FORD V8 MUSTANG

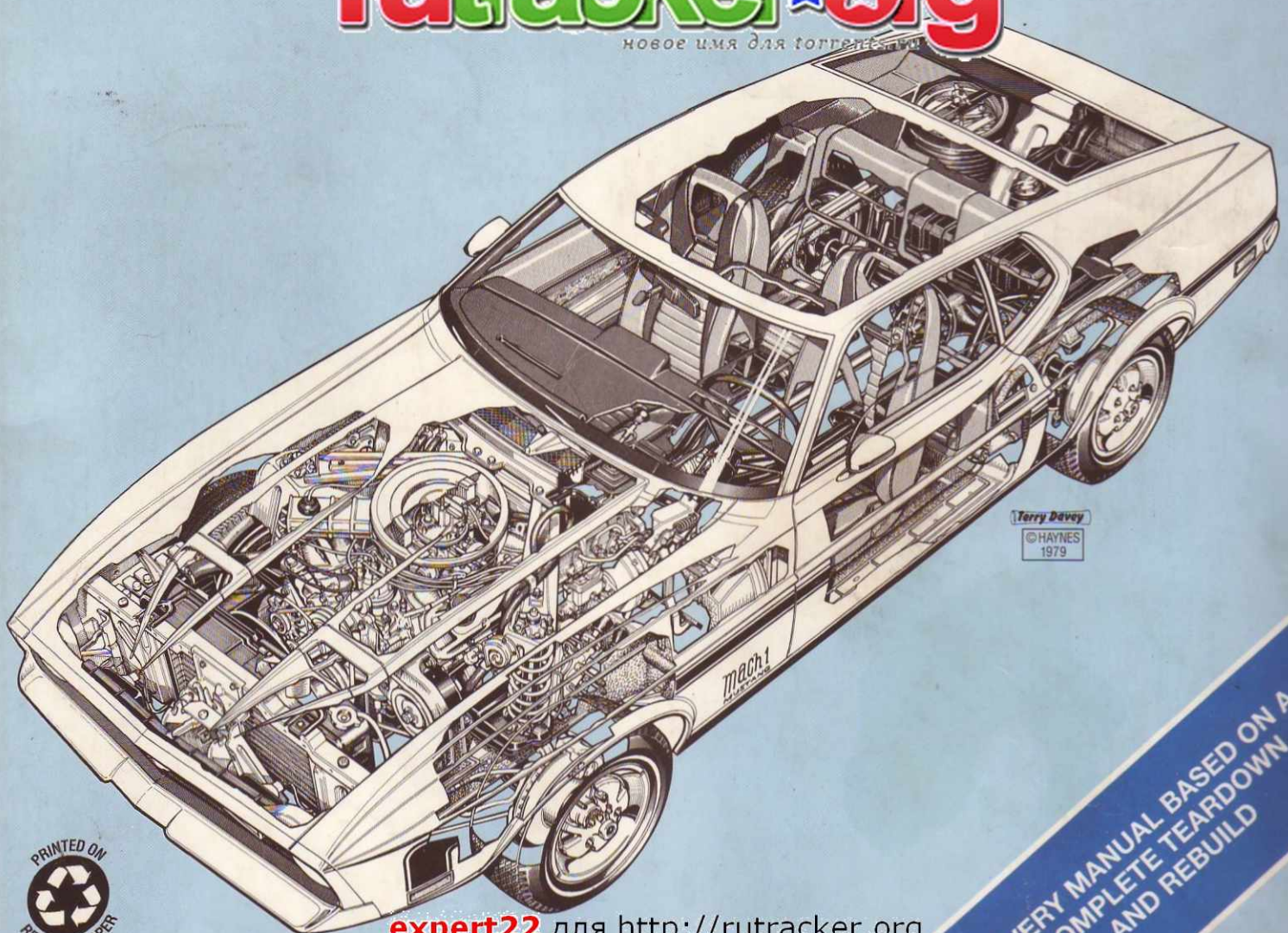
1964 1/2 thru 1973

260, 289, 302, 351, 390, 427, 428 & 429 cu in

36048 (357)

Haynes

Automotive Repair Manual



PRINTED ON RECYCLED PAPER

EVERY MANUAL BASED ON A COMPLETE TEARDOWN AND REBUILD

Ford Mustang Automotive Repair Manual

by J H Haynes
Member of the Guild of Motoring Writers
Bruce Gilmour
and Marcus S Daniels

Models covered:
All Mustang V8 models

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Special thanks are also due to all those people at Sparkford and in the USA who helped in the production of this Manual. Particularly, these are Brian Horsfall and Les Brazier who carried out the mechanical work and took the photographs respectively, Pete Ward who edited the text and Stanley Randolf who planned the page layout.

About this manual

Its aims

The aim of this Manual is to help you get the best value from your car. 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 repair station), 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 repair station, and going there twice to leave and collect it. Perhaps most important, a lot of money can be saved by avoiding the costs the garage must charge to cover its labor 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 twelve 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 4th drawing/illustration in Chapter 6. Photographs are numbered (either individually or in related groups) the same as the Section or sub-section of the text where the operation they show is described.

There is an alphabetical index at the back of the manual as well as a contents list at the front.

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

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.

Introduction to the Ford Mustang

The original Mustang design was created by Ford's chief stylist Joseph Oros and when the finished car was introduced to the market in April 1964 it caused even more interest and excitement amongst the American motoring fraternity than its predecessor the Thunderbird.

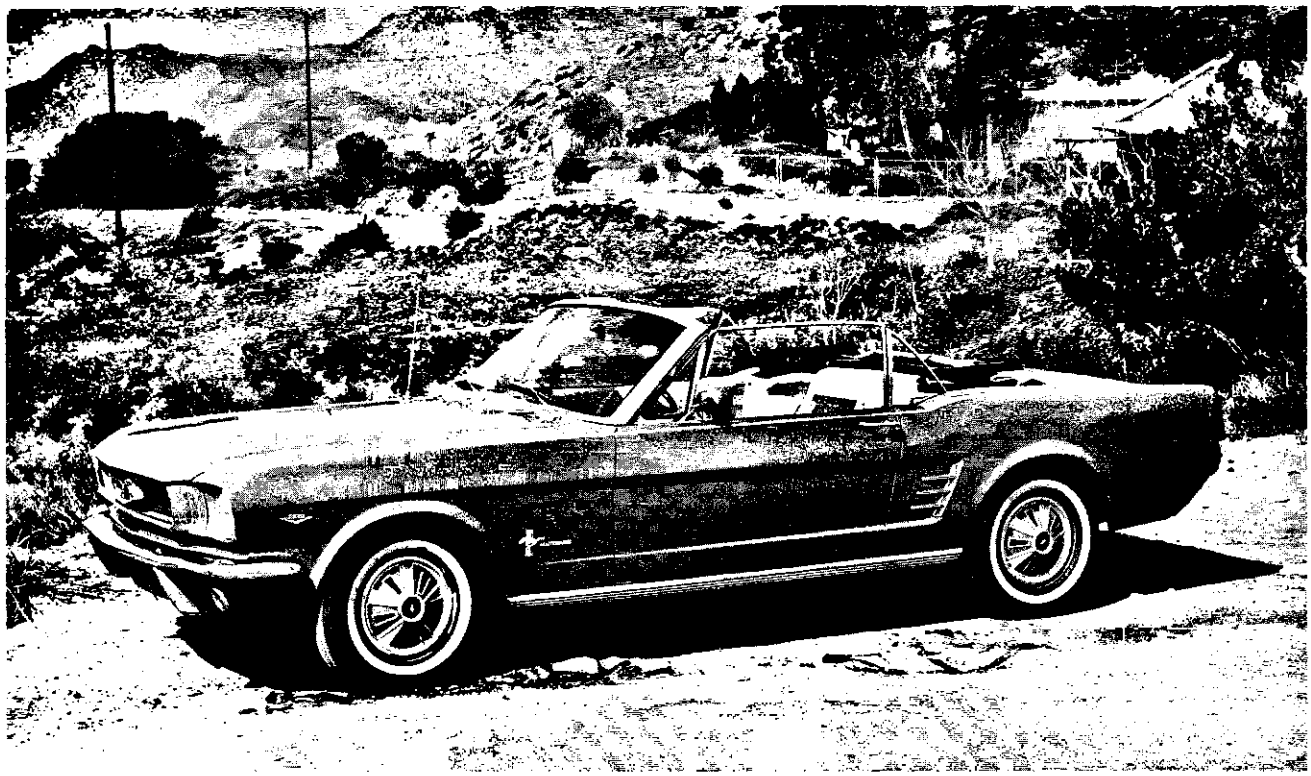
With its racy and definitely masculine appearance, the low price tag and not least the excellent choice of name, the Mustang was a phenomenal success. In fact, by 1966, the sales figures were nearing the two million figure.

When first introduced, the Mustang was available with an option of four engine capacities. For the owner with good gas mileage uppermost in mind, Ford offered the 170 cu in or 200 cu in six-cylinder engines, while the 260 cu in and 289 cu in V8 engines were available to the customer whose prime consideration was acceleration. For those who required even more power beneath the hood, a tuned version of the 289 cu in engine was obtainable which developed 271 brake horsepower at 6000 rpm.

Beneath the attractive bodyshell the mechanical layout of the Mustang was quite conventional, comprising a front-mounted engine driving the rear wheels via the transmission unit, driveshaft and differential unit. A choice of either three- or four-speed manual transmission, or three-speed automatic transmission was offered. Front suspension on all models is the independent coil spring and wishbone type, while the rear axle is located on leaf springs. Telescopic shock absorbers are fitted all round.

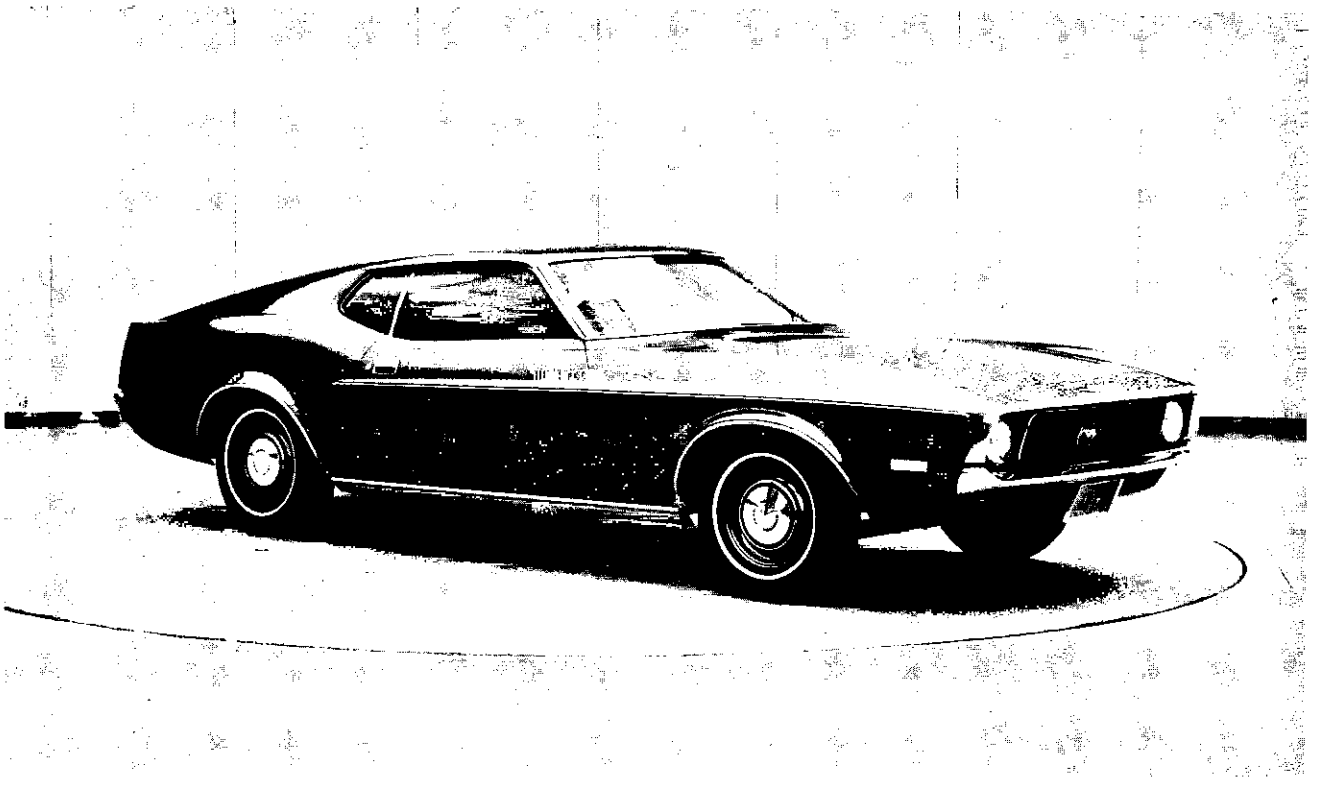
For 1967 / 1968 the larger capacity 302 and 390 V8 engines became optional and these were followed by the powerful 427, 428 and Boss 429 engines. Inevitably, as engines got larger, so the body size increased until it could no longer be described as a compact sports car. Because it had lost the original Mustang individuality, sales inevitable dropped and in 1974 Ford launched the Mustang Series II.

Contents



1966 Mustang Convertible, 289 cu in

1967 Mustang Hardtop



1971 Mustang Sports Roof

1972 Mustang Hardtop

Buying spare parts and vehicle identification numbers

Buying spare parts

Replacement parts are available from many sources, which generally fall into one of two categories – authorized dealer parts departments and independent retail auto parts stores. Our advice concerning these parts is as follows:

Retail auto parts stores: Good auto parts stores will stock frequently needed components which wear out relatively fast, such as clutch components, exhaust systems, brake parts, tune-up parts, etc. These stores often supply new or reconditioned parts on an exchange basis, which can save a considerable amount of money. Discount auto parts stores are often very good places to buy materials and parts needed for general vehicle maintenance such as oil, grease, filters, spark plugs, belts, touch-up paint, bulbs, etc. They also usually sell tools and general accessories, have convenient hours, charge lower prices and can often be found not far from home.

Authorized dealer parts department: This is the best source for parts which are unique to the vehicle and not generally available elsewhere (such as major engine parts, transmission parts, trim pieces, etc.).

Warranty information: If the vehicle is still covered under warranty, be sure that any replacement parts purchased – regardless of the source – do not invalidate the warranty!

To be sure of obtaining the correct parts, have engine and chassis numbers available and, if possible, take the old parts along for positive identification.

Vehicle identification numbers

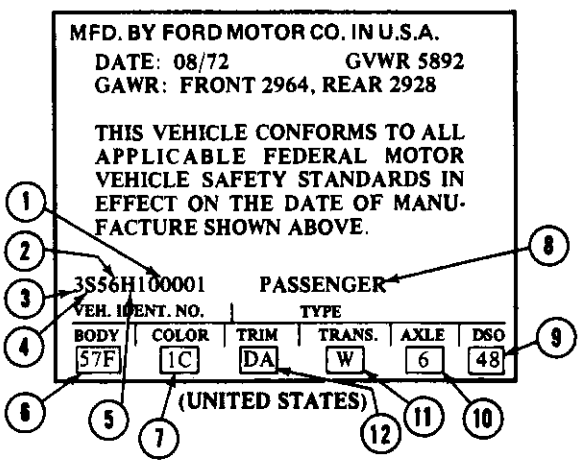
Modifications are a continuing and unpublicized process in car manufacture. Spare parts catalogs and lists are compiled on a numerical basis, the individual vehicle numbers being essential to correctly identify the component required.

A vehicle identification decal is located on the rear edge of the left hand door on all Mustang models. The decal gives the vehicle serial number and coded information regarding the engine, transmission and bodywork. Refer to the accompanying examples showing the type of decals used and a key to the coding.

A vehicle safety certification label is attached to the rear face of the left hand door on later models only. This gives the Gross Vehicle Weight Rating (GVWR) and the Gross Axle Weight Rating (GAWR) for that particular car.

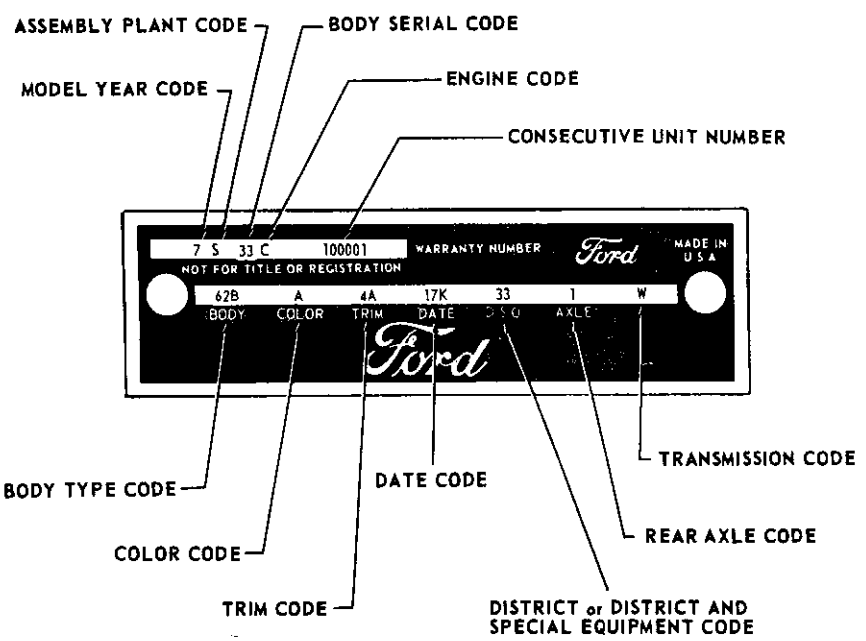
The engine number on all models prior to 1968 is stamped on the left side of the cylinder block. On 1968 and later models the engine number is stamped on a metal tag adjacent to the ignition coil.

The transmission number is stamped on a small metal plate which is riveted to the right side of the transmission casing.



Vehicle identification/safety certification decal (later models)

1 *Consecutive unit no.*
2 *Body serial code*
3 *Model year code*
4 *Assembly plant code*
5 *Engine code*
6 *Body type code*
7 *Color code*
8 *Vehicle type*
9 *District - special equipment*
10 *Rear axle code*
11 *Transmission code*
12 *Trim code*



Vehicle identification decal (earlier type)

Jacking and Towing

Jacking points

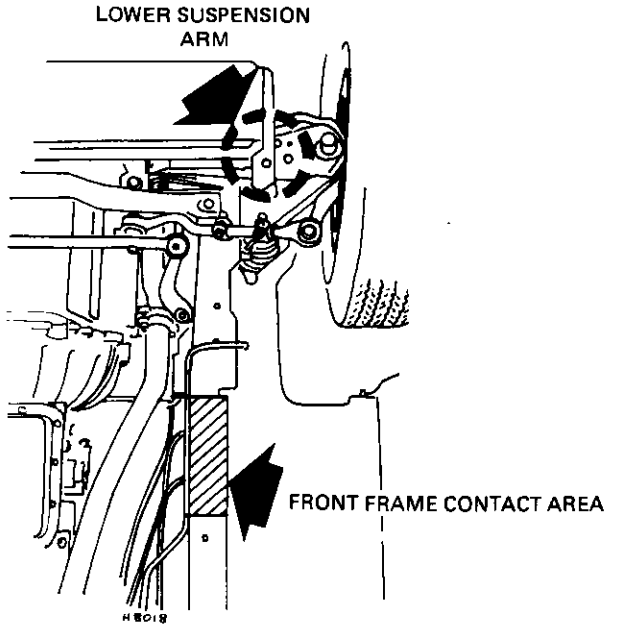
To change a wheel in an emergency, use the jack supplied with the car. Ensure that the roadwheel nuts are released before jacking up the car and make sure that the top of the jack is fully engaged with the body cutout, and that the base of the jack is standing on a firm surface.

The jack supplied with the vehicle is not suitable for use when raising the vehicle for maintenance or repair operations. For this work, use a trolley, hydraulic or screw type jack located under the front crossmember, bodyframe side-members or rear axle casing, as illustrated. Always supplement the jack with jack stands or blocks before crawling beneath the car.

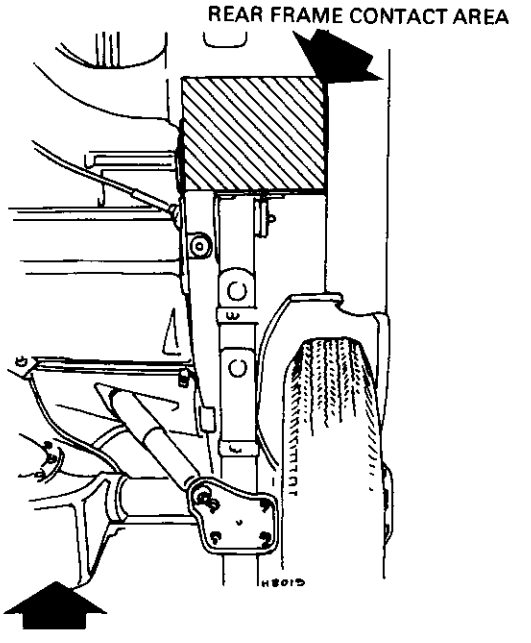
Towing points

If your vehicle is being towed, make sure that the tow rope is attached to the front crossmember. If the vehicle is equipped with automatic transmission, the distance towed must not exceed 15 miles (24 km), nor the speed 30 mph (48 km/h), otherwise serious damage to the transmission may result. If these limits are likely to be exceeded, disconnect and remove the propeller shaft.

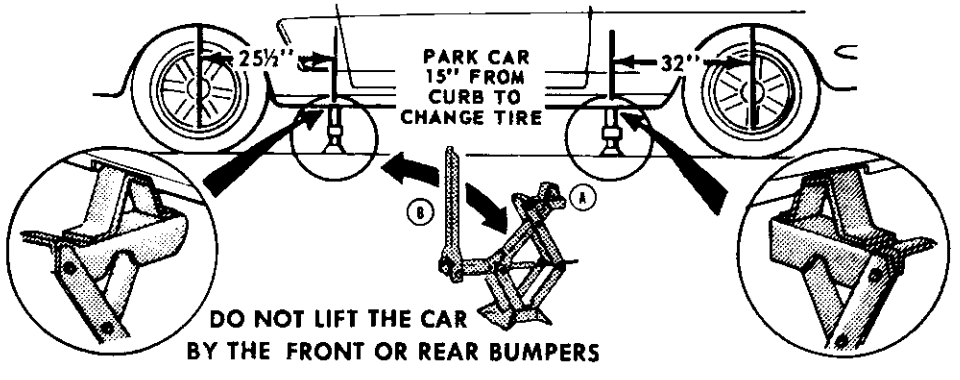
If you are towing another vehicle, attach the tow rope to the spring mounting bracket at the axle tube.



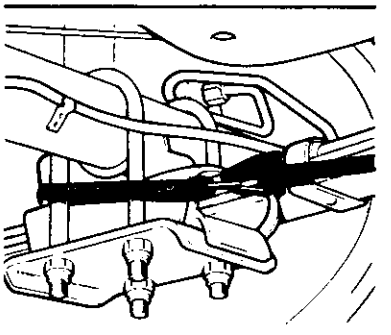
Front jacking areas to be used when raising the vehicle for maintenance purposes



Rear jacking areas to be used when raising the vehicle for maintenance purposes



Using the jack supplied with the car



Tow rope attachment point on rear axle

Tools and working facilities

Introduction

A selection of good tools is a fundamental requirement for anyone contemplating the maintenance and repair of a car. 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 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 car. 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 wrenches (ring one end, open-ended the other); although more expensive than open-ended ones, they do give the advantages of both types of wrench.

Combination wrenches - $\frac{3}{8}$ to $\frac{11}{16}$ in AF
Adjustable wrench - 9 inch
Engine oil pan/transmission/rear axle drain plug key (where applicable)
Spark plug wrench (with rubber insert)
Spark plug gap adjustment tool
Set of feeler gauges
Brake adjuster wrench (where applicable)
Brake bleed nipple wrench
Screwdriver - 4 in long x $\frac{1}{4}$ in die (flat blade)
Screwdriver - 4 in long x $\frac{1}{4}$ in dia (cross blade)
Combination pliers - 6 inch
Hacksaw, junior
Tire pump
Tire pressure gauge
Grease gun
Oil can
Fine emery cloth (1 sheet)
Wire brush (small)
Funnel (medium size)

Repair and overhaul tool kit

These tools are virtually essential for anyone undertaking any major repairs to a car, 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 $\frac{1}{2}$ 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 wrenches are a useful alternative.

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

Sockets (or box wrenches) to cover range $\frac{1}{4}$ $1\frac{1}{8}$ in AF
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-grip wrench - 8 inch
Ball pein hammer
Soft-faced hammer, plastic or rubber
Screwdriver - 6 in long x $\frac{5}{16}$ in dia (flat blade)
Screwdriver - 2 in long x $\frac{5}{16}$ in square (flat blade)
Screwdriver - $1\frac{1}{2}$ in long x $\frac{1}{4}$ in dia (cross blade)
Screwdriver - 3 in long x $\frac{1}{8}$ in dia (electricians)
Pliers - electricians side cutters
Pliers - needle nosed
Pliers - snap-ring (internal and external)
Cold chisel - $\frac{1}{2}$ inch
Scriber
Scraper
Centre punch
Pin punch
Hacksaw
Valve grinding tool
Steel rule/straight edge
Allen keys
Selection of files
Wire brush (large)
Jack stands
Jack (strong scissor or hydraulic type)

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 an automobile club) to make a joint purchase, or borrowing the tools against a deposit from a local repair station 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 manufacturer's 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 dealer.

Valve spring compressor
Piston ring compressor
Balljoint separator
Universal hub/bearing puller
Impact screwdriver
Micrometer and/or vernier gauge
Carburetor flow balancing device (where applicable)
Dial gauge
Stroboscopic timing light
Dwell angle meter/tachometer
Universal electrical multi-meter
Cylinder compression gauge
Lifting tackle
Trolley jack
Light with extension lead

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.

Remember, you don't have to buy the most expensive items on the shelf, but it is always advisable to steer clear of the very cheap tools. There are plenty of good tools around at reasonable prices, so ask the proprietor or manager of the shop for advice before making a purchase.

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 vise: 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 the 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 $\frac{5}{16}$ in (8 mm). This, together with a good range of twist drills, is virtually essential for fitting accessories such as wing 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.

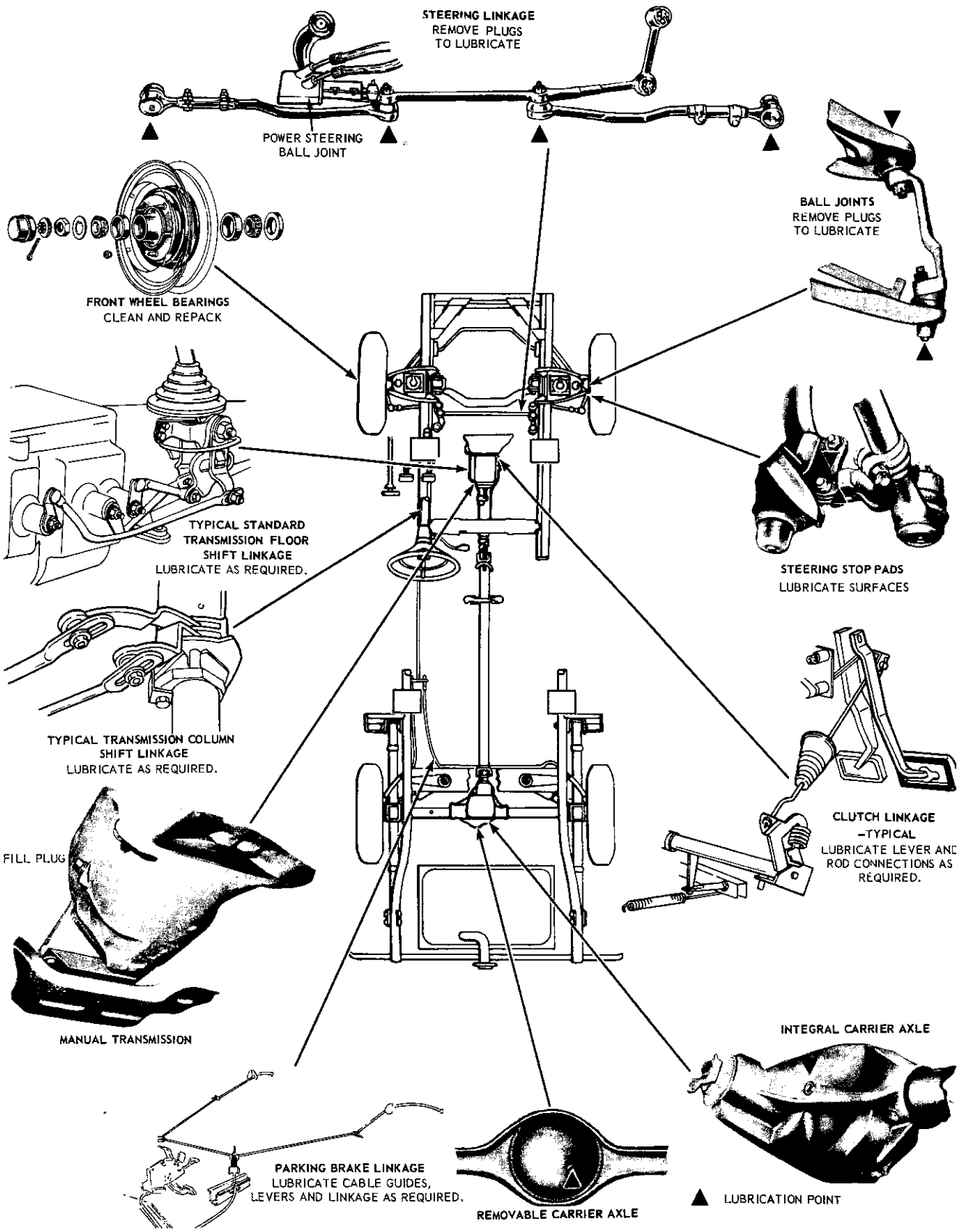
Care and maintenance of tools

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.

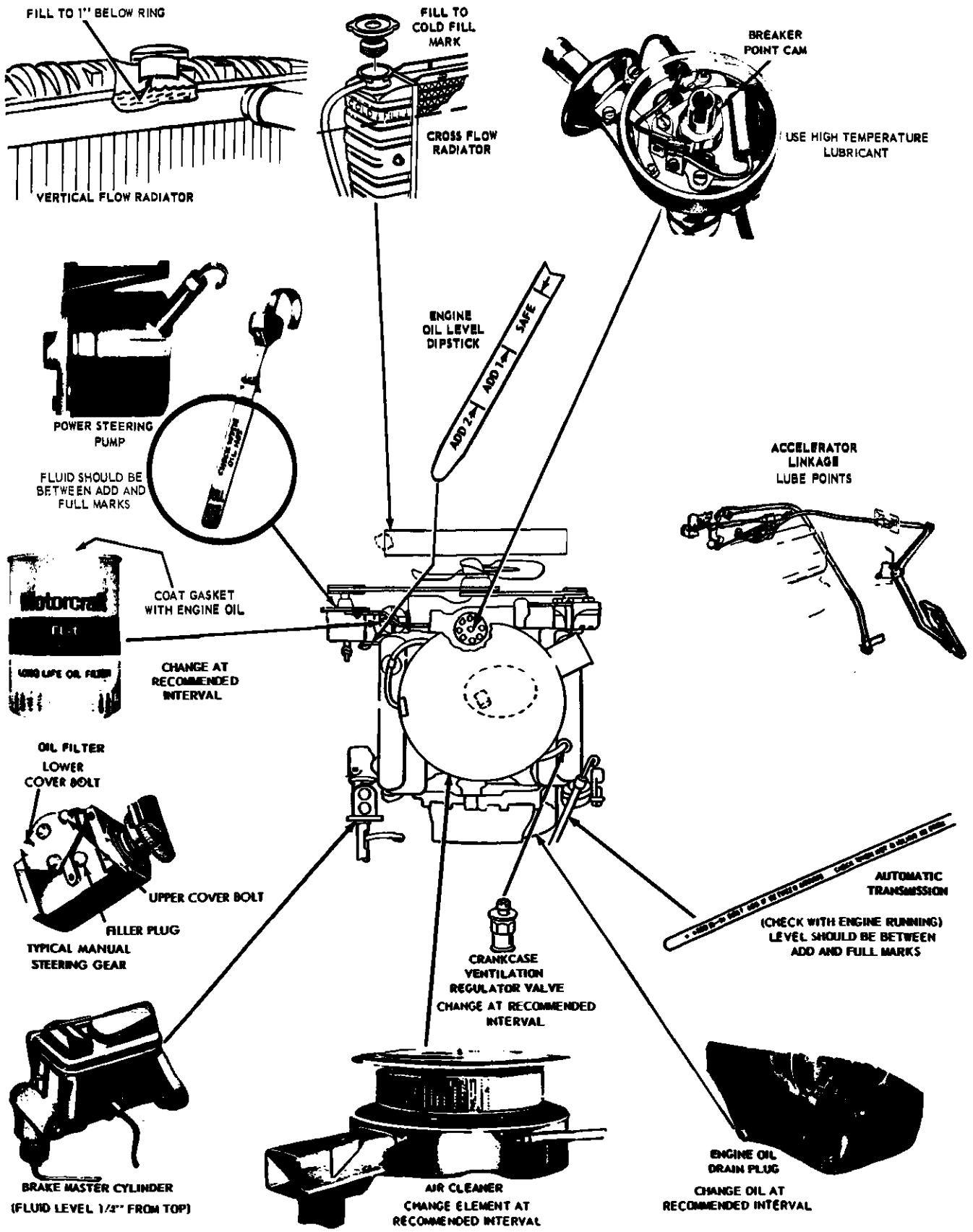
Take a little care when tools are used. Hammer heads inevitably become marked and screwdrivers lose the keen edge on their blades from time to time. A little timely attention with emery cloth or a file will soon restore items like this to a good serviceable finish.

Wrench jaw gap comparison table

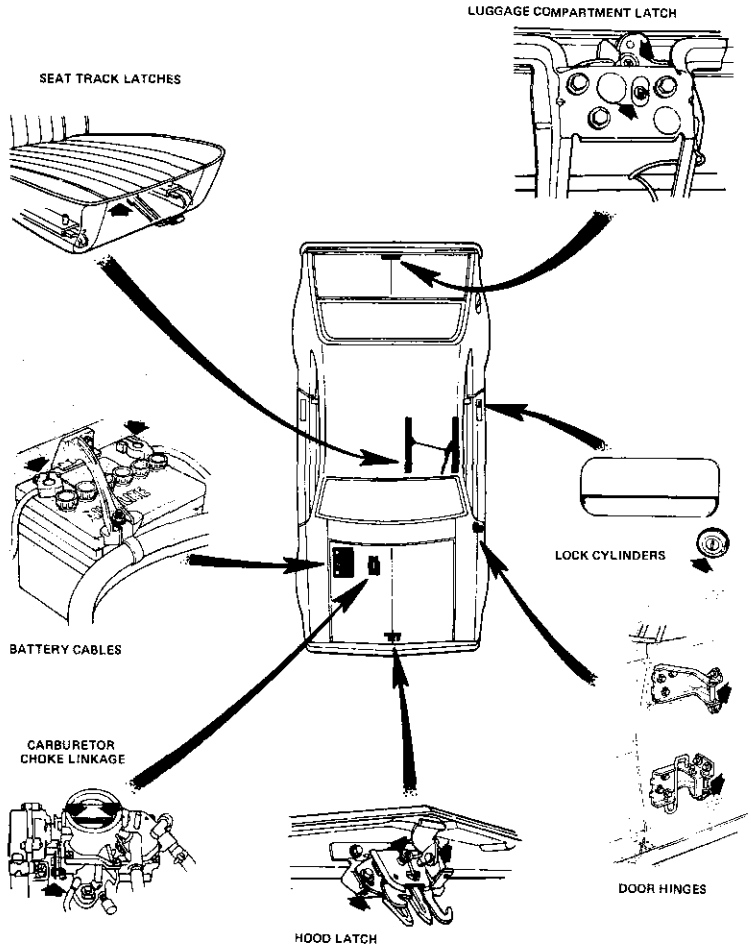
Jaw gap (in)	Wrench size
0·250	$\frac{1}{4}$ in AF
0·275	7 mm AF
0·312	$\frac{5}{16}$ in AF
0·315	8 mm AF
0·340	$\frac{11}{32}$ in AF; $\frac{1}{8}$ in Whitworth
0·354	9 mm AF
0·375	$\frac{3}{8}$ in AF
0·393	10 mm AF
0·433	11 mm AF
0·437	$\frac{7}{16}$ in AF
0·445	$\frac{3}{16}$ in Whitworth; $\frac{1}{4}$ in BSF
0·472	12 mm AF
0·500	$\frac{1}{2}$ in AF
0·512	13 mm AF
0·525	$\frac{1}{4}$ in Whitworth; $\frac{5}{16}$ in BSF
0·551	14 mm AF
0·562	$\frac{9}{16}$ in AF
0·590	15 mm AF
0·600	$\frac{5}{16}$ in Whitworth; $\frac{3}{8}$ in BSF
0·625	$\frac{5}{8}$ in AF
0·629	16 mm AF
0·669	17 mm AF
0·687	$\frac{11}{16}$ in AF
0·708	18 mm AF
0·710	$\frac{3}{8}$ in Whitworth; $\frac{7}{16}$ in BSF
0·748	19 mm AF
0·750	$\frac{3}{4}$ in AF
0·812	$\frac{13}{16}$ in AF
0·820	$\frac{7}{16}$ in Whitworth; $\frac{1}{2}$ in BSF
0·866	22 mm AF
0.875	$\frac{7}{8}$ in AF
0·920	$\frac{1}{2}$ in Whitworth; $\frac{9}{16}$ in BSF
0·937	$\frac{15}{16}$ in AF
0·944	24 mm AF
1·000	1 in AF
1·010	$\frac{9}{16}$ in Whitworth; $\frac{5}{8}$ in BSF
1·023	26 mm AF
1·062	$1\frac{1}{16}$ in AF; 27 mm AF
1·100	$\frac{5}{8}$ in Whitworth; $\frac{11}{16}$ in BSF
1·125	$1\frac{1}{8}$ in AF
1·181	30 mm AF
1·200	$\frac{11}{16}$ in Whitworth; $\frac{3}{4}$ in BSF
1·250	$1\frac{1}{4}$ in AF
1·259	32 mm AF
1·300	$\frac{3}{4}$ in Whitworth; $\frac{7}{8}$ in BSF
1·312	$1\frac{5}{16}$ in AF
1·390	$\frac{13}{16}$ in Whitworth; $\frac{15}{16}$ in BSF
1·417	36 mm AF
1·437	$1\frac{7}{16}$ in AF
1·480	$\frac{7}{8}$ in Whitworth; 1 in BSF
1·500	$1\frac{1}{2}$ in AF
1·574	40 mm AF; $\frac{15}{16}$ in Whitworth
1·614	41 mm AF
1·625	$1\frac{5}{8}$ in AF
1·670	1 in Whitworth; $1\frac{1}{8}$ in BSF
1·687	$1\frac{11}{16}$ in AF
1·811	46 mm AF
1·812	$1\frac{13}{16}$ in AF
1·860	$1\frac{1}{8}$ in Whitworth; $1\frac{1}{4}$ in BSF
1·875	$1\frac{7}{8}$ in AF
1·968	50 mm AF
2·000	2 in AF
2·050	$1\frac{1}{4}$ in Whitworth; $1\frac{3}{8}$ in BSF
2·165	55 mm AF
2·362	60 mm AF



Chassis lubrication points



Engine lubrication and servicing points



General lubrication point

Recommended lubricants and fluids

Component	Description	Ford Specification	Component	Description	Ford Specification
Hinges, hinge check and pivots	Polyethylene grease	ESB-M1C106-B	Automatic transmission	Ford automatic transmission fluid	ESW-M2C33-F Type F
Brake master cylinder	Heavy duty brake fluid	ESA-M6C25-A	Manual transmission	Ford manual transmisstion oil	ESW-M2C83-B or ESP-M2C83-C
Front suspension balljoints, front wheel bearings and clutch linkage	balljoint and multi-purpose grease	ESA-M1C75-B	Engine	Engine oil*	ESE-M2C101-C
Hood latch and auxiliary catch	Polyethylene grease	ESB-M1C106-B	Engine coolant	Ford cooling system fluid	ESE-M97B18-C
Lock cylinders	Lock lubricant	ESB-M2C20-A	Steering gear housing (manual and power)	Hypoid gear oil	ESW-M2C105-A
			Power steering pump reservoir	Power steering fluid	ESW-M2C128-B
Rear axle:			Door weatherstrip	Silicone lubricant	ESR-M1314-A
Conventional	Hypoid gear oil	ESW-M2C105-A			
Traction-Lok	Hypoid gear oil	ESW-M2C119-A			

** Note engine oil of a viscosity suitable for the ambient temperature must be used. Consult the operates handbook supplied with the car.*

Routine maintenance

Introduction

The Routine Maintenance instructions are basically those recommended by the vehicle manufacturer. They are supplemented by additional maintenance tasks proven to be necessary.

It must be emphasised that if any part of the engine or its ancillary equipment involved with emission control is disturbed, cleaned or adjusted the car must be taken to the local Ford dealer for checking to ensure that it still meets legal requirements.

Tasks in the maintenance instructions marked with an asterisk (*) must be entrusted to a Ford dealer.

Every 250 miles (400 km), weekly or before a long journey

Check tyre pressures (when cold)
Examine tyres for wear and damage
Check steering for smooth and accurate operation
Check brake reservoir fluid level. If this has fallen noticeably, check for fluid leakage
Check for satisfactory brake operation
Check operation of all lights
Check operation of windscreen wipers and washers
Check that the horn operates
Check that all instruments and gauges are operating
Check the engine oil level; top-up if necessary
Check radiator coolant level (photo)
Check battery electrolyte level

Radiator filler cap (cross-flow type)

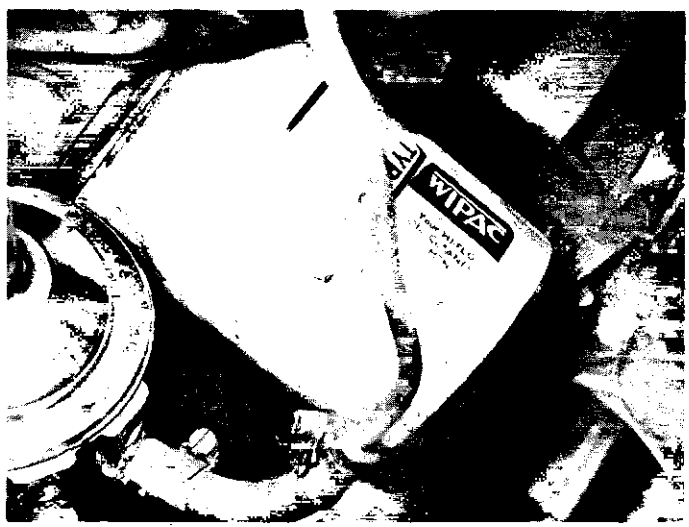
Every 3000 miles (5000 km) or 3 months

The following maintenance items must be carried out at this mileage/time interval if the car is being operated in severe conditions. These are considered to be:

(a) Outside temperature remains below 10°F (–12.2°C) for 60 days or more and most trips are less than 10 miles
(b) If a trailer having a total weight of more than 2000 lb is towed over long distances
(c) Extended periods of idling or low speed operation

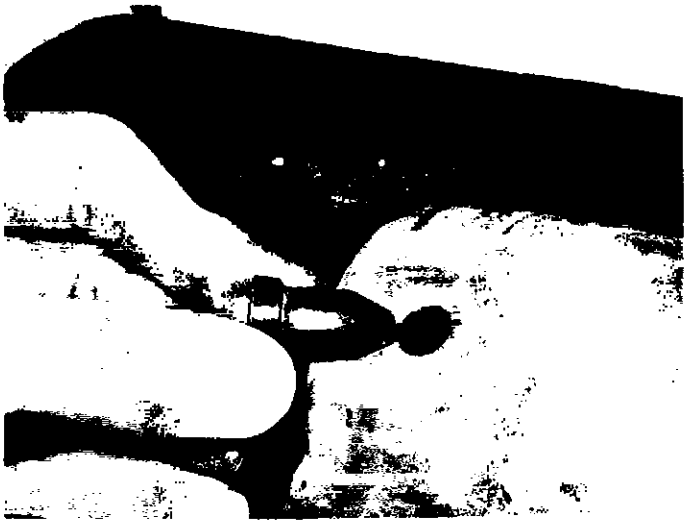
Complete the checks in the weekly inspection plus the following:
Change the engine oil
Install a new oil filter (photo)

For normal car operation these service items may be carried out at 6000 miles (10 000 km) or 6 month intervals



Location of engine oil filter

Rear axle filler plug



Checking the hood pump fluid level (convertibles only)

Every 6000 miles (10 000 km) or 6 months, whichever occurs first

Change engine oil and filter
Check transmission fluid levels (photo)
Check brake fluid level
Adjust clutch pedal free-play, if necessary
*Check fuel deceleration valve if so equipped
*Adjust engine idle speed and mixture
Check the torque of intake manifold bolts
Lubricate exhaust control valve if so equipped
Check operation of throttle and choke linkage
Renew fuel filter
Check all drivebelt tensions
Check fluid level of hood hydraulic pump reservoir (photo)

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

Adjust engine valve clearances
Check carburetor air cleaner element
Renew all spark plugs
Inspect spark plug leads
*Check spark control systems and delay valve
*Check EGR system and delay valve
Check condition of coolant
Inspect all drivebelts for wear and install new ones if necessary
*Inspect evaporative emission canister (if so equipped)
Check the torque of all engine-driven accessory mounting bolts
Check front suspension and steering linkage for abnormal slackness or damaged seals
*Adjust automatic transmission bands
Inspect exhaust system and heat shields for corrosion or damage

Every 18 000 miles (30 000 km) or 18 months, whichever occurs first

Inspect distributor cap and rotor
Check tightness of rear spring mountings

Every 24 000 miles (40 000 km) or 2 years, whichever occurs first

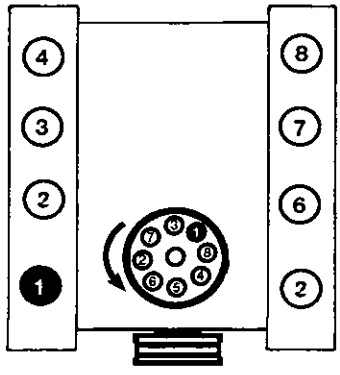
Dismantle, lubricate and adjust front wheel bearings
Renew crankcase filter in air cleaner
Renew air cleaner element
Inspect filler cap and fuel line for deterioration or leakage
*Check thermactor system if so equipped
Check cooling system hoses for leakage
Inspect disc pads and rear brake lining for wear
Inspect all brake hoses and lines

Every 30 000 miles (50 000 km) or 30 months, whichever occurs first

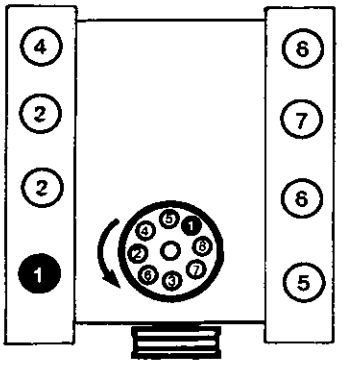
Lubricate front suspension and steering linkage
Drain and refill automatic transmission fluid
Renew coolant
Examine all brake hoses and pipes, and renew if necessary
Check wheel cylinders and master cylinder for leaks, and renew seals where necessary
Renew brake fluid

Chapter 1 Engine

Contents



351
Firing order
1-3-7-2-6-5-4-8



All others
Firing order
1-5-4-2-6-3-7-8

Cylinder location and distributor rotation

Specifications

Engine (general)

Engine types	V8, overhead valve
Engine capacities	260, 289, 302, 351, 390, 427, 428 and 429 cu in

Engine data (260 cu in)

Compression ratio	8.8 : 1
Bore	3.80 in (96.5 mm)
Stroke	2.87 in (72.8 mm)
Firing order	1, 5, 4, 2, 6, 3, 7, 8 (No. 1 cylinder on right-hand bank, nearest radiator)
Oil pressure (hot)	35 to 60 lbf/in²

Pistons

Diameter:	
Color coded red	3.7976 to 3.7982 in (96.45 to 97.47 mm)
Color coded blue	3.7988 to 3.7994 in (96.48 to 96.50 mm)
Piston-to-cylinder bore clearance	0.0021 to 0.0039 in (0.053to 0.099 mm)

Piston rings

Ring side clearance:	
Top ring	0.0019 to 0.0036 in (0.048 to 0.091 mm)
Second ring	0.001 to 0.004 in (0.025 to 0.101 mm)
Oil ring	Snug fit
Ring gap:	
Top ring	0.010 to 0.032 in (0.254 to 0.812 mm)
Second ring	0.010 to 0.032 in (0.254 to 0.812 mm)
Oil ring	0.015 to 0.067 in (0.381 to 1.701 mm)

Crankshaft

Main bearing journal diameter	2.2482 – 2.2490 in (57.104 – 57.124 mm)
Connecting rod journal diameter	2.1228 – 2.1236 in (53.919 – 53.939 mm)

Engine data (289 cu in)

Compression ratio	9.3 : 1
Bore	4.00 in (101.6 mm)
Stroke	2.870 in (72.8 mm)
Firing order	1, 5, 4, 2, 6, 3, 7, 8 (No. 1 cylinder on right-hand bank, nearest radiator)
Oil pressure (hot)	35 to 60 lbf/in^2

Pistons

Diameter:	
Color coded red	3.9984 to 3.9990 in (101.55 to 101.57 mm)
Color coded blue	3.9996 to 4.0002 in (101.58 to 101.60 mm)
Piston-to-cylinder bore clearance	0.0018 to 0.0026 in (0.045 to 0.066 mm)

Pistons rings

Ring side clearance:	
Top ring	0.0019 to 0.0036 in (0.048 to 0.091 mm)
Second ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Oil ring	Snug fit
Ring gap:	
Top ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Second ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Oil ring	0.015 to 0.055 in (0.381 to 1.397 mm)

Crankshaft

Main bearing journal diameter	2.2482 to 2.2490 in (57.10 to 57.12 mm)
Connecting rod journal diameter	2.1228 to 2.1236 in (53.91 to 53.93 mm)

Engine data (302 cu in)

Compression ratio	8.0 : 1 (10.5 : 1 Boss)
Bore	4.0 in (101.6 mm)
Stroke	3.0 in (76.0 mm)
Firing order	1, 5, 4, 2, 6, 3, 7, 8 (No. 1 cylinder on right-hand bank, nearest radiator)
Oil pressure (hot)	40 to 60 lbf/in^2

Pistons (standard 302 engine)

Diameter:	
Color coded red	4.0004 to 4.0052 in (101.61 to 101.73 mm)
Color coded blue	3.9996 to 4.0002 in (101.58 to 101.60 mm)
Piston-to-cylinder bore clearance	0.0018 to 0.0026 in (0.045 to 0.066 mm)

Pistons (Boss 302 engine)

Diameter:	
Color coded red	3.9968 to 3.9974 in (101.51 to 101.53 mm)
Color coded blue	3.9980 to 3.9986 in (101.54 to 101.56 mm)
Piston-to-cylinder bore clearance	0.0034 to 0.0042 in (0.086 to 0.106 mm)

Piston rings (all 302 engines)

Ring side clearance:	
Top ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Second ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Oil ring	Snug fit

Ring gap:	
Top ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Second ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Oil ring	0.015 to 0.069 in (0.381 to 1.752 mm)

Crankshaft

Main bearing journal diameter	2.2482 to 2.2490 in (57.10 to 57.12 mm)
Connecting rod journal diameter	2.1228 – 2.1236 in (53.91 – 53.93 mm)
Connecting rod journal diameter (Boss engine)	2.1222 – 2.1230 in (53.90 – 53.92 mm)

Engine data (351 cu in)

Compression ratio	9.5 : 1 (10.7 : 1 C-type)
Bore	4.0 in (101.6 mm)
Stroke	3.5 in (88.9 mm)
Firing order	1, 3, 7, 2, 6, 5, 4, 8 (No. 1 cylinder on right-hand bank, nearest radiator)
Oil pressure (hot)	45 to 75 lbf in^2

Pistons

Diameter:	
Color coded red	3.9978 to 3.9984 in (101.54 to 101.55 mm)
Colour coded blue	3.9990 to 3.9960 in (101.57 to 101.49 mm)
Piston-to-cylinder bore clearance	0.0018 to 0.0026 in (0.045 to 0.066 mm)

Piston rings

Ring side clearance:	
Top ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Second ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Oil ring	Snug fit
Ring gap:	
Top ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Second ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Oil ring	0.015 to 0.069 in (0.381 to 1.752 mm)

Crankshaft

Main bearing journal diameter (351 W)	2.2994 to 3.0002 in (58.40 to 76.20 mm)
Main bearing journal diameter (351 C)	2.7484 to 2.7492 in (69.80 to 69.82 mm)
Connecting rod journal diameter	2.3103 to 2.3111 in (58.68 to 58.70 mm)

Engine data (390 cu in)

Compression ratio	10.5 : 1
Bore	4.050 in (102.87 mm)
Stroke	3.784 in (96.11 mm)
Firing order	1, 5, 4, 2, 6, 3, 7, 8 (No. 1 cylinder on right-hand bank, nearest radiator)
Oil pressure	35 to 60 lbf/in^2

Pistons

Diameter:	
Color coded red	4.0484 to 4.0490 in (102.82 to 102.84 mm)
Color coded blue	4.0496 to 4.0502 in (102.85 to 102.87 mm)
Piston-to-cylinder bore clearance	0.0015 to 0.0023 in (0.038 to 0.058 mm)

Piston rings

Ring side clearance:	
Top ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Second ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Oil ring	Snug fit
Ring gap:	
Top ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Second ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Oil ring	0.015 to 0.055 in (0.381 to 1.397 mm)

Crankshaft

Main bearing journal diameter	2.7484 to 2.7492 in (69.80 to 69.82 mm)
Connecting rod journal diameter	2.4380 to 2.4388 in (61.92 to 61.94 mm)

Engine data (427 cu in)

Compression ratio	10.9 : 1
Bore	4.236 in (107.59 mm)
Stroke	3.781 in (96.03 mm)
Firing order	1, 5, 4, 2, 6, 3, 7, 8 (No. 1 cylinder on right-hand bank nearest radiator)
Oil pressure	35 to 60 lbf/in^2

Pistons

Diameter:	
Color coded red	4.2298 to 4.2299 in (107.43 to 107.44 mm)
Color coded blue	4.2305 to 4.2311 in (107.45 to 107.46 mm)
Piston-to-cylinder bore clearance	0.0030 to 0.0038 in (0.076 to 0.096 mm)

Piston rings

Ring side clearance:	
Top ring	0.0024 to 0.0041 in (0.060 to 0.104 mm)
Second ring	0.0020 to 0.0040 in (0.050 to 0.101 mm)
Oil ring	Snug fit
Ring gap:	
Top ring	0.010 to 0.031 in (0.254 to 0.787 mm)
Second ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Oil ring	0.015 to 0.066 in (0.381 to 1.676 mm)

Crankshaft

Main bearing journal diameter	2.7484 to 2.7492 in (69.80 to 69.82 mm)
Connecting rod journal diameter	2.4380 to 2.4388 in (61.92 to 61.94 mm)

Engine data (428 cu in)

Compression ratio	10.6 : 1
Bore	4.130 in (104.90 mm)
Stroke	3.984 in (101.19 mm)
Firing order	1, 5, 4, 2, 6, 3, 7, 8 (No. 1 cylinder on right-hand bank, nearest radiator)
Oil pressure	35 to 60 lbf/in^2

Pistons

Diameter:	
Color coded red	4.1284 to 4.1290 in (104.86 to 104.48 mm)
Color coded blue	4.1296 to 4.1302 in (104.89 to 104.90 mm)
Piston-to-cylinder bore clearance	0.0015 to 0.0023 in (0.038 to 0.058 mm)

Piston rings

Ring side clearance:	
Top ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Second ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Oil ring	Snug fit
Ring gap:	
Top ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Second ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Oil ring	0.015 to 0.035 in (0.381 to 0.889 mm)

Crankshaft

Main bearing journal diameter	2.7484 to 2.7492 in (69.80 to 69.82 mm)
Connecting rod journal diameter	2.4380 to 2.4388 in (61.92 to 61.94 mm)

Engine data (429 cu in)

Compression ratio	10.5 : 1
Bore	4.360 in (110.74 mm)
Stroke	3.590 in (91.18 mm)
Firing order	1, 5, 4, 2, 6, 3, 7, 8 (No. 1 cylinder on right-hand bank, nearest radiator)
Oil pressure	45 to 60 lbf/in^2

Pistons

Diameter:	
Color coded red	4.3569 to 4.3575 in (110.66 to 110.88 mm)
Color coded blue	4.3581 to 4.3587 in (110.69 to 110.71 mm)

Piston rings

Ring side clearance:	
Top ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Second ring	0.002 to 0.004 in (0.050 to 0.101 mm)
Oil ring	Snug fit
Ring gap:	
Top ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Second ring	0.010 to 0.020 in (0.254 to 0.508 mm)
Oil ring	0.010 to 0.035 in (0.254 to 0.889 mm)

Crankshaft

Main bearing journal diameter	2.9994 to 3.0002 in (76.18 to 76.20 mm)
Connecting rod journal diameter	2.4992 to 2.5000 in (63.47 to 63.50 mm)

Lubrication

Engine oil capacity	5 US qts/4 Imp qts (including 1 qt filter capacity)
Engine oil type	Multigrade

Torque wrench settings

	lbf ft	kgf m
Cylinder head bolts:		
260, 289, 302 cu in	65 to 70	8.9 to 9.7
390, 428 cu in	80 to 90	11 to 12.4
351 cu in	95 to 100	13 to 13.8
429 cu in	130 to 140	18 to 19.3
429 cu in Boss	90 to 95	12.4 to 13
Connecting rod bearing bolts:		
260, 289, 302 cu in	19 to 24	2.6 to 3.3
302 cu in HP	40 to 45	5.5 to 6.2
351, 390, 429 cu in	40 to 45	5.5 to 6.2
429 cu in Boss	85 to 90	11.7 to 12.4
428 cu in	53 to 58	7.3 to 8
Main bearing bolts:		
260, 289, 302 cu in	60 to 70	8.2 to 9.7
302 cu in Boss (outer bolts)	35 to 40	4.8 to 5.5
351, 390, 427, 428, 429 cu in	95 to 105	13 to 14.5
429 cu in Boss	70 to 80	9.7 to 11
Crankshaft pulley bolts:		
All engine types	70 to 90	9.7 to 12.4
Flywheel bolts:		
All engine types	75 to 85	10.3 to 11.7
Exhaust manifold bolts:		
260, 289, 302 cu in	15 to 20	2 to 2.8
351, 390, 427, 428 cu in	18 to 24	2.5 to 3.3
429 cu in	28 to 33	3.9 to 4.5
Intake manifold bolts:		
260, 289, 302 cu in	20 to 22	2.8 to 3
351 cu in	23 to 25	3.2 to 3.4
390, 427, 428 cu in	32 to 35	4.4 to 4.8
429 cu in	25 to 30	3.4 to 4.1

1 General description

The engines covered in this Chapter comprise the 260, 289, 302, 351, 390, 427, 428 and 429 cu in V8 units. Also covered are the Boss variants of the 302, 351 and 429 cu in engines and the Cleveland 351 cu in version.

All the above engines are similar in basic design having two banks of four cylinders set in a V-configuration. The cylinder bores are machined directly into the cast iron cylinder block which is integral with the crankcase. The one-piece crankshaft is supported within the crankcase on five renewable shell-type bearings.

The valve gear is actuated by a five-bearing camshaft located in the center of the cylinder banks, and is chain-driven from a sprocket on the front of the crankshaft. A gear on the front of the camshaft drives the distributor which in turn drives the oil pump via an intermediate shaft.

The most widely used engines are the 260, 289, 302 and 351 cu in units. These are very compact motors incorporating stud-mounted valve rockers, hydraulic valve lifters and wedge-shaped combustion chambers. The 260 cu in version was dropped from production in 1965 and the 289 cu in was last used in the Mustang in 1968.

In 1967 the 390 cu in engine became available and the following year saw the introduction of the still larger 427 and 428 cu in Cobra Jet units. 1969 saw the introduction of the special Boss version of the 302 cu in engine. This is basically the 302 unit fitted with cylinder heads from the 351 Cleveland engine. It was built to qualify for sedan racing purposes and had a limited production. It was later replaced by a high-performance Boss version of the 351 Cleveland engine.

In 1969/70 a limited number of Mustangs were equipped with the powerful Boss 429 cu in unit. This unique engine features specially modified combustion chambers with oversize valves and ports. The valve rockers operate on individual shafts and the aluminium cylinder heads use O-rings and chevron seals in place of head gaskets. Each of the main bearing caps is secured by four bolts.