SPECIAL NOTE

Although every care is taken to ensure accuracy and completeness in compiling this book, no liability can be accepted for damage, loss or injury caused by any errors or omissions in the information given.

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FORD CONSUL Mk II and 375

204E/205E

1956—1962

General

INTRODUCTION

The Ford Consul Mk II was introduced in February 1956. Although it is completely redesigned, in general arrangement it is similar to the Consul Mk I. The same body shell is used for the Consul, Zephyr and Zodiac Mk II. In October 1957 a *de luxe* version was introduced. The 1959 model, which was introduced in February 1959, differs from former models in details (see *Modifications*). Export vehicles assembled outside the United Kingdom differ in details from cars for the home market. From May 1961 the Consul Mk II is designated Consul '375'. In April 1962, after 355,000 units had been produced, the Consul was succeeded by the Zephyr-4 Mk III. The model range comprises:

204 E model (right-hand drive) and **205 E model** (left-hand drive).
Four-door, 5/6-passenger saloon.
Four-door, 5/6-passenger saloon *de luxe*.
Two-door, 4/5-passenger convertible.
Four-door, 2/5-passenger estate car (station wagon).

NOTE: The estate car is a conversion by E. D. Abbott Ltd., Farnham, England.

IDENTIFICATION

The identification plate is mounted under the bonnet at the right-hand side of the engine compartment, near the radiator.

Engine Number

The engine number is stamped on the cylinder block above right the engine mounting. If 'RC' included in the number, this indicates a works-reconditioned engine.

Chassis Number

On new cars the chassis number and engine number are the same; the chassis number is stamped on the right-hand front suspension reinforcement. The chassis number is prefixed with the model designation of the car in question. Example: * 204 E * 0123 *. From October 1961 a different numbering system is used, with a prefix as follows: 41A for saloon, 42A for saloon de luxe, 43A for convertible, 44A for estate car. For 1962 the prefixes are 41B, 42B, 43B, and 44B respectively. The two figures which indicate the body type are preceded by a letter which indicates the assembly plant.

Chassis numbers (approximate and for guidance only)

February 1956, No. 0001; October 1956, No. 26100; October 1957, No. 80620; October 1958, No. 150000; January 1959, No. 165000; January 1960, No. 235400; October 1960, 289200; January 1961, 301300; January 1962, B002950; April 1962, (final): B047830.

Owing to the difference in numbering sequence between cars manufactured in Dagenham and those assembled in other assembly plants, it is impossible to state precise manufacturing dates for all units.

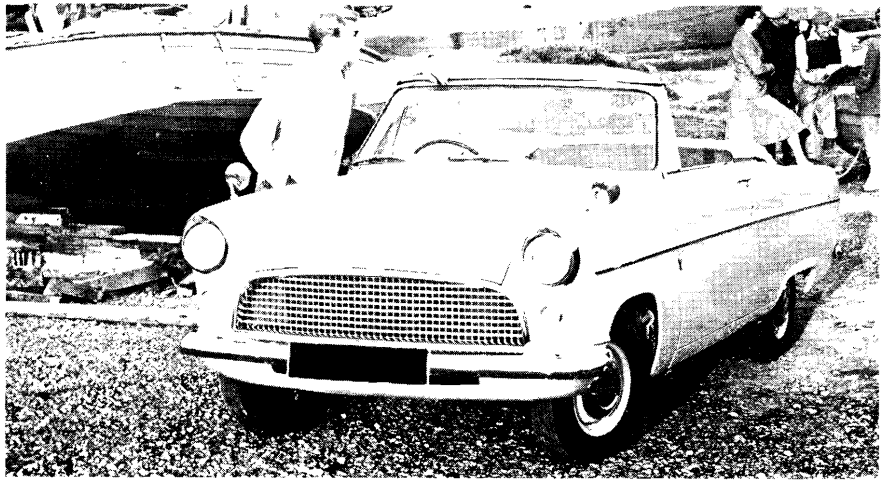


Fig. 3. Two-door, four/five-passenger convertible, 1959

MODIFICATIONS

NOTE: Modifications of a purely technical nature are given under *Repair data.*

October 1956 (1957 models):
No modifications of importance.

October 1957 (1958 models):
Saloon models
Redesigned front seat frame with new spring construction and foam rubber padding front and rear. Central armrest available on front and rear seat. Redesigned chromium-plated embellishment at either side of rear window. Redesigned gearchange mechanism, concentric to steering column instead of eccentric as on former models. Steering gear of the recirculating ball type.

NOTE: On the convertible only the modifications to the gearchange mechanism and steering gear are effective.
Consul de luxe saloon (from chassis No. 80617)
Consul *de luxe* saloon introduced with the following deviations from the standard model: body finished in two-tone colour schemes (also available in single colour).
Central armrest on front seat standard equipment; central armrest on rear seat optional. Upholstery in nylon cloth or leather. Door trim in two colours.
Twin-tone horns. Windscreen washers. Cigar lighter.
Chromium strips around side windows and tail-lights.
Chromium strips on rear body panel, under luggage compartment lid.
Vanity mirror on back of sun vizor on passenger side.
Coat-hooks in rear compartment.
Steering wheel as on Zephyr models, with horn control ring.

June 1958:
Convertible
Front seat with adjustable rake (from chassis No. 124936).

October 1958
All models
'Non-lock-out' front doors.

February 1959 (1959 models):
Saloons and Estate Cars
Lower silhouette due to flatter roof panel ('low line').
Longer rear wings with redesigned tail-lights and chromium strip along the full wing length. Wide chromium-plated strip around windscreen and rear window.
Chromium-plated headlamp rims. Chromium-plated rain gutters.
Higher windscreen, lower rear window.
Chromium strips around side windows.
Completely redesigned facia panel and instruments; padded upper half of facia panel, redesigned controls, temperature gauge fitted as standard equipment, panel light intensity variable by turning light switch knob, bright metal strip along the whole length of facia panel, larger ashtray and radio grille, gearchange mechanism relocated on steering column, redesigned heater controls, rear view mirror in chromium-plated mounting, sun vizors with foam rubber padding and chromium trim. New upholstery. New floor mats. Chromium strip on inside of doors.
Armrests on doors. All doors equipped with new safety locks.
Consul de luxe saloon (from chassis No. 165 532)

Chromium-plated ornament on radiator grille.
Chromium-plated rim embellishers.
Wider chromium-plated embellishments at either side of rear window.
Semi-circular horn ring.

October 1960 (1961 models):
All models
Power-assisted disc front brakes available (from chassis No. 289 210).

May 1961:
Models renamed Consul '375'. Disc front brakes standard, sealed-beam headlamps, 'Consul 375' on boot lid (from chassis No. 312 669).

Fig. 4. Four-door, two/five-passenger estate car (station wagon), 1959

PRICES

British prices are ex works. USA prices are East Coast P.o.E. list-prices.

Four-door, five/six-passenger saloon (Fig. 5)

		UK	USA
1956 (October)		£520 + £261 P.T.	$1968
1957 (October)	Standard	£545 + £274 P.T.	$1867
	De luxe	£580 + £291 P.T.	

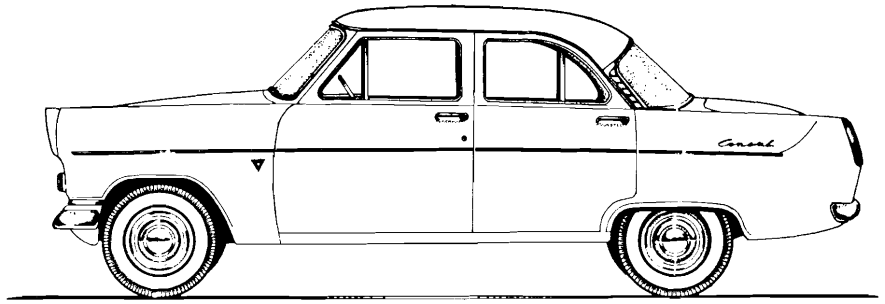


Fig. 5. Four-door, five/six-passenger saloon de luxe, 1958

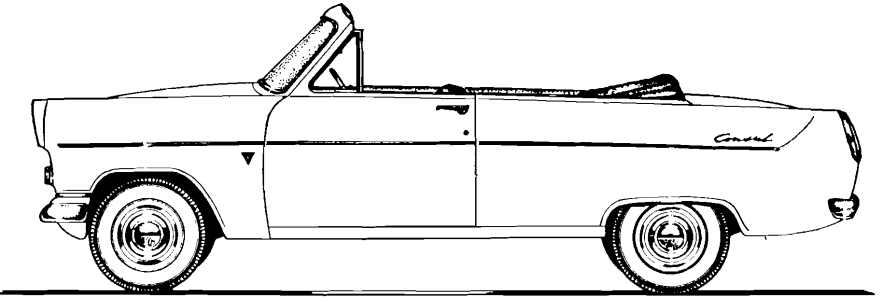


Fig. 6. Two-door, four/five-passenger convertible

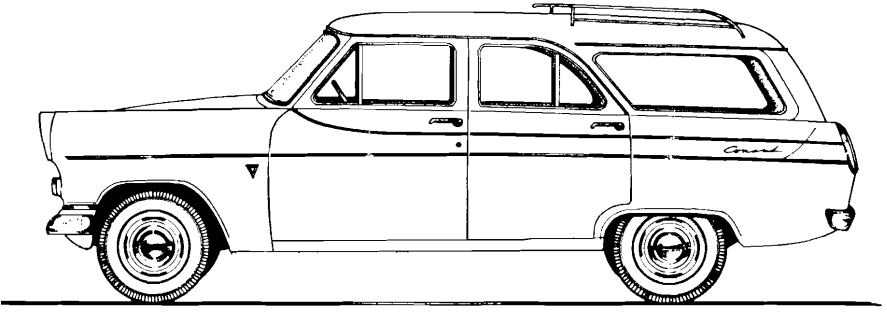


Fig. 7. Four-door, two/five-passenger estate car (station wagon)

		UK	USA
1958 (July)	Standard	£545 + £274 P.T.	$1867
	De luxe	£580 + £291 P.T.	
1959 (January)	Standard	£545 + £274 P.T.	$1465
	De luxe	£580 + £291 P.T.	
1960 (January)	Standard	£545 + £228 P.T.	
	De luxe	£580 + £243 P.T.	
1961 (January)	Standard	£545 + £228 P.T.	
	De luxe	£580 + £242 P.T.	
1962 (January)	Standard	£578 + £266 P.T.	
	De luxe	£608 + £280 P.T.	

Two-door, four/five-passenger convertible (Fig. 6)

	UK	USA
1956 (October)		
with hand-operated top (hood)	£630 + £316 P.T.	$2307
with power-operated top	£680 + £341 P.T.	
1957 (October)		
with hand-operated top	£660 + £331 P.T.	$2182
with power-operated top	£713 + £357 P.T.	
1958 (July)		
with hand-operated top	£660 + £331 P.T.	$2182
with power-operated top	£713 + £357 P.T.	
1959 (January)		
with hand-operated top	£660 + £331 P.T.	$1709
with power-operated top	£713 + £357 P.T.	
1960 (January)		
with hand-operated top	£660 + £276 P.T.	
with power-operated top	£713 + £298 P.T.	
1961 (January)		
with hand-operated top	£660 + £276 P.T.	
with power-operated top	£713 + £298 P.T.	
1962 (January)	£693 + £319 P.T.	

Four-door, two/five-passenger estate car (station wagon) (Fig. 7)

	UK	USA
1958 (January)	£710 + £356 P.T.	$2553
1959 (January)	£760 + £381 P.T.	$1995
1960 (January)	£760 + £318 P.T.	
1961 (January)	£760 + £318 P.T.	
1962 (January)	£743 + £306 P.T.	

INSTRUMENTS AND CONTROLS

Key to Figures 8 and 9. Figures in parentheses for left-hand drive cars.

1 (25) *Glove box.*
2/3 (27/28) *Heater and defroster controls with blower switch incorporated.*
4 (24) *Ashtray.*
5 (8) *Gear lever* (see also 18 (9)).
6 (21) *Choke control.*
7/16 (15/16) *Direction-indicator warning lights* (left and right).
8 (13) *Fuel gauge.*
9 (22) *Panel light switch.*
10 (18) *Oil pressure warning light* (green).
11 (14) *Main beam warning light.*

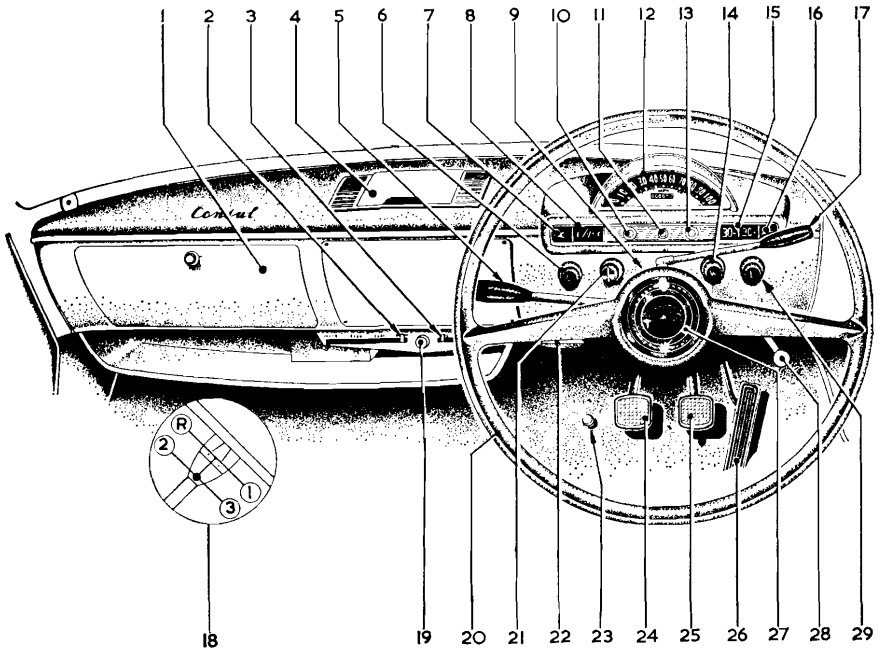


Fig. 8. Consul, 1956–1958, right-hand drive

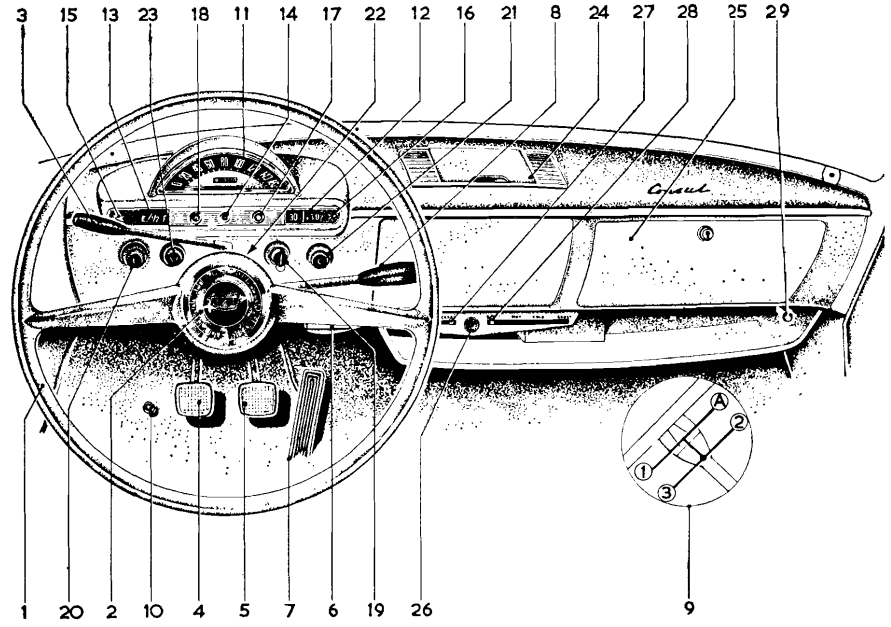


Fig. 9. Consul, 1956–1958, left-hand drive

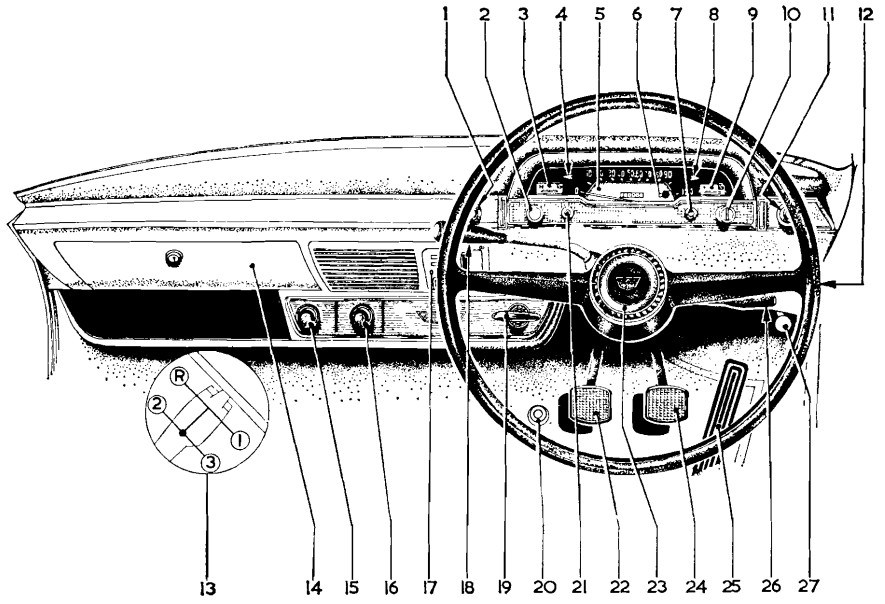


Fig. 10. Consul, 1959–1961, right-hand drive

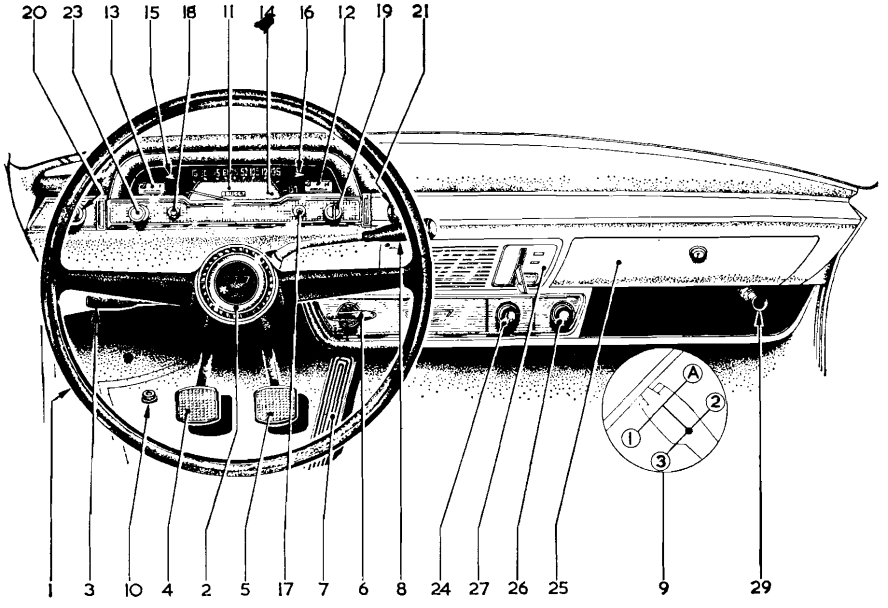


Fig. 11. Consul 1959–1961, left-hand drive

12 (11) *Speedometer.*
13 (17) *Ignition/generator warning light* (red).
14 (23) *Windscreen wiper control.*
15 (12) *Ammeter or temperature gauge.*
17 (3) *Direction-indicator switch* (self-cancelling).
18 (9) *Gear pattern* (*A and R=Reverse*).
19 (26) *Cigar lighter* (if fitted)
20 (1) *Steering wheel.*
21 (19) *Ignition/starter switch.* When the key is turned anti-clockwise, only the accessory circuit is switched on.
22 (6) *Parking brake lever.*
23 (10) *Dipper switch.*
24 (4) *Clutch pedal.*
25 (5) *Brake pedal.*
26 (7) *Accelerator pedal.*
27 (2) *Horn button.*
28 (29) *Bonnet release.*
29 (20) *Light switch.* Turn clockwise for sidelights, then pull out for headlights.

Key to Figures 10 *and* 11. Figures in parentheses for left-hand drive cars.

1 (20) *Choke control.*
2 (23) *Windscreen-wiper control.*
3 (13) *Fuel gauge.*
4/8 (15/16) *Direction-indicator warning lights* (left and right).
5 (11) *Speedometer.*
6 (14) *Main beam warning light.*
7 (17) *Ignition/generator warning light* (red).
9 (12) *Temperature gauge.*
10 (19) *Ignition switch.* When the key is turned anti-clockwise, only the accessory circuit is switched on.
11 (21) *Light switch.*
12 (1) *Steering wheel.* Number of turns, lock to lock, approximately 3½.
13 (9) *Gear pattern* (*A and R=Reverse*).
14 (25) *Glove box.*
15 (26) *Cigar lighter* (if fitted).
16 (24) *Ashtray.*
17 (27) *Heater and defroster controls.*
18 (8) *Gear lever.*
19 (6) *Parking brake lever.*
20 (10) *Dipper switch.*
21 (18) *Oil pressure warning light* (green).
22 (4) *Clutch pedal.*
23 (2) *Horn button.*
24 (5) *Brake pedal.*
25 (7) *Accelerator pedal.*
26 (3) *Direction-indicator switch* (self-cancelling).
27 (29) *Bonnet release.*

ELECTRICAL EQUIPMENT

12-volt electrical equipment. Built-in headlights. Separate built-in side-lights combined with front direction indicator lights, and stop/tail-lights combined with rear direction-indicator lights.

The direction-indicator lights are controlled by means of a self-cancelling switch on the steering column. Number plate light. Single or twin horns. Instrument panel illumination, interior illumination. Warning lights for main beam, ignition/generator, oil pressure and direction-indicators. Radio and heater may be installed as optional equipment.

BODY

The all-steel body and chassis are welded together to form a single unit.

Twin windscreen wipers, vacuum-controlled. Rear-view mirror. Curved windscreen and rear window. Ventilating panes in front doors. All windows of safety glass. Push-button door handles. Parcel shelf under facia panel.

Bench-type front seat. Upholstery in various combinations. Two sun vizors. Ashtray in front and rear compartment. Washable head lining. The two-door convertible is equipped with bench seat with separate back-rests which can be tipped for access, and a rear-view mirror on each front wing.

The estate car (stationwagon) is derived from the saloon. It is equipped with four doors and an extra door at the rear. The rear seat can be tilted towards the front, resulting in a loading compartment of approximately 66 cu ft. The estate car conversion is made by E. D. Abbott Ltd., Farnham, Surrey, England.

NOTE: See also pages 4-5 for a description of the Consul *de luxe*.

The Consul is available in an extensive variety of single and two-tone colour schemes, which vary with the year of manufacture and the assembly plant in which the car is finished.

Dimensions and weights

EXTERIOR DIMENSIONS

	(Saloon)	1957–58 (inches)	1959 onwards
1	Wheelbase	104·5	
2	Track, front	53·0	
3	Track, rear	52·0	
4	Overall length	174·0	
5	Overall width	69·0	
6	Overall height	59·5	58·2in
7	Ground clearance	6·75	
8	Turning circle	420·0	
11	Overhang, front	24·5	
12	Overhang, rear	41·3	
15	Width of front door	33·8	
16	Width of rear door	22·0	
17	Width of front door window	22·5	
18	Height of front door window	13·5	
19	Width of rear door window	22·5	
20	Height of rear door window	12·5	
23	Height of windscreen	15·75	17·25in
	Width of windscreen	54·0	

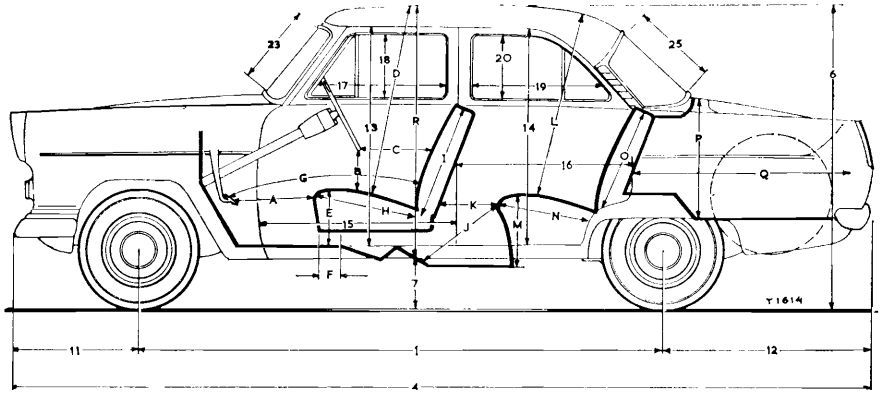


Fig. 12. Dimensions (1957-58 model illustrated)

		1957–58	1959 onwards
25	Height of rear window	17·3	16·75in
	Width of rear window	60·0	

INTERIOR DIMENSIONS

(Saloon)

		(inches)
A	Pedal to front seat (maximum)	21·0
	Pedal to front seat (minimum)	17·0
B	Steering wheel to front seat	5·5
C	Steering wheel to front seat backrest (maximum)	14·5
	Steering wheel to front seat backrest (minimum)	10·5
D	Height over front seat	38·0
E	Height of front seat	11·5
F	Maximum adjustment of front seat	4·0
G	Pedal to front seat backrest	40·0
H	Depth of front seat	19·0
I	Height of front seat backrest	20·0
J	Leg-room in rear compartment	21·0
K	Front seat backrest to rear seat	11·0
L	Height over rear seat	35·0
M	Height of rear seat	14·5
N	Depth of rear seat	18·0
O	Height of rear seat backrest	21·0
P	Height of luggage compartment	21·0
Q	Depth of luggage compartment	40·0
R	Maximum interior height	50·0
W	Width of front seat	54·0
X	Width of rear seat	55·0
Z	Width of luggage compartment	41·0

NOTE: The interior dimensions pertain to the saloon with the modified front seat (since October 1957); see also under *Modifications*.

WEIGHTS

(Saloon)

		(lb)
(1)	Complete car, dry	2448
(2)	Complete car, ready for use	2513
(3)	Complete car, ready for use, with two passengers	2844
(4)	Complete car, ready for use, with four passengers	3175
(5)	Front axle load, ready for use	1382
(6)	Rear axle load, ready for use	1131
(7)	Ratio of front and rear axle load	53/47

Technical Specifications

Figures in the following tables are based on measurements and weights according to the Imperial system, as used in Great Britain; i.e. Imperial Gallon and Long Ton. Figures in parentheses represent measurements and weights according to the American system, i.e. US Gallon and Short Ton.

ENGINE

(1)	Type: water-cooled, four-stroke, petrol engine, in line with overhead valves.	
(2)	Number of cylinders	four
(3)	Bore and stroke	3·25in × 3·13in
(4)	Piston displacement	103·9 cu in (1703 cc)
(5)	Compression ratio	7·8 : 1*
(6)	Stroke/bore ratio	0·906
(7)	Total piston area	33·19 sq in

PERFORMANCE (7·8 : 1 *compression ratio*)

(1) Maximum bhp, gross: 61 at 4400 rpm.
Maximum bhp, net: 59 at 4400 rpm.
(2) Bmep: 132lb/sq in at 2300 rpm.
(3) Maximum torque: 91 lb ft at 2300 rpm.
(4) Compression pressure at cranking speed: 150lb/sq in.
(5) Bhp per sq in piston area: 1·83.
(6) Bhp/litre: 35·9.
(7) Bhp/litre per 1000 rpm: 8·15.
(8) Maximum mean piston speed at 4400 rpm: 2294ft/min.

GEAR RATIOS

	Gearbox	*Overall*
First gear	2·840 : 1	11·67 : 1
Second gear	1·642 : 1	6·75 : 1
Top gear	1·000 : 1	4·11 : 1
Reverse	3·858 : 1	15·86 : 1

Rear axle ratio: 4·11 : 1.
Tyre size: 5·90 — 13.

* Also available with compression ratio 6·9 : 1.

SPECIFIC PERFORMANCE FIGURES

(Dry weight, saloon)

(1) Piston area per ton: 30·66 (27·37) sq in.
(2) Litre per ton: 1·54 (1·38).
(3) Bhp per ton: 55·6 (48·25).
(4) Brake lining area per ton: 134·5 (120·1) sq in.
(5) lb/bhp: 40·2.
(6) Bhp per cc piston displacement: 0·64.
(7) Road speed at 1000 rpm in top gear: 16·0.
Road speed at 4400 rpm in top gear: 70·3.
(8) Road speed at 2500ft/min piston speed, in top gear: 81.
(10) Litres per mile in top gear: 2131.
(11) Litres per ton/mile in top gear (specific): 1952 (1743).

THEORETICAL ROAD SPEEDS (mph)

rpm	*First gear*	*Second gear*	*Top gear*	*Mean piston speed (ft/min)*
(*a*) 1000	5·9	10·3	16·0	448
(*b*) 2300	13·6	23·6	36·8	1031
(*c*) 4400	26·1	45·3	70·3	1971

(*b*) = rpm at maximum torque. (*c*) = rpm at maximum bhp.

ROAD TEST

(Saloon with two passengers)

(1) **Maximum speed:** 80 mph.

(2) **Cruising speed:** 62 mph.

(3) **Cruising range:** approximately 300 miles.

(4) **Speed in gears** (mph):

	Normal	*Maximum*
First gear	18·5	32·0
Second gear	37·0	57·7
Top gear	62·0	80·7

(5) **Acceleration times:**
0–30 mph through gears 5·6 sec
0–40 mph through gears 9·8 sec
0–50 mph through gears 15·8 sec
0–60 mph through gears 23·2 sec
0–70 mph through gears 36·8 sec
Standing quarter-mile, 23 sec

(6)

	First gear	*Second gear*	*Top gear*
10–30 mph	4·3 sec	5·9 sec	11·1 sec
20–40 mph	– sec	6·7 sec	11·0 sec
30–50 mph	– sec	8·3 sec	11·8 sec
40–60 mph	– sec	– sec	15·1 sec
50–70 mph	– sec	– sec	22·7 sec

(7) **Climbing power:**
Second gear: 16·5% = 1 in 6·1 = 9°23′.
Top gear: 9·5% = 1 in 10·5 = 5°23′.

(8) **Fuel consumption:**
Minimum: 37·0 (29·6) miles per gallon at constant 30 mph.
Normal: 34·5 (27·6) miles per gallon at constant 40 mph.
Maximum: 20·5 (16·4) miles per gallon at constant 70 mph.
Mean: 22·2 (17·8) miles per gallon.

Lubrication and maintenance

RUNNING-IN SPEEDS

During the first 500 miles do not exceed the following maximum speeds:

First gear	15 mph.
Second gear	30 mph.
Top gear	50 mph.

Never overload the engine, but change to a lower gear in good time when necessary and avoid fierce acceleration.

GENERAL DATA

Engine: 6 Imp pints (7·2 US pints); add 1·5 Imp pints (1·8 US pints) for dry oil filter.
Oil viscosity: above 20°F, SAE 20 or 20W
from 20°F to −10°F, SAE 10W. } or 10W–30.
below – 10°F, SAE 5W.
Oil dipstick: on right-hand side of engine, beside ignition distributor.
Oil filler cap: on valve cover.
Oil drain plug: at bottom of sump.
Change oil when the oil is warm.

Oil filter: Full-flow oil filter, mounted at right-hand side of engine. Change filter element every 5000 miles.
Add 1·5 Imp pints (1·8 US pints) of oil to sump if filter element is renewed.
Always fit new filter housing gasket.

Gauze type air cleaner: Wash filter element in petrol, dip in engine oil and allow to drain.

Oil bath air cleaner: Wash filter element in petrol and allow to dry. Clean filter housing and refill with engine oil to level mark.

Oil filler cap: The oil filler cap incorporates the air cleaner for crankcase ventilation. Service as described for dry air cleaner.

Gearbox: Capacity: 2·5 Imp pints (3 US pints).
Oil grade: EP gear oil (extreme pressure).
Oil viscosity: summer and winter SAE 80 EP.
Oil level and filler plug: on left-hand side of gearbox.
Oil drain plug: at bottom of gearbox. Change oil when the oil is warm.

Universal joints: Lubricate with lithium base grease.

Rear axle/differential: Capacity: 2·5 Imp pints (3 US pints).
Oil grade: hypoid gear oil (extreme pressure).
Oil viscosity: summer and winter SAE 90 EP. (80 EP below – 10°F.)
Oil level and filler plug: on left-hand side of differential carrier.
Oil drain plug: at bottom of rear axle housing, if fitted.
Change oil when the oil is warm.

NOTE: Later production rear axles are fitted with a special lubricant, which need not be drained; no drain plug is fitted.

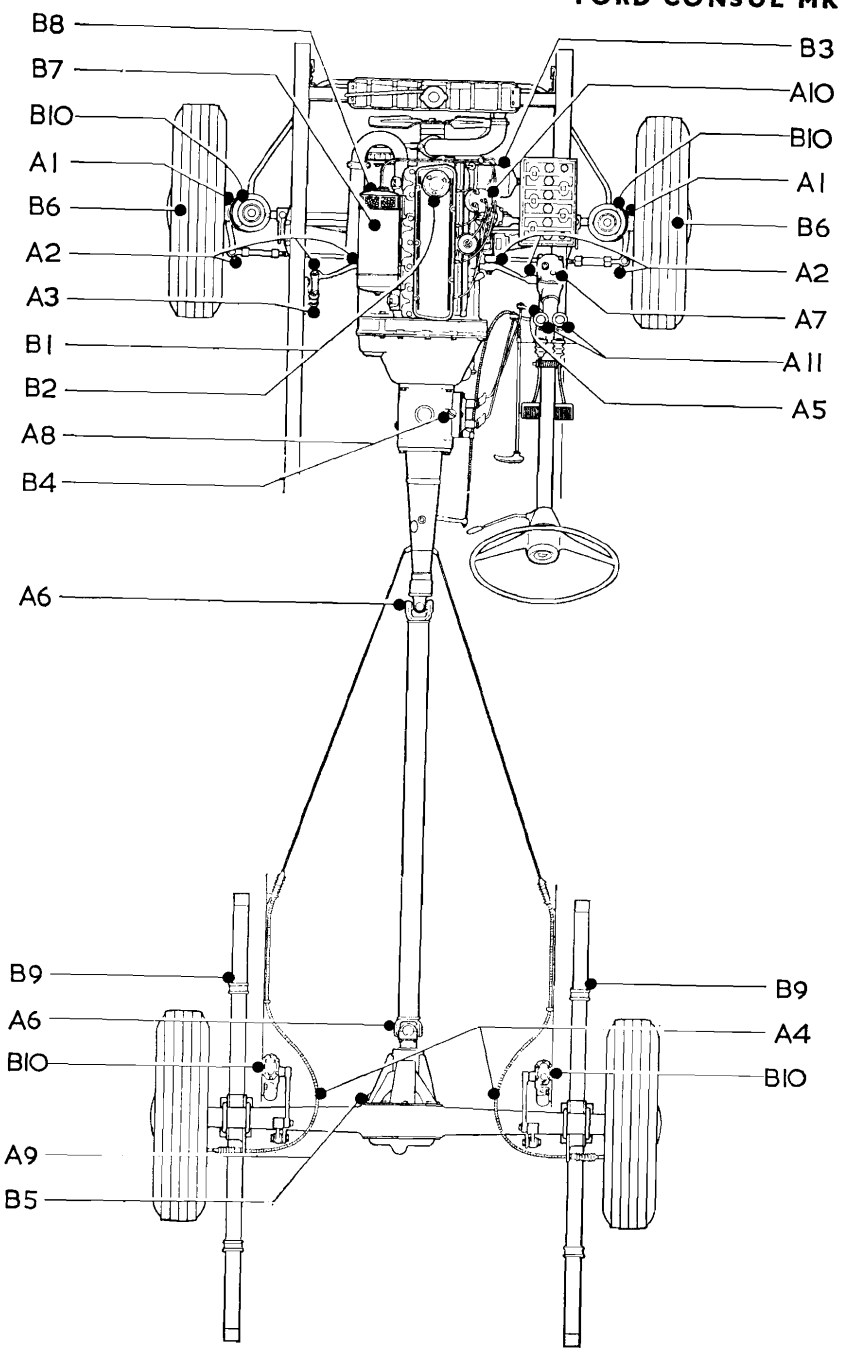


Fig. 13. Lubrication Chart

Cooling system: Capacity: 2·25 Imp gallons (2·95 US gallons).
Drain-cocks: at bottom of radiator and at left-hand side of cylinder block, above the starter motor. An approved anti-freeze should be added during winter months.

Water pump: No lubrication required.

Fuel tank: The fuel tank is mounted under the luggage compartment floor; the capacity is 10·5 Imp gallons (12·6 US gallons).
Filler cap: behind rear number plate, in the centre of rear body panel.

Steering gear: Top-up to edge of filler plug opening.
Oil grade: EP gear oil.
Oil viscosity: summer and winter SAE 90 EP.

Front wheel bearings: Clean and repack with wheel bearing grease.

Rear wheel bearings: No lubrication required.

Brake and clutch master cylinders: Keep fluid reservoirs (under bonnet on driver's side) filled up to the level mark with brake fluid. (Factory recommendation: Ford ME 3833-E). Avoid mixing fluids of different brands.

Shock-absorbers: If necessary, top-up with shock-absorber fluid (factory recommendation: Ford M-100502-E).

NOTE: On no account should a pressure-gun be used when topping-up shock-absorbers.

TYRE PRESSURES (Cold)

Tyre pressures, front and rear: 24–28 lb sq in, according to load.

ROUTINE MAINTENANCE

Daily: Check oil level, radiator, petrol, tyres, and lights.
Weekly: Check battery electrolyte and tyre pressures.

Running-in Period

After the first 300 miles, change oil in engine and rear axle; flush out the rear axle housing if a drain plug is fitted.

A. Every 1000 miles

A1 to A6 inclusive: lubricate with grease gun:

A1. Track control arm ball joints (two nipples).
A2. Track and steering rod ball joints (six nipples).
A3. Idler arm pivot (one nipple).
A4. Parking brake cables (two nipples).
A5. Gearchange mechanism (one nipple).
A6. Universal joints (two nipples).
A7. Steering gear: check oil level and top-up if necessary.
A8. Gearbox: check oil level and top-up if necessary.
A9. Rear axle: check oil level and top-up if necessary.
A10. Ignition distributor: lubricate shaft with two drops of engine oil (remove rotor) and governor weight mechanism with one or two drops of engine oil. Apply a light film of grease to breaker cam faces.
A11. Brake and clutch master cylinder reservoirs: check fluid level, top-up if necessary with brake fluid.

Lubricate with a few drops of engine oil: accelerator linkage, carburettor, parking brake, door hinges and locks, bonnet hinges, etc.

Clean fuel pump filter.

Check free play of clutch fork and readjust if necessary.

B. Every 5000 miles

*B*1. Engine sump: drain and refill.
*B*2. Breather cap: clean and re-lubricate with engine oil.
*B*3. Oil filter: clean housing, renew element.
*B*4. Gearbox: drain and refill (flush with flushing oil if necessary).
*B*5. Rear axle: drain and refill (flush with flushing oil) if a drain plug is fitted.
*B*6. Front wheel bearings: remove, clean and repack with wheel bearing grease.
*B*7. Air-cleaner (gauze type): remove element, clean and re-lubricate with engine oil.
Air-cleaner (oil bath type): drain, clean and refill bowl with fresh engine oil.
*B*8. Generator: lubricate rear bearing with two drops of engine oil.
*B*9. Rear springs: spray or brush with penetrating oil.
*B*10. Front and rear shock-absorbers: check level, top-up with shock-absorber fluid if necessary.

Check brakes and adjust if necessary.
Clean carburettor float chamber and adjust carburettor idling speed.
Check electric equipment: clean ignition distributor, adjust breaker points.
Clean and re-gap spark plugs.
Tighten all bolts and nuts.

Repair data

Repairs are best performed by authorised Ford dealers, who possess the special tools and experience.

ENGINE

Engine type: Consul 204E, four-cylinder, ohv petrol engine, in line. The engine, clutch and gearbox are bolted together to form a single unit, which is suspended in three rubber mountings. The engine can be removed as a single unit.

Removal of engine

(1) Drain oil and cooling system. Remove the bonnet, the battery, the battery support and the air-cleaner.
(2) Remove the radiator and radiator hoses, the water outlet from the cylinder head and the thermostat. Disconnect the heater hoses, if fitted. Disconnect the wires from the ignition coil and remove the coil, together with the coil bracket. Remove the heater motor and fan, if fitted.
(3) Disconnect the exhaust pipe from the exhaust manifold and remove the spacer ring.
(4) Disconnect the fuel and vacuum lines from pump, carburettor and ignition distributor.
(5) Remove the inlet manifold, together with the carburettor; remove the exhaust manifold. Disconnect the wires from starter motor and generator; remove the generator, together with the generator bracket.
(6) Remove the fan and fan pulley; remove the oil dipstick and disconnect the wires from the oil pressure and temperature gauge transmitter units.
(7) Remove the spark plugs and ignition distributor; remove the oil filter and the fuel pump.

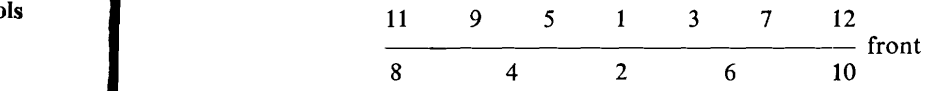
(8) Support the front of the engine sump on a jack with a wooden block and disconnect the engine mountings from the cylinder block. Carefully lower the engine until it rests on the front suspension cross-member.
(9) Install the special lifting hooks A/HT-6004 or, if these are not at hand, support the engine with suitable chains and tackle.
(10) Support the gearbox; remove the upper bolts securing the clutch housing, together with the starter motor attachment bolt. From under the car, remove the remaining bolts securing the clutch housing, together with the flywheel-housing cover. The clutch-actuating cylinder need not be removed or disconnected.
(11) Carefully lift the engine and pull it forward until the clutch shaft is free from the clutch plate.
(12) Lift the front of the engine as high as possible and turn the front of the engine towards one side; the engine may now be lifted from the car.

Re-installation

Re-installation is carried out in the reverse order of removal.

Engine compression: The compression pressure at cranking speed on a warm engine with wide-open throttle should be 150 lb sq in on engines with 7·8 : 1 compression ratio. On engines with compression ratio 6·9 : 1 the compression pressure should be 125 lb sq in.

Cylinder head: Cast-iron cylinder head, equipped with valve mechanism. Cylinder heads for 7·8 : 1 compression ratio are marked with H on the edge of one of the inlet ports. Tighten cylinder head bolts evenly to 65–70 lb ft in the order given below.



Cylinder head gasket: Steel cylinder head gasket. Before fitting, both sides should be coated with sealing compound. In order to avoid damaging the gasket while fitting the cylinder head, the use of guide studs A/HT-6050 is recommended. If necessary, guide studs may be locally manufactured from two cylinder head bolts by cutting off the bolt heads and sawing screwdriver slots into the bolt ends. The guide studs should be screwed in two diametrically opposite holes.

Cylinder block: Cast-iron cylinder block and crankcase.

Cylinder dimensions

Standard bore: 3·250–3·2512in.

See also under *Pistons*.

During an engine overhaul it may be necessary to install cylinder liners, which are available in standard size and 0·020in oversize.

When fitting standard size cylinder liners, the engine block should be rebored to 3·3745–3·3755in; when installing a 0·020in oversize cylinder liner, the cylinder block should be rebored to 3·3945–3·3955in.

The cylinders are offset by 0·060in with respect to the crankshaft centre line.

Inlet and exhaust manifolds: The exhaust manifold is made of steel; the inlet manifold is an aluminium casting which fits over the exhaust manifold to form a hot-spot. When installing the inlet manifold, always use new gaskets. Tighten the inlet manifold bolts to 17–20 lb ft. The exhaust manifold is installed without gaskets but

the mating faces of cylinder head and exhaust manifold should be coated with heat-resistant gasket cement. The rear saddle of the exhaust manifold is welded to it to ensure proper positioning of the manifold on the cylinder head; the exhaust manifold bolts should be tightened to 8–10 lb ft.

Engine sump: The engine sump is a steel pressing. The gasket consists of four separate parts which are dove-tailed. When installing the gasket and sump, make sure that the dove-tailed gasket ends are properly fitted together and coat them with a little gasket cement in order to avoid leaks.

When installing the engine sump, remember that the deep part of the sump is towards the front of the engine.

Coat the thread of the two screws which are screwed into the timing gear cover with gasket cement; tighten the sump screws to 5–7 lb ft.

Pistons: Light alloy pistons, cam ground with Invar struts.

Each piston is equipped with two compression rings and one oil-control ring, fitted above the piston pin.

Dimensions

Standard size:	diameter 3·2492 – 3·2504in.
0·0025in oversize:	diameter 3·2517 – 3·2529in.
0·005in oversize:	diameter 3·2542 – 3·2554in.
0·015in oversize:	diameter 3·2642 – 3·2654in.
0·030in oversize:	diameter 3·2792 – 3·2804in.
0·045in oversize:	diameter 3·2942 – 3·2954in.
0·060in oversize:	diameter 3·3092 – 3·3104in.

Pistons of each above-named dimension are available in four grades which are denoted by the numbers 1, 2, 3, and 4. The difference in diameter of pistons of different grading is 0·0003in.

The grade number (1–4) for each cylinder is also stamped on the mating face of the cylinder block side cover.

Measure the cylinder diameter at 4·5in from the top, at right angles to the crankshaft centre line.

Clearance of new piston in new cylinder bore: Install the piston, together with a 0·0015in feeler gauge, into the cylinder; a pull of 8–12lb should be required to remove the feeler gauge from between the piston and cylinder wall.

Piston clearance, new piston in used cylinder bore: Install the piston, together with a 0·002in feeler gauge, into the cylinder; a pull of 8–12lb should be required to remove the feeler gauge from between the piston and cylinder wall.

Always install the feeler gauge between the thrust side of the piston and cylinder wall. When installing pistons and connecting rods, always make sure that the mark 'Front' on piston and connecting rod is towards the front of the engine.

Width of compression ring groove: 0·080–0·081in (both grooves).
Width of oil control ring groove: 0·1875–0·1885in.
Diameter of piston pin bore in piston: 0·8747–0·8750in.
The piston pin bore is offset 0·060in.

Piston rings: Two compression rings and one oil control ring, fitted above the piston pin.

The second compression ring is a scraper ring. Both compression rings should be installed with the word 'Top' facing upwards.

Dimensions
Compression ring gap, new: 0·009–0·014in.
Compression ring gap, max.: 0·020in.
Gap of oil control ring: 0·010–0·020in (max.).
Width of upper compression ring: 0·0775–0·0780in.
Width of second compression ring: 0·0770–0·0780in.
Width of oil control ring: 0·186–0·1865in.
Clearance in groove, upper compression ring: 0·002–0·0035in (0·0045in max.).
Clearance in groove, second compression ring: 0·002–0·003in (0·0045in max.).
Clearance in groove, oil control ring: 0·001–0·0025in (0·004in max.).

Piston pins (gudgeon pins): Hollow steel, floating piston pins, retained in the piston by means of circlips. The piston pin runs on a bronze bush in the connecting rod.

When installing piston pins, heat the pistons in boiling water; the oiled piston pin should now be a light push-fit in the piston.

Dimensions
Length of piston pin: 2·786–2·798in.
Diameter of piston pin: 0·8745–0·8748in.
Clearance in piston: 0–0·0003in.
Piston pins are available in standard size and 0·002in oversize.

Connecting rods and bearings: The connecting rods are steel forgings of I-beam section and are equipped with steel-backed, thin-wall big-end bearing inserts. Connecting rods are marked on one side with the word 'Front'; consequently, the connecting rods should be installed with this side towards the front of the engine. The small oil hole for cylinder lubrication is then facing the left-hand side of the engine. Before dismantling an engine, always check whether the connecting rods and bearing caps are numbered on the camshaft side; if necessary, mark them 1 to 4 from front to rear.

Dimensions
Connecting rod length, centre to centre: 5·312in.
Big-end bore diameter: 2·2710–2·2715in.
Width of big-end: 1·248–1·250in.
Wall thickness of bearing inserts: 0·072–0·07225in.
End-clearance of big-end bearings: 0·006–0·010in.
Radial bearing clearance: 0·005–0·002in.

Big-end bearing inserts are available in standard size and in 0·002in, 0·010in, 0·020in, 0·030in and 0·040in undersizes.

Tighten big-end bearing bolts to 20–25 ft lb.

Crankshaft and main bearings: The cast-steel crankshaft runs in three main bearings. The crankshaft end-clearance is taken at the centre main bearing by means of four semi-circular thrust washers fitted at either side of the centre main bearing. When fitting these thrust washers make sure that the oil grooves are towards the outside. The lower halves of these thrust washers, which are installed in the main-bearing cap, incorporate a tongue which fits into a recess in the bearing cap. All main-bearing caps are marked with an arrow which should be pointing towards the front of the engine. The rear main-bearing oil-seal should be soaked for at least three hours in engine oil before it is fitted.
Length of front main-bearing journal: 1·173–1·183in.
Length of centre main-bearing journal: 1·354–1·356in.

Length of rear main-bearing journal: 1·650–1·655in.
Diameter of main-bearing journals: 2·3760–2·3765in.
Diameter of crank-pin journals: 2·1255–2·1260in.
Length of crank-pin journals: 1·256–1·258in.
End-clearance of connecting-rod big-end bearings: 0·006–0·010in.
Radial clearance of connecting-rod big-end bearings: 0·002–0·005in.
End-clearance of crankshaft: 0·004–0·012in.
Radial clearance of main bearings, normal: 0·001–0·0025in.
Radial clearance of main bearings (max.): 0·005in.
Diameter of main-bearing bore in cylinder block: 2·5210–2·5215in.
Wall thickness of main-bearing shells (standard size): 1956 0·092–0·09225in.
1958 0·072–0·07225in.

Main-bearing shells are available in standard size and in 0·010in, 0·020in, 0·030in, and 0·040in undersize. Also available are main-bearing shells on which the outer diameter is 0·015in oversize.

Thickness of thrust washers, standard size (1958): 0·091–0·093in.

Thrust washers are available in standard size and in 0·0025in, 0·005in, 0·0075in, and 0·010in oversize.

Tighten the main-bearing cap bolts to 55–60 lb ft.

Flywheel: Cast-iron flywheel with shrunk-on starter ring gear of special alloy steel. The flywheel bolts should be tightened to 70–75 lb ft. Maximum allowable run-out of flywheel: 0·006in.

When fitting the clutch-shaft pilot-bearing in the flywheel, the closed side of the bearing should be towards the clutch.

Starter ring gear: Starter ring gear of special alloy steel, shrunk on to the flywheel. When replacing the starter ring gear, split the old gear by means of a chisel between two teeth, taking care not to damage the flywheel. The new starter ring gear should be heated to 315°C (600°F); this can best be done by placing the new ring gear on a steel plate and heating this plate from the underside by means of a welding torch. Place a few scraps of lead around the circumference of the starter ring gear. When this lead starts to melt, the correct temperature has been reached. Do not use solder, because solder has a lower melting point. When the starter ring gear is heated to the correct temperature, it should be placed on the flywheel with the bevelled side of the starter ring gear teeth towards the front of the flywheel; make sure the starter ring gear is correctly seated by carefully tapping it with a drift and hammer.

Number of teeth on starter ring gear: 105.

Camshaft: The cast-steel camshaft runs in three bearings and is fitted in the right-hand side of the crankcase.

NOTE: The letter *B* is stamped between the first and second cam of the camshaft; the part number is also suffixed *B*. On no account should a camshaft be fitted to the Consul 1700 engine which bears the suffix *A* behind the part number, because the eccentric for the fuel pump drive on camshafts of type *B* is in a different position from that on type *A*. If a type *A* camshaft is fitted to a Consul 1700 engine, the eccentric for the fuel pump drive will be hit by a connecting rod.

Dimensions
Diameter of camshaft journals: 1·7665–1·7670in (new); 1·7655in (min.).
Length of front camshaft journal: 1·06in.

Length of second and third camshaft journal: 0·820in.
Camshaft end-clearance: 0·002–0·007in.
Radial clearance of camshaft bearings: 0·001–0·002in (new); 0·004in (max.).

The camshaft end-clearance is taken by means of a thrust flange which is fitted between the front camshaft journal and the camshaft sprocket. This thrust flange is 0·176–0·178in thick. The overall cam height (heel to toe) is 1·492in; if the overall cam height is reduced to 1·472in, the camshaft should be replaced.

Camshaft bearings: Steel-backed, thin-wall bearing bushes lined with white metal. New camshaft bearing bushes are machined to the correct size and no reaming is necessary.

Dimensions
Inner diameter of camshaft bearings: 1·7680–1·7685in (new); 1·7695in (max.).

New camshaft bearings should be installed with the aid of the special tools A/HT-6261-AB. Make sure that the oil holes in the bearing bushes coincide with the oil channels in the cylinder block. Always replace the rear camshaft bearing cover when new camshaft bearings are installed; the outer circumference of the bearing cover should be sparingly coated with gasket cement.

Camshaft drive: Camshaft drive by means of duplex roller chain and sprockets.

Number of teeth on crankshaft sprocket: 20.
Number of teeth on camshaft sprocket: 40.

When installing the chain and sprockets, the timing marks on camshaft and crankshaft sprockets should be on the centre line and facing each other.

An automatic chain-tensioner is fitted in the lower side of the timing gear cover. This chain-tensioner is operated by means of the engine oil pressure.

Valve timing: Inlet valve opens 17° before T.D.C.
Inlet valve closes 51° after B.D.C.
Exhaust valve opens 49° before B.D.C.
Exhaust valve closes 19° after T.D.C.
} as measured with zero valve clearance.

Valve clearance: The valve clearance of inlet and exhaust valves should be adjusted to 0·014in; the valve clearance may be adjusted on a cold engine but should be checked and if necessary readjusted to 0·014in when the engine has reached its normal operating temperature.

Valves: Overhead valves.

Dimensions
Valve head diameter, inlet: 1·432–1·442in.
Valve head diameter, exhaust: 1·182–1·192in.
Valve face angle, inlet and exhaust: 45°.
Valve stem diameter, inlet: 0·3096–0·3107in.
Valve stem diameter, exhaust: 0·3078–0·3098in.
Valve lift: 0·350in.

Since the valve guides are integral with the cylinder head, valves are available with stems in standard size and in 0·003in, 0·015in and 0·030in oversize.

Valve seats: The valve seats are machined directly in the cylinder head; the valve seat angle is 44·5°.

For purposes of reconditioning a cylinder head, replacement valve seats are available. In order to fit these, the cylinder head should be machined to the dimensions given in the following table

Valve seat	*Valves*	*Inner diameter of valve seat bore in cylinder head*	*Depth of valve seat bore in cylinder head*
Standard size	inlet	1·562–1·5625in	0·218–0·220in
	exhaust	1·312–1·325in	0·218–0·220in
0·010in oversize diam., standard height	inlet	1·572–1·5725in	0·218–0·220in
	exhaust	1·322–1·3225in	0·218–0·220in
0·010in oversize diam., and oversize height	inlet	1·572–1·5725in	0·228–0·230in
	exhaust	1·322–1·3225in	0·228–0·230in
0·020in oversize diam., and standard height	inlet	1·582–1·5825in	0·218–0·220in
	exhaust	1·332–1·3325in	0·218–0·220in
0·020in oversize diam., and oversize height	inlet	1·582–1·5825in	0·238–0·240in
	exhaust	1·332–1·3325in	0·238–0·240in

The new valve seats must be carefully fitted with the aid of a suitable driver until they are correctly seated in the cylinder head. The valve seats need not be undercooled before fitting.

Valve springs: Single valve springs; inlet and exhaust valve springs are identical. The springs should be fitted so that the closed coils are towards the cylinder head.

Dimensions

Free length of springs: 2·09in.
Spring pressure, when compressed to 1·270in: 102–113·5lb.

Valve guides: The valve guides are integral with the cylinder head and cannot be removed.

Dimensions

Diameter of valve guides, inlet and exhaust: 0·3113–0·3125in.
Valve stem clearance, inlet: 0·006–0·0029in.
Valve stem clearance, exhaust: 0·005–0·0038in.

Valve tappets: Mushroom type valve tappets.

Dimensions

Length of valve tappets: 2·34in.
Diameter of valve tappets: 0·4980–0·4985in (new); 0·4965in (min.).
Diameter of valve tappet bore in cylinder block: 0·499–0·500in.
Valve tappet clearance in bore, normal: 0·005–0·002in.
Valve tappet clearance in bore, max.: 0·0035in.

Valve rockers: The inlet and exhaust valve rockers are identical. When fitting rockers to the rocker shaft, proceed as follows:

Fit a split-pin at one end of the rocker shaft. Now install all rockers and related parts on the shaft in the following sequence:

1 flat washer	1 rocker shaft support	1 rocker
1 spring washer	1 rocker	1 rocker shaft support
1 flat washer	the long spring	1 rocker
1 rocker	1 rocker	1 flat washer
1 rocker shaft support	1 rocker shaft support	1 spring washer
1 rocker	1 rocker	1 flat washer
1 short spring	1 short spring	1 split-pin
1 rocker		

When assembling the various parts to the rocker shaft, make sure that the oil hole in the rocker shaft coincides with the oil hole in the third rocker shaft support, counting from the front. The rocker shaft support bolt-holes should be on the same side of the shaft as the adjusting screws in the valve rockers.

When all parts are correctly installed, the bolt-holes in the rocker shaft supports are to the right of the cylinder head. The valve rocker shaft is kept in place by the end of the oil supply pipe which is inserted in the third rocker shaft support.

When the cotter-pins in both ends of the rocker shaft are in a vertical position, the oil hole in the shaft should be visible through the hole in the third rocker shaft support. If this is not the case, the shaft should be turned 180°. When installing the oil supply pipe to the third rocker shaft support, make sure that the small rubber ring on the pipe is in place. The lower end of the oil supply pipe is a snug fit in the connector behind the side cover. The rocker shaft support bolts should be tightened to 30–35 lb ft; they are locked by means of double-coiled lock washers.

Valve rocker shaft: Hollow-steel valve-rocker shaft, mounted in four supports on the cylinder head. Oil is supplied to the valve rockers through eight small drillings in the lower side of the shaft. The hollow shaft is supplied with oil under pressure by means of a pipe which is fitted in the third rocker shaft support.

Valve push-rods: The steel push-rods are installed in the usual way with the rounded end down and the valve rocker adjusting screws resting in the cupped upper ends of the push-rods. Distorted push-rods should not be straightened, but must be renewed.

Lubrication: Full-pressure lubrication by means of gear type oil pump, mounted in the engine sump. The oil enters the pump via a wire-mesh screen and is fed to a full-flow oil filter; from the oil filter the oil enters the main oil channel which is drilled in the right-hand side of the crankcase. From the main oil channel the oil is fed to the main bearings and camshaft bearings through separate channels. The connecting rod big-end bearings are lubricated in the usual way by oil which is fed from the main bearings through drillings in the crankshaft. The front and rear connecting-rod big-end bearings are lubricated from the front and rear main bearing; the second and third connecting-rod bearings are fed from the centre main bearing. The front camshaft bearing journal incorporates a machined flat which corresponds once during each revolution of the camshaft with an oil channel supplying oil to the timing gears and chain.

The rear camshaft journal incorporates a small drilling, thus preventing excessive oil-pressure build-up behind the camshaft, which would thrust it forward.

Two channels are incorporated in the centre camshaft bearing journal; these channels join each other in the centre of the camshaft. Once during each revolution of the camshaft these two channels coincide with two channels in the bearing, one of which is connected to the oil supply whilst the other feeds the oil to the valve

rocker shaft. The oil supply to the valve rocker shaft is connected to the third rocker shaft support. The hollow valve rocker shaft incorporates eight drillings in the lower side to supply oil to the valve rockers. The pistons, piston pins and valve tappets are lubricated by splash. The oil which emerges from the valve rockers lubricates the valve stems and push-rods. The connecting-rod big ends are drilled for cylinder wall lubrication.

The oil pump incorporates a pressure relief valve to keep the oil pressure at a constant value. The wire-mesh screen on the oil pump inlet is made so that the oil will enter the pump without passing the screen when the latter is clogged.

The full-flow oil-filter incorporates a safety valve, which opens when the filter is clogged, thereby providing ample lubrication in all circumstances. An oil-pressure transmitter-unit is connected to the main oil channel; the transmitter unit is electrically connected to the oil-pressure warning light on the instrument panel. As long as the ignition switch is on, the warning lamp will light when the oil pressure is less than 5–7 lb sq in.

Oil pressure: Normal oil pressure: 50–60 lb sq in.

Oil-pressure relief valve: The non-adjustable oil-pressure relief valve is mounted in the oil pump. The relief valve spring should have a pressure of 12·7–14·7 lb when the spring is compressed to 1·35in.

Oil pump: Gear-type oil pump, mounted in the engine sump; the pump is driven by the camshaft, together with the ignition distributor.

When installing the oil pump, attention should be paid to the correct position of the distributor drive. Turn the crankshaft until the timing marks on camshaft and crankshaft sprockets coincide. Now install the oil pump so that the split in the distributor drive is at an angle of 45° with the crankshaft centre line and the large 'D' is towards the outside and the rear. If the oil pump is to be installed with the engine in the car the marks on the timing gear sprockets cannot be seen; in that case, the correct crankshaft position is found by turning the crankshaft until number one piston is at the top of the compression stroke and the timing mark on the crankshaft pulley coincides with the pointer on the timing gear cover.

Specifications

Diameter of oil pump shaft: 0·5045–0·5050in.
Inner diameter of oil pump bearing bush: 0·5065–0·5075in.
Clearance of pump shaft: 0·0015–0·0030in (0·005in max.).
Inner diameter of oil pump idler gear: 0·5025–0·5035in (0·5045in max.).
Diameter of oil pump idler gear shaft: 0·5010–0·5015in (0·500in max.).
Clearance of oil pump idler gear on shaft: 0·001–0·0025in (0·005in max.).

Oil filter: The full-flow oil filter is mounted at the right-hand side of the engine crankcase. When assembling and installing the oil filter, pay attention to the following points:

The by-pass valve in the filter housing should be fitted on the hollow centre bolt so that the holes in the valve are facing the bottom of the filter housing. The filter element should be installed so that the small recess in the filter element is facing the thread of the centre bolt.

Ignition: Ignition by means of coil and battery.
Firing order: 1-2-4-3.
Ignition timing: 8° before T.D.C.

Timing the ignition

Turn the crankshaft until the number one piston is at the end of the compression stroke and the timing mark on the crankshaft pulley coincides with the timing pointer on the timing gear cover. With the marks coinciding, the No. 1 piston is in the correct firing position.

Loosen the distributor clamp bolt and turn the distributor housing so that the rotor is facing the number one spark plug connection and the breaker points are just starting to open. In order to obtain accurate adjustment, the use of a 12V testlight is recommended; the testlight should be connected between the primary terminal on the distributor housing and a good earth. With the ignition switch turned on, the testlight will go on at the moment the breaker points start to open. Tighten the distributor clamp bolt and check the adjustment with a neon timing light with the engine running.

Ignition distributor: Lucas, No. 40543-A, on engines with high compression ratio; No. 40544-A on engines with low compression ratio. The difference between both models is in the vacuum diaphragm housing and the governor springs. The diaphragm housings can be identified by means of the numbers which are stamped on the hexagon connector for the vacuum pipe. On high compression engines the numbers 5, 11, 8 are stamped in the connector. The first number of each group denotes the start of vacuum advance in inches of mercury. The second number of each group denotes the end of vacuum advance, also in inches, of mercury. The last number in the group denotes the total number of degrees between start and finish of vacuum advance.

Specifications

Breaker point opening: 0·014–0·016in.
Breaker arm spring tension: 18–24 oz.
Governor springs, high-compression engine, 7·8 : 1 :
Tension of primary spring, when stretched 0·0625in: 29lb 8 oz–32lb 8 oz.
Tension of secondary spring, when stretched 0·0625in: 2lb 11 oz–3lb 1 oz.
Governor springs, low compression engine, 6·9 : 1:
Tension of primary spring, when stretched 0·0625in: 15lb 8 oz–17lb 8 oz.
Tension of secondary spring, when stretched 0·0625in: 4lb 3 oz–4lb 9 oz.
Percentage of dwell: 64–69 per cent.
Cam angle: 60±3°.

If the percentage of dwell is too low, first check the condition of the breaker points, which should be clean and flat. Check and if necessary adjust breaker point opening. If the percentage of dwell at high speed (4000 rpm) is considerably lower than at idling speed, the breaker arm spring tension should be checked.

Diameter of distributor shaft: 0·4895–0·4900in.
End-clearance of distributor shaft: 0·004–0·006in.
Radial clearance of distributor shaft: 0·0002–0·0014in.

Advance characteristics

Centrifugal advance, distributor degrees

Crankshaft (rpm)	*Distributor* 40543*A*	*Distributor* 40544*A*
1000	2 – 4°	0 – 2°
2000	7 – 9°	5¾– 7¾°
3000	8½–10°	9¾–11¾°
4000	10 –12°	12 –14°
5000	10 –12°	12 –14°

Vacuum advance, distributor degrees		
Vacuum in inches Hg	*Distributor* 40543*A*	*Distributor* 40544*A*
3	0 –1¼°	0°
5	0 –1°	0 –1°
7	½–2½°	1¾–3¾°
9	2¼–4¼°	4¼–6¼°
11	3¾–5¾°	6½–8½°
13	5½–7½°	7–9°
15	6½–8½°	7–9°

Condenser: The condenser is mounted in the distributor housing and has a capacity of 0·18–0·22 microfarad.

Spark plugs: Champion, 14mm, type N-8. Spark plug gap: 0·032in.

Ignition coil: Lucas, 12V.

Fuel system: The fuel tank is mounted under the luggage compartment floor; the fuel is fed to the downdraught carburettor by means of a mechanical fuel pump of the diaphragm type.

Fuel filter: The fuel filter on Mk II engines is not combined with the fuel pump, but is a separately fitted unit. To clean the filter, unscrew the knurled nut securing the glass filter bowl, swing the bowl retainer aside and remove the bowl, the gasket and the gauze screen. Always install a new gasket.

Fuel pump/Vacuum pump: The combined fuel and vacuum pump is of the diaphragm type, and driven by the engine camshaft. For exploded view see Fig. 14.

Dismantling:

Mark the fuel-pump cover, the main body and the vacuum-pump housing to facilitate reinstallation in the original position. Remove the fuel-pump cover screws and take off the cover; the valves and gasket may now be removed by unscrewing the valve retainer screws. Hold the vacuum-pump housing tightly against spring pressure and remove the screws; hold the housing until all screws are completely removed, otherwise the threads will be stripped. Remove the pump housing, the

Key to Fig. 14

1 Filter housing
2 Gauze screen
3 Bowl gasket
4 Filter bowl
5 Bowl retainer assembly
6 Fuel-pump cover
7 Valve gasket
8 Inlet valve
9 Outlet valve
10 Valve retainer
11 Fuel-pump diaphragm
12 Fuel-pump spring seat
13 Fuel-pump spring
14 Oil-seal retainer
15 Oil-seal
16 Rocker shaft
17 Gasket
18 Rocker-arm spring
19 Link spacer
20 Vacuum-pump rocker-arm link, right
21 Fuel-pump rocker-arm link
22 Rocker arm
23 Vacuum-pump rocker-arm link, left
24 Bush
25 Main body
26 Inlet valve, upper
27 Outlet valve, upper
28 Oil-seal
29 Oil-seal retainer
30 Vacuum-pump diaphragm
31 Spring seat
32 Vacuum-pump spring
33 Outlet valve, lower
34 Inlet valve, lower
35 Valve cage gaskets
36 Vacuum-pump housing

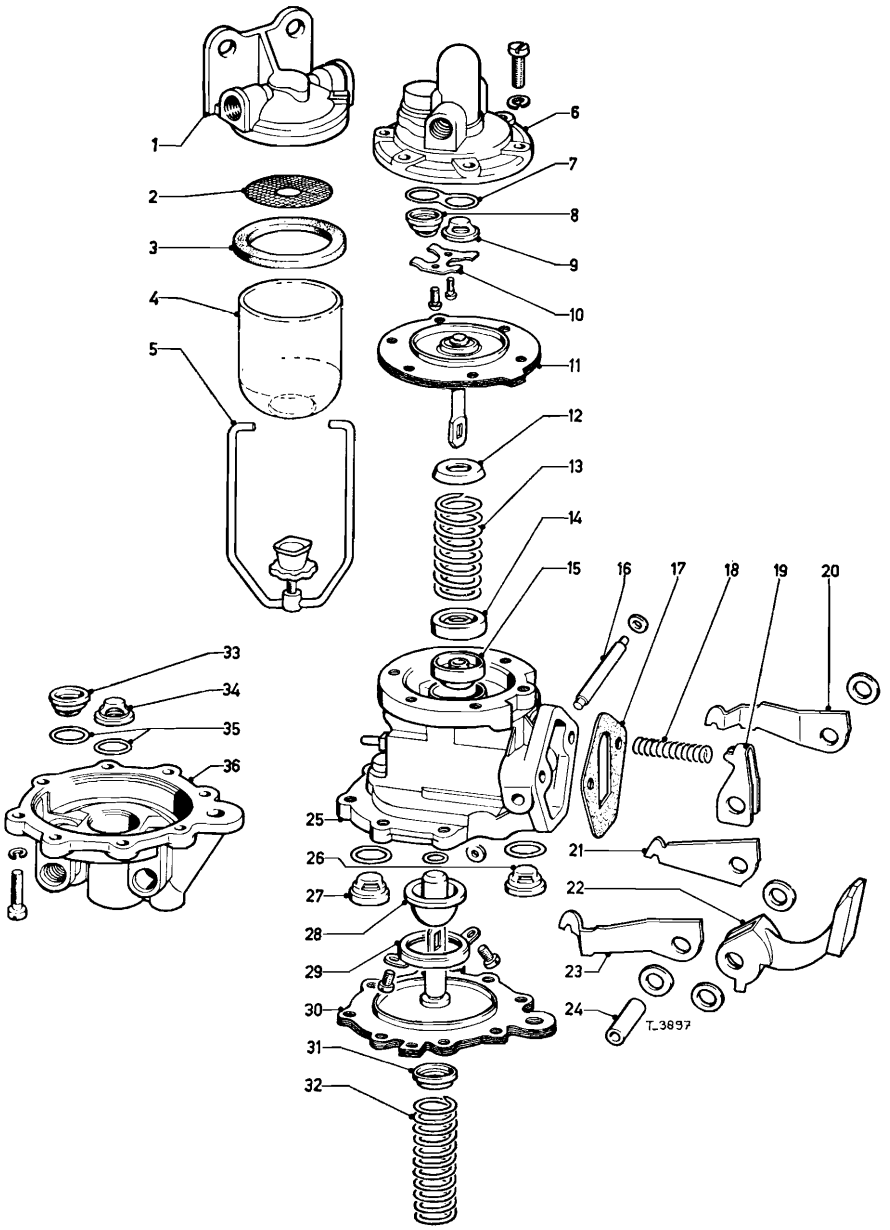


Fig. 14. Fuel pump, exploded view

spring and spring seat. The inlet and outlet valves may now be removed; observe that the inlet and outlet valve in the main body are both fitted with the cage upwards, whereas the outlet valve in the pump housing is fitted with its cage downwards. Carefully tap out the rocker-arm shaft and remove the rocker assembly, the rocker arm and rocker-arm spring. The rocker assembly and arm may now be taken apart by merely sliding out the bush. Lift both diaphragms from the main body, take out the fuel-pump diaphragm spring and remove the oil-seals.

Clean and inspect all parts; if necessary, lap the mating faces to ensure a perfectly flat and smooth finish. Always install new oil-seals and gaskets. The use of a repair kit, containing all necessary parts, is recommended for general overhaul.

Reassembly:

Soak the new diaphragms in kerosene for about fifteen minutes. Install the new oil-seals as shown in Fig. 14. Reassemble the valves in the fuel-pump cover, vacuum-pump housing and main body in the reverse order of dismantling; the vacuum-pump inlet valve in the main body *must not* be staked in place. Lightly stake the outlet valve in the main body and both valves in the vacuum-pump housing. All valves are interchangeable, but must be reinstalled in the correct position, as shown in the figure. Reassemble the rocker arm and rocker assembly with bush and washers and install the assembly, together with the rocker-arm spring, in the main body. Do not yet install the rocker-arm shaft, but hold the parts in place by inserting a suitable rod of the same diameter as the shaft. Install the fuel-pump diaphragm with its spring and spring seat and hook the stem onto the rocker; inverting the main body will facilitate this operation. Fit the fuel-pump cover to the main body, turning the screws down just far enough to make the screw heads touch the lock washers. Push the rocker arm in until the diaphragm is pulled down all the way, then tighten the screws gradually and evenly. Invert the pump and install the vacuum-pump diaphragm, making sure the rocker links are correctly engaged in the stem. Position the spring seat and spring on the diaphragm, install the vacuum-pump housing and fit the screws loosely. Hold the housing down against spring pressure and tighten the screws gradually and evenly. Fit the rocker-arm shaft with its washers and lock it by lightly peening the shaft ends over the washers.

Specification:

Fuel-pump pressure: 2½–3½ lb sq in.
Pump suction: 8in Hg at idle speed; 10½in Hg at full speed.

Carburettor: Zenith downdraught carburettor, type 34 WIA or 34 VN. Model numbers (34 WIA): C1521 (up to mid-1956), C1567 (later 1956), C1584 (up to June 1958); type 34 VN: C1621 (from June 1958, engine No. *204E*120679*). For exploded views see Figs. 15 and 16.

Specifications:

	Type 34 *WIA*	*Type* 34 *VN*
Flange diameter	34mm	34mm
Choke tube diameter	26mm	26mm
Main jet	115	97
Main air bleed	70	Compensator 80 Comp. air bleed 1·80
Pump jet	70	50 (first series 70)
Power jet	65	—
Idle jet	45	45
Idle air bleed	—	70

Idling and progression channels	2 × 80	—
Float needle valve	2mm	1·75mm
(From February 1958)	1½mm	—
Float level	⅝in under float chamber at 2½ lb sq in fuel pump pressure.	

Carburettor service operations—Zenith 36 WIA:

For normal service operations the carburettor does not have to be completely dismantled; the float chamber cover and air horn may be removed from the main body to gain access to all internal parts, without disturbing the main body and the adjustments.

Dismantling:

Remove the float chamber cover and air horn assembly, together with the float chamber gasket. The economizer valve and diaphragm, the choke valve and pump shaft and related parts may now be removed. From the main body remove the float assembly, the pump piston, piston spring, inlet and outlet valves, the power jet assembly, the idling jet, main jet and the discharge nozzles. Remove the throttle flange, the insulating gasket and the venturi. Remove the idling mixture adjusting screw from the throttle flange. If the throttle valve and shaft are in good condition, do not remove these parts, thus saving the time required to recentralize the throttle valve during assembly. Clean all metal parts in a non-caustic solvent; always replace all gaskets.

Reassembly:

Reassembly is carried out in the reverse order of dismantling.
Float level adjustment: If necessary, the float level may be adjusted by carefully bending the float lip to which the needle is attached.

Fast idle adjustment: Back off the idle adjustment screw until the throttle valve is fully seated in the bore of the main body. Close the choke valve and turn the fast idle arm to give 0·036in (No. 64 drill) opening of the throttle valve (approximately 5½ turns of the idling speed adjustment screw). In this position fasten the fast idle rod to the choke lever.

Accelerating pump stroke: The pump stroke is adjusted by setting the fulcrum pin of the pump connector link assembly in either one of the three holes provided. The average setting is obtained by using the centre hole; under normal climatic conditions this will give the best results for satisfactory acceleration and fuel economy. In very cold weather the long stroke (upper hole) and in hot weather the short stroke (lower hole) may be used, if necessary.

Idling mixture and idling speed: The idling mixture adjustment screw should be turned in until fully seated (use finger force only), then back off about 1¼ turns; this is a fair average to start with. After the carburettor is installed on the manifold, run the engine at fast idle until it has reached its normal operating temperature, then adjust the mixture by turning the screw in to weaken or out to enrich it. Turn the idling speed adjustment screw until the required speed is obtained.

Carburettor service operations—Zenith 34 VN:

For normal service operations the carburettor does not have to be completely dismantled; the float chamber and related parts may be removed from the main body without disturbing the main body and the adjustments. If the carburettor is to be completely dismantled, proceed as follows:

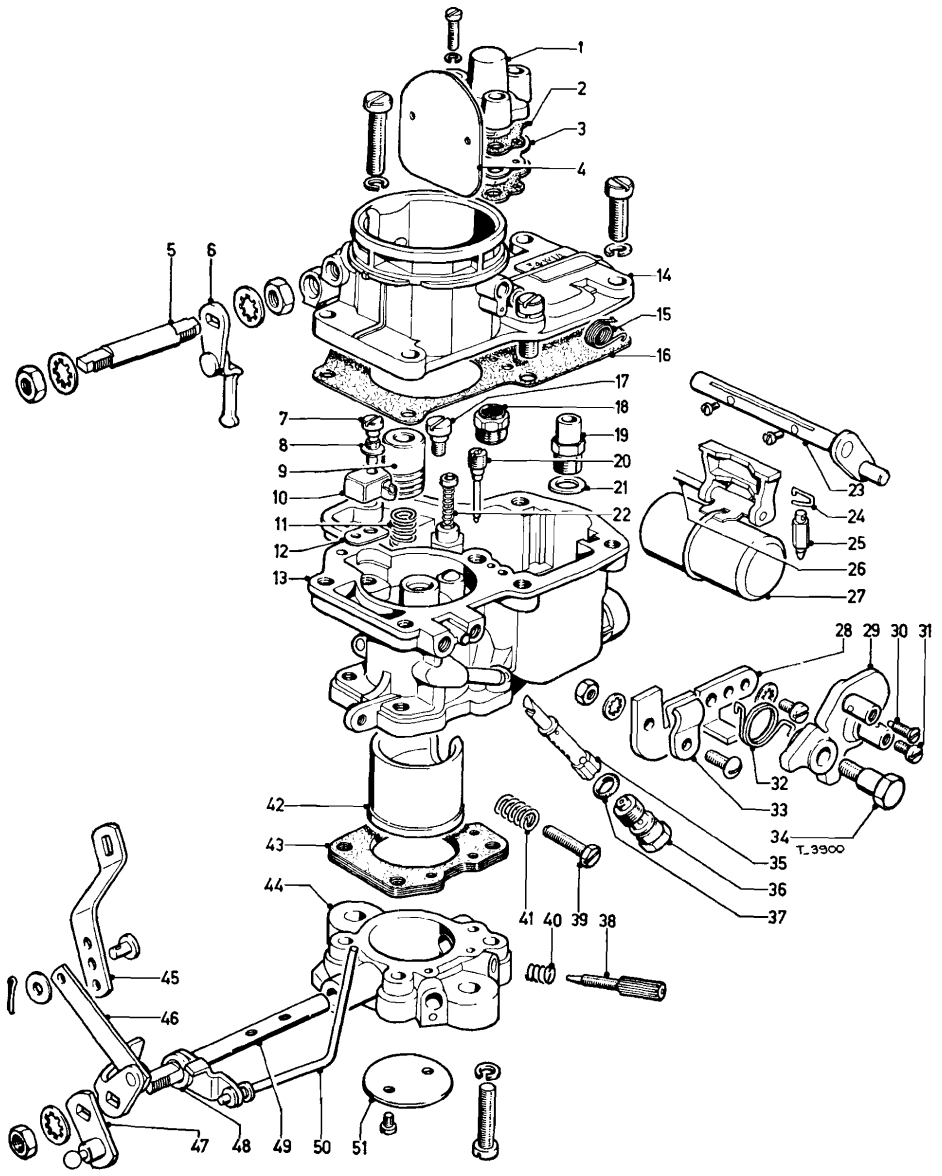


Fig. 15. Zenith WIA carburettor, exploded view

Dismantling:

Remove the float bowl, take out the float arm and pivot pin, remove the float, pump piston retaining screw, piston, spring, pump inlet and outlet valves; remove the emulsion block and the jets. From the main body remove the economizer valve assembly, the throttle lever, fast idle lever and pump rod, fast idle rod and articulated pump arm assembly. Lift the accelerating pump arm stop from its bore in the float chamber cover, remove the float needle valve and seat assembly, together with the seal ring; remove the float chamber gasket by carefully prying the tack-rivets loose. Remove the choke valve and related parts and the venturi. If the throttle valve and shaft are in good condition, do not remove these parts, thus saving time required to centralize the throttle valve during reassembly. Clean all metal parts in a non-caustic solvent; always replace all gaskets.

Reassembly:

Reassembly is carried out in the reverse order of dismantling.

Float level adjustment: The correct float level is usually obtained by fitting a seal ring of the same thickness as the old one under the needle valve seat. Should correction be necessary, fit a seal ring of the required thickness; *do not* fit two rings on top of each other, but select a thicker one, if necessary.

Fast idle adjustment: Back off the idling speed adjustment screw until the throttle valve is closed and the throttle stop arm is resting against the screw tip. Close the valve and turn the fast idle arm to give 0·040in (No. 60 drill) opening of the throttle

Key to Fig. 15

1 Economizer valve housing
2 Gasket
3 Economizer valve and diaphragm assembly
4 Choke valve
5 Accelerating pump shaft
6 Internal pump lever
7 Accelerating pump discharge nozzle screw
8 Seal
9 Accelerating pump piston
10 Accelerating pump discharge nozzle
11 Pump piston spring
12 Discharge nozzle gasket
13 Main body
14 Float chamber cover and air horn assembly
15 Choke actuating spring
16 Float chamber gasket
17 Pump piston retaining screw
18 Pump inlet valve and screen assembly
19 Float needle valve seat
20 Idling jet
21 Needle seat seal ring
22 Power jet assembly
23 Choke valve shaft
24 Float needle clip
25 Float needle
26 Float hinge pin
27 Float
28 Choke cable bracket
29 Choke valve operating cam
30 Choke inner cable clamp screw
31 Clamp screw for fast idle rod
32 Choke lever return spring
33 Choke cable clamp
34 Fulcrum bolt
35 Main jet discharge tube
36 Main jet
37 Seal ring
38 Idle mixture adjustment screw
39 Idle speed adjustment screw
40 Spring for 38
41 Spring for 39
42 Venturi
43 Insulating gasket between main body and throttle flange
44 Throttle flange
45, 46 } Pump connector link assembly
47 Throttle lever
48 Fast idle arm
49 Throttle shaft
50 Fast idle rod
51 Throttle valve

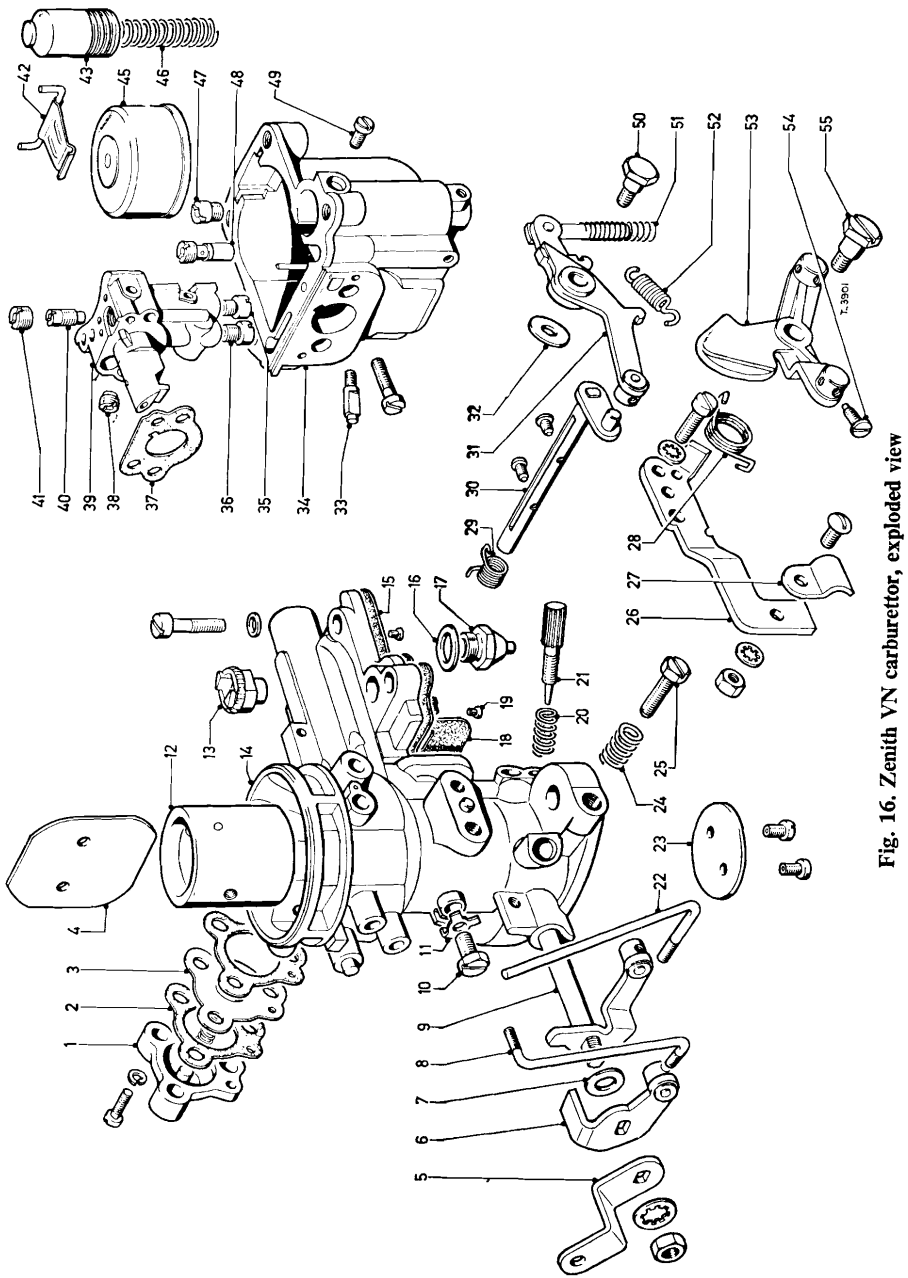


Fig. 16. Zenith VN carburettor, exploded view

valve (approximately 3½ turns of the idling speed adjustment screw). In this position fasten the fast idle rod to the choke lever.

Accelerating pump stroke: The pump stroke may be set in one of two positions, i.e. with the long boss of the pump stop under the pump arm (short stroke) or the short boss under the pump arm (long stroke). Under normal climatic conditions the short stroke will provide the best results, both for satisfactory acceleration and fuel economy. In very cold weather the long stroke may give better acceleration, albeit with a slight increase in fuel consumption.

Idle mixture and idle speed: The idle mixture adjustment screw should be turned in until fully seated (use finger force only), then back off about 1¾ turns; this is a fair average to start with. After the carburettor is installed on the manifold, run the engine at fast idle until it has reached its normal operating temperature, then adjust the mixture by turning the screw in to weaken or out to enrich it. Turn the idle speed adjustment screw until the required idling speed is obtained.

Air-cleaner: Dry type or oil-bath type air-cleaner.

The filter element of the dry air-cleaner should be flushed in petrol, dried with air and dipped in engine oil; allow to drip dry before refitting.

The filter element of the oil-bath air-cleaner should be flushed in petrol and dried with air. Clean the filter housing and refill with engine oil up to the level mark.

Fuel tank: The fuel tank is mounted under the luggage compartment floor and has a capacity of 10·5 Imp gallons (12·6 US gallons).

Key to Fig. 16

1 Economizer valve housing
2 Gasket
3 Economizer valve and diaphragm
4 Choke valve
5 Throttle lever
6 Throttle stop link
7 Spacer washer
8 Accelerating pump rod
9 Throttle shaft and fast idle arm assembly
10 Lock screw for venturi
11 Lock plate for 10
12 Venturi
13 Accelerating pump arm stop
14 Main body
15 Float chamber gasket (horizontal face)
16 Float needle valve seat seal ring
17 Float needle valve and seat assembly
18 Float chamber gasket (vertical face)
19 Tack-rivet for 15
20 Spring for 21
21 Idle mixture adjustment screw
22 Fast idle arm rod
23 Throttle valve
24 Spring for 25
25 Idle speed adjustment screw
26 Choke cable bracket
27 Choke cable clamp
28 Choke lever return spring
29 Choke actuating spring
30 Choke valve shaft
31 Articulating pump arm and pushrod assembly
32 Spacer washer
33 Accelerating pump jet
34 Float chamber
35 Compensating jet
36 Main jet
37 Emulsion block gasket
38 Main air bleed
39 Emulsion block
40 Idling jet
41 Idle air bleed
42 Float arm and pivot pin assembly
43 Accelerating pump piston
45 Float
46 Piston spring
47 Pump inlet valve
48 Pump outlet valve
49 Pump piston retaining screw
50 Fulcrum bolt for 31
51 Pushrod spring
52 Tension spring for 31
53 Choke operating cam
54 Clamping screw
55 Fulcrum bolt for 53

Cooling system: Water cooling with pump and thermostat. The cooling system functions with a pressure of 7 lb sq in; the capacity is 2·25 Imp gallons (2·95 US gallons).

Water pump: Water pump of the impeller type, mounted at the front of the cylinder block. The water pump shaft runs on a double row ball-bearing which is packed with grease during manufacture. When the pump is dismantled, the bearing and shaft assembly should not be flushed in petrol, kerosene or any other kind of solvent, since this would dilute the grease in the bearing assembly. The bearing assembly cannot be refilled with grease. When the bearing and shaft assembly is damaged or worn the complete assembly must be replaced. In order to remove the water pump from the engine the radiator must be removed first.

Thermostat: The thermostat is mounted in the water outlet on the cylinder head under the upper radiator hose. The thermostat starts to open at 170°F and is fully open at 199°F.

Fan: Two- or four-blade fan, mounted at the front of the water pump shaft. The diameter of the fan is 14⅛in.

Fan belt: Single V-belt, driving the water pump, the fan and the generator.
Dimensions
Angle of V: 38°.
Outer circumference: 33⅝in.
Inner circumference: 31 13/16in.
Top width: 13/32in.

Radiator: The radiator is of the tubular type; the filler cap incorporates a pressure valve which opens at a pressure of 7 lb sq in. The cooling system incorporates two drain-cocks, one at the bottom of the radiator and one at the left-hand side of the cylinder block, above the starter motor.

Transmission

Clutch: Single dry plate clutch, hydraulically operated.
Specifications
Outer diameter of clutch lining: 8in.
Inner diameter of clutch lining: 5·25in.
Thickness of clutch lining: 0·155–0·165in each.
Clutch lining material: woven asbestos.
Total clutch area: 57·24 sq in.
Number of damper springs in clutch plate: 6.
Colour of damper springs: mauve.
Diameter of clutch pressure plate: 8·28in.
Thickness of pressure plate: 0·70in.
Total clutch pressure: 624lb.

Only the complete pressure plate assembly is available for purposes of overhaul.

Tighten pressure plate assembly bolts to 12–15 lb ft.

The fluid reservoir forms part of the clutch master cylinder. Check and if necessary top-up with brake fluid up to the level mark (approximately ⅛in. below the top of the reservoir). Carefully clean the filler cap and surrounding area before the cap is removed in order to prevent ingress of dirt in the reservoir. Always inspect the vent hole in the filler cap to make sure it is not clogged.

Adjustment

Two different adjustments should be checked and if necessary corrected.

Clutch pedal adjustment (cars prior to engine number 204E–215289 and 206E–197458):

Loosen the lock nut on the eccentric clutch-pedal shaft and turn the shaft until the pedal is as far to the rear as possible, thus obtaining the maximum free play. The clutch pedal should now be in line with the brake pedal; if necessary, the clutch pedal height may be adjusted by shifting the pedal stop bracket on its slotted holes.

Now turn the eccentric clutch pedal shaft until a minimum of free play exists between the clutch master cylinder piston and clutch master cylinder push-rod. Securely tighten the clutch pedal shaft lock-nut. On later cars the only adjustment required is at the clutch fork.

Clutch fork adjustment:

Check the clutch fork adjustment; the free play of the clutch fork, measured at its outer end, should be 1/16in. If necessary, the clutch fork free play may be adjusted by varying the length of the clutch actuating cylinder push-rod.

NOTE: When the clutch plate or the clutch lining is renewed it is recommended to adjust the clutch fork free play to 1/10in in order to compensate for the extra wear during the running-in period of the new clutch lining. This will prevent clutch slip. After the new clutch plate has been in use for a few days, the clutch fork adjustment should be checked and if necessary readjusted to 1/16in.

Bleeding the hydraulic clutch control system

Before the system is bled the following points should first be inspected:

(1) Check the complete hydraulic clutch control system for evidence of leaks, particularly at the rubber boots of clutch master cylinder and clutch actuating cylinder and at the connections of the hydraulic lines. Fill the clutch master cylinder reservoir with brake fluid up to the level mark and check whether the vent hole in the filler cap is open.

(2) Check all hydraulic line connections for tightness and check the lines and hoses for damage.

Bleed the system as follows:

Remove the rubber dust protector from the bleed screw on the clutch actuating cylinder (under the car). Connect a bleeder hose to the bleed screw and hang the free end of the bleeder hose in a glass container which should be partly filled with brake fluid. Loosen the bleed screw and slowly pump the clutch pedal until all air is removed from the system and the fluid emerges in a steady stream during each downward stroke of the pedal. Keep the clutch master cylinder reservoir filled during the bleeding operation. Do not top-up the cylinder reservoir with fluid which has just been bled from the system, since this fluid is contaminated with air and possibly with dirt. If the fluid appears dirty, drain the hydraulic control system, flush with alcohol or brake fluid and refill with new, clean brake fluid. After refilling the clutch control system, it should be bled. At the end of the operation the bleed screw should be closed while the pedal is kept down. Remove the bleeder hose and reinstall the dust protector on the bleed screw. If necessary, top-up the fluid reservoir.

When installing a clutch plate, make sure that the long end of the clutch plate hub is towards the gearbox.

NOTE: The clutch plate on the Consul can be distinguished from the clutch plate for the Zephyr by the colour of the damper springs; the damper springs on the clutch plate for the Consul are mauve, whereas the clutch plate for the Zephyr has green damper springs.

The clutch pressure plate assemblies for Consul and Zephyr are also distinguished by the colour of the springs and the colour of the paint dot on the housing. Clutch pressure plate assemblies for Consul have yellow springs and red dots on the housing, whereas the springs on the pressure plate assembly for Zephyr cars are brown and the housing is marked with a blue paint dot.

When installing the clutch pilot bearing in the flywheel, the closed side of the ball-bearing should be towards the clutch.

Gearbox: Three-speed gearbox, second and top gear synchronized.

Removal

(1) Place the car on stands; disconnect the battery and drain the gearbox.
(2) Remove the propeller shaft. Disconnect the parking brake equalizer and parking brake front cable from the lever under the gearbox support. Disconnect the shifter rods from the gearbox and disconnect the speedometer cable.
(3) Remove the retracting spring and the rubber boot from the actuating cylinder and remove the cylinder retaining clip. The complete actuating cylinder can now be removed without disconnecting the hydraulic hose. Refit the rubber boot on the actuating cylinder, to prevent the piston from falling out.
(4) Place a jack under the gearbox, remove the starter motor and disconnect the rear rubber mounting from the gearbox support.
(5) Remove the rear gearbox support. Disconnect the throttle control rod from the carburettor and lower the rear of the engine in order to remove the upper clutch housing bolts. Remove all clutch housing bolts and remove the gearbox from under the car.

After the gearbox is removed it may be dismantled as follows:

Dismantling

(1) Mount the gearbox on the bracket P-7036.
(2) Pull the clutch fork out of the spring clips on the release bearing hub; remove the release bearing and the clutch fork.
(3) Unscrew the five bolts securing the clutch housing to the gearbox and remove the gearbox. If necessary, the clutch fork fulcrum pin may be removed with the aid of a drift and hammer.
(4) Turn the gearbox to a vertical position with the rear pointing up; place the shifter levers in the 1st gear position and remove the gearbox cover. Remove the shifter forks from the gearbox.

NOTE: The stub shaft on the first/reverse shifter fork is offset; when refitting the gearbox cover, the stub shaft of the shifter fork should be partly in line with the gear teeth.

(5) Remove the shift levers from the shifter fork shafts, noting the difference in shape. The ends of the first/reverse shift lever are parallel, whereas the ends of the second/top gear shift lever are not. Remove the shifter fork shafts, together with the detent balls, the detent ball spring and the interlock sleeve. If necessary remove the shifter fork shaft oil seals.
(6) Unscrew the bolts securing the extension housing to the gearbox housing. Move the second/top gear shifter sleeve towards the front as far as possible without engaging top gear. Move the extension housing and mainshaft assembly toward the rear until the second/top gear shifter sleeve almost touches the second gear pinion on the countershaft gear cluster. Tilt the extension housing

until the shifter sleeve is clear of the counter-shaft gear cluster and remove the complete extension housing/mainshaft assembly from the gearbox. While removing the assembly from the gearbox housing, prevent the second/top gear shifter sleeve from falling off the hub, since this would cause the three synchronizer keys and the synchronizer springs to drop into the gearbox.
(7) Remove the top gear synchronizer ring and the second/top gear shifter sleeve, together with the synchronizer keys and springs. Remove the circlip securing the synchronizer hub to the mainshaft and slide the hub off the shaft, together with the second gear synchronizer ring, the second gear idler pinion and the first/reverse sliding pinion.
(8) Remove the circlip retaining the mainshaft ball-bearing in the extension housing and remove the mainshaft, together with the ball-bearing and the speedometer drive worm gear from the extension housing.
(9) Remove the circlip securing the speedometer drive worm gear to the shaft; remove the worm gear and the key.
NOTE: On later models the mainshaft incorporates a nut to retain the speedometer drive gear and the mainshaft bearing. This nut should be tightened to 20–25lb/ft.
(10) If necessary the mainshaft ball-bearing can be pressed off toward the rear.
(11) Using a brass drift, drive the countershaft approximately 1in toward the rear; insert the dummy shaft P.7048 from the front and push the countershaft out of the gearbox. The dummy shaft remains in the countershaft gear cluster assembly
(12) Remove the front ball-bearing retainer.
(13) Remove the steel thrust washer from between the gearbox housing and the rear bronze thrust washer on the countershaft gear cluster. Remove the main drive gear and ball bearing from the gearbox housing.
(14) Remove the thirteen roller bearings from the main drive gear; remove the circlips securing the bearing to the shaft and remove the bearing with the aid of tool AT4/I-4615-ABI and the ring P.4022, making sure that the ring is correctly seated in the base plate of the puller. Remove the oil baffle plate from the main drive gear.
(15) Unscrew the set-screw securing the reverse idler gear shaft and remove the shaft with the aid of a $\frac{3}{8}$in NF2 bolt and nut, sleeve and washer.
Screw the bolt into the idler shaft thread and pull the shaft out of the gearbox housing by tightening the nut on the bolt.
(16) Remove the countershaft gear cluster assembly through the rear opening of the gearbox housing. Remove the thrust washers, the dummy shaft, the two abutment rings, the bearing needles and the spacer bush from the gear cluster.
Clean and inspect all parts and replace those that are damaged or worn.

NOTE: If the bearing bush in the extension housing needs no replacement, it should not be removed from the extension housing, since this would distort the bearing bush, making it unfit for further service.

The oil seal can be removed from the extension housing without disturbing the bearing bush with the aid of tool 7657. A new oil seal can be installed with the aid of the driver P.7064, making sure that the lip of the oil seal is towards the inside.

In Fig. 17 an exploded view of the gearbox is shown.

Reassembly

(1) Insert the spacer bush and the dummy shaft P.7048 in the countershaft gear cluster. Coat the bearing needles with grease and install them at front and

rear of the spacer bush in the countershaft gear cluster. Each needle bearing consists of twenty bearing needles. Install the needle bearing abutment rings with grease.

(2) Stick the large steel and bronze thrust washer in the front of the housing with grease. The notch on the thrust washer must be positioned in the recess in the gearbox housing so that the bronze-lined side of the thrust washer is towards the inside. Assemble the small steel and bronze thrust washer to the rear of the countershaft gear cluster so that the two tabs on the thrust washer enter the recess in the gear cluster.

(3) Position the countershaft gear cluster assembly in the gearbox housing through the large opening at the rear of the housing, making sure that the thrust washers are not dislodged.

(4) Inspect the oil holes in the main drive gear to ensure that they are open and fit a new baffle plate on the main drive gear.

Fit the ball-bearing on the main drive gear shaft with the aid of tools AT4/I-4615-ABI and P.4022.

The groove in the outer bearing race should be away from the gear.

(5) Select a circlip which fits the groove of the main drive gear shaft without clearance. Circlips are available in various sizes, each circlip being marked with the suffix letter of the part number (see table).

EOA-7064-A	0·091–0·093in
EOA-7064-B	0·094–0·096in
EOA-7064-C	0·097–0·099in
EOA-7064-D	0·086–0·088in

(6) Select a circlip to fit the groove in the outer ball-bearing race; circlips are available in the following sizes.

EOA-7026-A	0·0725–0·0745in
EOA-7026-B	0·0755–0·0775in
EOA-7026-C	0·0785–0·0805in

(7) Coat the thirteen bearing rollers with grease and install them in the main drive gear. If the bearing rollers are not worn they will stay in place as soon as the last roller is placed in position and cannot tilt toward the inside.

(8) Hold the front of the countershaft gear cluster aside and install the main drive gear and ball bearing assembly.

(9) Fit the front ball-bearing retainer with a new gasket, making sure that the oil return hole in the bearing retainer and the gasket coincide with the opening in the gearbox housing. Tighten the three cap screws to 12–15 lb ft.

(10) Install the reverse idler gear with the long boss towards the front in the gearbox housing and fit the shaft so that the recess at the rear end of the shaft coincides with the hole for the lock-screw. Install the lock-screw and tighten it securely. The end-clearance of the reverse idler gear should be 0·004–0·015in.

(11) Lift the countershaft gear cluster assembly so that it engages with the main drive gear and the reverse idler gear, and make sure that the thrust washers are not dislodged; now insert the steel thrust washer between the gearbox housing and the rear thrust washer on the countershaft gear cluster. The tab on this steel thrust washer will come to rest against the reverse idler gear shaft.

(12) Insert the countershaft, with the plain end towards the front, from the rear into the gearbox housing, pushing the dummy shaft out of the countershaft gear cluster assembly.

Turn the countershaft so that the flat at the rear end of the shaft is facing up, and seat the shaft in the front bore of the gearbox housing with the aid of a brass drift. Measure the end-clearance of the countershaft gear cluster; this should be 0·005–0·018in.

(13) Press the rear ball-bearing from the rear on the main shaft until it seats against the end of the splines.

(14) Fit the key and install the speedometer drive worm gear with the flat boss towards the front.

(15) Select a circlip which fits the main shaft groove without clearance. Each circlip is marked with the suffix letter of the part number (see table).

EOTTA-17286-A	0·085–0·087in
EOTTA-17286-B	0·088–0·090in
EOTTA-17286-C	0·091–0·093in
EOTTA-17286-D	0·094–0·096in

(16) Install the mainshaft in the extension housing, being careful not to damage the rear bearing bush or the oil seal, and select a circlip which fits the groove of the extension housing without end-play. Circlips are marked with the suffix letter of the part number (see table below).

204E-7030-A	0·061–0·063in (white)
204E-7030-B	0·064–0·066in (blue)
204E-7030-C	0·067–0·069in (orange)
204E-7030-D	0·070–0·072in (green)

NOTE: If the gearbox is equipped with an overdrive (Zephyr/Zodiac only) one of the following circlips must be fitted:

EOTTA-7030-A	0·061–0·063in
EOTTA-7030-B	0·064–0·066in
EOTTA-7030-C	0·067–0·069in
EOTTA-7030-D	0·070–0·072in

(17) Install the first/reverse gear, with the collar to the rear, on the mainshaft. Install the second-gear idler pinion with the tapered side towards the front on the mainshaft and install the second-gear synchronizer ring.

(18) Fit the two synchronizer springs at front and rear in the synchronizer hub, making sure that the tag end of both springs is in the same recess of the hub. The springs should be lying in opposite directions (see Fig. 17). Now install the synchronizer hub, with the long boss towards the front, on the mainshaft and fit a new circlip. Fit the three synchronizer keys in the hub and fit the second/top-gear shifter sleeve, making sure that the marks on the hub and shifter sleeve coincide. Stick the top-gear synchronizer ring in the front of the hub with some grease.

(19) Check the end-clearance of the second-gear idler pinion, which should be 0·003–0·012in.

(20) Slide the second/top-gear shifter sleeve towards the front in top-gear position and check to see whether the bearing rollers in the main drive gear are still in position.

(21) Stick a new gasket to the rear of the gearbox housing and install the mainshaft and extension housing assembly in the gearbox, lifting the front of the mainshaft assembly a little in order to guide it along the countershaft gear cluster. Insert the front of the mainshaft into the main drive gear roller bearing and push the extension housing right home.

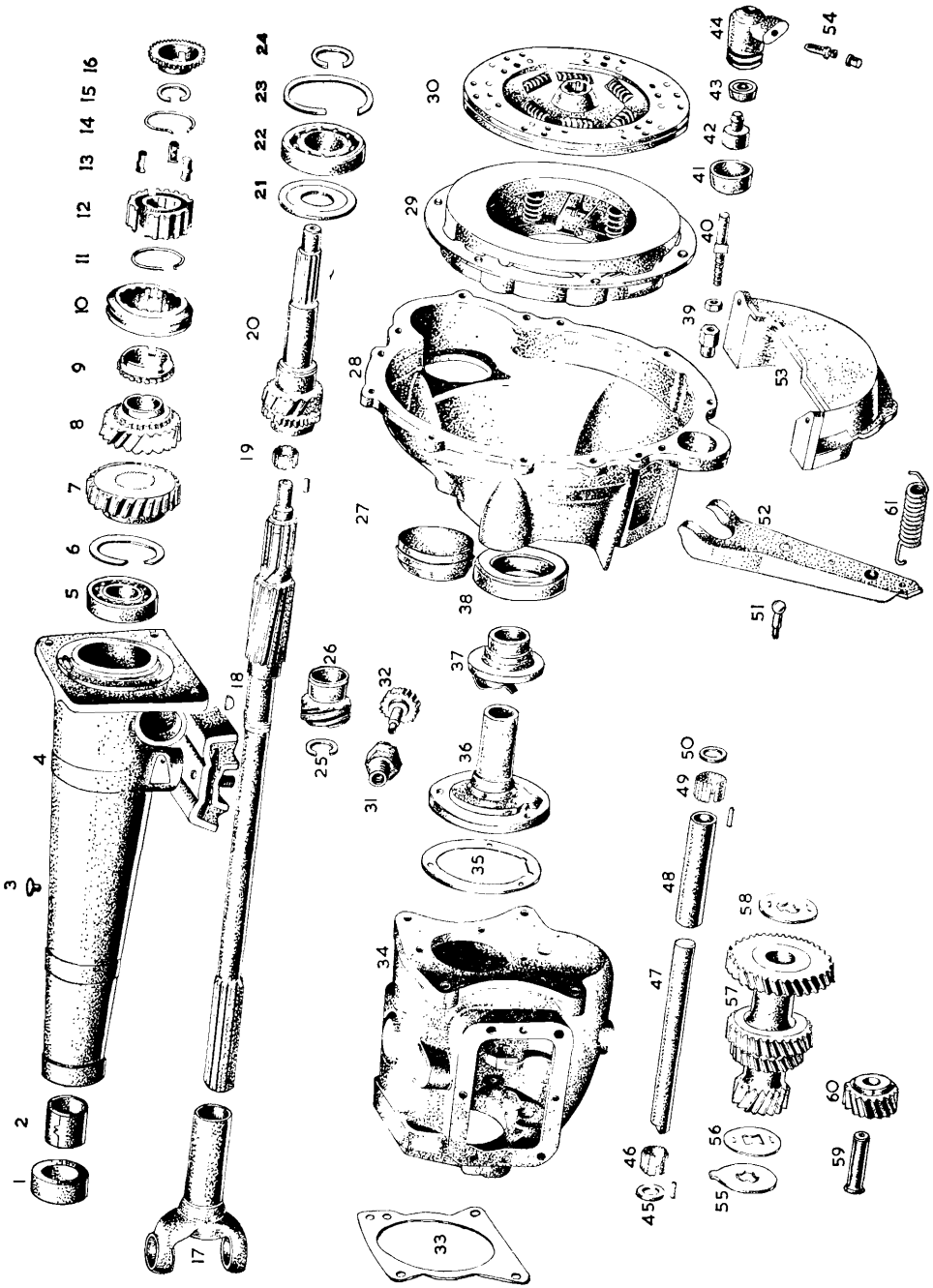


Fig. 17. Exploded view of the gearbox

Key to Fig. 17

1 Oil seal.
2 Bearing bush in extension housing.
3 Vent plug on extension housing.
4 Gearbox extension housing.
5 Mainshaft ball-bearing.
6 Mainshaft ball-bearing circlip.
7 First/reverse sliding pinion.
8 Second-gear idler pinion.
9 Second-gear synchronizer ring.
10 Second/top-gear shifter sleeve.
11 Second-gear synchronizer spring.
12 Synchronizer hub.
13 Synchronizer keys.
14 Top-gear synchronizer spring.
15 Circlip for 12.
16 Top-gear synchronizer ring.
17 Sliding yoke of front universal joint.
18 Mainshaft and key.
19 Bearing rollers in main drive gear.
20 Main drive gear.
21 Oil baffle plate.
22 Main drive gear ball-bearing.
23 Large circlip for 22.
24 Small circlip for 22.
25 Circlip for 26.
26 Speedometer drive worm gear.
27 Starter drive cover.
28 Clutch housing.
29 Clutch pressure plate assembly.
30 Clutch plate.
31 Bearing for speedometer drive.
32 Speedometer drive gear.
33 Extension housing gasket.
34 Gearbox housing.
35 Gasket for front bearing retainer.
36 Front bearing retainer.
37 Release bearing hub.
38 Release bearing.
39 Adjusting nut and lock-nut for clutch actuating cylinder push-rod.
40 Clutch actuating cylinder push-rod.
41 Rubber boot for clutch actuating cylinder.
42 Clutch actuating cylinder piston.
43 Rubber cup for 42.
44 Clutch actuating cylinder.
45 Abutment ring for countershaft rear needle bearing.
46 Countershaft rear needle bearing.
47 Countershaft.
48 Spacer bush.
49 Countershaft front needle bearing.
50 Abutment ring for countershaft front needle bearing.
51 Clutch fork fulcrum pin.
52 Clutch fork.
53 Clutch housing cover.
54 Bleed screw for clutch actuating cylinder.
55 Large steel thrust washer.
56 Steel/bronze thrust washer for countershaft gear cluster.
57 Countershaft gear cluster.
58 Front thrust washer for countershaft gear cluster.
59 Reverse gear idler shaft.
60 Reverse idler gear.
61 Clutch fork retracting spring.

(22) Install the four bolts and lock-washers securing the extension housing to the gearbox and tighten them evenly to 40–45 lb ft.

NOTE: On some installations with overdrive (Zephyr/Zodiac only), self-locking cap screws are used, which must be fitted without lock-washers.

(23) If necessary, install new oil seals in the gearbox cover. Ensure that the lip of the oil seals is towards the inside. The best way to install these seals is with the aid of the driver A2/HT-7288-D. Install the first/reverse shifter fork shaft (the one with the wide cam) in the rear bore of the gearbox cover and assemble the interlock sleeve, the detent balls and the spring. Now install the second/top-gear shifter fork shaft and both shift levers. The ends of the first/reverse shift lever lie parallel whereas the ends of the second/top-gear shift lever do not.

(24) Check the interlock mechanism as follows. Move the first/reverse shifter arm to the neutral position and the second/top-gear shifter arm half way between neutral and engaged position. With a feeler gauge measure the clearance

between the interlock sleeve and the highest point on the cam of the second/top-gear shifter arm. This clearance should be 0·0005–0·010in.

Now move the second/top-gear shifter arm to neutral position and the first/reverse shifter arm to half way between neutral and engaged position. Again measure the clearance between the interlock sleeve and the highest point on the cam of the shifter arm; this clearance should also be 0·0005–0·010in.

If necessary select an interlock sleeve of the proper size, according to the following table. The part number is stamped in one side of the interlock sleeve.

204E-7233-A	1·2865–1·2885in
204E-7233-B	1·2895–1·2915in
204E-7233-C	1·2925–1·2945in
204E-7233-D	1·2955–1·2975in
204E-7233-E	1·2985–1·3005in
204E-7233-F	1·3015–1·3035in

After the correct adjustment is obtained, install the flat washers and the self-locking nuts securing the shift levers to the shifter fork shafts and tighten them securely.

(25) Turn the gearbox to the vertical position with the rear end up and position the shifter forks with the stub shafts horizontal in the collars of the shifter gear and shifter sleeve. The first/reverse shifter fork is offset; the stub shaft should be partly in line with the teeth on the shifter gear. Install the gearbox cover with a new gasket and ensure that the word 'Top' is towards the top of the gearbox. Ensure that the stub shafts on the shifter forks properly enter the bores in the shifter fork shafts. Assemble the six cap screws and lock-washers, tightening them evenly to 12–15 lb ft. Install the clutch housing, fit the bolts and lock-washers and tighten the bolts to 40–45 lb ft.

(26) If the clutch fork fulcrum pin has been removed, fit a new fulcrum pin and the starter drive cover. Install the clutch fork and the release bearing with the rubber boot in the reverse order of dismantling.

The gearbox is now ready for reinstallation, which is carried out in the reverse order of removal. Be careful, while installing the gearbox under the car, that the clutch fork is not dislodged from the spring clips on the release bearing because it is very difficult to reassemble the clutch fork in the proper position when the gearbox is under the car.

Fill the gearbox with 2·5 pints (3 US pints) SAE 80 EP and if necessary top-up after road-testing the car. If the car in question is equipped with overdrive, the overdrive housing should be filled with 0·5 pints (0·6 US pints) SAE 80 EP.

The first/reverse and second/top-gear shift arms on the steering column are kept in position by means of a spring and washer which prevent the arms from axial movement. This washer bears against the bracket which is welded to the steering column; it is very important that this bracket is exactly at right angles to the steering column, otherwise difficulties will be encountered when changing gear.

Dimensions

Gear ratio, first gear: 2·84 : 1.
Gear ratio, second gear: 1·642 : 1.
Gear ratio, top gear: 1·000 : 1.
Gear ratio, reverse: 3·858 : 1.
Number of teeth on main drive gear: 17.

Inner diameter of main drive gear, new: 0·9725–0·9730in.
Wear limit: 0·976in.
Diameter of mainshaft journal, new: 0·596–0·5965in.
Wear limit: 0·591in.
Number of teeth on countershaft gear cluster: 34–28–19–14.
Inner diameter of countershaft gear cluster, new: 0·933–0·934in.
Wear limit: 0·937in.
Diameter of countershaft, new: 0·68175–0·68225in.
Wear limit: 0·677in.
End-clearance of countershaft gear cluster, new: 0·005–0·018in.
Wear limit: 0·025in.
Thickness of thrust washers
Front thrust washer, steel and bronze, new: 0·0615–0·0635in.
Wear limit: 0·0565in.
Rear thrust washer, steel and bronze, new: 0·061–0·063in.
Wear limit: 0·056in.
Rear thrust washer, steel, new: 0·0615–0·0635in.
Wear limit: 0·0565in.
Inner diameter of second-gear idler pinion, new: 1·1270–1·1275in.
Wear limit: 1·100in.
End-clearance of second gear idler pinion, new: 0·008–0·012in.
Inner diameter of reverse idler gear, new: 0·62275–0·62375in.
Wear limit: 0·62475in.
Diameter of reverse idler shaft, new: 0·61925–0·61975in.
Wear limit: 0·615in.
End-clearance of reverse idler gear: 0·004–0·015in.

Propeller shaft: Tubular propeller shaft with two universal joints. The front yoke of the front universal joint is a sliding fit over the splines on the end of the gearbox mainshaft. The outer diameter of the front yoke runs in the bearing bush at the end of the gearbox extension housing.

Rear axle: Three-quarter floating rear axle with hypoid pinion and crown wheel. Each rear wheel hub is mounted on a ball-bearing which is fitted to the ends of the rear axle housing. The rear axle shafts can be removed after removal of the wheel and brake drum. If necessary, the complete differential carrier can be removed from the rear axle housing after the rear axle shafts have been removed; therefore it is not necessary to remove the complete rear axle from under the car.

Specifications

Number of teeth on pinion and crownwheel: 9/37.
Rear axle ratio: 4·111 : 1
Tooth clearance: 0·005–0·007in.
Pinion bearing pre-load (not including the drag of the oil seal): 12–15 lb in.
Differential bearing pre-load (cap spread): 0·005–0·007in.
Thickness of differential pinion thrust washers (new): 0·030–0·032in.
Wear limit: 0·027in.
Thickness of thrust washers behind differential side gears (new): 0·030–0·032in.
Wear limit: 0·027in.
Diameter of differential pinion shaft: 0·6240–0·6245in.
Inner diameter of differential pinions: 0·6280–0·6290in.

The pinion depth is adjusted by means of shims which are fitted between the pinion and rear pinion bearing; these shims are available in the following sizes:

Part number	*Thickness*	*Part number*	*Thickness*
EOA-4661-AE	0·1506–0·1510in	EOA-4661-AK	0·1556·0·1560in
EOA-4661-AF	0·1516–0·1520in	EOA-4661-AL	0·1566–0·1570in
EOA-4661-AG	0·1526·0·1530in	EOA-4661-AM	0·1576–0·1580in
EOA-4661-AH	0·1536–0·1540in	EOA-4661-AN	0·1586–0·1590in
EOA-4661-AJ	0·1546–0·1550in	EOA-4661-AP	0·1596–0·1600in

Pinion bearing spacer bushes are available in the following sizes:

Part number	*Length*	*Part number*	*Thickness*
204E-4662-A	2·004–2·005in	204E-4662-F	2·014–2·015in
204E-4662-B	2·006–2·007in	204E-4662-G	2·016–2·017in
204E-4662-C	2·008–2·009in	204E-4662-H	2·018–2·019in
204E-4662-D	2·010–2·011in	204E-4662-J	2·020–2·021in
204E-4662-E	2·012–2·013in	204E-4662-K	2·022–2·023in

Dismantling and reassembly of rear wheel bearings and hubs

In Fig. 15 a section view of the rear axle is shown.

(1) Place car on stands; remove the rear wheels, the brake drums and the rear-axle shafts.

(2) Remove the rear wheel hub and bearing assembly. The bearing lock-nut can be removed with the aid of tool A/H-4252. After the bearing lock-nut is removed, use puller A/HT-1116-A to remove the hub. This puller is the same as A2/T-1116-A, but with a new adaptor (No. 3). The bearing can now be removed from the hub with the aid of a press and driver A/H-1225-A.

The oil seal retainer may be removed with the aid of a screwdriver, in which case both the oil seal and the seal retainer must be replaced. New leather oil seals and oil seal retainers must be soaked in oil for at least three hours, prior to installation. The new oil seal can be installed with the aid of driver P.4035; ensure that the lip of the oil seal is facing the ball-bearing. Repack the ball-bearing with wheel bearing grease and install it in the hub.

(3) Install the hub and bearing assembly and make sure that the inner ball-bearing race seats against the boss on the axle housing. The hub should turn freely without binding.

(4) Install the tab washer and the lock-nut; tighten the lock-nut with tool AH 4252, making sure that one of the notches in the lock-nut coincides with the tab on the tab washer. Bend over the tab washer, check to see that the mating faces of axle shaft flange and hub are free of burrs and fit the rear-axle shaft with a new gasket. Make sure that the small bolt holes in hub and shaft flange coincide.

Replacement of rear-axle housing oil seals

If necessary, the rear-axle housing oil seals are replaced as follows:

(1) Drain the rear axle, remove the wheels, the brake drums and the axle shafts.

(2) Disconnect the propeller shaft and remove the complete differential carrier from the rear-axle housing.

(3) Remove the old oil seals by driving them towards the centre of the axle housing and taking them out of the housing through the large opening from which the differential carrier is removed.

(4) New oil seals can only be installed with the aid of the special tool A/21HTY-4248-B and the adaptor No. 5. The new oil seals should be installed with the lip facing the differential.

Dismantling the differential

(1) Drain the rear axle, remove the wheels, the brake drums and the rear-axle shafts; disconnect the propeller shaft.

(2) Remove the complete differential carrier from the rear-axle housing; the differential may now be dismantled as follows:

(3) Mount the complete differential carrier in stand A/HT-4200. Check to see whether the differential bearing caps are marked; if necessary, make new marks.

(4) Remove the bearing adjusting nut lock-plates and unscrew the bearing adjusting nuts a few turns. Now remove the bearing cap bolts and lock-washers; remove the bearing caps.

(5) Lift the complete differential assembly, together with the bearings and bearing adjustment nuts, out of the carrier. Take care not to interchange the differential bearing outer races in order that they may be re-installed in their original positions.

(6) Unscrew the pinion nut, remove the drive flange and lift the pinion assembly out of the carrier.

(7) With the aid of special driver A/HT-4616-A2 remove the outer bearing race of the front pinion bearing, together with the oil seal. Remove the outer bearing race of the rear pinion bearing.

(8) Slide the spacer bush from the pinion shaft and if necessary remove the rear pinion bearing with the aid of tool P.4015.

(9) Unscrew the eight self-locking crown wheel bolts and press the differential housing out of the crown wheel.

(10) Remove the differential pinion shaft lock-pin.

NOTE: The differential pinion shaft lock-pin is tapered and should be driven out of the housing from the crown wheel side.

(11) Remove the differential pinion shaft, the pinions, the differential side gears and the thrust washers.

If necessary, remove the differential bearing cones with the aid of tool P-4012

Reassembly

(1) Install the differential side gears, together with the thrust washers, in the differential housing; install the differential pinions and thrust washers and the differential pinion shaft.

(2) Drive the differential shaft lock-pin into the housing from the right-hand side and lock it in place by staking.

(3) Lay the crown wheel (teeth down) on wooden blocks under a press. Position the differential housing on the crown wheel and insert four bolts in the bolt holes in the differential housing, in order to line up the holes of differential housing and crown wheel.

(4) Press the differential housing into the crown wheel; fit the bolts and tighten them evenly to 30–35 lb ft.

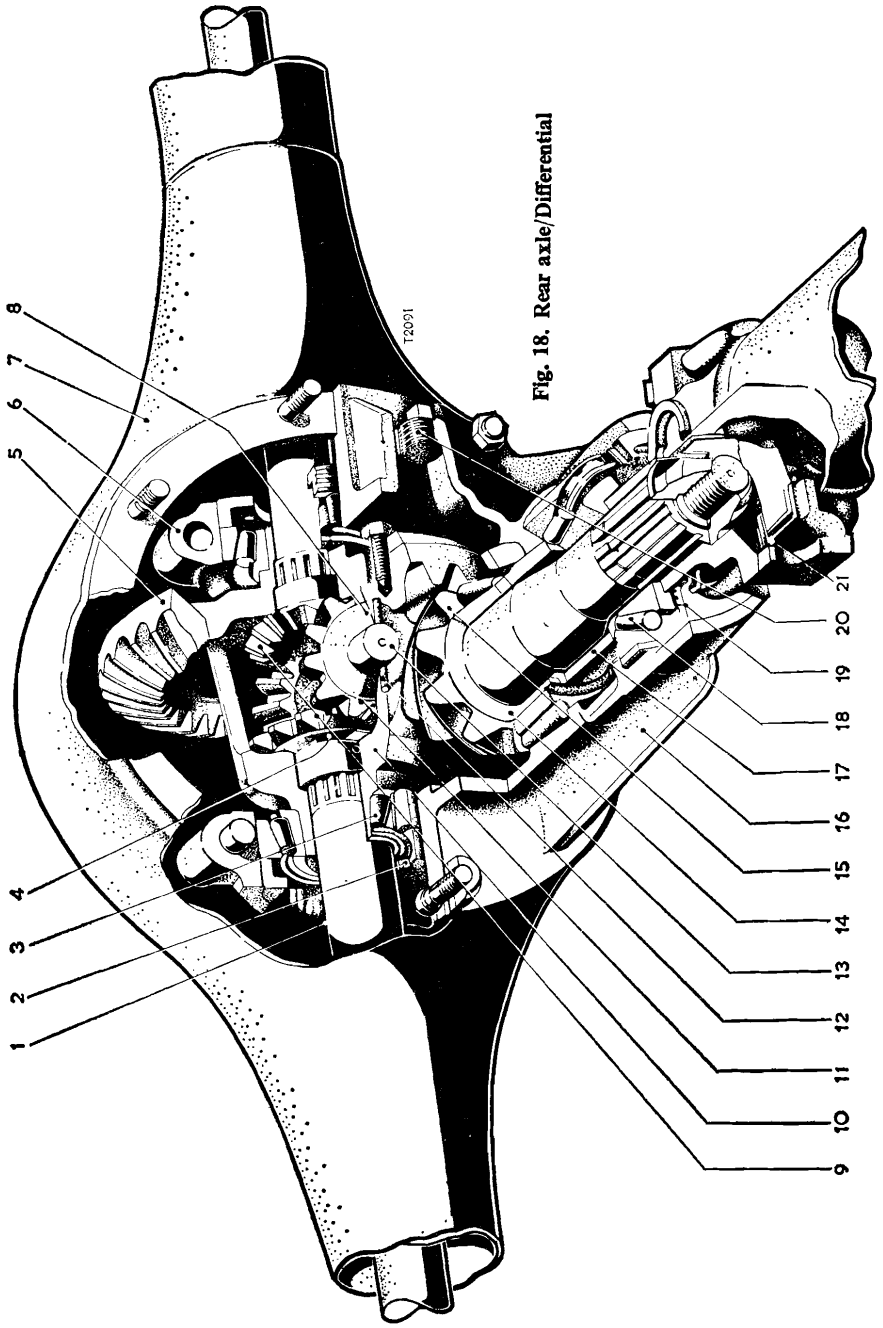


Fig. 18. Rear axle/Differential

(5) Fit the differential bearings and install the pinion-bearing outer races in the carrier.

The correct size of the pinion depth adjustment shim must now be determined as follows:

(6) Fit the rear pinion bearing on the dummy pinion P-4016—2. Extend depth gauge P-4016 to its maximum length and install this also on the dummy pinion with the large diameter of the depth gauge towards the bearing.

(7) Install this assembly in the differential carrier, fit the front bearing and the pinion drive flange on the splines of the dummy pinion and secure it with the aid of the special nut P-4030—2 from the tool set. Fit the special spanner CP-4030 on the nut P-4030—2.

(8) Slowly tighten the nut until the bearing pre-load of 12–15 lb in is obtained; during this operation the dummy pinion should be twisted back and forth in order to seat the bearings.

NOTE: If the bearing pre-load has been adjusted too tightly, the dummy pinion assembly should be removed from the carrier and the depth gauge should again be extended to its maximum length. Repeat the above-described procedure.

(9) Zero the dial gauge of tool A1/T-4610 with the aid of the setting button and position the tool in the differential bearing seats, so that the gauge plunger rests on the dummy pinion. Slowly move the gauge a little back and forth in order to establish the lowest dial reading: note this reading.

(10) Add 0·100in to the dial reading in order to determine the theoretically correct size of the shim to be fitted. For instance, if the dial reading is 0·055in, a shim of 0·055in + 0·100in = 0·155in should be fitted.

The pinion may be marked on the tapered part between the bearing seats; O (or no mark) denotes a pinion of standard size, in which case the shim to be fitted should be of the size as calculated. However, if the pinion is marked with a + or − mark, this should be taken into account when selecting the shim. When the pinion is marked with a +, the value after the + mark (in thousandths of an inch) should be added to the gauge reading; if the pinion is marked with a − mark the value should be subtracted. *Example:* +2 on the pinion means that 0·002in should be added to the dial reading; −3 means that 0·003in should be subtracted. Select a shim of the proper size, according to the table on page 46.

Key to Fig 18

1 Rear-axle shaft.
2 Differential bearing adjusting nut.
3 Differential bearing.
4 Side gear thrust washer.
5 Crown wheel.
6 Differential bearing cap.
7 Rear-axle housing.
8 Differential pinion thrust washer.
9 Side gears.
10 Differential housing.
11 Differential pinion.
12 Differential pinion-shaft lock pin.
13 Differential pinion-shaft.
14 Pinion depth adjustment shim.
15 Pinion.
16 Differential carrier.
17 Spacer bush.
18 Pinion bearing (front.)
19 Oil seal.
20 Oil level and filler plug.
21 Universal joint.

(11) Carefully remove the gauge and dummy pinion assembly.

(12) Measure the length of the depth gauge with the aid of tool P.4029, the, gauge block P.4029-2 and the dial gauge. The gauge block is 2in long; add to this the dial reading in order to obtain the true length of the depth gauge. Again add 0·003in. The value thus found represents the length of the spacer bush to be fitted between the pinion bearings.

(13) Fit the correct shim on the pinion shaft with the bevelled side of the shim towards the pinion teeth. Now press the rear pinion bearing onto the pinion shaft with the aid of tool AT4/U-4615-AD and the adaptors A/HT-4615-AD.

(14) Fit the selected spacer bush and insert the pinion assembly into the carrier.

(15) Fit the pinion drive flange and tighten the nut to 100–120 lb ft; re-check the bearing pre-load.

NOTE: If there is too much pre-load on the bearings, a longer spacer bush should be installed.

(16) After the correct bearing pre-load is established, remove the tools and the pinion assembly from the differential carrier and fit the oil seal with the aid of tool A/H-4616-D2 and the adaptor 4616/D2.

(17) Re-install the pinion and bearing assembly; fit the pinion drive flange and secure this in place with a new self-locking pinion nut which must be tightened to 100–120 lb ft. Carefully stake the nut as an extra safety measure with the aid of a centre punch.

(18) Install the differential assembly with bearings, adjusting nuts and bearing caps, making sure that the adjusting nuts are properly seated in the thread and the bearing caps are located correctly.

(19) Tighten the bearing cap bolts, then loosen the bolts until the adjusting nuts can be turned.

(20) Adjust the nuts so that the differential bearings are free of any clearance, but are not pre-loaded.

(21) Adjust the crown wheel/pinion tooth clearance with the aid of a dial gauge to 0·001–0·002in in the usual way by turning the adjusting nuts, making sure that one nut is unscrewed the same amount as the other nut is tightened.

Key to Fig. 19

	(inches)
a	160 49/64
b	28½ – 28 17/32
c	6 17/32 – 6 19/32
d	7
e	1¾
f	5/16
f¹	3/8 – 29/64
g	58 7/32 – 58 9/32
h	21 31/32 – 22 1/32
j	28½ – 28 17/32
k	35 5/16 – 35 3/8
l	58 7/32 – 58 9/32
m	31 23/32 – 31 25/32
n	32 7/32 – 32 9/32
o	40 29/32 – 41 1/32
p	12 3/32 – 12 5/32
q	11 7/8 – 11 15/16
r	10 25/32 – 10 27/32
s	7 21/64 – 7 25/64
t	4 57/64 – 4 59/64
u	12 5/8 – 12 24/32
v	13 11/64 – 13 3/8
w	14 3/64 – 14 5/64
x	15 33/64 – 15 17/32
ij	21 45/64 – 21 52/64
z	4 21/64
aa	10 7/64 – 10 9/64
bb	29 13/32 – 29 15/32
cc	8 7/8 – 8 63/64
dd	47 59/64 – 48 5/32
ee	104½
ff	7 7/32 – 7 9/32
gg	9 1/8 – 9 3/16
hh	19 5/8 – 19 11/16
jj	2 41/64 – 2 43/64
kk	12 11/16 – 12¾
ll	15 – 15 1/16
mm	10 25/64 – 10 27/64
nn	11 23/32 – 11 25/32
oo	53 29/64 – 53 37/64
pp	8¾ – 8 13/16

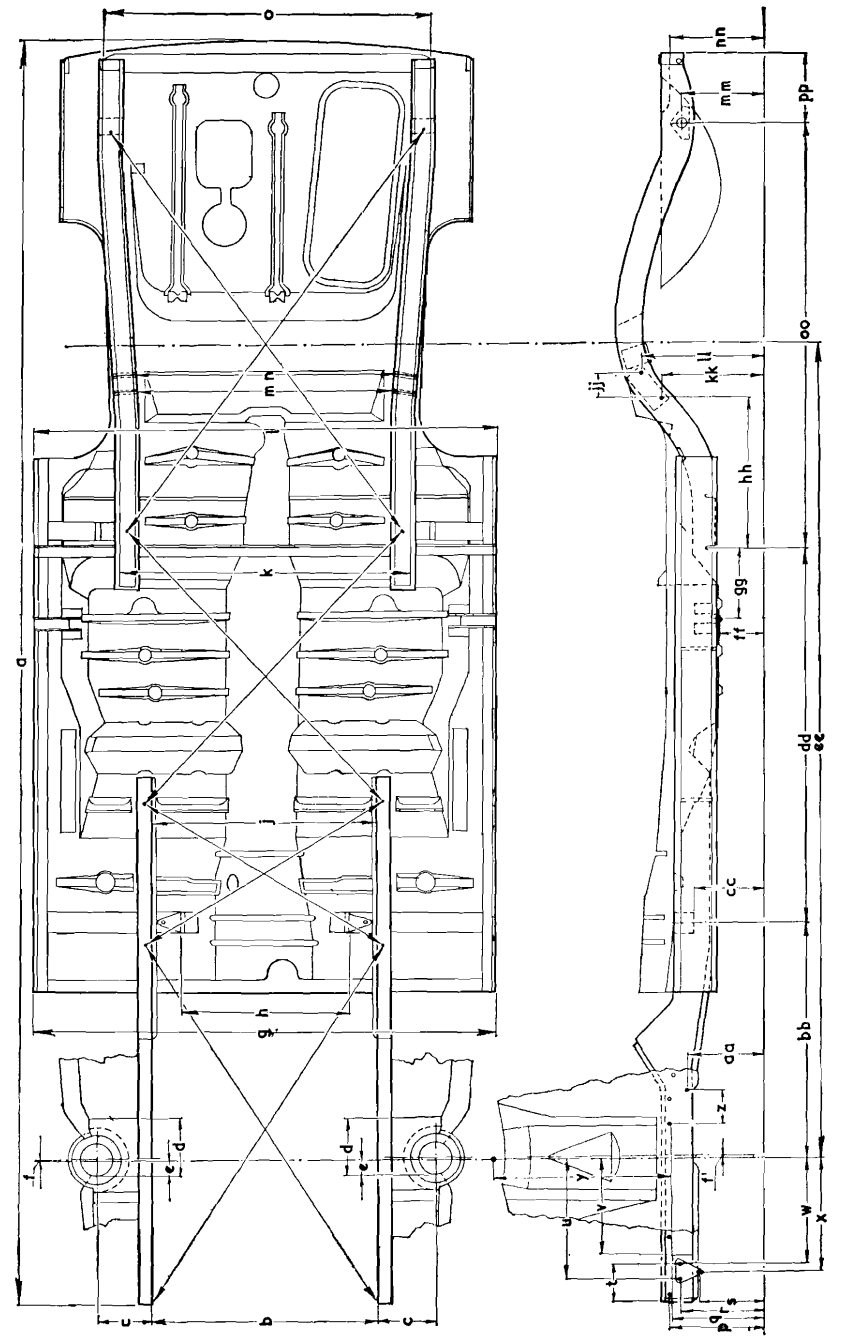


Fig. 19. Body floor dimensions

(22) Install tool A/HT-4220 on the right differential bearing cap; temporarily install the lock-plate bolt in the left differential bearing cap (crown wheel side). Allow the plunger of the dial gauge to rest against this bolt and set the gauge to zero.

NOTE: Ensure that the tip of the bolt does not rest on the adjusting nut; if necessary, install a flat washer under the bolt head.

The dial gauge plunger should rest against one of the flats on the bolt head.

(23) Tighten the right-hand differential bearing adjusting nut until the dial gauge reads 0·005–0·007 in. The bearings are now adjusted to the correct pre-load. The tooth clearance between crown wheel and pinion is now increased and should measure 0·005–0·007 in. If the clearance is outside these limits, it should be adjusted without changing the bearing pre-load; this is done in the usual way by unscrewing one adjusting nut and tightening the other nut the same amount.

NOTE: Always finish the adjustment by tightening the nut on the crown wheel side.

(24) Tighten the bearing cap bolts to 70–80 lb ft; install the bearing adjusting nut lock-plates and bolts; tighten the lock-plate bolts to 15–20 lb ft.

Recheck the tooth clearance and remove the gauges.

(25) Coat the teeth of the crown wheel with prussian blue, yellow ochre or red lead and check the tooth contact in the usual way.

Further assembly is done in the reverse order of dismantling.

NOTE: If new gears are installed, the rear axle should be filled with special lubricant; this lubricant should be drained after 300 miles of use and the rear axle refilled with the normal lubricant. (Rear axles with drain plug only.)

Chassis

Chassis-Body

The all-steel body and chassis are welded together to form a single unit.

See Fig. 19 for Body floor dimensions.

Front suspension: Independent front suspension. The front suspension system utilizes coil springs in conjunction with vertical type shock-absorbers to form front suspension units. The suspension units are mounted between ball joints on the ends of the track control arms and thrust bearings in reinforced flanges at the top of the engine compartment side walls. The upper mounting assemblies contain the thrust bearings which allow the unit to rotate about its vertical axis to provide steering movement. The front stub axle is bolted to the lower end of the suspension unit. The track control arms are secured at their inner ends to the suspension cross-member, and at their outer ends to the base of the suspension units. The centre stud of the ball joint at the outer end of each arm passes up through the boss at the base of the suspension unit. Both ends of the stabilizer bar are located in the outer ends of the track control arms. Attachment feet at each side of the stabilizer bar secure it to the body side-members. Each coil spring is located at the top on a seat on the suspension unit piston rod, and at the bottom on a seat welded to the body of the suspension unit. Rubber bushes are used in most joints of the front suspension system, and therefore lubrication is kept to a minimum.

The stabilizer bar and track control arm bushes can be renewed without removing the assemblies from the vehicle. Camber and king-pin inclination are set in production and cannot be altered, but the caster angle is adjustable on later models.

Whenever repairs are to be carried out to any part of the front suspension system, it is essential that spring clips are fitted to the coil springs, otherwise extreme difficulty will be experienced when dismantling and reassembling the component parts.

NOTE: The wheel alignment should always be checked after carrying out repairs to the front suspension unit or linkage.

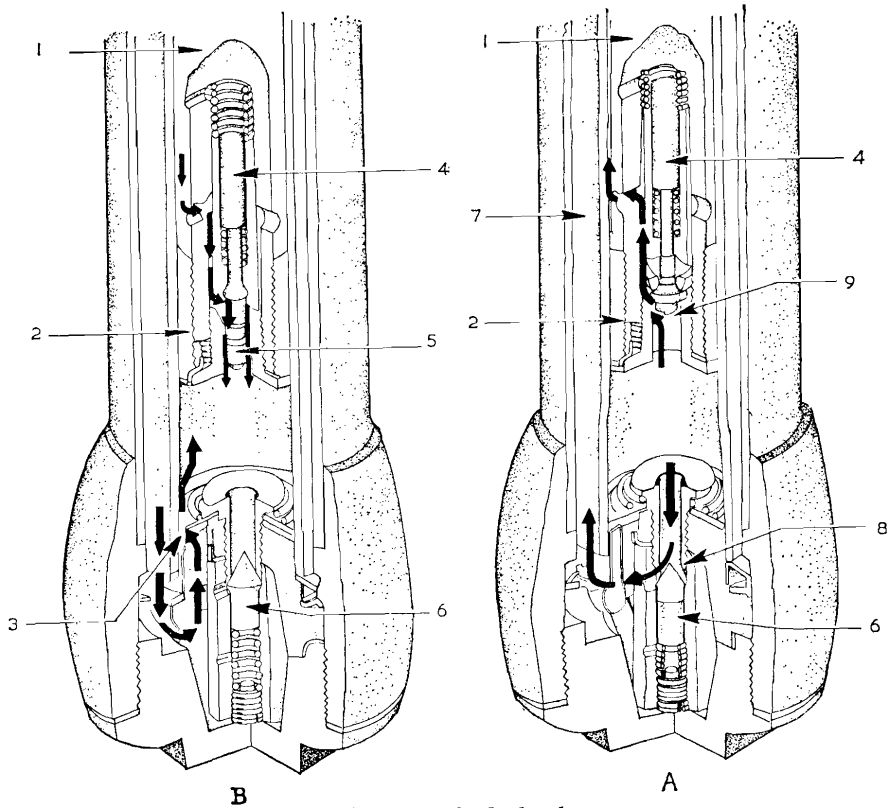


Fig. 20. Front shock-absorbers

1 Piston rod	4 Piston valve	7 Cylinder
2 Piston	5 Rebound valve	8 Valve seat
3 Compensating valve	6 Compression valve	9 Valve retainer

Fig. 20 shows a cross-section of the shock-absorber part of each front suspension unit; the arrows denote the flow of the shock-absorber fluid.

The shock-absorber functions as follows:

The piston and piston rod are rigidly mounted at the upper end and cannot move. The shock-absorber cylinder and related parts are connected to the front wheel swivel, consequently it moves up and down with the front wheel. When the wheel goes up, the shock-absorber fluid passes the piston valve and enters the chamber above the piston. Since the chamber above the piston is partly filled by the piston rod, there is not enough room for all the fluid which enters from the chamber below the piston. The surplus fluid escapes via the compression valve

the double-walled chamber around the cylinder. As soon as the front wheel moves down, the piston valve and compression valve are closed. The fluid is sucked back from the upper chamber to the lower chamber via the rebound valve. This time, however, there is not enough fluid to fill the lower chamber completely. Therefore the compensating valve opens, allowing fluid from the double-walled chamber around the cylinder to enter the lower chamber. The seat of the compensating valve incorporates two small recesses, so that the valve cannot be closed completely. This allows the fluid to expand or contract under the influence of differences in temperature.

Removal of front suspension unit

(1) Fit spring clips over 6 coils of the front spring; jack up the vehicle and support the cross-member on stands.
(2) Remove the front wheel, the drum and hub; remove the brake backing plate. Provided the brake backing plate is suitably supported, it is not necessary to disconnect the brake hose.
(3) Disconnect the track rod from the steering arm.
(4) Unscrew the nut from the ball stud on the lower side of the suspension unit. This ball stud is a taper fit and can be removed by tapping it out with the aid of a brass drift.
(5) Unscrew the three self-locking nuts on the upper mounting studs, which pass through the mudguard apron reinforcement.
(6) The complete suspension unit can now be removed from the car.

Installation

Installation is performed in the reverse order of removal. After installing the front suspension unit, always check the front wheel alignment.

Dismantling of front suspension unit

(1) Unscrew the self-locking nut which retains the upper bearing assembly, using tool A2/T 5433. Remove the upper thrust bearing assembly, together with the rubber block. Remove the front spring; if necessary, compress the spring and remove the spring clips.
(2) Remove the piston shroud; remove the filler plug and pump the fluid out of the suspension unit by moving the piston rod up and down.
(3) Unscrew the piston rod gland cap with tool A2/T 55462 after the stake locks have been bent up.
(4) Remove the gland and related parts (see Fig. 21).
(5) Remove the compression valve and compensator valve assembly from the cylinder, following which the piston and piston rod can be withdrawn.

NOTE: Do not interfere with the adjustment of the compression valve, which is accurately set during manufacture.

(6) Remove the piston valve assembly and the piston valve spring from the piston rod. The adjustment of the piston valve is also sealed at the time of assembly and should not be interfered with.
(7) If necessary, remove the track-rod arm from the suspension unit.
(8) Clean and inspect all parts, and replace those that are worn or otherwise damaged.

NOTE: The piston and piston rod are serviced as an assembly, consequently they should be replaced together; this also applies to the compression valve and compensator valve.

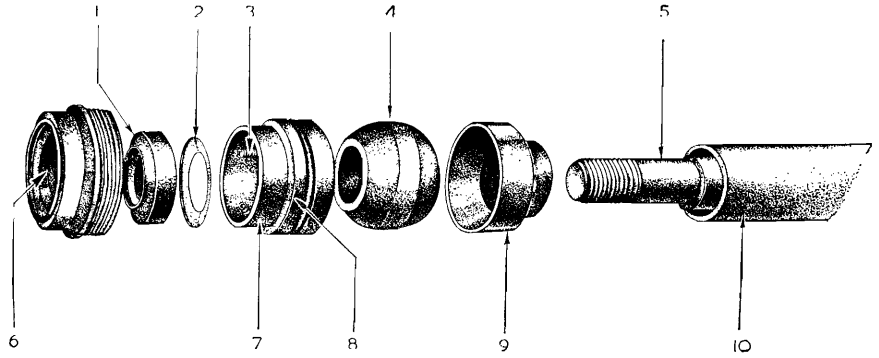


Fig. 21. Front suspension gland and related parts

1 Oil seal
2 Dished washer
3 Springs
4 Ball
5 Piston rod
6 Gland cap
7 Upper ball seat
8 Gland
9 Lower ball seat
10 Shroud

Reassembly

Reassembly is done in the reverse order of dismantling, with attention to the following points:

The oil seal on the piston rod is marked on one side with the words 'This side down'.

When installing the gland cap, first tighten it fully and then unscrew it one-tenth of a turn, allowing the ball to move.

Do not forget to stake the gland cap. After the front suspension unit is reassembled it should be filled with shock-absorber fluid. This is done as follows:

(1) Mount the shock-absorber vertically in a vice and push down the piston rod as far as it will go.
(2) Fill the shock-absorber with shock-absorber fluid to the filler plug.
(3) Move the piston rod up and down to the fullest extent at least six times and again top-up the unit with the piston rod at its lowest position. Replace the filler plug.

When a new front spring is fitted, ensure that the one fitted is of equal pressure to that removed, and that springs of similar rating are fitted to each side of the car. Springs are graded according to pressure and are marked with either one, two or three notches on the end coil. Springs should be installed with the notches at the bottom.

Front spring grading

	Consul (standard equipment)	*Consul Heavy Duty (export only)*	*Consul Estate Car*
Spring colour	Orange	Blue	Aluminium
Free length	16·17in	15·47in	16·76in
Spring length	9·24in	9·24in	9·24in
Under load of	698–722lb	698–722lb	777–803lb
Spring length (fully compressed)	5·04in	4·97in	5·35in

	Consul (standard equipment)	*Consul Heavy Duty (export only)*	*Consul Estate Car*
Spring rating	90–100 lb in	109–119 lb in	100–110 lb in
Number of coils	10,72–10,96	10,27–10,51	11,05–11,29
Spring diameter	4·76–4·82in	4·76–4·82in	4·76–4·82in
Wire diameter	0·472–0·487in	0·487–0·493in	0·487-0·493in
Part No.	204E–5310/B	204E–5310-C	206E–5310-D

Front wheel alignment: When checking the front wheel alignment, the car should be fully equipped, ready for use but unladen.

Camber: 0°30′ to 2°15′ positive.

Caster: 0° to 1°15′ positive, after September 1956.
0°15′ negative to 0°45′ positive on cars with stabiliser bar of first production, prior to September 1956.

Stabiliser bars of first production and later production can be readily distinguished by the length of the screw thread on the ends of the stabiliser bar; on stabiliser bars of first production the screw thread is 1⅛in long, on later production stabiliser bars the screw thread is 1⅜in long.

King-pin inclination: 3°30′ to 4°30′.

Toe-in: 1/16–⅛in.

Steering geometry (toe-out on turn): 1°30′ to 4°30′, with outer wheel turned 20°.

Rear suspension: Rear suspension by means of conventional semi-elliptic leaf springs and double-acting hydraulic shock-absorbers. The rear springs are mounted in rubber bushes which need no lubrication. Between the rear axle housing and the rear springs, steel plates and rubber insulators are fitted. Spring leaves are separated by oil-resistant rubber inserts. Every 5000 to 6000 miles the rear springs should be sprayed with penetrating oil. Do not use engine oil or grease. Later models have zinc interleaves or fibre inserts in rear springs in place of rubber.

Specifications

Number of spring leaves: six.
Material: silicon-manganese.
Spring length under load of 640–680lb: 41·94–42·06in.
Free height of spring: 7·26in.
Height of spring, laden: 1·42in.
Free camber: 5·898in.
Camber, laden: 0·058in.
Spring width: 2in.
Thickness of upper four spring leaves: 0·255in.
Thickness of lower two spring leaves: 0·235in.
Deflection rate: 113–123lb per in (saloon).

Shock-absorbers: Double-acting hydraulic shock-absorbers; the telescopic front shock-absorbers form part of the front suspension units. The rear shock-absorbers are of the piston type.

Wheel bearings and hubs: The front wheel bearings run on tapered adjustable roller bearings; the rear wheel bearings are non-adjustable ball-bearings.

When fitting new front bearings, it is essential to remove the outer bearing races with the aid of tool P.1024-3 and the appropriate adaptors (Rings b, f and d). On no account should the bearing races be removed with a drift, since this might easily result in damage to the hub, preventing the new bearing races from seating properly.

Install the oil seal with the aid of driver AH-1190-D; the lip of the oil seal should be facing inwards.

Adjustment

Turn the wheel in the forward direction and tighten the nut to 30 lb ft; now loosen the nut one-third of a turn. The stub axle is provided with two drillings for cotter-pins in order to facilitate accurate bearing adjustment. When adjusting used bearings, tighten the nut until slight binding of the bearings can be felt. Now slacken the nut until the wheel runs free with just the least perceptible amount of free-play.

Steering gear: The steering gear up to car No. 204E 80696 (206E 74969 on Zephyr/Zodiac) is of the worm and ball peg type with a reduction of 16·8 :1. The clearance between worm and ball peg is adjusted by means of a hollow adjusting screw and lock-nut. The hollow adjusting screw contains a spring which keeps the ball peg constantly in contact with the steering worm. The worm is an integral part of the steering shaft and is carried on ball-bearings on each end. The upper end of the steering shaft is supported by a felt bush located in the steering column, below the steering wheel. Before adjusting the clearance between worm and ball peg, the spring should be removed from the adjusting screw. Adjustment for the steering shaft end-clearance and ball peg pre-load is effected by reducing the number of shims between the steering gear housing and the end cover. The ball peg, which engages in the worm, fits into the upper end of the pitman shaft and is secured by a lock-washer and circlip. Ball-bearings in the top of the pitman shaft permit the ball peg to rotate.

Adjustment

(1) Loosen the stator tube clamp nut on the steering gear housing cover.
(2) Remove the pitman arm, unscrew the bolts securing the steering gear top cover and remove the cover and pitman shaft adjusting screw assembly. Carefully tap the lower end of the pitman shaft upward, which will lift the ball peg clear of the worm.
(3) Unscrew the bolts securing the steering gear bottom cover to the housing. Carefully detach the cover and shims, holding the worm lower bearing up to prevent the balls from falling out.
(4) Remove only one shim at a time, cutting it with a pair of scissors.
(5) To check the adjustment, replace the bottom cover and tighten the screws securely. The worm bearings should be free of clearance but they should not be pre-loaded.
(6) If all end-clearance has been removed and there is no tendency for the steering shaft to bind, push the pitman shaft down to engage fully in the worm and re-install the top cover and gasket with the adjusting screw fully unscrewed. Tighten the bolts securely.
(7) Refit the pitman arm, making sure that the marked splines engage.
(8) Turn the steering wheel to the 'straight-ahead' position.
(9) Remove the plug and spring from the adjusting screw on the steering housing top cover.
(10) Slacken the lock-nut and turn the adjusting screw until a very slight resistance can be felt in the 'straight-ahead' position as the steering wheel is rotated from lock to lock. This will ensure that the ball peg is in contact with the high point on the pitman shaft thrust face in the 'straight-ahead' position. Take care not to overtighten the adjusting screw, otherwise the ball peg will bind on the high point of the worm.

(11) Tighten lock-nut, place spring in hollow adjusting screw and refit plug.
(12) Tighten the clamping nut on the stator tube and top-up the steering gear with lubricant.

Recirculating ball and nut type
After October 1957 a steering gear of the worm and recirculating ball nut type was installed. When overhauling a steering gear of this type, always replace *all balls* if one or more are damaged; likewise, if the worm or the nut only are damaged, replace the worm and the nut, together with all balls.

Steering rods and track rods: The steering rod is connected to the pitman arm and idler arm by means of ball joints. The track rods are connected to the steering rod and to the left and right steering arms by means of ball joints. The ball joint which connects the steering rod to the pitman arm is adjustable.

Steering idler arm: The steering idler arm is secured to the frame member by means of an idler arm support bracket and screw bearing. When installing the idler arm and bearings, make sure that they are fitted in such a way that the distance between the edge of the bearing bush and the boss on the idler arm is 0·380in. In order to fit the tab washers, it may be necessary to turn the bearing bushes a little. This is permissible, provided the above-mentioned clearance is no less than 0·320in and no greater than 0·430in respectively, when the steering idler arm is turned to the extreme left and right position.

Steering swivels: See front suspension.

Brakes: Hydraulically-operated foot brakes on all four wheels. Mechanically-operated parking brake on rear wheels only. The front brakes are of the two-leading-shoe type, with a separate cylinder for each brake shoe; the rear brakes have a single cylinder for each pair of shoes, which also incorporates a mechanical expander, operated by the parking brake lever.

On later models, modified brake cylinder plungers and heavier cup springs are fitted. One end of the newer spring is pointed and should be fitted with this end against the plunger. Always install the newer plungers and cup springs as a set.
NOTE: for **Disc Brakes** see page 85.

Specifications
Total brake lining area: 147 sq in.
Length of front brake linings: 8·650in.
Width of front brake linings: 2·5in.
Thickness of brake linings: 0·190in.
Total brake lining area of front brakes: 86·48 sq in.
Length of rear brake lining: 8·650in.
Width of rear brake lining: 1·75in.
Total area of rear brake lining: 60·52 sq in.

Brake shoe retracting springs
Free length of front brake shoe retracting springs: 4 21/32in.
Length of front brake shoe retracting springs, under load of 67·5–82·5lb: 4 15/16in.
Numb of coils: 26 Colour black.
Free length of rear shoe retracting springs (adjusting cam side): 3 15/16in.
Length of rear brake shoe retracting springs, under load of 35–40lb: 5 3/16in.
Colour: green.
Free length of rear brake shoe retracting spring (brake cylinder side): 4·5in.
Length under load of 18–22lb: 5 3/16in. Colour: yellow.

Brake adjustment
Each front brake is equipped with two hexagonal brake adjusters; each rear brake with one square adjuster and an eccentric.

If necessary, the brake pedal must first be adjusted so that the pedal is in the same plane with the clutch pedal. Adjustment of the brake pedal height is performed in the same way as described for clutch pedal height adjustment (see under *Clutch*).

Front brake adjustment
Turn the front brake adjusters, one at a time, until the brake is dragging slightly; then slacken the adjuster until the wheel turns freely.
NOTE: Front disc brakes may be fitted; these are self-adjusting and no manual adjustment is provided or required. In this case the rear brakes will require normal adjustment periodically.

Rear brake adjustment
Tighten the square adjuster (on front half of brake backing plate) until the brake shoes seat tightly in the brake drums. Now turn the eccentric adjuster (on lower half of brake backing plate) until the eccentric is felt to touch the brake shoe, following which the square adjuster cam is slackened two 'clicks'.
NOTE: On cars of latest production the square adjusters act on the secondary brake shoes and are situated on the rear half of the brake backing plate.

The brake shoe hold-down springs are softer than those on former models; the colour of the new hold-down springs is yellow (green on former models).

Parking brake adjustment
Prior to adjustment of the parking brake linkage, inspect the cables for wear and damage and see that all moving parts are free. Also make sure that the rear brake cylinder is free to slide in the rear brake backing plate. Adjustment is carried out as follows:
(1) Fully release the parking brake lever.
(2) Turn the square brake adjusters until the rear brake shoes are firmly seated in the rear brake drums. Loosen the front nut on the parking brake equaliser and adjust the rear nut until all slack is removed from the cables; now tighten the front nut.
(3) Slacken the square brake adjusters on the rear brake until the rear wheels turn freely.

When the parking brake is correctly adjusted, the rear wheels should be locked when the parking brake lever is pulled out five to seven notches.

Brake drums: Cast-iron brake drums, removable.
Brake drum diameter, front and rear: 9·00–9·005in.

Brake master cylinder: The brake master cylinder is mounted under the bonnet beside the clutch master cylinder; the reservoir should be filled to the level mark with brake fluid. Always clean the filler cap and the surrounding area before removing the cap, in order to prevent dirt from entering the reservoir. Make sure that the vent hole in the filler cap is open.
Brake master cylinder diameter: ¾in.

Brake wheel cylinders: Each front brake is equipped with two single-acting brake cylinders which are connected by means of a pipe. Only the rear cylinder on each front brake is equipped with a bleed-screw. Each rear brake is equipped with one brake cylinder, which is able to slide in the brake backing plate, thus allowing proper centring of the rear brake shoes.

Bleeding the brakes: The hydraulic braking system is bled in the usual way. When bleeding the brakes, always start with the front wheel on the driver's side.

Wheels and tyres: Pressed steel disc wheels with five bolt holes.
Tyre size: 5·90 — 13, conventional tyres and tubes or 'tubeless'.
Tyre pressures: See page 17.

Electrical Equipment

Electrical equipment: Lucas, 12V, positive (+) battery terminal connected to earth.

Wiring diagram: See Fig. 22, page 62.

Battery: Ford, 12V, standard equipment 45Ah; special equipment 57Ah.

Battery type	45*Ah*	57*Ah*
Battery capacity at 20 minutes discharge	52	65
Number of plates per cell	9	9
Electrolyte, approx.	5½ pints	7½ pints
Height	7½in	8½in
Width	6½in	6½in
Length	12in	12in
Weight (filled with electrolyte) approx.	40lb	55lb
Specific gravity of electrolyte:		
battery fully charged	1·27–1·285	
battery discharged	1·110	

Starter motor: Lucas; type M35 G1, No. 25 022, four-pole, 12V.
Number of brushes: 4 (two main brushes and two earth brushes).
Lock torque: 10 ft lb.
Torque at 1000 rpm: 5 ft lb.
Number of teeth on starter pinion and starter ring gear: 9/105.
Ratio: 11·66 : 1.
Brush spring tension: 32–40 oz.

Dimensions
Bearing bush, commutator end:
Length: 0·760–0·770in.
Inner diameter, installed: 0·4995–0·5005in.
Outer diameter: 0·6235–0·6245in.
Bearing bush, drive end:
Length: 0·8095–0·8125in.
Inner diameter: 0·7495–0·7505in.
Outer diameter: 0·815–0·816in.

Generator: Lucas, type C 39 PV-2, No. 22 258, two brushes.
Maximum charging current: 19A at 13·5V at 1850–2100 rpm.
Maximum output: 234W.
Field resistance: 6·1 ohm at 20°C (68°F) at 13·5V.
Speed ratio, crankshaft/generator: 1·46 : 1.
Brush spring tension: 22–29 oz.

Dimensions
Brush length: 0·61–0·64in.
Length of bearing bush: 0·870–0·880in.
Inner diameter of bearing bush, installed: 0·5916–0·5928in.
Outer diameter: 0·716–0·717in.

Key to wiring diagram (*Fig.* 22)

A	Battery.	BQ	Temperature gauge.
AD	Horn.	BR	Temperature gauge transmitter unit.
AE	Horn control.		
AF	Horn relay.	BSL	Headlight, left.
AO	Panel light.	BSR	Headlight, right.
AP	Panel light switch.	BSV	Main beam warning light.
AQ	Dimmer switch.	BV	Light switch.
AR	Generator.	C	Tail-lights.
BC	Interior light.	CE	Number plate light.
BD	Interior light switch.	CF	Oil pressure transmitter unit.
BEL	Door switch, left.	CH	Oil pressure warning light.
BER	Door switch, right.	CN	Ignition switch.
BK	Clock.	CO	Ignition/generator warning light.
BLLA	Direction-indicator light, left rear.	DS	Voltage regulator.
BLLV	Direction-indicator light, left front.	DVL	Side-light, left.
		DVR	Side-light, right.
BLRA	Direction-indicator light, right rear.	EA	Starter motor.
		EEL	Stoplight, left.
BLRV	Direction-indicator light, right front.	EER	Stoplight, right.
		EF	Stoplight switch.
BLVL	Direction-indicator warning light, left.	EG	Ignition distributor.
		EI	Fuel-gauge tank unit.
BLVR	Direction-indicator warning light, right.	EL	Heater blower motor.
		EM	Heater blower switch.
BM	Direction-indicator flasher unit.	N	Ignition coil.
		Q	Fuel-gauge.
BN	Direction-indicator switch.		

Key to wire colours

1 Black.	10 Red and yellow.	18 White.
2 Black and yellow.	11 Yellow.	19 White and red.
3 Black and green.	12 Yellow and black.	20 White and black.
4 Black and red.	13 Yellow and red	21 Brown.
5 Black and white.	14 Yellow and white.	22 Brown and white.
6 Black and blue.	15 Yellow and green.	23 Purple.
7 Red.	16 Green.	24 Purple and red.
8 Red and green.	17 Green and red.	25 Blue and yellow.
9 Red and white.		

Regulator box: Lucas, type RB 106/1, No. 37 174, 12V.

Cut-out:
Closing voltage: 12·7–13·3V. Air gap: 0·011–0·015in.
Drop-off voltage: 8·5–10V. Contact gap: 0·025in.
Reverse current, maximum: 5A at 12V.

Voltage regulator:
Regulated voltage at 10°C (50°F) 15·9–16·5V.
20°C (68°F) 15·6–16·2V
30°C (86°F) 15·3–15·9V
40°C (104°F) 15·0–15·6V

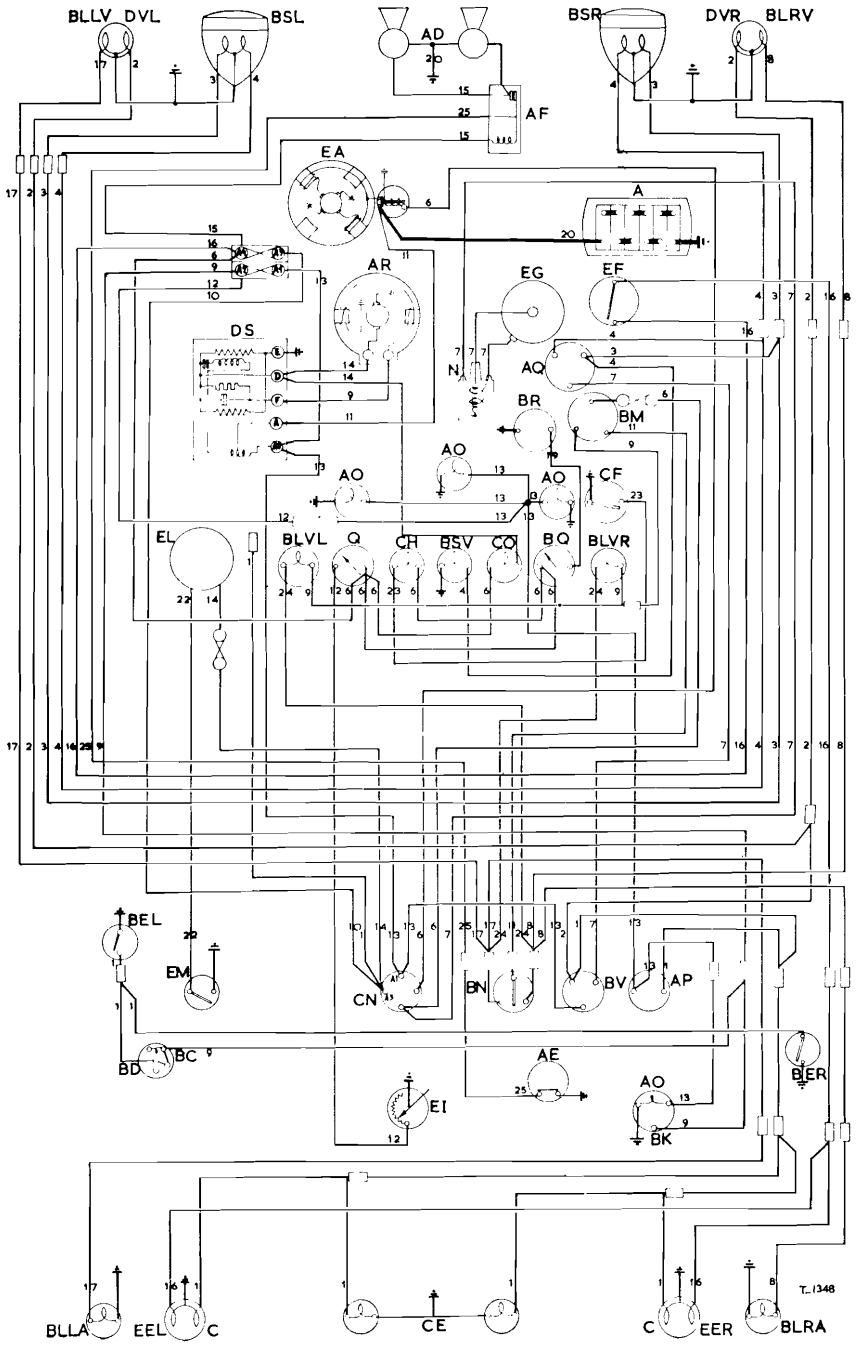


Fig. 22. Wiring diagram

NOTE: The voltage regulator should be checked and if necessary adjusted at open circuit. Disconnect wires A and A1 and join them together or insert a small piece of paper between the cut-out contacts.
Air gap: 0·012–0·020in.
Contact gap: 0·006–0·017in.

Headlights: Built-in headlights.

Headlight aiming

The headlights are aimed by means of the two adjusting screws which are accessible after removing the headlight rim. The upper screw adjusts vertical aim; the screw at the side adjusts the horizontal aim.

Light bulbs

Location	*Type*
Headlights	42/36W or 45/35W or 36/36W, depending on regulations in the country where the car is sold.
Side-light/direction-indicator light	21/6W
Stop/tail-light	21/6W
Direction-indicator light, rear	21W
Number-plate light	6W
Interior illumination	6W
Panel light	3·6W
Warning lights for main beam, direction-indicator, ignition/generator and oil pressure	2·2W

FORD ZEPHYR and ZODIAC Mk II

206E/207E

1956—1962

General

INTRODUCTION

The Ford Zephyr and Zodiac Mk II were introduced in February 1956. In general arrangement they are successors to the models Zephyr Six and Zephyr Zodiac Mk I. The same body shell is used as for the Consul Mk II, but wheelbase and overall length differ. The Zodiac is a *de luxe* version of the Zephyr.

1959 models were introduced on 28 February 1959, and differ in detail from former models; see also *Modifications*. The range was discontinued in March 1962 and succeeded by the Mark III models. The production range comprises:

Zephyr 206E (right-hand drive) and 207E (left-hand drive)
Four-door, 5/6-passenger saloon.
Two-door, 4/5-passenger convertible.
Four-door, 2/5-passenger estate car (stationwagon).

Zodiac 206E (right-hand drive) and 207E (left-hand drive)
Four-door, 5/6-passenger saloon.
Two-door, 4/5-passenger convertible.
Four-door, 2/5-passenger estate car (stationwagon).

NOTE: The estate car is built by Messrs. E. D. Abbott Ltd., Farnham, Surrey, England. Its construction is based on that of the saloon.

Fig. 23. Four-door, five/six-passenger saloon, Zephyr 1959

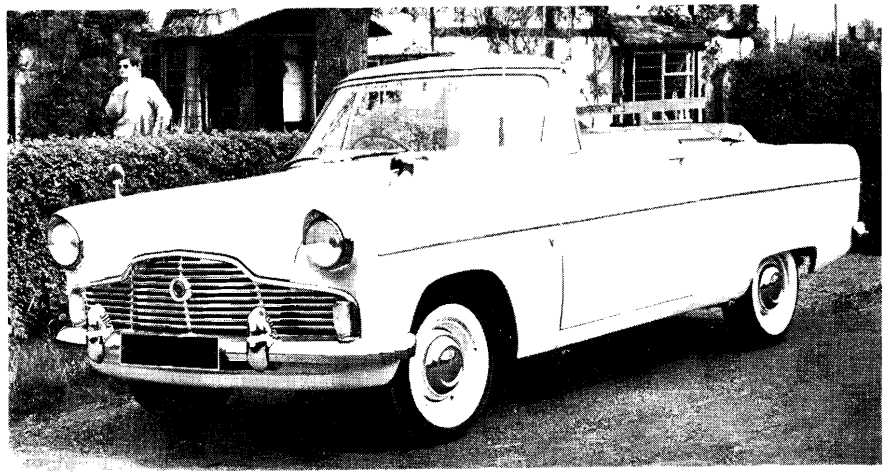


Fig. 24. Two-door, four/five-passenger convertible, Zephyr 1957

Fig. 25. Four-door, five/six-passenger estate car, Zephyr 1960

IDENTIFICATION

The identification plate, if fitted, is mounted under the bonnet, at the right-hand side, near the radiator.

Engine Number

The engine number is stamped on the right-hand side of the crankcase, near the engine mounting; on new cars the engine and chassis number are the same.

Chassis Number

The chassis number is stamped on the right-hand body reinforcement of the front suspension mounting. The chassis number is prefixed with the model designation of the car in question, for instance *207E*0234*. From October 1961 a different

Fig. 26. Four-door, five/six-passenger saloon, Zodiac 1958

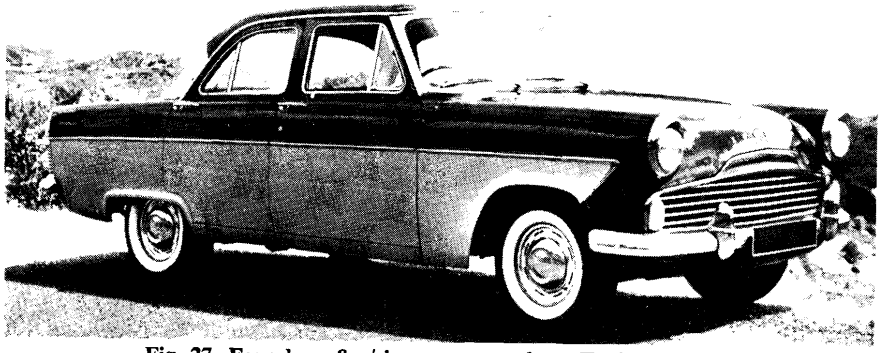


Fig. 27. Four-door, five/six-passenger saloon, Zodiac 1959 on

numbering system is used, with a prefix as follows: 51A (Zephyr saloon), 52A (Zephyr convertible), 53A (Zephyr estate car). For the Zodiac models these prefixes are: 61A, 62A, and 63A respectively. For 1962 the letter A was replaced by the letter B. The prefix is preceded by a letter which indicates the assembly plant.

Owing to the difference in numbering sequence between cars manufactured in Dagenham and those assembled in other assembly plants, it is impossible to state exact manufacturing dates for various units. The following numbers are approximate, and for guidance only.

Zephyr

February 1956: 0001.
October 1956: 25780 (saloon) and 26015 (convertible).
October 1957: 74301 (saloon) and 73785 (convertible).

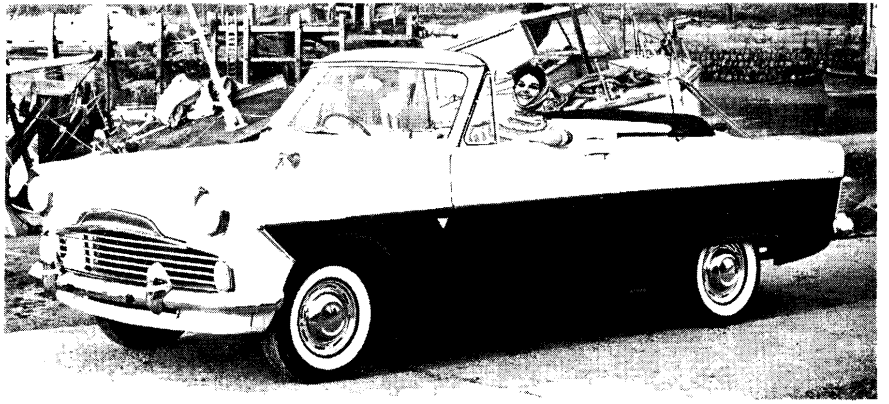


Fig. 28. Two door, four/five passenger convertible, Zodiac 1957

January 1959: 149875 (saloon) and 149820 (convertible).
January 1960: 222300 (saloon) and 222290 (convertible).
January 1961: 301300 (saloon) and 301320 (convertible).
January 1962: B002900 (saloon) and B004700 (convertible).
March 1962 (final): B327720.

Zodiac

February 1956: 0001.
October 1956: 25593 (saloon).
October 1957: 74378 (saloon) and 75001 (convertible).
January 1959: 149800 (saloon) and 150290 (convertible).
January 1960: 222310 (saloon) and 222300 (convertible).
January 1961: 286620 (saloon) and 286650 (convertible).
January 1962: B002910 (saloon) and B008850 (convertible).
March 1962 (final): B327720.

MODIFICATIONS

NOTE: Modifications of a purely technical nature are mentioned under the heading *Repair data.*

October 1956 (1957 models):

No modifications of importance.

October 1957 (1958 models):

All models

Redesigned front seat frame with new spring construction and foam rubber padding, front and rear. Central armrest available on front and rear seat.

Redesigned chromium-plated embellishment at either side of rear window.

Redesigned gear-change mechanism, concentric to steering column instead of eccentric, as on former models. Steering gear of the recirculating ball type.

Zephyr saloon

Redesigned radiator grille and side-lights.

Zodiac saloon

Clothes hangers in rear compartment.

Convertible

The same modifications to the gear-change mechanism, steering and radiator grille, as mentioned for Zephyr.

February 1959 (1959 models)
Saloons and Estate Cars
Lower roof line, due to flatter roof panel ('low line').
Chromium-plated headlight rims. Chromium-plated rain gutters.
Wider chromium-plated strip around windscreen and rear window.
Higher windscreen, lower rear window.
New upholstery.
Completely redesigned facia panel and instruments, incorporating: padded upper half of facia panel; redesigned controls, temperature gauge installed as standard equipment; panel light intensity variable by turning light switch; bright metal strip along the whole length of facia panel; larger ashtray and radio grille; gearchange mechanism relocated on steering column; redesigned heater controls; rear-view mirror in chromium-plated mounting; sun vizors with foam rubber padding and chromium trim; starter switch repositioned (opposite choke control).
Zephyr, Redesigned tail-lights. *Zodiac*, Modified rim embellishers.

January 1960 (1960 models)
All models
No material alterations.

September 1960 (1961 Models)
All models
Disc brakes on front wheels available. Where this brake system is fitted a vacuum servo unit is incorporated in the system.

May 1961
All models
Front disc brakes standard. Sealed beam headlamps.

PRICES

Prices for the UK are ex works: USA prices are East Coast P.o.E. list-prices.

Four-door, five/six passenger saloon, Zephyr

	UK	USA
1956 (March)	£580 + £291 P.T.	$2149
1957 (October)	£610 + £306 P.T.	$2035
1958 (July)	£610 + £306 P.T.	$2035
1959 (January)	£610 + £306 P.T.	$1595
1960 (January)	£610 + £255 P.T.	
1961 (January)	£610 + £255 P.T.	
1962 (January)	£645 + £297 P.T.	

With automatic transmission extra £115 (list price), extra for overdrive £60.

Four-door, five/six-passenger saloon (Sedan), Zodiac

	UK	USA
1956 (March)	£645 + £324 P.T.	$2321
1957 (October)	£675 + £339 P.T.	$2195
1958 (July)	£675 + £339 P.T.	$2195
1959 (January)	£675 + £339 P.T.	$1719
1960 (January)	£675 + £282 P.T.	
1961 (January)	£675 + £282 P.T.	
1962 (January)	£710 + £327 P.T.	

With automatic transmission extra £115 (list price), extra for overdrive £60.

Four-door, four/five-passenger convertible, Zephyr and Zodiac

		UK	USA
1956 (March)	Zephyr	£690 + £346 P.T.	$2508
1957 (October)	Zephyr	£725 + £364 P.T.	$2369
	Zodiac	£873 + £438 P.T.	$2639
1958 (July)	Zephyr	£778 + £390 P.T.	$2369
	Zodiac	£873 + £438 P.T.	$2639
1959 (January)	Zephyr	£778 + £390 P.T.	$1853
	Zodiac	£873 + £438 P.T.	$2062
1960 (January)	Zephyr	£778 + £325 P.T.	
	Zodiac	£873 + £365 P.T.	
1961 (January)	Zephyr	£778 + £325 P.T.	
	Zodiac	£873 + £365 P.T.	
1962 (January)	Zephyr	£760 + £350 P.T.	
	Zodiac	£908 + £417 P.T.	

Manually-operated top £75 (including P.T.) less on Zephyr.

Four-door, two/five-passenger estate car (station wagon), Zephyr and Zodiac

		UK	USA
1958 (January)	Zephyr	£775 + £389 P.T.	$2713
	Zodiac	£845 + £424 P.T.	$2902
1959 (January)	Zephyr	£825 + £414 P.T.	$2119
	Zodiac	£895 + £449 P.T.	$2266
1960 (January)	Zephyr	£825 + £345 P.T.	
	Zodiac	£895 + £374 P.T.	
1961 (January)	Zephyr	£825 + £345 P.T.	
	Zodiac	£895 + £374 P.T.	
1962 (January)	Zephyr	£810 + £372 P.T.	
	Zodiac	£880 + £405 P.T.	

INSTRUMENTS AND CONTROLS

1956–1958 models (Fig. 29)

1 *Glove box.*
2 *Heater/defroster.*
3 *Heat regulator control.*
4 *Ashtray.*
5 *Gear lever.*
6 *Choke control.*
7 *Direction-indicator warning light, left.*
8 *Fuel gauge.*
9 *Panel light switch.*
10 *Oil pressure warning light.*
11 *Main beam warning light.*
12 *Speedometer.*
13 *Ignition/generator warning light.*
14 *Windscreen-wiper control.* The wiper speed is variable by turning the knob.
15 *Ammeter.*
16 *Direction-indicator warning light, right.*
17 *Direction-indicator switch.*
18 *Gear pattern.*
19 *Cigar lighter* (if fitted).
20 *Ignition switch.*
21 *Parking brake.*
22 *Dipper switch.*
23 *Clutch pedal.*
24 *Brake pedal.*
25 *Accelerator pedal.*
26 *Horn control ring.*
27 *Bonnet release.*
28 *Light switch.* Turn clockwise for side-lights, then pull out for headlights.
29 *Steering wheel* 3¼ turns lock to lock.

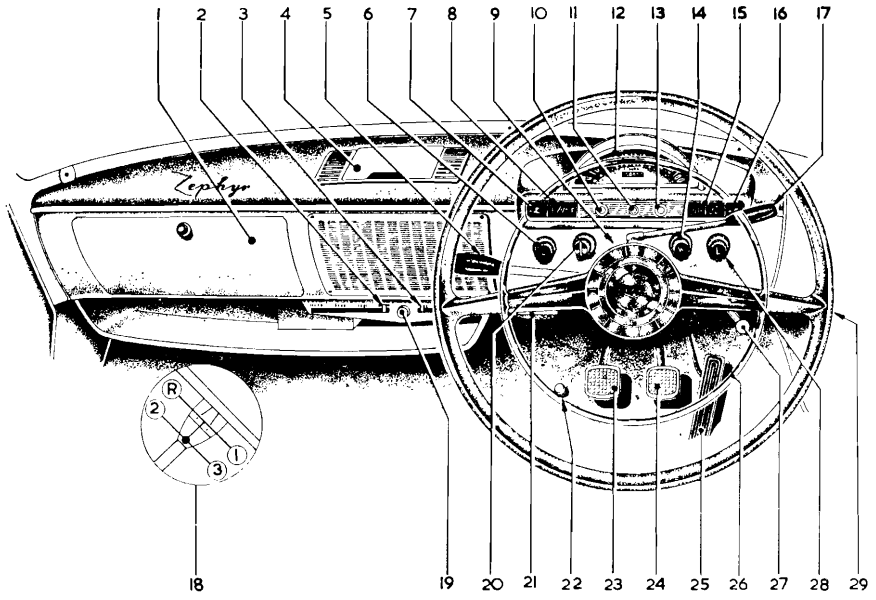


Fig. 29. Zephyr, 1956-1958, right-hand drive

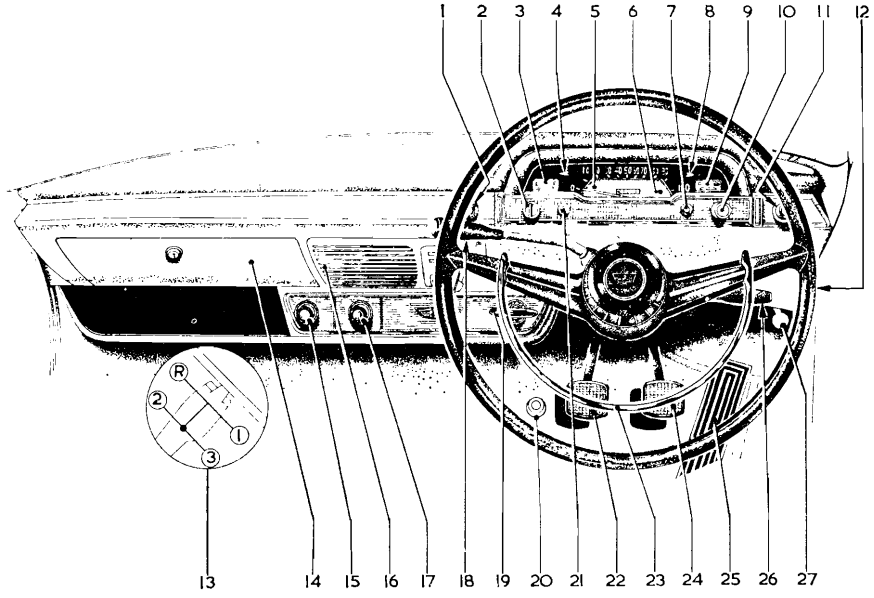


Fig. 30. Zephyr, 1959-1961, right-hand drive

INSTRUMENTS AND CONTROLS

1959–1960 models (Fig. 30)

1 *Choke.*
2 *Windscreen-wiper control.*
3 *Fuel gauge.*
4 *Direction-indicator warning light, left.*
5 *Speedometer.*
6 *Main beam warning light.*
7 *Ignition/generator warning light* (red).
8 *Direction-indicator warning light, right.*
9 *Temperature gauge.*
10 *Ignition switch.*
11 *Light switch.*
12 *Steering wheel.*
13 *Gear pattern.*
14 *Glove box.*
15 *Cigar lighter* (standard equipment on Zodiac).
16 *Heater control and radio grille.*
17 *Ashtray.*
18 *Gear lever.*
19 *Parking brake.*
20 *Dimmer switch.*
21 *Oil pressure warning light* (green).
22 *Clutch pedal.*
23 *Horn control.*
24 *Brake pedal.*
25 *Accelerator pedal.*
26 *Direction-indicator switch* (self-cancelling).
27 *Bonnet release.*

OVERDRIVE

The Zephyr and Zodiac cars are available with fully automatic overdrive. The cut-in speed of the overdrive is approximately 31 mph; the cut-out speed is approximately 27 mph. Reverse can be selected irrespective of the position of the overdrive control.

If the car is running in overdrive at speeds over approximately 31 mph, top gear can be automatically selected by depressing the accelerator pedal (kick-down). By pulling out the overdrive control, which is situated under the facia panel, next to the bonnet release, the overdrive is 'locked out', and the vehicle is operated as if fitted with a conventional three-speed transmission.

AUTOMATIC TRANSMISSION

In cars which are equipped with the Borg-Warner automatic transmission, the clutch pedal is omitted. In place of the conventional gear lever a selector lever is fitted with an indicator dial, denoting the position of the selector lever.

The engine can only be started when the selector lever is in 'P' (park) or 'N' (neutral). For all normal driving the selector lever is placed in 'D' position, following which the car is controlled by means of the accelerator pedal only. The car always starts in low gear. At a speed of approximately 8 mph, the transmission automatically changes to intermediate gear.

On hard acceleration the gearchange from low to intermediate gear occurs at approximately 20 mph. Top gear is automatically selected at a speed of about 21 mph when the accelerator pedal is partly depressed; on hard acceleration the change takes place at about 31 mph. When the accelerator pedal is released and the car is allowed to coast, the transmission changes down to intermediate gear at about 15 mph. The gearbox automatically changes down to intermediate gear from top gear when the accelerator is 'kicked down' below 45 mph.

If 'L' (low) is selected, the transmission remains in low gear for maximum pulling power and engine braking. 'P' (parking) is used as an extra parking brake and should not be selected when the car is still in motion. The various positions of the selector lever are, from left to right: R = Reverse; L = Low; D = Drive; N = Neutral; P = Park (P-N-D-L-R for left-hand drive).

ELECTRICAL EQUIPMENT

12-volt electrical equipment. Built-in headlights. Separate, built-in side-lights combined with front direction-indicator lights, and stop/tail-lights combined with rear direction-indicator lights. The direction-indicator lights are controlled by means of a self-cancelling switch on the steering column. Number-plate light. Twin horns. Instrument panel illumination, interior illumination. Warning lights for main beam, ignition/generator, oil pressure and direction-indicators. Radio and heater may be installed as optional equipment (heater is standard on Zodiac cars) cigar lighter optional (standard on Zodiac cars). An electric clock is fitted in Zodiac cars.

BODY

The all-steel body and chassis are welded together to form a single unit. Twin windscreen wipers, vacuum controlled. Rear-view mirror. Curved windscreen and rear window. Ventilating panes in front doors. All windows are of safety glass. Push-button door handles. Parcel shelf under facia panel. Bench-type front seat. Upholstery in various combinations. Two sun vizors, standard equipment. Ashtray in front and rear compartment. Washable head-lining.

The two-door convertible is equipped with a bench-type front seat with separate back-rests and a rear-view mirror on each front wing.

The Zodiac is a *de luxe* version of the Zephyr and is fitted with the following accessories as standard equipment: cigar lighter, electric clock, windscreen washer, heating and ventilating system, coat-hangers in rear compartment, white side-wall tyres, etc.

The estate car (stationwagon) is derived from the saloon. It is equipped with four doors and an extra door at the rear. The rear seat can be tilted towards the front, resulting in a loading compartment of approximately 66 cu ft. The estate car conversion is made by E. D. Abbot Ltd., Farnham, Surrey, England.

COLOURS

Zephyr and Zodiac cars are available in an extensive variety of single and two-tone colour schemes, which vary with the year of manufacture and the assembly plant at which the car was finished.

Dimensions and Weights

EXTERIOR DIMENSIONS (saloon)

		(*inches*)
1	Wheel base	107·0
2	Track front	53·0
3	Track, rear	52·0
4	Overall length	178·5 (Zodiac 180·5in)
5	Overall width	67·0

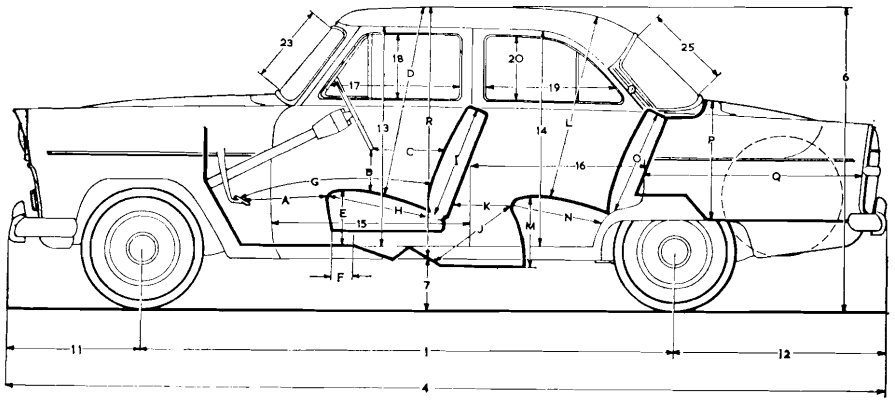


Fig. 31. Dimensions (1957-1958 model illustrated)

		1957–58 (*inches*)	1959 onwards (*inches*)
6	Overall height	59·5	58·5
7	Ground clearance	6·75	
8	Turning circle	432·0	
11	Overhang, front	29·5	
12	Overhang, rear	42·0	
15	Width of front door	34·0	
16	Width of rear door	22·0	
17	Width of front door window	22·0	
18	Height of front door window	13·3	
19	Width of rear door window	22·5	
20	Height of rear door window	12·5	
23	Height of windscreen	15·75	17·25
	Width of windscreen	54·0	
25	Height of rear window	17·3	16·75
	Width of rear window	60·0	

INTERIOR DIMENSIONS (saloon)

A	Pedal to front seat (maximum)	21·0
	Pedal to front seat (minimum)	17·0
B	Steering wheel to front seat	5·5
C	Steering wheel to front seat backrest (maximum)	14·5
	Steering wheel to front seat backrest (minimum)	10·5
D	Height over front seat	38·0
E	Height of front seat	11·5
F	Maximum adjustability of front seat	4·0
G	Pedal to front seat backrest	40·0
H	Depth of front seat	19·0
I	Height of front seat backrest	20·0
J	Rear compartment leg-room	21·0
K	Front seat backrest to rear seat	11·0
L	Height over rear seat	35·0

		(*inches*)
M	Height of rear seat	15·0
N	Depth of rear seat	18·0
O	Height of rear seat backrest	21·0
P	Height of luggage compartment	21·0
Q	Depth of luggage compartment	41·0
R	Maximum interior height	50·0
W	Width of front seat	54·0
X	Width of rear seat	55·0
Z	Width of luggage compartment	41·0

NOTE: Interior dimensions apply to the saloon model with redesigned front seat (October 1957). See also *Modifications*.

WEIGHTS (saloon)

	Zephyr	*Zodiac*
1 Complete car, dry	2623lb	2668lb
2 Complete car, ready for use	2690lb	2734lb
3 Complete car ready for use: with two passengers	3020lb	3065lb
4 with four passengers	3351lb	3395lb
5 Front axle load, ready for use	1426lb	1530lb
6 Rear axle load, ready for use	1263lb	1204lb
7 Ratio of front and rear axle load	53/47	56/44

Technical Specifications

Figures in the following tables are based on measurements and weights according to the Imperial system, used in Great Britain, i.e. Imperial Gallon and Long Ton.

Figures in brackets represent measurements and weights according to the American system, i.e. US Gallon and Short Ton.

ENGINE

(1) Type: water-cooled, four-stroke petrol engine in line, with overhead valves.
(2) Number of cylinders: six.
(3) Bore and stroke: 3·25 × 3·13in.
(4) Piston displacement: 155·8 cu in (2553 cc).
(5) Compression ratio: 7·8 : 1*.
(6) Stroke/bore ratio: 0·906.
(7) Total piston area: 49·8 sq in.

* Also available with compression ratio 6·9 : 1.

PERFORMANCE

(1) Maximum bhp, gross: 90 at 4400 rpm.
Maximum bhp (net): 85 at 4400 rpm.
(2) Bmep: 129lb/sq in at 2000 rpm.
(3) Maximum torque, gross: 137 ft lb at 2000 rpm.
Maximum torque, net: 133 ft lb at 2000 rpm.
(4) Compression pressure at cranking speed: 150lb/sq in.
(5) Bhp per sq in piston area: 1·8.
(6) Bhp/litre: 35·25.
(7) Bhp/litre per 1000 rpm: 8·0.
(8) Maximum mean piston speed at 4400 rpm: 2294 ft min.

GEAR RATIOS

	Gearbox	*Overall*
First gear	2·840 : 1	11·08 : 1
Second gear	1·642 : 1	6·40 : 1 (with overdrive 4·48 : 1)
Top gear	1·000 : 1	3·90 : 1 (with overdrive 2·73 : 1)
Reverse	3·858 : 1	15·06 : 1

Overdrive ratio: 0·7:1.

Rear axle ratio: 3·90 : 1.

Tyre size: 6·40—13.

SPECIFIC PERFORMANCE FIGURES

(Dry weight, Zephyr saloon)

(1) Piston area per ton: 42·5 (38).
(2) Litres per ton: 2·17 (1·94).
(3) Bhp per ton: 75·79 (66·42).
(4) Brake lining area per ton: 125·5 (112) sq in.
(5) lb/bhp: 29·2.
(6) Bhp per cc piston displacement: 0·46.
Bhp per cu in piston displacement: 2·96.
(7) Road speed at 1000 rpm in top gear: 18·4 mph.
Road speed at 4400 rpm in top gear: 81 mph.
(8) Road speed at 2500 ft/min piston speed, in top gear: 90·4 mph.
(10) Litres per mile in top gear: 4251·6.
(11) Litres per ton-mile in top gear (specific): 3630·5 (3242).

THEORETICAL ROAD SPEEDS (mph)

rpm	*First gear*	*Second gear*	*Top gear*	*Mean piston speed (ft/min)*
(*a*) 1000	6·5	11·2 (15·5)	18·4 (25·4)	450
(*b*) 2000	13·0	22·4 (31)	36·8 (50·8)	901
(*c*) 4400	28·6	49·3 (68)	81·0 (—)	1984

(*b*)=rpm at maximum torque. (*c*)=rpm at maximum bhp.

Figures in parentheses refer to road speeds with overdrive engaged.

ROAD TEST

(Zephyr saloon with two passengers)

(1) **Maximum speed:** 87·75 mph.
(2) **Cruising speed:** 70 mph.
(3) **Cruising range:** approximately 275 miles.
(4) **Speed in gears (mph):**

	Normal	*Maximum*
First gear	28·0	35·00
Second gear	43·5	58·00
Top gear	70·0	85·75
Top gear with overdrive	76·0	88·5

(5) **Acceleration times:**
0–30 mph through gears: 4·6 sec
0–40 mph through gears: 7·5 sec
0–50 mph through gears: 11·5 sec
0–60 mph through gears: 16·3 sec
0–70 mph through gears: 22·4 sec
0–80 mph through gears: 32·1 sec
Standing quarter mile: **20·2 sec**

(6)

	First gear	*Second gear*	*Top gear*	*Overdrive*
10–30 mph	3·5 sec	4·4 sec	7·4 sec	—
20–40 mph	—	5·6 sec	7·8 sec	—
30–50 mph	—	6·3 sec	8·2 sec	—
40–60 mph	—	—	9·3 sec	15·3 sec
50–70 mph	—	—	11·3 sec	18·8 sec
60–80 mph	—	—	17·4 sec	28·3 sec

(7) **Climbing power:**
Second gear: 19 per cent = 1 in 5·4 = 10°46′
Top gear: 11·5 per cent = 1 in 8·7 = 6°37′

(8) **Fuel consumption (in overdrive):**
Minimum: 38·3 (31·7) miles per gallon at constant 40 mph
Normal: 26 (21·6) miles per gallon at constant 70 mph
Maximum: 19·8 (16·5) miles per gallon at constant 80 mph
Mean: 23 (19·0) miles per gallon.

Lubrication and Maintenance

RUNNING-IN SPEEDS

During the first 500 miles do not exceed the following speeds:
First gear: 15 mph. Second gear: 30 mph. Top gear: 50 mph.

Never overload the engine, but change to a lower gear in good time when necessary and avoid fierce acceleration.

GENERAL DATA

Engine

Sump capacity: 7 Imp pints (8·4 US pints); add a further 1·5 Imp pints (1·8 US pints) for dry oil filter. Change oil when the oil is warm.

Oil viscosity: above 20°F, SAE 20 or 20W
from 20°F to −10°F, SAE 10W } or 10W–30.
below −10°F, SAE 5W.

Oil dipstick: on right-hand side of engine, beside the ignition distributor.
Oil filler cap: on valve cover. Oil drain plug: in bottom of sump.

Oil filter: Full-flow oil filter, mounted at right-hand side of engine. Change filter element every 5000 miles. Always fit new filter housing gasket.

Add 1·5 Imp pints (1·8 US pints) of oil to sump if filter element is renewed.

Air-cleaner: Gauze air-cleaner: wash filter element in petrol, dip in engine oil and allow to drain. Paper element type air-cleaner: renew paper element every 10,000 miles (more often if necessary).

Oil bath air-cleaner: wash filter element in petrol and allow to dry; clean filter housing and fill with engine oil to level mark.

Oil filler cap: the oil filler cap incorporates the air-cleaner for crankcase ventilation; service as described for dry air-cleaner.

Gearbox

Capacity: 2·5 Imp pints (3 US pints) + ½ Imp pint (0·6 US pints) for overdrive, when fitted. Change oil when the oil is warm.

Oil viscosity: summer and winter SAE 80 EP.

Oil level and filler plug: on left-hand side of gearbox and on left-hand side of overdrive if fitted.

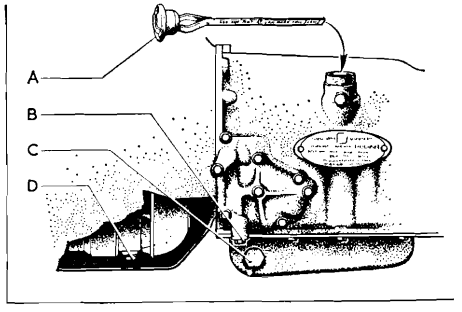
Oil drain plug: at bottom of gearbox and at bottom of overdrive, if fitted.

Overdrive (if fitted): If overdrive is fitted, the oil change should be performed as follows: Remove oil drain plugs from gearbox and overdrive housing; refit both plugs when the oil has drained. Remove the filler plug from the overdrive housing and fill the overdrive until the oil starts flowing from the filler opening. Refit the overdrive filler plug; fill the gearbox until the oil starts flowing from the filler plug opening and refit the gearbox filler plug.

Automatic transmission (if fitted): Capacity: 15 Imp pints (17 US pints).
Use only automatic transmission fluid AQ ATF, type A.

Checking and topping-up fluid

Check the fluid when the transmission is warm. If necessary, run the engine at a fast idle with the selector lever in L and parking brake applied until the transmission has reached its operating temperature. With the engine idling, move the selector lever through all position, pausing for a few seconds in each range. Put the selector lever in the 'P' position and with the engine still idling check the fluid level. If necessary, add fluid until it reaches the 'Full' mark on the dipstick. Do not overfill. After topping-up check fluid level again. The distance between the 'Low' and 'Full' mark on the dipstick corresponds to approximately 1 pint.



A Dipstick in filler opening.
B Converter pressure take-off plug.
C Transmission drain plug.
D Torque converter drain plug.

Fig. 32. Automatic transmission

Changing fluid

Position the car on a flat floor, over a pit or on a hoist; apply the parking brake. Switch off the ignition and drain the transmission fluid by removing the transmission drain plug 'C'. Crank the engine until converter drain plug 'D' is down. Remove this drain plug, following which the square-headed converter pressure take-off plug 'B' should be removed in order to vent the converter. When all fluid has drained off, carefully clean and replace the three plugs. Remove dipstick 'A' and fill the transmission with 9 Imp pints (10·5 US pints) of transmission fluid. Start the engine and let it idle for about one minute with the selector lever in 'L'; this will allow the torque converter to be completely filled with fluid. Top-up the transmission with fluid (approximately 5 Imp pints (6·3 US pints)) during which operation the engine should be idling with the selector lever in 'L'. The fluid level should now be up to the 'Full' mark on the dipstick. Do not overfill. Re-install the inspection cover in the front compartment floor.

Universal joints: Lubricate with lithium base grease.

Rear axle/differential: Capacity: 2½ Imp pints (3 US pints).
Oil grade: hypoid gear oil (extreme pressure).
Oil viscosity: summer and winter SAE 90 EP (or 80 EP below −10°F).
Oil level and filler plug: on left-hand side of differential carrier.
Oil drain plug: at bottom of rear axle housing, if fitted.
Change oil when the oil is warm (if drain plug is fitted).

Cooling system: Capacity: 2¾ Imp gallons (3·3 US gallons).
Drain-cocks: at bottom of radiator and at left-hand side of cylinder block, above the starter motor.

Water pump: No lubrication required.

Fuel tank: The fuel tank is mounted under the luggage compartment floor; the capacity is 10·5 Imp gallons (12·6 US gallons).
Filler cap: behind rear number plate, in centre of rear body panel.

Steering gear: Top-up to edge of filler plug opening.
Oil grade: EP gear oil. Oil viscosity: summer and winter SAE 90 EP.

Front wheel bearings: Clean and repack with wheel bearing grease.

Rear wheel bearings: No lubrication required.

Brake and clutch master cylinders: Keep fluid reservoirs (under bonnet at driver's side) filled up to the level mark with brake fluid. (Factory recommendation: Ford ME 3833-E). Avoid mixing fluids of different brands.

Brake servo air filter element: Renew filter element when replacing the brake pads.

Shock-absorbers: If necessary, top-up with shock-absorber fluid (factory recommendation: Ford M-100502E).

NOTE: On no account use a pressure gun when topping-up shock-absorbers.

TYRE PRESSURES (cold)

Tyre pressures, front and rear: 28 lb/sq in, according to load.

ROUTINE MAINTENANCE

Daily: Check oil level, radiator, petrol, tyres and lights.

Weekly: Check battery electrolyte and tyre pressures.

Running in period: After the first 300 miles, change oil of engine and rear axle, flush out the rear axle housing if a drain plug is fitted.

A. Every 1000 miles

A1 to A6 inclusive: Lubricate with grease gun:
*A*1. Track control arm ball joints (two nipples).
*A*2. Track and steering rod ball joints (six nipples).
*A*3. Idler arm pivot (one nipple).
*A*4. Parking brake cable (two nipples).
*A*5. Gearchange mechanism (one nipple).
*A*6. Universal joints (two nipples).
*A*7. Steering gear: check oil level and top-up if necessary.
*A*8. Gearbox/overdrive (if fitted): check oil level and top-up if necessary.

*A*9. Rear axle/differential: check oil level, top-up if necessary.
*A*10. Ignition distributor: lubricate shaft with two drops of engine oil (remove rotor), and governor weight mechanism with one or two drops of engine oil. Apply a light coat of grease to breaker cam faces. Give the grease cup (where fitted) one complete turn.
*A*11. Brake and clutch master cylinder reservoirs: check fluid level, top-up if necessary with brake fluid.
Lubricate with a few drops of engine oil: joints of accelerator linkage, carburettor, parking brake, door hinges and locks, bonnet hinges, etc.
Clean fuel pump filter. Check free play of clutch fork.

B. Every 1000 miles

*B*1. Automatic transmission (if fitted), check fluid level, top-up if necessary in accordance with the instructions on page 77.

C. Every 5000 miles

*C*1. Engine sump: drain and refill.
*C*2. Breather cap: clean, dip in engine oil and allow to drain.
*C*3. Oil filter: clean housing, renew element.
*C*4. Gearbox: drain and refill (flush with flushing oil if necessary).
*C*5. Overdrive (if fitted): drain and refill.
*C*6. Rear axle/differential: drain, flush, and refill if a drain plug is fitted.
*C*7. Front wheel bearings: dismantle, clean and repack with wheel bearing grease.
*C*8. Air-cleaner (gauze type): remove element, clean and re-lubricate with engine oil. Paper element type—see page 76.
Air cleaner (oil bath type): drain, clean and refill bowl with fresh engine oil.
*C*9. Generator: lubricate rear bearings with a few drops of engine oil.
*C*10. Rear springs: spray or brush with penetrating oil.
*C*11. Shock-absorbers: check level, top-up with shock-absorber fluid.
Check brakes and adjust if necessary.
Clean carburettor float chamber and adjust carburettor.
Check electrical equipment; clean ignition distributor, adjust breaker points. Clean and regap spark plugs. Tighten all bolts and nuts.

D. Every 15,000 miles

*D*1. Automatic transmission (if fitted): drain and refill.

When necessary

Renew the filter element of the brake servo if brake servo effect reduces (or at removal of brake pads).

Repair data

Repairs are best performed by authorised Ford dealers, who possess the special tools and experience.

IMPORTANT NOTE

In general arrangement the Zephyr and Zodiac resemble the Consul; therefore the repair data given for the Consul in most cases also apply to Zephyr and Zodiac. In the following description only those items are mentioned which differ from the Consul.

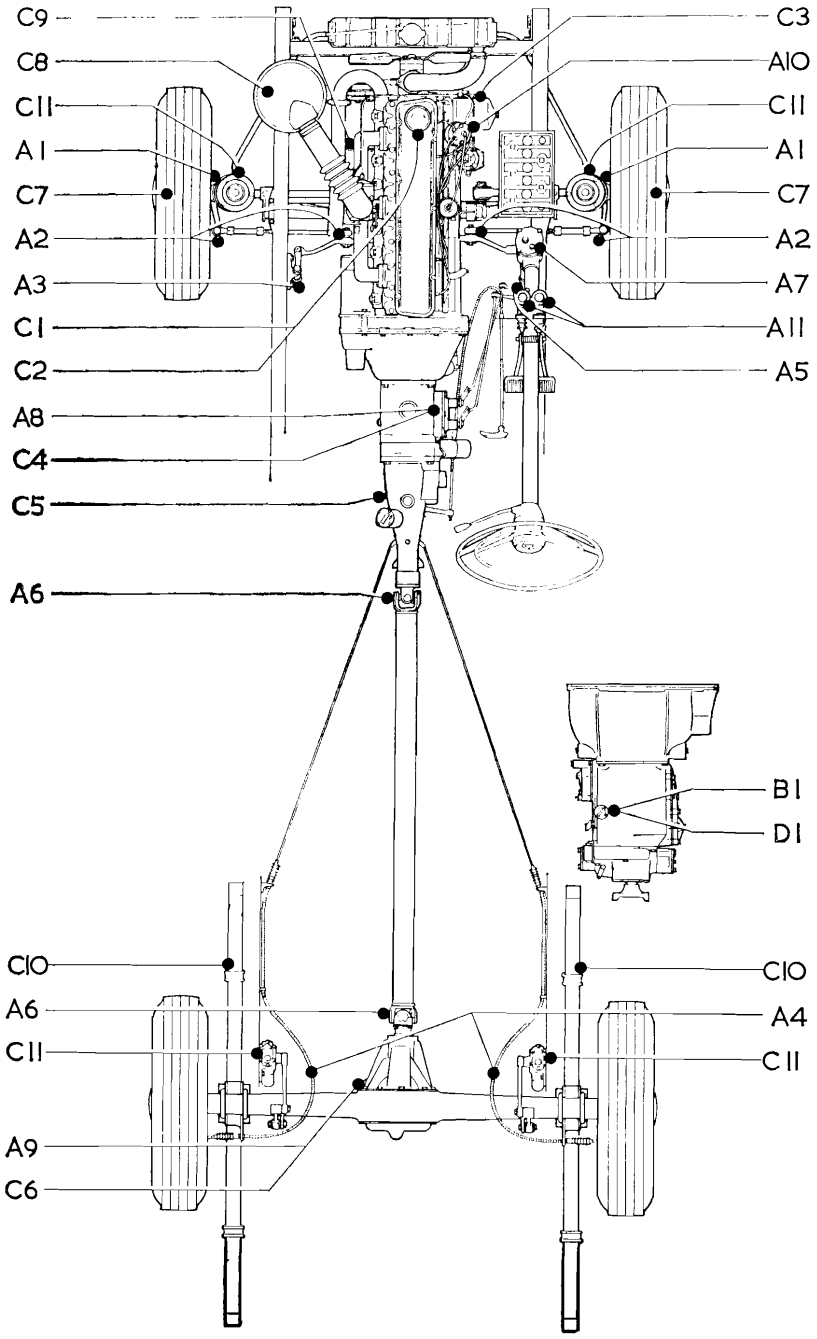


Fig. 33. Lubrication Chart

ENGINE

Type: 206E (2553 cc, six-cylinder ohv engine, in line.)

Cylinder head: Cast-iron cylinder head, equipped with valve mechanism. Tighten cylinder head bolts evenly to 65–70 ft lb in the order given below:

	13		9		7		2		5		11	15
front												
	16		14		10	4	1	3	6	8	12	17

Crankshaft: The cast-steel crankshaft runs in four main bearings.

Dimensions

Length of front main bearing journal	1·173–1·183in.
Length of second main bearing journal	1·350–1·360in.
Length of third main bearing journal	1·354–1·356in.
Length of rear main bearing journal	1·650–1·655in.

The four semi-circular thrust washers which control crankshaft end-play are fitted at either side of the third main bearing. For further information see page 21.

Camshaft: Cast-steel camshaft which runs in four main bearings.

Camshaft drive: As on the Consul, the Zephyr camshaft is driven by a Duplex roller chain; the camshaft drive on Zephyr engines, however, is not equipped with a hydraulic chain-tensioner. For further information see page 22.

Valve rocker shafts: The valve mechanism on Zephyr engines is of the same construction as on the Consul; the shaft is mounted in six supports. The oil supply tube is connected to the fourth valve rocker shaft support.

When assembling the rocker shaft, remember that the spring between the fourth and fifth rocker and the spring between the eighth and ninth rocker are longer than the three other springs.

Lubrication: The lubricating system on the Zephyr is the same as on the Consul, except that the oil supply to the valve rocker mechanism is taken from the third camshaft bearing.

Carburettor: Zenith down-draught carburettor, type 36WI.

Specifications

	Prior to May 1957	*From May* 1957
Flange diameter	36mm	36mm
Choke tube diameter	31mm	31mm
Main jet tube	016219	016289
Main jet	155	145
Power jet	100	107
Idling jet	50	50
Main air bleed	70	100
Pump jet	70	70
Float needle and seat	2,0	2,0

Float level $\frac{5}{8}$in below edge of float chamber at 2·5lb/sq in pump pressure.

NOTE: The carburettor which is fitted from May 1957 is secured to the inlet manifold by means of four bolts, whereas the carburettor of the former model was secured with three bolts, therefore they are not interchangeable.

Ignition: Ignition by means of coil and battery.

Ignition timing: 8° before T.D.C. on engine with compression ratio 7·8 : 1.
4° before T.D.C. on engine with compression ratio 6·9 : 1.

Firing order: 1-5-3-6-2-4.

Ignition distributor: Lucas, No. 40 545-A on engines with 6·9 : 1 compression ratio; No. 40 546-B on engines with 7·8 : 1 compression ratio.

Distributors for low-compression engines are equipped with a vacuum diaphragm housing which is marked 4,13,10; the vacuum diaphragm housing on distributors for high-compression engines is marked 4,15,7.

The numbers are stamped in the hexagon connector for the vacuum pipe. The first number of each group denotes the start of vacuum advance in inches Hg. The second number of each group denotes the end of vacuum advance, also in inches Hg. The last number in the group denotes degrees vacuum advance.

Specifications

Breaker point opening: 0·014–0·016in.
Breaker arm spring tension: 18–24 oz.
Centrifugal advance starts at 800 rpm (crankshaft) on low- and high-compression engines.
Centrifugal advance reaches its maximum at 4200 rpm (crankshaft) on low-compression engines, and at 4000 rpm (crankshaft) on high-compression engines.

Governor springs, high-compression engines, 7·8 : 1.
Tension of primary spring, when stretched 0·0625 in: 10–13 oz.
Length of secondary spring, when stretched 0·0625in: 19 lb 8 oz–20 lb 8 oz.
Governor springs, low-compression engines, 6·9 : 1.
Tension of primary spring, when stretched 0·0625 in: 10 lb 14 oz–11 lb 10 oz.
Length of secondary spring, when stretched 0·0625 in: 3 lb 8 oz–3 lb 11 oz.
Percentage of dwell: 55–60. Cam angle: 35°±2°.
Advance characteristics: centrifugal advance in distributor degrees.

rpm (crankshaft)	*Compression ratio* 7·8 : 1	*Compression ratio* 6·9 : 1
1000	1 – 3°	1¼ – 2¼°
2000	7½ – 9½°	7 – 9°
3000	8¾ – 10¾°	10¼ – 12¼°
4000	10 – 12°	12½ – 14½°
5000	10 – 12°	13 – 15°

Vacuum advance in distributor degrees:

in Hg	*Compression ratio* 7·8 : 1	*Compression ratio* 6·9 : 1
3	0 – 1¼°	0°
5	0 – 1¾°	½ – 2½°
7	1¼ – 3¼°	4¼ – 5¼°
9	2½ – 4½	6 – 8°
11	4 – 6°	7¾ – 9¾°
13	5¼ – 7¼°	8½ – 10½°
15	6 – 8°	9 – 11°

Cooling system: The cooling system has a capacity of 2¾ Imp gallons (3·3 US gallons). It is equipped with two drain-cocks, one at the radiator bottom and one at the left-hand side of the cylinder block, above the starter motor. An approved anti-freeze should be added during winter months.

Fan: Two-blade or four-blade fan; fan diameter 15½in.

TRANSMISSION

Clutch: Single dry-plate clutch.

The clutch pedal is equipped with an overcentre spring which decreases the pressure required to operate the clutch pedal. If the clutch pedal does not return to the rubber stop, the over-centre spring should be checked and if necessary re-adjusted. The over-centre spring is attached to an adjustable bracket, the bolt of which is situated behind the instrument panel at the bottom of the pedal bracket. Loosen the lock-nut and turn the adjusting bolt until the pedal returns to the rubber stop. As a rule there should be ½in. between the upper end of the adjusting bolt and the bottom of the pedal bracket. After the correct adjustment is obtained the lock-nut should be securely tightened.

Specifications

Diameter of clutch pressure plate: 8·64in.
Outer diameter of clutch lining: 8·5in.
Inner diameter of clutch lining: 5·75in.
Clutch lining area: 61·56 sq in.

Apart from the difference in diameter, the clutch plate for the Zephyr can be distinguished from that for the Consul by the colour of the six damper springs, which are painted green in the Consul. The clutch pressure plate assembly in Zephyr and Zodiac cars is equipped with brown springs and the housing is marked with a blue paint dot.

Rear axle: Number of teeth on pinion and crownwheel: 10/39 (9/40 with overdrive).
For futher information see page 45.

CHASSIS

Front springs	*standard*	*automatic and Estate Car*	*automatic Estate Car and Heavy Duty*
Spring rate:	100–110in lb	107–117in lb	121–131in lb
Wire diameter:	0·487–0·493in	0·495–0·502in	0·500–0·506in
Part No.	206E–5310–B	206E–5310–C	206E–5310–D

Disc brakes (1961–2 models): Hydraulically-operated foot-brakes; the front wheels are equipped with servo-assisted Girling disc brakes; the rear wheels with drum brakes. The parking brake is mechanically-operated. The disc brakes are self-adjusting. Brake disc diameter: 9¾in
Minimum permissible brake pad thickness: $\frac{1}{8}-\frac{1}{16}$in
Brake pads: Jack-up the car and remove the front wheel. Remove the four retaining pins from the front brake caliper assembly. Pull out the two pads and shims. NOTE: There is an arrow on the shim, pointing in the direction of rotation of the disc. Before fitting new brake pads, ensure there is no grease or oil on the lining material or brake disc. Check the rubber sealing bellows fitted to each piston; if damaged, replace.

Clean the disc from grease and oil. Refit new brake pads and shims. Refit the retaining pins and secure with the retaining-pin clip. The retaining pins must not

	(inches)
a	167⅛
b	28½ - 28 17/32
c	6 27/32 - 6 29/32
d	7
e	1¾
f	5/16
f¹	⅝ - 29/64
g	58 7/32 - 58 9/32
h	21 31/32 - 22 1/32
j	28½ - 28 17/32
k	35 5/16 - 35⅜
l	58 7/32 - 58 9/32
m	31 23/32 - 31 25/32
n	32 7/32 - 32 9/32
o	40 29/32 - 41 1/32
p	12 3/32 - 12 5/32
q	11⅞ - 11 15/16
r	10 25/32 - 10 27/32
s	7 21/64 - 7 25/64
t	9 7/16 - 9 15/32
u	15⅝ - 15 21/32
v	16 21/64 - 16⅜
w	14 3/64 - 14 5/64
x	14 27/32 - 14 55/64
ij	21 45/64 - 21 52/64
z	4 7/16
aa	10 3/64 - 10 5/64
bb	31 29/32 - 31 31/32
cc	8⅞ - 8 63/64
dd	47 59/64 - 48 5/32
ee	107
ff	7 7/32 - 7 9/32
gg	9⅛ - 9 3/16
hh	19⅝ - 19 11/16
jj	2 41/64 2 43/64
kk	12 11/16 12¾
ll	15 - 15 1/16
mm	10 25/64 - 10 27/64
nn	11 23/32 - 11 25/32
oo	53 29/64 - 53 37/64
pp	8¾ - 8 3/16

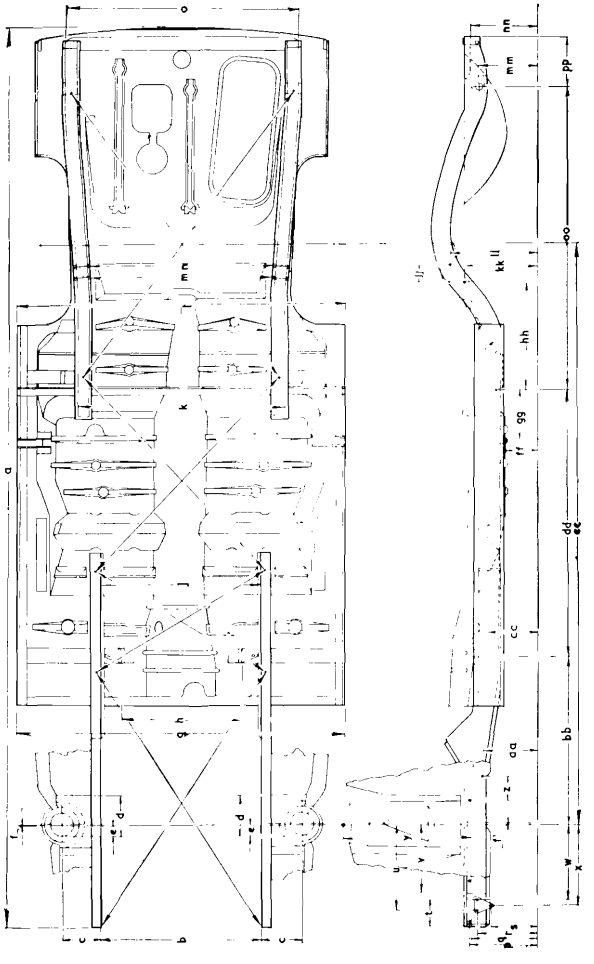


Fig. 34. Body floor dimensions

be forced into their locating holes. The brake-pad support plate (to which the lining material is attached) must not foul the retaining pins. Always ensure the pads are free to move slightly.

Rear wheel cylinder: The bore diameter was reduced from 0·875 to 0·700in.

Wheels and tyres: Pressed steel disc wheels with five bolt holes.

Tyre size: 6·40—13, tubeless or conventional.

Tyre pressure, front and rear: 24–28lb/sq in according to load.

ELECTRICAL EQUIPMENT

Electrical equipment: Lucas, 12-volt, positive (+) terminal connected to earth.

Battery: Ford, 12-volt, positive (+) battery terminal connected to earth. A battery of 57Ah is fitted as standard equipment; a battery of 72Ah is also available.

Specifications	*57Ah*	*72Ah*
Number of plates per cell	9	11
Electrolyte capacity	7·5 pints (approx.)	9 pints (approx.)
Height	7·5in	7·5in
Width	6·5in	6·5in
Length	12in	12in
Weight	55lb (approx.)	57lb (approx.)

Starter motor: Lucas, type M35G1, No. 25022 (in 1957 also 25065), four-pole, 12-volt. Number of brushes: four (two main brushes and two earth brushes).

Lock torque: 9ft lb; torque at 1000rpm: 5·4ft lb.

For further information see page 60.

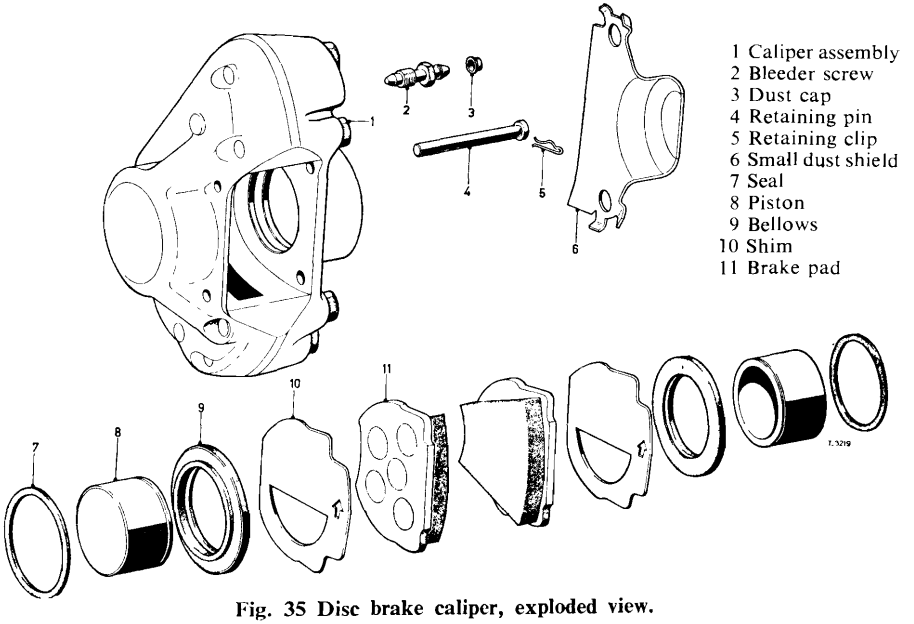


Fig. 35 Disc brake caliper, exploded view.

GENERAL FAULT-FINDING CHART FOR PETROL ENGINES

Some items in this chart are not applicable to *every* make of petrol engine

Engine will not start

A. Starter does not crank engine	
Battery run down	*Recharge; replace if defective*
Battery posts and terminals loose or corroded	*Clean and tighten. If badly corroded, soak with water to facilitate removal and avoid damage to the battery posts*
Faulty starter switch or solenoid, if fitted; broken battery cable or loose connection	*Check wires and cables; check solenoid and switch, replace if defective*
Starter motor defective	*Repair or replace*
Starter drive stuck (starter will run, but does not crank engine)	*Clean and if necessary repair or replace*
Starter drive pinion jammed with starter ring gear	*Free by rotating squared end of starter spindle with a spanner*
B. Starter cranks engine slowly	
Battery partly run down	*Recharge; replace if defective*
Loose or corroded connections	*Clean and tighten*
Faulty starter switch or solenoid; partly broken cable or loose connection	*Check wires and cables; check solenoid and switch, replace if necessary*
Starter motor defective	*Repair or replace*
C. Starter cranks engine, but engine will not start	
Trouble in ignition system:	
No spark at plugs:	
Moisture on spark plugs, ignition distributor, coil and wires (this trouble often occurs after parking overnight in foggy or rainy weather)	*Clean and dry. Avoid recurrence by coating wires, distributor rotor, cap, coil and spark plug insulators with moisture-proof lacquer*
Spark plugs flooded, due to excessive use of choke	*Start engine on full throttle. If this does not help, clean plugs. With plugs removed, turn over the crankshaft a few times to blow the accumulated fuel from the cylinders*

Spark plugs oiled up	*Clean; if necessary replace*
Spark plug insulator cracked	*Replace*
Spark plug gap too wide or too close	*Reset gap*
No spark at distributor:	
Loose, broken or shorted low-tension lead between coil and/or inside distributor	*Check and tighten; also check internal leads in distributor. These leads sometimes break inside their insulation, and the break is not always visible. Pull carefully on one end; a broken lead will stretch*
Cracked rotor or distributor cap	*Replace*
Contact breaker points dirty, worn or maladjusted	*Clean and adjust; if necessary replace*
Carbon brush in distributor cap not making contact	*Free; if necessary replace*
Faulty condenser	*Replace*
No spark at coil:	
High tension lead loose or broken	*Replace*
Broken or loose low-tension leads or faulty ignition switch	*Check wiring, repair or replace; check switch, replace if defective*
D. Starter cranks engine, but engine will not start	
Trouble in fuel system.	
No petrol in carburettor:	
Empty fuel tank	*Fill-up. If necessary, check and repair or replace fuel gauge*
Obstructed or damaged fuel pipe	*Clean; if necessary repair or replace*
Air leak in petrol line	*Check and repair or replace. Pay special attention to flexible fuel line (if fitted). If flexible fuel line is porous, a temporary 'get-you-home' repair can often be made by securely wrapping the line with friction tape or rubbing with hard soap*
Fuel filter clogged	*Clean and refit with new gasket. Always carry a spare gasket and a glass filter bowl, if so equipped*

Fuel pump defective	*Repair or replace. If electric pump does not function, lightly tap pump housing until ticking resumes*
Petrol in carburettor:	
Jets clogged	*Clean; blow out with air (never use wire to clean jets)*
Float needle stuck	*Clean or replace*
Carburettor flooded	*Clean float needle valve; if necessary replace. If this trouble persists, check fuel pump pressure*
Choke control faulty	*Repair or replace*
Air leak at inlet manifold or carburettor base	*Check nuts and bolts for tightness; if necessary replace gaskets*
Water or dirt in carburettor	*Clean. If this trouble persists, check rubber hose in fuel tank filler neck for damage or looseness, causing water to enter tank*

NOTE: *If ignition system and carburettor are in order, yet the engine will not start, check timing*

Engine starts but does not run properly

E. Engine misfires	
Ignition trouble	
Spark plug or coil leads loose or damaged	*Tighten; replace if necessary*
Incorrect spark plug gap	*Regap*
Cracked spark plug insulator	*Replace faulty spark plug*
Spark plug oiled up	*Clean, if necessary replace with spark plug of correct type. If trouble persists, check for mechanical trouble*
Cracked distributor cap	*Replace*
Loose connection in primary circuit	*Check and repair. Also check, and if necessary replace, ignition switch. In rare cases the ammeter has been found to be the cause of this trouble, due to faulty internal connection*
Distributor otherwise faulty	*See* **C**
Trouble in fuel system	*See* **D**

Mechanical trouble	
Incorrect valve clearance	*Adjust*
Valve sticking	*Try to free by pouring a gum solvent of good quality into carburettor air intake; if not successful, dismantle and repair*
Valve spring broken	*Replace. Usually the valve concerned will have to be ground*
Worn piston, piston rings and cylinder or burnt valve; cylinder-head gasket blown	*Test compression; if too low, dismantle for repairs*
F. Engine starts and stops	
Trouble in ignition or fuel system:	*See* **C** *and* **D**
Obstructed exhaust system	*Check and repair or replace*
G. Engine runs on wide throttle only	
Idle jet clogged or mixture improperly adjusted	*Clean idle jet and/or idle air bleed; adjust*
Valve sticking or burnt; valve spring broken; other mechanical trouble	*Check and repair. Pay special attention to heat riser, if so equipped, since a burnt heat riser tube will cause exhaust gas to enter intake manifold. This will sometimes cause backfiring in carburettor*
H. Lack of power	
Ignition too far retarded or other ignition trouble	*Check and correct* (*See* **C**)
Obstructed exhaust system	*Dented exhaust pipe and/or muffler* *Dislocated baffle plate or muffler* *Replace*
Trouble in fuel system	*Check and correct* (*See* **D**)
Loss of compression	*Test compression; if found to be too low, check valve clearance. If valve clearance is properly adjusted and compression is still low, check for other mechanical trouble, such as burnt valves and/or worn pistons, rings and cylinders*
Dragging brakes	*Check and correct. Essentially this is not an engine trouble*

I. Engine runs roughly	
Ignition timing incorrect	*Check and correct. Pay attention to possibly stuck advance mechanism, because the fixed advance may be correctly adjusted, yet the timing while running will be incorrect if the automatic advance is stuck*
Lean or rich mixture	*Check carburettor and fuel system, see* **D**
Improperly adjusted valve clearance	*Check and correct*
J. Engine knocks	
Ignition too far advanced	*Check and correct. Attend to possibly stuck advance mechanism, see* **I**
Excessive carbon deposit	*Decarbonize*
Loose bearings or pistons or other mechanical cause	*Check and repair*
K. Engine overheats	
Cooling system:	
Lack of water	*Top-up and check for leaks*
Fan belt loose or broken	*Check and adjust or replace*
Radiator clogged by insects	*Clean*
Cooling system clogged internally	*Clean with a cooling system cleaner of a reputable make and flush out according to maker's instructions. Inspect radiator hoses and replace if in bad condition*
Thermostat stuck or faulty	*Check and replace if necessary*
Ignition improperly timed	*Check and correct. Attend to possibly stuck advance mechanism*
Lean or rich mixture	*Check fuel system; see* **D**
Excessive carbon deposit	*Decarbonize*
Obstructed exhaust system	*Check and repair or replace*
Cylinder-head gasket of the incorrect type	*Replace*