

FIAT TIPO (petrol)

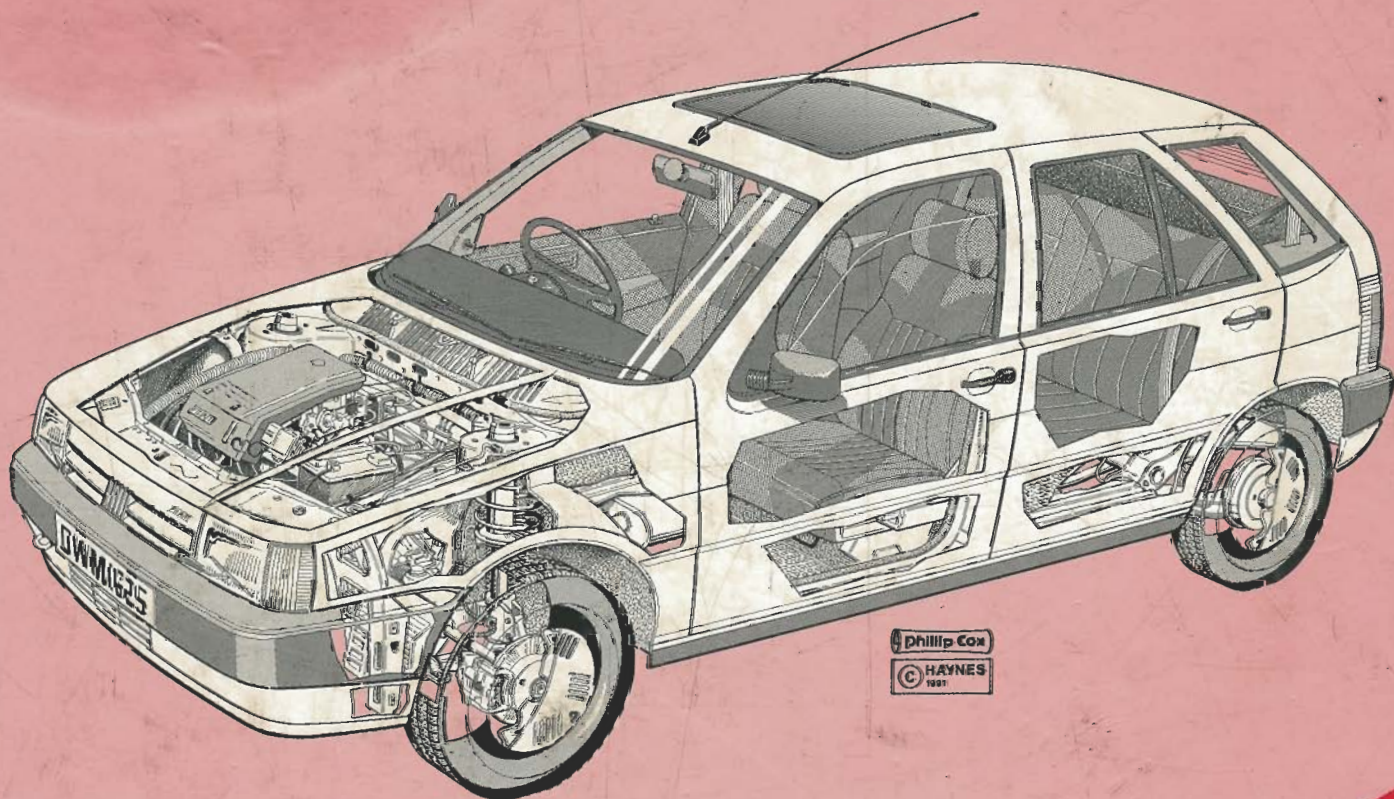
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THE
BOOK

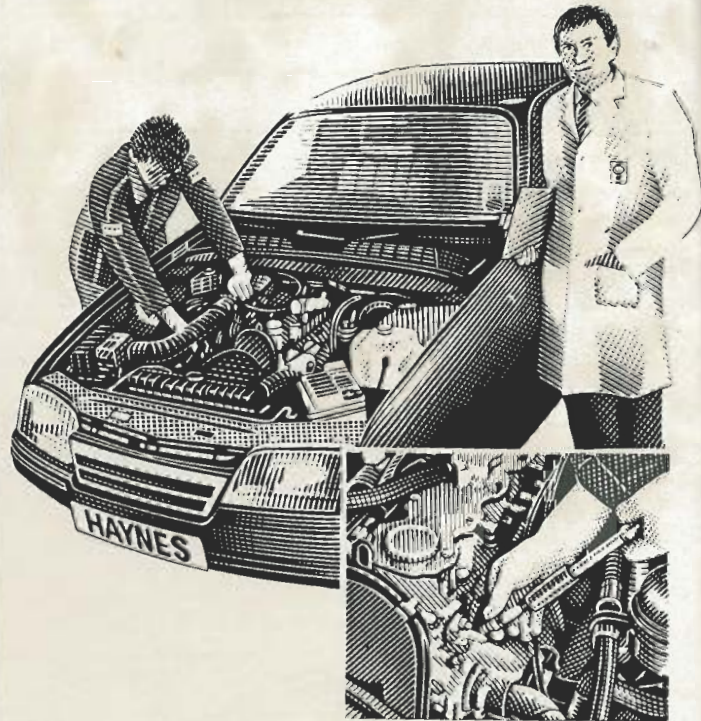
Owners Workshop Manual



Phillip Cox
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1987

EVERY MANUAL BASED ON
A STRIPDOWN AND
REBUILD

**“We fit
Champion - so
should you”**



Acknowledgements

Thanks are due to the Champion Sparking Plug Company Limited who supplied the illustrations showing spark plug conditions, to Holt Lloyd Limited who supplied the illustrations showing bodywork repair, and to Duckhams Oils who provided lubrication data. Certain other illustrations are the copyright of the FIAT Motor Company (UK) Limited and are used with their permission. Thanks are also due to Sykes-Pickavant Limited who supplied some of the workshop tools, and all those people at Sparkford who assisted in the production of this Manual.

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Whilst every care is taken to ensure that the information in this manual is correct, no liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in, or omissions from, the information given.

Many of the cars we strip for our manuals are from our own fleet of vehicles or loaned by garages. Often they are cars with many thousands of miles on the clock.

As a matter of course we always fit new plugs when reassembling the engine, and these days, it has to be Champion Double Copper.

The extra performance, ease of starting, anti-fouling and longer trouble-free life, due to the copper earth and centre core electrodes, means you cannot fit a better plug.

We also fit Champion oil, air and fuel filters and, when necessary, Champion wiper blades because, as they say, "You can't beat a Champion".

Jim Scott, Managing Director - Haynes



Go by the book. Fit Champion.

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FIAT Tipo DGT



FIAT Tipo DGT/SX

About this manual

Its aim

The aim of this manual is to help you get the best value from your vehicle. It can do so in several ways. It can help you decide what work must be done (even should you choose to get it done by a garage), provide information on routine maintenance and servicing, and give a logical course of action and diagnosis when random faults occur. However, it is hoped that you will use the manual by tackling the work yourself. On simpler jobs it may even be quicker than booking the car into a garage and going there twice, to leave and collect it. Perhaps most important, a lot of money can be saved by avoiding the costs a garage must charge to cover its labour and overheads.

The manual has drawings and descriptions to show the function of the various components so that their layout can be understood. Then the tasks are described and photographed in a step-by-step sequence so that even a novice can do the work.

Its arrangement

The manual is divided into eleven Chapters, each covering a logical sub-division of the vehicle. The Chapters are each divided into Sections, numbered with single figures, eg 5; and the Sections into paragraphs (or sub-sections), with decimal numbers following on from the Section they are in, eg 5.1, 5.2, 5.3 etc.

It is freely illustrated, especially in those parts where there is a detailed sequence of operations to be carried out. There are two forms of illustration: figures and photographs. The figures are numbered in

sequence with decimal numbers, according to their position in the Chapter – eg Fig. 6.4 is the fourth drawing/illustration in Chapter 6. Photographs carry the same number (either individually or in related groups) as the Section or sub-section to which they relate.

There is an alphabetical index at the back of the manual as well as a contents list at the front. Each Chapter is also preceded by its own individual contents list.

References to the 'left' or 'right' of the vehicle are in the sense of a person in the driver's seat facing forwards.

Unless otherwise stated, nuts and bolts are removed by turning anti-clockwise, and tightened by turning clockwise.

Vehicle manufacturers continually make changes to specifications and recommendations, and these, when notified, are incorporated into our manuals at the earliest opportunity.

Whilst every care is taken to ensure that the information in this manual is correct, no liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in, or omissions from, the information given.

Project vehicles

The main project vehicle used in the preparation of this manual, and appearing in the majority of the photographic sequences, was a 1989 Fiat Tipo 1.6 DGT SX. Additional work was carried out and photographed on a 1989 Fiat Tipo 1.4 Formula, and a 1989 Fiat Tipo 1.6 DGT.

Introduction to the FIAT Tipo

The FIAT Tipo was first introduced to the UK market in July 1988 with the option of three engine sizes and three trim levels. This manual covers the petrol engines, but other models in the range are fitted with Diesel engines.

The Tipo was introduced by FIAT as the successor to the Strada. However, the Tipo was conceived as a totally fresh design, and shares very little with its predecessor. The controversial styling incorporates an unusually long wheelbase for a car of this class, together with a high roof line, which allows maximum use of interior space.

All models share the same 5-door Hatchback body style and a five-

speed manual gearbox. 1.4 and 1.6 litre engines are available. All-round independent suspension is fitted, and the suspension and drivetrain components are mounted on subframes to reduce the transmission of road noise to the passenger compartment, and to preserve the alignment of the components in the event of minor impact.

The standard equipment fitment is comprehensive across the range, and as a result, few options are available.

For the home mechanic, the Tipo is a straightforward vehicle to maintain, and most of the items requiring frequent attention are easily accessible.

General dimensions, weights and capacities

Dimensions

Overall length	3958 mm (156.0 in)
Overall width (excluding door mirrors)	1700 mm (67.0 in)
Overall height	1445 mm (57.0 in)
Wheelbase	2540 mm (100.0 in)
Front track	1429 mm (56.3 in)
Rear track	1415 mm (55.8 in)
Turning circle.....	10.3 m (33.8 ft)

Weights

Kerb weight:*	
1.4 litre models	945 to 965 kg (2084 to 2128 lbs)
1.6 litre models	970 kg (2139 lbs)
Maximum gross vehicle weight	Refer to VIN plate
Maximum towing weight:	
Braked trailer:	
1.4 litre models.....	1100 kg (2426 lbs)
1.6 litre models.....	1200 kg (2646 lbs)
Unbraked trailer:	
1.4 litre models.....	525 kg (1158 lbs)
1.6 litre models.....	550 kg (1213 lbs)
Maximum towing hitch downward load:	
1.4 litre models	77 kg (170 lbs)
1.6 litre models	84 kg (185 lbs)

*Exact kerb weights depend upon model and specification

Capacities

Engine oil (including filter):	
Drain and refill	3.30 litres (5.80 pints)
From dry (after major overhaul)	3.75 litres (6.60 pints)
Cooling system	6.5 litres (11.4 pints)
Fuel tank	55.0 litres (12.1 gals)
Manual gearbox	1.4 litres (2.5 pints)

Jacking, towing and wheel changing

Jacking and wheel changing

Note: A "space-saver" spare wheel is provided on all Tipo models. The tyre fitted to this wheel is smaller than the standard tyres, and the wheel should only be used to travel the distance necessary to reach a suitable tyre repair specialist where the damaged tyre can be repaired. Do not exceed a speed of 50 mph (80 kmh) when using the spare wheel. The spare tyre has a maximum life of 1800 miles (3000 km)

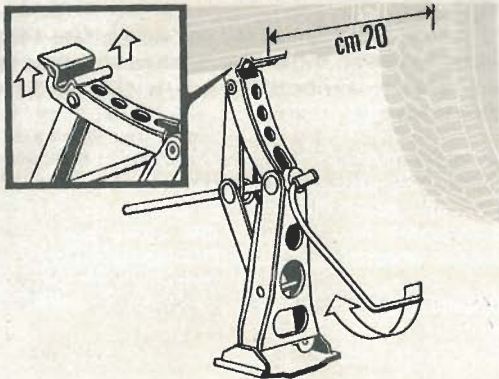
The jack supplied with the vehicle tool kit should only be used for changing roadwheels. When carrying out any other kind of work, raise the vehicle using a hydraulic jack, and always supplement the jack with axle stands positioned under the vehicle jacking points.

To change a roadwheel, first remove the spare wheel and jack from their stowage position with the spare wheel under the luggage compartment floor. Firmly apply the handbrake and engage first gear. Place chocks at the front and rear of the wheel diagonally opposite the one to be changed.

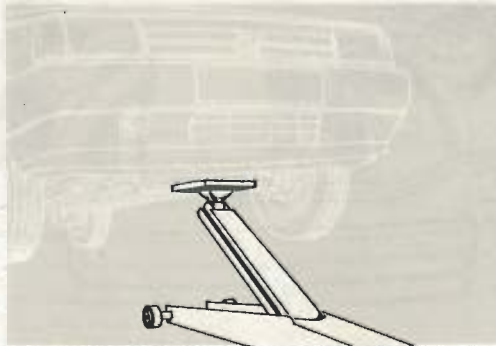
Remove the wheel trim and loosen the roadwheel bolts using the wheel brace provided in the tool kit. Position the jack head under the jacking point nearest the wheel to be changed. Raise the jack until the

wheel is clear of the ground. Note that as the car is raised, it will tend to move horizontally due to the geometry of the front suspension; the curved base of the jack is designed to compensate for this. Remove the wheel bolts and the wheel. Fit the spare wheel and secure it with the wheel bolts, noting that the locating peg on the brake disc or drum must locate in one of the four holes in the wheel rim. Lower the jack until the wheel is just touching the ground, and tighten the wheel bolts moderately tight. Now lower the jack fully and tighten the wheel bolts securely in a diagonal sequence. Refit the wheel trim, then withdraw the jack and stow the wheel, jack and wheel brace in their respective locations.

When jacking up the vehicle with a hydraulic jack, position the jack head under one of the relevant jacking points. If the rear of the vehicle is to be jacked up, a block of wood should be positioned under the rear crossmember between the jack and the vehicle, as shown in the accompanying illustration. If the front of the vehicle is to be jacked up, a block of wood should be placed between the gearbox casing and the jack. **Do not** jack the vehicle under the sump or any of the steering or suspension components. Supplement the jack with axle stands. The jacking points and axle stand positions are shown in the accompanying illustrations. **Never work under, around, or near a raised vehicle, unless it is adequately supported in at least two places.**

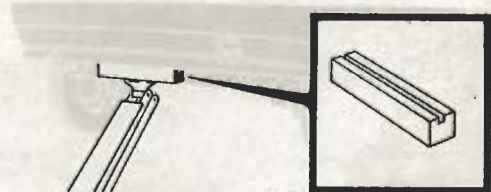


Jacking point for use with vehicle jack



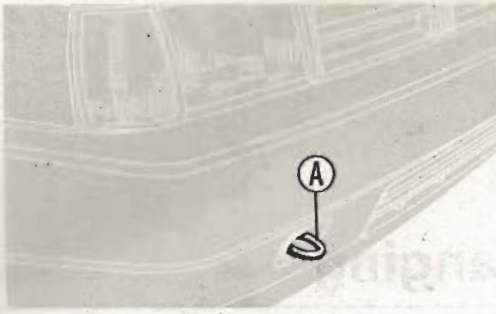
Front jacking point for use with hydraulic jack

Position jack head under gearbox casing with interposed block of wood

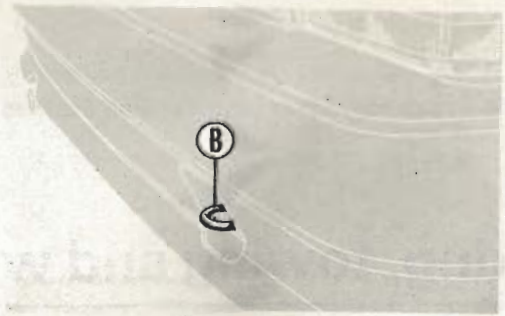


Rear jacking point for use with hydraulic jack

Dimensions of wooden block – 400 x 70 x 70 mm (16 x 3 x 3 in) with groove 10 mm (0.4 in) wide and 25 mm (1.0 in) deep



Front towing eye (A)



Rear towing eye (B)

Towing

Towing eyes are fitted to the front and rear of the vehicle for attachment of a tow rope. Always turn the ignition key to the "MAR" position when the vehicle is being towed, so that the steering lock is released and the direction indicator and brake lamps are operational.

Before being towed, release the handbrake and place the gear lever in neutral. Note that greater than usual pedal pressure will be required to operate the brakes, since the vacuum servo unit is only operational with the engine running. Similarly, on models with power steering, greater than usual steering effort will be required.

Buying spare parts and vehicle identification numbers

Buying spare parts

Spare parts are available from many sources, for example: FIAT garages, other garages and accessory shops, and motor factors. Our advice regarding spare part sources is as follows.

Officially appointed FIAT garages - This is the best source for parts which are peculiar to your car, and are not generally available (eg complete cylinder heads, internal gearbox components, badges, interior trim etc). It is also the only place at which you should buy parts if the vehicle is still under warranty. To be sure of obtaining the correct parts, it will be necessary to give the storeman your car's vehicle identification number, and if possible, take the old part along for positive identification. Many parts are available under a factory exchange scheme - any parts returned should always be clean. It obviously makes good sense to go straight to the specialists on your car for this type of part, as they are best equipped to supply you.

Other garages and accessory shops - These are often very good places to buy materials and components needed for the maintenance of your car (eg oil filters, spark plugs, bulbs, drivebelts, oils, and greases, touch-up paint, filler paste, etc). They also sell general accessories, usually have convenient opening hours, charge lower prices and can often be found not far from home.

Motor factors - Good factors will stock all the more important

components which wear out comparatively quickly (eg exhaust systems, brake pads, seals and hydraulic parts, clutch components, bearing shells, pistons, valves etc). Motor factors will often provide new or reconditioned components on a part exchange basis - this can save a considerable amount of money.

Vehicle identification numbers

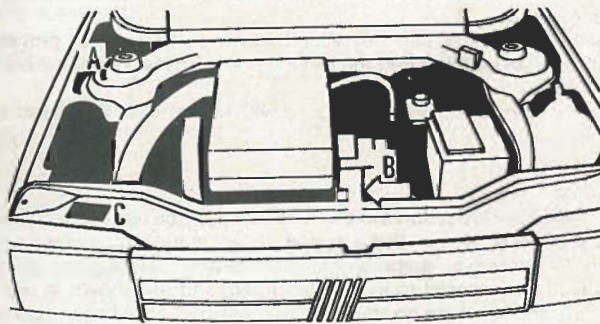
Modifications are a continuing and unpublicised process in vehicle manufacture, quite apart from major model changes. Spare parts manuals and lists are compiled upon a numerical basis, the individual vehicle identification numbers being essential to correct identification of the component concerned.

When ordering spare parts, always give as much information as possible. Quote the car model, year of manufacture, body and engine numbers as appropriate.

The **vehicle identification number (VIN)** is located on a plate in the engine compartment on the right-hand side of the body front panel (photo).

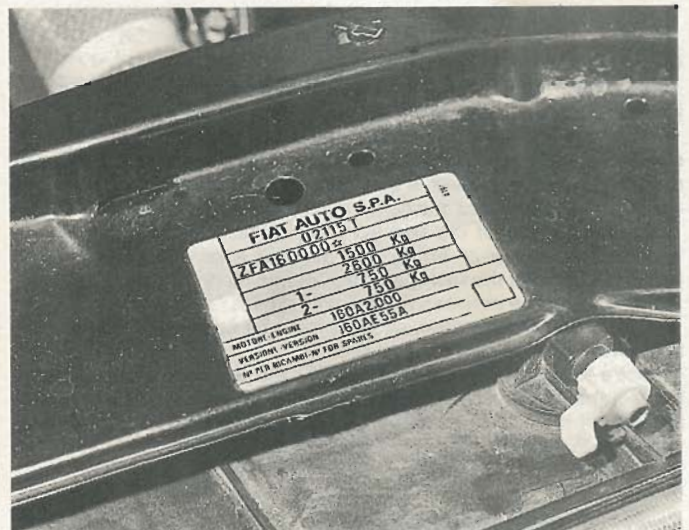
The **body (chassis) number** is stamped into the right-hand suspension turret.

The **engine number** is stamped into the flywheel end of the cylinder block casting, just below the cylinder head.



Identification number locations

- A Vehicle type code and chassis number
- B Engine number (on end-face of cylinder block)
- C VIN plate



VIN plate location

General repair procedures

Whenever servicing, repair or overhaul work is carried out on the car or its components, it is necessary to observe the following procedures and instructions. This will assist in carrying out the operation efficiently and to a professional standard of workmanship.

Joint mating faces and gaskets

Where a gasket is used between the mating faces of two components, ensure that it is renewed on reassembly, and fit it dry unless otherwise stated in the repair procedure. Make sure that the mating faces are clean and dry with all traces of old gasket removed. When cleaning a joint face, use a tool which is not likely to score or damage the face, and remove any burrs or nicks with an oilstone or fine file.

Make sure that tapped holes are cleaned with a pipe cleaner, and keep them free of jointing compound if this is being used unless specifically instructed otherwise.

Ensure that all orifices, channels or pipes are clear and blow through them, preferably using compressed air.

Oil seals

Whenever an oil seal is removed from its working location, either individually or as part of an assembly, it should be renewed.

The very fine sealing lip of the seal is easily damaged and will not seal if the surface it contacts is not completely clean and free from scratches, nicks or grooves. If the original sealing surface of the component cannot be restored, the component should be renewed.

Protect the lips of the seal from any surface which may damage them in the course of fitting. Use tape or a conical sleeve where possible. Lubricate the seal lips with oil before fitting and, on dual lipped seals, fill the space between the lips with grease.

Unless otherwise stated, oil seals must be fitted with their sealing lips toward the lubricant to be sealed.

Use a tubular drift or block of wood of the appropriate size to install the seal and, if the seal housing is shouldered, drive the seal down to the shoulder. If the seal housing is unshouldered, the seal should be fitted with its face flush with the housing top face.

Threads and fastenings

Ensure that a blind tapped hole is completely free from oil,

grease, water or other fluid before installing the bolt or stud. Failure to do this could cause the housing to crack due to the hydraulic action of the bolt or stud as it is screwed in.

When tightening a castellated nut to accept a split pin, tighten the nut to the specified torque, where applicable, and then tighten further to the next split pin hole. Never slacken the nut to align a split pin hole unless stated in the repair procedure.

When checking or retightening a nut or bolt to a specified torque setting, slacken the nut or bolt by a quarter of a turn, and then retighten to the specified setting.

Locknuts, locktabs and washers

Any fastening which will rotate against a component or housing in the course of tightening should always have a washer between it and the relevant component or housing.

Spring or split washers should always be renewed when they are used to lock a critical component such as a big-end bearing retaining nut or bolt.

Locktabs which are folded over to retain a nut or bolt should always be renewed.

Self-locking nuts can be reused in non-critical areas, providing resistance can be felt when the locking portion passes over the bolt or stud thread.

Split pins must always be replaced with new ones of the correct size for the hole.

Special tools

Some repair procedures in this manual entail the use of special tools such as a press, two or three-legged pullers, spring compressors etc. Wherever possible, suitable readily available alternatives to the manufacturer's special tools are described, and are shown in use. In some instances, where no alternative is possible, it has been necessary to resort to the use of a manufacturer's tool and this has been done for reasons of safety as well as the efficient completion of the repair operation. Unless you are highly skilled and have a thorough understanding of the procedure described, never attempt to bypass the use of any special tool when the procedure described specifies its use. Not only is there a very great risk of personal injury, but expensive damage could be caused to the components involved.

Tools and working facilities

Introduction

A selection of good tools is a fundamental requirement for anyone contemplating the maintenance and repair of a motor vehicle. For the owner who does not possess any, their purchase will prove a considerable expense, offsetting some of the savings made by doing-it-yourself. However, provided that the tools purchased meet the relevant national safety standards and are of good quality, they will last for many years and prove an extremely worthwhile investment.

To help the average owner to decide which tools are needed to carry out the various tasks detailed in this manual, we have compiled three lists of tools under the following headings: *Maintenance and minor repair*, *Repair and overhaul*, and *Special*. The newcomer to practical mechanics should start off with the *Maintenance and minor repair* tool kit and confine himself to the simpler jobs around the vehicle. Then, as his confidence and experience grow, he can undertake more difficult tasks, buying extra tools as, and when, they are needed. In this way, a *Maintenance and minor repair* tool kit can be built-up into a *Repair and overhaul* tool kit over a considerable period of time without any major cash outlays. The experienced do-it-yourselfer will have a tool kit good enough for most repair and overhaul procedures and will add tools from the *Special* category when he feels the expense is justified by the amount of use to which these tools will be put.

It is obviously not possible to cover the subject of tools fully here. For those who wish to learn more about tools and their use there is a book entitled *How to Choose and Use Car Tools* available from the publishers of this manual.

Maintenance and minor repair tool kit

The tools given in this list should be considered as a minimum requirement if routine maintenance, servicing and minor repair operations are to be undertaken. We recommend the purchase of combination spanners (ring one end, open-ended the other); although more expensive than open-ended ones, they do give the advantages of both types of spanner.

Combination spanners - 10, 11, 12, 13, 14 & 17 mm

- 1/8, 1/4, 3/8, 1/2, 5/8 & 3/4 in AF

Adjustable spanner - 9 inch

Engine sump/gearbox drain plug key

Spark plug spanner (with rubber insert)

Spark plug gap adjustment tool

Set of feeler gauges

Brake bleed nipple spanner

Screwdriver - 4 in long x 1/4 in dia (flat blade)

Screwdriver - 4 in long x 1/4 in dia (cross blade)

Combination pliers - 6 inch

Hacksaw (junior)

Tyre pump

Tyre pressure gauge

Oil can

Oil filter removal tool

Fine emery cloth

Wire brush (small)

Funnel (medium size)

Repair and overhaul tool kit

These tools are virtually essential for anyone undertaking any major repairs to a motor vehicle, and are additional to those given in the *Maintenance and minor repair* list. Included in this list is a comprehensive set of sockets. Although these are expensive, they will be found invaluable as they are so versatile - particularly if various drives are included in the set. We recommend the 1/2 in square-drive type, as this can be used with most proprietary torque wrenches. If you cannot afford a socket set, even bought piecemeal, then inexpensive tubular box spanners are a useful alternative.

The tools in this list will occasionally need to be supplemented by tools from the *Special* list.

Sockets (or box spanners) to cover range in previous list

Reversible ratchet drive (for use with sockets)

Extension piece, 10 inch (for use with sockets)

Universal joint (for use with sockets)

Torque wrench (for use with sockets)

Self-locking grips

Ball pein hammer

Soft-faced mallet (plastic/aluminium, or rubber)

Screwdriver - 6 in long x 3/8 in dia (flat blade)

Screwdriver - 2 in long x 1/8 in dia (flat blade)

Screwdriver - 1 1/2 in long x 1/4 in dia (cross blade)

Screwdriver - 3 in long x 1/2 in dia (electrician's)

Pliers - electrician's side cutters

Pliers - needle-nosed

Pliers - circlip (internal and external)

Cold chisel - 1/2 inch

Scriber

Scraper

Centre punch

Pin punch

Hacksaw

Brake hose clamp

Brake bleeding kit

Selection of twist drills

Steel rule/straight edge

Allen keys

Selection of files

Wire brush

Axle-stands

Jack (strong trolley or hydraulic type)

Light with extension lead

Special tools

The tools in this list are those which are not used regularly, are expensive to buy, or which need to be used in accordance with their manufacturers' instructions. Unless relatively difficult mechanical jobs are undertaken frequently, it will not be economic to buy many of these tools. Where this is the case, you could consider clubbing together with friends (or joining a motorists' club) to make a joint purchase, or borrowing the tools against a deposit from a local garage or tool hire specialist.

The following list contains only those tools and instruments freely available to the public, and not those special tools produced by the vehicle manufacturer specifically for its dealer network. You will find occasional references to these manufacturers' special tools in the text of this manual. Generally, an alternative method of doing the job without the vehicle manufacturers' special tool is given. However, sometimes, there is no alternative to using them. Where this is the case and the relevant tool cannot be bought or borrowed, you will have to entrust the work to a franchised garage.

Valve spring compressor
Coil spring compressors
Piston ring compressor
Balljoint separator
Universal hub/bearing puller
Impact screwdriver
Micrometer and/or vernier gauge
Dial gauge
Stroboscopic timing light
Dwell angle meter/tachometer
Universal electric multi-meter
Cylinder compression gauge
Lifting tackle
Trolley jack

Buying tools

For practically all tools, a tool factor is the best source since he will have a very comprehensive range compared with the average garage or accessory shop. Having said that, accessory shops often offer excellent quality tools at discount prices, so it pays to shop around.

There are plenty of good tools around at reasonable prices, but always aim to purchase items which meet the relevant national safety standards. If in doubt, ask the proprietor or manager of the shop for advice before making a purchase.

Care and maintenance of tools

Having purchased a reasonable tool kit, it is necessary to keep the tools in a clean serviceable condition. After use, always wipe off any dirt, grease and metal particles using a clean, dry cloth, before putting the tools away. Never leave them lying around after they have been used. A simple tool rack on the garage or workshop wall, for items such as screwdrivers and pliers is a good idea. Store all normal wrenches and sockets in a metal box. Any measuring instruments, gauges, meters, etc, must be carefully stored where they cannot be damaged or become rusty.

Take a little care when tools are used. Hammer heads inevitably become marked and screwdrivers lose the keen edge on their blades from time to time. A little timely attention with emery cloth or a file will soon restore items like this to a good serviceable finish.

Working facilities

Not to be forgotten when discussing tools, is the workshop itself. If anything more than routine maintenance is to be carried out, some form of suitable working area becomes essential.

It is appreciated that many an owner mechanic is forced by circumstances to remove an engine, or similar item, without the benefit of a garage or workshop. Having done this, any repairs should always be done under the cover of a roof.

Wherever possible, any dismantling should be done on a clean, flat workbench or table at a suitable working height. Any workbench needs a vice: one with a jaw opening of 4 in (100 mm) is suitable for most jobs. As mentioned previously, some clean dry storage space is also required for tools, as well as for lubricants, cleaning fluids, touch-up paints and so on, which become necessary.

Another item which may be required, and which has a much more general usage, is an electric drill with a chuck capacity of at least $\frac{7}{8}$ in (8 mm). This, together with a good range of twist drills, is virtually essential for fitting accessories such as mirrors and reversing lights.

Last, but not least, always keep a supply of old newspapers and clean, lint-free rags available, and try to keep any working area as clean as possible.

Spanner jaw gap comparison table

Jaw gap - in	Spanner size
0.250	$\frac{1}{4}$ in AF
0.275	7 mm
0.312	$\frac{1}{8}$ in AF
0.315	8 mm
0.343	$\frac{1}{2}$ in AF; $\frac{1}{2}$ in Whitworth
0.354	9 mm
0.375	$\frac{3}{8}$ in AF
0.394	10 mm
0.433	11 mm
0.437	$\frac{7}{16}$ in AF
0.445	$\frac{7}{16}$ in Whitworth; $\frac{1}{2}$ in BSF
0.472	12 mm
0.500	$\frac{1}{2}$ in AF
0.512	13 mm
0.525	$\frac{1}{2}$ in Whitworth; $\frac{5}{8}$ in BSF
0.551	14 mm
0.562	$\frac{1}{8}$ in AF
0.591	15 mm
0.600	$\frac{1}{8}$ in Whitworth; $\frac{3}{4}$ in BSF
0.625	$\frac{3}{8}$ in AF
0.630	16 mm
0.669	17 mm
0.687	$\frac{1}{4}$ in AF
0.709	18 mm
0.710	$\frac{3}{8}$ in Whitworth; $\frac{7}{16}$ in BSF
0.748	19 mm
0.750	$\frac{3}{8}$ in AF
0.812	$\frac{1}{2}$ in AF
0.866	22 mm
0.875	$\frac{1}{2}$ in AF
0.920	$\frac{1}{2}$ in Whitworth; $\frac{9}{16}$ in BSF
0.937	$\frac{1}{2}$ in AF
0.945	24 mm
1.000	1 in AF
1.010	$\frac{9}{16}$ in Whitworth; $\frac{5}{8}$ in BSF
1.024	26 mm
1.062	$1\frac{1}{16}$ in AF; 27 mm
1.063	27 mm
1.125	$1\frac{1}{8}$ in AF
1.182	30 mm
1.200	$\frac{1}{2}$ in Whitworth; $\frac{3}{4}$ in BSF
1.250	$1\frac{1}{2}$ in AF
1.260	32 mm
1.312	$1\frac{1}{8}$ in AF
1.375	$1\frac{3}{8}$ in AF
1.418	36 mm
1.437	$1\frac{1}{4}$ in AF
1.480	$\frac{3}{4}$ in Whitworth; 1 in BSF
1.500	$1\frac{1}{2}$ in AF
1.575	40 mm; $1\frac{1}{2}$ in Whitworth
1.615	41 mm
1.625	$1\frac{5}{8}$ in AF
1.670	1 in Whitworth; $1\frac{1}{2}$ in BSF
1.688	$1\frac{1}{2}$ in AF
1.811	46 mm
1.813	$1\frac{3}{4}$ in AF
1.860	$1\frac{1}{2}$ in Whitworth; $1\frac{1}{4}$ in BSF
1.875	$1\frac{5}{8}$ in AF
1.969	50 mm
2.000	2 in AF
2.050	$1\frac{1}{2}$ in Whitworth; $1\frac{3}{4}$ in BSF
2.165	55 mm
2.362	60 mm

Safety first!

Professional motor mechanics are trained in safe working procedures. However enthusiastic you may be about getting on with the job in hand, do take the time to ensure that your safety is not put at risk. A moment's lack of attention can result in an accident, as can failure to observe certain elementary precautions.

There will always be new ways of having accidents, and the following points do not pretend to be a comprehensive list of all dangers; they are intended rather to make you aware of the risks and to encourage a safety-conscious approach to all work you carry out on your vehicle.

Essential DOs and DON'Ts

DON'T rely on a single jack when working underneath the vehicle. Always use reliable additional means of support, such as axle stands, securely placed under a part of the vehicle that you know will not give way.

DON'T attempt to loosen or tighten high-torque nuts (e.g. wheel hub nuts) while the vehicle is on a jack; it may be pulled off.

DON'T start the engine without first ascertaining that the transmission is in neutral (or 'Park' where applicable) and the parking brake applied.

DON'T suddenly remove the filler cap from a hot cooling system – cover it with a cloth and release the pressure gradually first, or you may get scalded by escaping coolant.

DON'T attempt to drain oil until you are sure it has cooled sufficiently to avoid scalding you.

DON'T grasp any part of the engine, exhaust or catalytic converter without first ascertaining that it is sufficiently cool to avoid burning you.

DON'T allow brake fluid or antifreeze to contact vehicle paintwork.

DON'T syphon toxic liquids such as fuel, brake fluid or antifreeze by mouth, or allow them to remain on your skin.

DON'T inhale dust – it may be injurious to health (see *Asbestos* below).

DON'T allow any spilt oil or grease to remain on the floor – wipe it up straight away, before someone slips on it.

DON'T use ill-fitting spanners or other tools which may slip and cause injury.

DON'T attempt to lift a heavy component which may be beyond your capability – get assistance.

DON'T rush to finish a job, or take unverified short cuts.

DON'T allow children or animals in or around an unattended vehicle. **DO** wear eye protection when using power tools such as drill, sander, bench grinder etc, and when working under the vehicle.

DO use a barrier cream on your hands prior to undertaking dirty jobs – it will protect your skin from infection as well as making the dirt easier to remove afterwards; but make sure your hands aren't left slippery. Note that long-term contact with used engine oil can be a health hazard.

DO keep loose clothing (cuffs, tie etc) and long hair well out of the way of moving mechanical parts.

DO remove rings, wristwatch etc, before working on the vehicle – especially the electrical system.

DO ensure that any lifting tackle used has a safe working load rating adequate for the job.

DO keep your work area tidy – it is only too easy to fall over articles left lying around.

DO get someone to check periodically that all is well, when working alone on the vehicle.

DO carry out work in a logical sequence and check that everything is correctly assembled and tightened afterwards.

DO remember that your vehicle's safety affects that of yourself and others. If in doubt on any point, get specialist advice.

IF, in spite of following these precautions, you are unfortunate enough to injure yourself, seek medical attention as soon as possible.

Asbestos

Certain friction, insulating, sealing, and other products – such as brake linings, brake bands, clutch linings, torque converters, gaskets, etc – contain asbestos. *Extreme care must be taken to avoid inhalation of dust from such products since it is hazardous to health.* If in doubt, assume that they do contain asbestos.

Fire

Remember at all times that petrol (gasoline) is highly flammable. Never smoke, or have any kind of naked flame around, when working on the vehicle. But the risk does not end there – a spark caused by an electrical short-circuit, by two metal surfaces contacting each other, by careless use of tools, or even by static electricity built up in your body under certain conditions, can ignite petrol vapour, which in a confined space is highly explosive.

Always disconnect the battery earth (ground) terminal before working on any part of the fuel or electrical system, and never risk spilling fuel on to a hot engine or exhaust.

It is recommended that a fire extinguisher of a type suitable for fuel and electrical fires is kept handy in the garage or workplace at all times. Never try to extinguish a fuel or electrical fire with water.

Note: Any reference to a 'torch' appearing in this manual should always be taken to mean a hand-held battery-operated electric lamp or flashlight. It does NOT mean a welding/gas torch or blowlamp.

Fumes

Certain fumes are highly toxic and can quickly cause unconsciousness and even death if inhaled to any extent. Petrol (gasoline) vapour comes into this category, as do the vapours from certain solvents such as trichloroethylene. Any draining or pouring of such volatile fluids should be done in a well ventilated area.

When using cleaning fluids and solvents, read the instructions carefully. Never use materials from unmarked containers – they may give off poisonous vapours.

Never run the engine of a motor vehicle in an enclosed space such as a garage. Exhaust fumes contain carbon monoxide which is extremely poisonous; if you need to run the engine, always do so in the open air or at least have the rear of the vehicle outside the workplace.

If you are fortunate enough to have the use of an inspection pit, never drain or pour petrol, and never run the engine, while the vehicle is standing over it; the fumes, being heavier than air, will concentrate in the pit with possibly lethal results.

The battery

Never cause a spark, or allow a naked light, near the vehicle's battery. It will normally be giving off a certain amount of hydrogen gas, which is highly explosive.

Always disconnect the battery earth (ground) terminal before working on the fuel or electrical systems.

If possible, loosen the filler plugs or cover when charging the battery from an external source. Do not charge at an excessive rate or the battery may burst.

Take care when topping up and when carrying the battery. The acid electrolyte, even when diluted, is very corrosive and should not be allowed to contact the eyes or skin.

If you ever need to prepare electrolyte yourself, always add the acid slowly to the water, and never the other way round. Protect against splashes by wearing rubber gloves and goggles.

When jump starting a car using a booster battery, for negative earth (ground) vehicles, connect the jump leads in the following sequence: First connect one jump lead between the positive (+) terminals of the two batteries. Then connect the other jump lead first to the negative (-) terminal of the booster battery, and then to a good earthing (ground) point on the vehicle to be started, at least 18 in (45 cm) from the battery if possible. Ensure that hands and jump leads are clear of any moving parts, and that the two vehicles do not touch. Disconnect the leads in the reverse order.

Mains electricity and electrical equipment

When using an electric power tool, inspection light etc, always ensure that the appliance is correctly connected to its plug and that, where necessary, it is properly earthed (grounded). Do not use such appliances in damp conditions and, again, beware of creating a spark or applying excessive heat in the vicinity of fuel or fuel vapour. Also ensure that the appliances meet the relevant national safety standards.

Ignition HT voltage

A severe electric shock can result from touching certain parts of the ignition system, such as the HT leads, when the engine is running or being cranked, particularly if components are damp or the insulation is defective. Where an electronic ignition system is fitted, the HT voltage is much higher and could prove fatal.

Routine maintenance

Maintenance is essential for ensuring safety, and desirable for the purpose of getting the best in terms of performance and economy from your car. Over the years the need for periodic lubrication has been greatly reduced, if not totally eliminated. This has unfortunately tended to lead some owners to think that because no such action is required, the items either no longer exist, or will last forever. This is certainly not the case; it is essential to carry out regular visual examination as comprehensively as possible, in order to spot any potential defects at an early stage before they develop into major expensive repairs.

The following service schedules are a list of the maintenance requirements, and the intervals at which they should be carried out based on the manufacturer's recommendations. Where applicable, these procedures are covered in greater detail throughout this manual, near the beginning of each Chapter.

Every 250 miles (400 km) or weekly - whichever occurs first

Engine, cooling system and braking system

- Check the engine oil level and top up if necessary
- Check the coolant level and top up if necessary
- Check the brake fluid level in the reservoir and top up if necessary

Steering

- Check the power steering fluid level and top up if necessary (where applicable)

Lamps and wipers

- Check the operation of all lamps, wipers and washers
- Check the washer fluid level and top up if necessary

Tyres

- Check the tyre pressures (including the spare)
- Visually examine the tyres for wear or damage

Every 9000 miles (15 000 km) or 12 months - whichever occurs first

Engine (Chapter 1)

- Change the engine oil and renew the oil filter
- Check for oil leaks and rectify as necessary

Cooling system (Chapter 2)

- Check the coolant level and top up if necessary
- Check for coolant leaks and rectify as necessary
- Inspect the radiator matrix for blockage (eg dead insects), and clean as necessary

Fuel and exhaust systems (Chapter 3)

- Inspect the air cleaner element for blockage and clean or renew as necessary
- Check for fuel leaks and rectify as necessary
- Check the operation of the throttle linkage and lubricate if necessary
- Check the exhaust system for corrosion, leaks and security
- Check all vacuum hoses for condition and security
- Check the operation of the air cleaner air temperature control

Ignition system (Chapter 4)

- Check the condition of the spark plugs
- Check all wiring and vacuum hoses for condition and security

Manual gearbox (Chapter 6)

- Check for oil leaks and rectify as necessary

Driveshafts (Chapter 7)

- Check the driveshafts for damage or distortion and check the condition of the joint gaiters

Braking system (Chapter 8)

- Check the brake fluid level in the reservoir and top up if necessary
- Check the front brake pad friction material for wear and renew if necessary
- Check the brake fluid leaks and rectify as necessary
- Check brake fluid level warning lamp operation
- Check the condition and adjustment of the handbrake cable and check the handbrake mechanism for satisfactory operation

Suspension and steering (Chapter 9)

- Check the tightness of the roadwheel bolts
- Check the tyre pressures
- Check the condition and tension of the power steering fluid pump drivebelt (where applicable)

Electrical system (Chapter 11)

- Check the operation of all interior and exterior lamps and all electrical systems
- Check all exposed wiring for condition and security
- Check the washer fluid level and top up if necessary
- Check the battery electrolyte level and top up if necessary

Every 12 000 miles (20 000 km) or 12 months - whichever occurs first

In addition to all the items in the 9000 mile (15 000 km) service, carry out the following:

Engine (Chapter 1)

- Check and if necessary adjust the valve clearances
- Inspect the crankcase ventilation system for condition and security

Cooling system (Chapter 2)

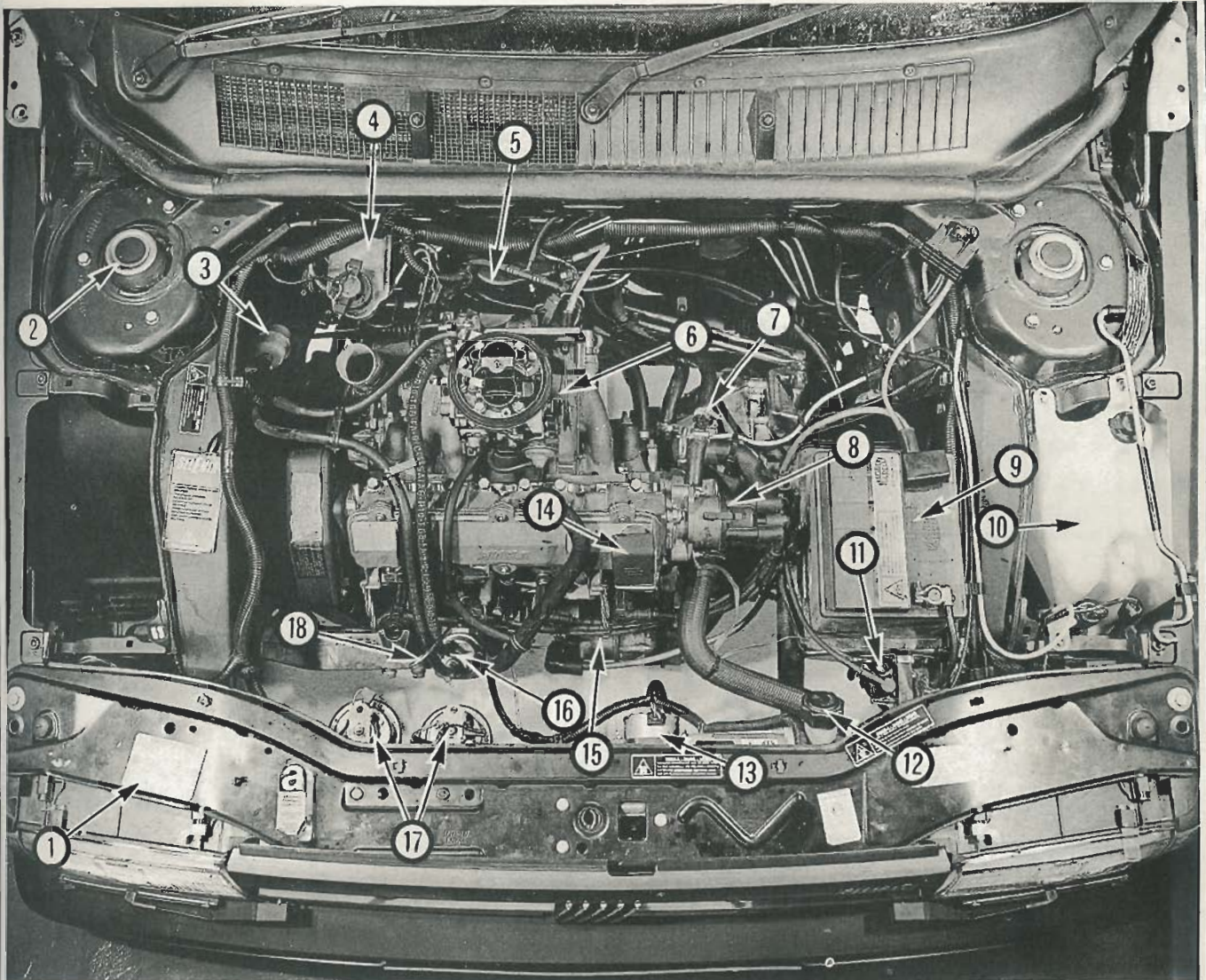
- Check the operation of the cooling fan
- Check the condition and tension of the coolant pump/alternator drivebelt

Fuel and exhaust systems (Chapter 3)

- Renew the air cleaner element
- Renew the fuel filter
- Check and if necessary adjust the idle speed and mixture

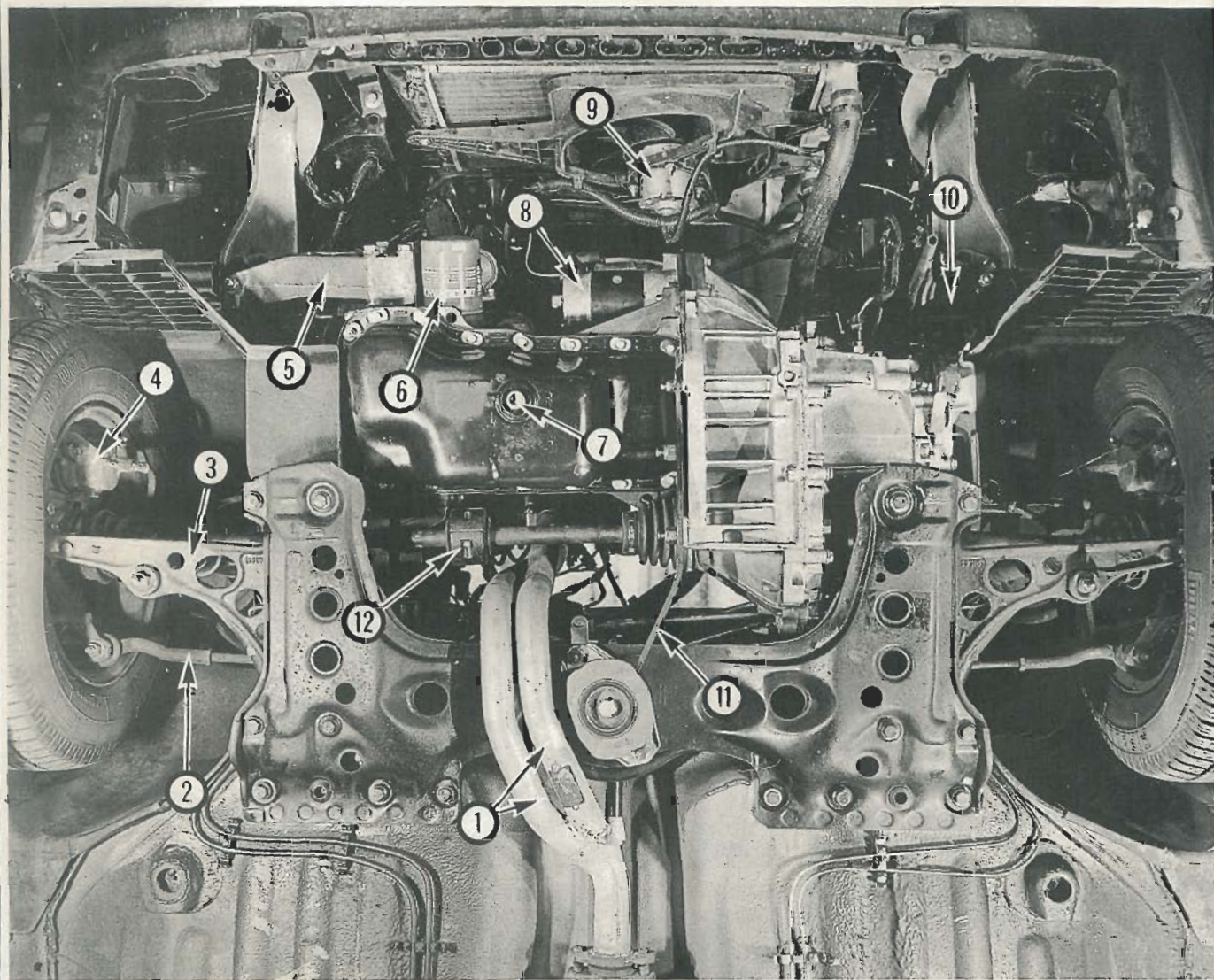
Ignition system (Chapter 4)

- Renew the spark plugs
- Inspect and clean the distributor cap and HT leads



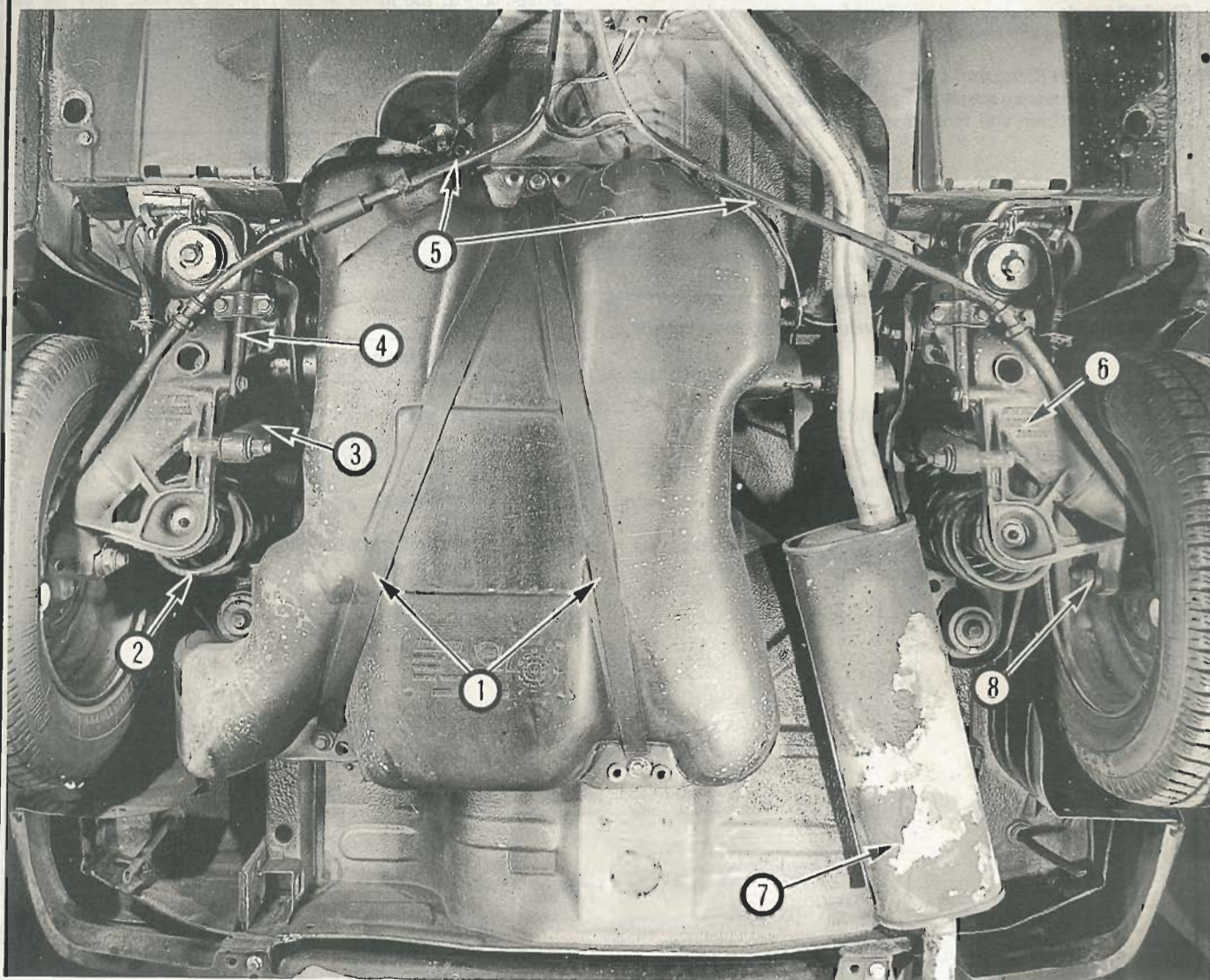
Underbonnet view of a 1989 1.6 DGT SX model (air cleaner removed)

- | | | | |
|----------------------------------|-----------------------------------|--------------------------------------|-----------------------|
| 1 VIN plate | 6 Carburettor | 10 Washer fluid reservoir | 14 Oil filler cap |
| 2 Suspension strut top | 7 Heater hose coolant bleed screw | 11 Ignition coil | 15 Starter motor |
| 3 Fuel filter | 8 Distributor cap | 12 Coolant expansion tank filler cap | 16 Fuel pump |
| 4 Brake fluid reservoir | 9 Battery | 13 Cooling fan motor | 17 Horns |
| 5 Cable bellcrank assembly cover | | | 18 Oil level dipstick |



Front underbody view of a 1989 1.6 DGT SX model

- | | | | |
|------------------------|------------------------------|-------------------------------|---|
| 1 Exhaust downpipes | 5 Right-hand engine mounting | 8 Starter motor | 11 Centre engine/gearbox mounting bracket |
| 2 Track rod end | 6 Oil filter | 9 Cooling fan motor | 12 Driveshaft damper weight |
| 3 Suspension lower arm | 7 Sump drain plug | 10 Left-hand gearbox mounting | |
| 4 Brake caliper | | | |



Rear underbody view of a 1989 1.6 DGT SX model

1 Fuel tank securing straps
2 Coil spring

3 Shock absorber
4 Anti-roll bar

5 Handbrake cables
6 Suspension trailing arm

7 Exhaust rear box
8 Rear hub nut

Clutch (Chapter 5)

Check the condition and adjustment of the clutch cable

Manual gearbox (Chapter 6)

Check the oil level and top up if necessary

Suspension and steering (Chapter 9)

Check all components for wear and damage

Bodywork (Chapter 10)

Check all panels and structural members for corrosion and damage
Lubricate all locks and hinges

Electrical system (Chapter 11)

Check and if necessary adjust the headlamp alignment
Check the condition and tension of the coolant pump/alternator drivebelt

Every 24 000 miles (40 000 km) or 24 months - whichever occurs first

In addition to all the items in the previous services, carry out the following:

Engine (Chapter 1)

Check the condition and tension of the timing belt

Fuel and exhaust system (Chapter 3)

Clean the carburettor exterior, float chambers and jets

Ignition system (Chapter 4)

Check and if necessary adjust the ignition timing, and check the operation of the vacuum advance unit (1.4 litre models only)

Braking system (Chapter 8)

Check the rear brake shoe friction material for wear, and renew if necessary
Check the operation of the rear brake wheel cylinders

Every 36 000 miles (60 000 km) or 24 months - whichever occurs first

In addition to the items in the previous services, carry out the following:

Cooling system (Chapter 2)

Renew the coolant

Every 24 months - regardless of mileage

In addition to the items in the previous services, carry out the following:

Braking system (Chapter 8)

Renew the brake fluid

Every 60 000 miles (100 000 km)

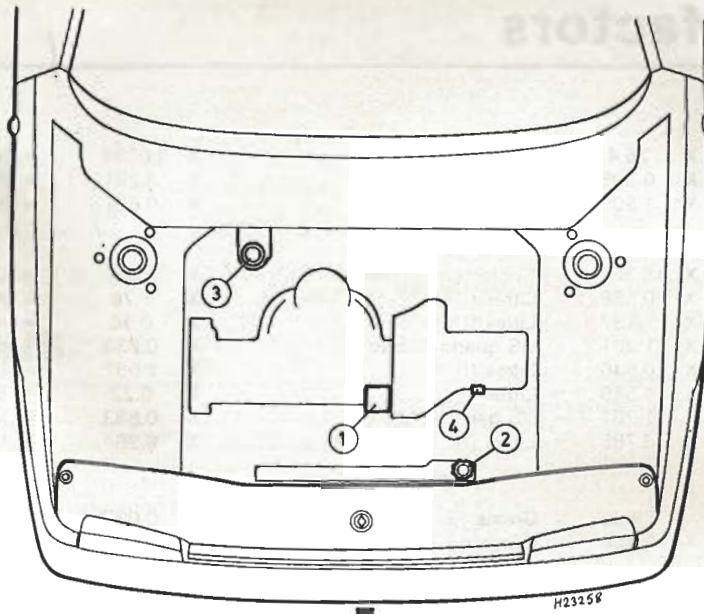
In addition to all the items in the previous services, carry out the following:

Engine (Chapter 1)

Renew the timing belt

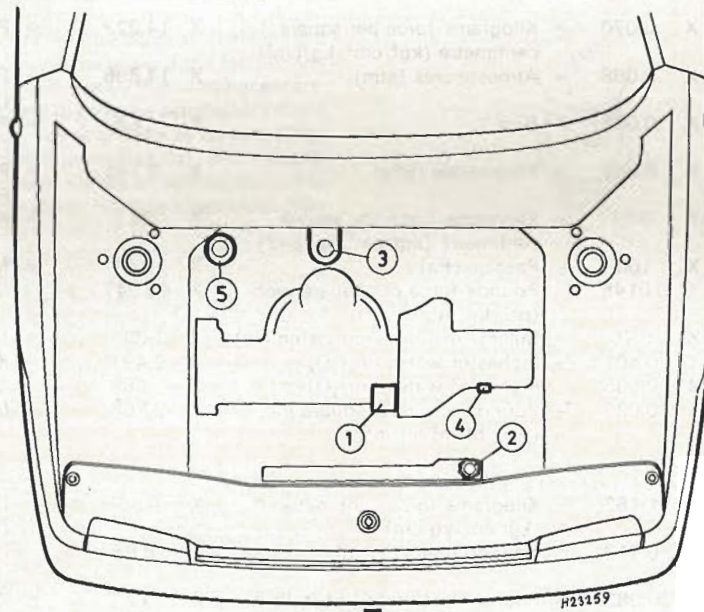
Manual gearbox (Chapter 6)

Renew the gearbox oil



FRONT

Models with manual steering



FRONT

Models with power steering

Recommended lubricants and fluids

Component or system	Lubricant type/specification	Duckhams recommendation
1 Engine	Multigrade engine oil, viscosity range SAE 15W/40, to API SF/CC or better	Duckhams QXR or Hypergrade
2 Cooling system	Soft water and ethylene glycol based antifreeze	Duckhams Universal Antifreeze and Summer Coolant
3 Brake hydraulic system	Hydraulic fluid to SAE J1703	Duckhams Universal Brake and Clutch Fluid
4 Manual gearbox	Gear oil, viscosity SAE 80 to API GL4	Duckhams Hypoid 80
5 Power steering	Dexron II type ATF	Duckhams D-Matic

Conversion factors

Length (distance)

Inches (in)	X 25.4	= Millimetres (mm)	X 0.0394	= Inches (in)
Feet (ft)	X 0.305	= Metres (m)	X 3.281	= Feet (ft)
Miles	X 1.609	= Kilometres (km)	X 0.621	= Miles

Volume (capacity)

Cubic inches (cu in; in ³)	X 16.387	= Cubic centimetres (cc; cm ³)	X 0.061	= Cubic inches (cu in; in ³)
Imperial pints (Imp pt)	X 0.568	= Litres (l)	X 1.76	= Imperial pints (Imp pt)
Imperial quarts (Imp qt)	X 1.137	= Litres (l)	X 0.88	= Imperial quarts (Imp qt)
Imperial quarts (Imp qt)	X 1.201	= US quarts (US qt)	X 0.833	= Imperial quarts (Imp qt)
US quarts (US qt)	X 0.946	= Litres (l)	X 1.057	= US quarts (US qt)
Imperial gallons (Imp gal)	X 4.546	= Litres (l)	X 0.22	= Imperial gallons (Imp gal)
Imperial gallons (Imp gal)	X 1.201	= US gallons (US gal)	X 0.833	= Imperial gallons (Imp gal)
US gallons (US gal)	X 3.785	= Litres (l)	X 0.264	= US gallons (US gal)

Mass (weight)

Ounces (oz)	X 28.35	= Grams (g)	X 0.035	= Ounces (oz)
Pounds (lb)	X 0.454	= Kilograms (kg)	X 2.205	= Pounds (lb)

Force

Ounces-force (ozf; oz)	X 0.278	= Newtons (N)	X 3.6	= Ounces-force (ozf; oz)
Pounds-force (lbf; lb)	X 4.448	= Newtons (N)	X 0.225	= Pounds-force (lbf; lb)
Newtons (N)	X 0.1	= Kilograms-force (kgf; kg)	X 9.81	= Newtons (N)

Pressure

Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 0.070	= Kilograms-force per square centimetre (kgf/cm ² ; kg/cm ²)	X 14.223	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)
Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 0.068	= Atmospheres (atm)	X 14.696	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)
Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 0.069	= Bars	X 14.5	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)
Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 6.895	= Kilopascals (kPa)	X 0.145	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)
Kilopascals (kPa)	X 0.01	= Kilograms-force per square centimetre (kgf/cm ² ; kg/cm ²)	X 98.1	= Kilopascals (kPa)
Millibar (mbar)	X 100	= Pascals (Pa)	X 0.01	= Millibar (mbar)
Millibar (mbar)	X 0.0145	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 68.947	= Millibar (mbar)
Millibar (mbar)	X 0.75	= Millimetres of mercury (mmHg)	X 1.333	= Millibar (mbar)
Millibar (mbar)	X 0.401	= Inches of water (inH ₂ O)	X 2.491	= Millibar (mbar)
Millimetres of mercury (mmHg)	X 0.535	= Inches of water (inH ₂ O)	X 1.868	= Millimetres of mercury (mmHg)
Inches of water (inH ₂ O)	X 0.036	= Pounds-force per square inch (psi; lbf/in ² ; lb/in ²)	X 27.68	= Inches of water (inH ₂ O)

Torque (moment of force)

Pounds-force inches (lbf in; lb in)	X 1.152	= Kilograms-force centimetre (kgf cm; kg cm)	X 0.868	= Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	X 0.113	= Newton metres (Nm)	X 8.85	= Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	X 0.083	= Pounds-force feet (lbf ft; lb ft)	X 12	= Pounds-force inches (lbf in; lb in)
Pounds-force feet (lbf ft; lb ft)	X 0.138	= Kilograms-force metres (kgf m; kg m)	X 7.233	= Pounds-force feet (lbf ft; lb ft)
Pounds-force feet (lbf ft; lb ft)	X 1.356	= Newton metres (Nm)	X 0.738	= Pounds-force feet (lbf ft; lb ft)
Newton metres (Nm)	X 0.102	= Kilograms-force metres (kgf m; kg m)	X 9.804	= Newton metres (Nm)

Power

Horsepower (hp)	X 745.7	= Watts (W)	X 0.0013	= Horsepower (hp)
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Velocity (speed)

Miles per hour (miles/hr; mph)	X 1.609	= Kilometres per hour (km/hr; kph)	X 0.621	= Miles per hour (miles/hr; mph)
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Fuel consumption*

Miles per gallon, Imperial (mpg)	X 0.354	= Kilometres per litre (km/l)	X 2.825	= Miles per gallon, Imperial (mpg)
Miles per gallon, US (mpg)	X 0.425	= Kilometres per litre (km/l)	X 2.352	= Miles per gallon, US (mpg)

Temperature

Degrees Fahrenheit = (°C x 1.8) + 32

Degrees Celsius (Degrees Centigrade; °C) = (°F - 32) x 0.56

*It is common practice to convert from miles per gallon (mpg) to litres/100 kilometres (l/100km),

where mpg (Imperial) x l/100 km = 282 and mpg (US) x l/100 km = 235