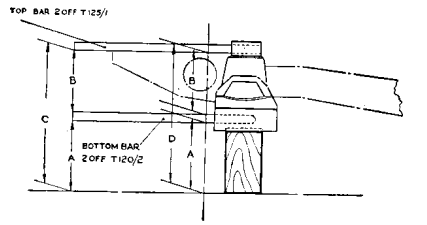
It is necessary, when using the jacks, to apply sufficient force slightly to over-straighten the side-members, for the frame will spring back when the jack is released.

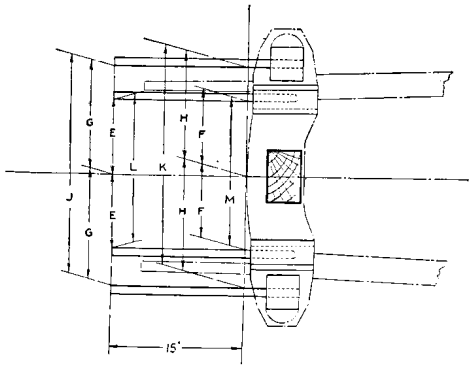
It is better to make a recovery in stages rather than to apply too great a force at one effort, and consequently have to rectify the results of over-straightening. It will be found, however, that a more natural recovery is achieved by introducing a considerable proportion of the load required before applying the heat. It is important also, when applying heat, to do so along a diagonal line up the walls of the side-member and not vertically, as this will control the release of the jacking strains more gradually and prevent the correction from being too localised.

If the frame has lifted or dropped at the front end, it will be necessary to correct this by trussing with the aid of a straining member and screw jack. (See Fig. S.6.)

The chassis frame front extensions are easily renewed by sawing through the weld securing the front extension to the front suspension cross-member, and welding replacement components in position. Ensure that the front extensions are correctly located before re-welding. See chassis dimensional diagram, Fig. S.2.







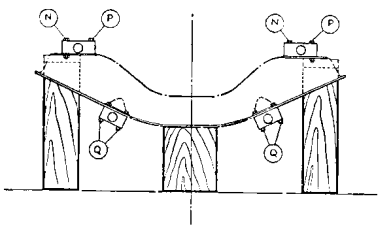


Fig. S.3.
The special bars for checking alignment of the front suspension cross-member are shown in position on the left.

When the front end is rectified, final checking is then directed to ensure that the side-members are in the correct plane and that the front suspension cross-member is set to the correct angle from the datum line. Reference to Fig. S.2 and Fig. S.3 will give all the required information.

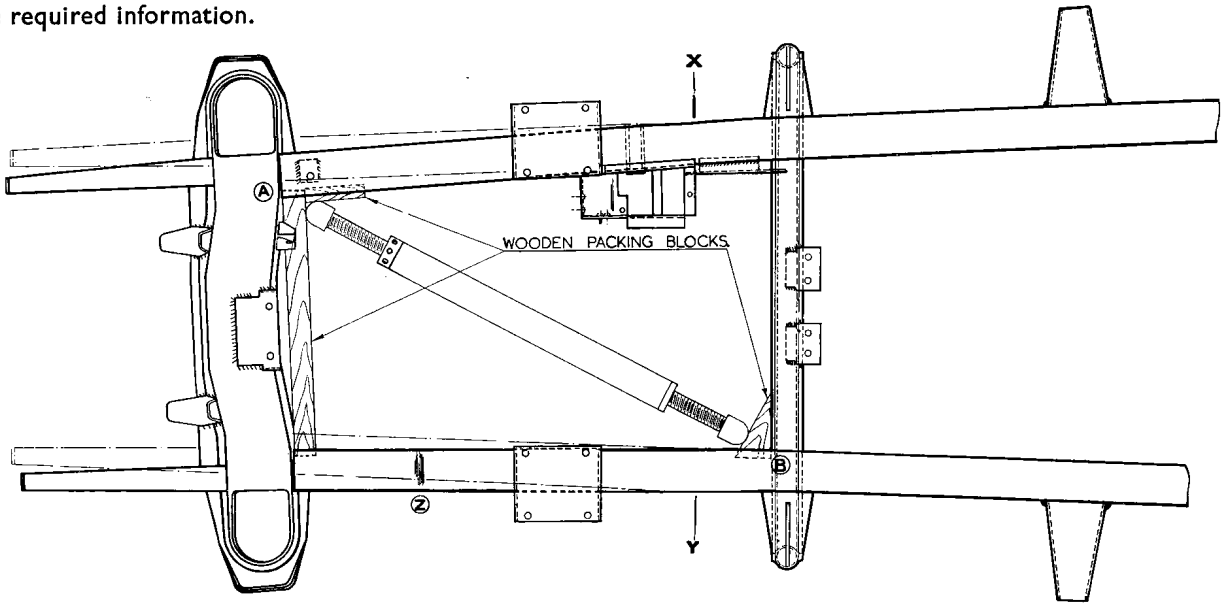


Fig. S.4.
A screw-type jack in position to correct front end misalignment.

Section S.5

CORRECTING A TWISTED FRAME

In the event of the frame being twisted, this condition can be corrected by anchoring the frame at points "A," "B" or "C" (Fig. S.7) to a fixed trestle, and by using a suitable lever, or a stout beam of timber, the frame can then be sprung back with sufficient effort applied at the end of the lever.

If necessary apply well-spread heat at the twisted section.

As the frame is completely dismantled, it is possible to remove all signs of damage by cutting out holes for access, with the welding torch, in the inner liner plates,

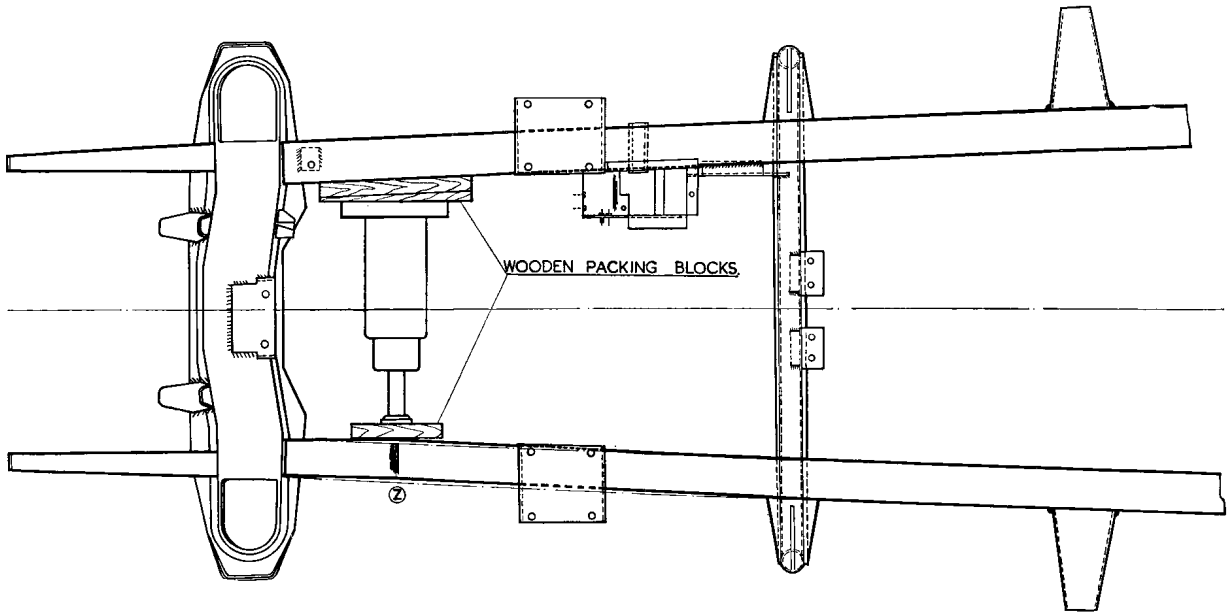


Fig. S.5.
A jack in use to straighten a damaged frame side-member.

hammering out bulges, dents or buckled areas, and closing the holes by welding in the pieces previously removed. The holes should be cut on the centre line of the inner liner plate and be kept as small as possible.

Final checking of the frame should be carried out as indicated in Figs. S.2 and S.3.

Comparative vertical measurements should reveal any frame twist.

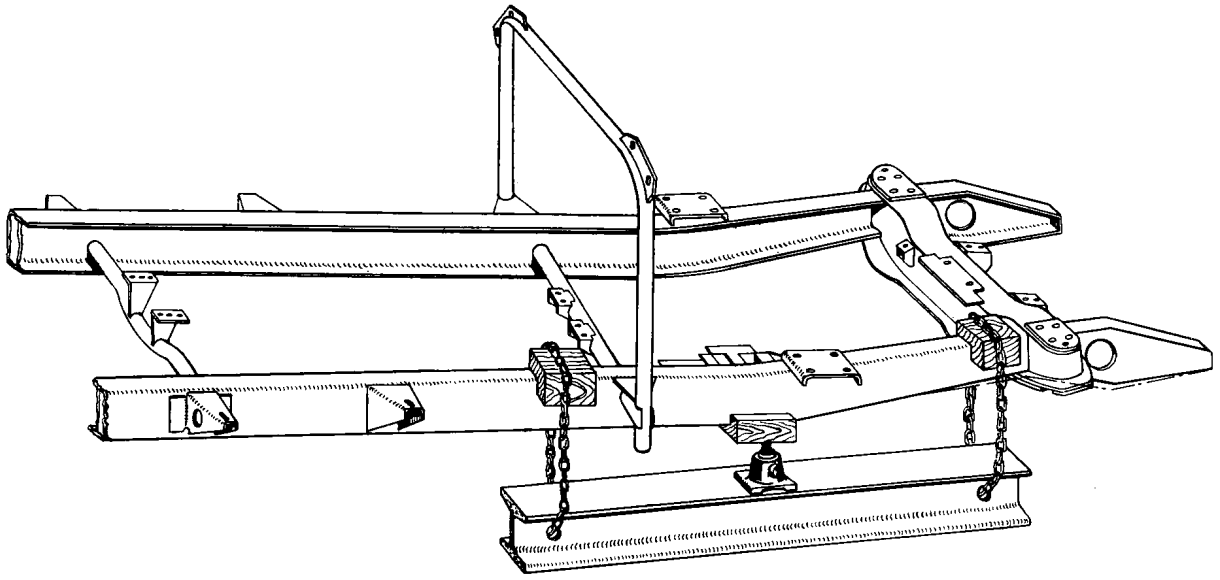


Fig. S.6.
A beam and jack may be used for the correction of lift or fall in a frame side-member.

The welds can be cleaned up and the repair is then invisible.

When any adjustment to the frame is carried out do not forget the light gauge of the material and treat it accordingly.

Check the wheel camber, castor angle, king-pin angle and front wheel alignment as detailed on pages K.2 and K.3.

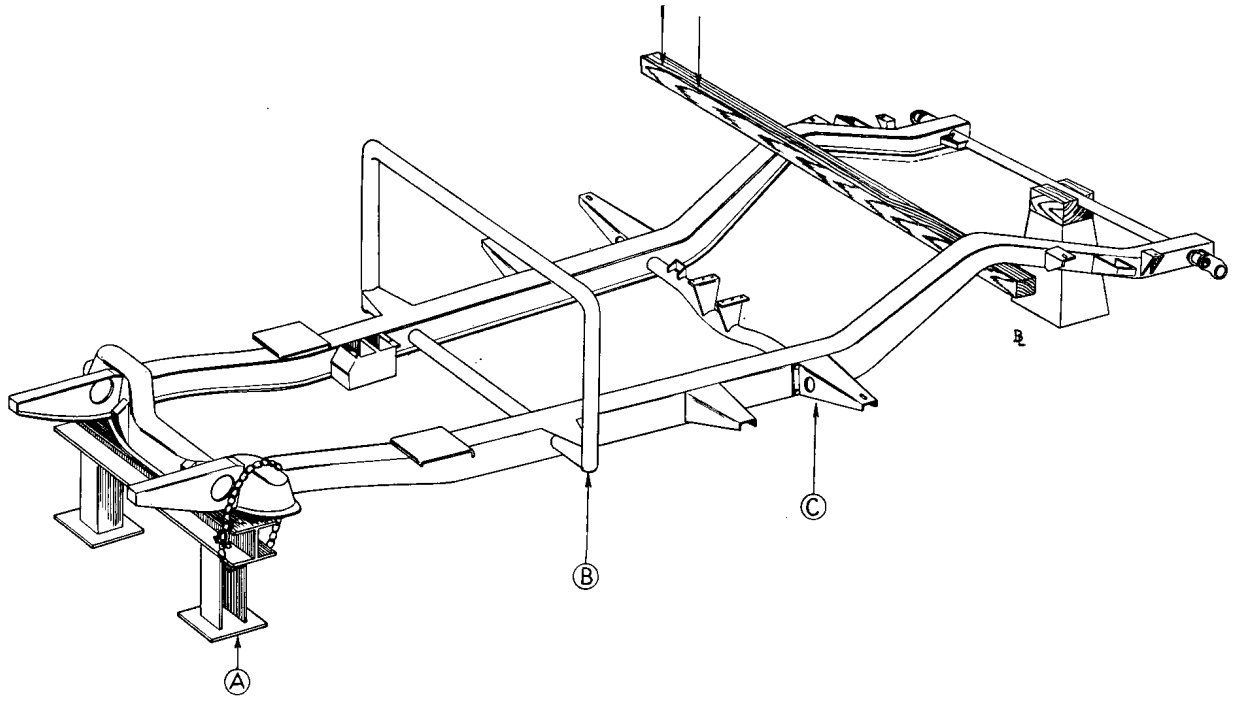


Fig. S.7.
The method of employing a stout beam to spring a twisted frame while it is held on a suitable stand.

KEY TO RECOMMENDED LUBRICANTS

A — ENGINE AND AIR CLEANER

Climatic Conditions	B.P. Energol	Filtrate	Sternol	Duckham's	Castrol	Esso	Mobiloil	Shell
Tropical and Temperate down to 32° F. (0° C.)	"Energol" Motor Oil S.A.E. 30	Medium "Filtrate"	"Sternol" W.W. 30	Duckham's N.O.L. "Thirty"	"Castrol" X.L.	"Essolube" 30	Mobiloil "A"	"Shell" X—100 S.A.E. 30
Cold and extreme cold down to 0° F. (—18° C.)	"Energol" Motor Oil S.A.E. 20	Zero "Filtrate"	"Sternol" W.W. 20	Duckham's N.O.L. "Twenty"	"Castrolite"	"Essolube" 20	Mobiloil "Arctic"	"Shell" X—100 S.A.E. 20
Arctic below 0° F. (—18° C.)	"Energol" Motor Oil S.A.E. 10	Sub-Zero "Filtrate"	"Sternol" W.W. 10	Duckham's N.O.L. "Ten"	"Castrol" Z	"Essolube" 10	Mobiloil 10W	"Shell" X—100 S.A.E. 10

B — GEARBOX, STEERING GEARBOX AND REAR AXLE (HYPOID GEARS)

Tropical and Temperate down to 10° F. (—12° C.)	"Energol" Transmission Oil E.P. S.A.E. 90	Hypoid "Filtrate" 90	"Sternol" Ambroleum E.P. 90	Duckham's Hypoid 90	"Castrol" Hypoy	"Esso" Expee Compound 90	Mobilube "G.X." 90	"Shell" Spirax 90 E.P.
Extreme cold below 10° F. (—12° C.)	"Energol" Transmission Oil E.P. S.A.E. 80	Hypoid "Filtrate" 80	"Sternol" Ambroleum E.P. 80	Duckham's Hypoid 80	"Castrol" Hypoy 80	"Esso" Expee Compound 80	Mobilube "G.X." 80	"Shell" Spirax 80 E.P.

C — WHEEL HUBS AND FAN BEARINGS

All conditions	"Energrease" C.3	"Filtrate" Super Lithium Grease	"Ambroline" R.B. Grease	Duckham's H.B.B. Grease or L.B. 10 Grease	"Castrolease" Heavy	*Home* "Esso" Grease *Export* "Esso" Bearing Grease	*Home* Mobil Hub Grease *Export* Mobilgrease No. 5	"Shell" Retinax A

D — STEERING CONNECTIONS, KING-PINS, PROPELLER SHAFT, CLEVIS PINS AND LEVER FULCRUMS

All conditions	"Energrease" C.1	"Filtrate" Super Lithium Grease	"Ambroline" M.M. Grease	Duckham's H.P.G. Grease or L.B. 10 Grease	"Castrolease" Medium	*Home* "Esso" Pressure Gun Grease *Export* "Esso" Chassis Lubricant	Mobilgrease No. 2 or 4	"Shell" Retinax A

E — CABLES AND VITAL CONTROL JOINTS

All conditions	"Energrease" C.1	"Filtrate" Super Lithium Grease	"Ambroline" A.F. Grease	Duckham's "Keenol" K.G. 16 Grease or L.B. 10 Grease	"Castrolease" Brake Cable Grease	*Home* "Esso" Pressure Gun Grease *Export* "Esso" Chassis Lubricant	Mobilgrease No. 2 or 4	"Shell" Retinax A

F — UTILITY LUBRICANT, S.U. CARBURETTER DASHPOT, OILCAN POINTS, ETC.

All conditions	"Energol" Motor Oil S.A.E. 20	Zero "Filtrate"	"Sternol" W.W. 20	Duckham's N.O.L. "Twenty"	"Castrolite"	"Essolube" 20	Mobiloil "Arctic"	"Shell" X—100 S.A.E. 20

EVERY 1,000 MILES (1600 Km.). Use oilcan on all control joints, door locks, hinges.

SPECIAL NOTE. Only Hypoid oils must be used in the rear axle.

THE M.G. MIDGET (Series "TD") LUBRICATION CHART

D

EVERY 500 MILES
(800 Km.)
GIVE 3 OR 4 STROKES OF GREASE GUN FILLED WITH GREASE TO REF. D.

A

EVERY 250 MILES
(400 Km.)
INSPECT OIL LEVEL IN ENGINE BY DIPSTICK AND REPLENISH IF NECESSARY WITH RECOMMENDED ENGINE OIL TO REF. A.

AFTER FIRST 500 MILES (800 Km.)
AND SUBSEQUENTLY
EVERY 3,000 MILES (5000 Km.)
DRAIN OFF OLD OIL AND REFILL WITH FRESH OIL TO REF. A.

B

EVERY 1,000 MILES
(1600 Km.)
INSPECT OIL LEVEL IN GEARBOX BY DIPSTICK AND REPLENISH IF NECESSARY WITH RECOMMENDED HYPOID OIL TO REF. B.

AFTER FIRST 500 MILES (800 Km.)
AND SUBSEQUENTLY
EVERY 6,000 MILES (10000 Km.)
DRAIN OFF OLD OIL AND REFILL WITH FRESH OIL TO REF. B.

B

EVERY 1,000 MILES
(1600 Km.)
INSPECT OIL LEVEL IN AXLE THROUGH FILLER AND REPLENISH IF NECESSARY WITH RECOMMENDED HYPOID OIL TO REF. B.

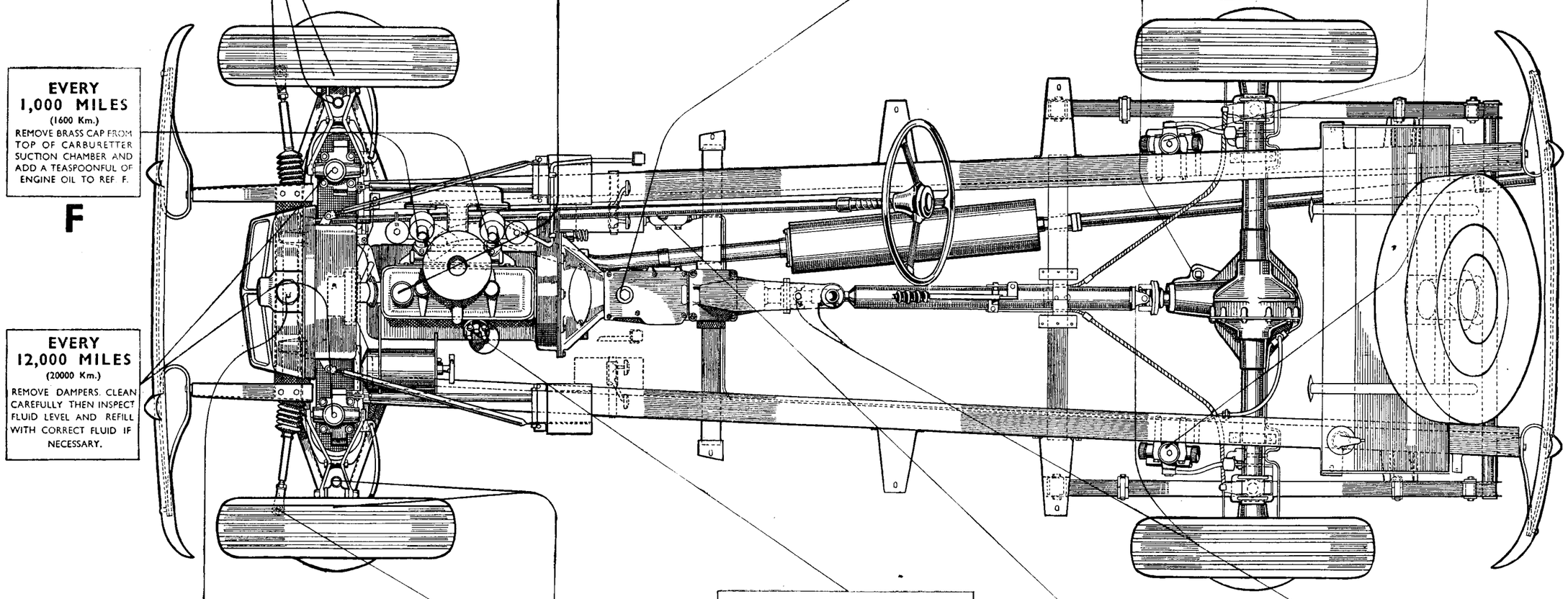
AFTER FIRST 500 MILES (800 Km.)
AND SUBSEQUENTLY
EVERY 6,000 MILES (10000 Km.)
DRAIN OFF OLD OIL AND REFILL WITH FRESH OIL TO REF. B.

EVERY 12,000 MILES
(20000 Km.)
REMOVE REAR HYDRAULIC DAMPERS. CAREFULLY CLEAN EXTERIOR AND THEN INSPECT FLUID LEVEL. REPLENISH WITH CORRECT FLUID IF NECESSARY.

EVERY 1,000 MILES
(1600 Km.)
REMOVE BRASS CAP FROM TOP OF CARBURETTER SUCTION CHAMBER AND ADD A TEASPOONFUL OF ENGINE OIL TO REF. F.

F

EVERY 12,000 MILES
(20000 Km.)
REMOVE DAMPERS. CLEAN CAREFULLY THEN INSPECT FLUID LEVEL AND REFILL WITH CORRECT FLUID IF NECESSARY.



EVERY 3,000 MILES
(5000 Km.)
APPLY GREASE GUN TO NIPPLE ON STEERING GEARBOX AND GIVE UP TO 10 STROKES, BUT NO MORE. USE HYPOID OIL TO REF. B.

B

EVERY 500 MILES
(800 Km.)
GIVE 3 OR 4 STROKES OF GREASE GUN FILLED WITH GREASE TO REF. D.

D

EVERY 3,000 MILES
(5000 Km.)
WITHDRAW DISTRIBUTOR ROTATING ARM AND ADD A FEW DROPS OF THIN OIL TO REF. F TO OPENING AND TO ADVANCE MECHANISM THROUGH GAP ROUND CAM SPINDLE.
REMOVE DYNAMO GREASE CAP AND REFILL WITH GREASE TO REF. C.

C F

EVERY 1,000 MILES
(1600 Km.)
INSPECT FLUID LEVEL IN BRAKE MASTER CYLINDER AND REPLENISH WITH LOCKHEED GENUINE BRAKE FLUID

EVERY 1,000 MILES
(1600 Km.)
GIVE 3 OR 4 STROKES OF GREASE GUN FILLED WITH GREASE TO REF. D.

D

EVERY 1,000 MILES (1600 KM.). APPLY GREASE GUN FILLED WITH GREASE TO REF. C TO FAN BEARING LUBRICATOR AND GIVE TWO STROKES.
USE OILCAN ON ALL CONTROL JOINTS, DOOR LOCKS, HINGES TO REF. F.

EVERY 3,000 MILES (5000 KM.). CLEAN AND RE-OIL AIR INTAKE CLEANER (EXPORT).

EVERY 6,000 MILES (10000 KM.). REMOVE FRONT WHEEL HUB DISC FROM HUB. APPLY GREASE GUN FILLED WITH GREASE TO REF. C AND GIVE ONE STROKE ON EARLY MODELS.
ON LATER MODELS REMOVE GREASE CAP, REPLENISH WITH GREASE TO REF. C AND REPLACE.
APPLY GREASE GUN FILLED WITH GREASE TO REF. D TO REVOLUTION INDICATOR GEARBOX AND GIVE TWO STROKES.
FIT NEW EXTERNAL OIL FILTER (THROW-AWAY TYPE), OR NEW ELEMENT (RENEWABLE ELEMENT TYPE).
CLEAN AND RE-OIL AIR CLEANER (HOME).

Published Officially by Morris Motors Ltd.
M.G. Midget (Series "TD"). Issue 3 (H & E) 82966—1/54

Printed by The Nuffield Press Ltd.

THE M.G. MIDGET (Series "TF") LUBRICATION CHART

D

EVERY 500 MILES
(800 Km.)
GIVE THREE OR FOUR STROKES OF GREASE GUN FILLED WITH GREASE TO REF. D TO NIPPLES ON STEERING JOINTS.

A

EVERY 250 MILES
(400 Km.)
INSPECT OIL LEVEL IN ENGINE BY DIPSTICK AND REPLENISH IF NECESSARY WITH RECOMMEND'D ENGINE OIL TO REF. A

AFTER FIRST 500 MILES (800 Km.)
AND SUBSEQUENTLY
EVERY 3,000 MILES (5000 Km.)
DRAIN OFF OLD OIL AND REFILL WITH FRESH OIL TO REF. A

B

EVERY 1,000 MILES
(1600 Km.)
INSPECT OIL LEVEL IN GEARBOX BY DIPSTICK AND REPLENISH IF NECESSARY WITH RECOMMENDED ENGINE OIL TO REF. B.

AFTER FIRST 500 MILES (800 Km.)
AND SUBSEQUENTLY
EVERY 6,000 MILES (10000 Km.)
DRAIN OFF OLD OIL AND REFILL WITH FRESH OIL TO REF. B

D

EVERY 1,000 MILES
(1600 Km.)
GIVE THREE OR FOUR STROKES OF GREASE GUN FILLED WITH GREASE TO REF. D TO PROPELLER SHAFT NIPPLES.

B

EVERY 1,000 MILES
(1600 Km.)
INSPECT OIL LEVEL IN REAR AXLES BY REMOVING FILLER PLUGS. REPLENISH IF NECESSARY TO LEVEL OF PLUG WITH OIL TO REF. B.

AFTER FIRST 500 MILES (800 Km.)
AND SUBSEQUENTLY
EVERY 6,000 MILES (10000 Km.)
DRAIN OFF OLD OIL BY REMOVING DRAIN PLUG AND REFILL WITH FRESH OIL TO REF. B

F

EVERY 1,000 MILES
(1600 Km.)
REMOVE CAP FROM TOP OF CARBURETTER SUCTION CHAMBERS AND ADD A TEASPOONFUL OF OIL TO REF. F.

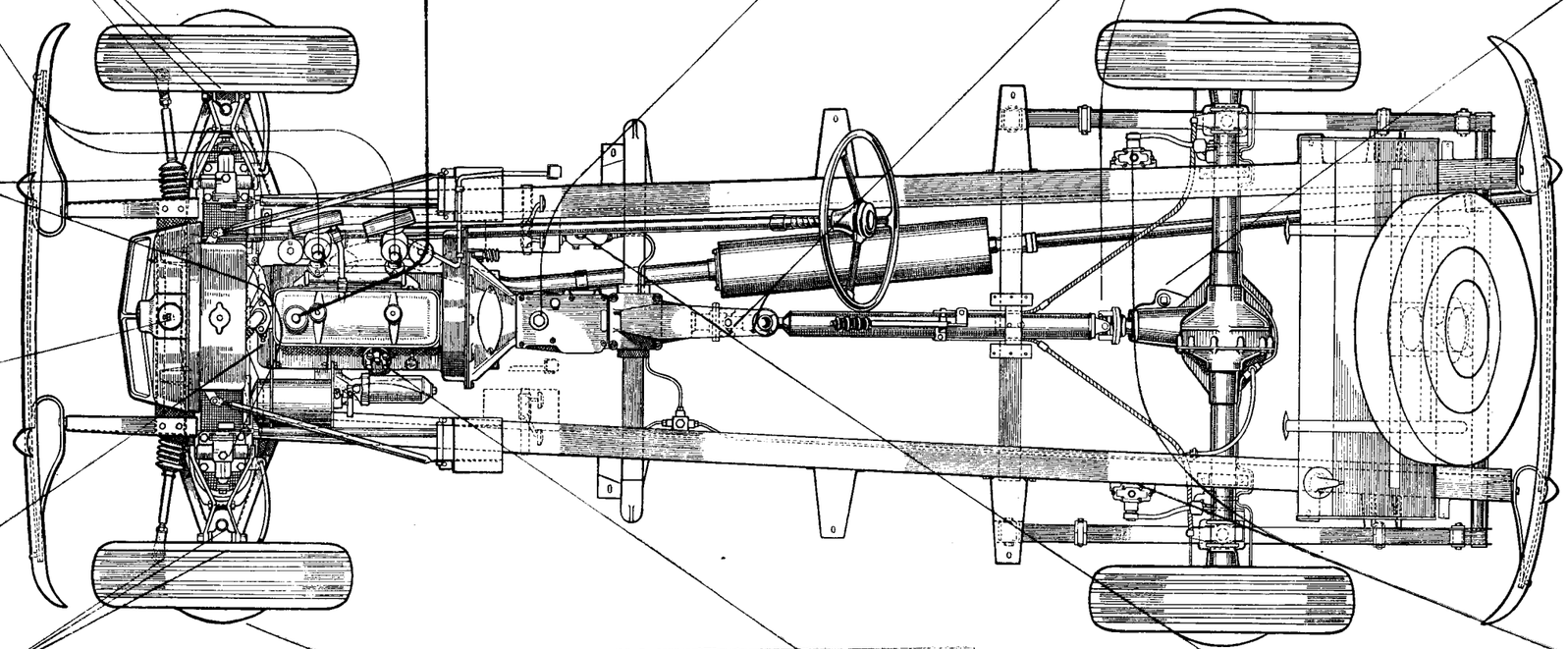
EVERY 12,000 MILES
(20000 Km.)
CLEAN SHOCK ABSORBERS THOROUGHLY AND EXAMINE FLUID LEVEL. REPLENISH IF NECESSARY WITH CORRECT FLUID

B

EVERY 3,000 MILES
(5000 Km.)
APPLY GREASE GUN FILLED WITH OIL TO REF. B TO NIPPLE ON STEERING GEARBOX, AND GIVE UP TO 20 STROKES, BUT NOT MORE

C

EVERY 1,000 MILES
(1600 Km.)
APPLY GREASE GUN FILLED WITH GREASE TO REF. C TO FAN BEARING LUBRICATOR AND GIVE 2 STROKES



D

EVERY 500 MILES
(800 Km.)
GIVE THREE OR FOUR STROKES OF GREASE GUN FILLED WITH GREASE TO REF. D TO NIPPLES ON STEERING JOINTS

C

EVERY 6,000 MILES
(10000 Km.)
REMOVE FRONT WHEEL HUB DISCS AND PRISE OFF GREASE RETAINING CAP FROM END OF HUB. FILL CAP WITH GREASE TO REF. C AND REPLACE SECURELY

D F

EVERY 3,000 MILES
(5000 Km.)
WITHDRAW DISTRIBUTOR ARM AND ADD A FEW DROPS OF THIN OIL TO REF. F TO OPENING AND TO ADVANCE MECHANISM THROUGH CAM ROUND CAM SPINDLE
REMOVE DYNAMO GREASE CAP AND REFILL WITH GREASE TO REF. D

EVERY 1,000 MILES
(1600 Km.)
INSPECT FLUID LEVEL IN MASTER CYLINDER SUPPLY CHAMBER AND REFILL IF NECESSARY WITH LOCKHEED GENUINE BRAKE FLUID

EVERY 12,000 MILES
(20000 Km.)
REMOVE REAR HYDRAULIC DAMPERS, CAREFULLY CLEAN EXTERIOR AND THEN INSPECT FLUID LEVEL, REPLENISH WITH CORRECT FLUID IF NECESSARY

EVERY 1,000 MILES (1600 KM.). USE OILCAN FILLED WITH OIL TO REF. F ON ALL CONTROL JOINTS, DOOR LOCKS, HINGES, ETC.
EVERY 6,000 MILES (10000 KM.). APPLY GREASE GUN FILLED WITH GREASE TO REF. D TO REVOLUTION INDICATOR GEARBOX AND GIVE TWO STROKES. FIT NEW EXTERNAL OIL FILTER ELEMENT.

Published Officially by Morris Motors Ltd.

M.G. Midget. Issue 1 (H & E) 82966—1/54

Printed by The Nuffield Press Ltd.